SIEMENS

Operating instructions

SINAMICS

SINAMICS G120XA

Infrastructure converters for standard pumps/fans

Edition 07/2020

www.siemens.com/drives

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SINAMICS G120XA
SINAMICS G120XA converter

Operating Instructions

Edition 07/2020, firmware V1.03

07/2020, FW V1.03
A5E44751205B AE

Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

⚠ DANGER
indicates that death or severe personal injury **will** result if proper precautions are not taken.

⚠ WARNING
indicates that death or severe personal injury **may** result if proper precautions are not taken.

⚠ CAUTION
indicates that minor personal injury can result if proper precautions are not taken.

NOTICE
indicates that property damage can result if proper precautions are not taken.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

⚠ WARNING
Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

Trademarks

All names identified by ® are registered trademarks of Siemens AG. The remaining trademarks in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owner.

Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

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Ⓟ 08/2020 Subject to change

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Fundamental safety instructions

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1.1 General safety instructions

WARNING

Electric shock and danger to life due to other energy sources

Touching live components can result in death or severe injury.

- Only work on electrical devices when you are qualified for this job.
- Always observe the country-specific safety rules.

Generally, the following steps apply when establishing safety:

1. Prepare for disconnection. Notify all those who will be affected by the procedure.
2. Isolate the drive system from the power supply and take measures to prevent it being switched back on again.
3. Wait until the discharge time specified on the warning labels has elapsed.
4. Check that there is no voltage between any of the power connections, and between any of the power connections and the protective conductor connection.
5. Check whether the existing auxiliary supply circuits are de-energized.
6. Ensure that the motors cannot move.
7. Identify all other dangerous energy sources, e.g. compressed air, hydraulic systems, or water. Switch the energy sources to a safe state.
8. Check that the correct drive system is completely locked.

After you have completed the work, restore the operational readiness in the inverse sequence.

WARNING

Risk of electric shock and fire from supply networks with an excessively high impedance

Excessively low short-circuit currents can lead to the protective devices not tripping or tripping too late, and thus causing electric shock or a fire.

- In the case of a conductor-conductor or conductor-ground short-circuit, ensure that the short-circuit current at the point where the converter is connected to the line supply at least meets the minimum requirements for the response of the protective device used.
- You must use an additional residual-current device (RCD) if a conductor-ground short circuit does not reach the short-circuit current required for the protective device to respond. The required short-circuit current can be too low, especially for TT supply systems.

WARNING

Risk of electric shock and fire from supply networks with an excessively low impedance

Excessively high short-circuit currents can lead to the protective devices not being able to interrupt these short-circuit currents and being destroyed, and thus causing electric shock or a fire.

- Ensure that the prospective short-circuit current at the line terminal of the converter does not exceed the breaking capacity (SCCR or Icc) of the protective device used.

WARNING

Electric shock if there is no ground connection

For missing or incorrectly implemented protective conductor connection for devices with protection class I, high voltages can be present at open, exposed parts, which when touched, can result in death or severe injury.

- Ground the device in compliance with the applicable regulations.

WARNING

Electric shock due to connection to an unsuitable power supply

When equipment is connected to an unsuitable power supply, exposed components may carry a hazardous voltage. Contact with hazardous voltage can result in severe injury or death.

- Only use power supplies that provide SELV (Safety Extra Low Voltage) or PELV- (Protective Extra Low Voltage) output voltages for all connections and terminals of the electronics modules.

WARNING

Electric shock due to equipment damage

Improper handling may cause damage to equipment. For damaged devices, hazardous voltages can be present at the enclosure or at exposed components; if touched, this can result in death or severe injury.

- Ensure compliance with the limit values specified in the technical data during transport, storage and operation.
- Do not use any damaged devices.

⚠ WARNING

Electric shock due to unconnected cable shield

Hazardous touch voltages can occur through capacitive cross-coupling due to unconnected cable shields.

- As a minimum, connect cable shields and the conductors of power cables that are not used (e.g. brake cores) at one end at the grounded housing potential.

⚠ WARNING

Arcing when a plug connection is opened during operation

Opening a plug connection when a system is operation can result in arcing that may cause serious injury or death.

- Only open plug connections when the equipment is in a voltage-free state, unless it has been explicitly stated that they can be opened in operation.

⚠ WARNING

Electric shock due to residual charges in power components

Because of the capacitors, a hazardous voltage is present for up to 5 minutes after the power supply has been switched off. Contact with live parts can result in death or serious injury.

- Wait for 5 minutes before you check that the unit really is in a no-voltage condition and start work.

NOTICE

Damage to equipment due to unsuitable tightening tools.

Unsuitable tightening tools or fastening methods can damage the screws of the equipment.

- Be sure to only use screwdrivers which exactly match the heads of the screws.
- Tighten the screws with the torque specified in the technical documentation.
- Use a torque wrench or a mechanical precision nut runner with a dynamic torque sensor and speed limitation system.

NOTICE

Property damage due to loose power connections

Insufficient tightening torques or vibration can result in loose power connections. This can result in damage due to fire, device defects or malfunctions.

- Tighten all power connections to the prescribed torque.
- Check all power connections at regular intervals, particularly after equipment has been transported.

⚠ WARNING

Spread of fire from built-in devices

In the event of fire outbreak, the enclosures of built-in devices cannot prevent the escape of fire and smoke. This can result in serious personal injury or property damage.

- Install built-in units in a suitable metal cabinet in such a way that personnel are protected against fire and smoke, or take other appropriate measures to protect personnel.
- Ensure that smoke can only escape via controlled and monitored paths.

⚠ WARNING

Active implant malfunctions due to electromagnetic fields

Converters generate electromagnetic fields (EMF) in operation. Electromagnetic fields may interfere with active implants, e.g. pacemakers. People with active implants in the immediate vicinity of an converter are at risk.

- As the operator of an EMF-emitting installation, assess the individual risks of persons with active implants.
- Observe the data on EMF emission provided in the product documentation.

⚠ WARNING

Unexpected movement of machines caused by radio devices or mobile phones

Using radio devices or mobile telephones in the immediate vicinity of the components can result in equipment malfunction. Malfunctions may impair the functional safety of machines and can therefore put people in danger or lead to property damage.

- Therefore, if you move closer than 20 cm to the components, be sure to switch off radio devices or mobile telephones.
- Use the "SIEMENS Industry Online Support app" only on equipment that has already been switched off.

NOTICE

Damage to motor insulation due to excessive voltages

When operated on systems with grounded line conductor or in the event of a ground fault in the IT system, the motor insulation can be damaged by the higher voltage to ground. If you use motors that have insulation that is not designed for operation with grounded line conductors, you must perform the following measures:

- IT system: Use a ground fault monitor and eliminate the fault as quickly as possible.
- TN or TT systems with grounded line conductor: Use an isolating transformer on the line side.

⚠ WARNING

Fire due to inadequate ventilation clearances

Inadequate ventilation clearances can cause overheating of components with subsequent fire and smoke. This can cause severe injury or even death. This can also result in increased downtime and reduced service lives for devices/systems.

- Ensure compliance with the specified minimum clearance as ventilation clearance for the respective component.

NOTICE

Overheating due to inadmissible mounting position

The device may overheat and therefore be damaged if mounted in an inadmissible position.

- Only operate the device in admissible mounting positions.

⚠ WARNING

Unrecognized dangers due to missing or illegible warning labels

Dangers might not be recognized if warning labels are missing or illegible. Unrecognized dangers may cause accidents resulting in serious injury or death.

- Check that the warning labels are complete based on the documentation.
- Attach any missing warning labels to the components, where necessary in the national language.
- Replace illegible warning labels.

NOTICE

Device damage caused by incorrect voltage/insulation tests

Incorrect voltage/insulation tests can damage the device.

- Before carrying out a voltage/insulation check of the system/machine, disconnect the devices as all converters and motors have been subject to a high voltage test by the manufacturer, and therefore it is not necessary to perform an additional test within the system/machine.

WARNING

Unexpected movement of machines caused by inactive safety functions

Inactive or non-adapted safety functions can trigger unexpected machine movements that may result in serious injury or death.

- Observe the information in the appropriate product documentation before commissioning.
- Carry out a safety inspection for functions relevant to safety on the entire system, including all safety-related components.
- Ensure that the safety functions used in your drives and automation tasks are adjusted and activated through appropriate parameterizing.
- Perform a function test.
- Only put your plant into live operation once you have guaranteed that the functions relevant to safety are running correctly.

Note

Important safety notices for Safety Integrated functions

If you want to use Safety Integrated functions, you must observe the safety notices in the Safety Integrated manuals.

WARNING

Malfunctions of the machine as a result of incorrect or changed parameter settings

As a result of incorrect or changed parameterization, machines can malfunction, which in turn can lead to injuries or death.

- Protect the parameterization against unauthorized access.
- Handle possible malfunctions by taking suitable measures, e.g. emergency stop or emergency off.

1.2 Equipment damage due to electric fields or electrostatic discharge

Electrostatic sensitive devices (ESD) are individual components, integrated circuits, modules or devices that may be damaged by either electric fields or electrostatic discharge.

NOTICE

Equipment damage due to electric fields or electrostatic discharge

Electric fields or electrostatic discharge can cause malfunctions through damaged individual components, integrated circuits, modules or devices.

- Only pack, store, transport and send electronic components, modules or devices in their original packaging or in other suitable materials, e.g conductive foam rubber of aluminum foil.
- Only touch components, modules and devices when you are grounded by one of the following methods:
  - Wearing an ESD wrist strap
  - Wearing ESD shoes or ESD grounding straps in ESD areas with conductive flooring
- Only place electronic components, modules or devices on conductive surfaces (table with ESD surface, conductive ESD foam, ESD packaging, ESD transport container).

1.3 Warranty and liability for application examples

Application examples are not binding and do not claim to be complete regarding configuration, equipment or any eventuality which may arise. Application examples do not represent specific customer solutions, but are only intended to provide support for typical tasks.

As the user you yourself are responsible for ensuring that the products described are operated correctly. Application examples do not relieve you of your responsibility for safe handling when using, installing, operating and maintaining the equipment.

1.4 Security information

Siemens provides products and solutions with industrial security functions that support the secure operation of plants, systems, machines and networks.

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial security concept. Siemens' products and solutions constitute one element of such a concept.

Customers are responsible for preventing unauthorized access to their plants, systems, machines and networks. Such systems, machines and components should only be connected to an enterprise network or the internet if and to the extent such a connection is necessary and only when appropriate security measures (e.g. firewalls and/or network segmentation) are in place.

For additional information on industrial security measures that may be implemented, please visit
https://www.siemens.com/industrialsecurity (https://www.siemens.com/industrialsecurity).

Siemens' products and solutions undergo continuous development to make them more secure. Siemens strongly recommends that product updates are applied as soon as they are available and that the latest product versions are used. Use of product versions that are no longer supported, and failure to apply the latest updates may increase customer's exposure to cyber threats.

To stay informed about product updates, subscribe to the Siemens Industrial Security RSS Feed under
https://www.siemens.com/industrialsecurity (https://new.siemens.com/global/en/products/services/cert.html#Subscriptions).

Further information is provided on the Internet:

Industrial Security Configuration Manual (https://support.industry.siemens.com/cs/ww/en/view/108862708)

⚠ WARNING

Unsafe operating states resulting from software manipulation

Software manipulations, e.g. viruses, Trojans, or worms, can cause unsafe operating states in your system that may lead to death, serious injury, and property damage.

- Keep the software up to date.
- Incorporate the automation and drive components into a holistic, state-of-the-art industrial security concept for the installation or machine.
- Make sure that you include all installed products into the holistic industrial security concept.
- Protect files stored on exchangeable storage media from malicious software by with suitable protection measures, e.g. virus scanners.
- On completion of commissioning, check all security-related settings.

1.5 Residual risks of power drive systems

When assessing the machine- or system-related risk in accordance with the respective local regulations (e.g., EC Machinery Directive), the machine manufacturer or system installer must take into account the following residual risks emanating from the control and drive components of a drive system:

1. Unintentional movements of driven machine or system components during commissioning, operation, maintenance, and repairs caused by, for example,
   - Hardware and/or software errors in the sensors, control system, actuators, and cables and connections
   - Response times of the control system and of the drive
   - Operation and/or environmental conditions outside the specification
   - Condensation/conductive contamination
   - Parameterization, programming, cabling, and installation errors
   - Use of wireless devices/mobile phones in the immediate vicinity of electronic components
   - External influences/damage
   - X-ray, ionizing radiation and cosmic radiation
2. Unusually high temperatures, including open flames, as well as emissions of light, noise, particles, gases, etc., can occur inside and outside the components under fault conditions caused by, for example:
   - Component failure
   - Software errors
   - Operation and/or environmental conditions outside the specification
   - External influences/damage
3. Hazardous shock voltages caused by, for example:
   - Component failure
   - Influence during electrostatic charging
   - Induction of voltages in moving motors
   - Operation and/or environmental conditions outside the specification
   - Condensation/conductive contamination
   - External influences/damage
4. Electrical, magnetic and electromagnetic fields generated in operation that can pose a risk to people with a pacemaker, implants or metal replacement joints, etc., if they are too close
5. Release of environmental pollutants or emissions as a result of improper operation of the system and/or failure to dispose of components safely and correctly
6. Influence of network-connected communication systems, e.g. ripple-control transmitters or data communication via the network

For more information about the residual risks of the drive system components, see the relevant sections in the technical user documentation.

Description 2

2.1 About the Manual

Who requires the operating instructions and what for?

These operating instructions primarily address fitters, commissioning engineers and machine operators. The operating instructions describe the devices and device components and enable the target groups being addressed to install, connect-up, set, and commission the converters safely and in the correct manner.

What is described in the operating instructions?

These operating instructions provide a summary of all of the information required to operate the converter under normal, safe conditions.

The information provided in the operating instructions has been compiled in such a way that it is sufficient for all standard applications and enables drives to be commissioned as efficiently as possible. Where it appears useful, additional information for entry level personnel has been added.

The operating instructions also contain information about special applications. Since it is assumed that readers already have a sound technical knowledge of how to configure and parameterize these applications, the relevant information is summarized accordingly. This relates, e.g. to operation with fieldbus systems.

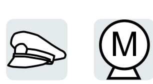
What is the meaning of the symbols in the manual?

 Reference to further information in the manual

 Download from the Internet

 DVD that can be ordered

End of a handling instruction.
❒



Examples of converter function symbols

2.2 About the converter

The SINAMICS G120XA is not allowed to be exported and used in the USA.

Use for the intended purpose

The converter described in this manual is a device to control a three-phase motor. The converter is designed for installation in electrical installations or machines.

It has been approved for industrial and commercial use on industrial networks. Additional measures have to be taken when connected to public grids.

The technical specifications and information about connection conditions are indicated on the rating plate and in the operating instructions.

Use of third-party products

This document contains recommendations relating to third-party products. Siemens accepts the fundamental suitability of these third-party products.

You can use equivalent products from other manufacturers.

Siemens does not accept any warranty for the properties of third-party products.

Use of OpenSSL

This product contains software developed in the OpenSSL project for use within the OpenSSL toolkit.

This product contains cryptographic software created by Eric Young.

This product contains software developed by Eric Young.

Further information is provided on the Internet:

OpenSSL (https://www.openssl.org/)

Cryptsoft (mailto:eay@cryptsoft.com)

2.3 Scope of delivery

The delivery comprises at least the following components:

- A ready-to-run converter with loaded firmware.
  Options for upgrading and downgrading the firmware can be found on the Internet:
  Firmware (https://support.industry.siemens.com/cs/ww/en/view/67364620)
- One pluggable RS485 connector for USS/Modbus RTU connection.
- One set of shield connection kit (available for FSA to FSG only). For FSD to FSG, the supplied shield connection kit is for the control connections only, and shield connection kit for the power connections can be ordered as an optional module.
- Compact Operating Instructions in Chinese and English.
- A printed full-size drill pattern (available for FSD to FSG only), which allows the easy drilling of the necessary mounting holes.
- The converter contains open-source software (OSS). The OSS license terms are saved in the converter.

Technical data

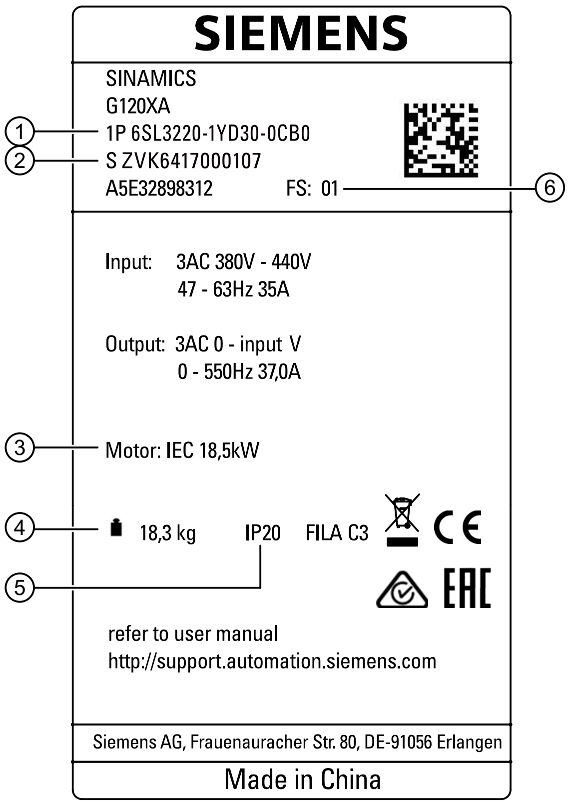
3-phase 380 V AC to 440 V AC (article number: 6SL32...)

380 V ... 440 V	Rated output power	Rated output current	Article number	
Frame size	Based on a low overload		Without filter	With filter
FSA	0.75 kW	2.2 A	6SL3220-□YD10-0UB0	6SL3220-□YD10-0CB0
	1.1 kW	3.1 A	6SL3220-□YD12-0UB0	6SL3220-□YD12-0CB0
	1.5 kW	4.1 A	6SL3220-□YD14-0UB0	6SL3220-□YD14-0CB0
	2.2 kW	5.6 A	6SL3220-□YD16-0UB0	6SL3220-□YD16-0CB0
	3 kW	7.3 A	6SL3220-□YD18-0UB0	6SL3220-□YD18-0CB0
FSB	4 kW	8.8 A	6SL3220-□YD20-0UB0	6SL3220-□YD20-0CB0
	5.5 kW	12.5 A	6SL3220-□YD22-0UB0	6SL3220-□YD22-0CB0
	7.5 kW	16.5 A	6SL3220-□YD24-0UB0	6SL3220-□YD24-0CB0
FSC	11 kW	25 A	6SL3220-□YD26-0UB0	6SL3220-□YD26-0CB0
	15 kW	31 A	6SL3220-□YD28-0UB0	6SL3220-□YD28-0CB0
FSD	18.5 kW	37 A	6SL3220-□YD30-0UB0	6SL3220-□YD30-0CB0
	22 kW	43 A	6SL3220-□YD32-0UB0	6SL3220-□YD32-0CB0
	30 kW	58 A	6SL3220-□YD34-0UB0	6SL3220-□YD34-0CB0
	37 kW	68 A	6SL3220-□YD36-0UB0	6SL3220-□YD36-0CB0
	45 kW	82.5 A	6SL3220-□YD38-0UB0	6SL3220-□YD38-0CB0
FSE	55 kW	103 A	6SL3220-□YD40-0UB0	6SL3220-□YD40-0CB0
FSF	75 kW	136 A	6SL3220-□YD42-0UB0	6SL3220-□YD42-0CB0
	90 kW	164 A	6SL3220-□YD44-0UB0	6SL3220-□YD44-0CB0
	110 kW	201 A	6SL3220-□YD46-0UB0	6SL3220-□YD46-0CB0
	132 kW	237 A	6SL3220-□YD48-0UB0	6SL3220-□YD48-0CB0
FSG	160 kW	289 A	-	6SL3220-□YD50-0CB0
	200 kW	364 A	-	6SL3220-□YD52-0CB0
	250 kW	436 A	-	6SL3220-□YD54-0CB0
FSH	315 kW	583 A	-	6SL3220-□YD56-0CB0
	355 kW	644 A	-	6SL3220-□YD58-0CB0
	400 kW	722 A	-	6SL3220-□YD60-0CB0
FSJ	450 kW	803 A	-	6SL3225-□YD62-0CB0
	500 kW	882 A	-	6SL3225-□YD64-0CB0
	560 kW	992 A	-	6SL3225-□YD66-0CB0
Without operator panel			1	1
With operator panel BOP-2			2	2
With operator panel IOP-2			3	3
Filter C3				C

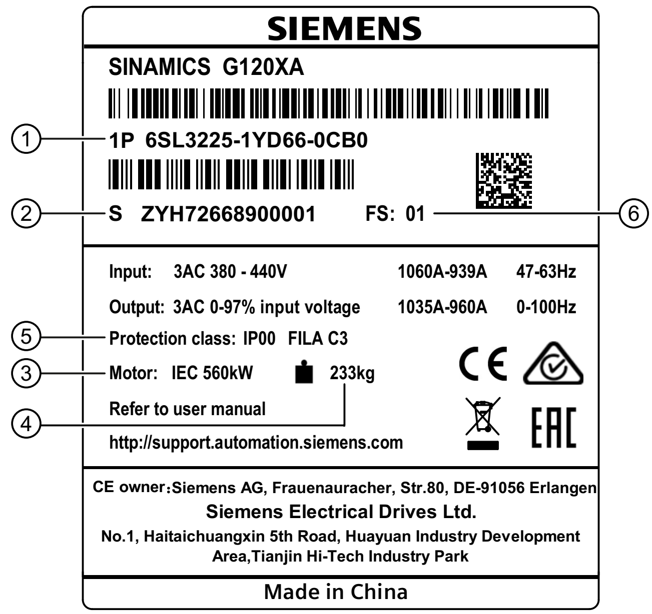
Rating plate

You will find a rating plate at the side of the converter. See the following for examples:

FSA ... FSG



FSH/FSJ



①	Article number	④	Net weight
②	Product serial number	⑤	Degree of protection
③	Motor data	⑥	FS code

2.4 Directives and standards

Relevant directives and standards

The following directives and standards are relevant for the converters:

European Low Voltage Directive

The converters fulfill the requirements stipulated in the Low-Voltage Directive 2014/35/EU, if they are covered by the application area of this directive.

European Machinery Directive

The converters fulfill the requirements stipulated in the Machinery Directive 2006/42/EC, if they are covered by the application area of this directive.

However, the use of the converters in a typical machine application has been fully assessed for compliance with the main regulations in this directive concerning health and safety.

Directive 2011/65/EU

The converter fulfills the requirements of Directive 2011/65/EU relating to the restriction of the use of certain hazardous substances in electrical and electronic devices (RoHS).

European EMC Directive

The compliance of the converter with the regulations of the Directive 2014/30/EU has been demonstrated by full compliance with the IEC/EN 61800-3.

Eurasian conformity

The converters comply with the requirements of the Russia/Belarus/Kazakhstan customs union (EAC).

Australia and New Zealand (RCM formerly C-Tick)

The converters showing the test symbols fulfill the EMC requirements for Australia and New Zealand.

Quality systems

Siemens AG employs a quality management system that meets the requirements of ISO 9001 and ISO 14001.

Certificates for download

- EC Declaration of Conformity: (https://support.industry.siemens.com/cs/us/en/view/109767762)

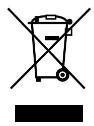
Standards that are not relevant

China Compulsory Certification

The converters do not fall in the area of validity of the China Compulsory Certification (CCC).

2.5 Device disposal

Recycling and disposal



For environmentally-friendly recycling and disposal of your old device, please contact a company certified for the disposal of waste electrical and electronic equipment, and dispose of the old device as prescribed in the respective country of use.

2.6 Optional components

The following optional components are available so that you can adapt the converter to different applications and ambient conditions:

- External line filter (Page 31)
- Line reactor (Page 32)
- Output reactor (Page 34)
- Sine-wave filter (Page 35)
- dv/dt filter plus VPL (Page 36)
- Operator panel (Page 37)
- SINAMICS G120 Smart Access (Page 38)
- Shield connection kit for the Power Module (FSD to FSG) (Page 38)
- SINAMICS FSG Adapter Set (Page 38)

Further information

Further information about the technical specifications and installing of these optional components is described in the documentation provided.

2.6.1 External line filter

With a line filter, the converter achieves a higher radio interference class. The converters of frame sizes FSA to FSF are available with and without integrated line filter. The converters of frame sizes FSG to FSJ are available with integrated line filter only. External line filters are available as optional components for the converters without integrated filters.

When using the line filter, observe the following restrictions:

- The permissible line voltage is 380 V to 440 V.
- The maximum permissible output frequency is 150 Hz.

NOTICE
Overloading the line filter when connected to line supplies that are not permissible
The line filter is only suitable for operation on TN or TT line supplies with a grounded neutral point. If operated on other line supplies, the line filter will be thermally overloaded and will be damaged. • For converters equipped with line filter, only connect to TN or TT line supplies with a grounded neutral point.

Article number

<table>
<tr><th colspan="2">Converter</th><th colspan="2">Line filter</th></tr>
<tr><th>Frame size</th><th>Rated power (kW)</th><th>Article number</th><th>Rated current (A)</th></tr>
<tr><td>FSA</td><td>0.75 ... 3</td><td rowspan="2">6SL3203-0BE17-7BA0</td><td rowspan="2">11.4</td></tr>
<tr><td rowspan="2">FSB</td><td>4</td></tr>
<tr><td>5.5 ... 7.5</td><td>6SL3203-0BE21-8BA0</td><td>23.5</td></tr>
<tr><td>FSC</td><td>11 ... 15</td><td rowspan="2">6SL3203-0BE23-8BA0</td><td rowspan="2">49.4</td></tr>
<tr><td rowspan="3">FSD</td><td>18.5 ... 22</td></tr>
<tr><td>30 ... 37</td><td>6SL3203-0BE27-5BA0</td><td>72</td></tr>
<tr><td>45</td><td rowspan="2">6SL3203-0BE31-1BA0</td><td rowspan="2">105</td></tr>
<tr><td>FSE</td><td>55</td></tr>
<tr><td>FSF</td><td>75 ... 110</td><td>6SL3203-0BE31-8BA0</td><td>204</td></tr>
</table>

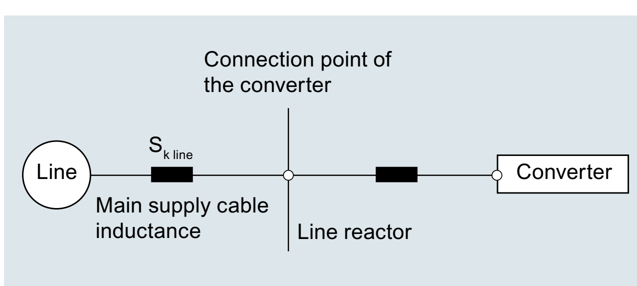
2.6.2 Line reactor

Note

Line reactors are available as optional components for converters of frame sizes FSH and FSJ only. As the converters of frame sizes FSA to FSG have integrated DC-link chokes, line reactors are thus not required.

A line reactor is needed for high short-circuit power levels, partly to protect the actual converter against excessive harmonic currents, and thus against overload, and partly to limit line harmonics to the permitted values. The harmonic currents are limited by the total inductance comprising the line reactor and mains supply cable inductance. Line reactors can be omitted if the mains supply cable inductance is increased sufficiently, i.e., the value of R_{SC} must be sufficiently small.

R_{SC} = Relative Short-Circuit power: ratio of short-circuit power $S_{k\ Line}$ at the supply connection point to the fundamental apparent power S_{inv} of the connected converters (to IEC 60146-1-1).

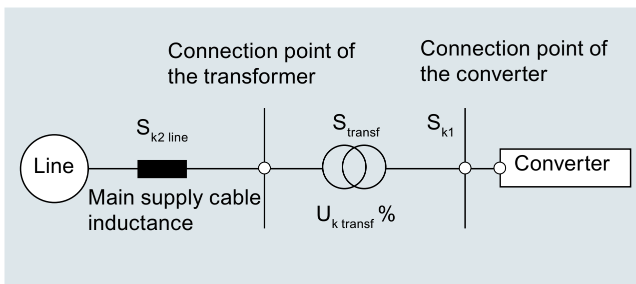


Requirements for line reactors

Rated power of converter (kW)	Line reactor can be omitted for R_{SC}	Line reactor is required for R_{SC}
315 ... 500	≤ 33	> 33
≥ 500	≤ 20	> 20

It is recommended that a line reactor is always connected on the line side of the converter, as in practice, it is often not known on which supply configuration individual converters are to be operated, i.e. which supply short-circuit power is present at the converter connection point.

A line reactor can only be dispensed with when the value for R_{SC} is less than that in the above table. This is the case, when the converter, as shown in the following figure, is connected to the line through a transformer with the appropriate rating.



In this case, the line short-circuit power S_{k1} at the connection point of the converter is approximately:

S_{k1} = S_{transf} / ($U_{k\ transf}$ + S_{transf} / $S_{k2\ line}$)
S_{transf} = Transformer rated power
$S_{k2\ line}$ = Short-circuit power of the higher-level voltage level
$U_{k\ transf}$ = Relative short-circuit voltage

When using the line reactor, observe the following restrictions:

- The permissible line voltage is 380 V to 440 V.
- The maximum permissible output frequency is 150 Hz.

Article number

Converter frame size	Rated power (kW)	Line reactor
FSH	315	6SL3000-0CE36-3AA0
	355 ... 400	6SL3000-0CE37-7AA0
FSJ	450	6SL3000-0CE38-7AA0
	500 ... 560	6SL3000-0CE41-0AA0

2.6.3 Output reactor

Note

Output reactors are available as optional components for converters of frame sizes FSD ... FSJ only.

The output reactor reduces the voltage rate of rise and dampens transient voltage peak at the converter output, and enable longer motor cables to be connected.

Maximum permissible motor cable length (Page 71)

When using the output reactor, observe the following restrictions:

- The permissible line voltage is 380 V to 440 V.
- The maximum permissible output frequency is 150 Hz.

NOTICE

Damage to the output reactor by exceeding the maximum pulse frequency

The maximum permissible pulse frequency when using the output reactor is 4 kHz. The output reactor can be damaged if the pulse frequency is exceeded.

- When using an output reactor, the pulse frequency of the converter must not exceed 4 kHz.

NOTICE

Damage to the output reactor if it is not activated during commissioning

The output reactor may be damaged if it is not activated during commissioning.

- Activate the output reactor during commissioning via parameter p0230.
- Activate the output reactor during commissioning according to the electric specifications.

Article number

Converter frame size	Rated power (kW)	Output reactor
FSD	18.5	6SL3202-0AE23-8CA0
	22 ... 37	6SE6400-3TC07-5ED0
	45	6SE6400-3TC14-5FD0
FSE	55	
FSF	75 ... 90	
	110	6SL3000-2BE32-1AA0
	132	6SL3000-2BE32-6AA0
FSG	160	6SL3000-2BE33-2AA0
	200	6SL3000-2BE33-8AA0
	250	6SL3000-2BE35-0AA0

Converter frame size	Rated power (kW)	Output reactor
FSH	315	6SL3000-2AE36-1AA0
	355 ... 400	6SL3000-2AE38-4AA0
FSJ	450 ... 500	6SL3000-2AE41-0AA0
	560	6SL3000-2AE41-4AA0

2.6.4 Sine-wave filter

Note

Sine-wave filters are available as optional components for converters of frame sizes FSD to FSG.

The sine-wave filter limits the voltage gradient and the capacitive recharging currents which generally occur in converter operation. Therefore, when a sine-wave filter is used, significantly longer screened motor cables are possible and the motor lifetime reaches the same values which are achieved when the motor is connected directly to the mains.

Maximum permissible motor cable length (Page 71)

When using sine-wave filters, observe the following restrictions:

- For rated power up to 90 kW, the pulse frequency should not exceed 8 kHz; for rated power above 90 kW, the pulse frequency should be 4 kHz.

  Note

  Restriction when using the sine-wave filter for converters ≥ 110 kW

  The sine-wave filter can only be operated at 4 kHz. This means that for converters with rated power ≥ 110 kW only 70% of the current and power is available due to derating.

- The maximum permissible output frequency is limited to 150 Hz.
- The maximum output voltage is limited to approx. 85% of the input voltage.

NOTICE

Damage to the sine-wave filter if it is not activated during commissioning

The sine-wave filter may be damaged if it is not activated during commissioning.

- Activate the sine-wave filter during commissioning via parameter p0230.
- Activate the sine-wave filter during commissioning according to the electric specifications.

Article number

Converter variants		Sine-wave filter
Frame size	**Rated power (kW)**	**Article number**
FSD	18.5	6SL3202-0AE24-6SA0
	22	
	30	6SL3202-0AE26-2SA0
	37	6SL3202-0AE28-8SA0
	45	
FSE	55	6SL3202-0AE31-5SA0
FSF	75	
	90	6SL3202-0AE31-8SA0
	110	6SL3000-2CE32-3AA0
	132	
FSG	160	6SL3000-2CE32-8AA0
	200	6SL3000-2CE33-3AA0
	250	6SL3000-2CE34-1AA0

Special restrictions for converter FSG

When connecting 400 V converter FSG with sine-wave filters, set parameters as follows:

Parameter	6SL3000-2CE32-8AA0	6SL3000-2CE33-3AA0	6SL3000-2CE34-1AA0
p0230	4	4	4
p0233 [mH]	0.25	0.2	0.15
p0234 [µF]	28.2	42.3	56.4
p1082 [rpm]	150*60/r0313	150*60/r0313	150*60/r0313
p1800 [kHz]	4	4	4

For converter FSG with sine-wave filter, operation is only permissible in the vector control mode.

2.6.5 dv/dt filter plus VPL

Note

dv/dt filters plus VPL are available as optional components for converters of frame sizes FSH and FSJ.

A combination of dv/dt filter and a voltage peak limiter (VPL) - dv/dt filter plus VPL - are available to suppress voltage peaks and enable longer motor cables to be connected.

Maximum permissible motor cable length (Page 71)

When using the dv/dt filter plus VPL, observe the following restrictions:

- The permissible line voltage is 380 V to 440 V.
- The maximum output frequency is 150 Hz.
- The maximum pulse frequency is 4 kHz.

NOTICE
Damage to the dv/dt filter plus VPL if it is not activated during commissioning
The dv/dt filter plus VPL may be damaged if it is not activated during commissioning. • Activate the dv/dt filter plus VPL during commissioning via parameter p0230. • Activate the dv/dt filter plus VPL during commissioning according to the electric specifications.

Further information is provided on the Internet:

- dv/dt filter plus VPL for G120X (https://support.industry.siemens.com/cs/ww/en/view/109766019)
- Functional principle and application cases (https://support.industry.siemens.com/cs/ww/en/view/109748645)

Article number

Converter variants		dv/dt filter plus VPL
Frame size	**Rated power (kW)**	**Article number**
FSH	315	6SL3000-2DE38-4AA0
	355	
	400	
FSJ	450	6SL3000-2DE41-4AA0
	500	
	560	

2.6.6 Operator panel

An operator panel can be ordered either together with the converter or separately as an optional component. It has been designed to enhance the interface and communications capabilities of the converter. You can use an operator panel to commission, troubleshoot, and control the converter, as well as to back up and transfer the converter settings.

The operator panels (BOP-2 and IOP-2) can be mounted either directly on the converter or in a control cabinet door using a door mounting kit.

Article number

Basic Operator Panel 2 (BOP-2)	6SL3255-0AA00-4CA1
Intelligent Operator Panel 2 (IOP-2)	6SL3255-0AA00-4JA2
SIPLUS IOP-2 (with 3C4 class coating)	6AG1255-0AA00-2JA2
IOP-2 Handheld	6SL3255-0AA00-4HA1
Door mounting kit for the operator panel	6SL3256-0AP00-0JA0

2.6.7 SINAMICS G120 Smart Access

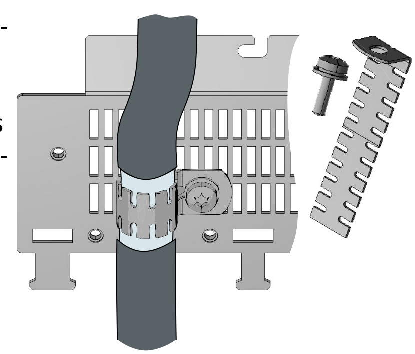
The SINAMICS G120 Smart Access is a Wi-Fi-based Web server module and an engineering tool. It has been designed for quick commissioning, parameterization, and maintenance of the converters.

Article number: 6SL3255-0AA00-5AA0

FAQ (https://support.industry.siemens.com/cs/ww/en/view/109765499)

2.6.8 Shield connection kit for the Power Module (FSD to FSG)

The shield connection kit comprises shield plates, toothed tapes, and fixing screws, which can establish the shield and strain relief for the power connections. The shield connection kit for the Power Module of converters in frame sizes FSD to FSG is provided as an optional component.



Article number

Converter frame size	Article number
FSD	6SL3262-1AD02-0DA0
FSE	6SL3262-1AE02-0DA0
FSF	6SL3262-1AF02-0DA0
FSG	6SL3262-1AG02-0DA0

2.6.9 SINAMICS FSG Adapter Set

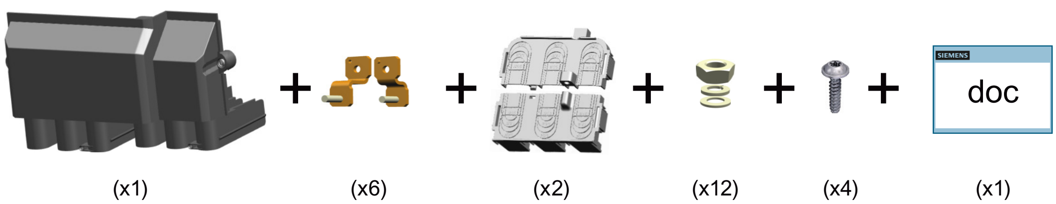
With the SINAMICS FSG Adapter Set, you can use cables with a maximum cross-section of 4 x 120 mm² per phase for line and motor connections on the G120XA FSG converters.

Article number: 6SL3266-2HG00-0BA0

Note

After installation, the FSG Adapter Set does not affect the technical specifications of the G120XA FSG converters.

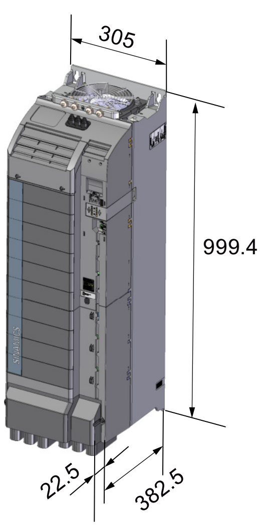
Scope of delivery



Applicable products

Product	Voltage (V)	Rated power (kW)	Article number
G120XA FSG	400	160	6SL3220- .YD50-0CB0
		200	6SL3220- .YD52-0CB0
		250	6SL3220- .YD54-0CB0

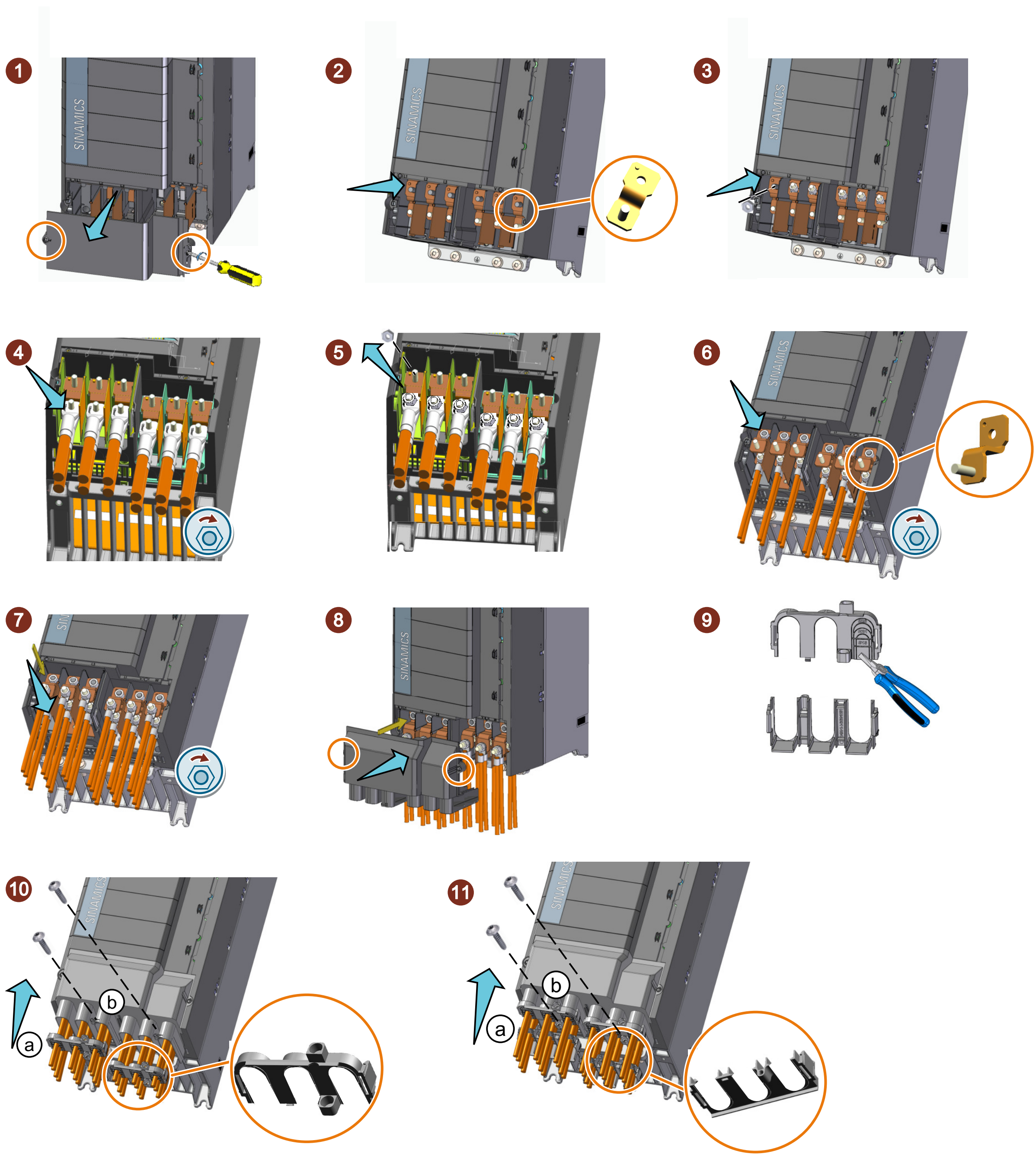
Dimensions (Unit: mm)



Cable cross-sections and screw tightening torques

Cable lug	Cross-section	Tightening torque
≤ 40 mm  Cable lug for M10 screws	35 ... 4 x 120 mm^2 1 ... 4 x 4/0 AWG	22 ... 25 Nm 195 ... 221 lbf.in

Installation



> **Note**
>
> To ensure correct and safe connections, crimp the cable lugs with a hexagon crimping tool.

Note

To install the cover in place, do not use shrink-on sleeves if the cable cross-section > 120 mm².

Note

Re-install the insulating plates in place after connecting the cables.

2.7 Motors and multi-motor drives that can be operated

Siemens motors that can be operated

You can operate the following motors with the converter:

- Standard asynchronous motors
- Synchronous reluctance motors

You can find information about more motors on the Internet:

Motors that can be operated (https://support.industry.siemens.com/cs/ww/en/view/100426622)

Third-party motors that can be operated

You can also operate the following non-Siemens motors with the converter:

- Standard asynchronous motors
- Most permanent magnet-synchronous motors designed for converter operation

NOTICE
Insulation failure due to unsuitable third-party motor
A higher load occurs on the motor insulation in converter mode than with line operation. Damage to the motor winding may occur as a result. • Contact your local Siemens contact person • Please observe the notes in the System Manual "Requirements for third-party motors"

Further information is provided on the Internet:

Requirements for third-party motors (https://support.industry.siemens.com/cs/ww/en/view/79690594)

Permissible power of standard induction motors

Standard induction motors in the range of 25% to 125% of the converter power are permissible without restriction.

Multi-motor operation

Multi-motor operation involves simultaneously operating several motors from one converter. For standard induction motors, multi-motor operation is generally permissible.

Additional preconditions and restrictions relating to multi-motor operation are available on the Internet:

Multi-motor drive (http://support.automation.siemens.com/WW/view/en/84049346)

Mounting

3

3.1 Power losses and air cooling requirements

Overview

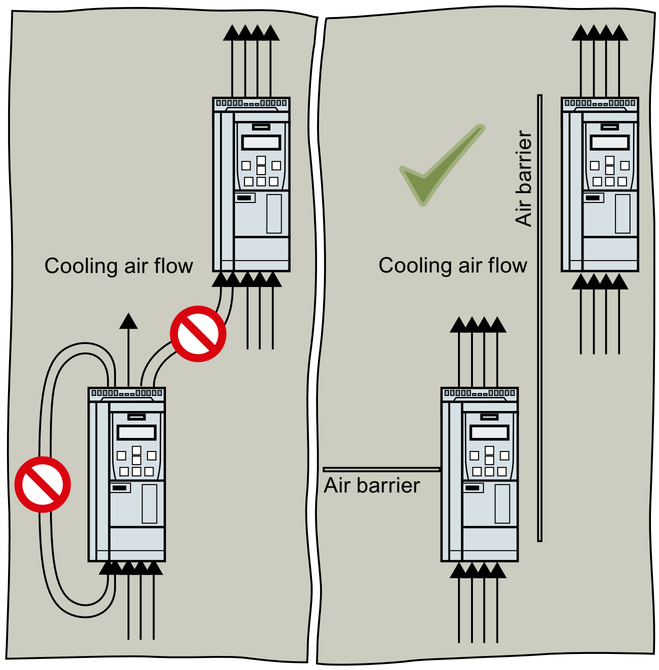
To protect the components from overheating, the control cabinet requires a cooling air flow, which depends on the power loss of the individual components.

Measures in order to ensure that the components are adequately cooled

- Add the power losses of the individual components.
  - Technical data dependent on the power (Page 1120)
  - Use the manufacturers' data for components, for example reactors or filters.
- Calculate the air flow required:
  airflow [l/s] = power loss [W] * 0.86 / ΔT [K]
  Power loss: Total of the power losses of the individual components.
  Δ T: Permissible temperature rise in the control cabinet.
- Ensure that the control cabinet is appropriately ventilated and equipped with suitable air filters.
- Ensure that the components maintain the specified clearances with respect to one another.
- Ensure that the components are provided with adequate cooling air through the cooling openings.
- Use appropriate air barriers to prevent cooling air short circuits.
- Ensure that the electrical cabinet is adequately ventilated and is equipped with suitable air filters.
  Comply with the replacement intervals of the air filter.

Further measures

Air barriers can prevent converters from overheating each other. Such measures are only necessary in extreme cases when the cooling air temperature reaches the maximum ambient temperature of the converter.



3.2 Mounting the converter

3.2.1 Basic installation rules

Requirements

When installing the converters carefully observe the conditions listed below in order to guarantee reliable, continuous and disturbance-free operation.

- The converters are designed for installation in a control cabinet.
- The converters are suitable for mounting on non-combustible solid surfaces only, for example, on an uncoated metal mounting plate.
- The converters comply with degree of protection IP20 (FSA to FSH) and IP00 (FSJ) according to IEC 60529.
- The converters are certified for use in environments with degree of pollution 2 without condensation, that is in environments where no conductive pollution/dirt occurs. Condensation is not permissible.
- Ensure that the device is free of dust and dirt. When using a vacuum cleaner, this must comply with ESD equipment rules.
- Keep the device away from water, solvents and chemicals. Take care to install it away from potential water hazards, for example, do not install it beneath pipes that are subject to condensation. Avoid installing it where excessive humidity and condensation may occur.
- Keep the device within the maximum and minimum operating temperatures. At temperatures > 40 °C and installation altitudes > 1000 m, the devices must be derated.
- Ensure that the correct level of ventilation and air flow is provided.
- Fast temperature changes of the air drawn in (for example, by using cooling units) are not permitted due to the danger of condensation.
- Ensure that all converters and the cabinet are grounded according to the guidelines given in Chapter EMC-compliant setup of the machine or plant (Page 59).
- For a system configuration in conformance with IEC, use the IEC-approved fuses or circuit breakers under the following Internet address:
  Fuses and circuit breakers (https://support.industry.siemens.com/cs/ww/en/view/109762895)
- The converter of frame size FSA has to be mounted in an enclosure sized min. 500 mm (height) × 400 mm (depth) × 255 mm (width).
- For converters FSA to FSC, only use copper cables rated for 75 °C.

⚠ WARNING
Risk of explosion or spread of fire from built-in devices Short circuits in the converter or its components may cause explosion or fire in the control cabinet, which can result in serious personal injury or property damage. • Install built-in devices in a suitable and robust metal cabinet in such a way that personnel are protected against the explosive shock and fire, or take other appropriate protection measures, for example, using five safety cabinet locks additionally.

Protection against the spread of fire

The device may be operated only in closed housings or in control cabinets with protective covers that are closed, and when all of the protective devices are used. The installation of the device in a metal control cabinet or the protection with another equivalent measure must prevent the spread of fire and emissions outside the control cabinet.

Protection against condensation or electrically conductive contamination

Protect the device, e.g. by installing it in a control cabinet with degree of protection IP54 according to IEC 60529 or NEMA 12. Further measures may be necessary for particularly critical operating conditions.

If condensation or conductive pollution can be excluded at the installation site, a lower degree of control cabinet protection may be permitted.

Mounting position

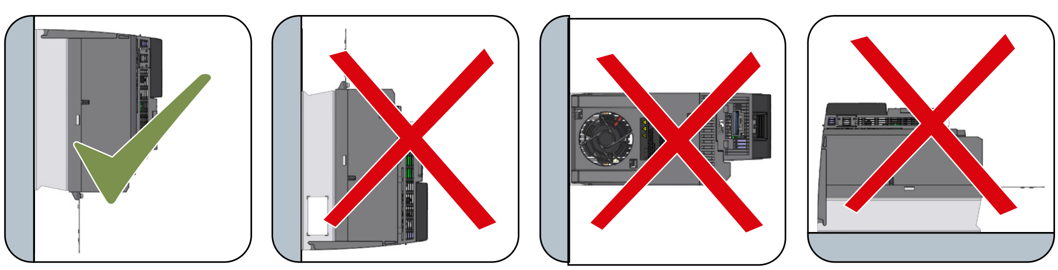


Figure 3-1 Only mount in the vertical position with the line connection at the bottom

3.2.2 Dimension drawings and drill patterns

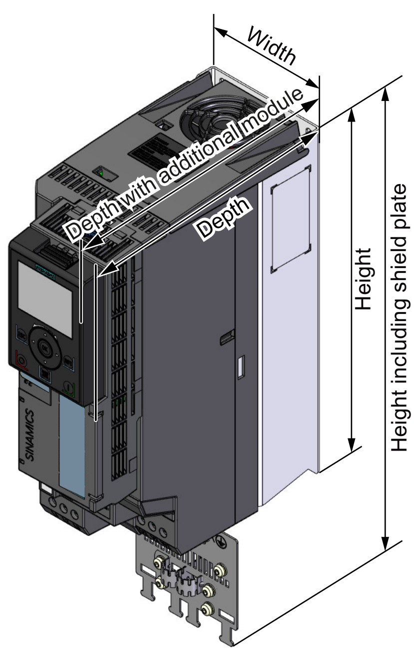
Overview

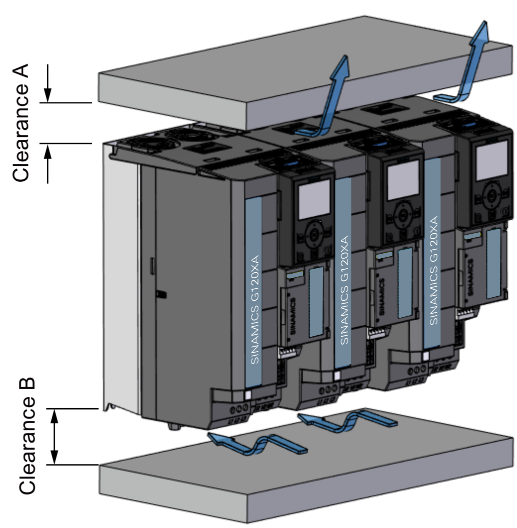
The converters are designed to be mounted in accordance with the dimension drawings, in a cabinet using screws, nuts and washers.

Note

To comply with EMC specifications, it is recommended to mount the converter on an electrically conductive mounting panel in the cabinet. This mounting panel should be connected to the cabinet PE.

Dimensions and clearance distances (mm)





Frame size	Height	Height including shield plate [1]	Width	Depth	Depth with additional module		Clearance [2]			
					With operator panel	With G120 Smart Access	A	B	lateral	front
FSA	232	330	73	209	218	216	80	100	0 [3]	-
FSB	275	383	100	209	218	216	80	100	0 [3]	-
FSC	295	423	140	209	218	216	80	100	0 [3]	-
FSD	472	625	200	239	248	246	300	350	0 [3]	-
FSE	551	729	275	239	248	246	300	350	0 [3]	-

Frame size	Height	Height including shield plate [1]	Width	Depth	Depth with additional module		Clearance [2]			
					With operator panel	With G120 Smart Access	A	B	lateral	front
FSF	709	969	305	360	369	367	300	350	0 [3]	-
FSG	999	1255	305	360	369	367	300	350	0 [3]	-
FSH	1487	-	548	410	-	-	200	200	30	100
FSJ	1438	-	801	410	-	-	200	200	30	100

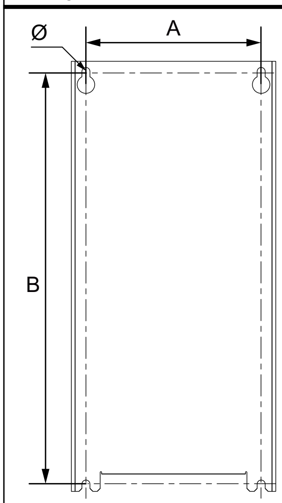
[1] The shield plates for FSD to FSG are available as options only.

[2] The cooling air clearances A and B refer to the converter without shield plate.

[3] For tolerance reasons, we recommend a lateral clearance of approx. 1 mm. For converters FSA ... FSC, the side-by-side mounting (with 0 mm lateral clearance) allows a maximum surrounding air temperature during operation of 55 °C; in case of the surrounding air temperature higher than 55 °C, a lateral clearance of 50 mm or greater is required.

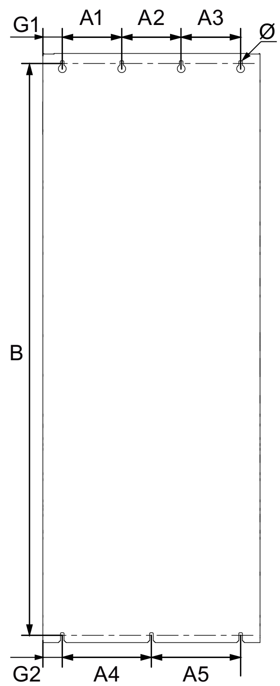
Drill patterns (mm)

Table 3-1 FSA ... FSG

Drill pattern	Dimensions	FSA	FSB	FSC	FSD	FSE	FSF	FSG
	A	55	80	118	170	230	270	265
	B	221.5	265	283	430	509	680	970.5
	Ø	5	5	5.5	6.0	6.5	8.5	12.0
	Fixings (bolts, washers, nuts)	4 × M4	4 × M4	4 × M5	4 × M5	4 × M6	4 × M8	4 × M10
	Tightening torque (Nm)	2.5	2.5	2.5	6	10	25	50

Note: For the converters FSD to FSG, a printed drill pattern is supplied with each converter. This can be used to easily drill the necessary mounting holes.

Table 3-2 FSH and FSJ

Drill pattern	Dimensions	FSH	FSJ
	A1	150	247
	A2	150	200
	A3	150	200
	A4	225	367
	A5	225	315
	B	1444	1399
	G1	49	61
	G2	49	60
	Ø	8.5	8.5
	Fixings (bolts, washers, nuts)	7 × M8	7 × M8
	Tightening torque (Nm)	25	25

3.2.3 Mounting the shield connection kit

Overview

We recommend that you mount the shield connection kits provided. The shield connection kit makes it simpler to install the converter in compliance with EMC regulations and to provide strength relief for the connected cables.

Mounting the shield connection kit, FSA ... FSC

Procedure

1. Remove the two screws and two U clamps from the bottom of the converter ①.
2. Mount the two U clamps with the two screws on the shield plate ②.
3. Fasten the shield plate in place using two screws ③.

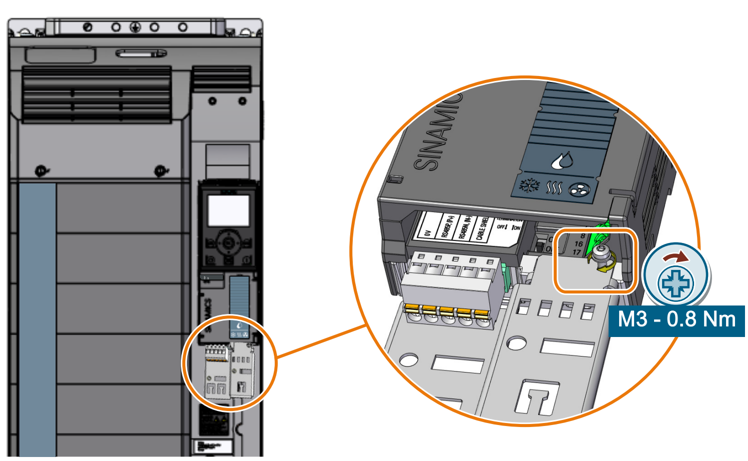
You have now mounted the shield connection kit.
❒

Mounting the shield connection kit, FSD ... FSG

For converters FSD to FSG, two sets of shield connection kits are available for the control connection and the power connection respectively. The shield connection kit for the control connection is provided at delivery, while the shield connection kit for the power connection is available as an optional module.

Mounting the shield connection kit for the control connection, FSD ... FSG

Attach the shielding plate as shown below.

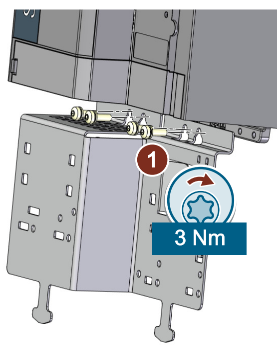


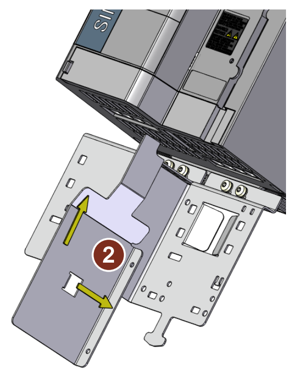
Use a cross-tip screwdriver PZ to tighten the screw to fix it onto the converter.

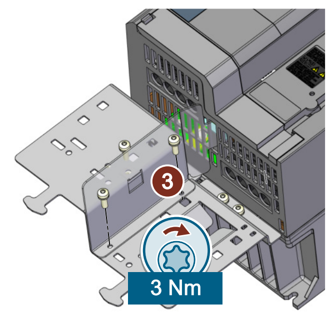
Mounting the shield connection kit for the power connection, FSD ... FSG

Procedure, FSD/FSE

1. Attach the shielding plate to the bottom of the converter and fasten it in place using four screws ①.
2. If the converter has an integrated line filter, mount the EMC connecting bracket additionally.
   a. Slide the EMC connecting bracket into the converter, so that it is held in the converter by the clamping spring ②.
   The EMC connecting bracket is positioned correctly if you feel some resistance when pulling it out from the converter.
   b. Having ensured that it is positioned correctly, fasten the EMC connecting bracket in place using three screws ③.



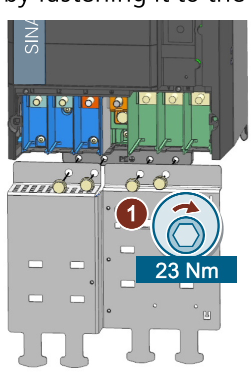


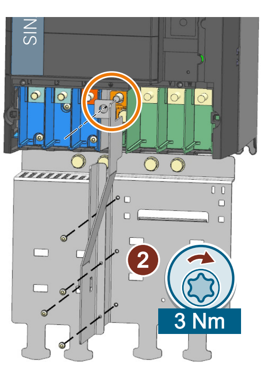


You have now mounted the shield connection kit.
❒

Procedure, FSF

1. Attach the shielding plate to the bottom of the converter and fasten it in place using four screws ①.
2. If the converter has an integrated line filter, mount the EMC connecting bracket additionally by fastening it to the shielding plate with four screws ②.

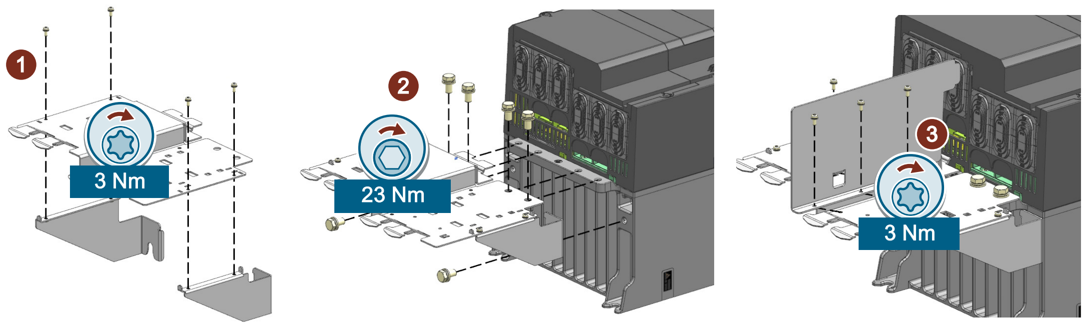




You have now mounted the shield connection kit.
❒

Procedure, FSG

1. Secure each side part to the shielding plate with two screws ①.
2. Attach the shielding plate to the bottom of the converter and fasten it in place using six screws ②.
3. If the converter has an integrated line filter, mount the EMC connecting bracket additionally by fastening it to the shielding plate with four screws ③.



You have now mounted the shield connection kit.
❒

3.2.4 Additional mounting instructions for FSD ... FSJ

3.2.4.1 Additional mounting instructions, FSD ... FSG

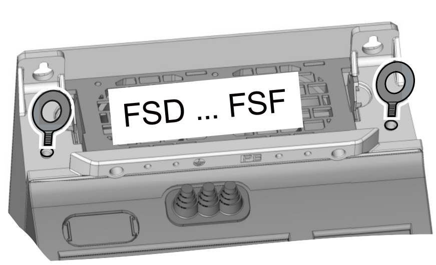
When mounting the converters FSD to FSG, the weight of the converter should be considered and appropriate hoisting gear for mounting should be applied.

Converter weight:

Technical data dependent on the power (Page 1120)

Hoisting gear

Use crane lifting lugs and the appropriate hoisting gear when mounting the converters on the cabinet panel.



3.2.4.2 Additional mounting instructions, FSH/FSJ

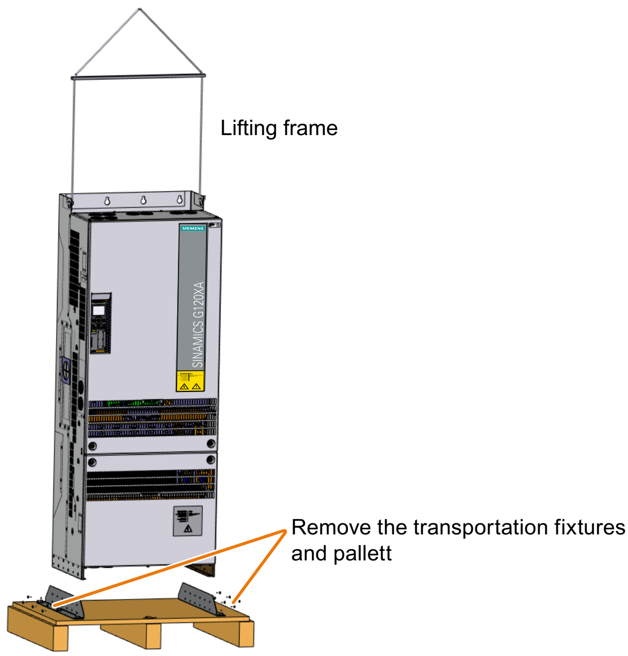
Overview

Lifting the converter

The converters FSH and FSJ can be lifted into the cabinet with the lifting eyes. Use a lifting harness where the ropes or chains are maintained in a vertical position. The device must not be lifted at an angle because this can damage the housing. Rope spreaders may have to be used.

Installing

Removing the pallet

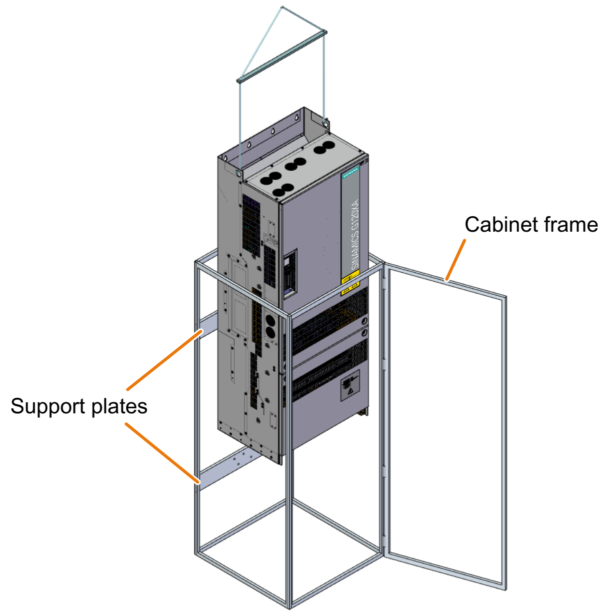


Lifting the converter into the cabinet

The electrical cabinet installation must be realized in accordance with the dimension drawings supplied. The minimum cabinet sizes for the installation of converters FSH and FSJ are provided as follows:

- For FSH: 800 mm (width) × 2000 mm (height) × 600 mm (depth)
- For FSJ: 1000 mm (width) × 2000 mm (height) × 600 mm (depth)

Before converter installation, remove the side, back, and top plates from the cabinet frame, and mount at least two support plates in the cabinet.



After the converter is installed in the cabinet, install the side, back, and top plates back to the cabinet frame.

3.2.5 Mounting the optional components

Depending on the particular application, converters may require optional components. For more information about optional components, refer to Section "Optional components (Page 31)".

Wiring

4

4.1 Line supply and motor

4.1.1 EMC-compliant setup of the machine or plant

The converter is designed for operation in industrial environments where strong electromagnetic fields are to be expected.

Reliable and disturbance-free operation is only guaranteed for EMC-compliant installation.

To achieve this, subdivide the control cabinet and the machine or system into EMC zones:

EMC zones

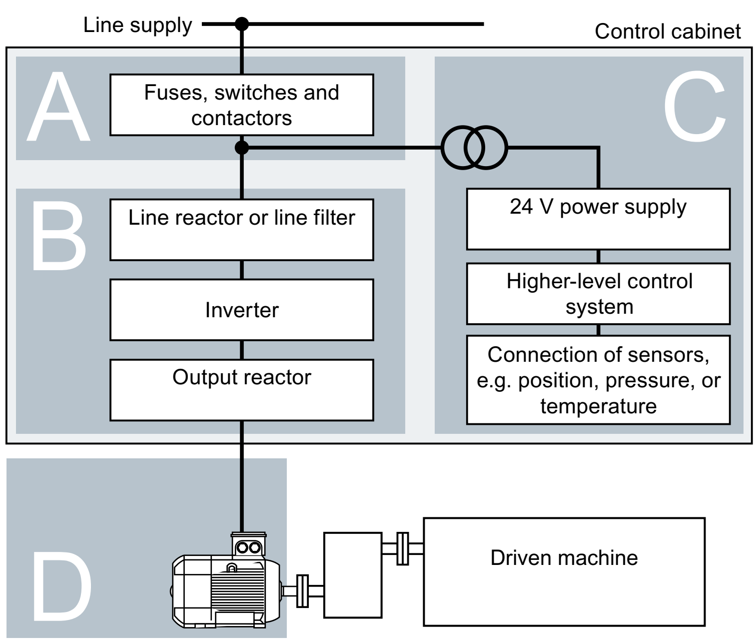


Figure 4-1 Example of the EMC zones of a plant or machine

Inside the control cabinet

- Zone A: Line supply connection
- Zone B: Power electronics
  Devices in Zone B generate energy-rich electromagnetic fields.
- Zone C: Control and sensors
  Devices in Zone C do not generate any energy-rich electromagnetic fields themselves, but their functions can be impaired by electromagnetic fields.

Outside the control cabinet

- Zone D: Motors
  Devices in Zone D generate electromagnetic fields with a significant amount of energy

4.1.1.1 Control cabinet

- Assign the various devices to zones in the control cabinet.
- Electromagnetically uncouple the zones from each other by means of one of the following actions:
  – Side clearance ≥ 25 cm
  – Separate metal enclosure
  – Large-area partition plates
- Route cables of various zones in separate cable harnesses or cable ducts.
- Install filters or isolation amplifiers at the interfaces of the zones.

Control cabinet assembly

- Connect the door, side panels, top and base plate of the control cabinet with the control cabinet frame using one of the following methods:
  – Electrical contact surface of several cm^2 for each contact location
  – Several screw connections
  – Short, finely stranded, braided copper wires with cross-sections ≥ 95 mm^2 / 000 (3/0) (-2) AWG
- Install a shield support for shielded cables that are routed out of the control cabinet.
- Connect the PE bar and the shield support to the control cabinet frame through a large surface area to establish a good electrical connection.
- Mount the control cabinet components on a bare metal mounting plate.
- Connect the mounting plate to the control cabinet frame and PE bar and shield support through a large surface area to establish a good electrical connection.
- For screw connections onto painted or anodized surfaces, establish a good conductive contact using one of the following methods:
  – Use special (serrated) contact washers that cut through the painted or anodized surface.
  – Remove the insulating coating at the contact locations.

Measures required for several control cabinets

- Install equipotential bonding for all control cabinets.
- Screw the frames of the control cabinets together at several locations through a large surface area using serrated washers to establish a good electrical connection.
- In plants and systems where the control cabinets are lined up next to one another, and which are installed in two groups back to back, connect the PE bars of the two cabinet groups at as many locations as possible.

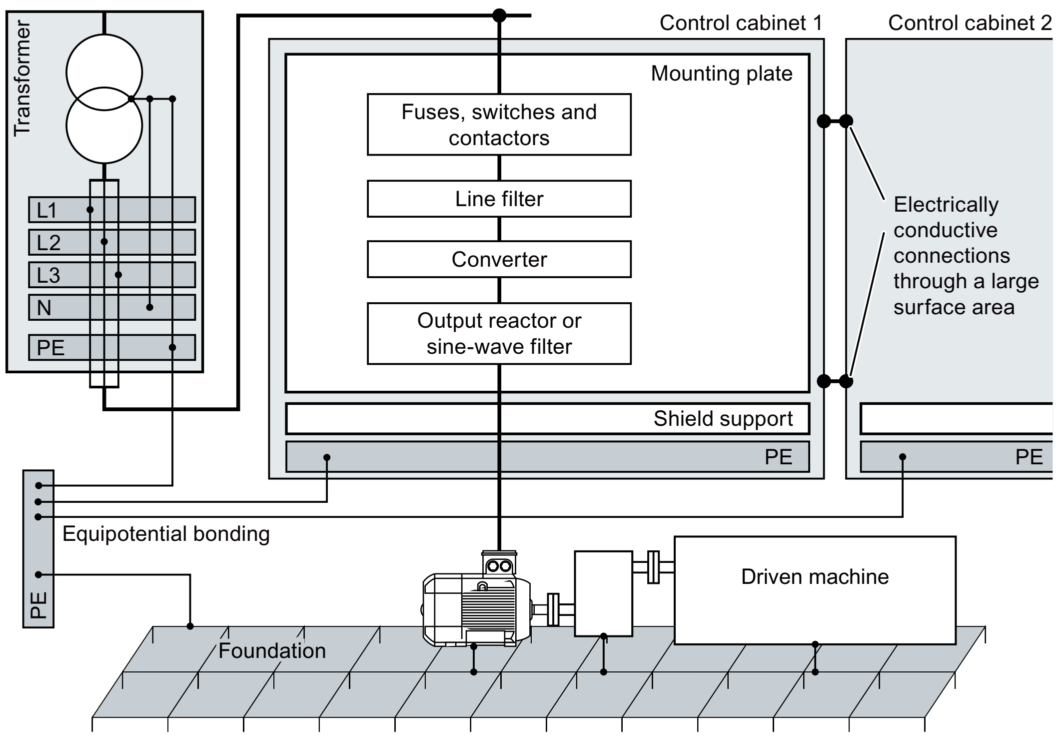


Figure 4-2 Grounding and high-frequency equipotential bonding measures in the control cabinet and in the plant/system

Further information

Additional information about EMC-compliant installation is available in the Internet:

EMC installation guideline (http://support.automation.siemens.com/WW/view/en/60612658)

4.1.1.2 Cables

Cables with a high level of interference and cables with a low level of interference are connected to the converter:

- Cables with a high level of interference:
  - Cable between the line filter and converter
  - Motor cable
  - Cable at the converter DC link connection
- Cables with a low level of interference:
  - Cable between the line and line filter
  - Signal and data cables

Cable routing inside the cabinet

- Route the power cables with a high level of interference so that there is a minimum clearance of 25 cm to cables with a low level of interference.
  If the minimum clearance of 25 cm is not possible, insert separating metal sheets between the cables with a high level of interference and cables with a low level of interference. Connect these separating metal sheets to the mounting plate to establish a good electrical connection.
- Cables with a high level of interference and cables with a low level of interference may only cross over at right angles:
- Keep all of the cables as short as possible.
- Route all of the cables close to the mounting plates or cabinet frames.
- Route signal and data cables - as well as the associated equipotential bonding cables - parallel and close to one another.
- Twist incoming and outgoing unshielded individual conductors.
  Alternatively, you can route incoming and outgoing conductors in parallel, but close to one another.
- Ground any unused conductors of signal and data cables at both ends.
- Signal and data cables must only enter the cabinet from one side, e.g. from below.
- Using shielded cables for the following connections:
  - Cable between the converter and line filter
  - Cable between the converter and output reactor

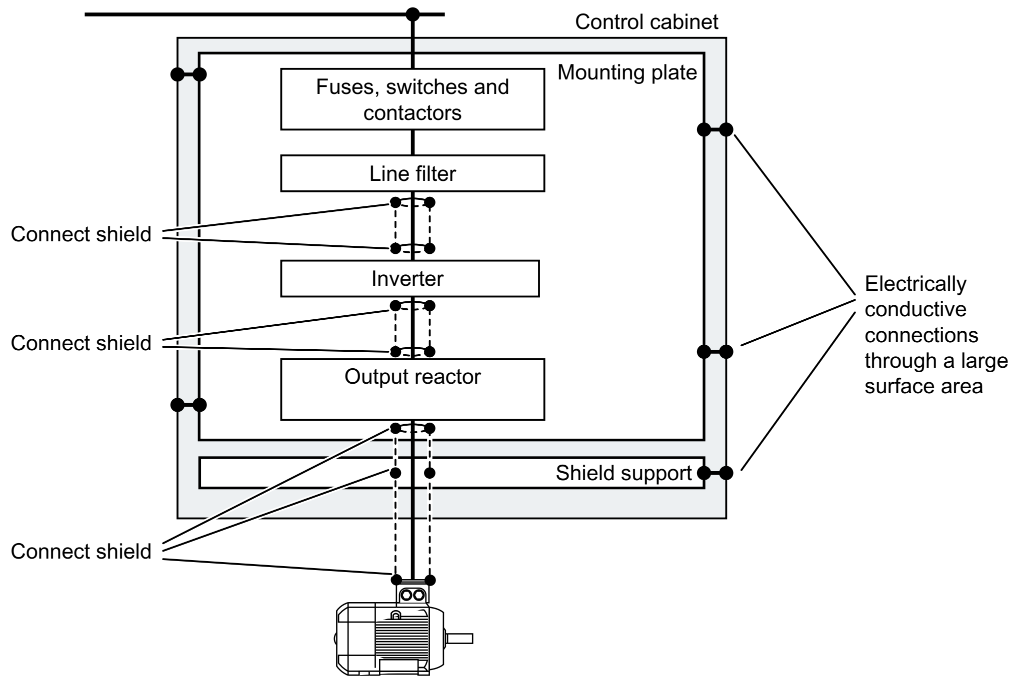


Figure 4-3 Routing converter cables inside and outside a control cabinet

Routing cables outside the control cabinet

- Maintain a minimum clearance of 25 cm between cables with a high level of interference and cables with a low level of interference.
- Using shielded cables for the following connections:
  - Converter motor cable
  - Signal and data cables
- Connect the motor cable shield to the motor enclosure using a PG gland that establishes a good electrical connection.

Requirements relating to shielded cables

- Use cables with finely-stranded, braided shields.
- Connect the shield to at least both ends of the cable.

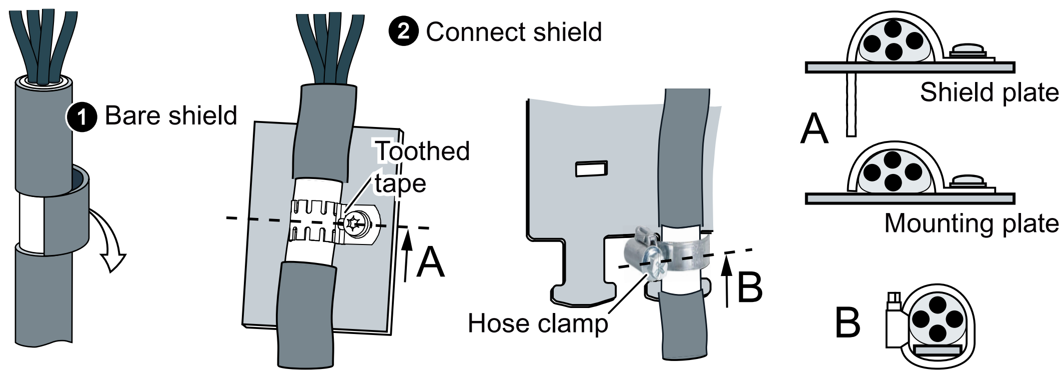


Figure 4-4 Examples for EMC-compliant shield support

- Attach the shield to the shield support directly after the cable enters the cabinet.
- Do not interrupt the shield.
- Only use metallic or metallized plug connectors for shielded data cables.

4.1.1.3 Electromechanical components

Surge voltage protection circuit

- Connect surge voltage protection circuits to the following components:
  - Coils of contactors
  - Relays
  - Solenoid valves
  - Motor holding brakes
- Connect the surge voltage protection circuit directly at the coil.
- Use RC elements or varistors for AC-operated coils and freewheeling diodes or varistors for DC-operated coils.

4.1.2 Permissible line supplies

4.1.2.1 TN system

Overview

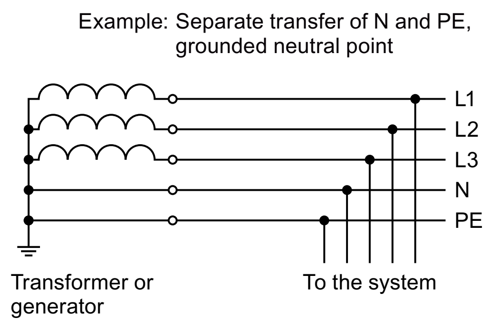


Figure 4-5 TN system

A TN system transfers the PE protective conductor to the installed plant or system using a cable.

Generally, in a TN system the neutral point is grounded. There are versions of a TN system with a grounded line conductor, e.g. with grounded L1.

The TN system can transfer the neutral conductor N and the PE protective conductor either separately or combined.

Operating the converter on a TN line system

Table 4-1 Converter operated on a TN system

Converter	Line supply with grounded neutral								
Frame size	A	B	C	D	E	F	G	H	J
Without line filter	✓	✓	✓	✓	✓	✓	○	○	○
Integrated line filter C3	✓	✓	✓	✓	✓	✓	✓	✓	✓

✓ = Operation permissible

✓ 1) Operation permissible once grounding screw has been removed
If the grounding screw has been removed, the converter no longer fulfills the requirements of class C3.

- Operation not permissible

○ Converter not available

More information on removing the grounding connection in the converter:

Removing functional grounding of the converter (Page 67)

4.1.2.2 TT system

Overview

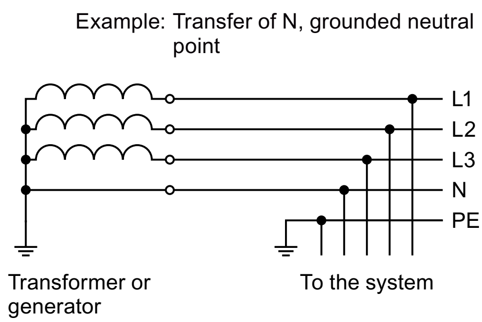


Figure 4-6 TT system

In a TT system, the transformer grounding and the installation grounding are independent of one another.

There are TT supplies where the neutral conductor N is either transferred – or not.

Function description

Table 4-2 Converter operated on a TT system

Converter	Line supply with grounded neutral								
Frame size	A	B	C	D	E	F	G	H	J
Without line filter	✓	✓	✓	✓	✓	✓	○	○	○
Integrated line filter C3	✓	✓	✓	✓	✓	✓	✓	✓	✓

✓ = Operation permissible

✓ [1)] Operation permissible once grounding screw has been removed
If the grounding screw has been removed, the converter no longer fulfills the requirements of class C3.

- Operation not permissible

○ Converter not available

More information on removing the grounding connection in the converter:

Removing functional grounding of the converter (Page 67)

4.1.2.3 IT system

Overview

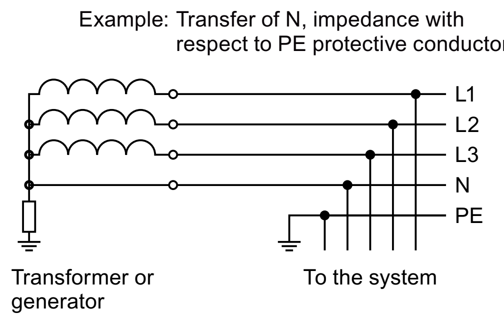


Figure 4-7 IT system

In an IT system, all of the conductors are insulated with respect to the PE protective conductor – or connected to the PE protective conductor through an impedance.

There are IT systems with and without transfer of the neutral conductor N.

Operating the converter on an IT system

Table 4-3 Converter operated on an IT system

Converter	**Line supply with grounded neutral**								
Frame size	A	B	C	D	E	F	G	H	J
Without line filter	✓	✓	✓	✓	✓	✓	○	○	○
Integrated line filter C3	-	-	-	-	-	-	✓ 1)	✓ 1)	✓ 1)

✓ = Operation permissible

✓ 1) Operation permissible once grounding screw has been removed
If the grounding screw has been removed, the converter no longer fulfills the requirements of class C3.

- Operation not permissible

○ Converter not available

More information on removing the grounding connection in the converter:

Removing functional grounding of the converter (Page 67)

4.1.2.4 Removing functional grounding of the converter

If you wish to use the converters with C3 line filter, note the information in the following sections:

TN system (Page 65)

TT system (Page 66)

IT system (Page 67)

Precondition

Switch off the converter power supply before removing the functional grounding.

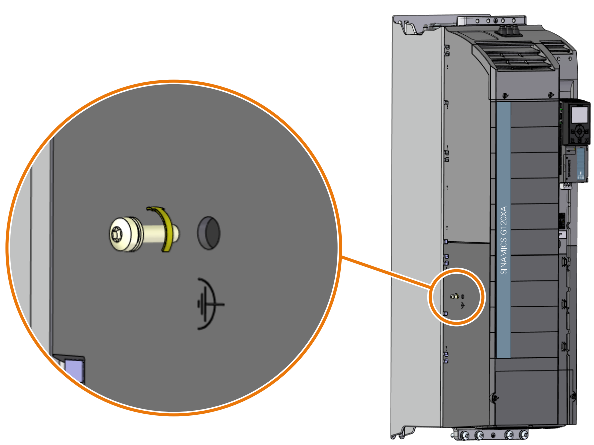
⚠ WARNING

Electric shock as a result of a residual charge in power components

After the power supply has been switched off, it takes up to 5 minutes until the capacitors in the converter have discharged so that the residual charge is at a non-hazardous level. Therefore, touching the converter immediately after powering off can result in electric shock due to residual charge in the power components.

- Check the voltage at the converter connections before you remove the functional grounding.

Removing screw for functional grounding, FSG



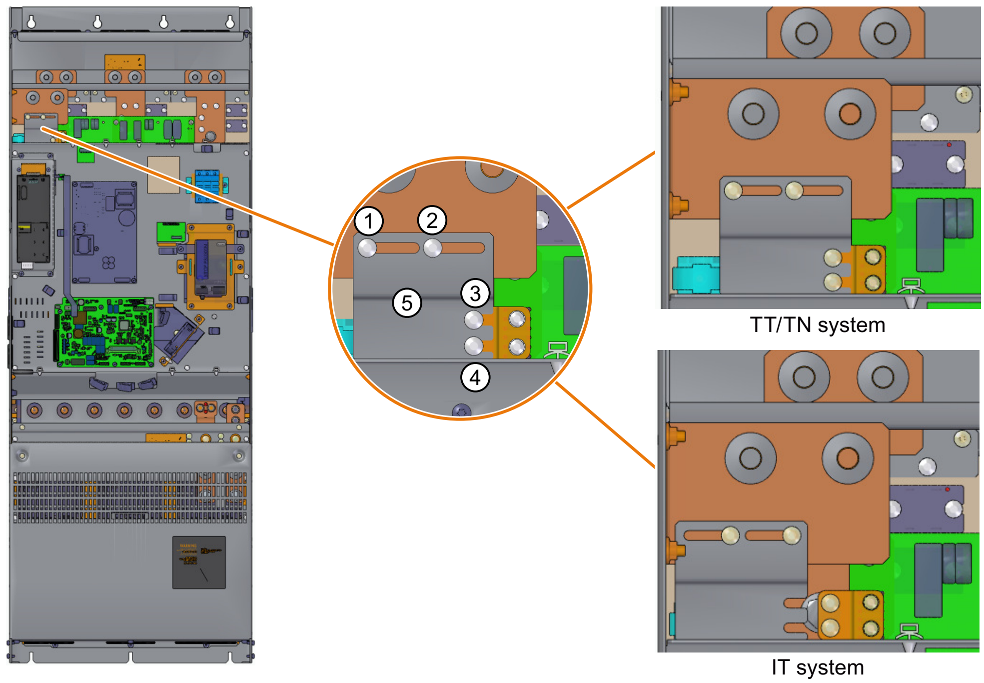
Disconnecting the basic interference suppression module, FSH/FSJ

If a converter FSH or FSJ is operated from a non-grounded line supply (IT system), the connection to the basic interference suppression module of the Power Module must be opened.

Procedure

1. Remove the upper cover of the converter.
2. Release the four screws ①, ②, ③, and ④, but do not remove the screws.

3. Slide the connection clip ⑤ towards the left until the clip is disconnected from the PE connections at screws ③ and ④.
4. Tighten all screws with 6 Nm.



You have disconnect the basic interference suppression module.
❑

NOTICE
Device damage due to not removing the connection clip with a non-grounded line supply
When operating a converter FSH or FSJ on a non-grounded line supply (IT system), failure to open the connection to the basic interference suppression module can cause significant damage to the device. • With a non-grounded line supply (IT system), open the connection to the basic interference suppression module.

4.1.3 Requirements for the protective conductor

Overview

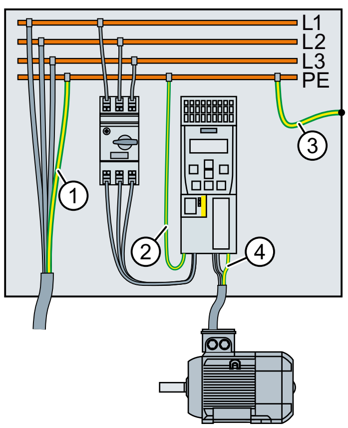
A high leakage current flows through the protective conductor in converter operation. The protective conductor of the converter must not be interrupted for safe touch protection in converter operation.

This primarily results in requirements for the minimum conductor cross-section of the protective conductor.

No restriction applies to the length of the protective conductor for touch protection. However, short protective conductors are advantageous for EMC-compliant installation.

Description

⚠ WARNING
Electric shock due to interrupted protective conductor
The drive components conduct a high leakage current via the protective conductor. Touching conductive parts when the protective conductor is interrupted can result in death or serious injury.
• Comply with the requirements for the protective conductor.



① Protective conductor for line feeder cables
② Protective conductor for converter line feeder cables
③ Protective conductor between PE and the control cabinet
④ Protective conductor for motor feeder cables

The minimum cross-section of the protective conductor ① ... ④ depends on the cross-section of the line or motor feeder cable:

- Line or motor feeder cable ≤ 16 mm²
  ⇒ Minimum cross-section of the protective conductor = cross-section of the line or motor feeder cable
- 16 mm² < line or motor feeder cable ≤ 35 mm²
  ⇒ Minimum cross-section of the protective conductor = 16 mm²
- Line or motor feeder cable > 35 mm²
  ⇒ Minimum cross-section of the protective conductor = ½ cross-section of the line or motor feeder cable

Additional requirements placed on the protective conductor ① according to IEC 60204-1:

- For permanent connection, the protective conductor must fulfill at least one of the following conditions:
  - The protective conductor is routed so that it is protected against damage along its complete length.
    Cables routed inside switch cabinets or enclosed machine housings are considered to be adequately protected against mechanical damage.
  - As a conductor of a multi-conductor cable, the protective conductor has a cross-section ≥ 2.5 mm^2 Cu.
  - For an individual conductor, the protective conductor has a cross-section ≥ 10 mm^2 Cu.
  - The protective conductor consists of 2 individual conductors with the same cross-section.
- When connecting a multi-core cable using an industrial plug connector according to EN 60309, the protective conductor must have a cross-section of ≥ 2.5 mm^2 Cu.
- Observe the local regulations for protective conductors subject to a high leakage current at the installation site.

4.1.4 Maximum permissible motor cable length

Overview

The longer the motor cable of the converter, the higher the line capacitances of the motor cable. Line capacitances cause an additive current in converter operation and present an additional load to the converter.

Therefore, a maximum permissible motor cable length is specified for each converter.

Options between converter and motor, e.g. output reactors, partially compensate for the line capacitances. Certain options make the use of longer motor cables possible.

If you have to achieve compliance with an EMC category, additional restrictions apply to the motor cable length in order to control conducted interference emissions.

Description

EMC category according to EN 61800-3

Shielded motor cables and EMC-compliant installation are required in order to satisfy an EMC category.

EMC-compliant setup of the machine or plant (Page 59)

Table 4-4 Maximum permissible motor cable length depending on EMC category [1]

			Converter frame size	Maximum motor cable length
Second environment	C3	Converters with integrated filter	FSA ... FSC	50 m
			FSD ... FSE	100 m
			FSF ... FSG	150 m
			FSH ... FSJ	100 m
		Converters without line filters with external C3 filter	FSA ... FSF	50 m

[1] The values apply to a pulse frequency at the factory setting. If you set other pulse frequencies, you must ensure that the EMC category is complied with on the plant or system side.

Without EMC category

Table 4-5 Maximum permissible motor cable length [1]

		Converter frame size 400 V	Maximum motor cable length
With shielded motor cable	Without output reactor or dv/dt filter	FSA ... FSC	150 m
		FSD ... FSE	200 m
		FSF ... FSG	300 m
		FSH ... FSJ	150 m [2]
	With 2 output reactors in series	FSD ... FSE	350 m
		FSF ... FSG	525 m
	With 1 output reactor	FSH ... FSJ	300 m [2]
With unshielded motor cable	Without output reactor or dv/dt filter	FSA ... FSC	300 m
		FSD ... FSE	300 m
		FSF ... FSG	450 m
		FSH ... FSJ	200 m [2]
	With 2 output reactors in series	FSD ... FSE	525 m
		FSF ... FSG	800 m
	With 1 output reactor or dv/dt filter	FSH ... FSJ	450 m [2]

[1] The values apply to pulse frequencies with factory settings.

[2] The values are valid for a pulse frequency = 2 kHz

More information

The permissible motor cable length depends on the following conditions:

- Quality of the motor cable
  The above values apply to high-quality cables, e.g. CY100.
- Pulse frequency
  - A maximum of 25 m for FSA 2.2 kW and 3.0 kW converters with a pulse frequency ≥ 10 kHz
  - A maximum of 10 m for FSC converters with a pulse frequency = 16 kHz

Dimension the motor cable such that the resistance losses are less than 5% of the rated converter power.

4.1.5 Connecting the converter and converter components

WARNING

Electric shock when the motor terminal box is open

As soon as the converter is connected to the line supply, the motor connections of the converter may carry dangerous voltages. When the motor is connected to the converter, there is danger to life through contact with the motor terminals if the motor terminal box is open.

- Close the motor terminal box before connecting the converter to the line supply.

Note

Fault protection when insulation fails in the motor circuit at the output side

In case of insulation failure in the motor circuit, the overcurrent trip of the converter meets the requirements of IEC 60364-4-41:2005/AMD1:2017 Section 411 and Annex D for protection against electric shock.

- Observe the installation specifications for this converter.
- Ensure the continuity of the protective conductor.
- Observe the applicable installation standards.

4.1.5.1 Connection overview

Note

Line filter

The converters FSA ... FSF are available with or without integrated line filter (C3).

Line reactor

No line reactor is required for FSA ... FSG converters.

Available options

For information about available options, see Chapter "Optional components (Page 31)".

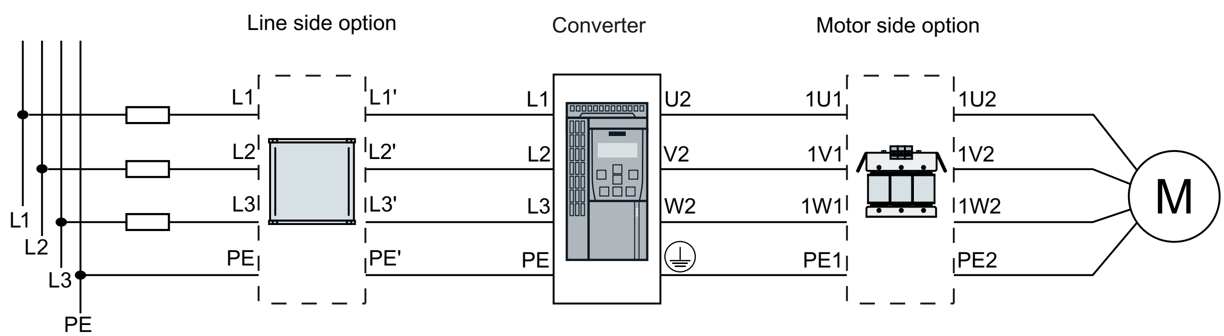


Figure 4-8 Connecting converters FSA...FSG and their optional components

400 V Converter	Line side option	Motor side option [1]	
	Line filter	Output reactor	Sine-wave filter
FSA ... FSC	√	--	--
FSD...FSG	√ [2]	√	√

[1] If you choose to use motor side option, it is enough to use only one of the options.

[2] External line filter is not provided for converter FSG.

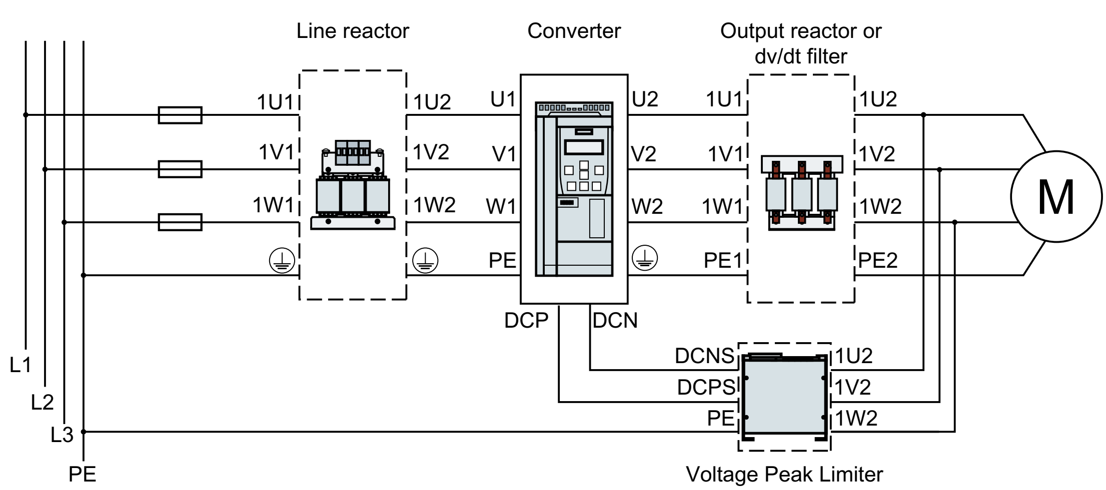
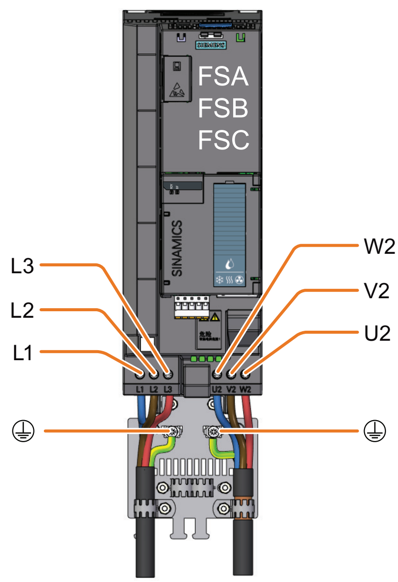


Figure 4-9 Connecting converters FSH/FSJ and their optional components

4.1.5.2 Connecting converters

Connecting converters, FSA ... FSC



Connecting converters, FSD ... FSG

You must remove the connection cover from the converter in order to connect the line supply and motor to the converter.

- For FSD/FSE, remove the connection cover as shown below:

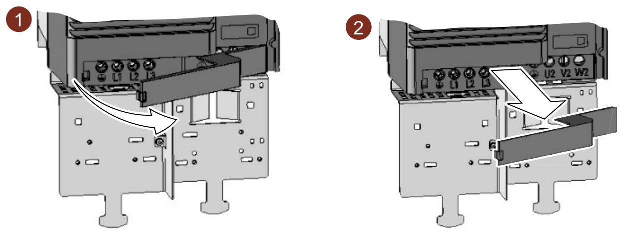


Figure 4-10 Removing the connection cover, FSD/FSE

- For FSF/FSG, remove the two screws from the cover and then remove it. In addition, you must make openings on the connection cover for the line supply and power cables. Use side cutters or a fine saw blade.

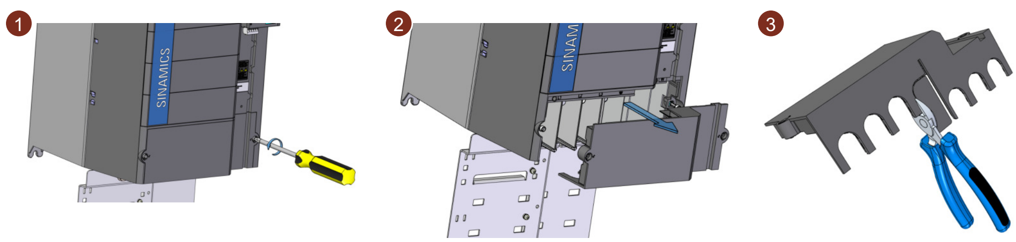


Figure 4-11 Removing the connection cover and making openings, FSF/FSG

After the cables are connected, you must re-attach the cover in order to re-establish the touch protection of the converter.

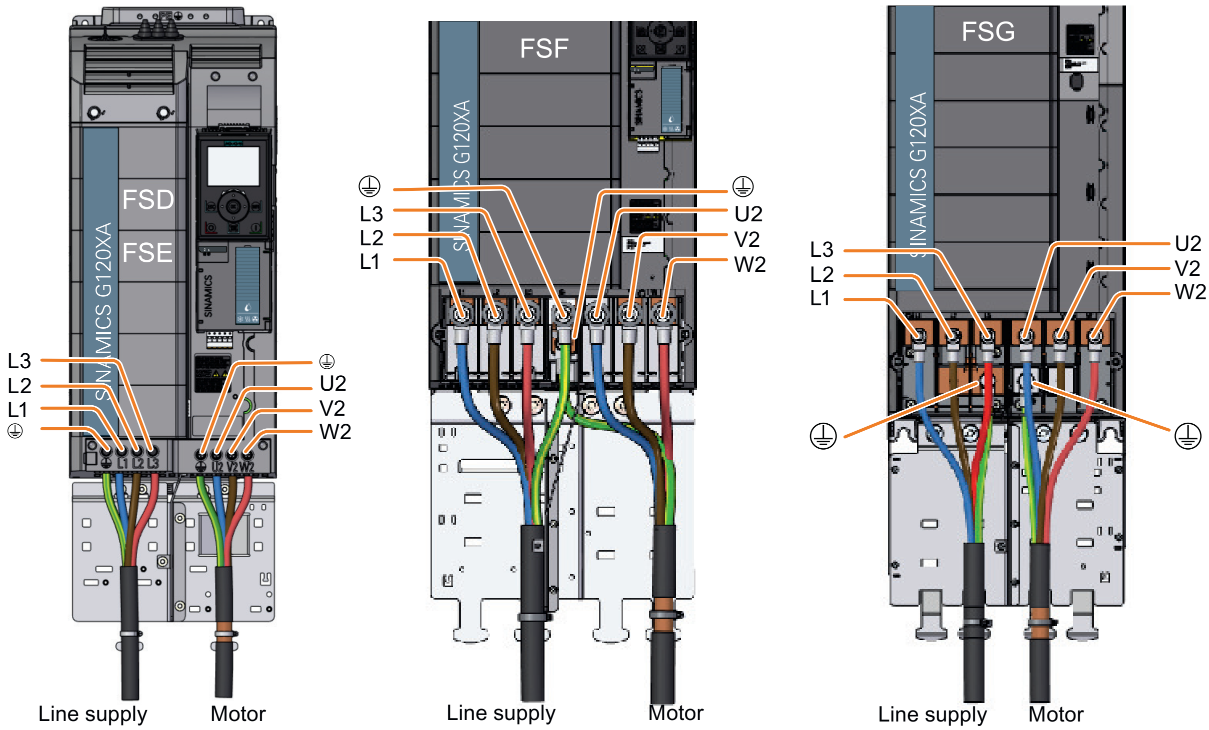
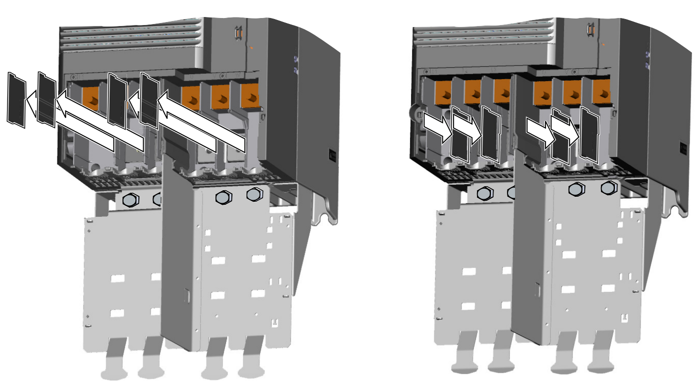


Figure 4-12 Connections for the line supply and motor

Additional information when connecting FSG converters

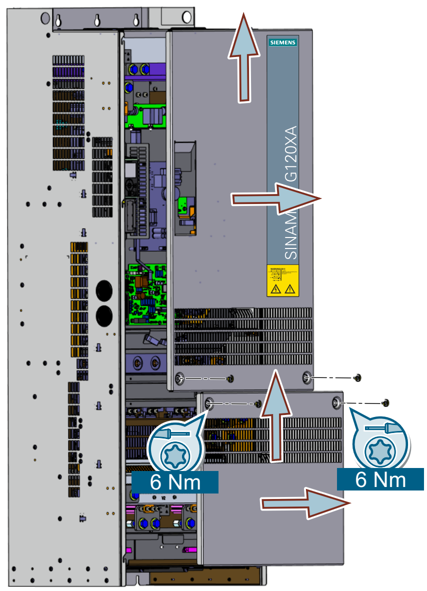
Remove the plastic insulating plate as shown below to gain better access to the terminals for the power connections.



⚠ WARNING
Damage to converter as a result of operation without insulating plates
Without the insulating plates, voltage flashovers may occur between the phases. • Replace the insulating plates after connecting the cables.

Connecting converters, FSH/FSJ

To access the line and motor terminals, release the screws (four screws on FSH, and six screws on FSJ) from the front cover, and remove the cover towards the front. See the following example of removing the covers from converter FSH:



The diagram shows the layout of line and motor terminals, DC link terminals, and terminal strip X9.

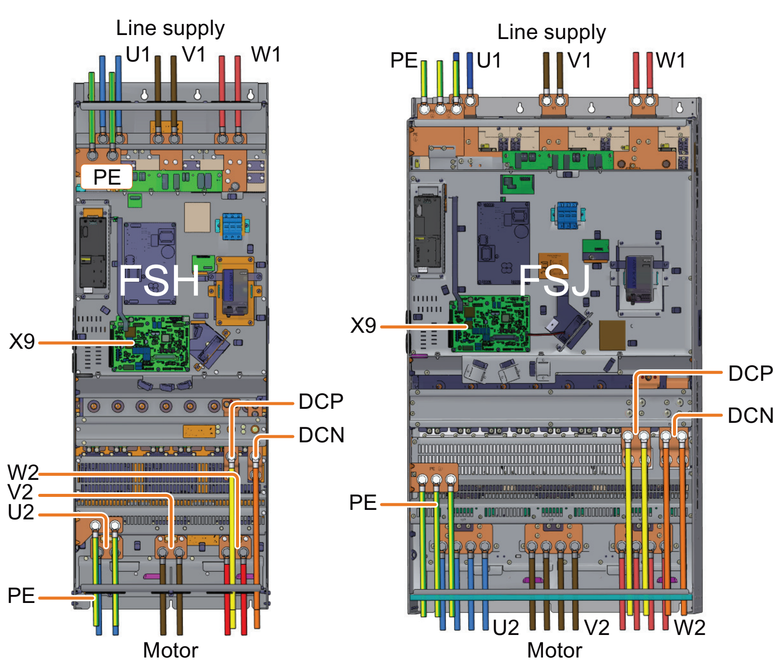


Figure 4-13 Connections for the line supply and motor

Note

For converters FSH/FSJ, the DCP and DCN terminals are only used to connect the dv/dt filters plus VPL.

For more information about the connection of terminal strip X9, see Chapter "Terminal strip X9 (FSH/FSJ only) (Page 115)".

For converter FSH, you must make openings on the cable entry protection cover for the line and motor connections according to the diameter of the cable to be introduced.

After the cables are connected, you must re-attach the covers in order to re-establish the touch protection of the converter (screw tightening torque: 6 Nm/53 lbf.in).

WARNING

Electric shock if the cable entry protection cover is not cut correctly

A cable entry protection cover which is not cut correctly may lead to dangerous touch voltage which can result in serious injury or death.

- Make proper openings on the cover according to the required cable diameter in order to ensure degree of protection IP20.

WARNING

Electric shock due to no prevention from touching the power connection terminals

No cable entry protection is available for converter FSJ, which may lead to dangerous touch voltage.

- The converter must be built in an enclosure of degree of protection IP20 at least, and prevention measures against electric shock must be adopted.

4.1.5.3 Cable cross-sections and screw tightening torques

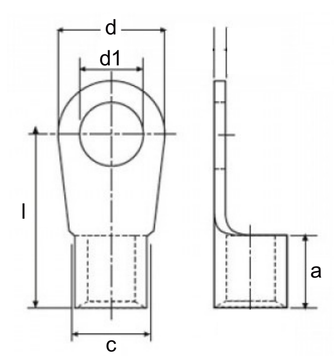
Converter frame size	Terminal/connector type		Cable cross-section		Screw tightening torque - Nm (lbf.in)		Stripped insulation length (mm)
FSA	Line, motor and PE	Screw-type terminal	1.5 ... 2.5 mm²	16 ... 14 AWG	0.5 Nm	4.4 lbf.in	9 ... 10 mm
FSB			1.5 ... 6 mm²	16 ... 10 AWG	1.3 Nm	11.5 lbf.in	12 ... 13 mm
FSC			1.5 ... 16 mm²	16 ... 6 AWG	1.3 Nm	11.5 lbf.in	12 ... 13 mm
FSD	Line, motor and PE	Screw-type terminal	10 ... 35 mm²	8 ... 2 AWG	4.5 Nm	39.8 lbf.in	18 mm
FSE	Line, motor and PE	Screw-type terminal	25 ... 70 mm²	6 ... 3/0 AWG	10 Nm	88.5 lbf.in	25 mm

Converter frame size	Terminal/connector type		Cable cross-section		Screw tightening torque - Nm (lbf.in)		Stripped insulation length (mm)
FSF	Line, motor and PE	 Cable lug according to DIN 46234 for M10 bolts	35 ... 2 × 120 mm²	1 ... 2 × 4/0 AWG	22 ... 25 Nm	194.7 ... 221.3 lbf.in	--
FSG	Line, motor and PE	 Cable lug according to DIN 46234 for M10 bolts	35 ... 2 × 185 mm²	1 ... 2 × 350 MCM	22 ... 25 Nm	194.7 ... 221.3 lbf.in	--
FSH	Line, motor, PE and DC link	 Cable lug according to DIN 46234 for M12 screws [1)]	2 × 240 mm²	2 × 500 MCM	50	442.5	--
FSJ			4 × 240 mm²	4 × 500 MCM			

[1)] Alternative copper busbars can be used for line and motor connections. Make sure that you use copper busbars of the same cross-sections as the connecting busbars of the converter itself (FSH: 60 mm × 6 mm; FSJ 450 kW to 500 kW: 80 mm × 6 mm; FSJ 560 kW: 80 mm × 8 mm).

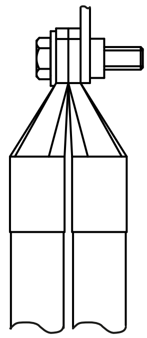
4.1.5.4 Cable lugs

For cable connections using cable lugs, the maximum dimensions of the cable lugs are listed in the table below. These cable lugs are not to exceed these dimensions, as mechanical fastening and adherence to the voltage distances is not guaranteed otherwise.



Converter frame size	Screw/bolt	Cable cross-section (mm²)	a (mm)	c (mm)	d1 (mm)	d (mm)	l (mm)
FSF	M10	120	26	22	10.5	32	59.5
FSG		185	30	27	10.5	39	72.5
FSH/FSJ	M12	240	32	23.5	13	38	56

The cable lugs can be attached as shown in the following diagram if, at one connection per phase, two cable lugs can be connected.



4.1.5.5 Connecting the cable shields (FSA ... FSG only)

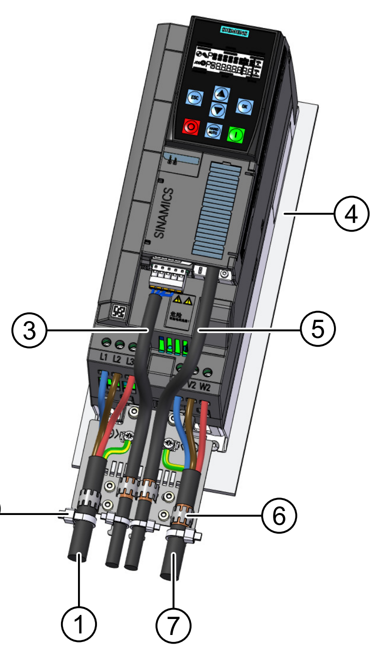
For EMC-compliant wiring, you must connect the cable shields to the shield plate of the converter.

Use shielded cables for the following connection:

- Communication cable
- Control cable
- Motor cable

Before connecting the cable shields, you need to strip the cable insulation.

Connecting the cable shields, FSA ... FSC



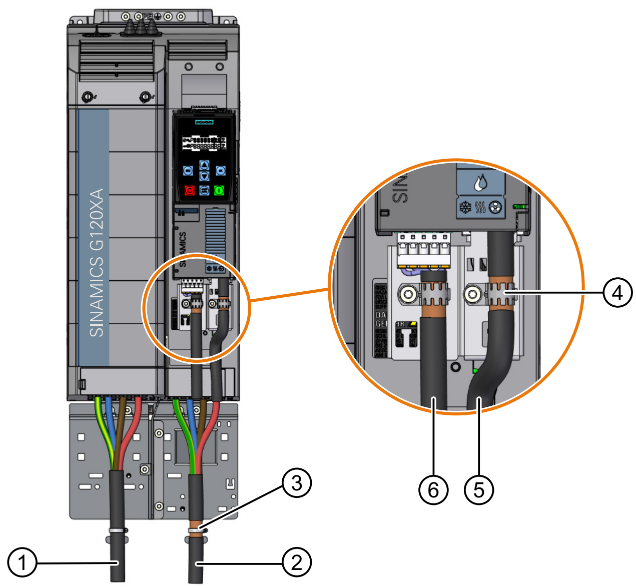
The shield support for converter FSB is displayed as an example.

① Unshielded line cable
② Cable tie
③ Shielded communication cable
④ Unlacquered, good electrically conducting mounting plate
⑤ Shielded control cable
⑥ Toothed tape
⑦ Shielded motor cable

Note

For FSA ... FSC, connect the cable shields of the communication cable and the control cable to the same point of the shield plate using one toothed tape.

Connecting the cable shields, FSD ... FSG



The shield support for converter FSD is displayed as an example.

① Unshielded line cable	④ Toothed tape
② Shielded motor cable	⑤ Shielded control cable
③ Hose clamp	⑥ Shielded communication cable

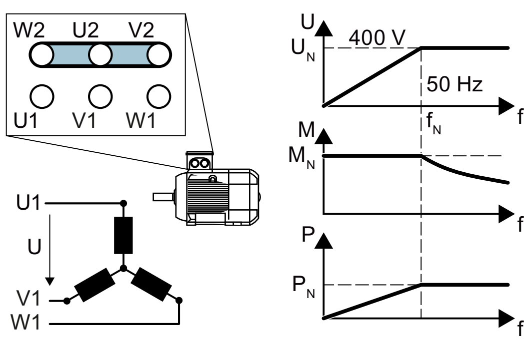
4.1.6 Connecting the motor to the converter in a star or delta connection

Overview

Standard induction motors up to a rated power of approximately 3 kW are usually connected in star/delta connection (Y/Δ) at 400 V/230 V. For a 400-V line supply, you can connect the motor to the converter either in a star or in a delta connection.

Function description

Operating the motor in a star connection

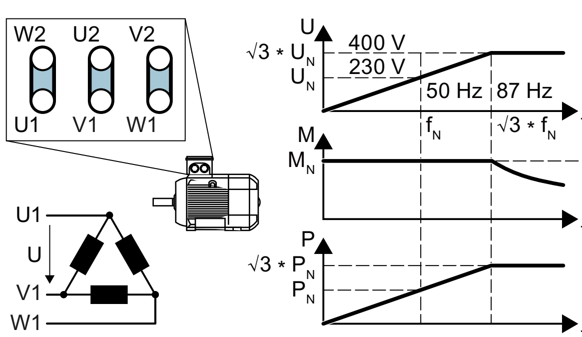


In a star connection, the motor can provide its rated torque M_N in the range 0 ... rated frequency f_N.

Rated voltage U_N = 400 V is available at a rated frequency f_N = 50 Hz.

The motor goes into field weakening above the rated frequency. In field weakening, the available motor torque decreases proportionally with 1/f. In field weakening, the available power remains constant.

Operating the motor in a delta connection with 87 Hz characteristic



In a delta connection, the motor is operated with a voltage and frequency above its rated values. As a consequence, the motor power is increased by a factor $\sqrt{3} \approx 1.73$.

In the range f = 0 ... 87 Hz, the motor can output its rated torque M_N.

The maximum voltage U = 400 V is available at a frequency of $f = \sqrt{3} \times 50$ Hz ≈ 87 Hz.

The motor only goes into field weakening above 87 Hz.

The higher motor power when operated with an 87 Hz characteristic has the following disadvantages:

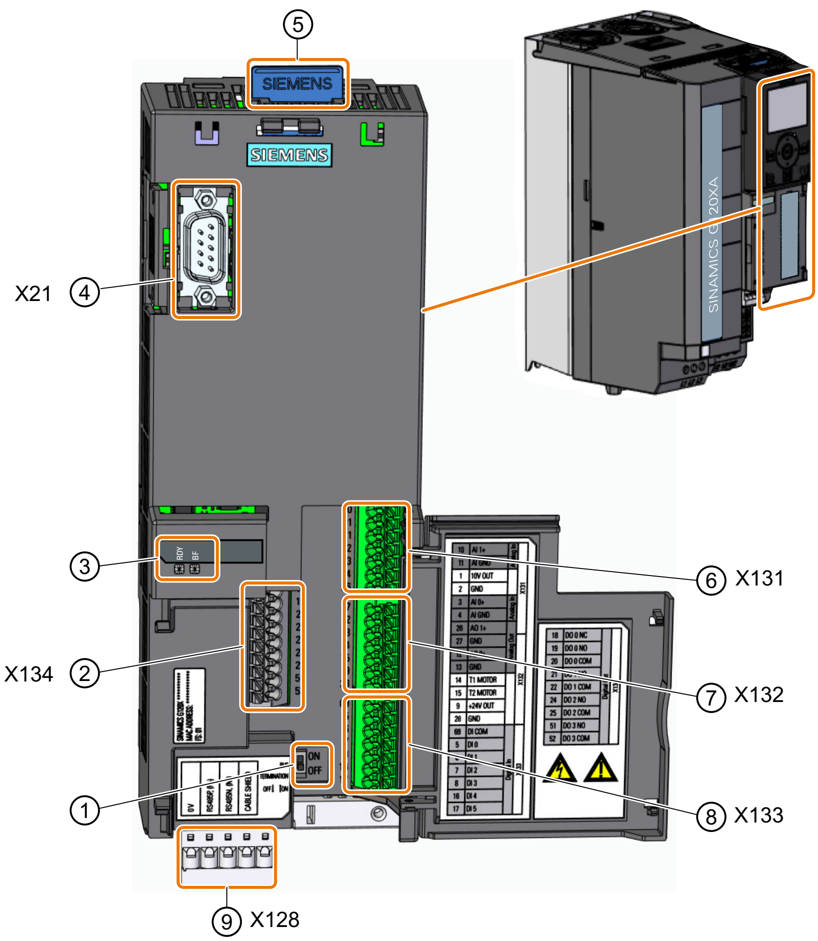
- The converter must supply approximately 1.73x current. Select a converter based on its rated current - and not its rated power.
- The motor temperature increases more significantly than when operated with f ≤ 50 Hz.
- The motor must have windings that are approved for a voltage > rated voltage U_N.
- As the fan impeller rotates faster, the motor has a higher noise level than operation with f ≤ 50 Hz.

4.2 Control interfaces

4.2.1 Overview of the interfaces

Overview

To access the interfaces, you must open the front door.



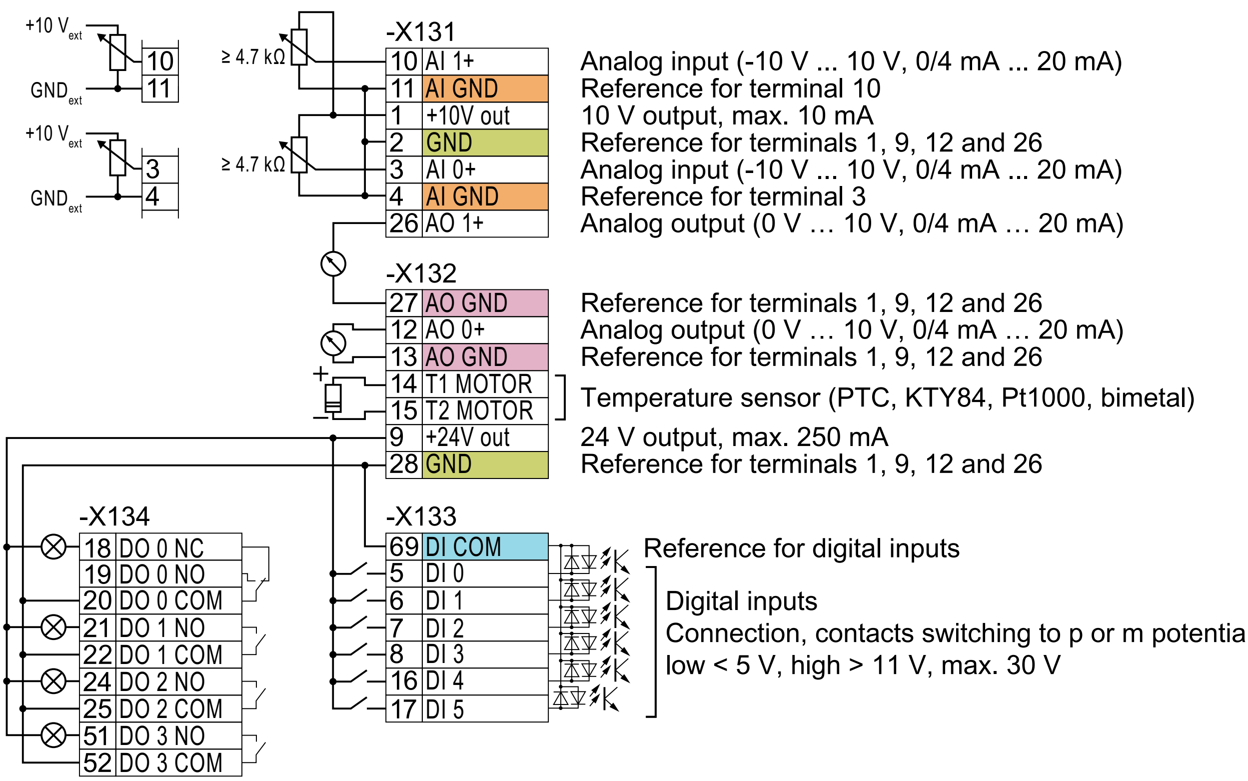
①	Bus terminating resistor	②	Terminal strip
③	Status LED	④	Connection to the operator panel or SINAMICS G120 Smart Access
⑤	Memory card slot		
⑥⑦⑧	Terminal strips	⑨	Fieldbus interfaces at the lower side

Table 4-6 Number of inputs and outputs

Digital inputs DI	Digital outputs DO	Analog inputs AI	Analog outputs AO	Input for motor temperature sensor
6	4	2	2	1

4.2.2 Terminal strips

Terminal strips with wiring example



Digital outputs, max. 1 A 30 V DC/1 A 250 V AC [1)]

1) The digital outputs are designed for low voltage systems of overvoltage category II.
In installations of overvoltage category III, galvanic isolation is required between the supply network and the digital output.

Figure 4-14 Wiring the digital inputs with p-switching contacts and an internal 24 V power supply (terminal 9)

GND	All terminals with the "GND" reference potential are internally connected with one another.
DI COM	The reference potential "DI COM" is not internally connected with "GND". → If, as shown above, you wish to use the 24 V supply from terminal 9 as supply for the digital inputs, a jumper is required between terminals 28 and 69.
AO GND	The reference potential of the analog outputs is not internally connected with "GND".

10	AI 1+
11	AI GND

3	AI 0+
4	AI GND

You may use the internal 10 V power supply or an external power supply to supply the analog inputs.
→ When you use the internal 10 V power supply, you must connect "AI GND" with "GND".

Additional options for wiring the digital inputs

The following diagram shows how you supply the digital inputs and digital outputs with an external voltage.

You must connect terminals 28 and 69 together if the external and the internal power supplies should be at the same potential.

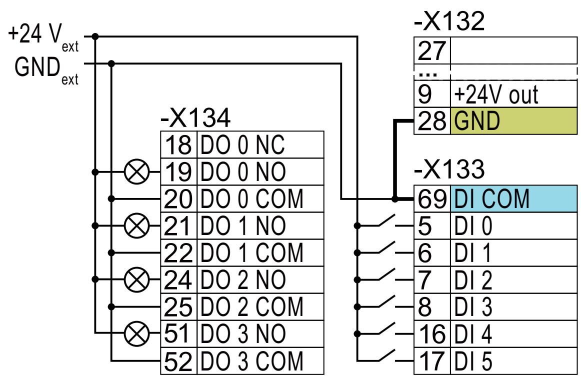


Figure 4-15 Connecting contacts switching to p potential with an external power supply

The following diagram shows how you use the digital inputs for the contacts that switch to m potential.

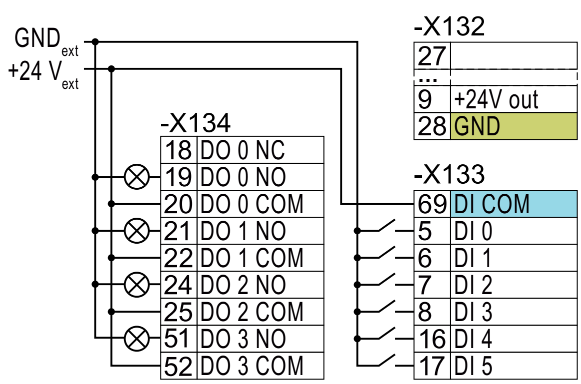


Figure 4-16 Connecting contacts switching to m potential with an external power supply

> **WARNING**
>
> **Electric shock due to unsuitable power supply**
>
> When equipment is connected to an unsuitable power supply, exposed components may carry a hazardous voltage that might result in serious injury or death.
>
> - Only use power supplies that provide SELV (Safety Extra Low Voltage) or PELV- (Protective Extra Low Voltage) output voltages (maximum 60 V DC briefly) for all connections and terminals of the electronics modules.

4.2.3 Factory interface settings

Function description

The fieldbus interface is not active in the factory setting.

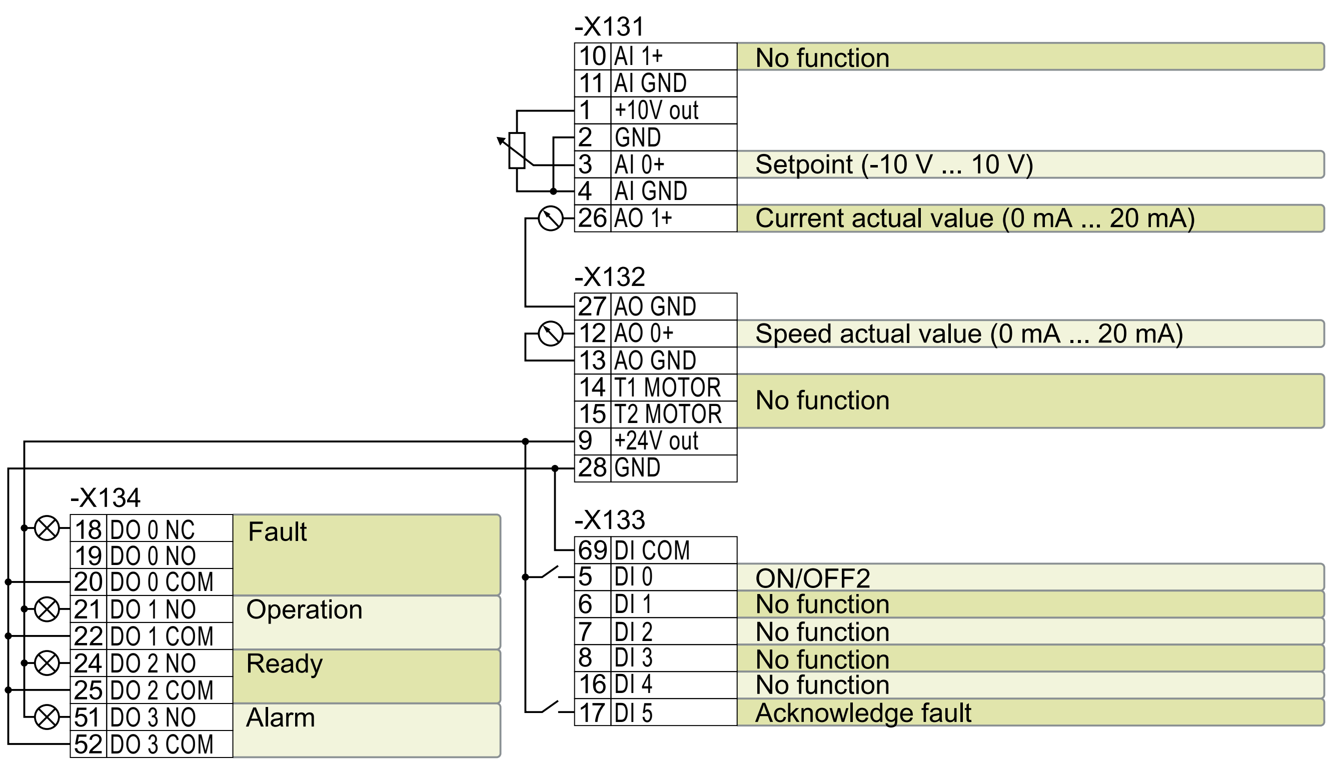


Figure 4-17 Factory interface settings

4.2.4 Default setting of the interfaces (macros)

4.2.4.1 Overview

Function description

The function of most of the converter terminals can be set.

In order to avoid having to successively change terminal for terminal, multiple terminals can be set jointly for quick commissioning. Parameter p0015 for quick commissioning initiates a macro that adopts the setting of the terminals.

Table 4-7 Overview of default settings, Part 1/2

	Default setting (macro)					
Terminal	**41**	**42**	**43**	**44**	**45**	**46**
AI 0	Setpoint	Setpoint	Setpoint	Setpoint	Setpoint	Setpoint local
AI 1	-	PID actual value	PID actual value	PID actual value	-	Setpoint remote
AO 0	Speed actual value	Speed actual value	Speed actual value	Speed actual value	Speed actual value	Speed actual value
AO 1	Current actual value	Current actual value	Current actual value	Current actual value	Current actual value	Current actual value
DI 0	ON/OFF2	ON/OFF2	ON/OFF2	ON/OFF2	ON/OFF2	ON/OFF2 local
DI 1	-	-	Service pump 1	Service pump 1	Fixed setpoint 1	ON/OFF2 remote
DI 2	-	-	Service pump 2	Service pump 2	Fixed setpoint 2	-
DI 3	-	-	-	Service pump 3	Fixed setpoint 3	-
DI 4	-	manual ↔ auto	manual ↔ auto	manual ↔ auto	-	local ↔ remote
DI 5	Acknowledge fault	Acknowledge fault	Acknowledge fault	Acknowledge fault	Acknowledge fault	Acknowledge fault
DO 0	Fault	Fault	Fault	Fault	Fault	Fault
DO 1	Operation	Operation	Operation	Pump 1	Operation	Operation
DO 2	Ready	Ready	Pump 1	Pump 2	Ready	Ready
DO 3	Alarm	Alarm	Pump 2	Pump 3	Alarm	Alarm
Fieldbus	-	-	-	-	-	-

Table 4-8 Overview of default settings, Part 2/2

	Default setting (macro)						
Terminal	**47**	**48**	**49**	**51**	**52**	**54**	**55**
AI 0	-	-	-	-	Setpoint local	-	Setpoint local
AI 1	PID actual value	PID actual value	PID actual value	-	-	-	-
AO 0	Speed actual value	Speed actual value	Speed actual value	Speed actual value	Speed actual value	Speed actual value	Speed actual value
AO 1	Current actual value	Current actual value	Current actual value	Current actual value	Current actual value	Current actual value	Current actual value

	Default setting (macro)						
Terminal	**47**	**48**	**49**	**51**	**52**	**54**	**55**
DI 0	ON/OFF2	ON/OFF2	ON/OFF2	ON/OFF2	ON/OFF2 local	ON/OFF2	ON/OFF2 local
DI 1	-	Service pump 1	Service pump 1	-	ON/OFF2 remote	-	ON/OFF2 remote
DI 2	-	Service pump 2	Service pump 2	-	-	-	-
DI 3	-	-	Service pump 3	-	-	-	-
DI 4	-	manual ↔ auto	manual ↔ auto	-	local ↔ remote	-	local ↔ remote
DI 5	Acknowledge fault	Acknowledge fault	Acknowledge fault	Acknowledge fault	Acknowledge fault	Acknowledge fault	Acknowledge fault
DO 0	Fault	Fault	Fault	Fault	Fault	Fault	Fault
DO 1	Operation	Operation	Pump 1	Operation	Operation	Operation	Operation
DO 2	Ready	Pump 1	Pump 2	Ready	Ready	Ready	Ready
DO 3	Alarm	Pump 2	Pump 3	Alarm	Alarm	Alarm	Alarm
Fieldbus	-	-	-	Modbus RTU	Modbus RTU	USS	USS

More information

The default terminal settings can be adjusted to suit your requirements.

Adapt the default setting of the terminal strips (Page 177)

4.2.4.2 Default setting (macro) 41: "Analog control"

Function description

"Analog control" is the default factory setting.

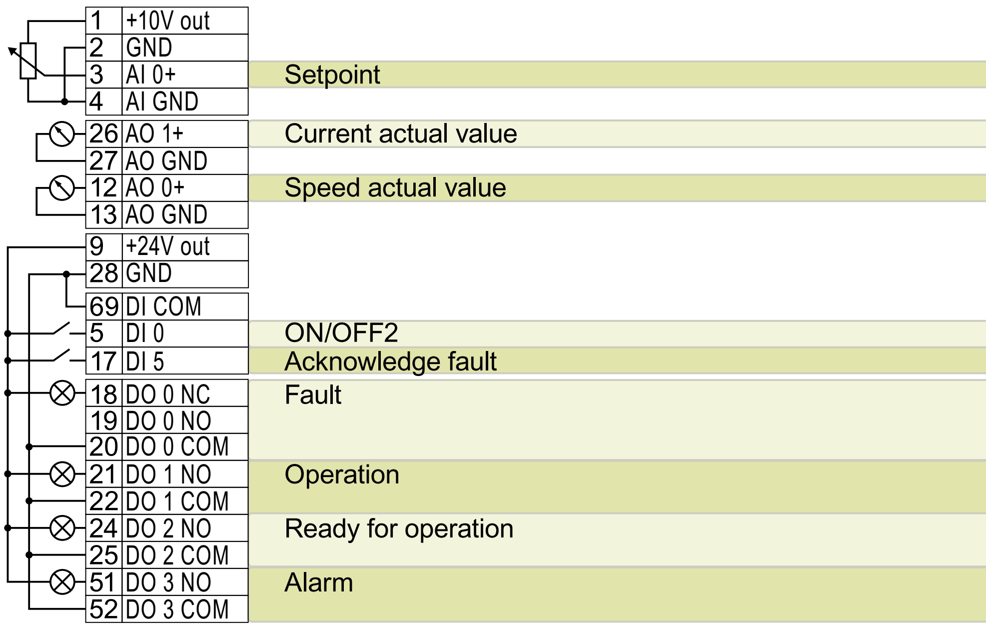


Table 4-9 Characteristics

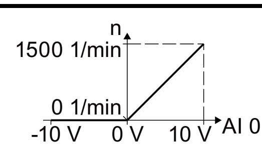
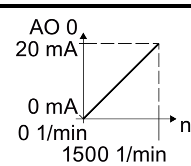
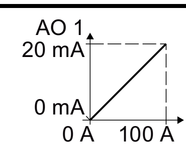
Analog input	Analog outputs	
		

Table 4-10 Procedure for selecting the default setting

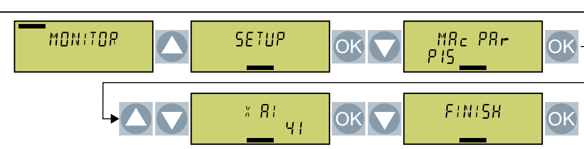
Operator panel BOP-2	
Operator panel IOP-2	→ Setup → Quick commissioning → I/O setup → Select macro → (41) Analog control → Complete setup
Smart Access	→ Quick setup → I/O configuration → 41: Analog control → Complete quick setup

Table 4-11 Parameters that define the functions of the inputs and outputs

<table>
<tr><th>Setting</th><th>Parameter</th><th>Setting</th><th>Parameter</th></tr>
<tr><td>Default setting 41</td><td>p0015 = 41</td><td rowspan="2">DI 0

ON/OFF1
OFF2
DI 5</td><td rowspan="2">p29652[0] = 722.0
p29650[0] = 0
p0840[0] = 29659.0
p0844[0] = 29659.1
p2104[0] = 722.5</td></tr>
<tr><td>AI 0</td><td>p1070[0] = 755[0]</td></tr>
<tr><td>AO 0</td><td>p0771[0] = 21</td><td rowspan="2">DO 0
DO 1
DO 2
DO 3</td><td rowspan="2">p0730 = 52.3
p0731 = 52.2
p0732 = 52.0
p0733 = 52.7</td></tr>
<tr><td>AO 1</td><td>p0771[1] = 27</td></tr>
</table>

4.2.4.3 Default setting (macro) 42: "PID controller with analog control"

Function description

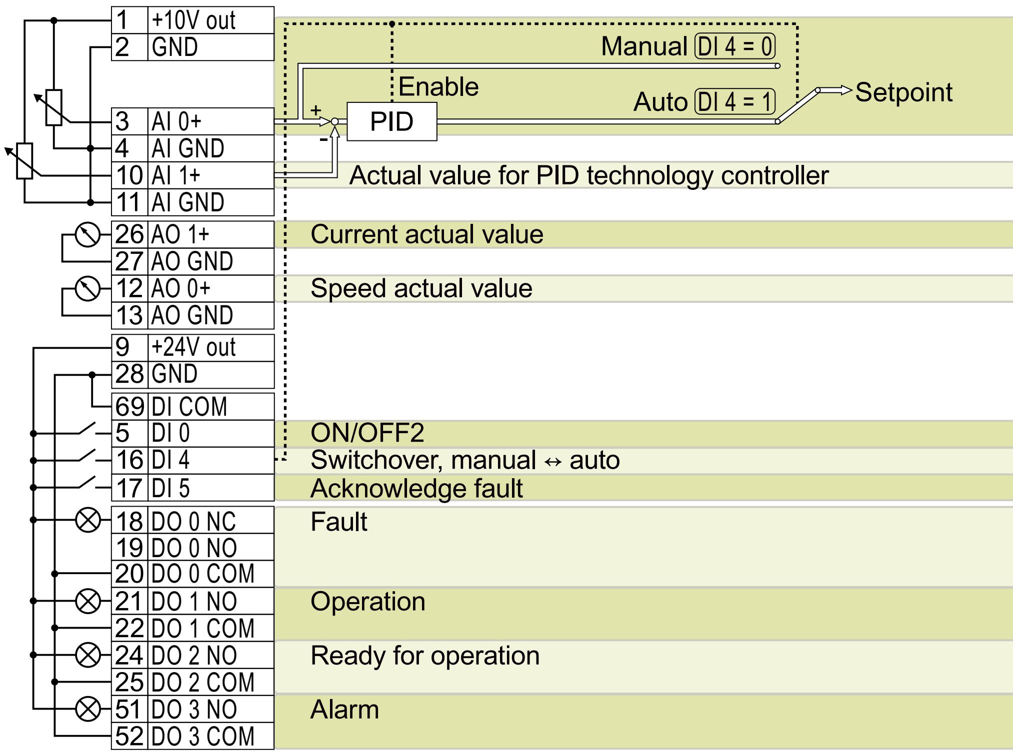


Table 4-12 Characteristics

Analog inputs		Analog outputs	

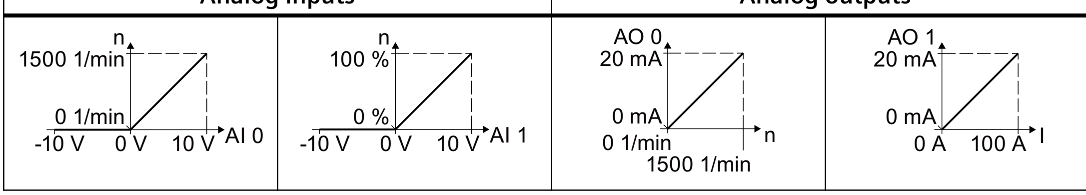


Table 4-13 Procedure for selecting the default setting

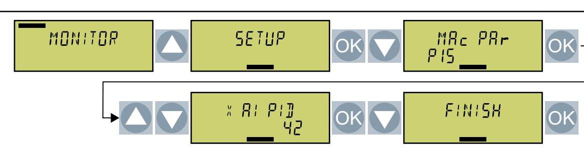
Operator panel BOP-2	
Operator panel IOP-2	→ Setup → Quick commissioning → I/O setup → Select macro → (42) PID controller with analog control → Complete setup
Smart Access	→ Quick setup → I/O configuration → 42: PID controller with analog control → Complete quick setup

Table 4-14 Parameters that define the functions of the inputs and outputs

Setting	Parameter	Setting	Parameter
Default setting 42	p0015 = 42	DI 0 ON/OFF1 OFF2 DI 4 DI 5	p29652[0] = 722.0 p29650[0] = 0 p0840[0] = 29659.0 p0844[0] = 29659.1 p2200 = 722.4 p2104[0] = 722.5
AI 0	p2253[0] = 755[0] p1070[0] = 755[0]		
AI 1	p2264[0] = 755[1]		
AO 0	p0771[0] = 21	DO 0 DO 1 DO 2 DO 3	p0730 = 52.3 p0731 = 52.2 p0732 = 52.0 p0733 = 52.7
AO 1	p0771[1] = 27		

4.2.4.4 Default setting (macro) 43: "2 pumps with analog control"

Function description

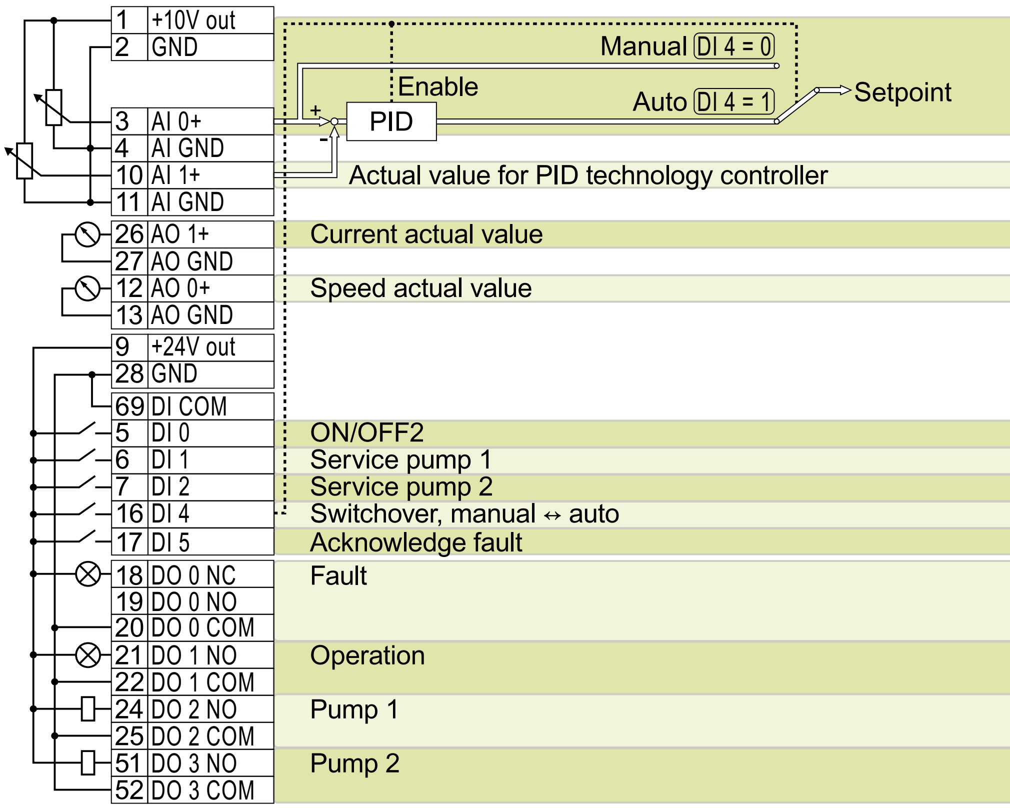


Table 4-15 Characteristics

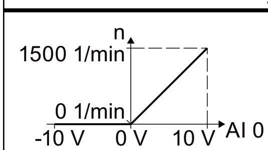
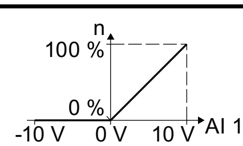
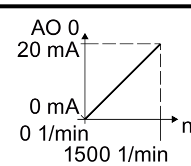
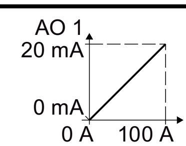
Analog inputs		Analog outputs	
			

Table 4-16 Procedure for selecting the default setting

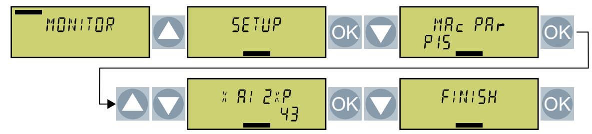
<table>
<tr><td>Operator panel BOP-2</td><td>
</td></tr>
<tr><td>Operator panel IOP-2</td><td>→ Setup → Quick commissioning → I/O setup → Select macro → (43) 2 pumps with analog control → Complete setup</td></tr>
<tr><td>Smart Access</td><td>→ Quick setup → I/O configuration → 43: 2 pumps with analog control → Complete quick setup</td></tr>
</table>

Table 4-17 Parameters that define the functions of the inputs and outputs

<table>
<tr><th>Setting</th><th>Parameter</th><th>Setting</th><th>Parameter</th></tr>
<tr><td>Default setting 43</td><td>p0015 = 43</td><td rowspan="3">DI 0

ON/OFF1
OFF2
DI 1
DI 2
DI 4
DI 5</td><td rowspan="3">p29652[0] = 722.0
p29650[0] = 0
p0840[0] = 29659.0
p0844[0] = 29659.1
p29543[0] = 722.1
p29543[1] = 722.2
p2200 = 722.4
p2104[0] = 722.5</td></tr>
<tr><td>AI 0</td><td>p2253[0] = 755[0]
p1070[0] = 755[0]</td></tr>
<tr><td>AI 1</td><td>p2264[0] = 755[1]</td></tr>
<tr><td>AO 0</td><td>p0771[0] = 21</td><td rowspan="2">Multi-pump control</td><td rowspan="2">p29520 = 1
p29521 = 2
p29539 = 1
p29540 = 1</td></tr>
<tr><td rowspan="2">AO 1</td><td rowspan="2">p0771[1] = 27</td></tr>
<tr><td>DO 0
DO 1
DO 2
DO 3</td><td>p0730 = 52.3
p0731 = 52.2
p0732 = 29529.0
p0733 = 29529.1</td></tr>
</table>

4.2.4.5 Default setting (macro) 44: "3 pumps with analog setpoint"

Function description

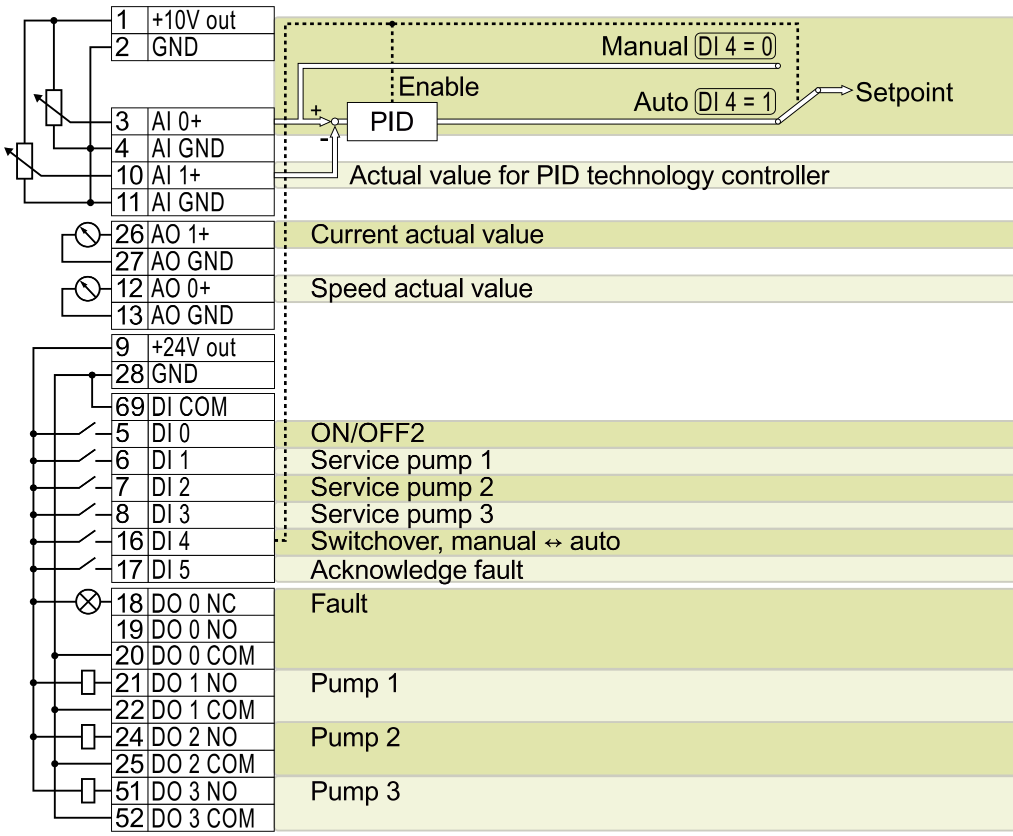


Table 4-18 Characteristics

Analog inputs		Analog outputs	

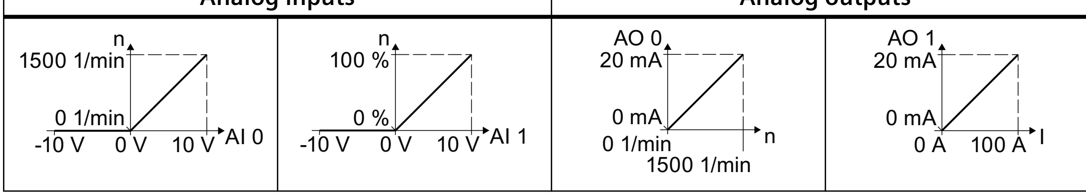


Table 4-19 Procedure for selecting the default setting

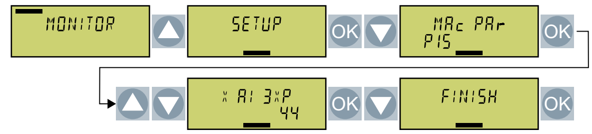
Operator panel BOP-2	
Operator panel IOP-2	→ Setup → Quick commissioning → I/O setup → Select macro → (44) 3 pumps with analog setpoint → Complete setup
Smart Access	→ Quick setup → I/O configuration → 44: 3 pumps with analog setpoint → Complete quick setup

Table 4-20 Parameters that define the functions of the inputs and outputs

Setting	Parameter	Setting	Parameter
Default setting 44	p0015 = 44	DI 0 ON/OFF1 OFF2 DI 1 DI 2 DI 3 DI 4 DI 5	p29652[0] = 722.0 p29650[0] = 0 p0840[0] = 29659.0 p0844[0] = 29659.1 p29543[0] = 722.1 p29543[1] = 722.2 p29543[2] = 722.3 p2200 = 722.4 p2104[0] = 722.5
AI 0	p2253[0] = 755[0] p1070[0] = 755[0]		
AI 1	p2264[0] = 755[1]		
AO 0	p0771[0] = 21		
AO 1	p0771[1] = 27		
Multi-pump control	p29520 = 1 p29521 = 3 p29539 = 1 p29540 = 1	DO 0 DO 1 DO 2 DO 3	p0730 = 52.3 p0731 = 29529.0 p0732 = 29529.1 p0733 = 29529.2

4.2.4.6 Default setting (macro) 45: "Fixed setpoint control"

Function description

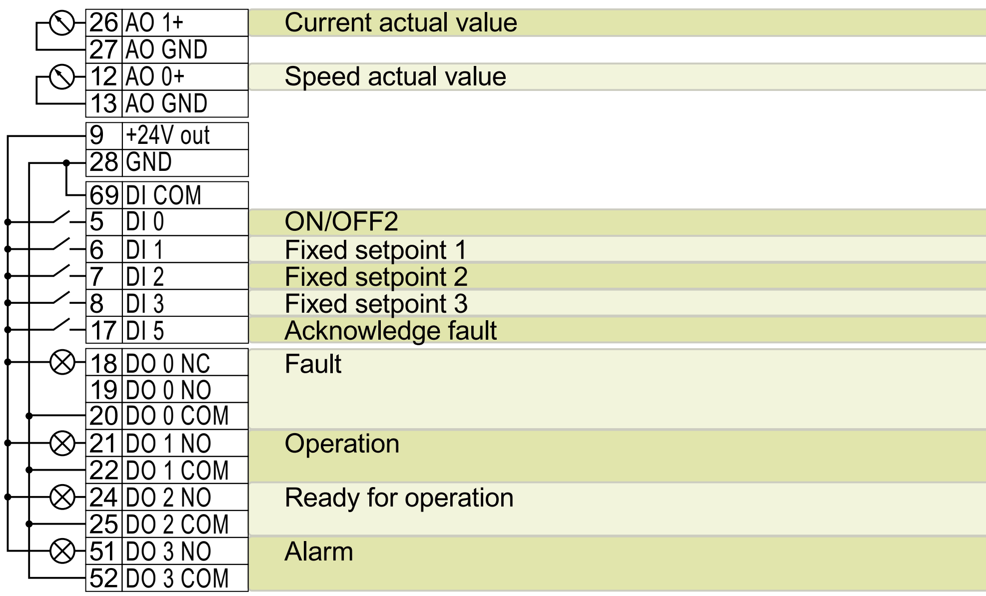


Table 4-21 Characteristics

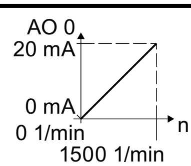
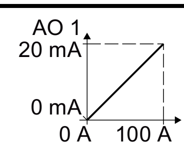
Analog outputs	
	

Table 4-22 Procedure for selecting the default setting

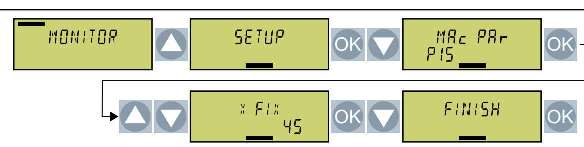
Operator panel BOP-2	
Operator panel IOP-2	→ Setup → Quick commissioning → I/O setup → Select macro → (45) Fixed setpoint control → Complete setup
Smart Access	→ Quick setup → I/O configuration → 45: Fixed setpoint control → Complete quick setup

Table 4-23 Parameters that define the functions of the inputs and outputs

<table>
<tr><th>Setting</th><th>Parameter</th><th>Setting</th><th>Parameter</th></tr>
<tr><td>Default setting 45</td><td>p0015 = 45</td><td rowspan="4">DI 0

ON/OFF1
OFF2
DI 1
DI 2
DI 3
DI 5</td><td rowspan="4">p29652[0] = 722.0
p29650[0] = 0
p0840[0] = 29659.0
p0844[0] = 29659.1
p1020[0] = 722.1
p1021[0] = 722.2
p1022[0] = 722.3
p2104[0] = 722.5</td></tr>
<tr><td>AO 0</td><td>p0771[0] = 21</td></tr>
<tr><td>AO 1</td><td>p0771[1] = 27</td></tr>
<tr><td rowspan="2">Fixed setpoint</td><td rowspan="2">p1070 = 1024
p1016 = 2</td></tr>
<tr><td>DO 0
DO 1
DO 2
DO 3</td><td>p0730 = 52.3
p0731 = 52.2
p0732 = 52.0
p0733 = 52.7</td></tr>
</table>

4.2.4.7 Default setting (macro) 46: "AI control local/remote"

Function description

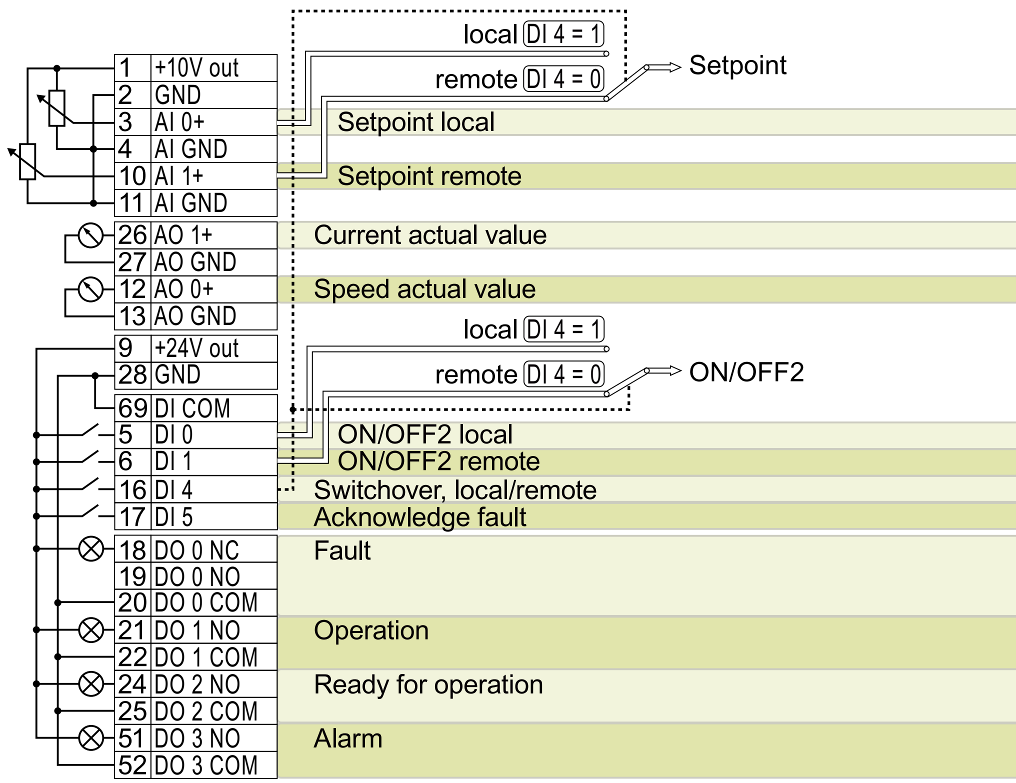


Table 4-24 Characteristics

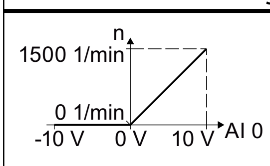
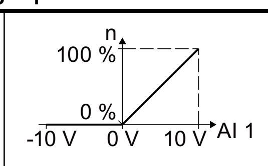
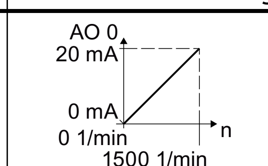
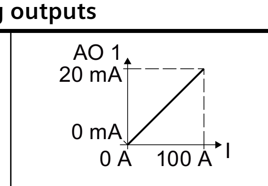
Analog inputs		Analog outputs	
			

Table 4-25 Procedure for selecting the default setting

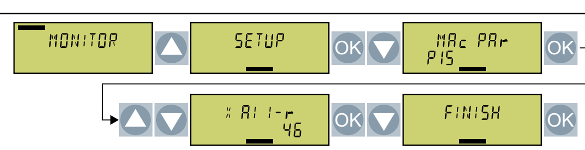
Operator panel BOP-2	
Operator panel IOP-2	→ Setup → Quick commissioning → I/O setup → Select macro → (46) AI control local/remote → Complete setup
Smart Access	→ Quick setup → I/O configuration → 46: AI control local/remote → Complete quick setup

Table 4-26 Parameters that define the functions of the inputs and outputs

Setting	Parameter	Setting	Parameter
Default setting 46	p0015 = 46	DI 0 ON/OFF1 OFF2 DI 1 DI 4 DI 5	p29652[1] = 722.0 p29650[0] = 1 p0840[0] = 29659.0 p0844[0] = 29659.1 p29652[0] = 722.1 p0810 = 722.4 p2104[0...1] = 722.5
AI 0	p1070[1] = 755[0]		
AI 1	p1070[0] = 755[1]		
AO 0	p0771[0] = 21		
AO 1	p0771[1] = 27	DO 0 DO 1 DO 2 DO 3	p0730 = 52.3 p0731 = 52.2 p0732 = 52.0 p0733 = 52.7

4.2.4.8 Default setting (macro) 47: "PID controller with internal fixed setpoint"

Function description

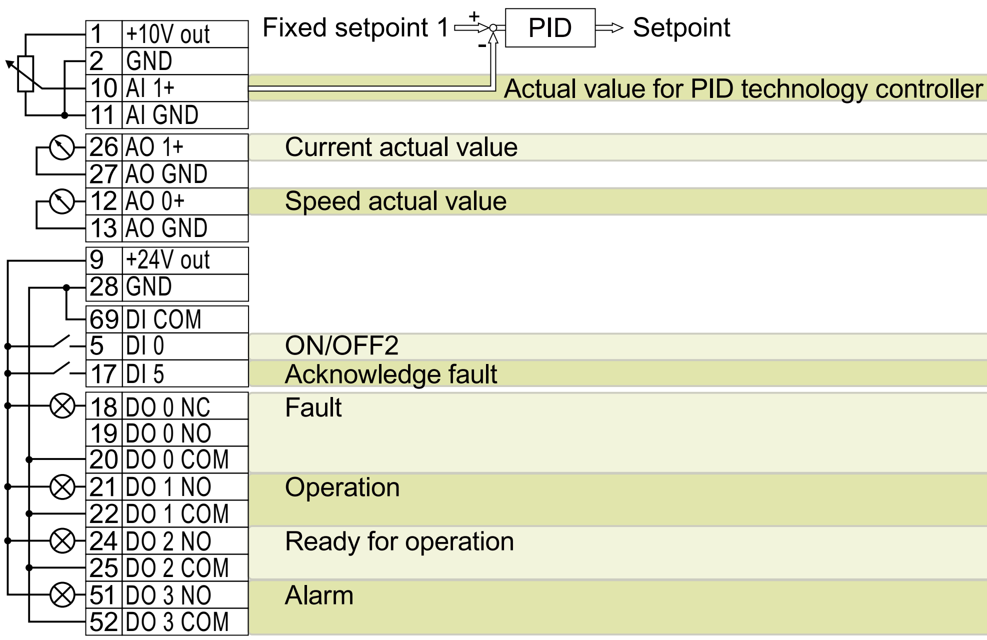


Table 4-27 Characteristics

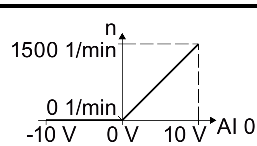
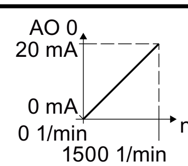
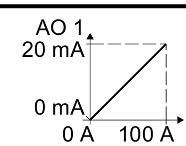
Analog input	Analog outputs	
		

Table 4-28 Procedure for selecting the default setting

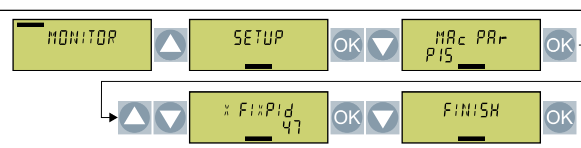
Operator panel BOP-2	
Operator panel IOP-2	→ Setup → Quick commissioning → I/O setup → Select macro → (47) PID controller with internal fixed setpoint → Complete setup
Smart Access	→ Quick setup → I/O configuration → 47: PID controller with internal fixed setpoint → Complete quick setup

Table 4-29 Parameters that define the functions of the inputs and outputs

<table>
<tr><th>Setting</th><th>Parameter</th><th>Setting</th><th>Parameter</th></tr>
<tr><td>Default setting 47</td><td>p0015 = 47</td><td rowspan="4">DI 0

ON/OFF1
OFF2
DI 5</td><td rowspan="4">p29652[0] = 722.0
p29650[0] = 0
p0840[0] = 29659.0
p0844[0] = 29659.1
p2104[0] = 722.5</td></tr>
<tr><td>AI 1</td><td>p2264[0] = 755[1]</td></tr>
<tr><td>AO 0</td><td>p0771[0] = 21</td></tr>
<tr><td>AO 1</td><td>p0771[1] = 27</td></tr>
<tr><td>Setpoint</td><td>p2253[0] = 2224
p2220[0] = 1
p2200 = 65536</td><td>DO 0
DO 1
DO 2
DO 3</td><td>p0730 = 52.3
p0731 = 52.2
p0732 = 52.0
p0733 = 52.7</td></tr>
</table>

4.2.4.9 Default setting (macro) 48: "2 pumps and internal fixed setpoint"

Function description

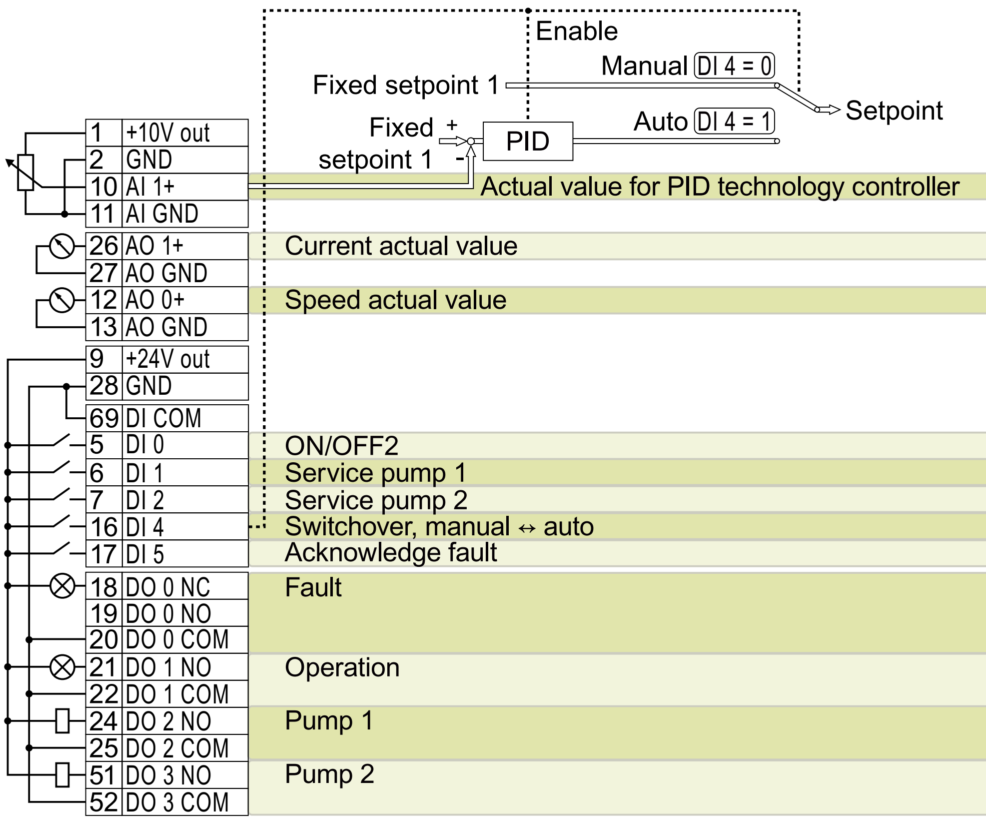


Table 4-30 Characteristics

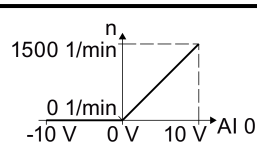
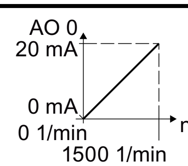
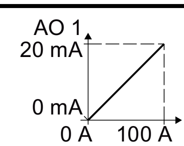
Analog input	Analog outputs	
		

Table 4-31 Procedure for selecting the default setting

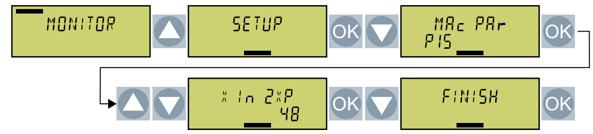
Operator panel BOP-2	
Operator panel IOP-2	→ Setup → Quick commissioning → I/O setup → Select macro → (48) 2 pumps and internal fixed setpoint → Complete setup
Smart Access	→ Quick setup → I/O configuration → 48: 2 pumps and internal fixed setpoint → Complete quick setup

Table 4-32 Parameters that define the functions of the inputs and outputs

Setting	Parameter	Setting	Parameter
Default setting 48	p0015 = 48	DI 0 ON/OFF1 OFF2 DI 1 DI 2 DI 4 DI 5	p29652[0] = 722.0 p29650[0] = 0 p0840[0] = 29659.0 p0844[0] = 29659.1 p29543[0] = 722.1 p29543[1] = 722.2 p2200[0] = 722.4 p2104[0] = 722.5
AI 1	p2264[0] = 755[1]		
AO 0	p0771[0] = 21		
AO 1	p0771[1] = 27		
Setpoint	p1070[0] = 1024 p2253[0] = 2224 p1020[0] = 65536	DO 0 DO 1 DO 2 DO 3	p0730 = 52.3 p0731 = 52.2 p0732 = 29529.0 p0733 = 29529.1
Multi-pump control	p29520 = 1 p29521 = 2 p29539 = 1 p29540 = 1		

4.2.4.10 Default setting (macro) 49: "3 pumps and internal fixed setpoint"

Function description

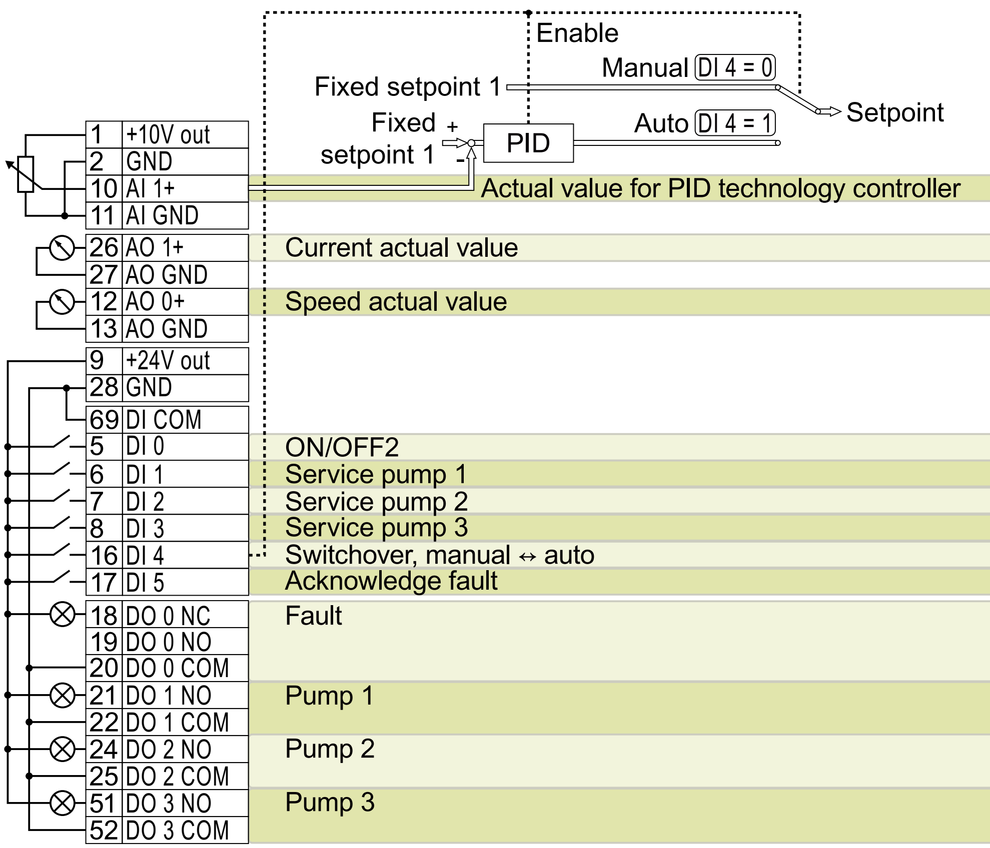


Table 4-33 Characteristics

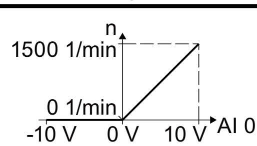
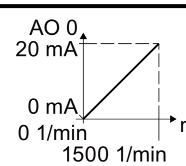
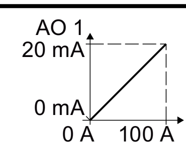
Analog input	Analog outputs	
		

Table 4-34 Procedure for selecting the default setting

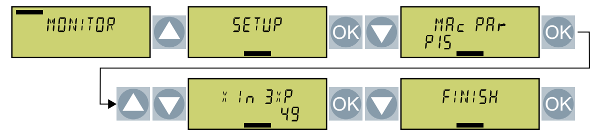
Operator panel BOP-2	
Operator panel IOP-2	→ Setup → Quick commissioning → I/O setup → Select macro → (49) 3 pumps and internal fixed setpoint → Complete setup
Smart Access	→ Quick setup → I/O configuration → 49: 3 pumps and internal fixed setpoint → Complete quick setup

Table 4-35 Parameters that define the functions of the inputs and outputs

<table>
<tr><th>Setting</th><th>Parameter</th><th>Setting</th><th>Parameter</th></tr>
<tr><td>Default setting 49</td><td>p0015 = 49</td><td rowspan="5">DI 0

ON/OFF1
OFF2
DI 1
DI 2
DI 3
DI 4
DI 5</td><td rowspan="5">p29652[0] = 722.0
p29650[0] = 0
p0840[0] = 29659.0
p0844[0] = 29659.1
p29543[0] = 722.1
p29543[1] = 722.2
p29543[2] = 722.3
p2200 = 722.4
p2104[0] = 722.5</td></tr>
<tr><td>AI 1</td><td>p2264[0] = 755[1]</td></tr>
<tr><td>AO 0</td><td>p0771[0] = 21</td></tr>
<tr><td>AO 1</td><td>p0771[1] = 27</td></tr>
<tr><td>Setpoint</td><td>p1070[0] = 1024
p2253[0] = 2224
p1020[0] = 65536</td></tr>
<tr><td>Multi-pump control</td><td>p29520 = 1
p29521 = 3
p29539 = 1
p29540 = 1</td><td>DO 0
DO 1
DO 2
DO 3</td><td>p0730 = 52.3
p0731 = 29529.0
p0732 = 29529.1
p0733 = 29529.2</td></tr>
</table>

4.2.4.11 Default setting (macro) 51: "Modbus RTU control"

Function description

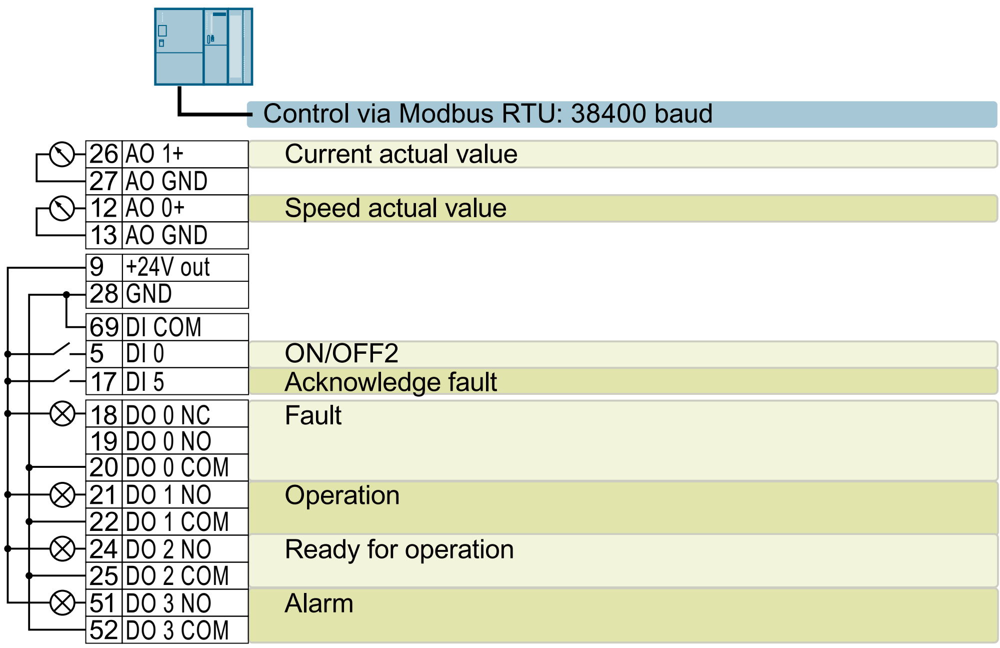


Table 4-36 Characteristics

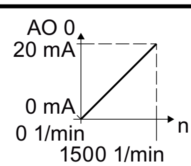
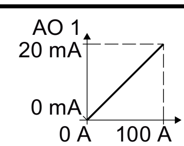
Analog outputs	
	

Table 4-37 Procedure for selecting the default setting

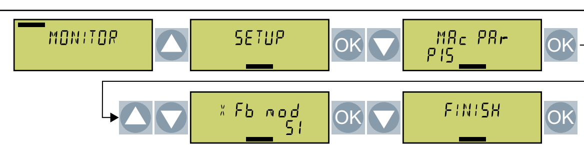
Operator panel BOP-2	
Operator panel IOP-2	→ Setup → Quick commissioning → I/O setup → Select macro → (51) Modbus RTU control → Complete setup
Smart Access	→ Quick setup → I/O configuration → 51: Modbus RTU control → Complete quick setup

Table 4-38 Parameters that define the functions of the inputs and outputs

<table>
<tr><th>Setting</th><th>Parameter</th><th>Setting</th><th>Parameter</th></tr>
<tr><td>Default setting 51</td><td>p0015 = 51</td><td rowspan="3">DI 0

ON/OFF1
OFF2
DI 5</td><td rowspan="3">p29652[0] = 722.0
p29650[0] = 0
p0840[0] = 29659.0
p0844[0] = 29659.1
p2104[0] = 722.5</td></tr>
<tr><td>AO 0</td><td>p0771[0] = 21</td></tr>
<tr><td>AO 1</td><td>p0771[1] = 27</td></tr>
<tr><td>Setpoint</td><td>p1070[0] = 2050[1]</td><td rowspan="2">DO 0
DO 1
DO 2
DO 3</td><td rowspan="2">p0730 = 52.3
p0731 = 52.2
p0732 = 52.0
p0733 = 52.7</td></tr>
<tr><td>Modbus RTU</td><td>p2020 = 8
p2030 = 2
p2040 = 65000</td></tr>
</table>

4.2.4.12 Default setting (macro) 52: "Modbus RTU control local/remote"

Function description

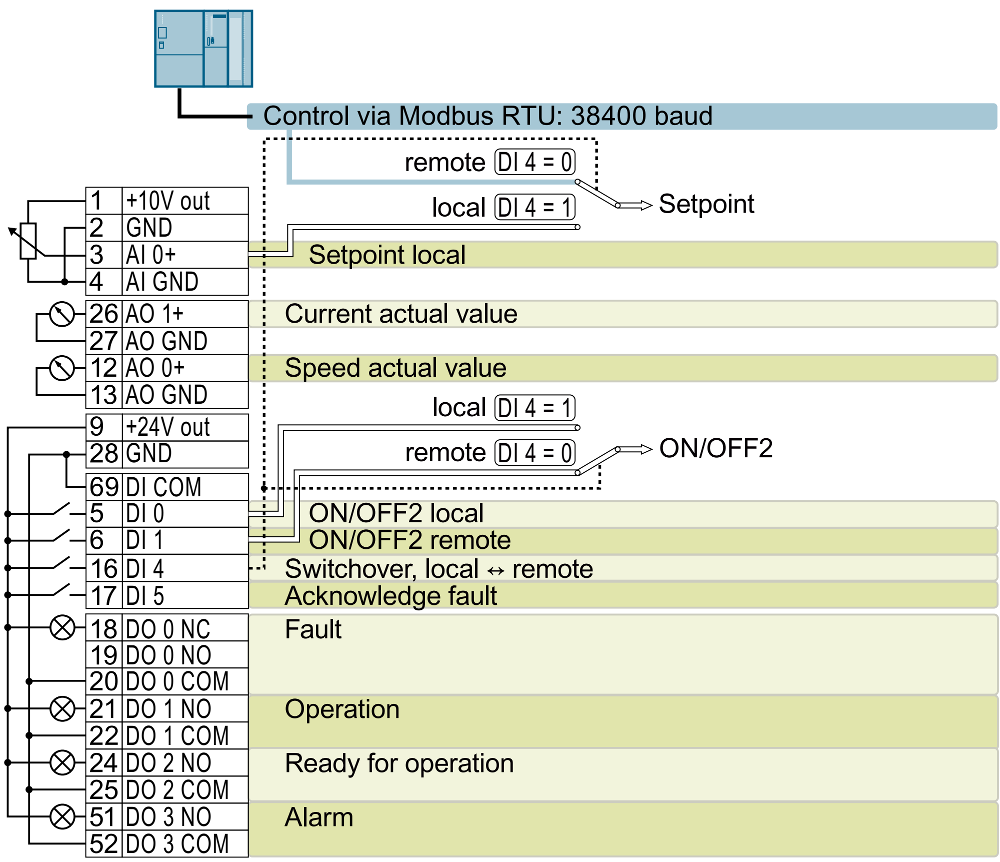


Table 4-39 Characteristics

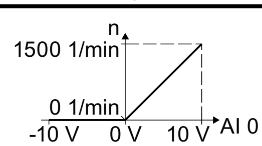
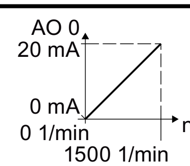
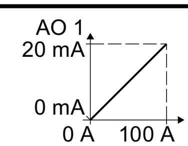
Analog input	Analog outputs	
		

Table 4-40 Procedure for selecting the default setting

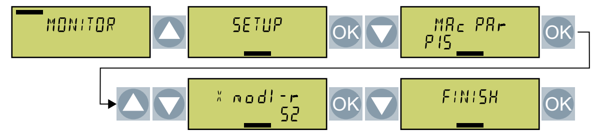
Operator panel BOP-2	
Operator panel IOP-2	→ Setup → Quick commissioning → I/O setup → Select macro → (52) Modbus RTU control local/remote → Complete setup
Smart Access	→ Quick setup → I/O configuration → 52: Modbus RTU control local/remote → Complete quick setup

Table 4-41 Parameters that define the functions of the inputs and outputs

Setting	**Parameter**	**Setting**	**Parameter**
Default setting 52	p0015 = 52	DI 0	p29652[1] = 722.0 p29650[1] = 0
AI 0	p1070[1] = 755[0]	ON/OFF1	p0840[0...1] = 29659.0
AO 0	p0771[0] = 21	OFF2	p0844[0...1] = 29659.1
AO 1	p0771[1] = 27	DI 1	p29652[0] = 722.1 p29650[0] = 1
Modbus RTU	p2020 = 8 p2030 = 2 p2040 = 65000 p0854[0] = 2090.10 p1070[0] = 2050[1]	DI 4 DI 5 DO 0 DO 1 DO 2 DO 3	p0810 = 722.4 p2104[0...1] = 722.5 p0730 = 52.3 p0731 = 52.2 p0732 = 52.0 p0733 = 52.7

4.2.4.13 Default setting (macro) 54: "USS control"

Function description

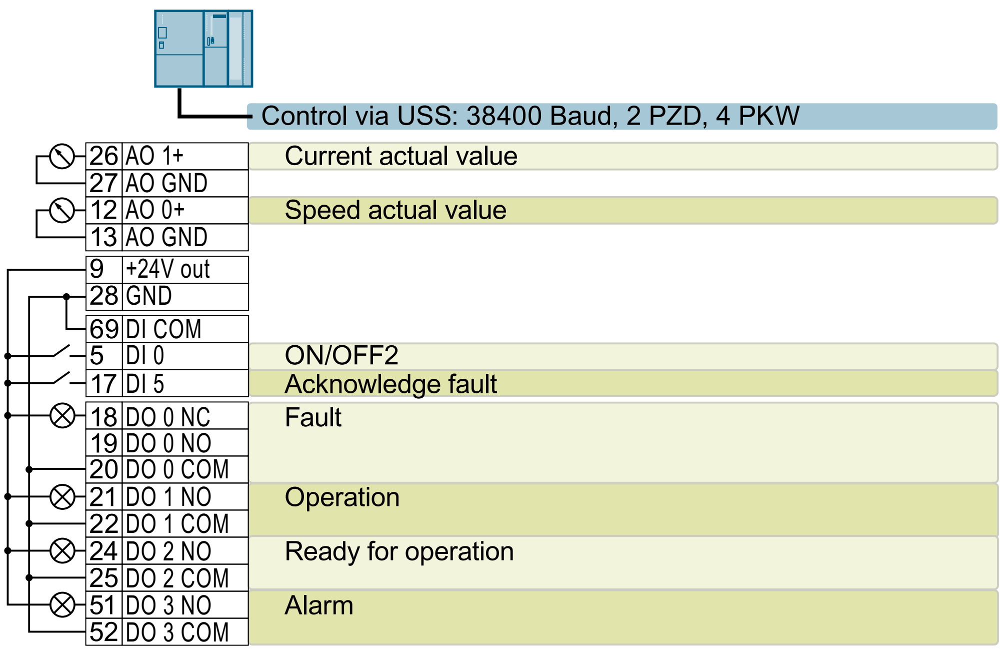


Table 4-42 Characteristics

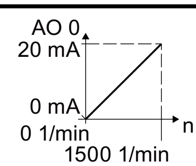
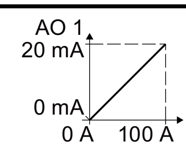
Analog outputs	
	

Table 4-43 Procedure for selecting the default setting

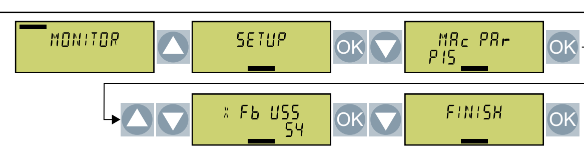
Operator panel BOP-2	
Operator panel IOP-2	→ Setup → Quick commissioning → I/O setup → Select macro → (54) USS control → Complete setup
Smart Access	→ Quick setup → I/O configuration → 54: USS control → Complete quick setup

Table 4-44 Parameters that define the functions of the inputs and outputs

Setting	Parameter	Setting	Parameter
Default setting 54	p0015 = 54	DI 0 ON/OFF1 OFF2 DI 5	p29652[0] = 722.0 p29650[0] = 0 p0840[0] = 29659.0 p0844[0] = 29659.1 p2104[0] = 722.5
AO 0	p0771[0] = 21		
AO 1	p0771[1] = 27		
USS	p2020 = 8 p2023 = 4 p2030 = 1 p2040 = 65000 p1070[0] = 2050[1]	DO 0 DO 1 DO 2 DO 3	p0730 = 52.3 p0731 = 52.2 p0732 = 52.0 p0733 = 52.7

4.2.4.14 Default setting (macro) 55: "USS control local/remote"

Function description

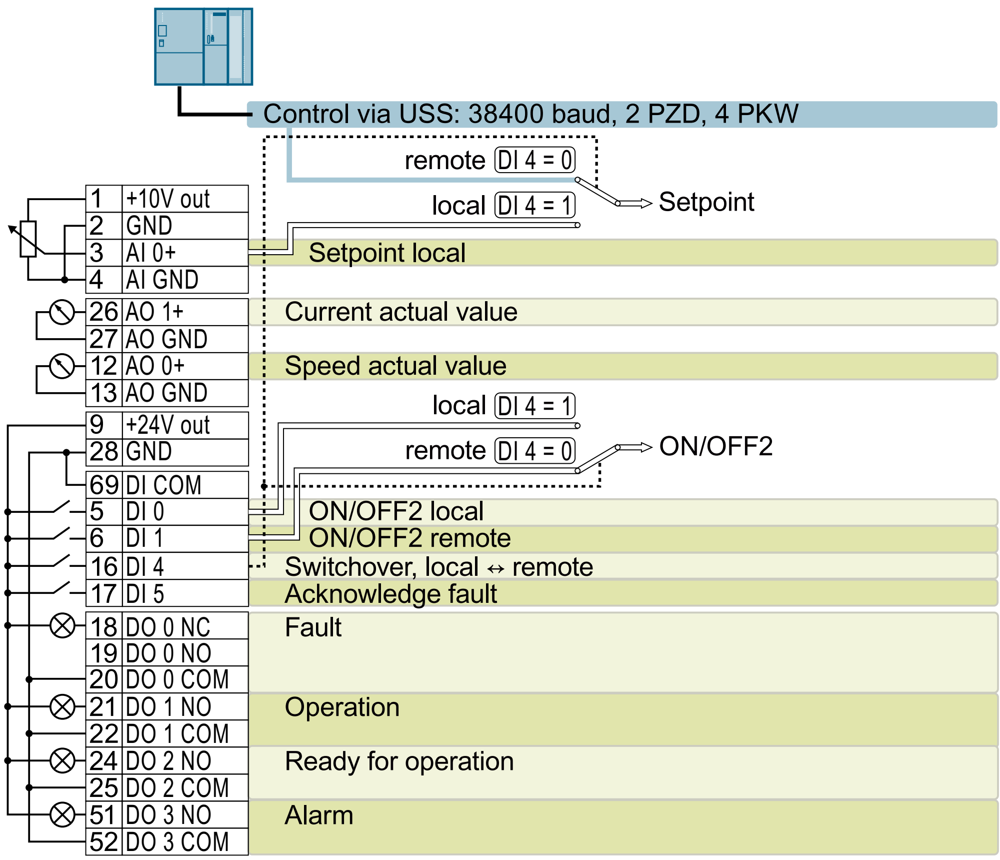


Table 4-45 Characteristics

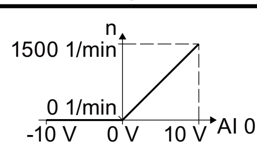
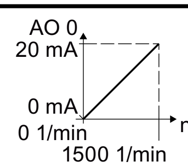
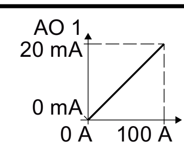
Analog input	Analog outputs	
		

Table 4-46 Procedure for selecting the default setting

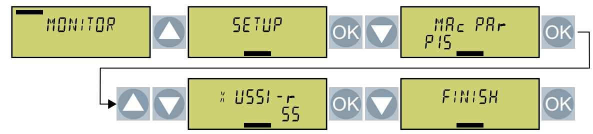
Operator panel BOP-2	
Operator panel IOP-2	→ Setup → Quick commissioning → I/O setup → Select macro → (55) USS control local/remote → Complete setup
Smart Access	→ Quick setup → I/O configuration → 55: USS control local/remote → Complete quick setup

Table 4-47 Parameters that define the functions of the inputs and outputs

<table>
<tr><th>Setting</th><th>Parameter</th><th>Setting</th><th>Parameter</th></tr>
<tr><td>Default setting 55</td><td>p0015 = 55</td><td rowspan="5">DI 0

ON/OFF1
OFF2
DI 1

DI 4
DI 5</td><td rowspan="5">p29652[1] = 722.0
p29650[1] = 0
p0840[0...1] = 29659.0
p0844[0...1] = 29659.1
p29652[0] = 722.1
p29650[0] = 1
p0810 = 722.4
p2104[0...1] = 722.5</td></tr>
<tr><td>AI 0</td><td>p1070[1] = 755[0]</td></tr>
<tr><td>AO 0</td><td>p0771[0] = 21</td></tr>
<tr><td>AO 1</td><td>p0771[1] = 27</td></tr>
<tr><td rowspan="2">USS</td><td rowspan="2">p2020 = 8
p2023 = 4
p2030 = 1
p2040 = 65000
p1070[0] = 2050[1]
p0854[0] = 2090.10</td></tr>
<tr><td>DO 0
DO 1
DO 2
DO 3</td><td>p0730 = 52.3
p0731 = 52.2
p0732 = 52.0
p0733 = 52.7</td></tr>
</table>

4.2.5 Terminal strip X9 (FSH/FSJ only)

Converter FSH and FSJ have 4 additional digital inputs and 2 digital outputs at terminal strip X9.

To access terminal strip X9, you must first remove the front cover from the converter.

Connecting converters (Page 75)

Fault and alarm signals can be connected to the digital inputs.

The external 24 V DC power supply must be connected if the converter is connected to the line supply via a main contactor (to start the converter).

The power supply should be located directly next to the converter (e.g. in the same cabinet) and the cable length to terminal strip X9 should not exceed 5 m.

Note

Inputs are low active.

All signal inputs are low active (wire-break-proof).

Note

If terminals 3 to 6 are not used, then you must connect 24 V DC to them. To do this, use an external power supply or terminal 9 on the control interface.

The reference potential is connected to terminal X9.2 and X9.7, and terminal 28 on the control interface.

Note

Line contactor control

If the line contactor is controlled via terminals 11 and 12, then it is not necessary to use a control transformer to provide isolation from the line supply. A 250 V/8 A fuse must be used as protection.

Note

Insulated end sleeves

Insulated end sleeves according to DIN 46228-4 must be used.

Note

Strain relief

For strain relief, the cables to the control interface and to the terminal X9 must be fastened to the lugs in the cable duct below terminal X9 (e.g. with cable ties).

If the cables are introduced at the side (at the height of terminal X9), the strain relief must be provided outside the converter.

Connecting terminal strip X9

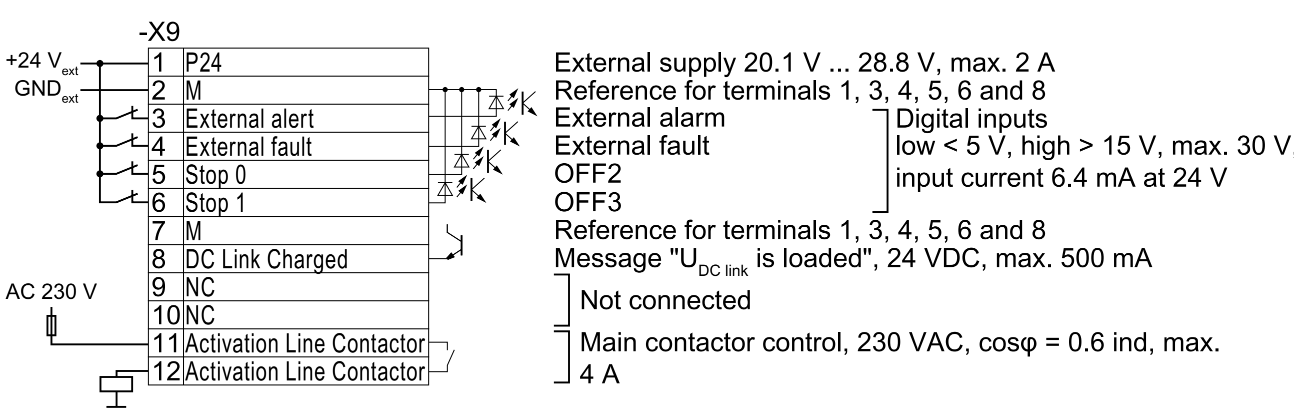


Figure 4-18 Connecting external 24 V power supply

Terminal	Name	Meaning	Input/ output	Technical data
1	P24	External power supply	Input	Voltage: 24 V DC (20.1 V ... 28.8 V) Current consumption: max. 2 A
2	M	Electronics ground	Reference	

Terminal	Name	Meaning	Input/ output	Technical data
3	External alert	External alarm	Input	Voltage: -3 V ... +30 V Current consumption: • 6.4 mA at 24 V DC • 1.3 mA at < 5 V • 4 mA at > 15 V • 8 mA at 30 V Level (including ripple): • High level: 15 V ... 30 V • Low level: -3 V ... +5 V
4	External fault	External fault	Input	
5	Stop 0	Emergency OFF, category 0	Input	
6	Stop 1	Emergency Stop, category 1	Input	
7	M		Reference	
8	DC link charged	Enable signal, "$U_{DC\ link}$ charged"	Output	Voltage: 24 V DC Max. load current: 500 mA Continuously short-circuit proof The output current is taken from the supply at X9, terminal 1.
9	NC	Not connected		
10	NC	Not connected		
11	Activation line contactor	Line contactor control	Output	Contact type: NO contact Maximum load current: 4 A, 230 VAC, cosφ = 0.6 ind Floating A device to protect against overload and short-circuit is required to supply the unprotected output (e.g. 4 A / 250 V fuses). Surge suppressors must be connected to the excitation coil of the main contactor (e.g. RC element). To control the line contactor, the following contact characteristic values of the relay apply: • 250 V AC, 10 A (NC and NO), general purpose, 85 °C • 24 V DC, 10 A (NC and NO), general purpose, 85 °C • 30 V DC, 8 A (NO), 6 A (NC), general purpose, 85 °C • B300 (NC and NO), pilot duty, 85 °C • R300 (NC and NO), pilot duty, 85 °C • 24 V AC, 2.0 A (NC and NO), pilot duty, 85 °C
12	Activation line contactor	Line contactor control	Output	

Maximum connection cross section: 2.5 mm² (14 AWG)

Minimum connection cross section: 0.2 mm² (25 AWG)

Maximum tightening torque: 0.5 Nm (4.4 lbf.in)

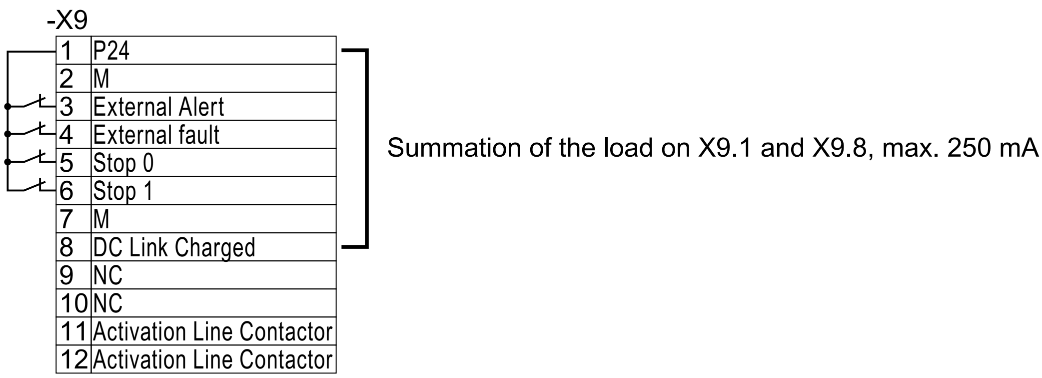


Figure 4-19 Connecting internal 24 V power supply

4.2.6 Wiring the terminal strips

WARNING

Electric shock due to unsuitable motor temperature evaluation system

Voltage flashovers to the electronics of the converter can occur in motors without safe electrical separation of the temperature sensors in accordance with IEC 61800-5-1 when the motor develops a fault.

- Install a temperature monitoring relay 3RS1… or 3RS2…
- Evaluate the temperature monitoring relay output using a digital input of the converter, e.g. using the "External fault" function.

You can find additional information about the temperature monitoring relay on the Internet:

Manual 3RS1 / 3RS2 temperature monitoring relays (https://support.industry.siemens.com/cs/ww/en/view/54999309)

Note

Malfunction caused by incorrect switching states as the result of diagnostic flows in the off state (logical state "0")

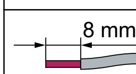
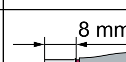
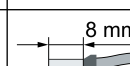
In contrast to mechanical switching contacts, e.g. emergency stop switches, diagnostic flows can also flow with semiconductor switches in the off state. If interconnection with digital inputs is faulty, the diagnostic flows can lead to incorrect switching states and thus to a malfunction of the drive.

- Observe the conditions for digital inputs and digital outputs specified in the relevant manufacturers documentation.
- Check the conditions of the digital inputs and digital outputs in regard to the flows in off state. If applicable, connect the digital inputs with suitably dimensioned, external resistors to protect against the reference potential of the digital inputs.

NOTICE
Overvoltages for long signal cables
Using > 30 m long cables at the converter's digital inputs and 24 V power supply or inductive circuits at the digital inputs can lead to overvoltage. Overvoltages can damage the converter. • Connect an overvoltage protection device between the terminal and the associated reference potential. We recommend using the Weidmüller overvoltage protection terminal with designation MCZ OVP TAZ DIODE 24VDC.

⚠ WARNING
Electric shock due to damaged insulation
Damaged insulation of cables carrying hazardous voltages can cause a short circuit with cables carrying non-hazardous voltages. This can have the effect that parts of the converter or the installation carry an unexpectedly high voltage. • Use only cables with double insulation for 230 V cables which you connect to the digital outputs of the converter.

Table 4-48 Permissible cables and wiring options

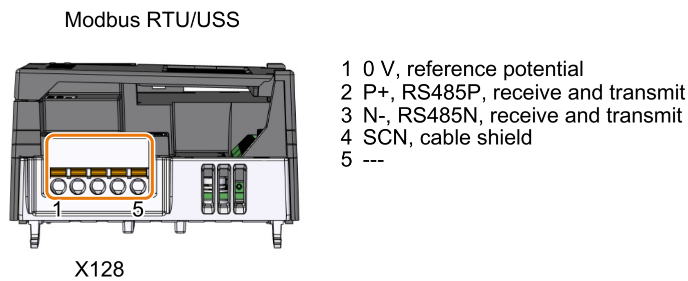
Solid or finely stranded conductor	Finely stranded conductor with non-insulated conductor end sleeve	Finely stranded conductor with partially insulated conductor end sleeve
 8 mm 0.5 ... 1.5 mm^2	 8 mm 0.5 ... 1.0 mm^2	 8 mm 0.5 mm^2
Cables with twin end sleeves are not permissible.		

Wiring the terminal strip in compliance with EMC

- If you use shielded cables, then you must connect the shield to the mounting plate of the control cabinet or with the shield support of the converter through a good electrical connection and a large surface area.
  Further information about EMC-compliant wiring is available on the Internet:
  EMC installation guideline (http://support.automation.siemens.com/WW/view/en/60612658)
- Use the right shield connection plate for shield support and strain relief.
  Mounting the shield connection kit (Page 51)

4.2.7 Fieldbus

Assignment



4.2.8 Connecting to Modbus RTU, USS or BACnet MS/TP

Function description

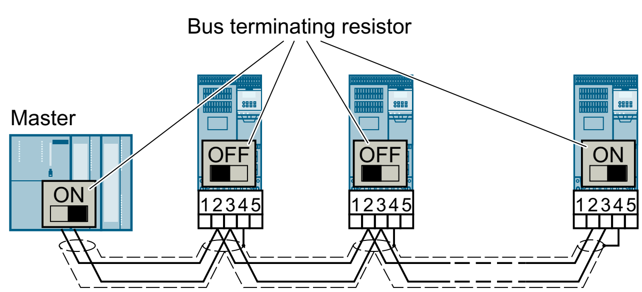


Figure 4-20 Connection with the fieldbus via RS485

The RS485 ports of the converter are short-circuit proof and isolated.

You must switch-in the bus-terminating resistor for the first and last nodes.

Overview of the interfaces (Page 84)

Table 4-49 Maximum cable length

Modbus RTU	USS	BACnet MS/TP
1200 m	1200 m for a baud rate up to 38400 bit/s and maximum of 32 nodes	1200 m
	1000 m for a baud rate of 187500 bit/s and a maximum of 30 nodes	

Further information

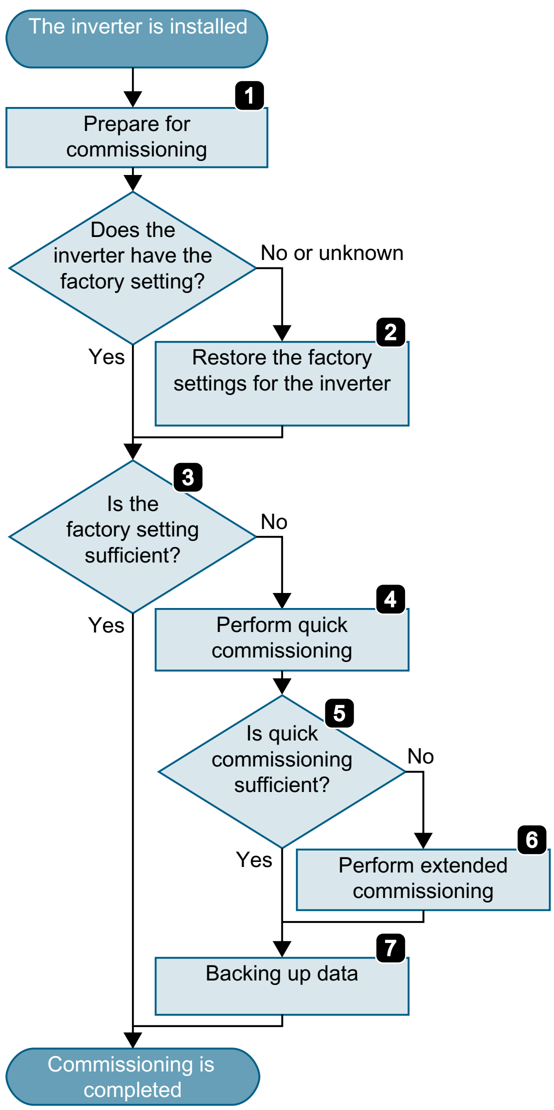
The precondition for error-free communications is that the first and last station are supplied with power.

Communication is maintained if you withdraw individual slaves from the fieldbus without interrupting the cable.

Commissioning 5

5.1 Commissioning guidelines

Overview



1. Define the requirements to be met by the drive for your application.
   (Page 125)
2. Restore the factory settings of the converter if necessary.
   (Page 146)
3. Check if the factory setting of the converter is sufficient for your application.
   (Page 128)
4. Set the following for quick commissioning of the drive:
   - The closed-loop motor control
   - The inputs and outputs
   - The fieldbus interface

   (Page 130)
5. Check if additional converter functions are required for the application.
   (Page 171)
6. If necessary, adapt the drive.
   (Page 171)
7. Save your settings.
   (Page 155)

5.2 Tools

Operator panel

An operator panel is used to commission, troubleshoot and control the converter, as well as to back up and transfer the converter settings.

The **Intelligent Operator Panel (IOP-2)** can either be snapped onto a converter, or is available as handheld device with a connecting cable to the converter. The graphics-capable plain text display of the IOP-2 enables intuitive converter operation.

Additional information on the IOP-2 is available in the Internet:

SINAMICS IOP-2 release for sale (https://support.industry.siemens.com/cs/ww/en/view/109747625)

The **Operator Panel BOP-2** for snapping onto the converter has a two-line display for diagnostics and operating the converter.

Operating Instructions of the BOP-2 and IOP-2 operator panels:

Manuals and technical support (Page 1133)

SINAMICS G120 Smart Access

The SINAMICS G120 Smart Access is a Web server module and an engineering tool that provides wireless connection to a PC, a tablet, or a smartphone. It is designed for quick commissioning, parameterization, and maintenance of the converters. SINAMICS G120 Smart Access are only for commissioning and thus cannot be used with the converter permanently.

Operating instructions of the SINAMICS G120 Smart Access:

Manuals and technical support (Page 1133)

Preventing misuse of the operator panel

The operator panel does not provide protection against unauthorized access. To protect the converter against unauthorized operation or changes to the settings, you need to prevent access to the operator panel:

- Remove the operator panel after commissioning
- Install the converter in a control cabinet that can be locked and lock the control cabinet after commissioning.

Compliance with the General Data Protection Regulation

Siemens respects the principles of data protection, in particular the data minimization rules (privacy by design).

For this product, this means:
The product does not process neither store any person-related data, only technical function data (e.g. time stamps). If the user links these data with other data (e.g. shift plans) or if he stores person-related data on the same data medium (e.g. hard disk), thus personalizing these data, he has to ensure compliance with the applicable data protection stipulations.

5.3 Preparing for commissioning

5.3.1 Collecting motor data

Data for a standard induction motor

Before starting commissioning, you must know the following data:

- **Which motor is connected to the converter?**
  Note down the Article No. of the motor and the motor's nameplate data.
  If available, note down the motor code on the motor's nameplate.

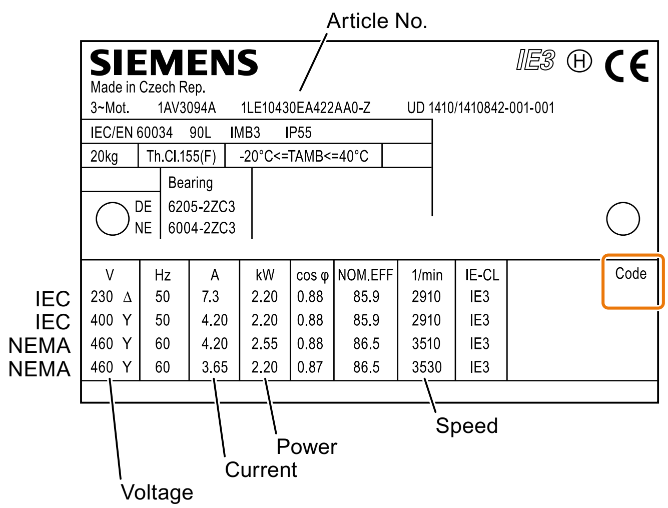


Figure 5-1 Example of the rating plate for a standard induction motor

- **How is the motor connected?**
  Pay attention to the connection of the motor (star connection [Y] or delta connection [Δ]).
  Note the appropriate motor data for connecting.

Data for a synchronous reluctance motor

Before starting commissioning, you must know the following data:

- **Which motor is connected to the converter?**
  Note down the motor code on the type plate of the motor.

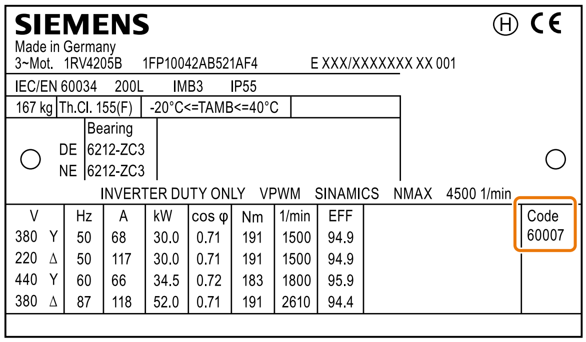


Figure 5-2 Example of a type plate for a reluctance motor

- **How is the motor connected?**
  Pay attention to the connection of the motor (star connection [Y] or delta connection [Δ]). Note the appropriate motor data for connecting.

5.3.2 Precharing the circuit (FSH/FSJ only)

FSH/FSJ converters include a half-controlled thyristor bridge as rectifier circuit. As a result of the precharging principle with phase control, precharging is only started when all of the enable signals are available and by setting the ON/OFF command (p0840 = 1). The DC link is then fully charged after approximately 4 s.

5.3.3 Forming DC link capacitors

Overview

You have to reform the DC link capacitors if the converter has been stored for more than one year. Non-formed DC link capacitors can damage the converter in operation.

Precondition

The converter has not yet been used, and according to the production date it was made over a year ago.

The production date of the converter is coded in the 3rd and 4th digit of the serial number on the rating plate: S . . ③④...

- Example: Serial number S ZV**K5**375000118 → Production date May 2018

Table 5-1 Production year and month

Digit ③	Production year		Digit ④	Month of manufacture
K	2018		1 ... 9	January ... September
L	2019		0	October
M	2020		N	November
...	...		D	December

Function description

You form the DC link capacitors by supplying the converter with a line voltage of ≤ 100% of the rated voltage for a defined time.

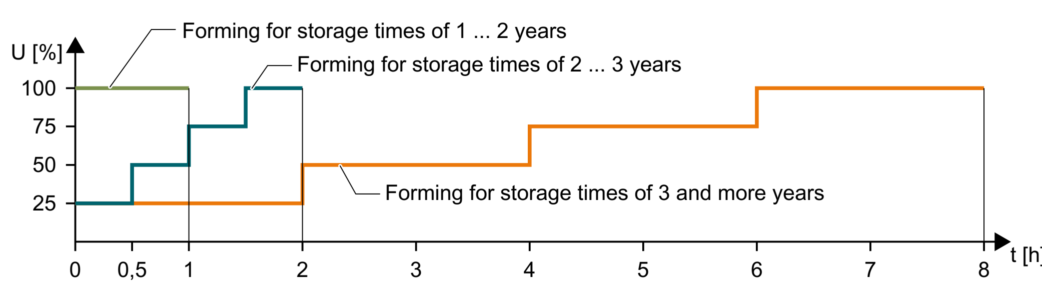


Figure 5-3 Forming the DC link capacitors

5.3.4 Converter factory setting

Motor

In the factory, the converter is set for an induction motor that matches the rated power of the converter.

Converter interfaces

The inputs and outputs and the fieldbus interface of the converter have specific functions when set to the factory settings.

Factory interface settings (Page 87)

Switching the motor on and off

The converter is set in the factory as follows:

- After the ON command, the motor accelerates within the ramp-up time (referred to 1500 rpm) to its speed setpoint.

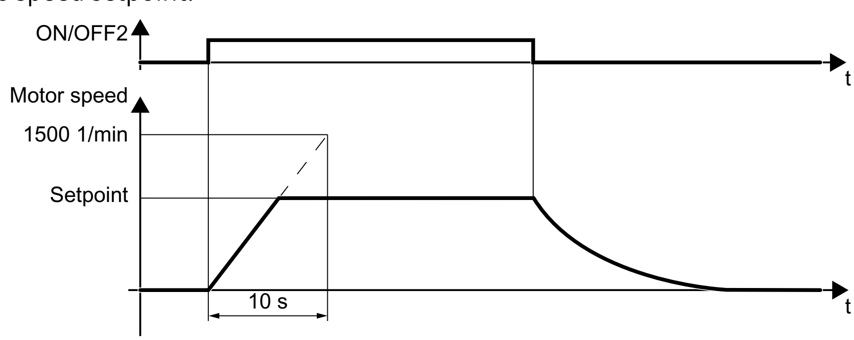


Figure 5-4 Switching the motor on and off in the factory setting

  The ramp-up time defines the maximum motor acceleration when the speed setpoint changes. The ramp-up time refers to the time from standstill up to the set maximum motor speed.

- The converter only permits speed setpoints in one direction of rotation.
- The converter switches off the motor after the OFF2 command. The motor coasts down to a standstill.

Minimum and maximum speed

- Minimum speed - factory setting 0 [rpm]
  After the selection of a motor, during the quick commissioning, the converter sets the minimum speed to 20% of the rated speed.
  The minimum speed is the lowest speed of the motor independent of the speed setpoint.
- Maximum speed - factory setting 1500 [rpm]
  The converter limits the motor speed to this value.

Operate the motor in the factory setting

We recommend that you execute quick commissioning. For quick commissioning, you must adapt the converter to the connected motor by setting the motor data in the converter.

For basic applications, you can try to operate the drive with a rated power < 18.5 kW without any other commissioning steps. Check whether the control quality of the drive without commissioning is adequate for the requirements of the application.

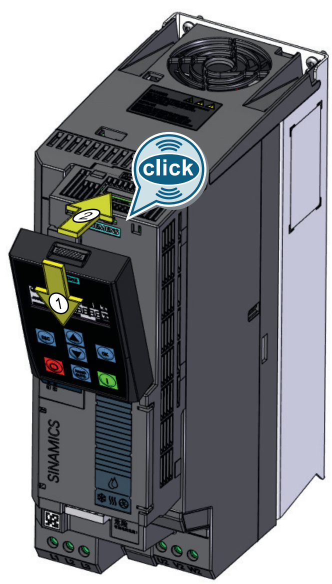
5.4 Quick commissioning using the BOP-2 operator panel

5.4.1 Fitting the BOP-2 to the converter

Fitting the BOP-2 to the converter

Procedure

1. Open the cover of the interface X21 on the front of the converter.
2. Locate the lower edge of the Operator Panel into the matching recess of the converter.
3. Plug the operator panel BOP-2 onto the converter until the latch audibly engages.



You have plugged the BOP-2 onto the converter.
❒

The operator panel BOP-2 is ready for operation when you connect the converter to the power supply.

5.4.2 Overview

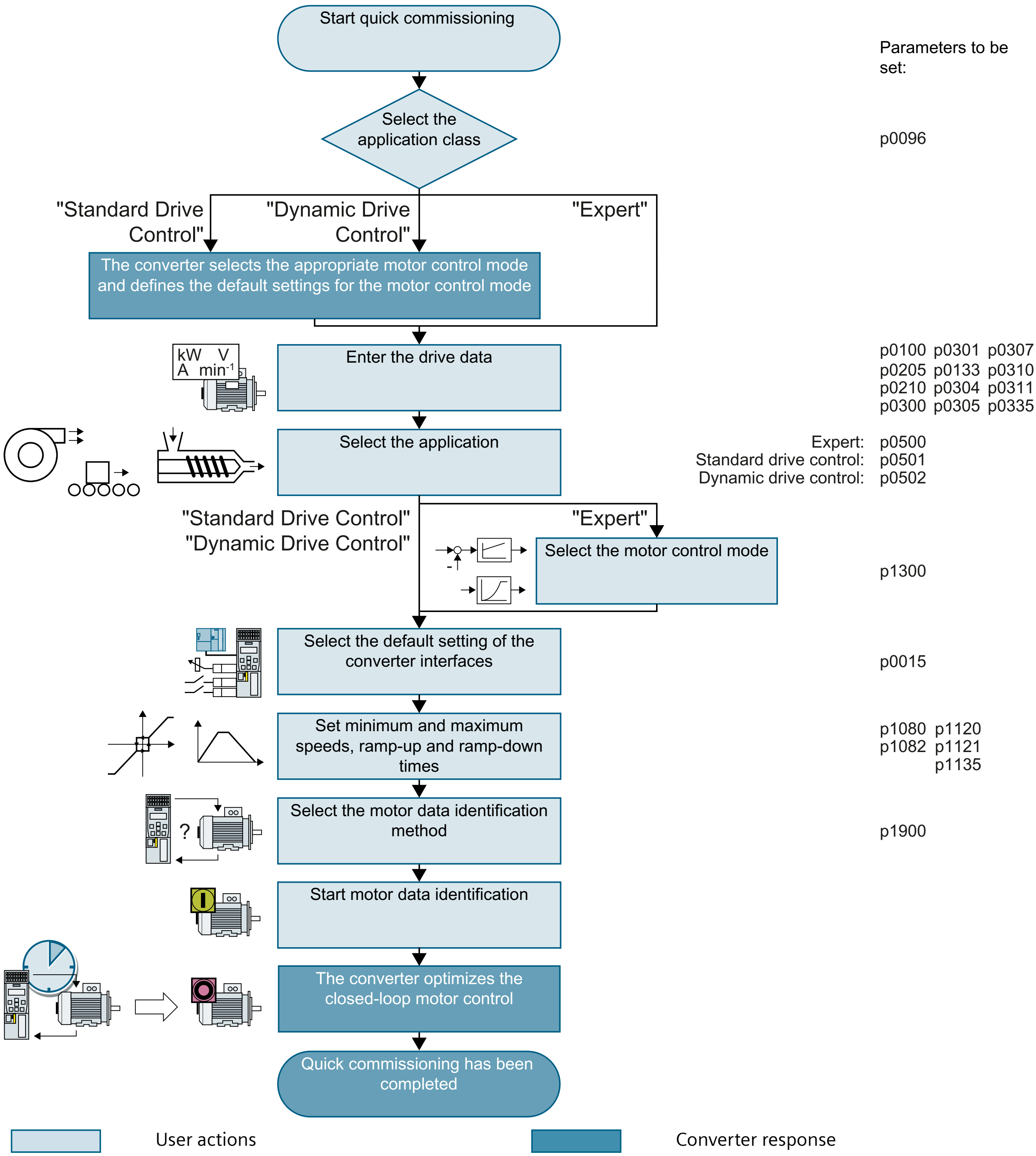


Figure 5-5 Quick commissioning using the BOP-2 operator panel

5.4.3 Starting quick commissioning

Requirement

The following requirements apply:

- The power supply is switched on.
- The operator panel displays setpoints and actual values.

Function description

Procedure

Press the ESC key.

Press one of the arrow keys until the BOP-2 displays menu SETUP.

To start quick commissioning, press the OK key in menu SETUP.

We recommend resetting the converter to the factory setting before commencing quick commissioning.

Should you wish to change the default setting of the interfaces, the converter must be reset to the factory settings now.

Proceed as follows:

1. Press the OK key.
2. Switch over the display using an arrow key: nO → YES
3. Press the OK key.

Selecting an application class (Page 132)

5.4.4 Selecting an application class

Overview

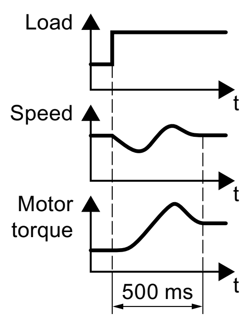
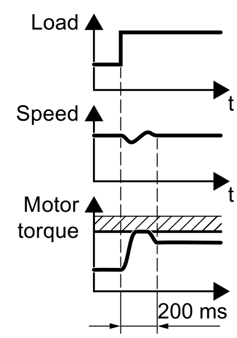
When selecting an application class, the converter sets the closed-loop motor control to match the specific applications.

If you do not set the application class, but instead setting "Expert", then you must define the appropriate closed-loop motor control setting.

Function description

Select one of the application classes or setting "Expert":

- STANDARD Standard Drive Control (Page 134)
- DYNAMIC Dynamic Drive Control (Page 136)
- EXPERT Expert (Page 139)

Application class	Standard Drive Control	Dynamic Drive Control
Properties	• Typical settling time after a speed change: 100 ms ... 200 ms • Typical settling time after a load surge: 500 ms  • Standard Drive Control is suitable for the following requirements: – Motor power ratings < 45 kW – Ramp-up time 0 → rated speed (depending on the motor power rating): 1 s (0.1 kW) ... 10 s (45 kW) – Applications with steady load torque without load surges • Standard Drive Control is insensitive with respect to imprecise setting of the motor data	• Typical settling time after a speed change: < 100 ms • Typical settling time after a load surge: 200 ms  • Dynamic Drive Control controls and limits the motor torque • Torque accuracy that can be achieved: ± 5 % for 15 % ... 100 % of the rated speed • We recommend Dynamic Drive Control for the following applications: – Motor power ratings > 11 kW – For load surges of 10 % ... >100 % of the rated motor torque • Dynamic Drive Control is necessary for a ramp-up time 0 → rated speed (dependent on the rated motor power): < 1 s (0.1 kW) ... < 10 s (560 kW).
Application examples	• Pumps, fans, and compressors with flow characteristic	• Pumps and compressors with displacement machines
Motors that can be operated	Induction motors	Induction and synchronous motors
Max. output frequency	550 Hz	240 Hz 150 Hz with Power Modules FSG ... FSJ

Application class	Standard Drive Control	Dynamic Drive Control
Torque control	Without torque control	Speed control with lower-level torque control
Commissioning	• Unlike "Dynamic Drive Control," no speed controller needs to be set • Compared with the "EXPERT" setting: – Simplified commissioning using predefined motor data – Reduced number of parameters • Standard Drive Control is preset for converters of frame size A ... frame size C	• Fewer parameters compared with the "EXPERT" setting • Dynamic Drive Control is preset for converters of frame size D ... frame size J

5.4.5 Standard Drive Control

Function description

Select the motor standard:

- KW 50HZ IEC
- HP 60HZ NEMA, US units
- KW 60HZ NEMA, SI units

Set the converter supply voltage.

Select the motor type. If a 5-digit motor code is stamped on the motor rating plate, select the corresponding motor type with motor code.

Motors without motor code stamped on the rating plate:

- INDUCT Third-party induction motor
- 1L IND 1LE1, 1LG6, 1LA7, 1LA9 induction motors

Motors with motor code stamped on the rating plate:

- 1LE1 IND 100 1LE1 induction motor . 9
- 1PC1 IND 1PC1 induction motor

Depending on the converter, the motor list in BOP-2 can deviate from the list shown above.

If you have selected a motor type with motor code, you must now enter the motor code. The converter assigns the following motor data corresponding to the motor code.

If you do not know the motor code, then you must set the motor code = 0, and enter motor data from p0304 and higher from the rating plate.

87 Hz motor operation The BOP-2 only indicates this step if you selected IEC as the motor standard (EUR/USA, P100 = kW 50 Hz).

Rated motor voltage

Rated motor current

Rated motor power

Rated motor frequency

Rated motor speed

Motor cooling:

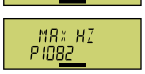
- SELF Natural cooling
- FORCED Forced-air cooling
- LIQUID Liquid cooling
- NO FAN Without fan

Select the basic setting for the motor control:

- VEC STD Constant load
- PUMP FAN Speed-dependent load

Select the default setting for the interfaces of the converter that is suitable for your application.

Overview (Page 88)



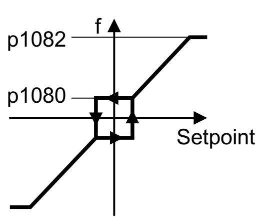


Figure 5-6 Minimum and maximum motor frequency

> **CAUTION**
>
> **Material damage caused by unexpected acceleration of the motor**
>
> The converter sets the minimum frequency p1080 to 20 % of the maximum frequency. Also for setpoint = 0, the motor accelerates for p1080 > 0 to the minimum frequency after switching on the motor. An unexpected acceleration of the motor can cause material damage.
>
> - If the application requires a minimum frequency = 0, then set p1080 = 0.

Scaling of analog input 0

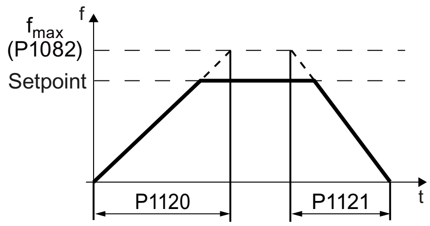


Figure 5-7 Ramp-up and ramp-down time of the motor

Ramp-down time after the OFF3 command

Motor data identification. Select the method which the converter uses to measure the data of the connected motor:

- OFF No motor data identification
- STIL ROT Measure the motor data at standstill and with the motor rotating.
  The converter switches off the motor after the motor data identification has been completed.
- STILL Recommended setting: Measure the motor data at standstill.
  The converter switches off the motor after the motor data identification has been completed.
  Select this setting if the motor cannot rotate freely.
- ROT Measure the motor data while the motor is rotating.
  The converter switches off the motor after the motor data identification has been completed.
- ST RT OP Setting the same as STIL ROT
  After the motor data identification, the motor accelerates to the current setpoint.
- STILL OP Setting the same as STILL
  After the motor data identification, the motor accelerates to the current setpoint.

Complete the data entry for quick commissioning as follows:

1. Switch over the display using an arrow key: nO → YES
2. Press the OK key.

You have completed quick commissioning.
❐

5.4.6 Dynamic Drive Control

Function description

Select the motor standard:

- KW 50HZ: IEC
- HP 60HZ: NEMA, US units
- KW 60HZ: NEMA, SI units

Set the converter supply voltage.

Select the motor type. If a 5-digit motor code is stamped on the motor rating plate, select the corresponding motor type with motor code.

Motors without motor code stamped on the rating plate:

- INDUCT: Third-party induction motor
- 1L IND: 1LE1, 1LG6, 1LA7, 1LA9 induction motors

Motors with motor code stamped on the rating plate:

- 1LE1 IND 100: 1LE1 . 9
- 1PC1 IND: 1PC1

Depending on the converter, the motor list in BOP-2 can deviate from the list shown above.

If you have selected a motor type with motor code, you must now enter the motor code. The converter assigns the following motor data corresponding to the motor code.

If you do not know the motor code, then you must set the motor code = 0, and enter motor data from p0304 and higher from the rating plate.

87 Hz motor operation The BOP-2 only indicates this step if you selected IEC as the motor standard (P100 = KW 50HZ).

Rated motor voltage

Rated motor current

Rated motor power

Rated motor frequency

Rated motor speed

Motor cooling:

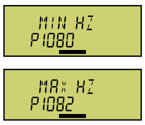
- SELF: Natural cooling
- FORCED: Forced-air cooling
- LIQUID: Liquid cooling
- NO FAN: Without fan

Select the basic setting for the motor control:

- OP LOOP: Recommended setting for standard applications
- CL LOOP: Recommended setting for applications with short ramp-up and ramp-down times.
- HVY LOAD: Recommended setting for applications with a high break loose torque.

Select the default setting for the interfaces of the converter that is suitable for your application.

Overview (Page 88)



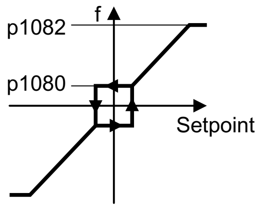
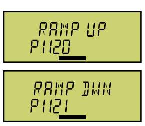


Figure 5-8 Minimum and maximum motor frequency

> **CAUTION**
>
> **Material damage caused by unexpected acceleration of the motor**
>
> The converter sets the minimum frequency p1080 to 20 % of the maximum frequency. Also for setpoint = 0, the motor accelerates for p1080 > 0 to the minimum frequency after switching on the motor. An unexpected acceleration of the motor can cause material damage.
>
> - If the application requires a minimum frequency = 0, then set p1080 = 0.

Scaling of analog input 0



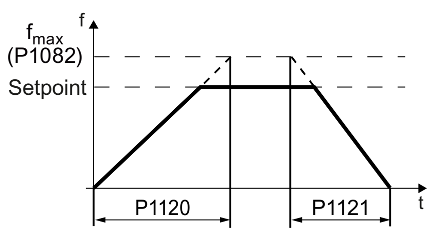


Figure 5-9 Ramp-up and ramp-down time of the motor

Ramp-down time after the OFF3 command

Motor data identification: Select the method which the converter uses to measure the data of the connected motor:

- OFF: Motor data is not measured
- STIL ROT: Recommended setting: Measure the motor data at standstill and with the motor rotating.
  The converter switches off the motor after the motor data identification has been completed.
- STILL: Default setting: Measure the motor data at standstill.
  The converter switches off the motor after the motor data identification has been completed.
  Select this setting if the motor cannot rotate freely.
- ROT: Measure the motor data while the motor is rotating.
  The converter switches off the motor after the motor data identification has been completed.
- ST RT OP: Setting the same as STIL ROT
  After the motor data identification, the motor accelerates to the current setpoint.
- STILL OP: Setting the same as STILL
  After the motor data identification, the motor accelerates to the current setpoint.

Complete the data entry for quick commissioning as follows:

1. Switch over the display using an arrow key: nO → YES
2. Press the OK key.

You have entered all of the data that is necessary for the quick commissioning of the converter. ❐

5.4.7 Expert

Function description

Select the motor standard:

- KW 50HZ IEC
- HP 60HZ NEMA, US units
- KW 60HZ NEMA, SI units

Specify the overload capability of the converter:

LOW OVL Duty cycle with "low overload"

Set the converter supply voltage.

Select the motor type. If a 5-digit motor code is stamped on the motor rating plate, select the corresponding motor type with motor code.

Motors without motor code stamped on the rating plate:

- INDUCT Third-party induction motor
- 1L IND 1LE1, 1LG6, 1LA7, 1LA9 induction motors

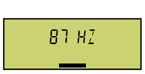
Motors with motor code stamped on the rating plate:

- 1LE1 IND 100 1LE1 . 9
- 1PC1 IND 1PC1

Depending on the converter, the motor list in BOP-2 can deviate from the list shown above.

If you have selected a motor type with motor code, you must now enter the motor code. The converter assigns the following motor data corresponding to the motor code.

If you do not know the motor code, then you must set the motor code = 0, and enter motor data from p0304 and higher from the rating plate.



87 Hz motor operation The BOP-2 only indicates this step if you selected IEC as the motor standard (P100 = KW 50HZ).

Rated motor voltage

Rated motor current

Rated motor power

Rated motor frequency

Rated motor speed

Motor cooling:

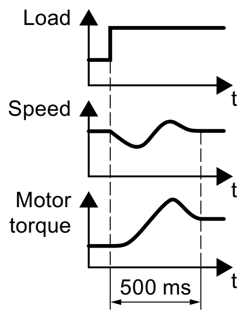
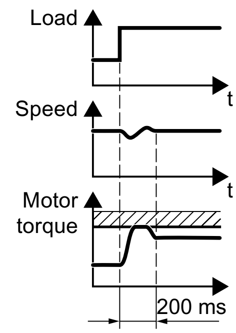
- SELF: Natural cooling
- FORCED: Forced-air cooling
- LIQUID: Liquid cooling
- NO FAN: Without fan

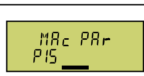
Select the appropriate application:

- VEC STD In all applications that do not fit the other setting options.
- PUMP FAN Applications involving pumps and fans
- SLVC 0HZ Applications with short ramp-up and ramp-down times.
- PUMP 0HZ Applications involving pumps and fans with optimized efficiency. The setting only makes sense for steady-state operation with slow speed changes. We recommend setting VEC STD if load surges during operation cannot be ruled out.
- V LOAD Applications with high break loose torque

Select the control mode:

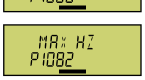
- VF LIN: U/f control with linear characteristic
- VF LIN F: Flux current control (FCC)
- VF QUAD: U/f control with square-law characteristic
- SPD N EN: Sensorless vector control

Control mode	U/f control or flux current control (FCC)	Sensorless vector control
Properties	• Typical settling time after a speed change: 100 ms ... 200 ms • Typical settling time after a load surge: 500 ms  • The control mode is suitable to address the following requirements: – Motor power ratings < 45 kW – Ramp-up time 0 → rated speed (depending on the motor power rating): 1 s (0.1 kW) ... 10 s (45 kW) – Applications with steady load torque without load surges • The control mode is insensitive with respect to imprecise setting of the motor data	• Typical settling time after a speed change: < 100 ms • Typical settling time after a load surge: 200 ms  • The control mode controls and limits the motor torque • Torque accuracy that can be achieved: ± 5 % for 15 % ... 100 % of the rated speed • We recommend the control mode for the following applications: – Motor power ratings > 11 kW – For load surges of 10 % ... >100 % of the rated motor torque • The control mode is necessary for a ramp-up time 0 → rated speed (dependent on the rated motor power): < 1 s (0.1 kW) ... < 10 s (560 kW).
Application examples	• Pumps, fans, and compressors with flow characteristic	• Pumps and compressors with displacement machines
Motors that can be operated	Induction motors	Induction and synchronous motors
Max. output frequency	550 Hz	240 Hz 150 Hz with Power Modules FSG ... FSJ
Torque control	Without torque control	Torque control with and without higher-level speed control
Commissioning	• In contrast to sensorless vector control, the speed controller does not have to be set	



Select the default setting for the interfaces of the converter that is suitable for your application.

Overview (Page 88)



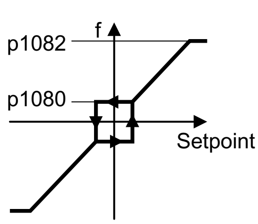


Figure 5-10 Minimum and maximum motor frequency

⚠ CAUTION
Material damage caused by unexpected acceleration of the motor
The converter sets the minimum frequency p1080 to 20 % of the maximum frequency. Also for setpoint = 0, the motor accelerates for p1080 > 0 to the minimum frequency after switching on the motor. An unexpected acceleration of the motor can cause material damage. • If the application requires a minimum frequency = 0, then set p1080 = 0.

Scaling of analog input 0

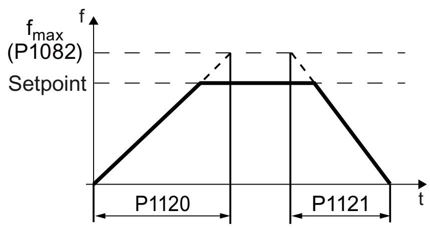


Figure 5-11 Ramp-up and ramp-down time of the motor

Ramp-down time for the OFF3 command

Motor data identification: Select the method which the converter uses to measure the data of the connected motor:

- OFF: Motor data is not measured.
- STIL ROT: Recommended setting: Measure the motor data at standstill and with the motor rotating. The converter switches off the motor after the motor data identification has been completed.
- STILL: Measure the motor data at standstill. The converter switches off the motor after the motor data identification has been completed.
  Select this setting if one of the following cases is applicable:
  – You have selected control mode SPD N EN; however, the motor cannot rotate freely.
  – You have selected U/f control as control mode, e.g. VF LIN or VF QUAD
- ROT: Measure the motor data while the motor is rotating. The converter switches off the motor after the motor data identification has been completed.
- ST RT OP: Setting the same as STIL ROT
  After the motor data identification, the motor accelerates to the current setpoint.
- STILL OP: Setting the same as STILL
  After the motor data identification, the motor accelerates to the current setpoint.

Complete the data entry for quick commissioning as follows:

1. Switch over the display using an arrow key: nO → YES
2. Press the OK key.

Press the OK key.

You have entered all of the data that is necessary for the quick commissioning of the converter.
❒

5.4.8 Identifying the motor data and optimizing the closed-loop control

Overview

Using the motor data identification, the converter measures the data of the stationary motor. In addition, based on the response of the rotating motor, the converter can determine a suitable setting for the vector control.

To start the motor data identification routine, you must switch-on the motor via the terminal strip, fieldbus or from the operator panel.

Identifying the motor data and optimizing the closed-loop control

Requirements

- You have selected a method of motor data identification during quick commissioning, e.g. measuring motor data while the motor is stationary.
  When quick commissioning is complete, the converter issues alarm A07991.
- The motor has cooled down to the ambient temperature.
  An excessively high motor temperature falsifies the motor data identification results.

> ⚠ **WARNING**
>
> **Unexpected machine motion while the motor data identification is in progress**
>
> For the stationary measurement, the motor can make several rotations. The rotating measurement accelerates the motor up to the rated speed. Secure dangerous machine parts before starting motor data identification:
>
> - Before switching on, ensure that nobody is working on the machine or located within its working area.
> - Secure the machine's work area against unintended access.
> - Lower suspended loads to the floor.

Procedure

Enable the control priority via the operator panel.

The BOP-2 displays the symbol indicating manual operation.

Switch on the motor.

During motor data identification MOT-ID flashes on the BOP-2.

If the converter again outputs alarm A07991, then it waits for a new ON command to start the rotating measurement.

If the converter does not output alarm A07991, switch off the motor as described below, and switch over the converter control from HAND to AUTO.

Switch on the motor to start the rotating measurement.

During motor data identification MOT-ID flashes on the BOP-2.

The motor data identification can take up to 2 minutes depending on the rated motor power.

Depending on the setting, after motor data identification has been completed, the converter switches off the motor - or it accelerates it to the setpoint.

If required, switch off the motor.

Disable the control priority via the operator panel.

You have completed the motor data identification.
❒

Quick commissioning has been completed once the motor data identification has been successfully completed.

5.5 Restoring the factory settings

Why restore the factory settings?

Reset the converter to the factory settings in the following cases:

- You do not know the converter settings.
- The line voltage was interrupted during commissioning and you were not able to complete commissioning.

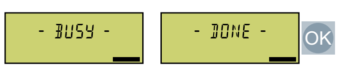
Resetting to factory setting with the BOP-2 operator panel

Procedure

1. Select "Reset to factory settings"

2. Start the reset.

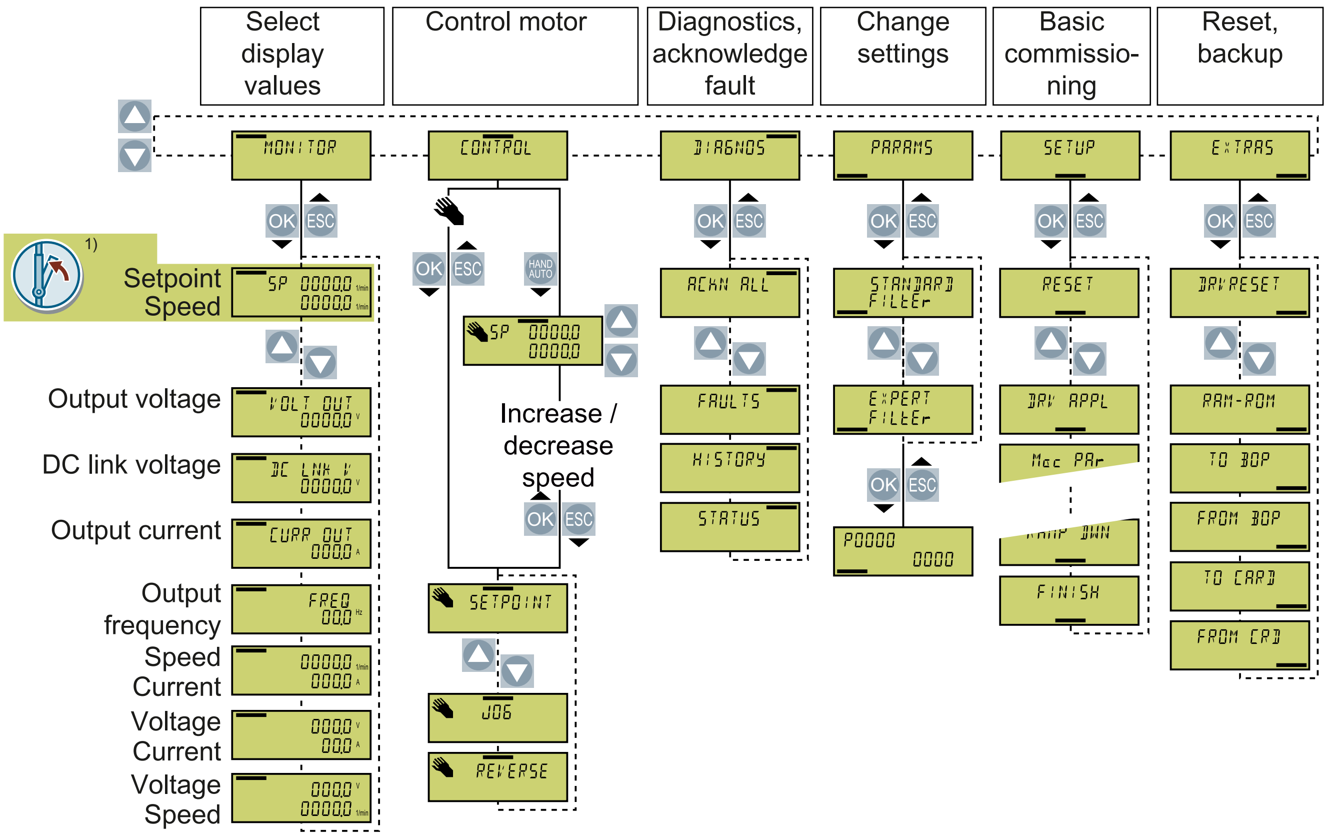
3. Wait until the converter has been reset to the factory setting.



You have reset the converter to the factory settings.
❒

5.6 Handling the BOP-2 operator panel

Overview



1) Status display once the power supply for the converter has been switched on.

Figure 5-12 Menu of the BOP-2

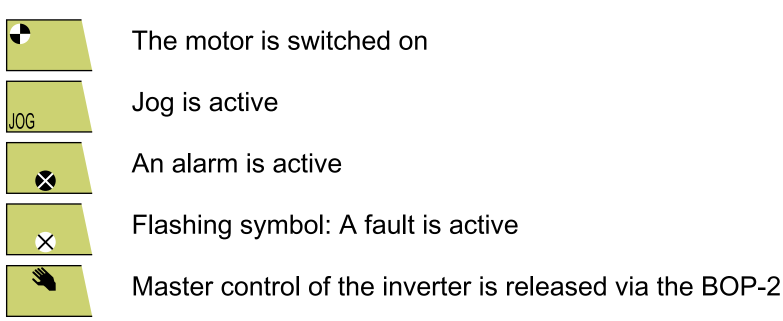


Figure 5-13 Additional symbols of the BOP-2

5.6.1 Switching the motor on and off

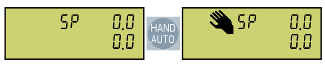
Overview

The BOP-2 offers the option of switching the motor on and off using the control keys.

Function description

Procedure

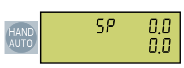
1. Enable the control priority via the operator panel.



2. Switch on the motor.

3. Switch off the motor.

4. Disable the control priority via the operator panel.



You switched the motor on and off again.
❒

5.6.2 Changing parameter values

Overview

You can modify the settings of the converter by changing the parameter values in the converter.

Precondition

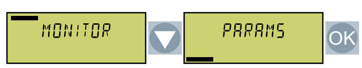
The converter only permits changes to write parameters. Write parameters begin with a "P", e.g. P45.

The value of a read-only parameter cannot be changed. Read-only parameters begin with an "r", for example: r2.

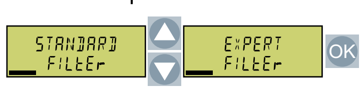
Function description

Procedure

1. Select the menu to display and change parameter values.



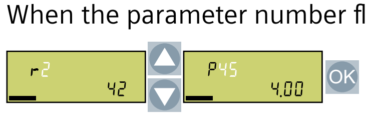
2. Select the parameter filter.



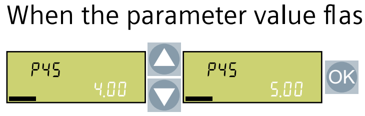
   – The converter only displays the most important parameters:

   – The converter displays all of the parameters to you:

3. When the parameter number flashes, select the desired parameter number.



4. When the parameter value flashes, change the parameter value.



You changed a parameter value.
❒

Additional information

The converter immediately saves any changes so that they are protected against power failure.

5.6.3 Changing indexed parameters

Overview

For indexed parameters, several parameter values are assigned to a parameter number. Each of the parameter values has its own index.

Precondition

You are in the menu for displaying and changing parameter values.

The number of an indexed parameter flashes in the BOP-2 display.

Function description

Procedure

1. Set the parameter index.

2. Set the parameter value for the selected index.

You have now changed an indexed parameter.

❒

5.6.4 Entering the parameter number directly

Overview

The BOP-2 offers the possibility of setting the parameter number digit by digit.

Precondition

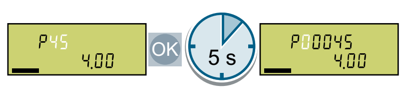
You are in the menu for displaying and changing parameter values.

The number of a given parameter flashes in the BOP-2 display.

Function description

Procedure

1. Press the OK button until the first digit of the parameter number flashes.



2. Change the parameter number digit-by-digit.
   If you press the OK button, the BOP-2 jumps to the next digit.

3. After you have entered all of the digits of the parameter number, press the OK button.

You set the parameter number directly.
❒

5.6.5 Entering the parameter value directly

Overview

The BOP-2 offers the option of setting the parameter value digit by digit.

Precondition

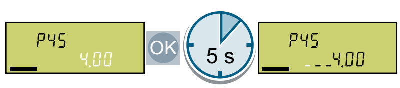
You are in the menu for displaying and changing parameter values.

The parameter value flashes in the BOP-2 display.

Function description

Procedure

1. Press the OK button until the first digit of the parameter value flashes.



2. Change the parameter value digit-by-digit.

You set the parameter value directly.
❒

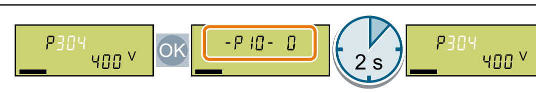
5.6.6 Why can a parameter value not be changed?

Overview

Whether or not a parameter value can be changed depends on the type of parameter and the operating mode of the converter.

Function description

The converter indicates why it currently does not permit a parameter to be changed:

Read parameters cannot be adjusted	
The parameter can only be adjusted during quick commissioning.	
A parameter can only be adjusted when the motor is switched off	

Further information

For each parameter, the parameter list contains the operating state in which the parameter can be changed.

5.7 Series commissioning

Overview

Series commissioning is the commissioning of several identical converters. During series commissioning, it is sufficient to commission one of the converters and then transfer the settings of the first converter to additional converters.

Precondition

The following preconditions apply to the converters regarding series commissioning:

- All converters have the same article number
- The converters to which the settings are transferred have the same or a higher firmware version as the source converter with the original settings.

Function description

Procedure

1. Commission the first converter.
2. Back up the settings of the first converter to an external storage medium.
   Upload of the converter settings (Page 155)
3. Transfer the settings from the first converter to another converter via the data storage medium.
   Download of the converter settings (Page 1076)

6 Upload of the converter settings

Overview

After commissioning, your settings are permanently saved in the converter.

We recommend that you additionally back up the converter settings on an external storage medium by means of an upload. Without a backup, your settings could be lost should the converter develop a fault.

The following storage media options are available:

- Memory card
- Operator panel BOP-2
- Operator panel IOP-2
- SINAMICS G120 Smart Access

6.1 Upload from the converter to the memory card

6.1.1 Recommended memory cards

Function description

Table 6-1 Memory card to back up converter settings

Scope of delivery	Article number
Memory card without firmware	6SL3054-4AG00-2AA0

More information

Using memory cards from other manufacturers

If you use a different SD memory card, then you must format it as follows:

- Insert the card into your PC's card reader.
- Command to format the card:
  format x: /fs:fat or format x: /fs:fat32 (x: Drive code of the memory card on your PC.)

Functional restrictions with memory cards from other manufacturers

The following functions are either not possible – or only with some restrictions – when using memory cards from other manufacturers:

- Know-how protection is only possible with one of the recommended memory cards.
- In certain circumstances, memory cards from other manufacturers do not support writing or reading data from/to the converter.

6.1.2 Automatic upload

Overview

We recommend that you insert the memory card before switching on the converter. The converter automatically backs up its settings on the inserted memory card and always keeps it up to date.

Precondition

The converter power supply has been switched off.

Function description

Procedure

1. Insert an empty memory card into the converter.

   Note

   Accidental overwrite of the converter settings

   When the supply voltage is switched on, the converter automatically accepts the settings already backed up on the memory card. If you use a memory card on which settings are already backed up, you will overwrite the settings of the converter.

   - Use an empty memory card for the first automatic back-up of your settings.

   Note

   Unintentional firmware update

   If the memory card contains a converter firmware, the converter may perform a firmware update after the supply voltage has been switched on.

   - Before inserting the memory card, ensure that it is empty.

   Firmware upgrade and downgrade (Page 1107)

   ---
2. Switch on the power supply for the converter.

After the power supply has been switched on, the converter copies its changed settings to the memory card.
❒

6.1.3 Manual upload with BOP-2

Overview

If you insert the memory card into a converter that is already supplied with power, you must start the upload manually using a commissioning tool.

Precondition

The converter power supply has been switched on.

A memory card is inserted in the converter.

Function description

Procedure

1. Select the upload.

2. Set the number of your data backup. You can back up 99 different settings on the memory card.

3. Start the upload.

4. Wait until the converter has backed up the settings to the memory card.

You have backed up the settings of the converter to the memory card.
❒

6.1.4 Message for a memory card that is not inserted

Function description

The converter identifies that a memory card is not inserted, and signals this state. The message is deactivated in the converter factory setting.

Activate message

Procedure

1. Set p2118[x] = 1101, x = 0, 1, ... 19
2. Set p2119[x] = 2

Message A01101 for a memory card that is not inserted is activated.
❐

To cyclically signal to the higher-level control that a memory card is not inserted, connect parameter r9401 to the send data of the fieldbus interface.

Deactivate message

Procedure

1. Set p2118[x] = 1101, x = 0, 1, ... 19
2. Set p2119[x] = 3

Message A01101 for a memory card that is not inserted is deactivated.
❐

Parameter

Parameter	Explanation	Factory setting
p2118[0...19]	Change message type, message number	0
p2119[0 ... 19]	Change message type, type	0
r9401	Safely remove memory card status	-

6.1.5 Safely removing a memory card using the BOP-2

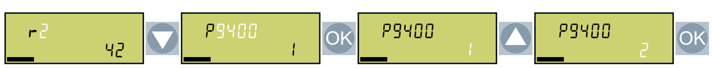
Function description

NOTICE
Data loss from improper handling of the memory card
If you remove the memory card when the converter is switched on without implementing the "safe removal" function you may destroy the file system on the memory card. The data on the memory card are lost. The memory card will only function again after formatting. • Only remove the memory card using the "safe removal" function.

Procedure

1. Select the menu for changing parameter values.

2. If a memory card is inserted, p9400 = 1.
   Set p9400 = 2.



3. The converter indicates whether it is currently writing data to the memory card:
   - The converter sets p9400 = 100:

     You must not remove the memory card. Wait for several seconds and then set p9400 = 2 again.
   - The converter sets p9400 = 3:

     Remove the memory card.

4. After removing the memory card, the converter sets p9400 = 0.

You have safely removed the memory card.

❒

6.2 Uploading to the BOP-2

Overview

You can back up the converter settings on the BOP-2 operator panel.

Precondition

The converter power supply has been switched on.

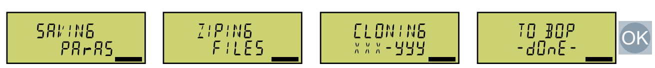
Function description

Procedure

1. Select the upload to the operator panel.

2. Start the upload.

3. Wait until the upload is completed.



The upload from the converter to the BOP-2 is completed.
❒

6.3 More options for the upload

Function description

In addition to the default setting, the converter has an internal memory for backing up three other settings.

On the memory card, you can back up 99 other settings in addition to the default setting.

Further information is provided on the Internet:

Memory options (http://support.automation.siemens.com/WW/view/en/43512514)

Protecting the converter settings 7

7.1 Write protection

Overview

The write protection prevents unauthorized changing of the converter settings.

Function description

Write protection is applicable for all user interfaces:

- Commissioning tool, e.g. operator panel or PC
- Parameter changes via fieldbus

No password is required for write protection.

Activate and deactivate write protection

Parameter		
r7760	**Write protection/know-how protection status**	
	.00	1 signal: Write protection active
p7761	**Write protection** (factory setting: 0)	
	0:	Deactivate write protection
	1:	Activate write protection

Parameter

Table 7-1 Parameters that can be changed with active write protection

Number	Name
p0003	Access level / Acc_level
p0010	Drive commissioning parameter filter / Drv comm par_filt
p0124[0...n]	CU detection using LED / CU detect LED
p0970	Reset drive parameters / Drive par reset
p0971	Save parameters / Sav par
p0972	Drive unit reset / Drv_unit reset
p2111	Alarm counter / Alarm counter
p3950	Service parameter / Serv par
p3981	Acknowledge drive object faults / Ackn DO faults
p3985	Master control mode selection / PcCtrl mode select
p7761	Write protection / Write protection
p8805	Identification and Maintenance 4 Configuration / I&M 4 Config

Number	Name
p8806[0...53]	Identification and Maintenance 1 / I&M 1
p8807[0...15]	Identification and Maintenance 2 / I&M 2
p8808[0...53]	Identification and Maintenance 3 / I&M 3
p8809[0...53]	Identification and Maintenance 4 / I&M 4
p9400	Safely remove memory card / Mem_card rem
p9484	BICO interconnections search signal source / BICO S_src srch

Note

Write protection for multimaster fieldbus systems

Via multimaster fieldbus systems, e.g. BACnet or Modbus RTU, in spite of write protection being activated, parameters can still be changed. So that write protection is also active when accessing via these fieldbuses, you must additionally set p7762 to 1.

7.2 Know-how protection

Overview

Know-how protection prevents unauthorized reading of the converter settings.

To protect your converter settings against unauthorized copying, in addition to know-how protection, you can also activate copy protection.

Precondition

Know-how protection requires a password.

Combination of know-how protection and copy protection	Is a memory card necessary?	
Know-how protection without copy protection	The converter can be operated with or without memory card.	
Know-how protection with basic copy protection		The converter can only be operated with a SIEMENS memory card Recommended memory cards (Page 156)
Know-how protection with extended copy protection		

Function description

The active know-how protection provides the following:

- With just a few exceptions, the values of all adjustable parameters p ... are invisible.
  - Several adjustable parameters can be read and changed when know-how protection is active.
    In addition, you can define an exception list of adjustable parameters, which end users may change.
  - Several adjustable parameters can be read but not changed when know-how protection is active.
- The values of monitoring parameters r ... remain visible.
- Adjustable parameters cannot be changed using commissioning tools.

- Locked functions:
  - Automatic controller optimization
  - Stationary or rotating measurement of the motor data identification
  - Deleting the alarm history and the fault history
  - Generating acceptance documents for safety functions
- Executable functions:
  - Restoring factory settings
  - Acknowledging faults
  - Displaying faults, alarms, fault history, and alarm history
  - Reading out the diagnostic buffer
  - Uploading adjustable parameters that can be changed or read when know-how protection is active.

When know-how protection is active, support can only be provided (from Technical Support) after prior agreement from the machine manufacturer (OEM).

Know-how protection without copy protection

You can transfer converter settings to other converters using a memory card or an Operator Panel.

Know-how protection with basic copy protection

After replacing a converter, to be able to operate the new converter with the settings of the replaced converter without knowing the password, the memory card must be inserted in the new converter.

Know-how protection with extended copy protection

It is not possible to insert and use the memory card in another converter without knowing the password.

Commissioning know-how protection

1. Check as to whether you must extend the exception list.
   List of exceptions (Page 168)
2. Activate the know-how protection.
   Know-how protection (Page 169)

Parameters

Table 7-2 Parameters that can be changed with active know-how protection

Number	Name
p0003	Access level / Acc_level
p0010	Drive commissioning parameter filter / Drv comm par_filt
p0124[0...n]	CU detection using LED / CU detect LED
p0791[0...1]	CO: Fieldbus analog outputs / Fieldbus AO

Number	Name
p0970	Reset drive parameters / Drive par reset
p0971	Save parameters / Sav par
p0972	Drive unit reset / Drv_unit reset
p2040	Fieldbus interface monitoring time / Fieldbus t_monit
p2111	Alarm counter / Alarm counter
p3950	Service parameter / Serv par
p3981	Acknowledge drive object faults / Ackn DO faults
p3985	Master control mode selection / PcCtrl mode select
p7761	Write protection / Write protection
p8402[0...8]	RTC daylight saving time setting / RTC DST
p8805	Identification and Maintenance 4 Configuration / I&M 4 Config
p8806[0...53]	Identification and Maintenance 1 / I&M 1
p8807[0...15]	Identification and Maintenance 2 / I&M 2
p8808[0...53]	Identification and Maintenance 3 / I&M 3
p8809[0...53]	Identification and Maintenance 4 / I&M 4
p8980	EtherNet/IP profile / Eth/IP profile
p8981	EtherNet/IP ODVA STOP mode / Eth/IP ODVA STOP
p8982	EtherNet/IP ODVA speed scaling / Eth/IP ODVA n scal
p8983	EtherNet/IP ODVA torque scaling / Eth/IP ODVA M scal
p9400	Safely remove memory card / Mem_card rem
p9484	BICO interconnections search signal source / BICO S_src srch

Table 7-3 Parameters that can be read with active know-how protection

Number	Name
p0015	Macro drive unit / Macro drv unit
p0100	IEC/NEMA Standards / IEC/NEMA Standards
p0170	Number of Command Data Sets (CDS) / CDS count
p0180	Number of Drive Data Sets (DDS) / DDS count
p0300[0...n]	Motor type selection / Mot type sel
p0304[0...n]	Rated motor voltage / Mot U_rated
p0305[0...n]	Rated motor current / Mot I_rated
p0505	Selecting the system of units / Unit sys select
p0595	Technological unit selection / Tech unit select
p0730	BI: CU signal source for terminal DO 0 / CU S_src DO 0
p0731	BI: CU signal source for terminal DO 1 / CU S_src DO 1
p0732	BI: CU signal source for terminal DO 2 / CU S_src DO 2
p0806	BI: Inhibit master control / Inhibit PcCtrl
p0870	BI: Close main contactor / Close main cont
p0922	PROFIdrive PZD telegram selection / PZD telegr_sel
p1080[0...n]	Minimum velocity / v_min
p1082[0...n]	Maximum velocity / v_max

Number	Name
p1520[0...n]	CO: Torque limit upper / M_max upper
p2000	Reference speed reference frequency / n_ref f_ref
p2001	Reference voltage / Reference voltage
p2002	Reference current / I_ref
p2003	Reference torque / M_ref
p2006	Reference temperature / Ref temp
p2030	Fieldbus interface protocol selection / Fieldbus protocol
p2038	PROFIdrive STW/ZSW interface mode / PD STW/ZSW IF mode
p2079	PROFIdrive PZD telegram selection extended / PZD telegr ext
p7763	KHP OEM exception list number of indices for p7764 / KHP OEM qty p7765
p7764[0...n]	KHP OEM exception list / KHP OEM excep list
p11026	Free tec_ctrl 0 unit selection / Ftec0 unit sel
p11126	Free tec_ctrl 1 unit selection / Ftec1 unit sel
p11226	Free tec_ctrl 2 unit selection / Ftec2 unit sel

7.2.1 Extending the exception list for know-how protection

In the factory setting, the exception list only includes the password for know-how protection.

Before activating know-how protection, you can additionally enter the adjustable parameters in the exception list, which must still be able to be read and changed by end users – even if know-how protection has been activated.

You do not need to change the exception list, if, with exception of the password, you do not require additional adjustable parameters in the exception list.

Absolute know-how protection

If you remove password p7766 from the exception list, it is no longer possible to enter or change the password for know-how protection.

You must reset the converter to the factory settings in order to be able to gain access to the converter adjustable parameters. When restoring the factory settings, you lose what you have configured in the converter, and you must recommission the converter.

Parameter

Parameter	Description	Factory setting
p7763	KHP OEM exception list, number of indices for p7764	1
p7764[0...p7763]	KHP OEM exception list p7766 is the password for know-how protection	[0] 7766 [1...499] 0

7.2.2 Activating and deactivating know-how protection

Requirements

- The converter has now been commissioned.
- You have generated the exception list for know-how protection.
- To guarantee know-how protection, you must ensure that the project does not remain at the end user as a file.

Function description

Activating know-how protection

1. Enter a password of your choice in p7767.
   Each index of p7767 corresponds with a character in the ASCII format.
2. Complete entry of the password with p7767[29] = 0.
3. Enter the same password in p7768 as that for p7767.
4. Complete entry of the password with p7768[29] = 0.

The know-how protection for the converter is activated.
❒

Deactivating know-how protection

1. Enter the password for the know-how protection in p7766.
   Each index of p7766 corresponds with a character in the ASCII format.
2. Complete entry of the password with p7766[29] = 0.

The know-how protection for the converter is deactivated.
❒

Parameter

Parameter	Description	Factory setting
r7758[0...19]	KHP Control Unit serial number	---
p7759[0...19]	KHP Control Unit reference serial number	---
r7760	Write protection/know-how protection status	---
p7765	KHP configuration	0000 bin
p7766[0...29]	KHP password, input	---
p7767[0...29]	KHP password, new	---
p7768[0...29]	KHP password, confirmation	---
p7769[0...20]	KHP memory card reference serial number	---
r7843[0...20]	Memory card serial number	---

Further information

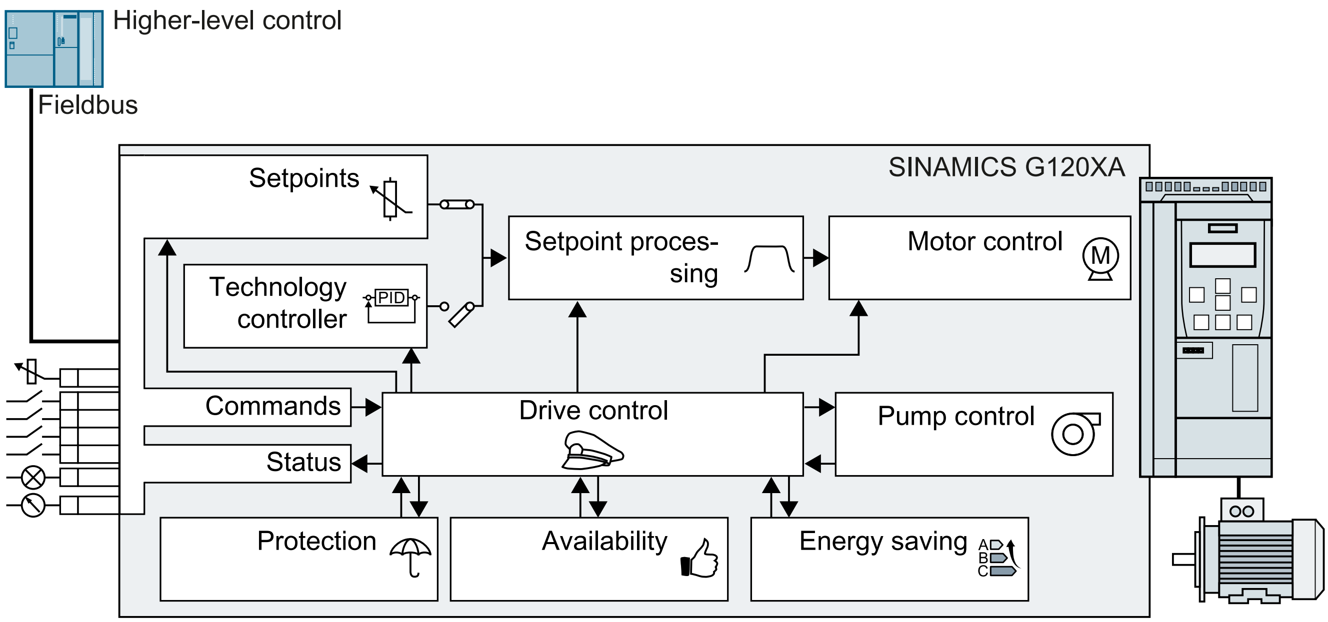
Preventing data reconstruction from the memory card

As soon as know-how protection has been activated, the converter only backs up encrypted data to the memory card.

In order to guarantee know-how protection, after activating know-how protection, we recommend that you insert a new, empty memory card. For memory cards that have already been written to, previously backed up data that was not encrypted can be reconstructed.

8 Advanced commissioning

8.1 Overview of the converter functions



Drive control

The converter receives its commands from the higher-level control via the terminal strip or the fieldbus interface. The drive control defines how the converter responds to the commands.

Drive control (Page 174)

Thecon can switch between different settings of the drive control.

Changeover drive control (Page 250)

Setpoints and setpoint conditioning

The setpoint generally determines the motor speed.

Pump control (Page 289)

The setpoint processing uses a ramp-function generator to prevent speed steps occurring and to limit the speed to a permissible maximum value.

Setpoints and setpoint processing (Page 312)

Technology controller

The technology controller controls process variables, e.g. pressure, temperature, level or flow. The motor closed-loop control either receives its setpoint from the higher-level control - or from the technology controller.

Technology controller (Page 339)

Motor control

The motor closed-loop control ensures that the motor follows the speed setpoint. You can choose between various control modes.

Motor control (Page 365)

Drive protection

The protection functions prevent damage to the motor, converter and driven load.

Drive protection (Page 444)

Increasing the drive availability

The drive can bridge temporary power failures or be switched on while the motor is rotating.

Drive availability (Page 475)

Energy saving

The converter optimizes the efficiency optimization of the standard induction motor or disconnects the power module from the system, if necessary.

Energy saving (Page 486)

8.2 Brief description of the parameters

Overview

The brief parameter description provides the most important information for all of the parameters that are assigned to a certain converter function.

If the number of parameter indices depends on the data sets, then the parameter index is shown in an abbreviated form.

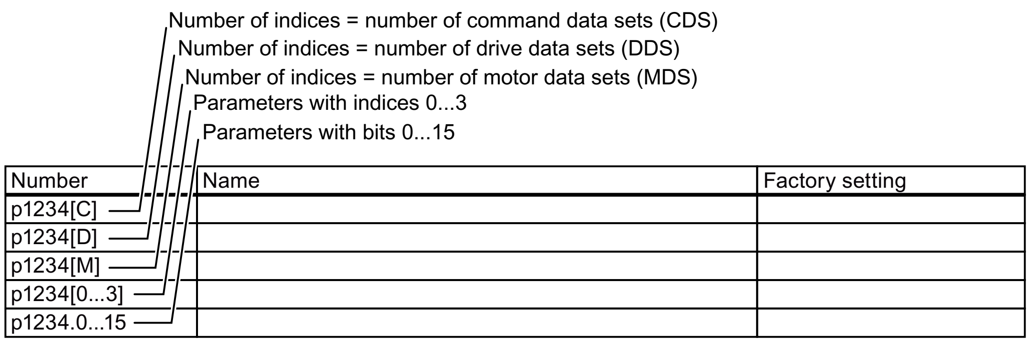


Figure 8-1 Brief parameter description

8.3 Drive control

8.3.1 Switching the motor on and off

8.3.1.1 Sequence control when switching the motor on and off

Overview

The sequence control defines the rules for switching the motor on and off.

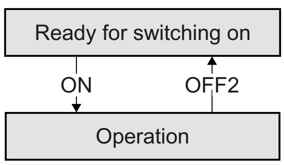


Figure 8-2 Simplified representation of the sequence control

After switching the supply voltage on, the converter normally goes into the "ready to start" state. In this state, the converter waits for the command to switch on the motor.

The converter switches on the motor with the ON command. The converter changes to the "Operation" state.

After the OFF2 command, the converter switches off the motor immediately without first braking it. The converter is again "ready to start".

Requirement

Functions

In order to be able to respond to external commands, you must set the command interface so that it fits your specific application.

Tools

One of the commissioning tools is needed to change the function settings.

Function description

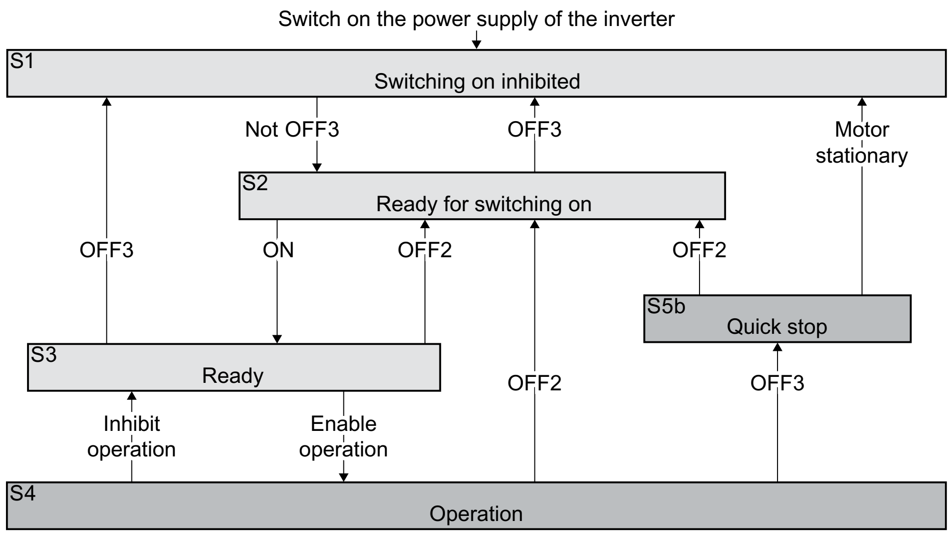


Figure 8-3 Sequence control of the converter when the motor is switched on and off

The sequence control defines the transition from one of the converter states S1 ... S5b to another converter state.

Table 8-1 Converter states

The motor is switched off		**The motor is switched on**	
Current does not flow in the motor and the motor does not generate any torque		Current flows in the motor and the motor generates a torque	
S1	The OFF3 command is active. You must deactivate the OFF3 command and activate the ON command again in order to make the converter exit the state.	S4	The motor is switched on.
S2	The converter waits for a new command to switch on the motor.	S5b	The motor is still switched on. The converter brakes the motor with the OFF3 ramp-down time.
S3	The converter waits for "Enable operation". The "Enable operation" command is always active in the converter factory setting.		

Table 8-2 Commands for switching the motor on and off

ON Enable operation	The converter switches the motor on.
OFF3	1. The converter brakes the motor. 2. The converter switches off the motor once it comes to a standstill. The converter identifies that the motor is at a standstill when at least one of the following conditions is satisfied: • The speed actual value falls below the threshold in p1226, and the time started in p1228 has expired. • The speed setpoint falls below the threshold in p1226, and the time subsequently started in p1227 has expired.
OFF2 Inhibit operation	The converter switches off the motor immediately without first braking it.

Parameters

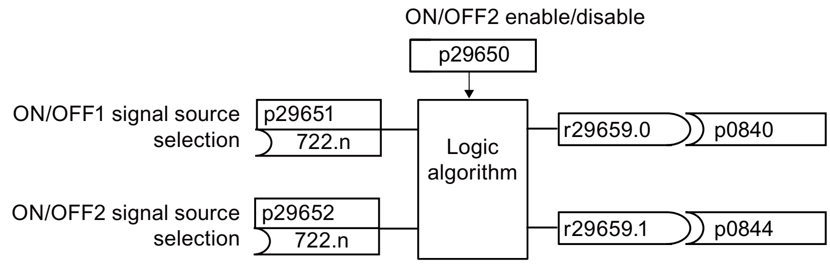
Parameter	Description	Factory setting
r0046.0...31	CO/BO: Missing enable signals	-
p0857	Power unit monitoring time	10000 ms
p0858[C]	BI: Unconditionally close holding brake	0
p0860	BI: Line contactor feedback signal	863.1
p0861	Line contactor monitoring time	100 ms
p1226[D]	Speed threshold for standstill detection	20 rpm
p1227	Standstill detection monitoring time	300 s
p1228	Pulse suppression delay time	0.01 s

8.3.1.2 Selecting the ON/OFF functions

Overview

With different ON/OFF functions, the converter can flexibly respond to a wide range of situations and stop the motor when necessary. You can select ON/OFF1 or ON/OFF2 command to fit your specific application.

Function description



ON/OFF2

In the factory setting, the ON/OFF2 function is enabled by default (p29650 = 0).

ON/OFF1

To use the ON/OFF1 function, you need to first disable the ON/OFF2 function by setting p29650 = -1, and configure the command and command source as required.

Table 8-3 Example: ON/OFF1 command via DI 0

Parameter	Description
p29650 = -1	**DI selection for ON/OFF2:** None
p29651 = 722.0	**BI: ON/OFF1:** Select ON/OFF1 via digital input 0
p29652 = 0.0	**BI: ON/OFF2:** Deselect ON/OFF2
p0840 = 29659.0	Connect the ON/OFF1 status to the binector input

Parameter

Number	Name	Factory setting
p29650[C]	DI selection for ON/OFF2	0
p29651[C]	BI: ON/OFF1	0
p29652[C]	BI: ON/OFF2 (OFF2)	0
r29659.0...1	CO/BO: Command word	-

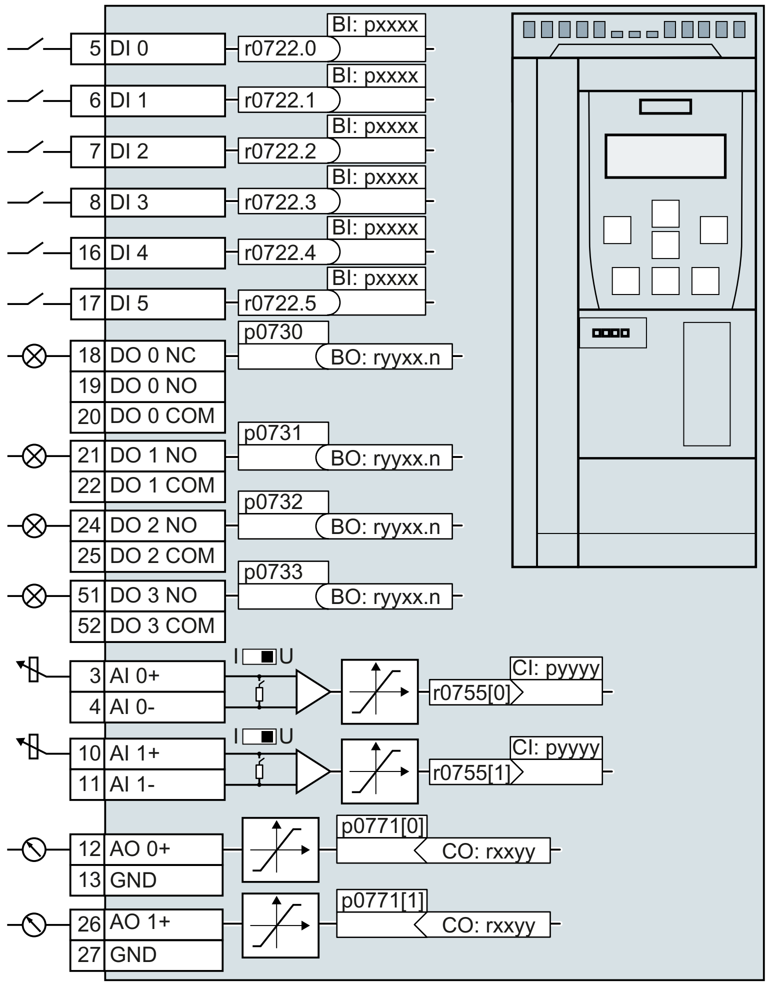
8.3.2 Adapt the default setting of the terminal strips

Overview

In the converter, the input and output signals are interconnected with specific converter functions using special parameters. The following parameters are available to interconnect signals:

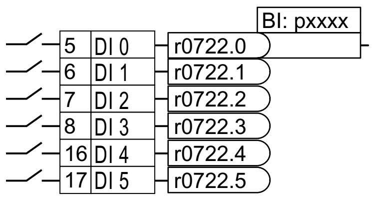
- Binectors BI and BO are parameters to interconnect binary signals.
- Connectors CI and CO are parameters to interconnect analog signals.

The following chapters describe how you adapt the function of individual converter inputs and outputs using binectors and connectors.



8.3.2.1 Digital inputs

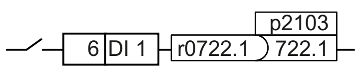
Function description



To change the function of a digital input, you must interconnect the status parameter of the digital input with a binector input of your choice.

Binector inputs are designated in the parameter list with the prefix "BI:".

Example



To acknowledge converter fault messages using digital input DI 1, you must interconnect DI 1 with the command to acknowledge faults (p2103).

Set p2103 = 722.1.

Parameters

Parameter	Description	Factory setting
r0721	CU digital inputs, terminal actual value	-
r0722	CO/BO: CU digital inputs, status	-
r0723	CO/BO: CU digital inputs, status inverted	--
p0724	CU digital inputs debounce time	4 ms
p0810	BI: Command data set selection CDS bit 0	0
p0840[C]	BI: ON/OFF (OFF1)	Dependent on the converter
p0844[C]	BI: No coast down/coast down (OFF2) signal source 1	Dependent on the converter
p0848[C]	BI: No quick stop/quick stop (OFF3) signal source 1	1
p0852[C]	BI: Enable operation/inhibit operation	Dependent on the converter
p1020[C]	BI: Fixed speed setpoint selection, bit 0	0
p1021[C]	BI: Fixed speed setpoint selection, bit 1	0
p1022[C]	BI: Fixed speed setpoint selection, bit 2	0
p1023[C]	BI: Fixed speed setpoint selection, bit 3	0
p1035[C]	BI: Motorized potentiometer setpoint higher	Dependent on the converter
p1036[C]	BI: Motorized potentiometer setpoint lower	Dependent on the converter
p1055[C]	BI: Jogging bit 0	Dependent on the converter
p1056[C]	BI: Jogging bit 1	Dependent on the converter

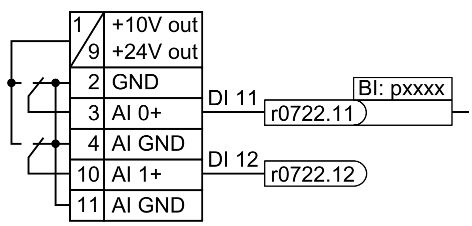
Parameter	Description	Factory setting
p1113[C]	BI: Setpoint inversion	Dependent on the converter
p2103[C]	BI: 1. Acknowledge faults	Dependent on the converter
p2106[C]	BI: External fault 1	1
p2112[C]	BI: External alarm 1	1

For further binector inputs and additional information on parameters, please refer to the parameter list.

Parameter list (Page 514)

8.3.2.2 Analog input as digital input

Function description

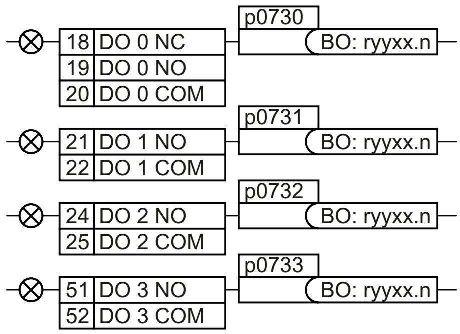


To use an analog input as additional digital input, you must interconnect the corresponding status parameter r0722.11 or r0722.12 with a binector input of your choice.

You may operate the analog input as a digital input with 10 V or with 24 V.

8.3.2.3 Digital outputs

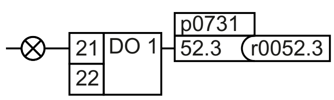
Function description



To change the function of a digital output, you must interconnect the digital output with a binector output of your choice.

Binector outputs are designated in the parameter list with a "BO:" as prefix.

Example



To output converter fault messages via digital output DO 1, you must interconnect DO 1 with these fault messages.

Set p0731 = 52.3

Parameters

Table 8-4 Frequently used binector outputs (BO) of the converter

Parameter	Description		Factory setting
r0052[0...15]	CO/BO: Status word 1		-
	.00	1 signal: Ready for switching on	
	.01	1 signal: Ready for operation	
	.02	1 signal: Operation enabled	
	.03	1 signal: Fault active: The converter inverts signal r0052.03 if it is interconnected to a digital output.	
	.04	0 signal: OFF2 active	
	.05	0 signal: OFF3 active	
	.06	1 signal: Switching on inhibited active	
	.07	1 signal: Alarm active	
	.08	0 signal: Deviation, setpoint/actual speed	
	.09	1 signal: Control request	
	.10	1 signal: Maximum speed (p1082) reached	
	.11	0 signal: I, M, P limit reached	
	.13	0 signal: Alarm, motor overtemperature	
	.14	1 signal: Motor clockwise rotation	
	.15	0 signal: Alarm, converter overload	
r0053[0...11]	CO/BO: Status word 2		-
	.00	1 signal: DC braking active	
	.02	1 signal: Speed > minimum speed (p1080)	
	.06	1 signal: Speed ≥ setpoint speed (r1119)	

You can find additional binector outputs in the parameter list.

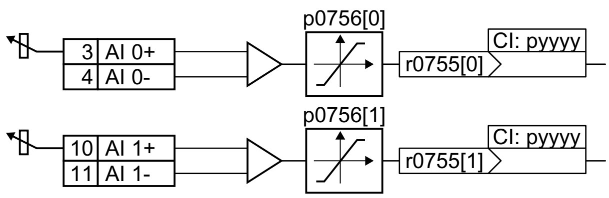
Parameter list (Page 514)

See also

Interconnecting signals in the converter (Page 507)

8.3.2.4 Analog inputs

Function description



Define the analog input type

With parameter p0756[x] you specify the type of analog input.

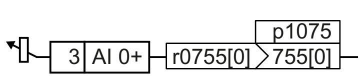
Table 8-5 Default settings via parameter p0756

AI 0	Unipolar voltage input	0 V ... +10 V	p0756[0] =	0
	Unipolar voltage input monitored	+2 V ... +10 V		1
	Unipolar current input	0 mA ... +20 mA		2
	Unipolar current input monitored	+4 mA ... +20 mA		3
	Bipolar voltage input (factory setting)	-10 V ... +10 V		4
AI 1	Unipolar voltage input	0 V ... +10 V	p0756[1] =	0
	Unipolar voltage input monitored	+2 V ... +10 V		1
	Unipolar current input	0 mA ... +20 mA		2
	Unipolar current input monitored	+4 mA ... +20 mA		3
	Bipolar voltage input (factory setting)	-10 V ... +10 V		4

Defining the function of an analog input

You define the analog input function by interconnecting a connector input of your choice with parameter p0755. Parameter p0755 is assigned to the particular analog input via its index, e.g. parameter p0755[0] is assigned to analog input 0.

Example



In order to enter the supplementary setpoint via analog input AI 0, you must interconnect AI 0 with the signal source for the supplementary setpoint.

Set p1075 = 755[0].

Parameters

Table 8-6 Frequently used connector inputs (CI) of the converter

Parameter	Description	Factory setting
p1070[C]	CI: Main setpoint	Dependent on the converter
p1075[C]	CI: Supplementary setpoint	0
p2253[C]	CI: Technology controller setpoint 1	0
p2264[C]	CI: Technology controller actual value	0

You can find additional connector inputs in the parameter list.

Parameter list (Page 514)

More information

Using an analog input as a digital input

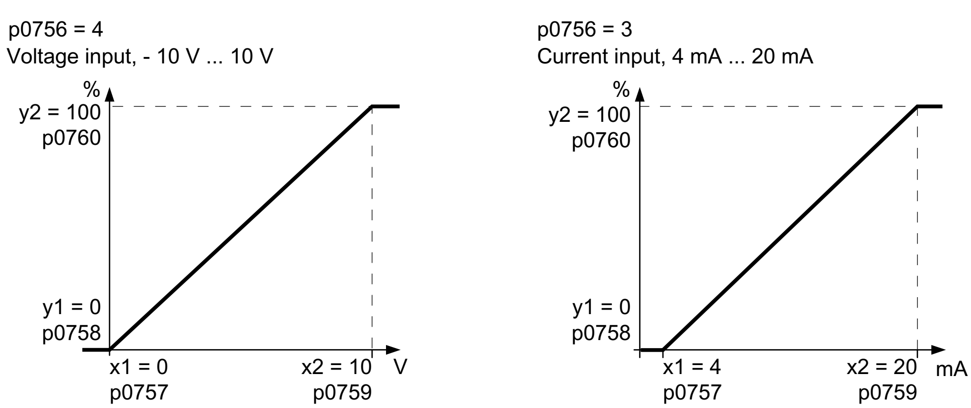
An analog input can also be used as a digital input.

Analog input as digital input (Page 180)

8.3.2.5 Adjusting characteristics for analog input

Function description

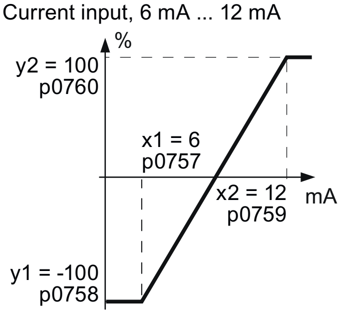
If you change the analog input type using p0756, then the converter automatically selects the appropriate scaling of the analog input. The linear scaling characteristic is defined using two points (p0757, p0758) and (p0759, p0760). Parameters p0757 ... p0760 are assigned to an analog input via their index, e.g. parameters p0757[0] ... p0760[0] belong to analog input 0.



You must define your own characteristic if none of the default types match your particular application.

Example

The converter should convert a 6 mA ... 12 mA signal into the value range -100% ... 100% via analog input 0. The wire-break monitoring of the converter should respond when 6 mA is fallen below.



Procedure

1. set p0756[0] = 3
   You have defined analog input 0 as a current input with wire-break monitoring.
2. Set p0757[0] = 6.0 (x1)
3. Set p0758[0] = -100.0 (y1)
4. Set p0759[0] = 12.0 (x2)
5. Set p0760[0] = 100.0 (y2)
6. Set p0761[0] = 6
   An input current < 6 mA results in fault F03505.

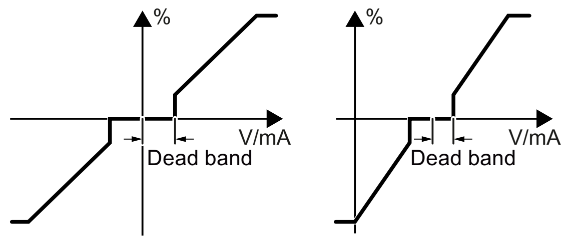
The characteristic for the application example is set.
❒

Parameters

Parameter	Description	Factory setting
p0757[0...n]	CU analog inputs characteristic value x1	0
p0758[0...n]	CU analog inputs characteristic value y1	0%
p0759[0...n]	CU analog inputs characteristic value x2	10
p0760[0...n]	CU analog inputs characteristic value y2	100%
p0761[0...n]	CU analog inputs wire-break monitoring, response threshold	2
p0762[0...n]	CU analog inputs wire breakage monitoring time	100 ms

8.3.2.6 Setting the deadband

Function description



With the control enabled, electromagnetic interference on the signal cable can cause the motor to slowly rotate in one direction in spite of a speed setpoint = 0.

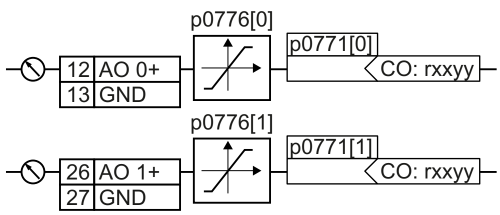
The deadband acts on the zero crossover of the analog input characteristic. Internally, the converter sets its speed setpoint = 0, even if the signal at the analog input terminals is slightly positive or negative. This prevents the converter from rotating the motor when the speed setpoint = 0.

Parameters

Parameter	Description	Factory setting
p0764[0]	Analog inputs deadband, AI 0	0
p0764[1]	Analog inputs deadband, AI 1	0

8.3.2.7 Analog outputs

Function description



Connector outputs are designated with a "CO" as prefix.

Defining the analog output type

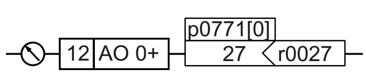
Define the analog output type using parameter p0776.

AO 0	Current output (factory setting)	0 mA ... +20 mA	p0776[0] =	0
	Voltage output	0 V ... +10 V		1
	Current output	+4 mA ... +20 mA		2
AO 1	Current output (factory setting)	0 mA ... +20 mA	p0776[1] =	0
	Voltage output	0 V ... +10 V		1
	Current output	+4 mA ... +20 mA		2

Defining the function of an analog output

You define the analog output function by interconnecting parameter p0771 with a connector output of your choice. Parameter p0771 is assigned to the specific analog output via its index, e.g. parameter p0771[0] is assigned to analog output 0.

Example



To output the converter output current via analog output 0, you must interconnect AO 0 with the signal for the output current.

Set p0771 = 27.

Parameters

Table 8-7 Frequently used connector outputs (CO) of the converter

Parameter	Description	Factory setting
r0021	CO: Speed actual value, smoothed	- rpm
r0025	CO: Output voltage, smoothed	- Vrms
r0026	CO: DC link voltage, smoothed	- V

Parameter	Description	Factory setting
r0027	CO: Absolute actual current, smoothed	- Arms
r0063	CO: Speed actual value	- rpm

You can find additional connector outputs in the parameter list.

Parameters (Page 511)

Function diagram

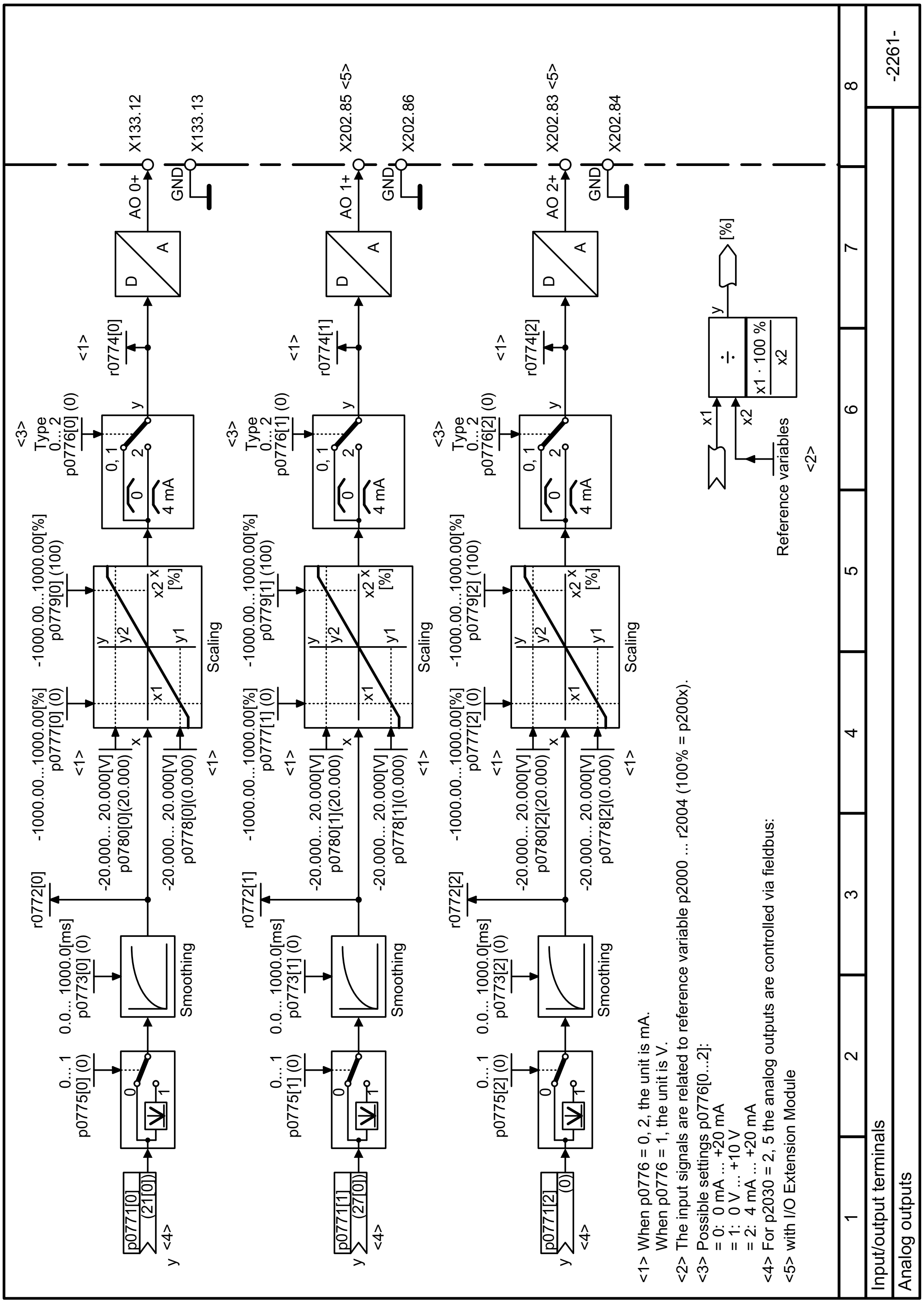


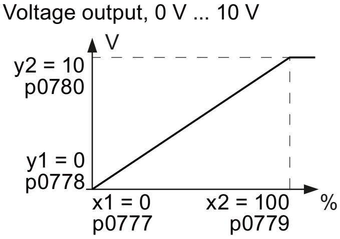
Figure 8-4 FP 2261

8.3.2.8 Adjusting characteristics for analog output

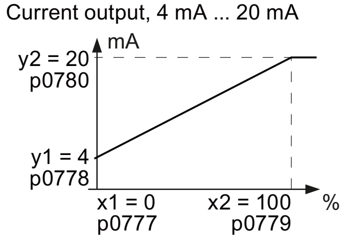
Function description

If you change the analog output type, then the converter automatically selects the appropriate scaling of the analog output. The linear scaling characteristic is defined using two points (p0777, p0778) and (p0779, p0780).

p0776 = 1
Voltage output, 0 V ... 10 V



p0776 = 2
Current output, 4 mA ... 20 mA



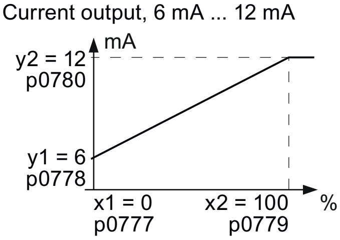
Parameters p0777 ... p0780 are assigned to an analog output via their index, e.g. parameters p0777[0] ... p0770[0] belong to analog output 0.

You must define your own characteristic if none of the default types match your particular application.

Example

Via analog output 0, the converter should convert a signal in the value range 0% ... 100% into an output signal 6 mA ... 12 mA.

Current output, 6 mA ... 12 mA



Procedure

1. Set p0776[0] = 2
   This defines analog output 0 as a current output.
2. Set p0777[0] = 0.0 (x1)
3. Set p0778[0] = 6.0 (y1)
4. Set p0779[0] = 100.0 (x2)
5. Set p0780[0] = 12.0 (y2)

The characteristic for the application example is set.
❒

Parameters

Table 8-8 Parameters for the scaling characteristic

Parameter	Description	Factory setting
p0777[0...1]	CU analog outputs characteristic value x1	-
p0778[0...1]	CU analog outputs characteristic value y1	0 V
p0779[0...1]	CU analog outputs characteristic value x2	100%
p0780[0...1]	CU analog outputs characteristic value y2	20 V

8.3.2.9 Function diagram 2221 - Digital inputs

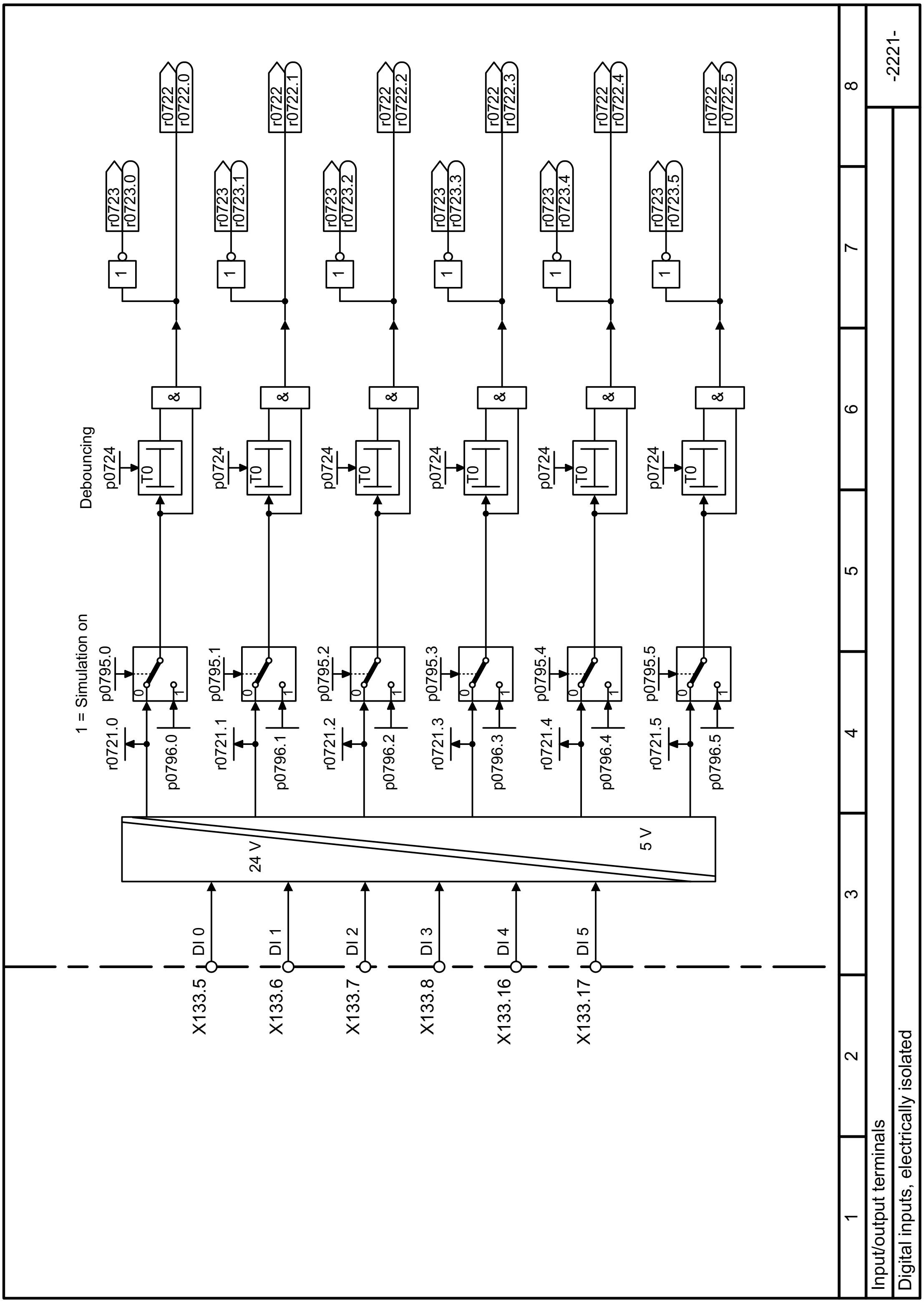


Figure 8-5 FP 2221

8.3.2.10 Function diagram 2243 - Digital outputs

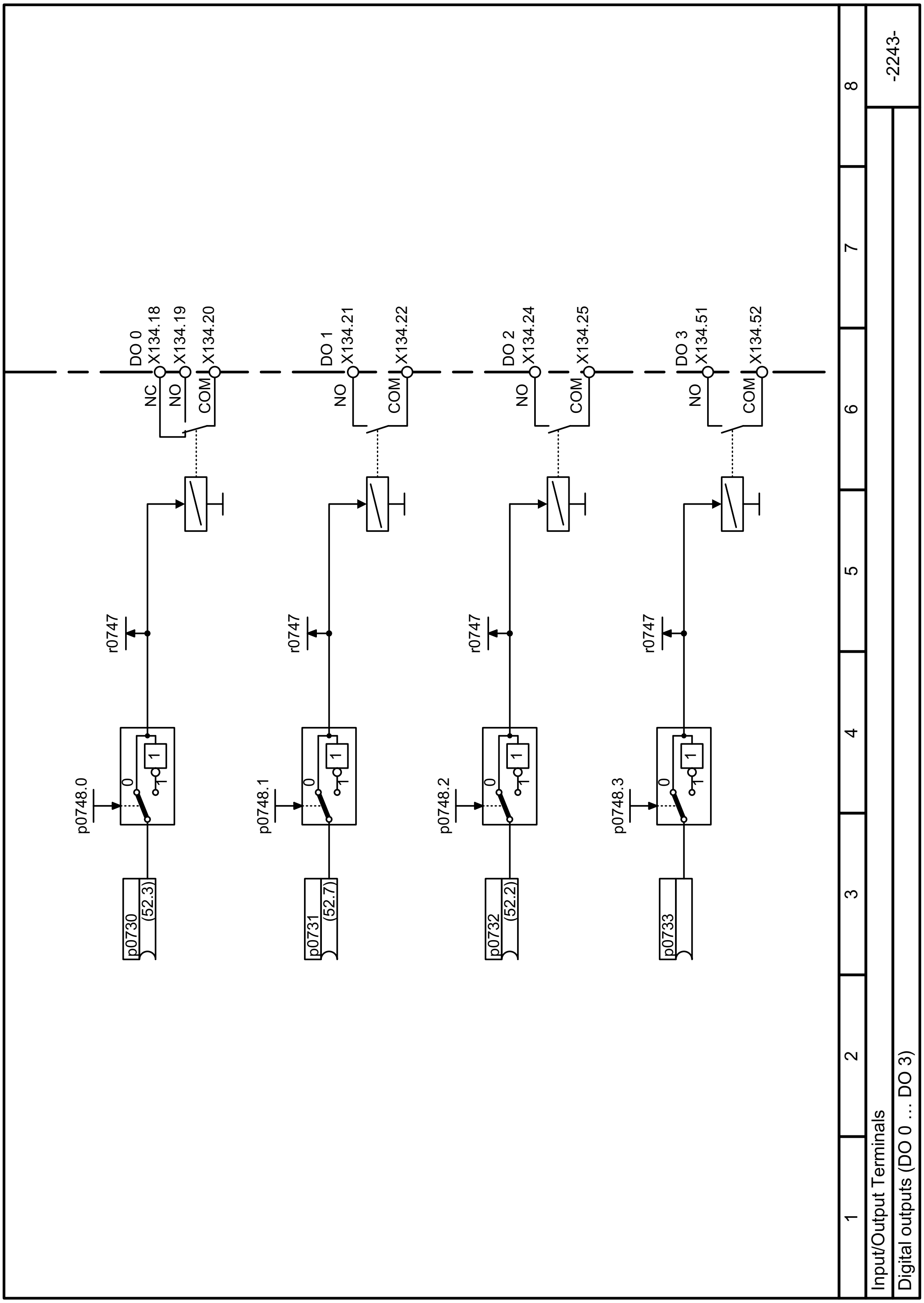


Figure 8-6 FP 2243

8.3.2.11 Function diagram 2251 - Analog inputs 0 and 1

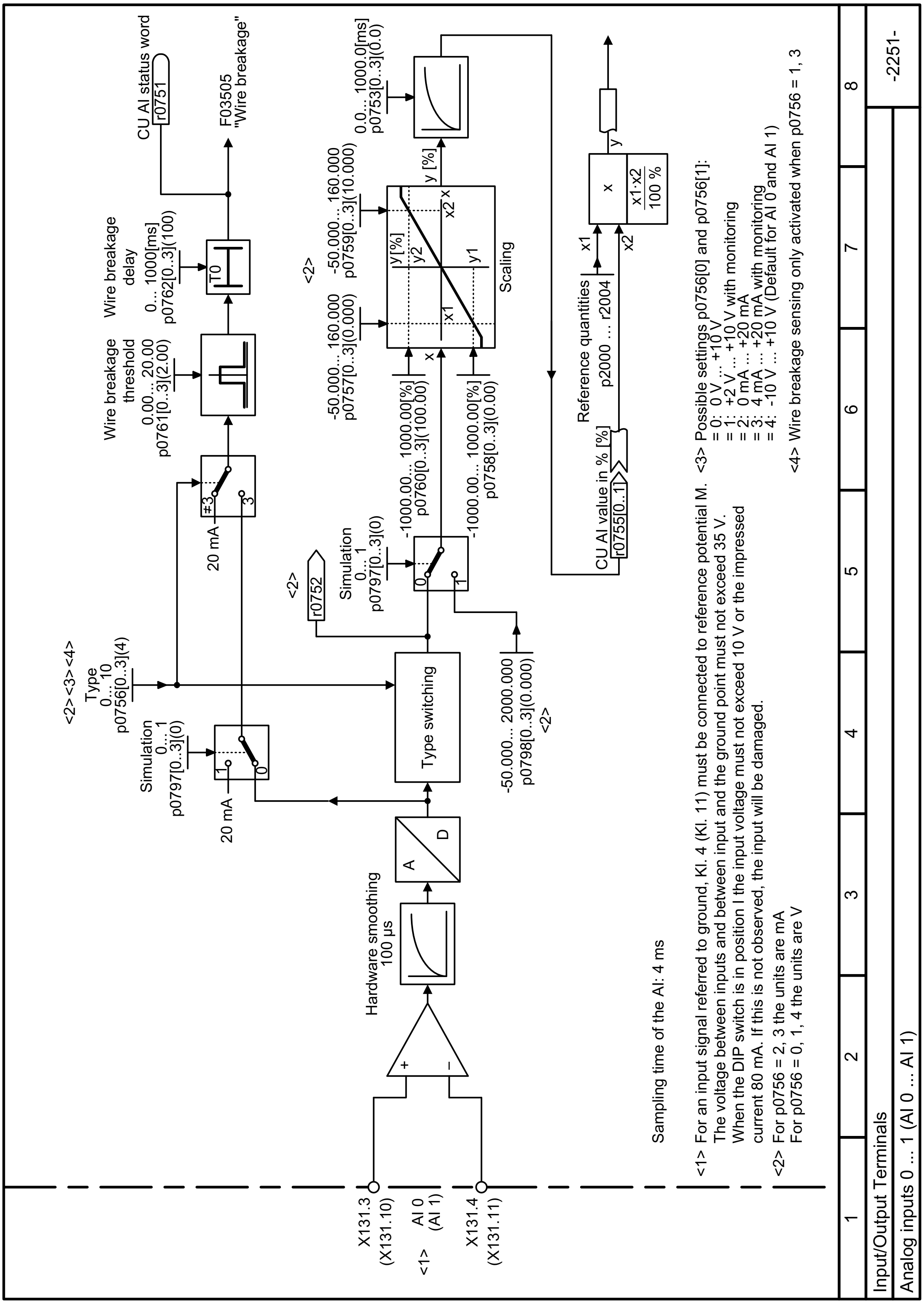


Figure 8-7 FP 2251

8.3.2.12 Function diagram 2256 - Analog inputs as digital inputs

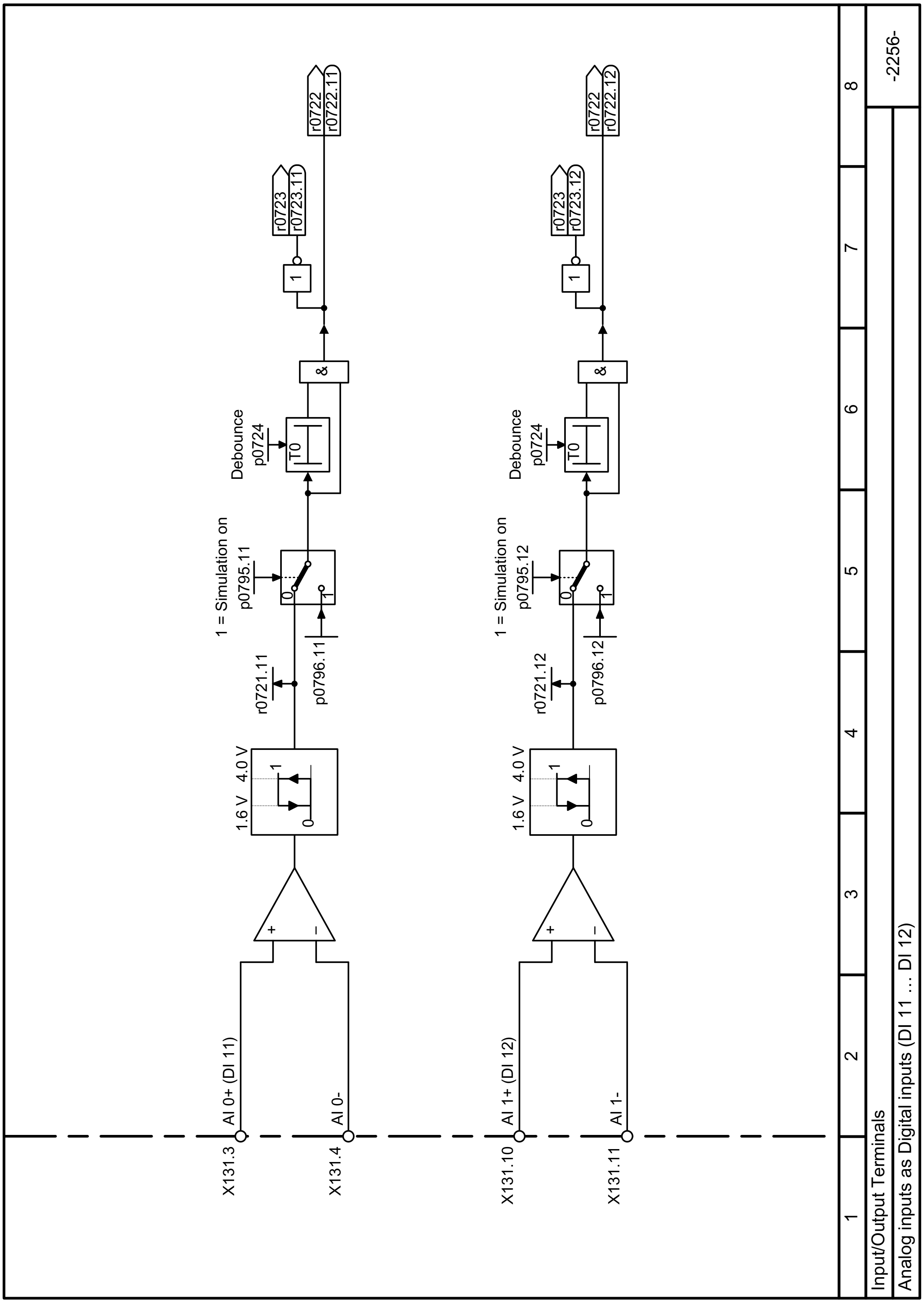


Figure 8-8 FP 2256

8.3.2.13 Function diagram 2261 - Analog outputs

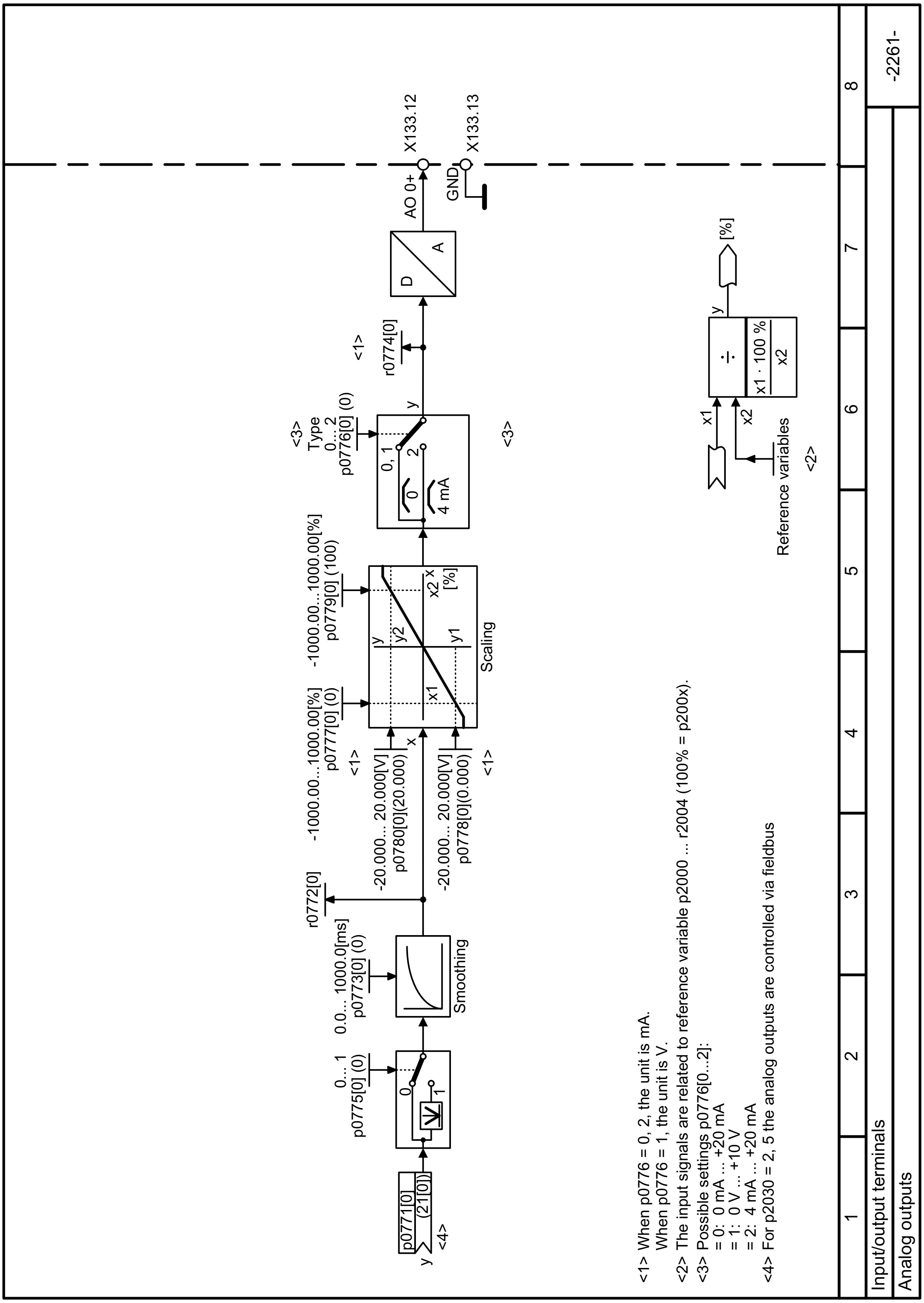


Figure 8-9 FP 2261

8.3.3 Modbus RTU

8.3.3.1 Activating communication via fieldbus

Function description

Procedure

Proceed as follows to activate communication via Modbus RTU:

1. Start quick commissioning.
2. In the first steps of the quick commissioning, confirm all of the values that have already been set.
3. Select one of the following default settings:
   - 51: "Modbus RTU control"
   - 52: "Modbus RTU control local/remote"

   Overview (Page 88)
4. In the next steps of the quick commissioning, confirm all additional values that have already been set.
5. Exit quick commissioning.

You have activated communication via Modbus RTU.
❒

ON/OFF commands via Modbus RTU

Selecting the macros 51 and 52 has the following effect:

- Only the ON/OFF2 command is possible via the terminal strip.
- The higher-level controller cannot turn the motor on or off.

To turn the motor on and off via the higher-level controller, you need to manually interconnect the ON/OFF1 and OFF2 commands with the PROFIdrive control word:

- Set p0840[0] = r2090.0
- Set p0844[0] = r2090.1

8.3.3.2 Setting the address

Function description

Procedure

1. Using parameter p2021, set the address using an operator panel or SINAMICS G120 Smart Access.
   Permissible addresses: 0 ... 31.
2. Switch off the converter power supply.
3. Wait until all LEDs on the converter are dark.
4. Switch on the converter power supply again.
   Your settings become active after switching on.

You have set the bus address.
❒

Parameters

Parameter	Description	Factory setting
p2021	Fieldbus interface address	0

8.3.3.3 Parameters for setting communication via Modbus RTU

General settings

Fieldbus protocol selection   p2030 = 2 (Modbus RTU)

Baud rate   p2020 = 7, 19200 bit/s

Setting range: 4800 bit/s ... 187500 bit/s

Parity

In the factory, the converter is set for controllers with "parity even". You can adapt the parity at your controller using p2031:

- p2031 = 0: No parity, 1 stop bit or 2 stop bits
- p2031 = 1: Odd parity, 1 stop bit
- p2031 = 2: Even parity, 1 stop bit

Modbus timing p2024[0 ... 2]

- **p2024[0]: Maximum slave telegram processing time:**
  The time after which the slave must have sent a response to the master. 0 ms ... 10000 ms, factory setting = 6000 ms.
- **p2024[1]: Character delay time:**
  Character delay time: Maximum permissible time between the individual characters in the Modbus frame. (Modbus standard processing time for 1.5 bytes).
- **p2024 [2]: Inter-telegram delay:**
  maximum permissible time between Modbus telegrams. (Modbus standard processing time for 3.5 bytes).

Values for p2024 [1] and p2024 [2]
Table 8-9 Baud rates, transmission times, and delays (Page 202).

Fieldbus monitoring time p2040 = 1000 ms

Setting range: 0 ms ... 1999999 ms

The more slaves that are connected in the network, the longer the fieldbus monitoring time must be.

If process data is not transferred within one cycle of the fieldbus monitoring time, then the converter shuts down with fault F01910.

p2040 = 0 ⇒ bus monitoring deactivated.

Fieldbus error statistics r2029

Displaying receive errors at the fieldbus interface

Interconnecting analog outputs

If you set communication via Modbus (p2030 = 2), then the analog outputs of the converter are internally interconnected with the fieldbus analog outputs:

- p0771[0] = 791[0]
- p0771[1] = 791[1].

The values for p0791[0] and p0791[1] are written via registers 40523 and 40524. Interconnections between parameter p0791 and other sources are rejected.

This means that the control outputs system-specific values via the analog outputs of the converter.

However, if you still wish to display a converter-specific value, you must adapt the appropriate wiring.

Example

- AO 0 should display the value written via the control with register 40523. In this particular case, no other settings are required in the converter.
- AO 1 should display the smoothed current actual value. To do this, you must set p0771[1] = 27 (r0027 smoothed current actual value).
  In this case, a write access via register 40524 to p0791[1] results in a fault message in the control.

Note

Reset to the factory setting for Modbus

If you have set communication via Modbus (p2030 = 2), when restoring the factory settings, the analog outputs are again interconnected with p0771[0] = 791[0] and p0771[1] = 791[1].

8.3.3.4 Modbus RTU telegram

Description

For Modbus, there is precisely one master and up to 247 slaves. The master always starts the communication. Slaves send data when requested to do so by the master. Slave-to-slave communication is not possible. The converter always operates as slave.

The following figure shows the structure of a Modbus RTU telegram.

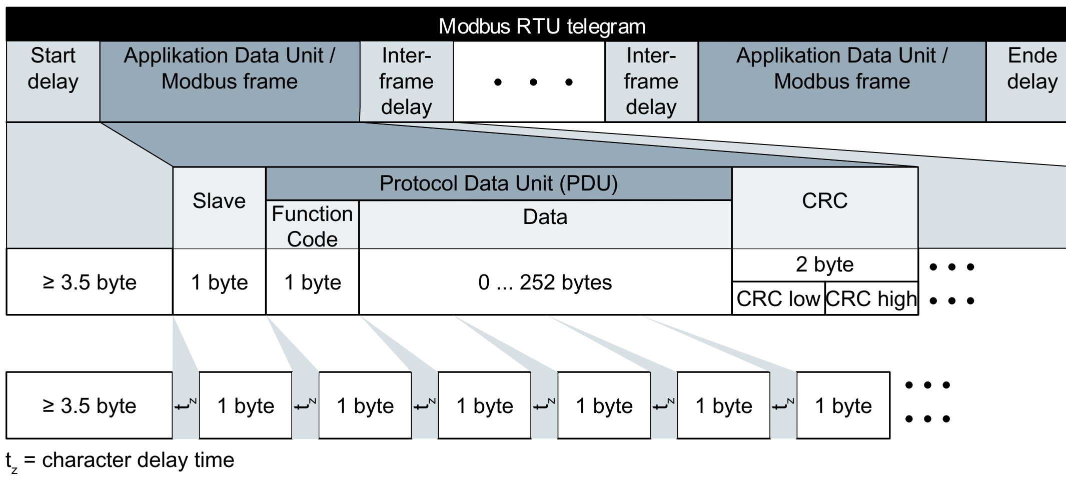


Figure 8-10 Modbus with delay times

The data area of the telegram is structured according to the mapping tables.

8.3.3.5 Baud rates and mapping tables

Permissible baud rates and telegram delay

The Modbus RTU telegram requires pauses for the following situations:

- for the start identifier
- for separating the individual frames
- for the end identifier

Minimum duration: Processing time for 3.5 bytes (can be set via p2024[2]).

A character delay time is also permitted between the individual bytes of a frame. Maximum duration: Processing time for 1.5 bytes (can be set via p2024[1]).

Table 8-9 Baud rates, transmission times, and delays

Baud rate in bit/s (p2020)	Transmission time per character (11 bits)	Minimum pause between two telegrams (p2024[2])	Maximum pause between two bytes (p2024[1])
4800	2.292 ms	≥ 8.021 ms	≤ 3.438 ms
9600	1.146 ms	≥ 4.010 ms	≤ 1.719 ms
19200 (factory setting)	0.573 ms	≥ 1.75 ms	≤ 0.859 ms
38400	0.286 ms	≥ 1.75 ms	≤ 0.75 ms
57600	0.191 ms	≥ 1.75 ms	≤ 0.556 ms
76800	0.143 ms	≥ 1.75 ms	≤ 0.417 ms
93750	0.117 ms	≥ 1.75 ms	≤ 0.341 ms
115200	0.095 ms	≥ 1.75 ms	≤ 0.278 ms
187500	0.059 ms	≥ 1.75 ms	≤ 0.171 ms

Note

The factory setting for p2024[1] and p2024[2] is 0. The converter defines the particular values depending on the protocol selection (p2030) or the baud rate.

Modbus register

The converter supports the subsequently listed registers. Error "Exception Code" is output if an attempt is made to access other registers.

Note

Read and write access to converter data

R: read via FC03; W: write via FC06; R/W: read via FC03 or write via FC06

Table 8-10 Assigning the Modbus registers to the process data

Register	Description	Access	Scaling	Data / parameter
40100	Control word	R/W	1	Process data 1
40101	Main setpoint	R/W	1	Process data 2
40110	Status word	R	1	Process data 1
40111	Main actual value	R	1	Process data 2

8.3.3.6 Mapping tables - converter data

Table 8-11 Assigning the Modbus registers to the parameters - inputs and outputs

Regis-ter	Description	Ac-cess	Unit	Scaling	ON/OFF text/ value range		Data / parameter
Digital outputs							
40200	DO 0	R/W	--	1	HIGH	LOW	p0730, r747.0, p748.0
40201	DO 1	R/W	--	1	HIGH	LOW	p0731, r747.1, p748.1
40202	DO 2	R/W	--	1	HIGH	LOW	p0732, r747.2, p748.2
40203	DO 3	R/W	--	1	HIGH	LOW	p0733, r747.3, p748.3
Analog outputs							
40220	AO 0	R	%	100	-100.0 ... 100.0		r0774.0
40221	AO 1	R	%	100	-100.0 ... 100.0		r0774.1
40523	AO 0	R/W	%	100	-199.99 ... 199.99		p0791.0
40524	AO 1	R/W	%	100	-199.99 ... 199.99		p0791.1
Digital inputs							
40240	DI 0	R	--	1	HIGH	LOW	r0722.0
40241	DI 1	R	--	1	HIGH	LOW	r0722.1
40242	DI 2	R	--	1	HIGH	LOW	r0722.2
40243	DI 3	R	--	1	HIGH	LOW	r0722.3
40244	DI 4	R	--	1	HIGH	LOW	r0722.4
40245	DI 5	R	--	1	HIGH	LOW	r0722.5
Analog inputs							
40260	AI 0	R	%	100	-300.0 ... 300.0		r0755 [0]
40261	AI 1	R	%	100	-300.0 ... 300.0		r0755 [1]

Table 8-12 Assigning the Modbus registers to the parameters - converter data

Regis-ter	Description	Ac-cess	Unit	Scaling	ON/OFF text/ value range	Data / parameter
40300	Powerstack number	R	--	1	0 ... 32767	r0200
40301	Converter firmware	R	--	1	e.g. 470	r0018 / 10000
40320	Rated power	R	kW	100	0 ... 327.67	r0206
40321	Current limit	R/W	A	10	10.0 ... 400.0	p0640
40322	Ramp-up time	R/W	s	100	0.00 ... 650.0	p1120
40323	Ramp-down time	R/W	s	100	0.00 ... 650.0	p1121
40324	Reference speed	R/W	RPM	1	6 ... 32767	p2000
Converter diagnostics						
40340	Speed setpoint	R	RPM	1	-16250 ... 16250	r0020
40341	Actual speed value	R	RPM	1	-16250 ... 16250	r0022
40342	Output frequency	R	Hz	100	- 327.68 ... 327.67	r0024
40343	Output voltage	R	V	1	0 ... 32767	r0025
40344	DC-link voltage	R	V	1	0 ... 32767	r0026

Regis-ter	Description	Ac-cess	Unit	Scaling	ON/OFF text/ value range		Data / parameter
40345	Current actual value	R	A	100	0 ... 163.83		r0027
40346	Actual torque value	R	Nm	100	- 325.00 ... 325.00		r0031
40347	Actual active power	R	kW	100	0 ... 327.67		r0032
40348	Energy consumption	R	kWh	1	0 ... 32767		r0039
40349	Control priority	R	--	1	HAND	AUTO	r0807

Table 8-13 Assigning the Modbus registers to the parameters - fault diagnostics

Regis-ter	Description	Ac-cess	Unit	Scaling	ON/OFF text/ value range	Data / parameter
40400	Failure number, index 0	R	--	1	0 ... 32767	r0947 [0]
40401	Failure number, index 1	R	--	1	0 ... 32767	r0947 [1]
40402	Failure number, index 2	R	--	1	0 ... 32767	r0947 [2]
40403	Fault number, index 3	R	--	1	0 ... 32767	r0947 [3]
40404	Fault number, index 4	R	--	1	0 ... 32767	r0947 [4]
40405	Fault number, index 5	R	--	1	0 ... 32767	r0947 [5]
40406	Fault number, index 6	R	--	1	0 ... 32767	r0947 [6]
40407	Fault number, index 7	R	--	1	0 ... 32767	r0947 [7]
40408	Alarm number	R	--	1	0 ... 32767	r2110 [0]
40409	Actual alarm code	R	--	1	0 ... 32767	r2132
40499	PRM ERROR code	R	--	1	0 ... 255	--

Table 8-14 Assigning the Modbus registers to the parameters - technology controller

Regis-ter	Description	Ac-cess	Unit	Scaling	ON/OFF text/ value range	Data / parameter
40500	Technology controller enable	R/W	--	1	0 ... 1	p2200, r2349.0
40501	Technology controller MOP	R/W	%	100	-200.0 ... 200.0	p2240
Technology controller adjustment						
40510	Time constant for actual-value filters of the technology controller	R/W	--	100	0.00 ... 60.0	p2265
40511	Scaling factor for actual value of the technology controller	R/W	%	100	0.00 ... 500.00	p2269
40512	Proportional amplification of the tech-nology controller	R/W	--	1000	0.000 ... 65.000	p2280
40513	Integral time of the technology control-ler	R/W	s	1	0 ... 60	p2285
40514	Time constant D-component of the tech-nology controller	R/W	--	1	0 ... 60	p2274
40515	Max. limit of technology controller	R/W	%	100	-200.0 ... 200.0	p2291
40516	Min. limit technology controller	R/W	%	100	-200.0 ... 200.0	p2292

Table 8-15 Assigning the Modbus registers to the parameters - PID diagnostics

Register	Description	Access	Unit	Scaling	ON/OFF text/ value range	Data / parameter
40520	Effective setpoint acc. to internal technology controller MOP ramp-function generator	R	%	100	-100.0 ... 100.0	r2250
40521	Actual value of technology controller after filter	R	%	100	-100.0 ... 100.0	r2266
40522	Output signal technology controller	R	%	100	-100.0 ... 100.0	r2294

Table 8-16 Modbus registers for communication via DS47

Register	Description	Access	Unit	Scaling	Data / parameter
40601	DS47 Control	R/W	--	--	--
40602	DS47 header	R/W	--	--	--
40603	DS47 data 1	R/W	--	--	--
...	...	...			
40722	DS47 data 120	R/W	--	--	--

Table 8-17 Modbus registers for multi-pump control

Register	Last register	Description	Access	Unit	Scaling	ON/OFF text/value range	Data / parameter
40800		Status word	R	--	1	0 ... 65535	p29529
40801		Motor index speed control	R	--	1	0 ... 3	p29538
40802		Status word, service mode	R	--	1	0 ... 65535	p29544
40804	40805	Motor 1 operating hours	R/W	h	10	0 ... 429496729.5	p29530[0]
40806	40807	Motor 2 operating hours	R/W	h	10	0 ... 429496729.5	p29530[1]
40808	40809	Motor 3 operating hours	R/W	h	10	0 ... 429496729.5	p29530[2]
40810	40811	Motor 4 operating hours	R/W	h	10	0 ... 429496729.5	p29530[3]

8.3.3.7 Acyclic communication via Modbus RTU

Acyclic communication or general parameter access is realized using the Modbus registers 40601 ... 40722.

Acyclic communication is controlled using 40601. 40602 contains the function code (always = 47 = 2F hex) and the number of the following user data. User data are contained in registers 40603 ... 40722.

Overview of acyclic communication

Value in the register				Explanation
40601	40602		40603 ... 40722	
0	47	...	...	Write values for acyclic access
1	47	Request length [bytes]	Request data	Activate acyclic access
2	47	Response length [bytes]	Response data	Response for a successful request
2	47	0	Error code	Response for an erronous request

Error codes

1 hex: Invalid Length (invalid length)
2 hex: Invalid State (in the current converter state, this action is not permitted)
3 hex: Invalid function code (FC ≠ 2F hex)
4 hex: Response not ready (the response has still not been issued)
5 hex: Internal Error (general system error)

Incorrect access operations to parameters via data set 47 are logged in registers 40603 ... 40722.

8.3.3.8 Write and read access using function codes

Basic structure of read and write access using function codes

Slave ID	Protocol Data Unit (PDU)		CRC	
	FC	Data	low	high
1 Byte	1 Byte	0 ... 252 Bytes	2 Byte	

Function codes used

For data exchange between the master and slave, predefined function codes are used for communication via Modbus.

The converter uses the following Modbus function codes:

- FC 03: Holding register to read data from the converter
- FC 06: Write single register to write to individual register
- FC 16: Write to multiple registers to write to several registers

Structure of a read request via Modbus function code 03 (FC 03)

Any valid register address is permitted as the start address.

Via FC 03, the control can address more than one register with one request. The number of addressed registers is contained in bytes 4 and 5 of the read request.

Table 8-18 Structure of a read request via slave number 17, example

Value	Byte	Description
11 h	0	Slave address
03 h	1	Function code
00 h	2	Register start address "High" (register 40110)
6D h	3	Register start address "Low"
00 h	4	Number of registers "High" (2 registers: 40110; 40111)
02 h	5	number of registers "Low"
xx h	6	CRC "Low"
xx h	7	CRC "High"

The response returns the corresponding data set:

Table 8-19 Slave response to the read request, example

Value	Byte	Description
11 h	0	Slave address
03 h 04 h 11 h 22 h 33 h 44 h	1 2 3 4 5 6	Function code Number of bytes (4 bytes are returned) Data first register "High" Data first register "Low" Data second register "High" Data second register "Low"
xx h xx h	7 8	CRC "Low" CRC "High"

Table 8-20 Invalid read request

Read request	Converter response
Invalid register address	Exception code 02 (invalid data address)
Read a write-only register	Telegram in which all values are set to 0.
Read a reserved register	
Controller addresses more than 125 registers	Exception code 03 (invalid data value)
The start address and the number of registers of an address are located outside of a defined register block	Exception code 02 (invalid data address)

Structure of a write request via Modbus function code 06 (FC 06)

Start address is the holding register address.

Via FC 06, with one request, only precisely one register can be addressed. The value, which is written to the addressed register, is contained in bytes 4 and 5 of the write request.

Table 8-21 Structure of a write request for slave number 17, example

Value	Byte	Description
11 h	0	Slave address
06 h 00 h 63 h 55 h 66 h	1 2 3 4 5	Function code Register start address "High" (write register 40100) Register start address "Low" Register data "High" Register data "Low"
xx h xx h	6 7	CRC "Low" CRC "High"

The response returns register address (bytes 2 and 3) and the value (bytes 4 and 5), which the higher-level control had written to the register.

Table 8-22 Slave response to the write request

Value	Byte	Description
11 h	0	Slave address
06 h 00 h 63 h 55 h 66 h	1 2 3 4 5	Function code Register start address "High" Register start address "Low" Register data "High" Register data "Low"
xx h xx h	6 7	CRC "Low" CRC "High"

Table 8-23 Invalid write request

Write request	Converter response
Incorrect address (a holding register address does not exist)	Exception Code 02 - invalid data address
Write to a "read-only" register	Exception Code 04 - device failure
Write to a reserved register	

For Exception Code 4, via the holding register 40499, you can read out the internal drive error code, which has occurred for the last parameter access via the holding register.

8.3.3.9 Reading and writing parameters acyclically via FC 16

Via FC 16, with one request, up to 122 registers can be written to directly one after the other, while for Write Single Register (FC 06) you must individually write the header data for each register.

Header

In addition to the slave address, enter the transfer type, the start address and the number of the following registers in the header.

User data

You control the access in the user data via register 40601.

In register 40602, you define the acyclic access as well as the length of the request data.

Register 40603 contains the request reference - it is defined by the user - and the access type - reading or writing.

Register 40604 contains the number of the drive object (always 1) and the number of parameters that are read or written.

Register 40605 contains the attribute that you use to control whether you read out the parameter value or the parameter attribute. In the number of elements you specify how many indices are read.

Example: r0002 read acyclically

Table 8-24 Write parameter request: Reading the parameter value of r0002 from slave number 17

Value	Byte	Description
11 h	0	Slave address
10 h	1	Function code (write multiple)
0258 h	2,3	Register start address
0007 h	4,5	Number of registers to be read (40601 … 40607)
0E h	6	Number of data bytes (7 registers, each 2 bytes = 14 bytes)
0001 h	7,8	40601: DS47 Control = 1 (activate request)
2F0A h	9,10	40602: Function 2F h (47), request length 10 bytes (0A h)
8001 h	11,12	40603: Request reference = 80 h, request identifier = 1 h
0101 h	13,14	40604: DO-Id = 1, number of parameters = 1
1001 h	15,16	40605: Attribute, number of elements = 1
0002 h	17,18	40606: Parameter number = 2
0000 h	19,20	40607: Subindex = 0
xx h	21	CRC "Low"
xx h	22	CRC "High"

Table 8-25 Start parameter request: Reading the parameter value of r0002 from slave number 17

Value	Byte	Description
11 h	0	Slave address
03 h	1	Function code (read)
0258 h	2,3	Register start address
0007 h	4,5	Number of registers to be read (40601 … 40607)
0010 h	6,7	Number of registers
xx h	8	CRC "Low"
xx h	9	CRC "High"

Table 8-26 Response for successful read operation

Value	Byte	Description
11 h	0	Slave address
03 h	1	Function code (read)
20 h	2	Number of following data bytes (20 h: 32 bytes corresponds to 16 registers)
0002 h	3,4	40601: DS47 Control = 2 (the request was executed)
2F08 h	5,6	40602: Function code 2F h (47), response lengths 8 bytes
8001 h	7,8	40603: Request reference mirrored = 80 h, response identifier = 1 (request parameter)
0101 h	9,10	40604: DO-ID = 1, number of parameters = 1
0301 h	11,12	40605: Format, number of elements = 1
001F h	13,14	40606: Parameter value = 1F h (31)
xx h	15	CRC "Low"
xx h	16	CRC "High"

Table 8-27 Response for unsuccessful read operation - read request still not completed

Value	Byte	Description
11 h	0	Slave address
03 h 20 h 0001 h 2F00 h 0004 h	1 2 3,4 5,6 7,8	Function code (read) Number of following data bytes (20 h: 32 bytes corresponds to 16 registers) 40601: Check value 1 = request is processed 40602: Function 2F h(47), response length 0 (fault) 40603: Error code: 0004 Response Not Ready (response has still not been issued)
xx h xx h	9 10	CRC "Low" CRC "High"

Example: Set p1121 = 12.15

Table 8-28 Write parameter request: Writing the parameter value of p1121 from slave number 17

Value	Byte	Description
11 h	0	Slave address
10 h 0258 h 000A h 14 h 0001 h 2F10 h 8002 h 0101 h 1001 h 0461 h 0000 h 0801 h 4142 h 6666 h	1 2,3 4,5 6 7,8 9,10 11,12 13,14 15,16 17,18 19,20 21,22 23,24 25,26	Function code (write multiple) Register start address Number of registers to be written to (40601 … 40610) Number of data bytes (10 registers, each 2 bytes = 20 bytes) 40601: C1 (activate request) 40602: Function 2F h (47), request length 16 bytes (10 h) 40603: Request reference = 80 h, request identifier = 2 h (write) 40604: DO-Id = 1, number of parameters = 1 40605: Attribute, number of elements = 1 40606: Parameter number = 1121 40607: Subindex = 0 40608: Format + number of values 40609: Parameter value 12,15 40610: Parameter value
xx h xx h	27 28	CRC "Low" CRC "High"

Table 8-29 Start parameter request: Writing the parameter value of p1121 from slave number 17

Value	Byte	Description
11 h	0	Slave address
06 h 0258 h 0007 h 0010 h	1 2,3 4,5 6,7	Function code (write) Register start address Number of registers to be written to (40601 … 40610) Number of registers
xx h xx h	8 9	CRC "Low" CRC "High"

Table 8-30 Response for successful write operation

Value	Byte	Description
11 h	0	Slave address
06 h 20 h 0002 h 2F04 h 8002 h 0101 h	1 2 3,4 5,6 7,8 9,10	Function code (write) Number of following data bytes (20 h: 32 bytes corresponds to 16 registers) 40601: DS47 Control = 2 (request was executed) 40602: Function code 2F h (47), response length 4 bytes 40603: Request reference mirrored = 80 h, response identifier = 2 (change parameter) 40604: DO-ID = 1, number of parameters = 1
xx h xx h	11 12	CRC "Low" CRC "High"

Table 8-31 Response for unsuccessful write operation - write request still not completed

Value	Byte	Description
11 h	0	Slave address
06 h 20 h 0001 h 2F00 h 0004 h	1 2 3,4 5,6 7,8	Function code (write) Number of following data bytes (20 h: 32 bytes corresponds to 16 registers) 40601: DS47 Control = 1 (request is processed) 40602: Function 2F h(47), response length 0 (fault) 40603: Error code: 0004 Response Not Ready (response has still not been issued)
xx h xx h	9 10	CRC "Low" CRC "High"

8.3.3.10 Communication procedure

Procedure for communication in a normal case

Normally, the master sends a telegram to a slave (address range 1 ... 247). The slave sends a response telegram to the master. This response telegram mirrors the function code; the slave enters its own address in the telegram and so the slave identifies itself with the master.

The slave only processes orders and telegrams which are directly addressed to it.

Communication error

If the slave detects a communication error on receipt (parity, CRC), it does not send a response to the master, since this can lead to "setpoint timeout".

Logical error

If the slave detects a logical error within a request, it responds to the master with an "exception response". In the response, the slave sets the highest bit in the function code to 1. If the slave receives, for example, an unsupported function code from the master, the slave responds with an "exception response" with code 01 (Illegal function code).

Table 8-32 Overview of exception codes

Exception code	Modbus name	Remark
01	Illegal function code	An unknown (unsupported) function code was sent to the slave.
02	Illegal Data Address	An invalid address was requested.
03	Illegal data value	An invalid data value was detected.
04	Server failure	Slave has terminated during processing.

Maximum processing time, p2024[0]

The slave-response time is the time in which the Modbus master expects a response to a request. Set the same slave-response time (p2024 [0] in the converter) in the master and slave.

Process data monitoring time (setpoint timeout), p2040

"Setpoint timeout" (F1910) is issued by the Modbus if p2040 is set to a value > 0 ms and no process data is requested within this time period.

The "Setpoint timeout" only applies for access to process data (40100, 40101, 40110, 40111). The "Setpoint timeout" is not generated for parameter data (40200 ... 40522).

Note

Adjust the time (factory setting = 100 ms) depending on the number of slaves and the baud rate set on the bus.

8.3.3.11 Application example

An application example for MODBUS RTU is provided on the Internet:

Communication via the MODBUS interface (https://support.industry.siemens.com/cs/ww/en/view/35928944)

8.3.4 USS

8.3.4.1 Activating communication via fieldbus

Function description

Procedure

Proceed as follows to activate communication via USS:

1. Start quick commissioning.
2. In the first steps of the quick commissioning, confirm all of the values that have already been set.
3. Select one of the following default settings:
   - 54: "USS control"
   - 55: "USS control local/remote"

   Overview (Page 88)
4. In the next steps of the quick commissioning, confirm all additional values that have already been set.
5. Exit quick commissioning.

You have activated communication via USS.
❒

ON/OFF commands via USS

Selecting the macros 54 and 55 has the following effect:

- Only the ON/OFF2 command is possible via the terminal strip.
- The higher-level controller cannot turn the motor on or off.

To turn the motor on and off via the higher-level controller, you need to manually interconnect the ON/OFF1 and OFF2 commands with the PROFIdrive control word:

- Set p0840[0] = r2090.0
- Set p0844[0] = r2090.1

8.3.4.2 Setting the address

Function description

Procedure

1. Using parameter p2021, set the address using an operator panel or SINAMICS G120 Smart Access.
   Permissible addresses: 1 ... 247.
2. Switch off the converter power supply.
3. Wait until all LEDs on the converter are dark.
4. Switch on the converter power supply again.
   Your settings become active after switching on.

You have set the bus address.
❒

Parameters

Parameter	Description	Factory setting
p2021	Fieldbus interface address	0

8.3.4.3 Telegram structure

Overview

A USS telegram comprises a series of elements with a defined sequence. Each element contains 11 bits.

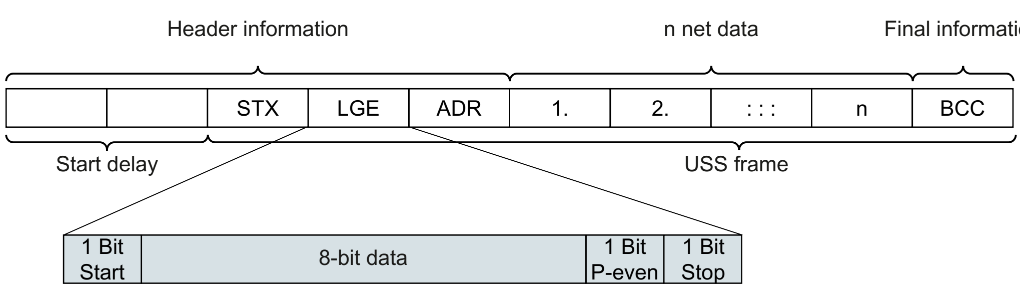


Figure 8-11 Structure of a USS telegram

Telegram part	Description
Start delay / response delay	There is always a start / response delay between two telegrams. Telegram monitoring (Page 221)
STX	An ASCII character (02 hex) indicates the beginning of the message.
LGE	The telegram length "LGE" is calculated as follows: LGE = user data (n bytes) + ADR (1 byte) + BCC (1 byte)

Telegram part	Description
ADR	Bit 7: Special telegram; Bit 6: Mirror telegram; Bit 5: Broadcast bit; Bits 4 3 2 1 0: Address • Bit 7 = 0: Normal data exchange. Bit 7 =1, to transfer telegrams that require a net data structure different from the device profile. • Bit 6 = 0: Normal data exchange. Bit 6 = 1: Testing the bus connection: The converter returns the telegram unchanged to the master. • Bit 5 = 0: Normal data exchange. (Bit 5 = 1: Not supported in the converter.) • Bits 0 ... 4: Address of the converter.
User data	Specify user data of telegram (Page 217).
BCC	Checksum (exclusive or) across all telegram bytes – with the exception of BCC.

8.3.4.4 Specify user data of telegram

Overview

The user data of the telegram consist of the following elements:

- Parameter channel (PIV) for writing and reading parameter values
- Process data (PZD) for controlling the drive

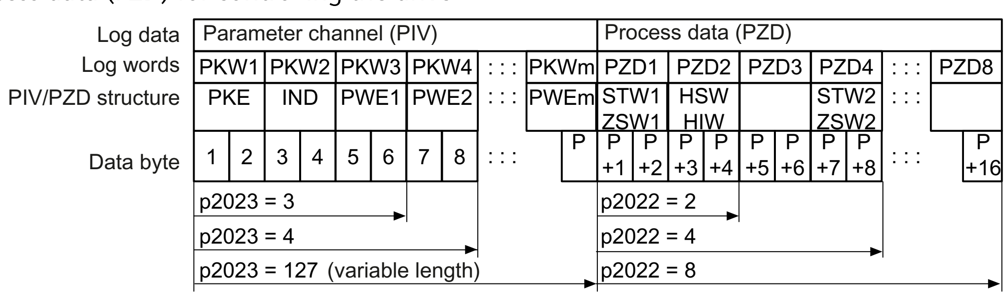


Figure 8-12 USS telegram - user data structure

Function description

Parameter channel

You specify the length of the parameter channel in parameter p2023:

- p2023 = 0
  With this setting, no parameter values are transferred.
- p2023 = 3
  You can select this setting if you only want to read or write 16-bit data or alarm signals.

- p2023 = 4:
  If you want to read or write 32-bit values (for example indexed parameters or bit parameters, e.g. r0722.2), then this setting is required. In this case, the send or receive telegram always contains four words, even if only three would be required. The values are right-justified in the 4th word.
- p2023 = 127:
  If you set p2023 = 127 (variable length), the send and response telegrams are exactly as long as the task requires.

Process data

Parameter p2022 defines the length for the process data. You can transfer up to eight process data items in one telegram (p2022 = 0 ... 8). For p2022 = 0, no process data is transferred.

Parameters

Parameter	Description	Factory setting
p2022	Fieldbus interface USS PZD number	2
p2023	Fieldbus interface USS PKW number	127

8.3.4.5 USS process data channel (PZD)

Function description

The process data channel (PZD) contains the following data depending on the transmission direction:

- Control words and setpoints for the slave
- Status words and actual values for the master.

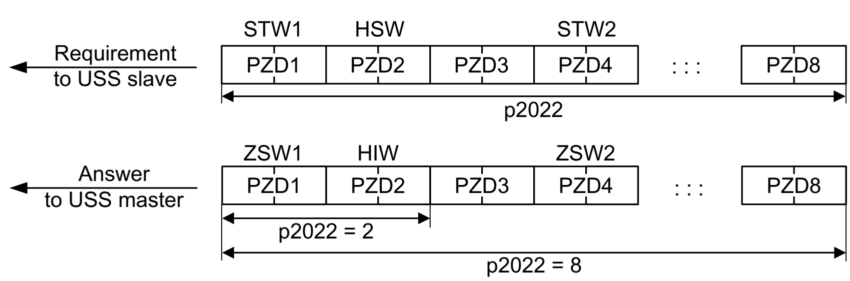


Figure 8-13 Process data channel

The first two words are:

- Control 1 (STW1) and main setpoint (HSW)
- Status word 1 (ZSW1) and main actual value (HIW)

If p2022 is greater than or equal to 4, then the converter receives the additional control word (STW2).

Control word 1 (STW1)

Bit	Significance	Explanation	Signal interconnection in the converter
0	0 = OFF1	The motor brakes with the ramp-down time p1121 of the ramp-function generator. The converter switches off the motor at standstill.	p0840[0] = r2090.0
	0 → 1 = ON	The converter goes into the "ready" state. If, in addition bit 3 = 1, then the converter switches on the motor.	
1	0 = OFF2	Switch off the motor immediately, the motor then coasts down to a standstill.	p0844[0] = r2090.1
	1 = No OFF2	The motor can be switched on (ON command).	
2	0 = Quick stop (OFF3)	Quick stop: The motor brakes to a standstill with the OFF3 ramp-down time p1135.	p0848[0] = r2090.2
	1 = No quick stop (OFF3)	The motor can be switched on (ON command).	
3	0 = Inhibit operation	Immediately switch-off motor (cancel pulses).	p0852[0] = r2090.3
	1 = Enable operation	Switch-on motor (pulses can be enabled).	
4	0 = Disable RFG	The converter immediately sets its ramp-function generator output to 0.	p1140[0] = r2090.4
	1 = Do not disable RFG	The ramp-function generator can be enabled.	
5	0 = Stop RFG	The output of the ramp-function generator stops at the actual value.	p1141[0] = r2090.5
	1 = Enable RFG	The output of the ramp-function generator follows the setpoint.	
6	0 = Inhibit setpoint	The converter brakes the motor with the ramp-down time p1121 of the ramp-function generator.	p1142[0] = r2090.6
	1 = Enable setpoint	Motor accelerates to the setpoint with the ramp-up time p1120.	
7	0 → 1 = Acknowledge faults	Acknowledge fault. If the ON command is still active, the converter switches to the "switching on inhibited" state.	p2103[0] = r2090.7
8, 9	Reserved		
10	0 = No control via PLC	Converter ignores the process data from the fieldbus.	p0854[0] = r2090.10
	1 = Control via PLC	Control via fieldbus, converter accepts the process data from the fieldbus.	
11	1 = Direction reversal	Invert setpoint in the converter.	p1113[0] = r2090.11
12	Reserved		
13	1 = MOP up	Increase the setpoint saved in the motorized potentiometer.	p1035[0] = r2090.13
14	1 = MOP down	Reduce the setpoint saved in the motorized potentiometer.	p1036[0] = r2090.14
15	Reserved		

Status word 1 (ZSW1)

Bit	Significance	Remarks	Signal interconnection in the converter
0	1 = Ready for switching on	Power supply switched on; electronics initialized; pulses locked.	p2080[0] = r0899.0
1	1 = Ready	Motor is switched on (ON/OFF1 = 1), no fault is active. With the command "Enable operation" (STW1.3), the converter switches on the motor.	p2080[1] = r0899.1
2	1 = Operation enabled	Motor follows setpoint. See control word 1, bit 3.	p2080[2] = r0899.2
3	1 = Fault active	The converter has a fault. Acknowledge fault using STW1.7.	p2080[3] = r2139.3
4	1 = OFF2 inactive	Coast down to standstill is not active.	p2080[4] = r0899.4
5	1 = OFF3 inactive	Quick stop is not active.	p2080[5] = r0899.5
6	1 = Switching on inhibited active	It is only possible to switch on the motor after an OFF1 followed by ON.	p2080[6] = r0899.6
7	1 = Alarm active	Motor remains switched on; no acknowledgement is necessary.	p2080[7] = r2139.7
8	1 = Speed deviation within the tolerance range	Setpoint / actual value deviation within the tolerance range.	p2080[8] = r2197.7
9	1 = Master control requested	The automation system is requested to accept the converter control.	p2080[9] = r0899.9
10	1 = Comparison speed reached or exceeded	Speed is greater than or equal to the corresponding maximum speed.	p2080[10] = r2199.1
11	1 = Torque limit not reached	Fallen below comparison value for current or torque.	p2080[11] = r0056.13 / r1407.7
12	Reserved		p2080[12] = r0899.12
13	0 = Alarm, motor overtemperature	--	p2080[13] = r2135.14
14	1 = Motor rotates clockwise	Internal converter actual value > 0.	p2080[14] = r2197.3
	0 = Motor rotates counter-clockwise	Internal converter actual value < 0.	
15	0 = Alarm, converter thermal overload		p2080[15] = r2135.15

8.3.4.6 Telegram monitoring

Function description

You require the telegram runtimes in order to set the telegram monitoring. The character runtime is the basis of the telegram runtime:

Table 8-33 Character runtime

Baud rate in bit/s	Transmission time per bit	Character run time (= 11 bits)
9600	104.170 µs	1.146 ms
19200	52.084 µs	0.573 ms
38400	26.042 µs	0.286 ms
57600	17.361 µs	0.191 ms
115200	8.681 µs	0.095 ms

The telegram runtime is longer than just purely adding all of the character runtimes (=residual runtime). You must also take into consideration the character delay time between the individual characters of the telegram.

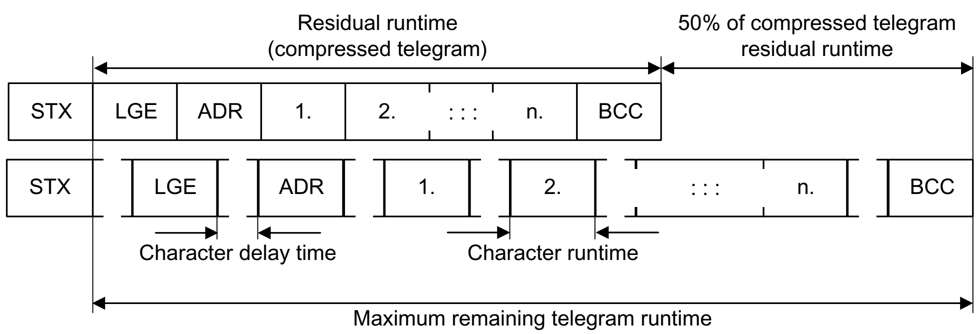


Figure 8-14 Telegram runtime as the sum of the residual runtime and character delay times

The total telegram runtime is always less than 150% of the pure residual runtime.

Before each request telegram, the master must maintain the start delay. The start delay must be > 2 × character runtime.

The slave only responds after the response delay has expired.

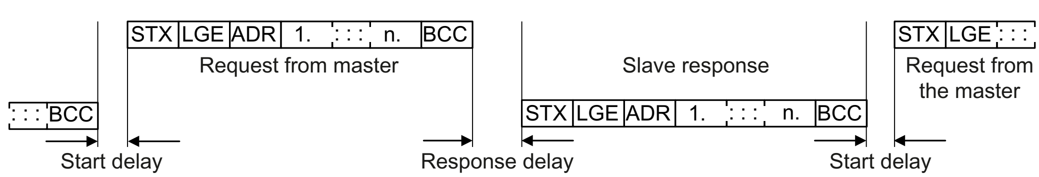


Figure 8-15 Start delay and response delay

Table 8-34 Start delay

Baud rate in bit/s	Transmission time per character (= 11 bits)	Min. start delay
9600	1.146 ms	> 2.291 ms
19200	0.573 ms	> 1.146 ms

Baud rate in bit/s	Transmission time per character (= 11 bits)	Min. start delay
38400	0.286 ms	> 0.573 ms
57600	0.191 ms	> 0.382 ms
115200	0.095 ms	> 0.191 ms

The character delay time must be shorter than the start delay.

Telegram monitoring of the master

With your USS master, we recommend that the following times are monitored:

- Response delay:
  Response time of the slave to a request from the master
  The response delay must be < 20 ms, but longer than the start delay
- Telegram runtime:
  Transmission time of the response telegram sent from the slave

Telegram monitoring of the converter

The converter monitors the time between two requests of the master. Parameter p2040 defines the permissible time in ms. If a time p2040 ≠ 0 is exceeded, then the converter interprets this as telegram failure and responds with fault F01910.

150% of the residual runtime is the guide value for the setting of p2040, i.e. the telegram runtime without taking into account the character delay times.

For communication via USS, the converter checks bit 10 of the received control word 1. If the bit is not set when the motor is switched on ("Operation"), the converter responds with fault F07220.

Parameters

Parameter	Description	Factory setting
p2040	Fieldbus interface monitoring time	1 000 ms

8.3.4.7 USS parameter channel

Structure of the parameter channel

Depending on the setting in p2023, the parameter channel has a fixed length of three or four words, or a variable length, depending on the length of the data to be transferred.

1. and 2nd word contain the parameter number and index as well as the type of job (read or write). The other words of the parameter channel contain parameter contents. The parameter contents can be 8-bit values, 16-bit values (such as baud rate) or 32-bit values (e.g. CO parameters). The parameter contents are entered right justified in the word with the highest number. Words that are not required are assigned 0.

Bit 11 in the 1st word is reserved and is always assigned 0.

The diagram shows a parameter channel that is four words long.

Parameter channel						
PKE (1st word)			IND (2nd word)		PWE (3rd and 4th word)	
15...12	11	10 ... 0	15 ... 8	7 ... 0	15 ... 0	15 ... 0
AK	SPM	PNU	Page index	Subindex	PWE 1, High Word	PWE 2, Low Word

You can find examples of telegrams at the end of this section.

Function description

AK: Request and response ID

Table 8-35 Request identifiers, control → converter

AK	Description	Response identifier	
		positive	negative
0	No request	0	7 / 8
1	Request parameter value	1 / 2	7 / 8
2	Change parameter value (word)	1	7 / 8
3	Change parameter value (double word)	2	7 / 8
4	Request descriptive element [1)]	3	7 / 8
6 [2)]	Request parameter value (field) [1)]	4 / 5	7 / 8
7 [2)]	Change parameter value (field, word) [1)]	4	7 / 8
8 [2)]	Change parameter value (field, double word) [1)]	5	7 / 8
9	Request number of field elements	6	7 / 8

1) The required element of the parameter is specified in IND (2nd word).

2) The following request IDs are identical: 1 ≡ 6, 2 ≡ 7 and 3 ≡ 8.
We recommend that you use identifiers 6, 7 and 8.

Table 8-36 Response identifiers, converter → control

AK	Description
0	No response
1	Transfer parameter value (word)
2	Transfer parameter value (double word)
3	Transfer descriptive element [1)]
4	Transfer parameter value (field, word) [2)]
5	Transfer parameter value (field, double word) [2)]
6	Transfer number of field elements

AK	Description
7	Converter cannot process the request. In the most significant word of the parameter channel, the converter sends an error number to the control, refer to the following table.
8	No master controller status / no authorization to change parameters of the parameter channel interface

1) The required element of the parameter is specified in IND (2nd word).

2) The required element of the indexed parameter is specified in IND (2nd word).

Table 8-37 Error numbers for response identifier 7

No.	Description
00 hex	**Illegal parameter number** (access to a parameter that does not exist)
01 hex	**Parameter value cannot be changed** (change request for a parameter value that cannot be changed)
02 hex	**Lower or upper value limit exceeded** (change request with a value outside the value limits)
03 hex	**Incorrect subindex** (access to a subindex that does not exist)
04 hex	**No array** (access with a subindex to non-indexed parameters)
05 hex	**Incorrect data type** (change request with a value that does not match the data type of the parameter)
06 hex	**Setting not permitted, only resetting** (change request with a value not equal to 0 without permission)
07 hex	**Descriptive element cannot be changed** (change request to a descriptive element error value that cannot be changed)
0B hex	**No master control** (change request but with no master control, see also p0927.)
0C hex	**Keyword missing**
11 hex	**Request cannot be executed due to the operating state** (access is not possible for temporary reasons that are not specified)
14 hex	**Inadmissible value** (change request with a value that is within the limits but which is illegal for other permanent reasons, i.e. a parameter with defined individual values)
65 hex	**Parameter number is currently deactivated** (depending on the mode of the converter)
66 hex	**Channel width is insufficient** (communication channel is too small for response)
68 hex	**Illegal parameter value** (parameter can only assume certain values)
6A hex	**Request not included / task is not supported** (the valid request identifications can be found in table "Request identifications controller → converter")
6B hex	**No change access for a controller that is enabled**. (The operating state of the conerter prevents a parameter change)
86 hex	**Write access only for commissioning (p0010 = 15)** (operating state of the converter prevents a parameter change)
87 hex	**Know-how protection active, access locked**
C8 hex	**Change request below the currently valid limit** (change request to a value that lies within the "absolute" limits, but is however below the currently valid lower limit)
C9 hex	**Change request above the currently valid limit** (example: a parameter value is too large for the converter power)
CC hex	**Change request not permitted** (change is not permitted as the access code is not available)

PNU (parameter number) and page index

Parameter number	PNU	Page index
0000 ... 1999	0000 ... 1999	0 hex
2000 ... 3999	0000 ... 1999	80 hex
6000 ... 7999	0000 ... 1999	90 hex
8000 ... 9999	0000 ... 1999	20 hex
10000 ... 11999	0000 ... 1999	A0 hex
20000 ... 21999	0000 ... 1999	50 hex
29000 ... 29999	0000 ... 1999	70 hex
30000 ... 31999	0000 ... 1999	F0 hex
60000 ... 61999	0000 ... 1999	74 hex

Subindex

For indexed parameters, the parameter index is located in subindex as hexadecimal value.

PWE: Parameter value or connector

Parameter values or connectors can be located in the PWE.

Table 8-38 Parameter value or connector

<table>
<tr><th></th><th>PWE 1</th><th colspan="3">PWE 2</th></tr>
<tr><td rowspan="4">Parameter value</td><td>Bit 15 ... 0</td><td colspan="2">Bit 15 ... 8</td><td>Bit 7 ... 0</td></tr>
<tr><td>0</td><td colspan="2">0</td><td>8-bit value</td></tr>
<tr><td>0</td><td colspan="3">16-bit value</td></tr>
<tr><td colspan="4">32-bit value</td></tr>
<tr><td rowspan="2">Connector</td><td>Bit 15 ... 0</td><td>Bit 15 ... 10</td><td colspan="2">Bit 9 ... 0</td></tr>
<tr><td>Number of the connector</td><td>3F hex</td><td colspan="2">The index or bit field number of the connector</td></tr>
</table>

Examples

Read request: Read out serial number of the Power Module (p7841[2])

To obtain the value of the indexed parameter p7841, you must fill the telegram of the parameter channel with the following data:

- **PKE, Bit 12 ... 15 (AK): = 6** (request parameter value (field))
- **PKE, Bit 0 ... 10 (PNU): = 1841** (parameter number without offset)
  Parameter number = PNU + offset (page index)
  (7841 = 1841 + 6000)
- **IND, bit 8 ... 15 (subindex): = 2** (index of parameter)

- **IND, bit 0 ... 7 (page index): = 90 hex** (offset 6000 corresponds to 90 hex)
- Because you want to read the parameter value, words 3 and 4 in the parameter channel for requesting the parameter value are irrelevant. They should be assigned a value of 0, for example.

Parameter channel							
PKE, 1st word			IND, 2nd word		PWE1 - high, 3rd word	PWE2 - low, 4th word	
15...12	11	10 ... 0	15 ... 8	7 ... 0	15 ... 0	15 ... 10	9 ... 0
AK		Parameter number	Subindex	Page index	Parameter value	Drive object	Index
0 1 1 0	0	1 1 1 0 0 1 1 0 0 0 1	0 0 0 0 0 0 1 0	1 0 0 1 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0

Figure 8-16 Telegram for a read request from p7841[2]

Parameter number

Parameter numbers < 2000	PNU = parameter number. Write the parameter number into the PNU (PKE bit 10 ... 0).
Parameter numbers ≥ 2000	PNU = parameter number - offset. Write the parameter number minus the offset into the PNU (PKE bit 10 ... 0). Write the offset in the page index (IND bit 15 ... 8).

Table 8-39 Offset and page index of the parameter numbers

Parameter number	Offset	Page index								
		Hex	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
0000 ... 1999	0	0 hex	0	0	0	0	0	0	0	0
2000 ... 3999	2000	80 hex	1	0	0	0	0	0	0	0
6000 ... 7999	6000	90 hex	1	0	0	1	0	0	0	0
8000 ... 9999	8000	20 hex	0	0	1	0	0	0	0	0
10000 ... 11999	10000	A0 hex	1	0	1	0	0	0	0	0
20000 ... 21999	20000	50 hex	0	1	0	1	0	0	0	0
29000 ... 29999	28000	70 hex	0	1	1	1	0	0	0	0
30000 ... 31999	30000	F0 hex	1	1	1	1	0	0	0	0
60000 ... 61999	60000	74 hex	0	1	1	1	0	1	0	0

Indexed parameters

For indexed parameters, you must write the index as hex value into the subindex (IND bit 7 ... 0).

Parameter contents

Parameter contents can be parameter values or connector parameters. You require two words for connector parameters. You can find more information on interconnecting connector parameters in the operating instructions of the converter in the section "Interconnecting signals in the converter".

Enter the parameter value in the parameter channel right-justified as follows:

- 8-bit values: Low word, bits 0 ... 7, bits 8 ... 15 are zero.
- 16-bit values: Low word, bits 0 ... 15,
- 32-bit values: Low word and high word

Enter a connector parameter right-justified as follows:

- Number of the connector parameter: High word
- Drive object of the connector parameter: Low word, bits 10 ... 15
- The index or bit field number of the connector parameter: Low word, bits 0 ... 9

Telegram examples, length of the parameter channel = 4

Read request: Read out serial number of the Power Module (p7841[2])

To obtain the value of the indexed parameter p7841, you must fill the telegram of the parameter channel with the following data:

- **PKE, bit 12 ... 15 (AK): = 6** (request parameter value (field))
- **PKE, bit 0 ... 10 (PNU): = 1841** (parameter number without offset)
  Parameter number = PNU + offset (page index)
  (7841 = 1841 + 6000)
- **IND, bit 8 ... 15 (page index): = 90 hex** (offset 6000 corresponds to 90 hex)
- **IND, bit 0 ... 7 (subindex): = 2** (index of parameter)
- Because you want to read the parameter value, words 3 and 4 in the parameter channel for requesting the parameter value are irrelevant. They should be assigned a value of 0, for example.

Parameter channel							
PKE (1st word)			IND, 2nd word		PWE1 - high, 3rd word	PWE2 - low, 4th word	
15...12	11	10 ... 0	15 ... 8	7 ... 0	15 ... 0	15 ... 10	9 ... 0
AK		Parameter number	Page index	Subindex	Parameter value	Drive Object	Index
0 1 1 0	0	1 1 1 0 0 1 1 0 0 0 1	1 0 0 1 0 0 0 0	0 0 0 0 0 0 1 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0

Figure 8-17 Telegram for a read request from p7841[2]

Write request: Changing the automatic restart mode (p1210)

Parameter p1210 defines the automatic restart mode:

- **PKE, bit 12 ... 15 (AK): = 7** (change parameter value (field, word))
- **PKE, bit 0 ... 10 (PNU): = 4BA hex** (1210 = 4BA hex, no offset, as 1210 < 1999)
- **IND, bit 8 ... 15 (page index): = 0 hex** (offset 0 corresponds to 0 hex)
- **IND, bit 0 ... 7 (subindex): = 0 hex** (parameter is not indexed)

- **PWE1, bit 0 ... 15: = 0 hex**
- **PWE2, bit 0 ... 15: = 1A hex** (26 = 1A hex)

Parameter channel						
PKE, 1st word			IND, 2nd word		PWE1 - high, 3rd word	PWE2 - low, 4th word
15...12	11	10 ... 0	15 ... 8	7 ... 0	15 ... 0	15 ... 0
AK		Parameter number	Page index	Subindex	Parameter value (bit 16 ... 31)	Parameter value (bit 0 ... 15)
0 1 1 1	0	1 0 0 1 0 1 1 1 0 1 0	0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 1 1 0 1 0

Figure 8-18 Telegram, to activate the automatic restart with p1210 = 26

Write request: Assign digital input 2 with the function ON/OFF1 (p0840[1] = 722.2)

In order to link digital input 2 with ON/OFF1, you must assign parameter p0840[1] (source, ON/OFF1) the value 722.2 (DI 2). To do this, you must fill the telegram of the parameter channel as follows:

- **PKE, bit 12 ... 15 (AK): = 7 hex** (change parameter value (field, word))
- **PKE, bit 0 ... 10 (PNU): = 348 hex** (840 = 348 hex, no offset, as 840 < 1999)
- **IND, bit 8 ... 15 (page index): = 0 hex** (offset 0 corresponds to 0 hex)
- **IND, bit 0 ... 7 (subindex): = 1 hex** (command data set CDS1 = index1)
- **PWE1, bit 0 ... 15**: = **2D2 hex** (722 = 2D2 hex)
- **PWE2, bit 10 ... 15: = 3f hex** (drive object - for SINAMICS G120 always 63 = 3f hex)
- **PWE2, bit 0 ... 9: = 2 hex** (index or bit number of the parameter: DI 2 = r0722.2)

Parameter channel							
PKE, 1st word			IND, 2nd word		PWE1 - high, 3rd word	PWE2 - low, 4th word	
15...12	11	10 ... 0	15 ... 8	7 ... 0	15 ... 0	15 ... 10	9 ... 0
AK		Parameter number	Page index	Subindex	Parameter value	Drive Object	Index
0 1 1 1	0	0 1 1 0 1 0 0 1 0 0 0	0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 1	0 0 0 0 0 0 1 0 1 1 0 1 0 0 1 0	1 1 1 1 1 1	0 0 0 0 0 0 0 0 1 0

Figure 8-19 Telegram, to assign DI 2 with ON/OFF1

8.3.5 BACnet MS/TP

8.3.5.1 BACnet properties

Function description

In BACnet, components and systems are considered to be black boxes which contain a number of objects. BACnet objects only stipulate the behavior outside the device, BACnet sets no internal functions.

A range of object types and their instances represent one component.

Each BACnet device has precisely one BACnet device object. An NSAP (Network Service Access Point - comprising network number and MAC address; MAC: **M**edium **A**ccess **C**ontrol) uniquely identifies a BACnet device. This address is BACnet-specific and must not be confused with the Ethernet MAC address.

Data exchange with the client

The converter receives control commands and setpoints via service instructions from the control and transmits its status back to the control. The converter can also send telegrams automatically itself, respectively execute services, e.g. COV_Notification.

The converter supports Unicode, coded with character set UTF-8

Further information

The Protocol Implementation Conformance Statement (PICS) is available on the Internet:

PICS (https://support.industry.siemens.com/cs/us/en/view/109760469)

8.3.5.2 Activating communication via fieldbus

Function description

Procedure

Proceed as follows to activate communication via BACnet MS/TP:

1. Start quick commissioning.
   Quick commissioning using the BOP-2 operator panel (Page 130)
2. In the first steps of the quick commissioning, confirm all of the values that have already been set.
3. Select the default setting 54: "USS control".
   Overview (Page 88)
4. In the next steps of the quick commissioning, confirm all additional values that have already been set.
5. Exit quick commissioning.
6. Set p2030 = 5

You have activated communication via BACnet MS/TP.
❒

ON/OFF commands via BACnet

Selecting the macro 54 has the following effect:

- Only the ON/OFF2 command is possible via the terminal strip.
- The higher-level controller cannot turn the motor on or off.

To turn the motor on and off via the higher-level controller, you need to manually interconnect the ON/OFF1 and OFF2 commands with the PROFIdrive control word:

- Set p0840[0] = r2090.0
- Set p0844[0] = r2090.1

8.3.5.3 Setting the address

Function description

Procedure

1. Using parameter p2021, set the address using an operator panel or SINAMICS G120 Smart Access.
   Permissible addresses: 0 ... 127.
2. Switch off the converter power supply.
3. Wait until all LEDs on the converter are dark.
4. Switch on the converter power supply again.
   Your settings become active after switching on.

You have set the bus address.
❒

Parameters

Parameter	Description	Factory setting
p2021	Fieldbus interface address	0

8.3.5.4 Setting communication via BACnet

General settings

Processing times p2024[0 ... 2]

p2024[0]: 0 ms ... 10000 ms, maximum processing time (APDU timeout), factory setting = 6000 ms,
p2024 [1 ... 2]: Irrelevant

BACnet communication parameter p2025[0 ... 3]

- p2025 [0]: 0 ... 4194303: Device object instance number,
  Factory setting = 1
- p2025 [1]: 1 ... 10: Maximum Info Frames, factory setting = 5
- p2025 [2]: 0 ... 39: Number of APDU Retries (repeated attempts after fault telegrams), factory setting = 3
- p2025 [3]: 1 ... 127: maximum master address, factory setting = 32

Setting COV_Increment p2026[0 ... 75]

(COV = change of values) 0 ... 4194303.000, factory setting = 1. A maximum of 32 COVs are permissible.

COV_Increment: Changes the value of the "present value" of an object instance for which the server transfers an UnConfirmedCOV_Notification or ConfirmedCOV_Notification.

You can use these parameters to set the converter value changes for which an UnConfirmedCOV_Notification or ConfirmedCOV_Notification result is sent.

The factory setting 1 means that the converter sends an UnConfirmedCOV_Notification or ConfirmedCOV_Notification if the considered value, e.g. for a range of 0 ... 10 V, changes by an absolute value ≥ 1.
This requires an active SubscribeCOV_Service to send the relevant object instance.

You can also set the COV_Increment via the object property "COV_Increment" of the relevant analog input, analog output or analog value.

BACnet language selection p2027

German/English - only becomes effective after power off/on

Fieldbus error statistics r2029

Displaying receive errors at the fieldbus interface

Device name - default setting, change, restore factory setting

The converter has a device name in BACnet that uniquely identifies the converter.

The device name is preset at initial power up. It has the following structure:

$$\underbrace{\text{SINAMICS G120 . . . . .}}_{\text{Name of the Control Unit}}\quad\underbrace{\text{- XAB812-005806}}_{\text{Serial number of the Power Module}}$$

p7610[0...79] contains the device names in ASCII format.

Changing device names - procedure

1. Change the device name either in the converter or via the controller:
   – Converter: Change p7610
   – Controller: Change the "object-name" property via the Write Property Service
2. Switch off the converter power supply to activate the name.
3. Wait until all LEDs on the converter are dark.
4. Switch on the converter power supply again.
   Your settings become active after switching on.

The device name is now changed.
❒

Restoring factory settings

The device name is retained when the factory settings are restored.

If you wish to reset the name to the factory setting, original value, proceed as described above and set p7610[0] = 0.

Interconnecting analog outputs, restoring factory settings

If you set communication via BACnet, the converter switches its analog outputs with the fieldbus.

The control then specifies the values which the converter outputs via its analog outputs.

To display a converter-specific value, you must change the interconnection of the analog output.

Examples:

- AO 0 should display the value which the control specifies in the ANALOG OUTPUT 0 object.
  In this particular case, no other settings are required in the converter.
- AO 1 should display the smoothed current actual value of the converter (r0027 smoothed current actual value).
  Interconnect p0771[1] with r0027: p0771[1] = 27
  In this case, write access via the object ANALOG OUTPUT 1 results in an error message in the control.

Reset to the factory setting for BACnet

When restoring the factory setting, the converter again uses the fieldbus to switch its analog outputs.

8.3.5.5 Supported services and objects

BIBBs used by the converter

The BIBBs (BIBB: **B**ACnet **I**nteroperability **B**uilding **Bl**ock) are a collection of one or several BACnet services. BACnet services are subdivided into A and B devices. An A device operates as client and a B device as server.

The converter is a server and therefore operates as B device, as "BACnet Application Specific Controller" (B-ASC).

It uses the following executed BIBBs.

Overview of the BIBB used and the associated services

Short designation	BIBB	Service
DS-RP-B	Data Sharing-ReadProperty-B	ReadProperty
DS-RPM-B	Data Sharing-ReadMultipleProperty-B	ReadPropertyMultiple
DS-WP-B	Data Sharing-WriteProperty-B	WriteProperty
DM-DDB-B	Device Management-Dynamic Device Binding-B	• Who-Is • I-Am
DM-DOB-B	Device Management-Dynamic Object Binding-B	• Who-Has • I-Have
DM-DCC-B	Device Management-DeviceCommunicationControl-B	DeviceCommunicationControl
DS-COV-B	Data Sharing-COV-B	• SubscribeCOV, • ConfirmedCOVNotification, • UnConfirmedCOVNotification

The converter can simultaneously process up to 32 SubscribeCOV services. These can all refer to the same object instances - or different object instances.

SubscribeCOV monitors the property changes of the following objects:

- Analog Input AI...
- Analog Output AO...
- Analog Value AV...
- Binary Value BV...
- Multi-State Input MSI...

Note

SubscribeCOV services are not retentive; i.e. the master must re-initiate the SubscribeCOV services when restarting the converter.

Object types in BACnet

Object type	Code digit		Object type	Code digit
Device Object	8		Analog Output AO...	1
Binary Input BI...	3		Analog Value AV...	2
Binary Output BO...	4		Multi-State Input MSI...	13
Binary Value BV...	5		Octet String Values	47
Analog Input AI...	0			

Object properties of the "Device" object type

• Object_Identifier	• Application_Software_Version	• APDU_Timeout
• Object_Name	• Protocol_Version	• Number_Of_APDU_Retries
• Object_Type	• Protocol_Revision	• Max Master
• System_Status	• Protocol_Services_Supported	• Max Info Frames
• Vendor_Name	• Protocol_Object_Types_Supported	• Device Address Binding
• Vendor_Identifier	• Object_List	• Database Revision
• Model_Name	• Max_APDU_Length_Accepted [1]	
• Firmware_Revision	• Segmentation_Supported [2]	

[1] Length = 480, [2] not supported

Properties of the other object types

Property	Object type							
	Binary Input BI...	Binary Output BO...	Binary Value BV...	Analog Input AI...	Analog Output AO...	Analog Value AV...	Multi-State Input MSI...	Octet String values
Object_Identifier	X	X	X	X	X	X	X	X
Object_Name	X	X	X	X	X	X	X	X
Object_Type	X	X	X	X	X	X	X	X
Present_Value	X	X	X	X	X	X	X	X
Description	X	X	X	X	X	X	X	
Status_Flags	X	X	X	X	X	X	X	X
Event_State	X	X	X	X	X	X	X	
Out_Of_Service	X	X	X	X	X	X	X	
Units				X	X	X		
Priority_Array		X	X [1]		X	X [1]		
Relinquish_Default		X	X [1]		X	X [1]		
Polarity	X	X						
Active_Text	X	X	X					
Inactive_Text	X	X	X					
COV_Increment				X	X	X		

Property	Object type							
	Binary Input BI...	Binary Output BO...	Binary Value BV...	Analog Input AI...	Analog Output AO...	Analog Value AV...	Multi-State Input MSI...	Octet String values
State_Text							X	
Number_of_States							X	

1) Only for access type C: Commandable

Note

Language switching

Using parameter p2027, you can switch the language of the BACnet object properties (German, English). Only the English identifiers (e.g. "Object name") are specified in the following tables.

Binary Input Objects

Instance ID	Object name	Description	Possible values	Text active / text inactive	Access type	Parameter
BI0	DI0 ACT	State of DI 0	ON/OFF	ON/OFF	R	r0722.0
BI1	DI1 ACT	State of DI 1	ON/OFF	ON/OFF	R	r0722.1
BI2	DI2 ACT	State of DI 2	ON/OFF	ON/OFF	R	r0722.2
BI3	DI3 ACT	State of DI 3	ON/OFF	ON/OFF	R	r0722.3
BI4	DI4 ACT	State of DI 4	ON/OFF	ON/OFF	R	r0722.4
BI5	DI5 ACT	State of DI 5	ON/OFF	ON/OFF	R	r0722.5
BI7	DI7 ACT	State of AI 0 - used as DI 11	ON/OFF	ON/OFF	R	r0722.11
BI8	DI8 ACT	State of AI 1 - used as DI 12	ON/OFF	ON/OFF	R	r0722.12
BI10	DO0 ACT	State of DO 0 (relay 1)	ON/OFF	ON/OFF	R	r747.0
BI11	DO1 ACT	State of DO 1 (relay 2)	ON/OFF	ON/OFF	R	r747.1
BI12	DO2 ACT	State of DO 2 (relay 3)	ON/OFF	ON/OFF	R	r747.2
BI13	DO3 ACT	State of DO 3 (relay 3)	ON/OFF	ON/OFF	R	read r747.3

Binary Output Objects

Instance ID	Object name	Description	Possible values	Text active / text inactive	Access type	Parameter
BO0	DO0 CMD	Controls DO 0 (relay 1)	ON/OFF	ON/OFF	C	p0730
BO1	DO1 CMD	Controls DO 1 (relay 2)	ON/OFF	ON/OFF	C	p0731
BO2	DO2 CMD	Controls DO 2 (relay 3)	ON/OFF	ON/OFF	C	p0732
BO3	DO3 CMD	Controls DO 3 (relay 3)	ON/OFF	ON/OFF	C	p0733

Analog Input Objects

Instance ID	Object name	Description	Unit	Range	Access type	Parameter
AI0	ANALOG IN 0	Input signal from AI 0	V/mA	Converter-dependent	R	r0752[0]
AI1	ANALOG IN 1	Input signal from AI 1	V/mA	Converter-dependent	R	r0752[1]
AI10	AIN 0 SCALED	Scaled AI 0 input signal	%	Converter-dependent	R	r0755[0]
AI11	AIN 1 SCALED	Scaled AI 1 input signal	%	Converter-dependent	R	r0755[1]

Analog Output Objects

Instance ID	Object name	Description	Unit	Range	Access type	Parameter
AO0	ANALOG OUTPUT 0	Value of AO 0	%	Converter-dependent	C	p0791[0]
AO1	ANALOG OUTPUT 1	Value of AO 1	%	Converter-dependent	C	p0791[1]

Binary Value BV...

Instance ID	Object name	Description	Possible values	Text active	Text inactive	Access type[1)]	Parameter
BV0	RUN STOPPED	Converter status regardless of command source	RUN / STOP	STOP	RUN	R	r0052.2
BV1	FWD REV	Direction of rotation regardless of command source	REV / FWD	FWD	REV	R	r0052.14
BV2	FAULT	Converter fault	FAULT / OK	FAULT	OK	R	r0052.3
BV3	WARN	Converter warning	WARN / OK	WARN	OK	R	r0052.7
BV4	MANUAL AUTO	Source of Manual/Auto converter control	AUTO / MANUAL	AUTO	LOCAL	R	r0052.9
BV6[1)]	MAINT REQ	Maintenance required	MAINT/OK	MAINT	OK	R	reserved
BV7	HAND CONTROL	Control of the converter from the BACnet override control via BV93 The "Manual" mode of the operator panel has a higher priority than the BACnet override control.	ON/OFF	0	1	R	r2032[10]
BV8	AT SET-POINT	Setpoint reached	YES / NO	YES	NO	R	r0052.8
BV9	AT MAX FREQ	Maximum speed reached	YES / NO	YES	NO	R	r0052.10
BV10	DRIVE READY	Converter ready	YES / NO	YES	NO	R	r0052.1
BV15	HAND RUNNING	Status of the ON command, regardless of the source	YES / NO	0	1	R	r2032[0]

Instance ID	Object name	Description	Possible values	Text active	Text inactive	Access type[1]	Parameter
BV16	HIB MOD ACT	Energy saving mode is active	ON/OFF	0	1	R	r2399[1]
BV17	ESM MOD	Essential service mode is active	ON/OFF	0	1	R	r3889[0]
BV20	RUN STOP CMD	ON command for the converter (when controlling via BACnet)	RUN / STOP	0	1	C	r0054.0
BV21	FWD REV CMD	Reverse direction of rotation (when controlling via BACnet)	REV / FWD	0	1	C	r0054.11
BV22	FAULT RESET	Acknowledge fault (when controlling via BACnet)	RESET / NO	0	1	C	r0054.7
BV24	CDS	Changeover drive control	Local / Remote	YES	NO	C	r0054.15
BV26	RUN ENA CMD	Enable converter operation		ENABLED	DISABLED	C	r0054.3
BV27	OFF2	Status OFF2	RUN / STOP	0	1	C	r0054.1
BV28	OFF3	Status OFF3 BV28 sets the r0054.4, r0054.5, and r0054.6 bits	RUN / STOP	0	1	C	r0054.2
BV50	ENABLE PID	Enable technology controller	ENABLED / DISABLED	ENABLED	DISABLED	C	p2200
BV51	ENABLE PID 0	Enable technology controller 0	ENABLED / DISABLED	ENABLED	DISABLED	C	p11000
BV52	ENABLE PID 1	Enable technology controller 1	ENABLED / DISABLED	ENABLED	DISABLED	C	p11100
BV53	ENABLE PID 2	Enable technology controller 2	ENABLED / DISABLED	ENABLED	DISABLED	C	p11200
BV90	LOCAL LOCK	Use MANUAL (operator panel) to lock converter control		LOCK	UNLOCK	C	p0806
BV91[2]	LOCK PANEL	Interlocking for operator panel and parameter changes	LOCK/UNLO	0	1	W	reserved
BV93	CTL OVERRIDE	Converter control using BACnet override control	ON/OFF	0	1	C	r0054.10

[1] C: Commandable, R: Readable, W: Writable

[2] reserved for future functional expansions

Analog Value AV...

Instance ID	Object name	Description	Unit	Range	Access type[1]	Parameter
AV0	OUT FREQ HZ	Output frequency (Hz)	Hz	converter-dependent	R	r0024
AV1	OUT FREQ PCT	Output frequency (%)	%	converter-dependent	R	HIW
AV2	OUTPUT SPEED	Motor speed	RPM	converter-dependent	R	r0022
AV3	DC BUS VOLT	DC-link voltage.	V	converter-dependent	R	r0026

Instance ID	Object name	Description	Unit	Range	Access type[1]	Parameter
AV4	OUTPUT VOLT	Output voltage	V	converter-dependent	R	r0025
AV5	CURRENT	Motor current	A	converter-dependent	R	r0027
AV6	TORQUE	Motor torque	Nm	converter-dependent	R	r0031
AV7	POWER	Motor power	kW	converter-dependent	R	r0032
AV8	DRIVE TEMP	Heat sink temperature	°C	converter-dependent	R	r0037
AV9	MOTOR TEMP	Measured or calculated motor temperature	°C	converter-dependent	R	r0035
AV10	KWH NR	Cumulative converter energy consumption (cannot be reset!)	kWh	converter-dependent	R	r0039
AV12	INV RUN TIME	Motor's operating hours (is reset by entering "0")	h	0 ... 4294967295	W	p0650
AV13	INV MODEL	Code number of Power Module	---	converter-dependent	R	r0200
AV14	INV FW VER	Firmware version	---	converter-dependent	R	r0018
AV15	INV POWER	Rated power of the converter	kW	converter-dependent	R	r0206
AV16	RPM STPT 1	Reference speed of the converter	RPM	6.0 ... 210000	W	p2000
AV17	FREQ SP PCT	Setpoint 1 (when controlling via BACnet)	%	-199.99 ... 199.99	C	HSW
AV18	ACT FAULT	Number of the fault due to be dealt with	---	converter-dependent	R	r0947[0]
AV19	PREV FAULT 1	Number of the last fault	---	converter-dependent	R	r0947[1]
AV20	PREV FAULT 2	Number of the fault before last	---	converter-dependent	R	r0947[2]
AV21	PREV FAULT 3	Number of the fault third from last	---	converter-dependent	R	r0947[3]
AV22	PREV FAULT 4	Number of the fault fourth from last	---	converter-dependent	R	r0947[4]
AV25	SEL STPT	Command to select the setpoint source	---	0 ... 32767	W	p1000
AV28	AO1 ACT	Signal from AO 1	mA	converter-dependent	R	r0774.0
AV29	AO2 ACT	Signal from AO 1	mA	converter-dependent	R	r0774.1
AV30	MIN Speed	Minimum speed	RPM	0.000 – 19500.000	W	p1080
AV31	MAX Speed	Maximum speed	RPM	0.000 ... 210000.000	W	p1082
AV32	ACCEL TIME	Ramp-up time	s	0.00 ... 999999.0	W	p1120
AV33	DECEL TIME	Ramp-down time	s	0.00 ... 999999.0	W	p1121

Instance ID	Object name	Description	Unit	Range	Access type[1)]	Parameter
AV34	CUR LIM	Current limit	A	converter-dependent	R	p0640
AV39	ACT WARN	Indication of a pending alarm	---	converter-dependent	R	r2110[0]
AV40	PREV WARN 1	Indication of the last alarm	---	converter-dependent	R	r2110[1]
AV41	PREV WARN 2	Indication of the last but one alarm	---	converter-dependent	R	r2110[2]
AV5000	RAMP UP TIME	Technology controller ramp-up time	s	0 ... 650	W	p2257
AV5001	RAMP DOWN TIME	Technology controller ramp-down time	s	0 ... 650	W	p2258
AV5002	FILTER TIME	Technology controller actual value filter time constant	s	0 ... 60	W	p2265
AV5003	DIFF TIME	Technology controller differentiation time constant	s	0 ... 60	W	p2274
AV5004	PROP GAIN	Technology controller proportional gain	s	0 ... 1000	W	p2280
AV5005	INTEG TIME	Technology controller integral time	s	0 ... 1000	W	p2285
AV5006	OUTPUT MAX	Technology controller maximum limiting	%	- 200 ... 200	W	p2291
AV5007	OUTPUT MIN	Technology controller minimum limiting	%	- 200 ... 200	W	p2292
AV5100	RAMP UP TIME 0	Technology controller 0 ramp-up time	s	0 ... 650	W	p11057
AV5101	RAMP DOWN TIME 0	Technology controller 0 ramp-down time	s	0 ... 650	W	p11058
AV5102	FILTER TIME 0	Technology controller 0 actual value filter time constant	s	0 ... 60	W	p11065
AV5103	DIFF TIME 0	Technology controller 0 differentiation time constant	s	0 ... 60	W	p11074
AV5104	PROP GAIN 0	Technology controller 0 proportional gain	s	0 ... 1000	W	p11080
AV5105	INTEG TIME 0	Technology controller 0 integral time	s	0 ... 1000	W	p11085
AV5106	OUTPUT MAX 0	Technology controller 0 maximum limiting	%	- 200 ... 200	W	p11091
AV5107	OUTPUT MIN 0	Technology controller 0 minimum limiting	%	- 200 ... 200	W	p11092
AV5200	RAMP UP TIME 1	Technology controller 1 ramp-up time	s	0 ... 650	W	p11157
AV5201	RAMP DOWN TIME 1	Technology controller 1 ramp-down time	s	0 ... 650	W	p11158
AV5202	FILTER TIME 1	Technology controller 1 actual value filter time constant	s	0 ... 60	W	p11165

Instance ID	Object name	Description	Unit	Range	Access type[1]	Parameter
AV5203	DIFF TIME 1	Technology controller 1 differentiation time constant	s	0 ... 60	W	p11174
AV5204	PROP GAIN 1	Technology controller 1 proportional gain	s	0 ... 1000	W	p11180
AV5205	INTEG TIME 1	Technology controller integral time	s	0 ... 1000	W	p11185
AV5206	OUTPUT MAX 1	Technology controller 1 maximum limiting	%	- 200 ... 200	W	p11191
AV5207	OUTPUT MIN 1	Technology controller 1 minimum limiting	%	- 200 ... 200	W	p11192
AV5300	RAMP UP TIME 2	Technology controller 2 ramp-up time	s	0 ... 650	W	p11257
AV5301	RAMP DOWN TIME 2	Technology controller 2 ramp-down time	s	0 ... 650	W	p11258
AV5302	FILTER TIME 2	Technology controller 2 actual value filter time constant	s	0 ... 60	W	p11265
AV5303	DIFF TIME 2	Technology controller 2 differentiation time constants	s	0 ... 60	W	p11274
AV5304	PROP GAIN 2	Technology controller 2 proportional gain	s	0 ... 1000	W	p11280
AV5305	INTEG TIME 2	Technology controller 2 integral time	s	0 ... 1000	W	p11285
AV5306	OUTPUT MAX 2	Technology controller 2 maximum limiting	%	- 200 ... 200	W	p11291
AV5307	OUTPUT MIN 2	Technology controller 2 minimum limiting	%	- 200 ... 200	W	p11292

[1] C: Commandable, R: Readable, W: Writable

Multi-State Input MSI...

Instance ID	Object name	Description	Possible values	Access type	Parameter
MSI0	FAULT 1	Fault number 1	See "List of fault codes and alarm codes"	R	r0947[0]
MSI1	FAULT 2	Fault number 2		R	r0947[1]
MSI2	FAULT 3	Fault number 3		R	r0947[2]
MSI3	FAULT 4	Fault number 4		R	r0947[3]
MSI4	FAULT 5	Fault number 5		R	r0947[4]
MSI5	FAULT 6	Fault number 6		R	r0947[5]
MSI6	FAULT 7	Fault number 7		R	r0947[6]
MSI7	FAULT 8	Fault number 8		R	r0947[7]
MSI8	WARNING 1	Warning number 1		R	r2110[0]
MS9	WARNING 2	Warning number 2		R	r2110[1]
MSI10	WARNING 3	Warning number 3		R	r2110[2]
MSI11	WARNING 4	Warning number 4		R	r2110[3]
MSI12	WARNING 5	Warning number 5		R	r2110[4]
MSI13	WARNING 6	Warning number 6		R	r2110[5]
MSI14	WARNING 7	Warning number 7		R	r2110[6]
MSI15	WARNING 8	Warning number 8		R	r2110[7]

1) R: Readable

8.3.5.6 Acyclic communication (general parameter access) via BACnet

Acyclic communication or general parameter access is realized via BACnet objects DS47IN and DS47OUT.

Acyclic communication uses the octet string value objects OSV0 and OSV1.

Instance ID	Object name	Description	Access type
OSV0	DS47IN	Maximum length 242, of which two bytes header, 240 bytes user data	W
OSV1	DS47OUT		R

The OSV are structured as follows:

Function Code	Request length	User data
2F (1 Byte)	(1 byte)	Maximum 240 bytes

Write parameter request with OSV0 and read with OSV1

To read parameter r0002 write the following values into the present value window of OSV0

Table 8-40 Write parameter request via OSV0

	Byte	Description
2F h	1	Function code 2F h (47),
0A h	2	Request length 10 bytes (0A h)
80 h	3	Request reference = 80 h
01 h	4	Request identifier = 1 h
01 h	5	DO-Id = 1
01 h	6	Number of parameters = 1
10 h	7	Attribute
01 h	8	Number of elements = 1
0002 h	9,10	Parameter number = 2
0000 h	11,12	Subindex = 0

If the request was successfully processed, then you can read out the response precisely once from the present value window of the OSV1:

Table 8-41 Read parameter content via OSV1

	Byte	Description
2F h	1	Function code 2F h (47)
08 h	2	Response length 8 bytes
80 h	3	Request reference = 80 h
01 h	4	Request identifier = 1 h
01 h	5	DO-Id = 1
01 h	6	Number of parameters = 1
10 h	7	Format
01 h	8	Number of elements = 1
001F h	9,10	Parameter value 1F h = 31

If the response is still not available, then you receive the following message via the present value window of the OSV1:

Table 8-42 Read parameter content via OSV1

	Byte	Description
2F h	1	Function code 2F h (47)
00 h	2	Response length 0 (error)
0004 h	3,4	Error code 4 h (response still not available)

If you wish to read the response once more, then you obtain the following message via the present value window of the OSV1:

Table 8-43 Read parameter content again via OSV1

	Byte	Description
2F h	1	Function code 2F h (47)
00 h	2	response length 0 (error)
0002 h	3,4	Error code 2 h (Invalid State)

Overview of the error codes

1 h: Invalid Length (invalid length)

2 h: Invalid State (action is not permitted in the actual converter state)

3 h: Invalid function Code (FC = 2 hex)

4 h: Response not ready (the response has still not been issued)

5 h: Internal Error (general system error)

Incorrect access operations to parameters via data set 47 are logged in objects OSV0 and OSV1.

8.3.6 Function diagrams for USS, Modbus and BACnet

8.3.6.1 Overview

The following fieldbuses are described in common function diagrams:

- USS
- Modbus
- BACNet

8.3.6.2 Function diagram 9310 - Configuration, addresses and diagnostics

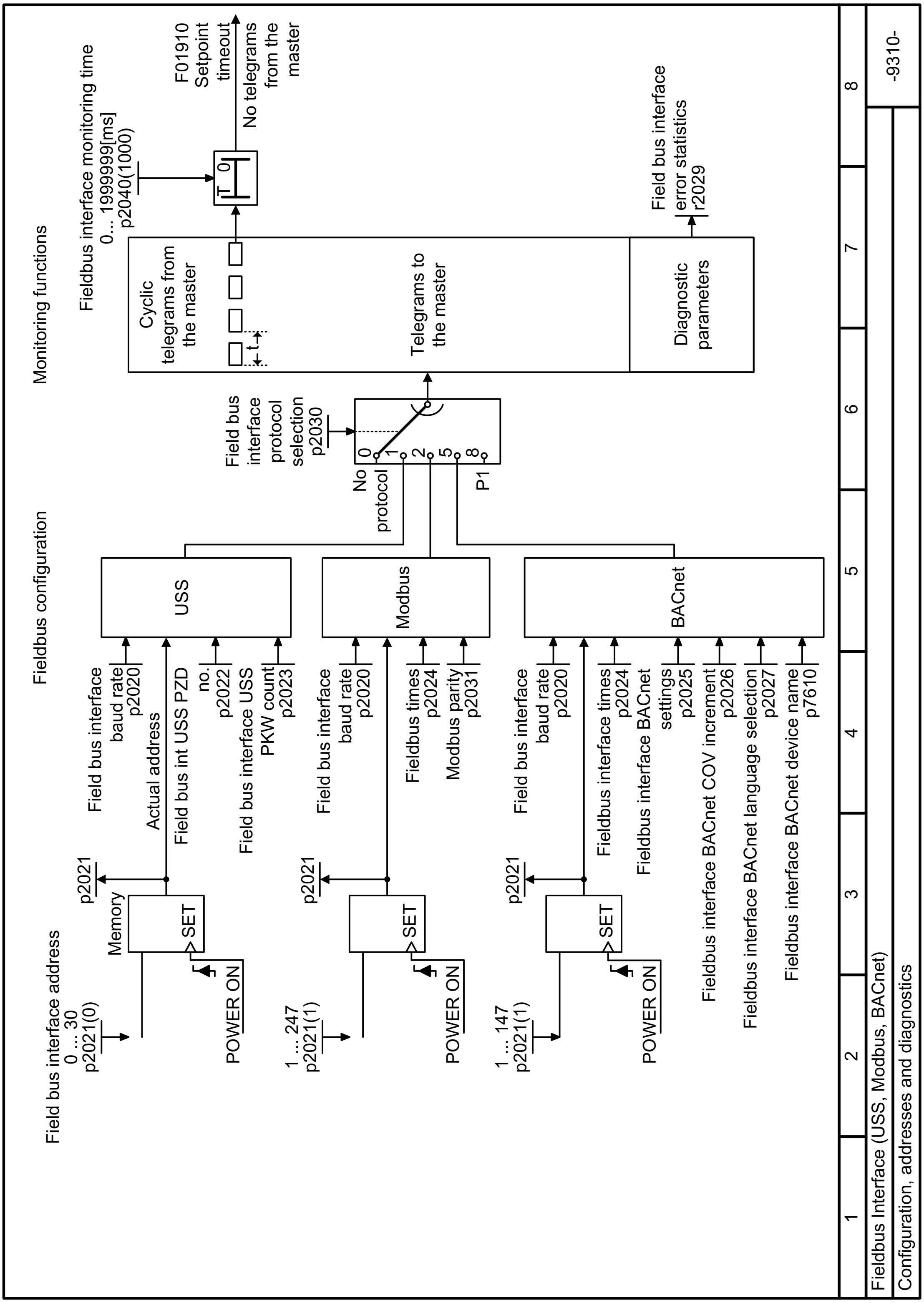


Figure 8-20 FP 9310

8.3.6.3 Function diagram 9342 - Control word

Signal targets for fieldbus STW1				
Signal	Meaning	Interconnection parameter	[Function diagram] internal control word	[Function diagram] signal target
STW1.0	↑ = ON (switch on motor) 0 = OFF1 (braking with p1120, then switch off motor and ready for switching on)	p0840[0] = r2090.0	[2501.3]	Sequence control
STW1.1	1 = No OFF2 (switch on motor is possible) 0 = OFF2 (switch motor off immediately switching on inhibited)	p0844[0] = r2090.1	[2501.3]	Sequence control
STW1.2	1 = No OFF3 (enable is possible) 0 = OFF3 (braking with p1135, then switch motor off and switching on inhibited)	p0848[0] = r2090.2	[2501.3]	Sequence control
STW1.3	1 = Enable operation (switch on motor is possible) 0 = Inhibit operation (switch off motor)	p0852[0] = r2090.3	[2501.3]	Sequence control
STW1.4	1 = Ramp-function generator enable 0 = Inhibit ramp-function generator (set the ramp-function generator output to zero)	p1140[0] = r2090.4	[2501.3]	[3070], [3080]
STW1.5	1 = Continue ramp-function generator 0 = Freezes the ramp-function generator	p1141[0] = r2090.5	[2501.3]	[3070]
STW1.6	1 = Setpoint enable 0 = Inhibits the setpoint (set the ramp-function generator input to zero)	p1142[0] = r2090.6	[2501.3]	[3070], [3080]
STW1.7	↑ = Acknowledge faults	p2103[0] = r2090.7	[2546.1]	[8060]
STW1.8	Reserved	-	-	-
STW1.9	Reserved	-	-	-
STW1.10	1 = Control via PLC <1>	p0854[0] = r2090.10	[2501.3]	[2501]
STW1.11	1 = Direction of rotation reversal <2>	p1113[0] = r2090.11	[2505.3]	[3040]
STW1.12	Reserved	-	-	-
STW1.13	1 = Motorized potentiometer, setpoint, raise	p1035[0] = r2090.13	[2505.3]	[3020]
STW1.14	1 = Motorized potentiometer, setpoint, lower	p1036[0] = r2090.14	[2505.3]	[3020]
STW1.15	Reserved	-	-	-

<1> Bit 10 in STW1 must be set to ensure that the drive accepts the process data
<2> The direction reversal can be locked (see p1110 and p1111)

1	2	3	4	5	6	7	8

Fieldbus Interface (USS, Modbus, BACnet)
STW1 control word interconnection
-9342-

Figure 8-21 FP 9342

8.3.6.4 Function diagram 9352 - Status word

Signal sources for fieldbus ZSW1

Signal	Meaning	Interconnection parameters	[Function diagram] internal control word	[Function diagram] signal target	Inverted <1>
ZSW1.0	1 = Ready for switching on	p2080[0] = r0899.0	[2503.7]	Sequence control	-
ZSW1.1	1 = Ready for operation (DC link loaded, pulses inhibited)	p2080[1] = r0899.1	[2503.7]	Sequence control	-
ZSW1.2	1 = Operation enabled (drive follows n_set)	p2080[2] = r0899.2	[2503.7]	Sequence control	-
ZSW1.3	1 = Fault present	p2080[3] = r2139.3	[2548.7]	[8060]	-
ZSW1.4	1 = No coast down active (OFF2 inactive)	p2080[4] = r0899.4	[2503.7]	Sequence control	-
ZSW1.5	1 = No Quick stop active (OFF3 inactive)	p2080[5] = r0899.5	[2503.7]	Sequence control	-
ZSW1.6	1 = Switching on inhibited active	p2080[6] = r0899.6	[2503.7]	Sequence control	-
ZSW1.7	1 = Alarm present	p2080[7] = r2139.7	[2548.7]	[8065]	-
ZSW1.8	1 = Speed setpoint -actual value deviation within tolerance t_off	p2080[8] = r2197.7	[2534.7]	[8011]	-
ZSW1.9	1 = Control requested <2>	p2080[9] = r0899.9	[2503.7]	[2503]	-
ZSW1.10	1 = f or n comparison value reached/exceeded	p2080[10] = r2199.1	[2536.7]	[8010]	-
ZSW1.11	1 = I, M, or P limit not reached	p2080[11] = r1407.7	[2522.7]	[6060]	✓
ZSW1.12	Reserved	p2080[12] = r0899.12	[2503.7]	[2701]	-
ZSW1.13	1 = No motor overtemperature alarm	p2080[13] = r2135.14	[2548.7]	[8016]	✓
ZSW1.14	1 = Motor rotates forwards (n_act ≥ 0) 0 = Motor rotates backwards (n_act < 0)	p2080[14] = r2197.3	[2534.7]	[8011]	-
ZSW1.15	1 = No alarm, thermal overload, power unit	p2080[15] = r2135.15	[2548.7]	[8021]	✓

<1> The converter generates ZSW1 using the binector-connector converter (BI: p2080[0..15], inversion: p2088[0].0 … p2088[0].15)
<2> The converter is ready to accept data

1	2	3	4	5	6	7	8

Fieldbus Interface (USS, Modbus, BACnet)
ZSW1 status word interconnection
-9352-

Figure 8-22 FP 9352

8.3.6.5 Function diagram 9360 - Receive telegram

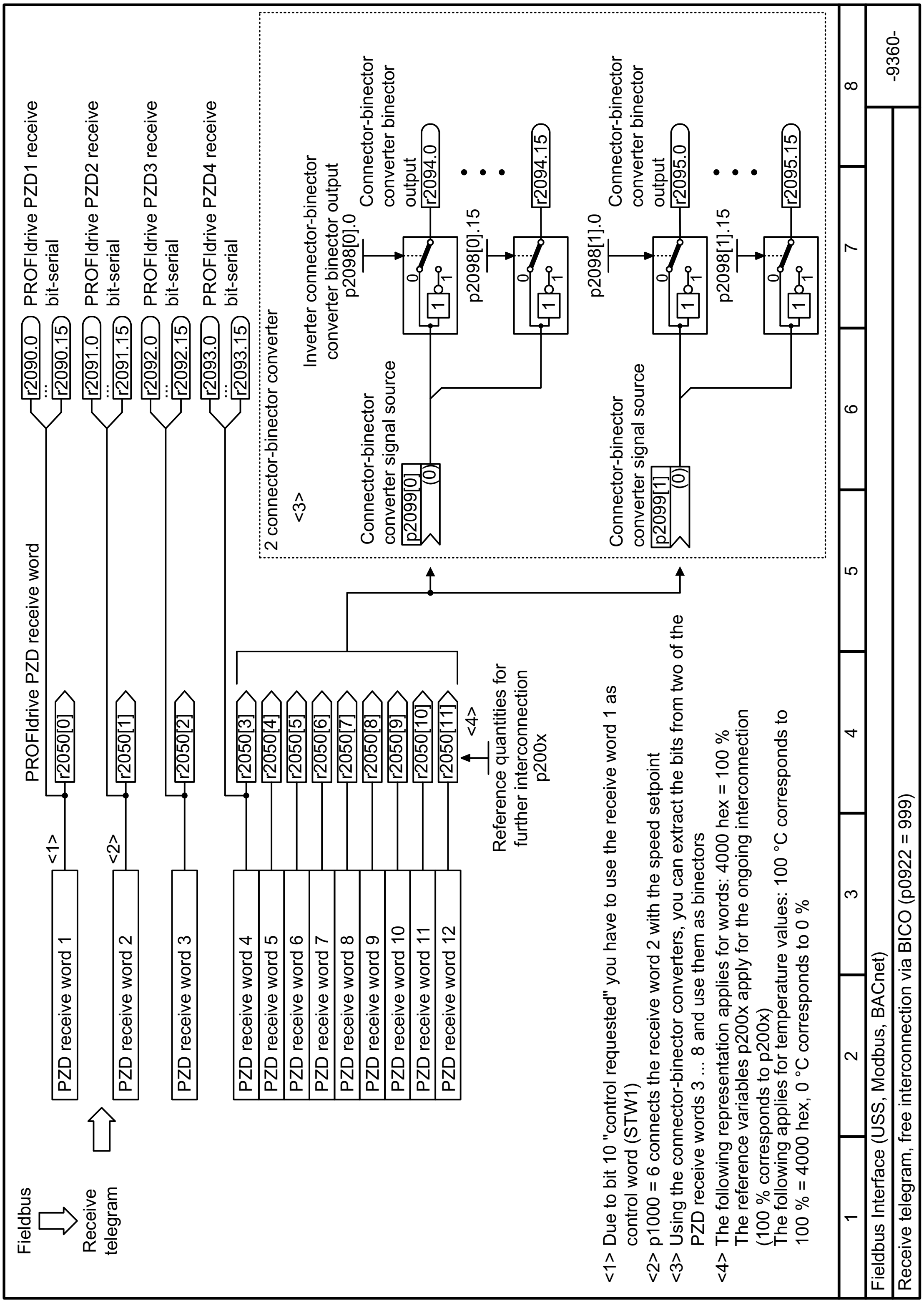


Figure 8-23 FP 9360

8.3.6.6 Function diagram 9370 - Send telegram

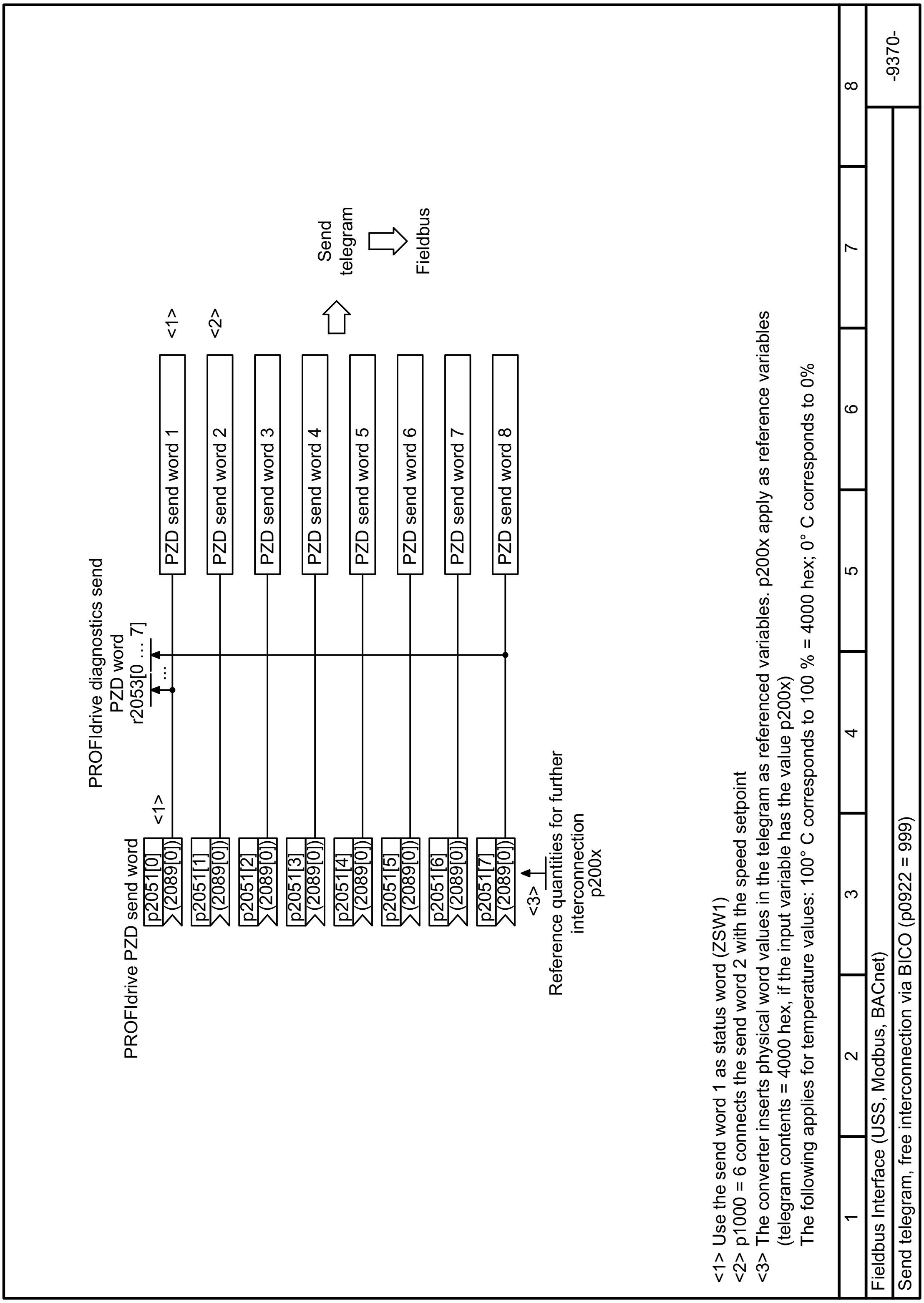


Figure 8-24 FP 9370

8.3.6.7 Function diagram 9372 - Status word free interconnection

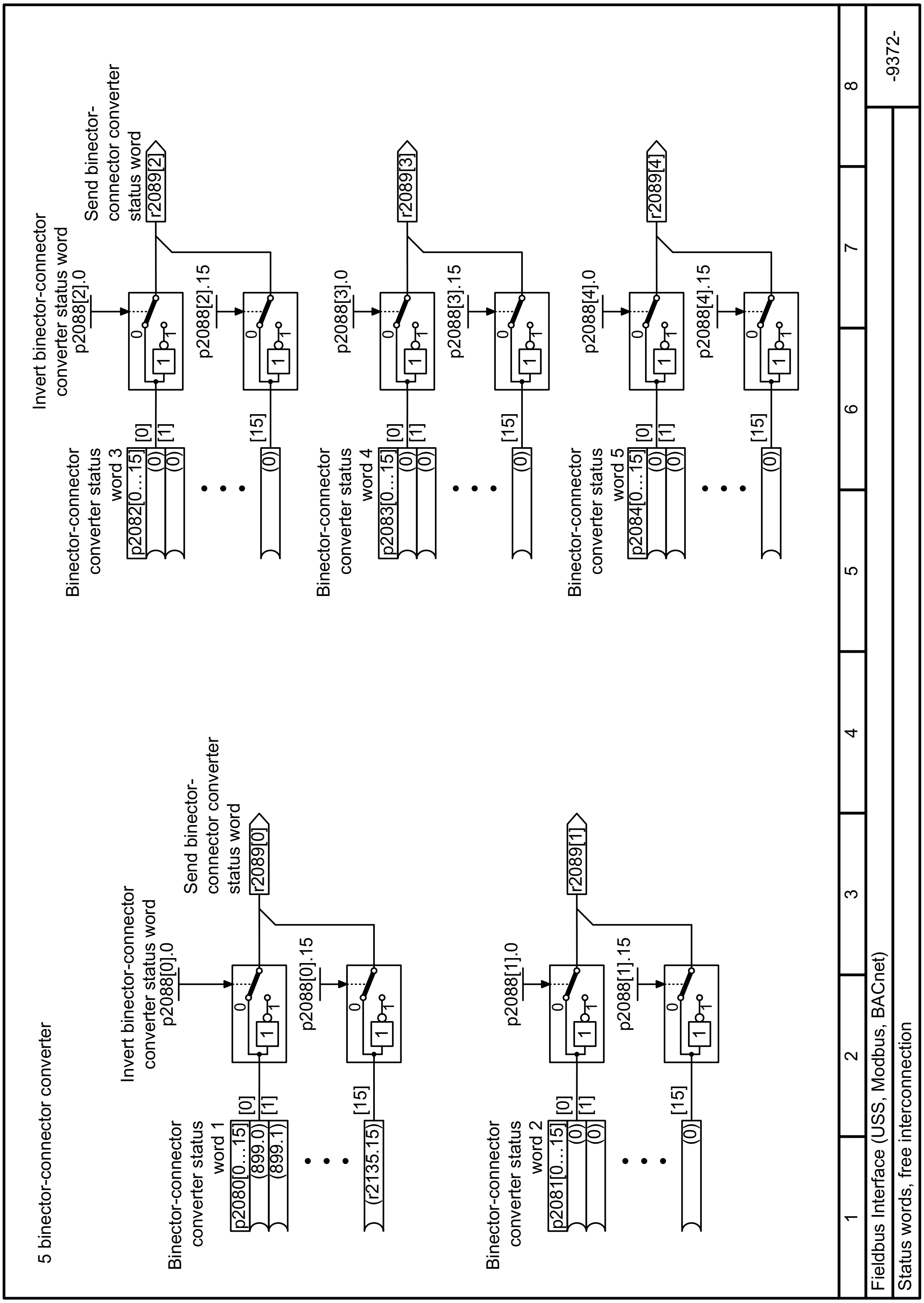


Figure 8-25 FP 9372

8.3.7 Changeover drive control

Overview

This means that you can set the converter control in various ways and toggle between the settings. For instance, the converter can be operated either via a fieldbus or via its digital inputs.

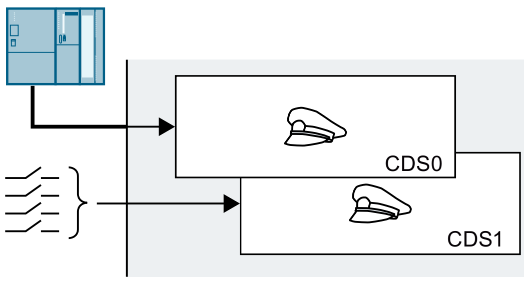


Figure 8-26 Changeover drive control

The settings in the converter, which are assigned to a specific master control, are called the command data set.

Function description

You select the command data set using parameter p0810. To do this, you must interconnect parameter p0810 with a control command of your choice, e.g. a digital input.

A parameter, which can be switched over using the command data set, is designated as follows:

- In the parameter list with "Dynamic index: CDS"
  Parameters (Page 511)
- In the parameter overview with "[C]"

It takes approximately 4 ms to toggle between command data sets.

Changing the number of command data sets

1. Set p0010 = 15.
2. The number of command data sets is configured with p0170.
3. Set p0010 = 0.

You have changed the number of command data sets.
❒

Copying command data sets

1. Set p0809[0] to the number of the command data set whose settings you wish to copy (source).
2. Set p0809[1] to the number of the command data set into which you wish to copy the settings.
3. Set p0809[2] = 1
4. The converter sets p0809[2] = 0.

You have copied the settings of a command data set into another command data set.
❒

Parameters

Parameter	Description	Factory settings
p0010	Drive commissioning parameter filter	1
r0050	CO/BO: Command data set CDS effective	-
p0170	Number of command data sets (CDS)	2
p0809[0 ... 2]	Copy command data set CDS	0
p0810	BI: Command data set selection CDS bit 0	0
p0811	BI: Command data set selection CDS bit 1	0

8.3.8 Selecting physical units

8.3.8.1 Unit system

Some physical units depend on the system of units selected (SI or US), for example the power [kW or hp] or the torque [Nm or lbf ft]. You can select in which system of units the converter represents its physical values.

Options when selecting the system of units

The following options apply when selecting the system of units:

- p0505 = 1: System of units SI (factory setting)
  Torque [Nm], power [kW], temperature [°C or K]
- p0505 = 2: Referred system of units/SI
  Represented as [%]
- p0505 = 3: US system of units
  Torque [lbf ft], power [hp], temperature [°F]
- p0505 = 4: System of units, referred/US
  Represented as [%]

Special features

The values for p0505 = 2 and for p0505 = 4 - represented in the converter - are identical. However, the reference to SI or US units is required for internal calculations and to output physical variables.

For variables, which cannot be represented as [%], then the following applies:

- p0505 = 1 corresponds to setting p0505 = 2
- p0505 = 3 corresponds to setting p0505 = 4

In the case of variables whose units are identical in the SI system and US system, and which can be displayed as a percentage, the following applies:

- p0505 = 1 corresponds to setting p0505 = 3
- p0505 = 2 corresponds to setting p0505 = 4

Reference variables

There is a reference variable in the converter for most parameters with physical units. When the referred representation [%] is set, then the converter scales the physical variables based on the particular reference variable.

When the reference variable changes, then the significance of the scaled value also changes. Example:

- Reference speed = 1500 rpm → fixed speed = 80 % corresponds to the speed = 1200 rpm
- Reference speed = 3000 rpm → fixed speed = 80 % corresponds to the speed = 2400 rpm

For each parameter you can find the associated reference variable for scaling in the parameter list. Example: r0065 is scaled with reference variable p2000.

If scaling is not specified in the parameter list, then the converter always shows/displays the parameter unscaled.

Groups of units

In the parameter list you will find the following information for parameters with changeable units:

- Unit group
  Designates the group to which the parameter belongs
- Unit selection
  Designates the parameter that changes over the unit

Example:

Unit group: 7_1, unit selection: p0505

The parameter belongs to the unit group 7_1 and p0505 changes over the unit.

Table 8-44 Unit group (p0100)

Unit group	Unit selection for p0100 =		
	0	1	2
7_4	Nm	lbf ft	Nm
14_6	kW	hp	kW
25_1	kg m²	lbf ft²	kg m²
27_1	kg	lb	kg
28_1	Nm/A	lbf ft/A	Nm/A

Table 8-45 Unit group (p0505)

Unit group	Unit selection for p0505 =				Reference value for %
	1	2	3	4	
2_1	Hz	%	Hz	%	p2000
3_1	rpm	%	rpm	%	p2000
5_1	Vrms	%	Vrms	%	P2001
5_2	V	%	V	%	p2001
5_3	V	%	V	%	p2001
6_2	Arms	%	Arms	%	p2002
6_5	A	%	A	%	p2002
7_1	Nm	%	lbf ft	%	p2003
7_2	Nm	Nm	lbf ft	lbf ft	-
14_5	kW	%	hp	%	r2004
14_10	kW	kW	hp	hp	-
21_1	° C	° C	° F	° F	-
21_2	K	K	° F	° F	-
39_1	$1/s^2$	%	$1/s^2$	%	p2007

8.3.8.2 Technological unit of the technology controller

Options when selecting the technological unit

p0595 defines in which technological unit the input and output variables of the technology controller are calculated, e.g. [bar], [m^3/min] or [kg/h].

Reference variable

p0596 defines the reference variable of the technological unit for the technology controller.

Unit group

Parameters involved with p0595 belong to unit group 9_1.

The values that can be set and the technological units are shown in p0595.

Special features

You must optimize the technology controller after changing p0595 or p0596.

See also

Parameters (Page 511)

Additional technology controllers

You can set the technological unit for each additional technology controller.

	Technological unit	Reference variable for the technological unit	Unit group
Additional technology controller 0	p11026	p11027	9_2
Additional technology controller 1	p11126	p11127	9_3
Additional technology controller 2	p11226	p11227	9_4

8.3.9 Free function blocks

8.3.9.1 Overview

Overview

The free function blocks permit configurable signal processing in the converter.

Requirement

The free function blocks are only available on converters FSA ... FSG.

Function description

The following free function blocks are available:

Table 8-46 Free function blocks

Logic blocks	AND 0 AND 1 AND 2	OR 0 OR 1 OR 2	XOR 0 XOR 1 XOR 2	NOT 0 NOT 1 NOT 2	
Calculation blocks	Adder	Subtractor	Multiplier	Divider	Comparator
	ADD 0 ADD 1	SUB 0 SUB 1	MUL 0 MUL 1	DIV 0 DIV 1	NCM 0 NCM 1
Timer blocks	Pulse generator	ON time	OFF delay		
	MFP 0 MFP 1 MFP 2	PDE 0 PDE 1 PDE 2	PDF 0 PDF 1 PDF 2		
Memory block	RS flip-flop				
	RSR 0 RSR 1 RSR 2				

Breaker block	Analog switch
	NSW 0 NSW 1
Control block	Limiter
	LVM 0 LVM 1
Complex block	Limit monitor
	LVM 0 LVM 1

You can only use a function block once. The converter has 2 adders for instance, ADD 0 and ADD 1. If you have already configured 2 adders, then no other adders are available.

8.3.9.2 Runtime groups and run sequence

In order to activate a free function block, you must assign it to a runtime group.

There are 3 runtime groups in different time slices.

Table 8-47 Permissible runtime groups of the free function blocks

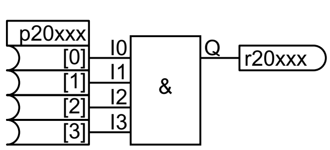
Runtime group	**4**	**5**	**6**
Time slice	**64 ms**	**128 ms**	**256 ms**
AND, OR, XOR, NOT, RSR	✓	✓	✓
ADD, SUB, MUL, DIV, NCM, MFP, PDE, PDF, NSW, LIM, LVM	-	✓	✓

✓: You can assign the free function blocks to this runtime group
-: A free function block is not possible in this runtime group

You can define a run sequence (0 ... 32000) within a runtime group. The converter calculates the function blocks in an ascending run sequence.

8.3.9.3 List of free function blocks

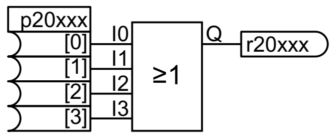
Logic block AND



If a value of 1 is available at all inputs I0 ... I3, then Q = 1.
In all other cases, output Q = 0.

	AND 0	AND 1	AND 2
I0 ... I3	p20030[0 ... 3]	p20034[0 ... 3]	p20038[0 ... 3]
Q	r20031	r20035	r20039
Runtime group	p20032	p20036	p20040
Run sequence	p20033	p20037	p20041

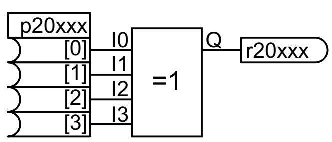
Logic block OR



If a value of 0 is available at all inputs I0 ... I3, then Q = 0.
In all other cases, output Q = 1.

	OR 0	OR 1	OR 2
I0 ... I3	p20046[0 ... 3]	p20050[0 ... 3]	p20054[0 ... 3]
Q	r20047	r20051	r20055
Runtime group	p20048	p20052	p20056
Run sequence	p20049	p20053	p20057

Logic block XOR (EXKLUSIVE OR block)



The function block logically combines the binary quantities at inputs I according to a logical exclusive or function.

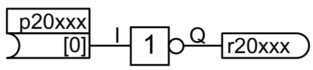
Table 8-48 Truth table

I0	I1	I2	I3	Q
0	0	0	0	0
0	0	0	1	1
0	0	1	0	1
0	0	1	1	0
0	1	0	0	1
0	1	0	1	0
0	1	1	0	0
0	1	1	1	1
1	0	0	0	1
1	0	0	1	0
1	0	1	0	0
1	0	1	1	1
1	1	0	0	0
1	1	0	1	1
1	1	1	0	1
1	1	1	1	0

	XOR 0	XOR 1	XOR 2
I0 ... I3	p20062[0 ... 3]	p20066[0 ... 3]	p20070[0 ... 3]
Q	r20063	r20067	r20071

	XOR 0	XOR 1	XOR 2
Runtime group	p20064	p20068	p20072
Run sequence	p20065	p20069	p20073

Logic block NOT (converter)



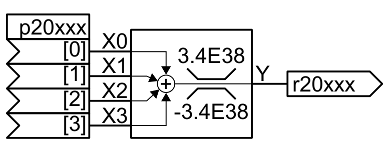
The function block inverts the input:

I = 0 ⇒ Q = 1

I = 1 ⇒ Q = 0

	NOT 0	NOT 1	NOT 2
I	p20078[0]	p20082[0]	p20086[0]
Q	r20079	r20083	r20087
Runtime group	p20080	p20084	p20088
Run sequence	p20081	p20085	p20089

Calculation block ADD (adder)

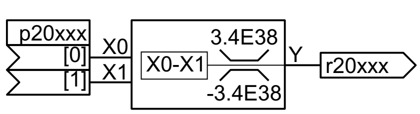


Y = X0 + X1 + X2 + X3

The function block adds inputs X0 ... X3, and limits the result in the range -3.4E38 ... 3.4E38.

	ADD 0	ADD 1
X0 ... X3	p20094[0 ... 3]	p20098[0 ... 3]
Y	r20095	r20099
Runtime group	p20096	p20100
Run sequence	p20097	p20101

Calculation block SUB (subtractor)

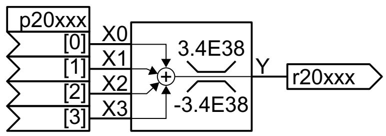


Y = X0 - X1

The function block subtracts input X1 from input X0 and limits the result in the range -3.4E38 ... 3.4E38.

	SUB 0	SUB 1
X0, X1	p20102[0, 1]	p20106[0, 1]
Y	r20103	r20107
Runtime group	p20104	p20108
Run sequence	p20105	p20109

Calculation block MUL (multiplier)

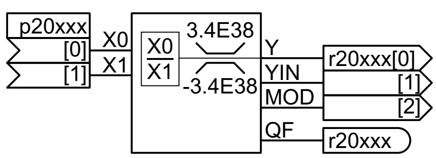


Y = X0 × X1 × X2 × X3

The function block multiplies inputs X0 ... X3, and limits the result in the range -3.4E38 ... 3.4E38.

	MUL 0	MUL 1
X0 ... X3	p20110[0 ... 3]	p20114[0 ... 3]
Y	r20111	r20115
Runtime group	p20112	p20116
Run sequence	p20113	p20117

Calculation block DIV (divider)



Y = X0 / X1

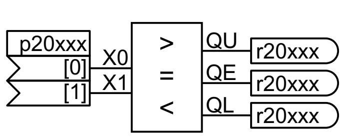
The function block divides the inputs and limits the result in the range -3.4E38 ... 3.4E38. With a division of 0/0, Y remains unchanged.

Significance of other outputs:

- YIN: Integer quotient
- MOD = (Y - YIN) × X1 (division remainder)
- QF: The converter sets QF = 1 when output value Y exceeds the permissible value range or for division by zero.

	DIV 0	DIV 1
X0, X1	p20118[0, 1]	p20123[0, 1]
Y, YIN, MOD	p20119[0 ... 2]	p20124[0 ... 2]
QF	r20120	r20125
Runtime group	p20121	p20126
Run sequence	p20122	p20127

Calculation block NCM (numeric comparator)



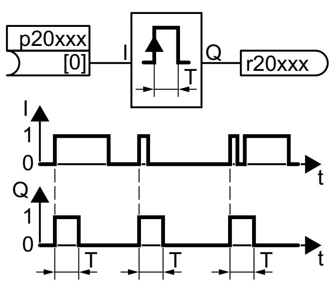
The function block compares two inputs with one another.

Table 8-49 Function table

Comparing inputs	QU	QE	QL
X0 > X1	1	0	0
X0 = X1	0	1	0
X0 < X1	0	0	1

	NCM 0	NCM 1
X0, X1	p20312[0, 1]	p20318[0, 1]
QU	r20313	r20319
QE	r20314	r20320
QL	r20315	r20321
Runtime group	p20316	p20322
Run sequence	p20317	p20323

Timer block MFP - pulse generator

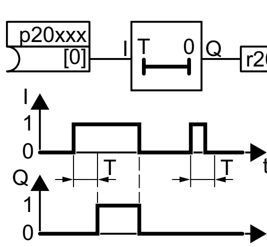


The pulse generator generates a pulse with a fixed duration. The rising edge of a pulse at input I sets output Q = 1 for pulse duration T.

The pulse generator cannot be subsequently triggered.

	MFP 0	MFP 1	MFP 2
I	p20138[0]	p20143[0]	p20354[0]
T	p20139	p20144	p20355
Q	r20140	p20145	p20356
Runtime group	p20141	p20146	p20357
Run sequence	p20142	p20147	p20358

Timer block PDE (ON delay)

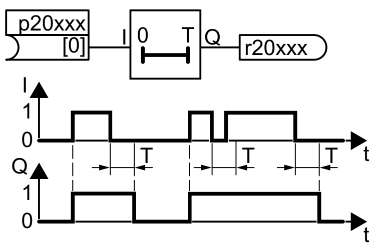


The rising edge of a pulse at input I sets output Q = 1 after pulse delay time T.

When I = 0, then the function block sets Q = 0.

	PDE 0	PDE 1	PDE 2
I	p20158[0]	p20163[0]	p20334[0]
T	p20159	p20164	p20335
Q	r20160	r20165	r20336
Runtime group	p20161	p20166	p20337
Run sequence	p20162	p20167	p20338

Timer block PDF (OFF delay)



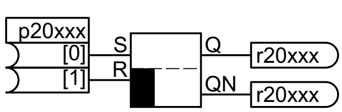
When I = 1, then the function block sets Q = 1.

The falling edge of a pulse at input I sets output Q = 0 after OFF delay time T.

When input I returns to 1 before time T has expired, output Q remains 1.

	PDF 0	PDF 1	PDF 2
I	p20168[0]	p20173[0]	p20344[0]
T	p20169	p20174	p20345
Q	r20170	r20175	r20346
Runtime group	p20171	p20176	p20347
Run sequence	p20172	p20177	p20348

Memory block RSR (RS flip-flop)



RS flip-flop, reset dominant.

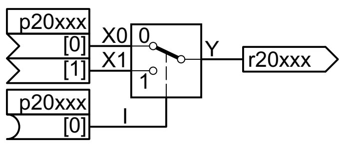
Table 8-50 Truth table

S	R	Q	QN
0	0	No change	
1	0	1	0
0	1	0	1
1	1	0	1

	RSR 0	RSR 1	RSR 2
S, R	p20188[0, 1]	p20193[0, 1]	p20324[0, 1]
Q	r20189	r20194	r20325

	RSR 0	RSR 1	RSR 2
QN	r20190	r20195	r20326
Runtime group	p20191	p20196	p20327
Run sequence	p20192	p20197	p20328

Breaker block NSW (numeric changeover switch)



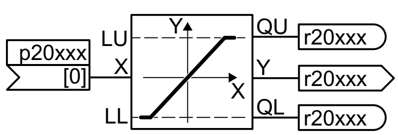
This function block switches one of two numeric input variables to the output:

When I = 0, then Y = X0.

When I = 1, then Y = X1.

	NSW 0	NSW 1
X0, X1	p20218[0, 1]	p20223[0, 1]
I	p20219[0]	p20224[0]
Y	r20220	r20225
Runtime group	p20221	p20226
Run sequence	p20222	p20227

Control block LIM (limiter)



Y = LU, if X ≥ LU

Y = X, if LL < X < LU

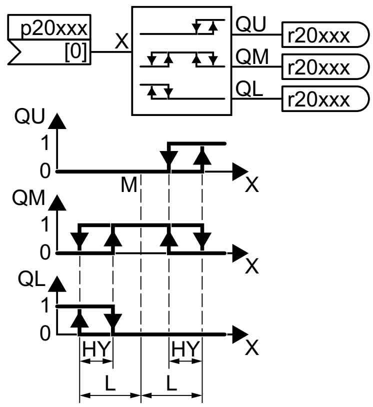
Y = LL, if X ≤ LL

The function block limits output Y to values within LL ... LU.

	LIM 0	LIM 1
X	p20228[0]	p20236[0]
LU [1)]	p20229	p20237
LL [1)]	p20230	p20238
Y	r20231	r20239
QU	r20232	r20240
QL	r20233	r20241
Runtime group	p20234	p20242
Run sequence	p20235	p20243

[1)] LU must be greater than LL

Complex block LVM (limit monitor)



The function block monitors an input quantity by comparing it with reference quantities.

	LVM 0	LVM 1
X	p20266[0]	p20275[0]
M	p20267	p20276
L	p20268	p20277
HY	p20269	p20278
QU	r20270	r20279
QM	r20271	r20280
QL	r20272	r20281
Runtime group	p20273	p20282
Run sequence	p20274	p20283

8.3.9.4 Activating free function blocks

Function description

None of the free function blocks in the converter are active in the factory setting.

Procedure

Proceed as follows to activate a free function block and interconnect it with signals:

1. Activate the function block: Assign the function block to a runtime group.
2. If you have assigned several function blocks to the same runtime group, define a sensible run sequence within the runtime group.
3. Interconnect the inputs and outputs of the function block with the required signals in the converter.

You have now activated a free function block and interconnected its inputs and outputs.
❒

Example

p20096 = 5 assigns ADD 0 to runtime group 5.

p20097 < p20101 (factory setting): The converter first calculates ADD 0 and then ADD 1.

8.3.9.5 Function diagram 7200 – Sampling times of the runtime groups

	Run-time group		
	4	5	6
	r20001[4] = 64 ms	r20001[5] = 128 ms	r20001[6] = 256 ms
Logic function blocks AND, OR, XOR, NOT	X	X	X
Arithmetic function blocks ADD, SUB, MUL, DIV, NCM	-	X	X
Time function blocks MFP, PDE, PDF	-	X	X
Memory function blocks RSR	X	X	X
Switch function block NSW	-	X	X
Control function blocks LIM	-	X	X
Complex function blocks LVM	-	X	X

Run-time group sampling time [ms]
r20001[0..9]

1 2 3 4 5 6 7 8

Free Function Blocks
Sampling times of the runtime groups
-7200-

Figure 8-27 FP 7200

8.3.9.6 Function diagram 7210 - Logic block AND

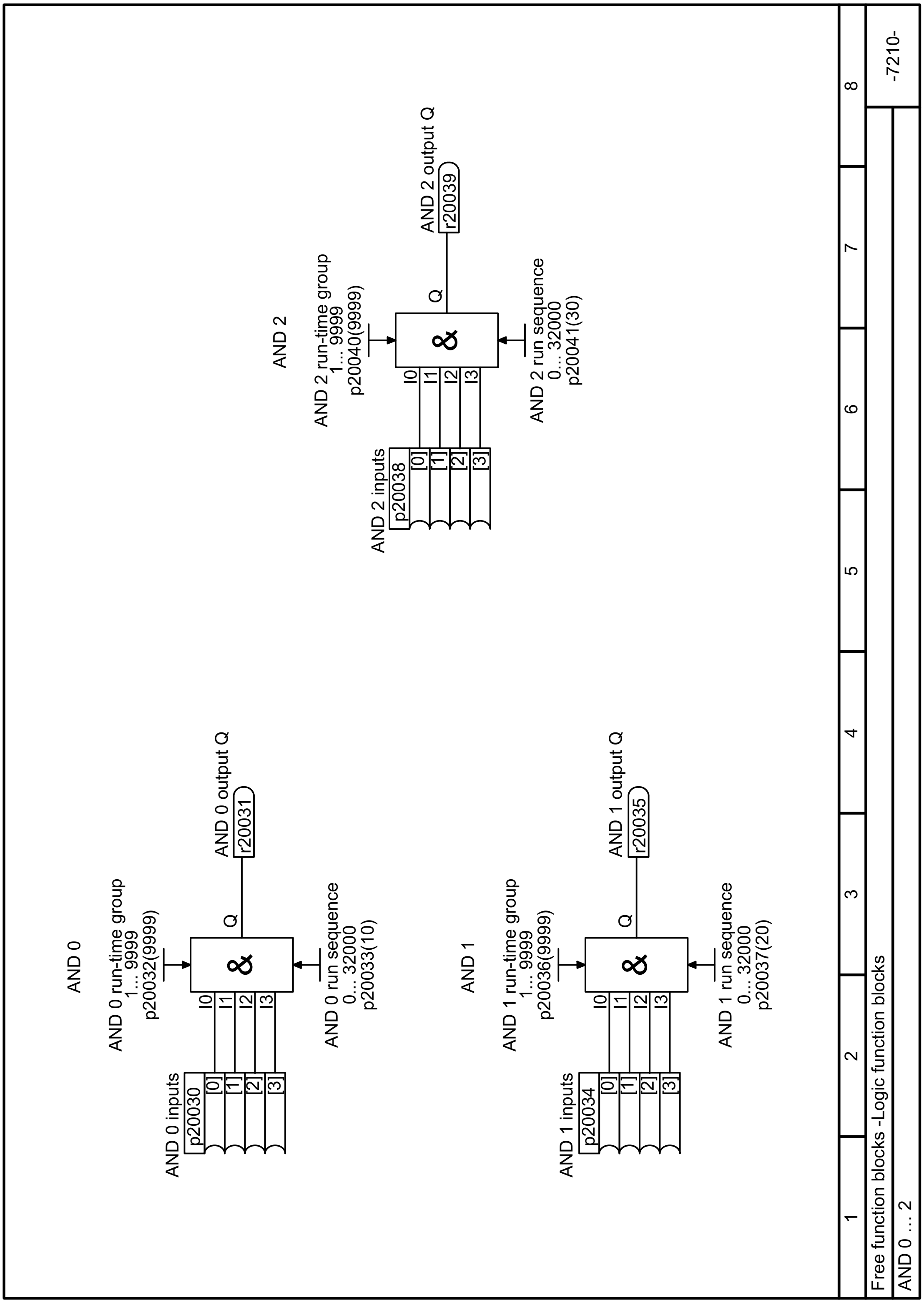


Figure 8-28 FP 7210

8.3.9.7 Function diagram 7212 - Logic block OR

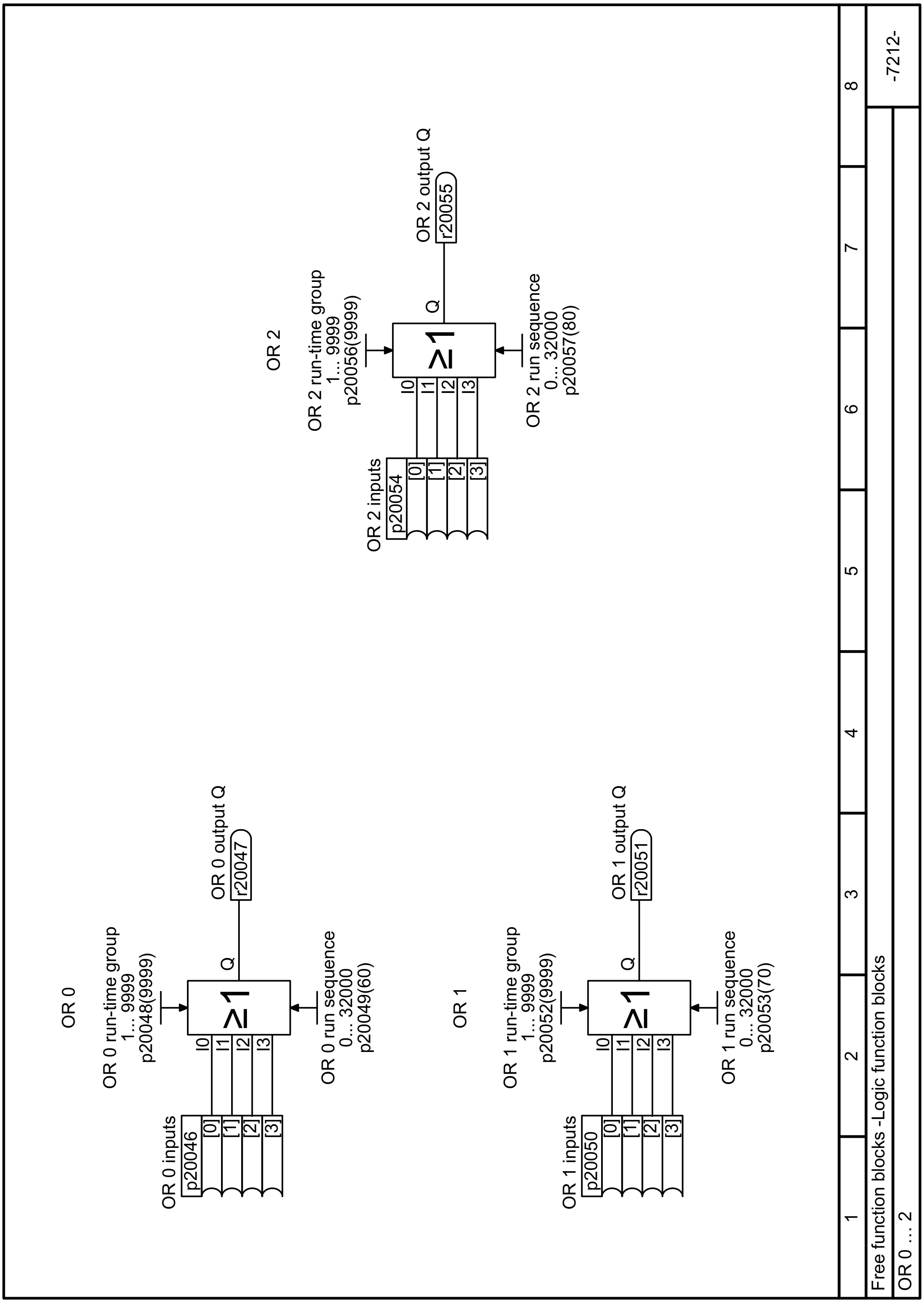


Figure 8-29 FP 7212

8.3.9.8 Function diagram 7214 - Logic block EXCLUSIVE OR

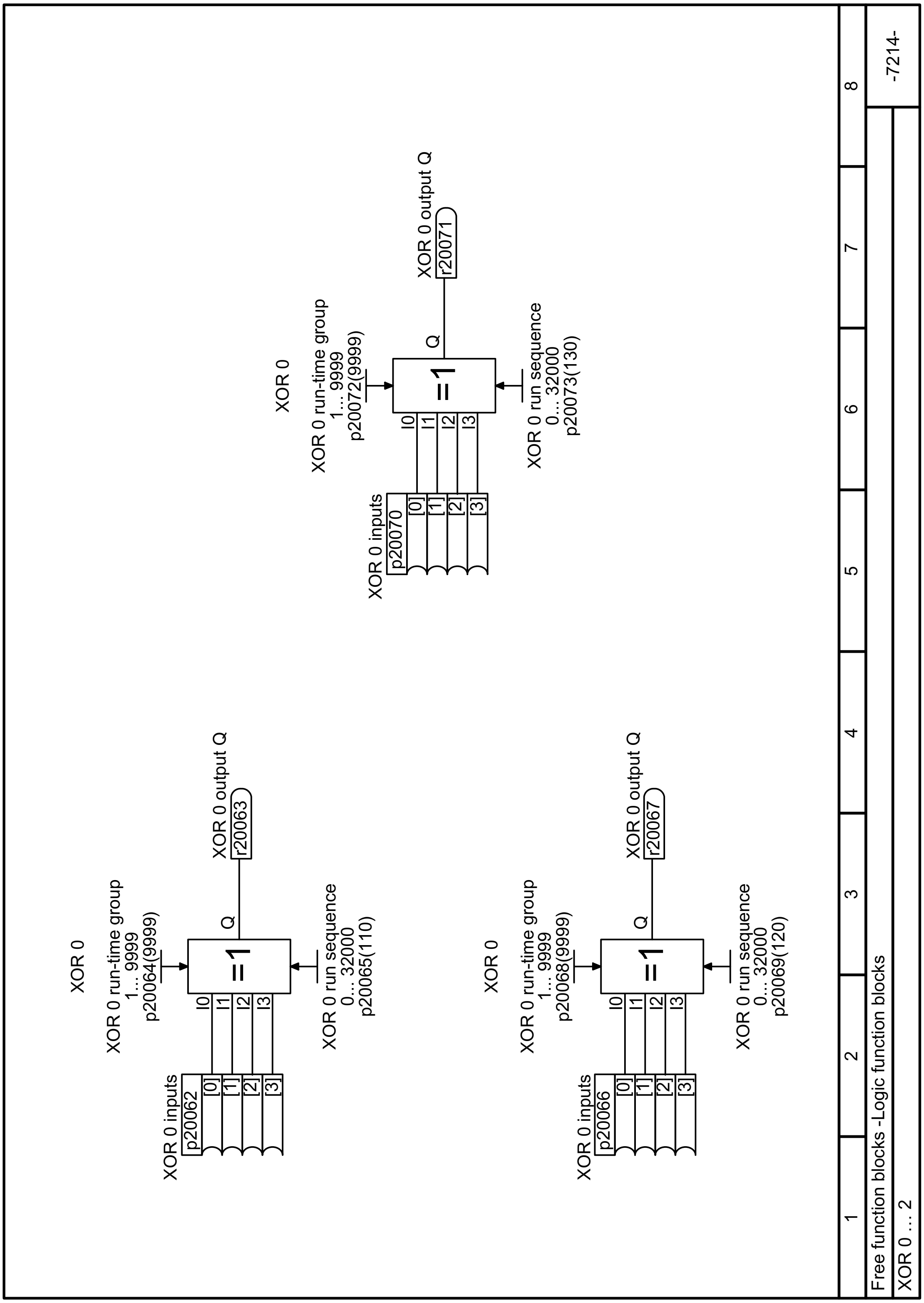


Figure 8-30 FP 7214

8.3.9.9 Function diagram 7216 - Logic block INVERTER

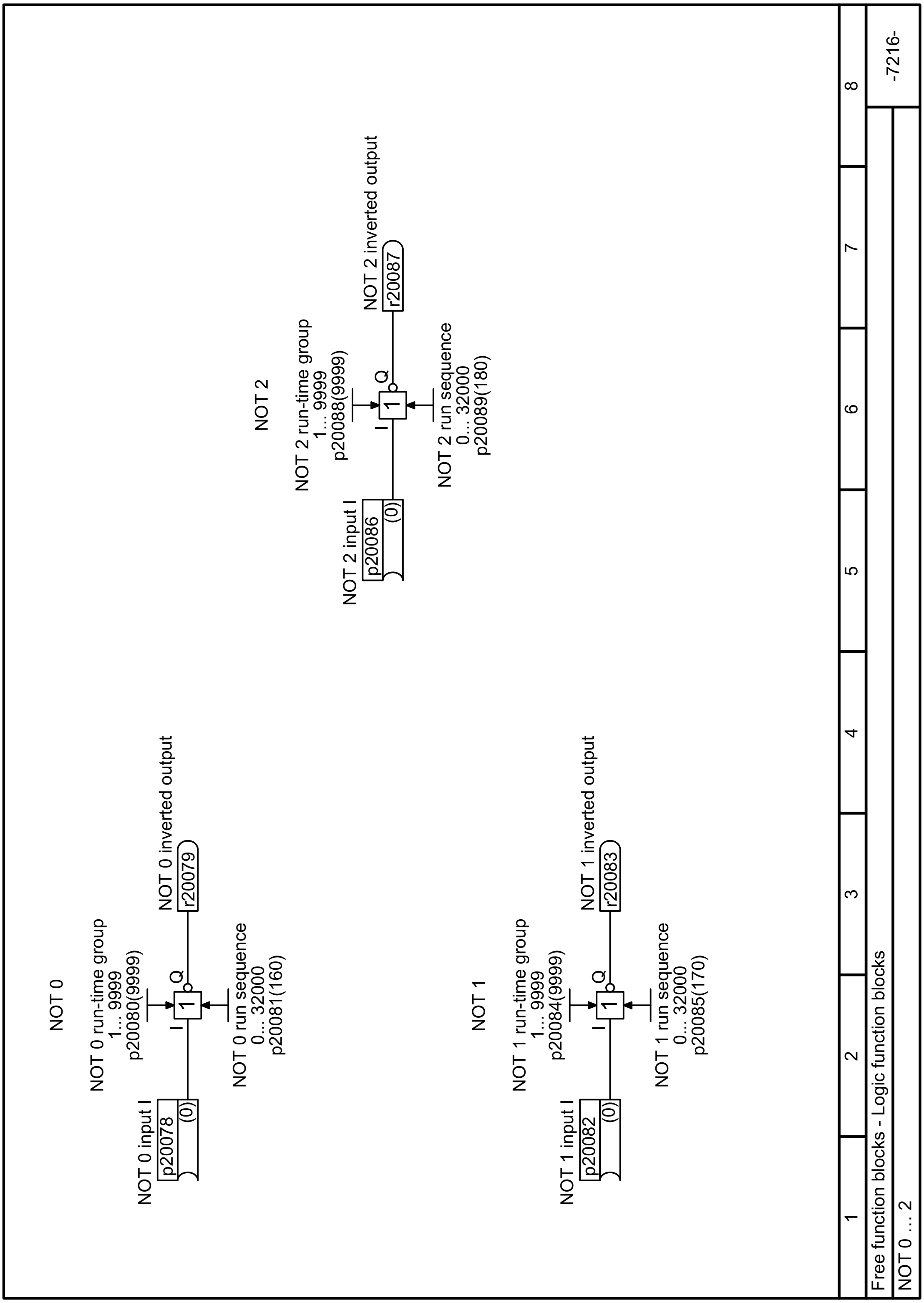


Figure 8-31 FP 7216

8.3.9.10 Function diagram 7220 - Arithmetic blocks ADDER and SUBTRACTOR

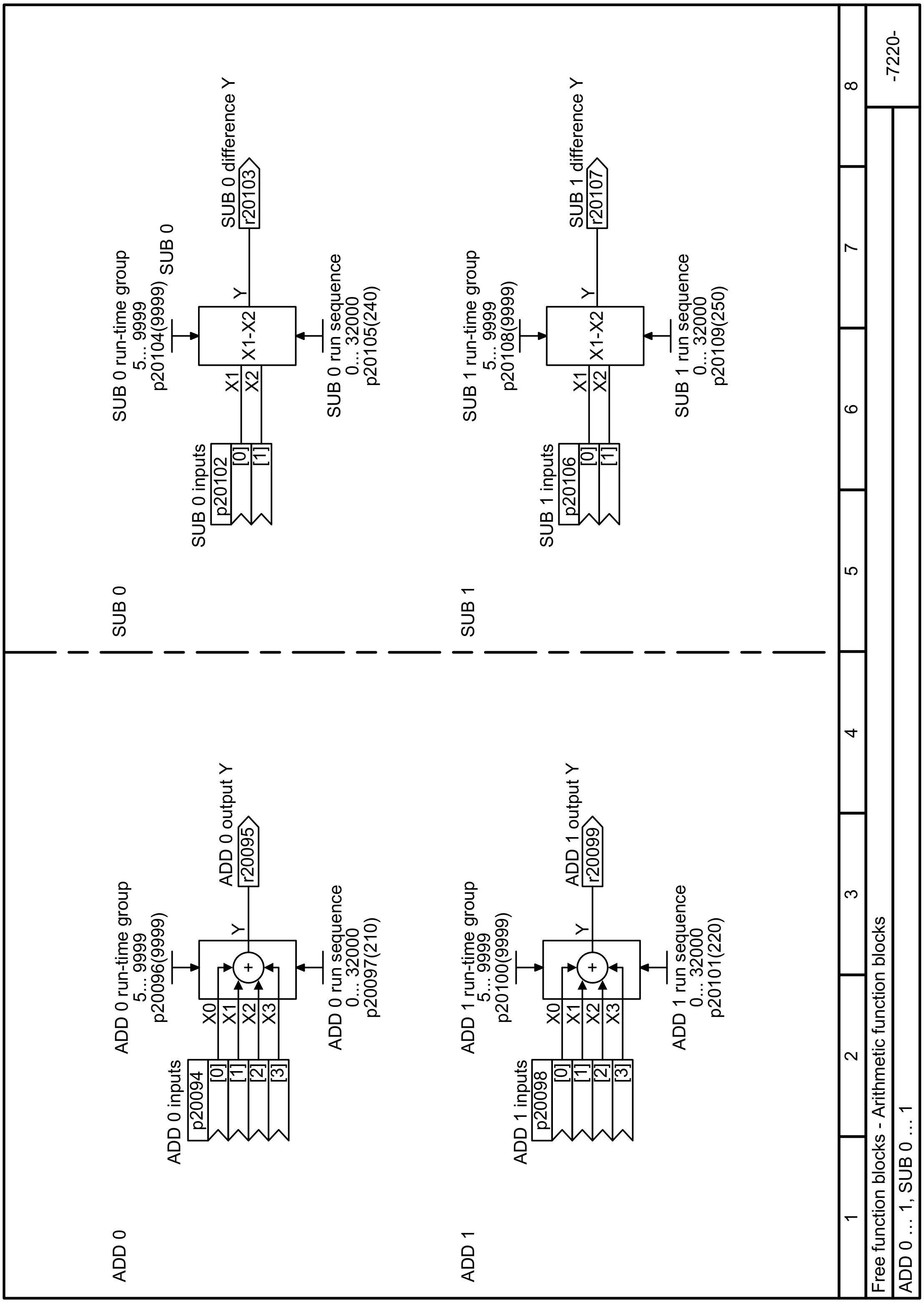


Figure 8-32 FP 7220

8.3.9.11 Function diagram 7222 - Arithmetic blocks MULTIPLIER and DIVIDER

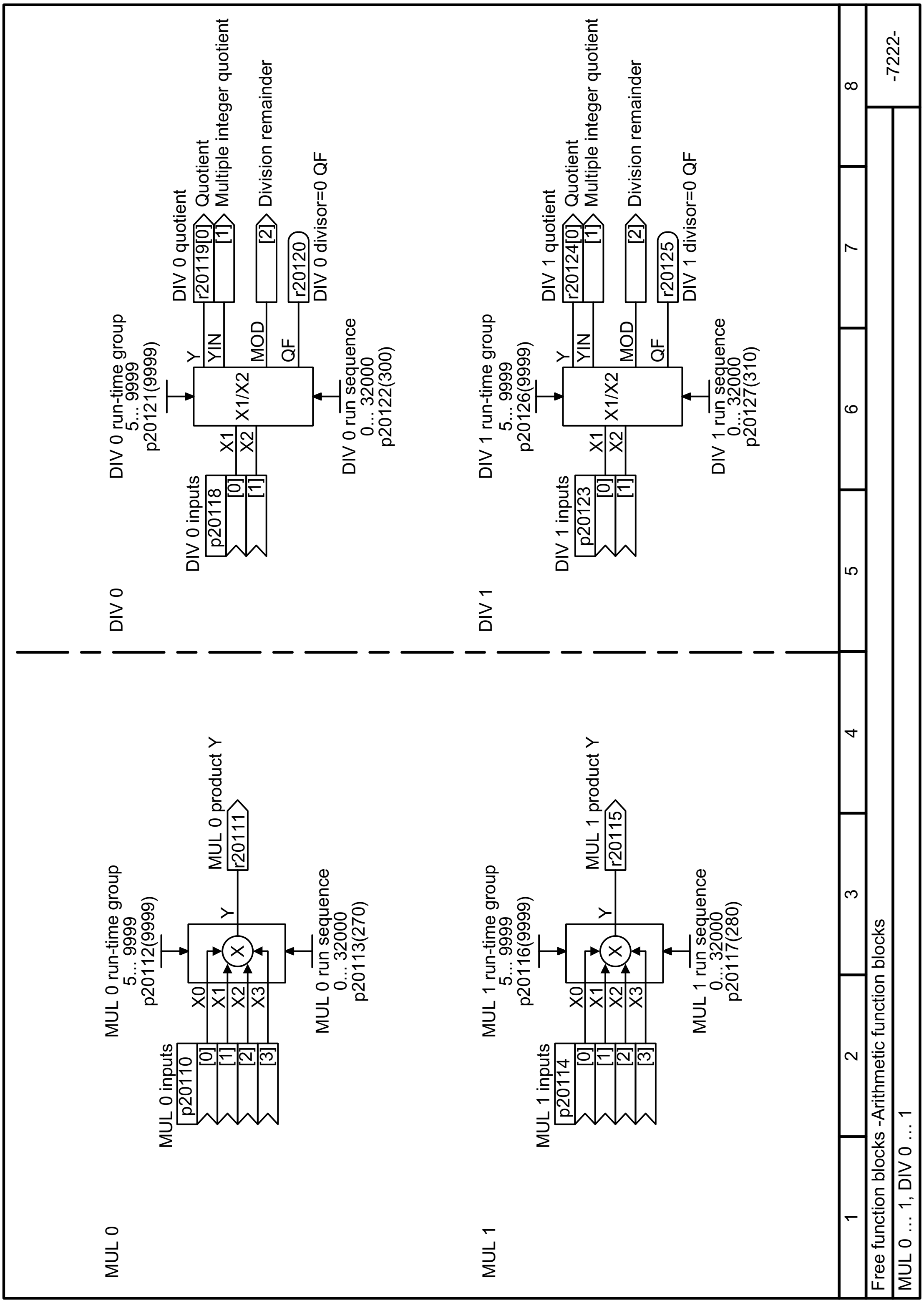


Figure 8-33 FP 7222

8.3.9.12 Function diagram 7225 - Arithmetic block COMPARATOR

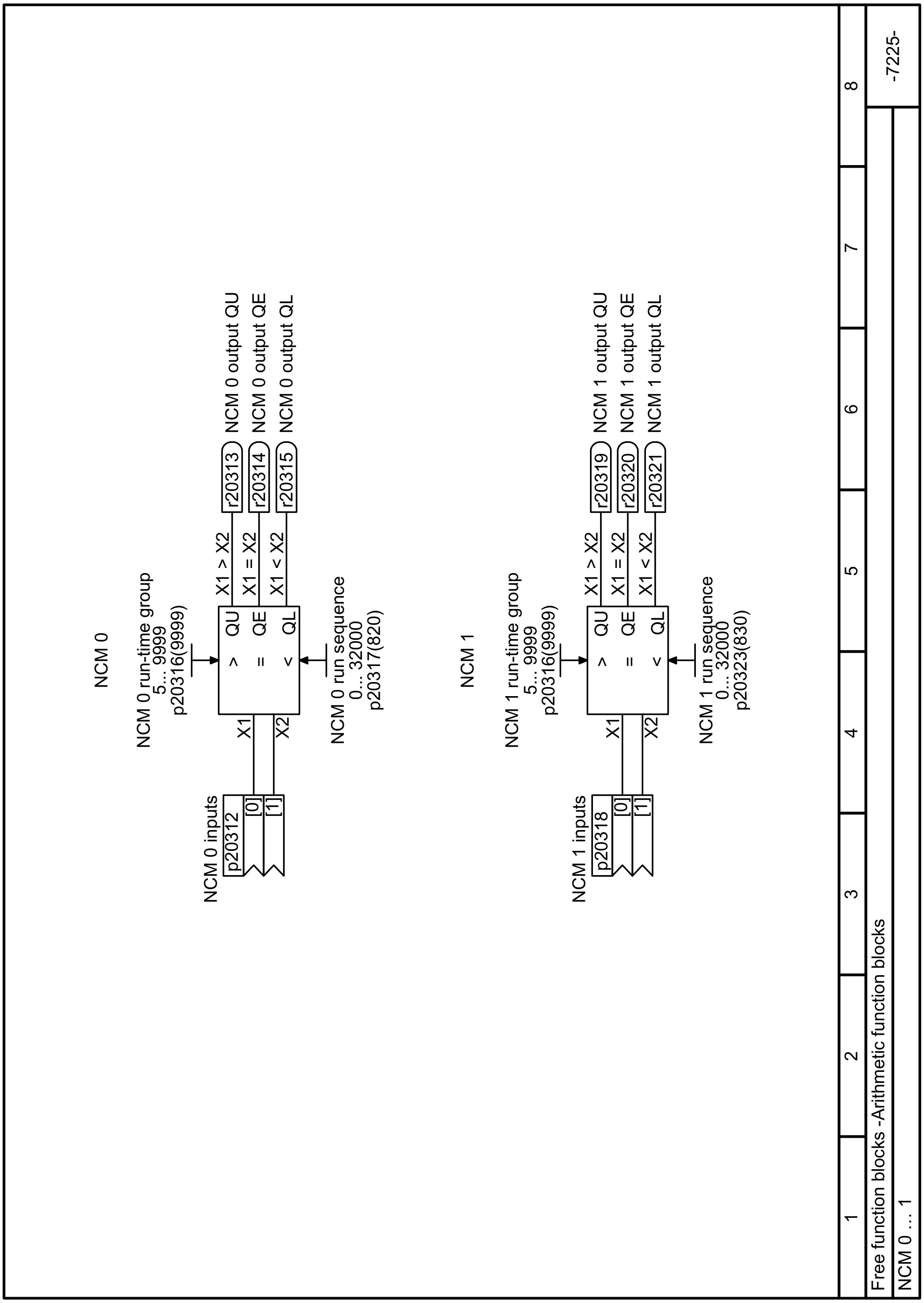


Figure 8-34 FP 7225

8.3.9.13 Function diagram 7230 - Timer block PULSE GENERATOR

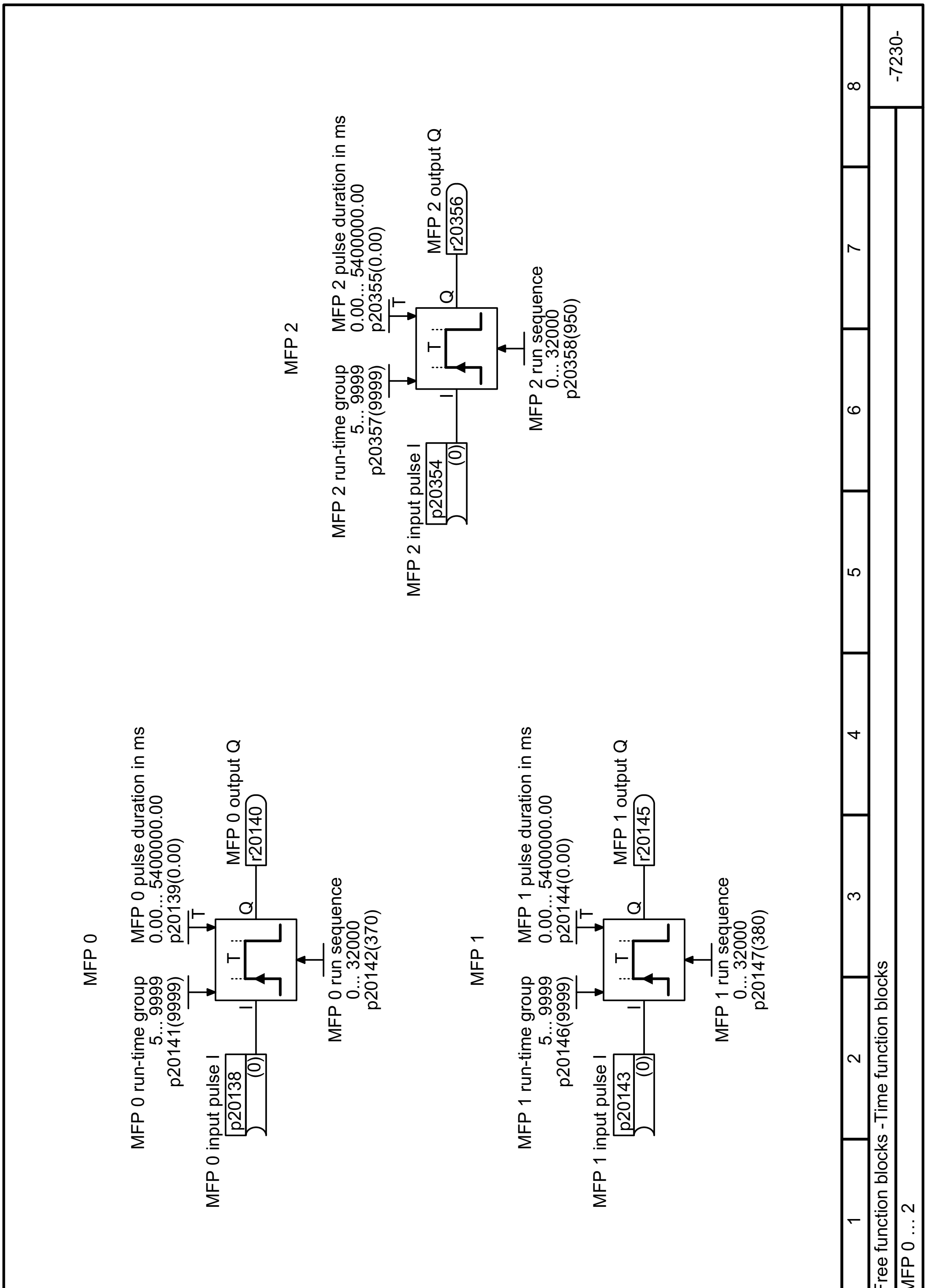


Figure 8-35 FP 7230

8.3.9.14 Function diagram 7232 - Timer blocks SWITCH-ON DELAY

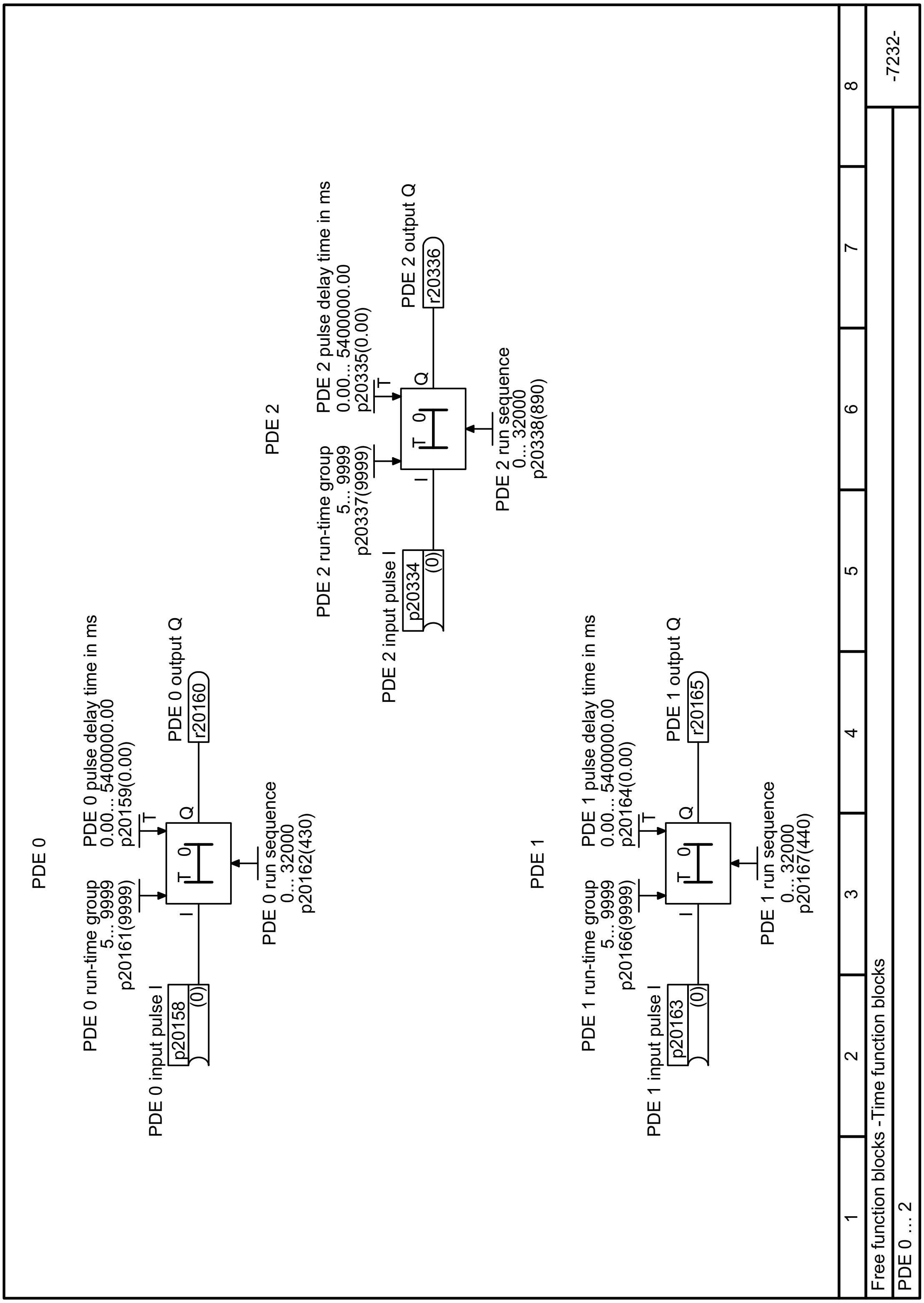


Figure 8-36 FP 7232

8.3.9.15 Function diagram 7233 - Timer blocks SWITCH-OFF DELAY

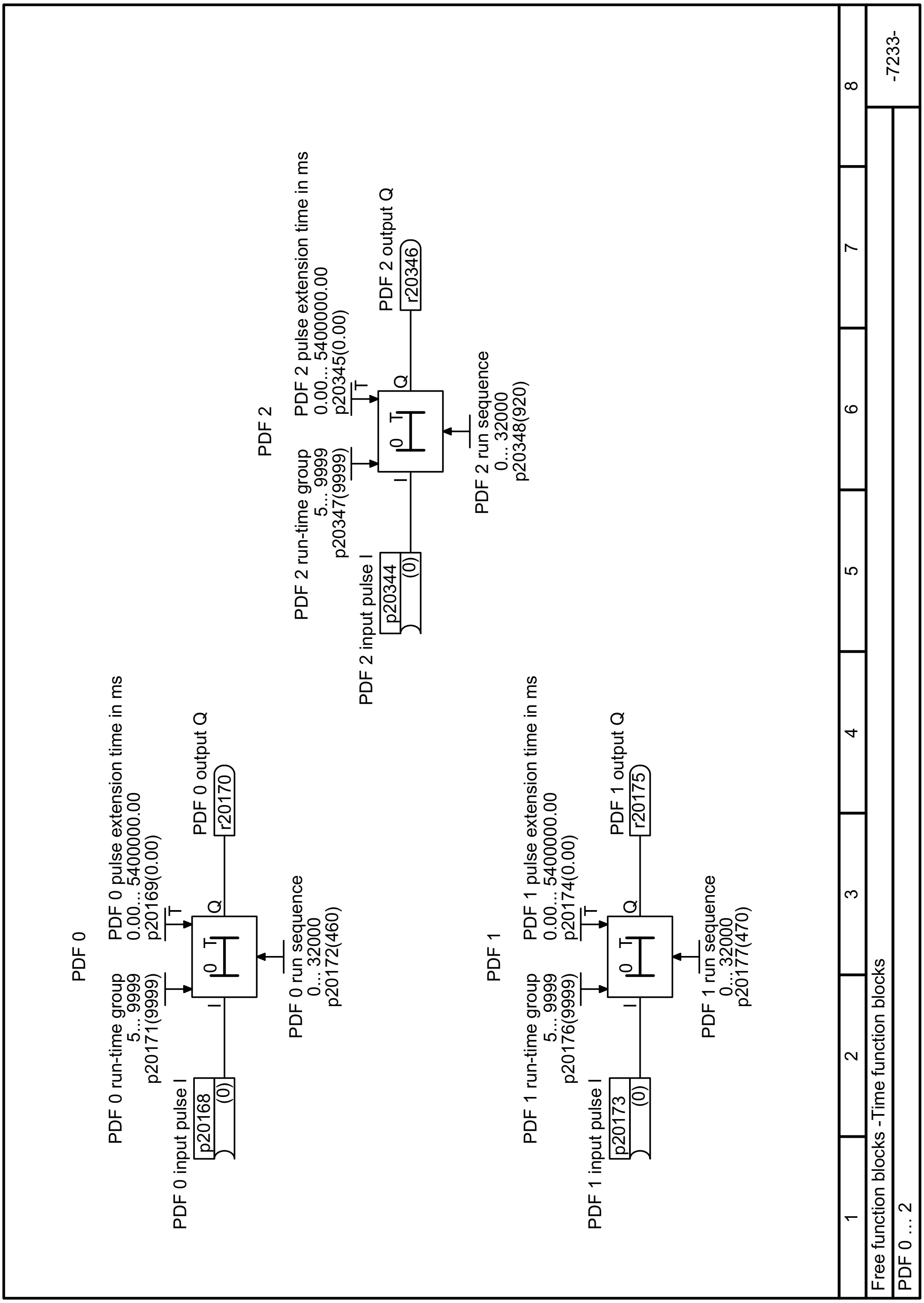


Figure 8-37 FP 7233

8.3.9.16 Function diagram 7240 - Memory block RS flip-flop

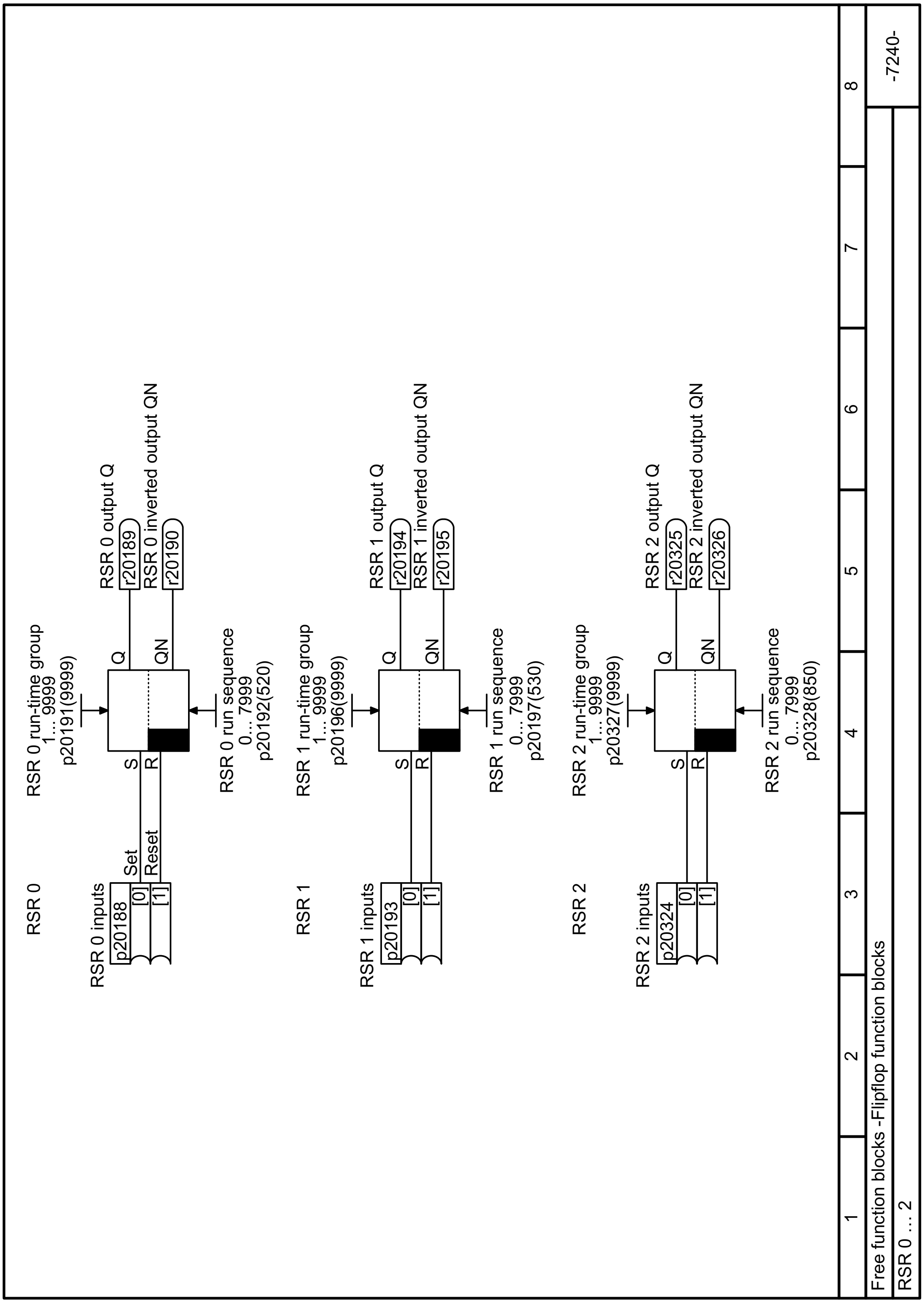


Figure 8-38 FP 7240

8.3.9.17 Function diagram 7250 - Switch block NUMERICAL SWITCHOVER

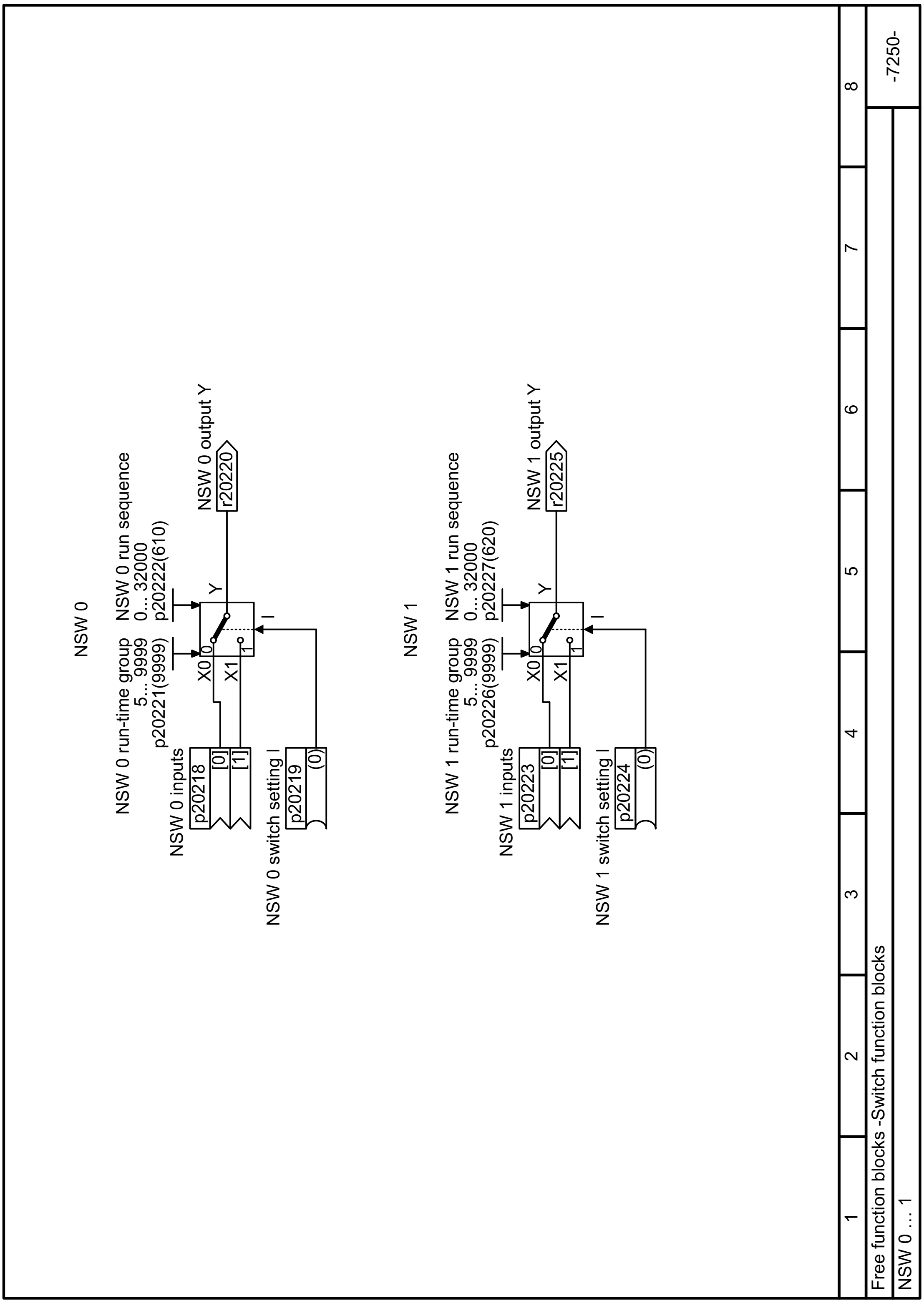


Figure 8-39 FP 7250

8.3.9.18 Function diagram 7260 - Control block LIMITER

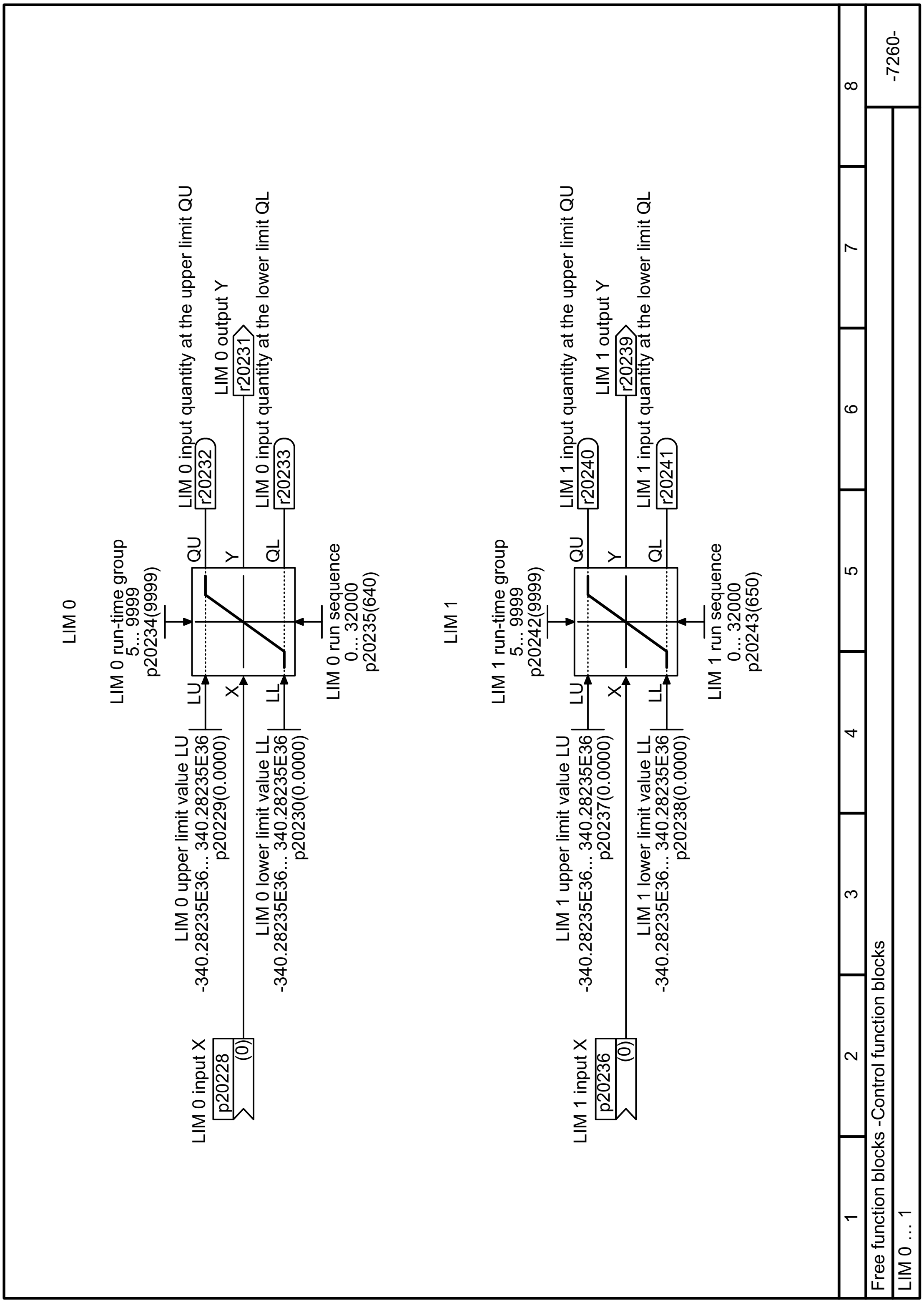


Figure 8-40 FP 7260

8.3.9.19 Function diagram 7270 - Block LIMIT MONITOR

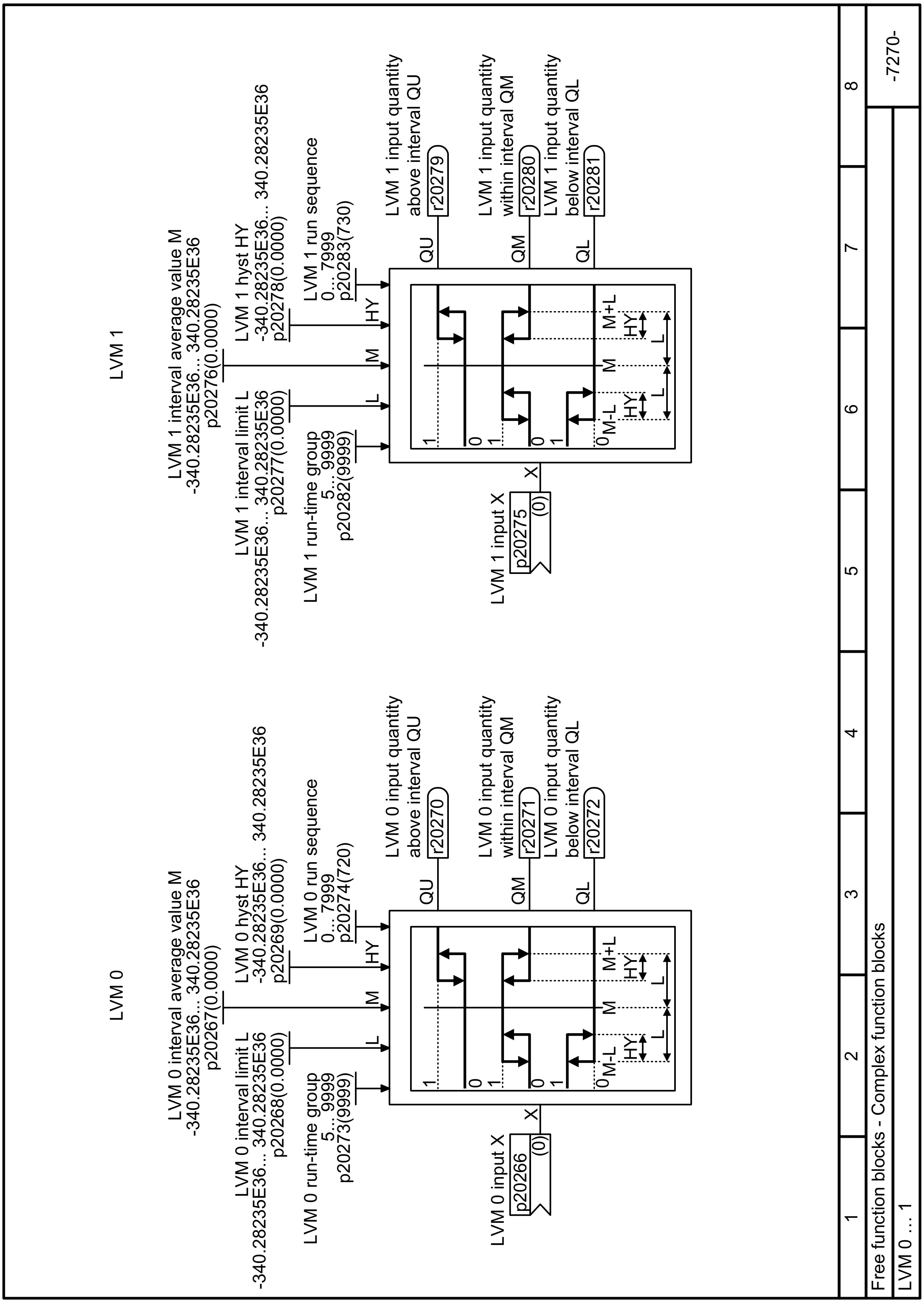


Figure 8-41 FP 7270

8.3.10 Controlling clockwise and counter-clockwise operation via digital inputs

8.3.10.1 Overview

The converter offers various methods to start and stop the motor and reverse its direction:

- Two-wire control, ON/reverse
- Two-wire control, clockwise/counter-clockwise rotation 1
- Two-wire control, clockwise/counter-clockwise rotation 2
- Three-wire control, enable/clockwise/counter-clockwise rotation
- Three-wire control, enable/ON/reverse

Reversing is disabled in the factory setting. To use the "Reverse" function, you must enable the negative rotational direction.

Enable direction of rotation (Page 327)

8.3.10.2 Two-wire control, ON/reverse

Function description

Command "ON/OFF1" switches the motor on and off. The "Reversing" command inverts the motor direction of rotation.

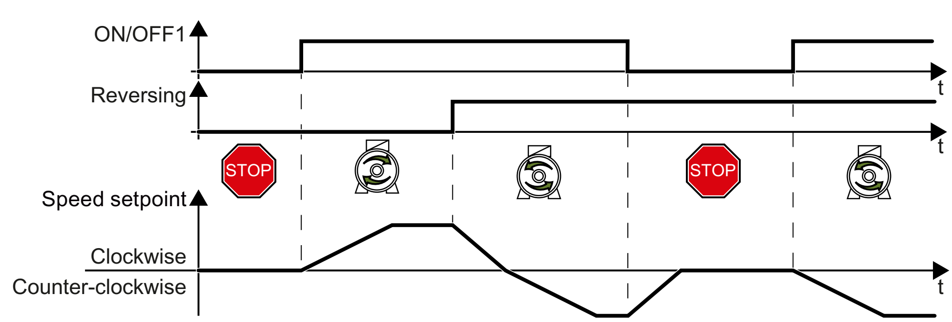


Figure 8-42 Two-wire control, ON/reverse

Assign the following digital inputs to the commands:

- DI 0: ON/OFF1
- DI 1 or other available DI terminals: Reversing

Table 8-51 Function table

ON/OFF1	Reversing	Function
0	0	The motor stops
0	1	
1	0	Clockwise motor rotation
1	1	Counter-clockwise motor rotation

Example

The following parameter setting example is based on the default macro p0015 = 41.

Step	Parameter	Description
1	p29650 = -1	Disable the ON/OFF2 function
2	p29652 = 0	Disable the internal interconnection between ON/OFF2 and DI 0
3	p1110 = 0	Activate negative direction
4	p3334 = 0	Default setting
5	p0840 = r722.0	DI 0: ON/OFF1
6	p1113 = r722.1	DI 1: reversing (example)
7	p0971 = 1	Save settings

Parameters

Parameter	Description	Factory setting
r0722.0...n	CO/BO: CU digital inputs, status	-
p0840[C]	BI: ON/OFF (OFF1)	0
p1110	BI: Inhibit negative direction	1
p1113[C]	BI: Setpoint inversion	0
p3330[C]	BI: 2/3 wire control command 1	0
p3331[C]	BI: 2/3 wire control command 2	0
r3333.0...n	CO/BO: 2/3 wire control control word	-
p3334	2/3 wire control selection 0: Two-wire control, ON/reverse	0

8.3.10.3 Two-wire control, clockwise/counter-clockwise rotation 1

Function description

Commands "ON/OFF1 clockwise rotation" and "ON/OFF1 counter-clockwise rotation" switch on the motor - and simultaneously select a direction of rotation. The converter only accepts a new command when the motor is at a standstill.

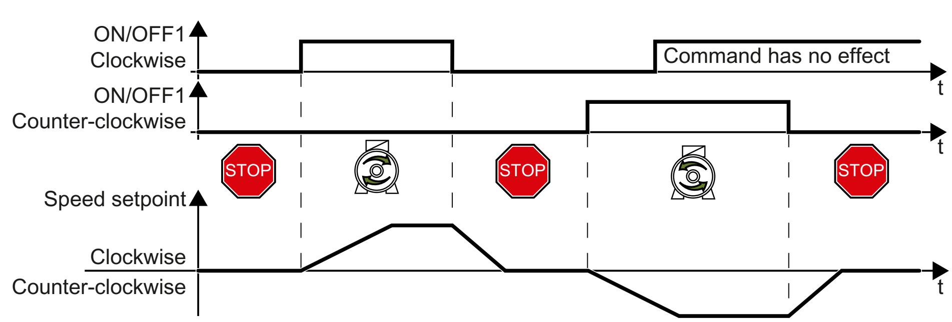


Figure 8-43 Two-wire control, clockwise/counter-clockwise rotation 1

Assign the following digital inputs to the commands:

- DI 0: ON/OFF1 clockwise rotation
- DI 1 or other available DI terminals: ON/OFF1 counter-clockwise rotation

Table 8-52 Function table

ON/OFF1 clockwise rotation	ON/OFF1 counter-clockwise rotation	Function
0	0	The motor stops.
1	0	Clockwise motor rotation.
0	1	Counter-clockwise motor rotation.
1	1	The motor direction of rotation is defined by the command that first reaches state "1".

Example

The following parameter setting example is based on the default macro p0015 = 41.

Step	Parameter	Description
1	p29650 = -1	Disable the ON/OFF2 function
2	p29652 = 0	Disable the internal interconnection between ON/OFF2 and DI 0
3	p1110 = 0	Activate negative direction
4	p3334 = 1	Select the two-wire control clockwise/counter-clockwise rotation 1
5	p3330 = r722.0	DI 0: ON/OFF1 clockwise rotation
6	p3331 = r722.1	DI 1: ON/OFF1 counter-clockwise rotation (example)
7	p0840 = r3333.0	Interconnect the signal source for ON/OFF1
8	p1113 = r3333.1	Sets the signal source to invert the setpoint
9	p0971 = 1	Save settings

Parameter

Parameter	Description	Factory setting
r0722.0...n	CO/BO: CU digital inputs, status	-
p0840[C]	BI: ON/OFF (OFF1)	0
p1110	BI: Inhibit negative direction	1
p1113[C]	BI: Setpoint inversion	0
p3330[C]	BI: 2/3 wire control command 1	0
p3331[C]	BI: 2/3 wire control command 2	0
r3333.0...n	CO/BO: 2/3 wire control control word	-
p3334	2/3 wire control selection 1: Two-wire control, clockwise/counter-clockwise rotation 1	0

8.3.10.4 Two-wire control, clockwise/counter-clockwise rotation 2

Function description

Commands "ON/OFF1 clockwise rotation" and "ON/OFF1 counter-clockwise rotation" switch on the motor - and simultaneously select a direction of rotation. The converter accepts a new command at any time, independent of the motor speed.

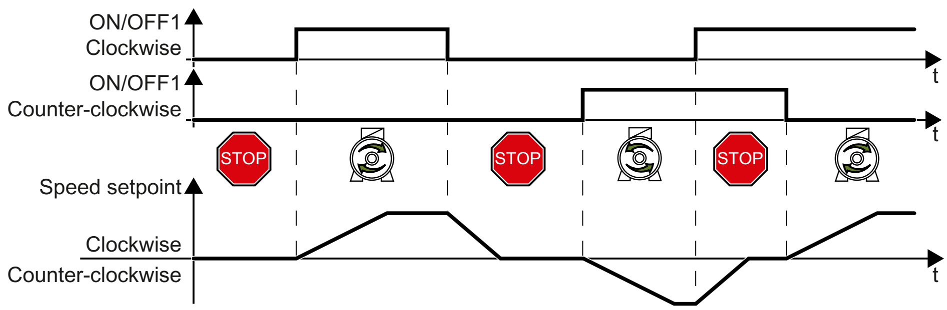


Figure 8-44 Two-wire control, clockwise/counter-clockwise rotation

Assign the following digital inputs to the commands:

- DI 0: ON/OFF1 clockwise rotation
- DI 1 or other available DI terminals: ON/OFF1 counter-clockwise rotation

Table 8-53 Function table

ON/OFF1 clockwise rotation	ON/OFF1 counter-clockwise rotation	Function
0	0	The motor stops.
1	0	Clockwise motor rotation.
0	1	Counter-clockwise motor rotation.
1	1	The motor stops.

Example

The following parameter setting example is based on the default macro p0015 = 41.

Step	Parameter	Description
1	p29650 = -1	Disable the ON/OFF2 function
2	p29652 = 0	Disable the internal interconnection between ON/OFF2 and DI 0
3	p1110 = 0	Activate negative direction
4	p3334 = 2	Select the two-wire control clockwise/counterclockwise rotation 2
5	p3330 = r722.0	DI 0: ON/OFF1 clockwise rotation
6	p3331 = r722.1	DI 1: ON/OFF1 counterclockwise rotation (example)
5	p0840 = r3333.0	Interconnect the signal source for ON/OFF1

Step	Parameter	Description
6	p1113 = r3333.1	Set the signal source to invert the setpoint
7	p0971 = 1	Save settings

Parameters

Parameter	Description	Factory setting
r0722.0...n	CO/BO: CU digital inputs, status	-
p0840[C]	BI: ON/OFF (OFF1)	0
p1110	BI: Inhibit negative direction	1
p1113[C]	BI: Setpoint inversion	0
p3330[C]	BI: 2/3 wire control command 1	0
p3331[C]	BI: 2/3 wire control command 2	0
r3333.0...n	CO/BO: 2/3 wire control control word	-
p3334	2/3 wire control selection 2: Two-wire control, clockwise/counter-clockwise rotation 2	0

8.3.10.5 Three-wire control, enable/clockwise/counter-clockwise rotation

Function description

The "Enable" command is a precondition for switching on the motor. Commands "ON clockwise rotation" and "ON counter-clockwise rotation" switch on the motor - and simultaneously select a direction of rotation. Removing the enable switches the motor off (OFF1).

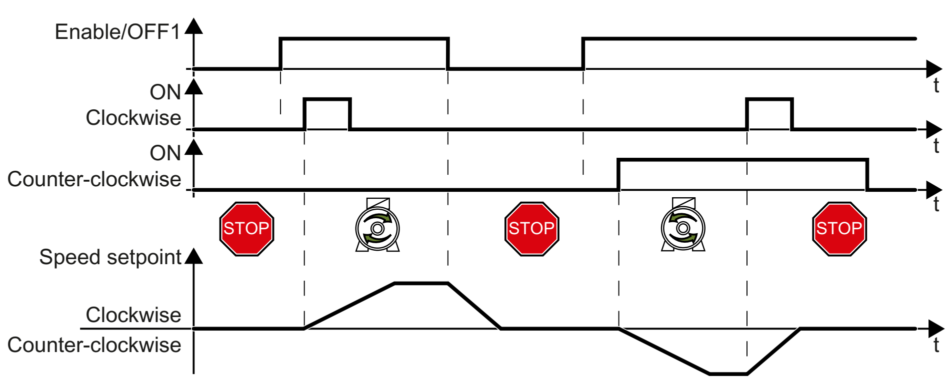


Figure 8-45 Three-wire control, enable/clockwise/counter-clockwise rotation

Assign the following digital inputs to the commands:

- DI 0: ON/OFF1
- DI 1 or other available DI terminals: Clockwise rotation
- DI 2 or other available DI terminals: Counter-clockwise rotation

Table 8-54 Function table

Enable / OFF1	ON clockwise rotation	ON counter-clockwise rotation	Function
0	0 or 1	0 or 1	The motor stops.
1	0→1	0	Clockwise motor rotation.
1	0	0→1	Counter-clockwise motor rotation.
1	1	1	The motor stops.

Example

The following parameter setting example is based on the default macro p0015 = 41.

Step	Parameter	Description
1	p29650 = -1	Disable the ON/OFF2 function
2	p29652 = 0	Disable the internal interconnection between ON/OFF2 and DI 0
3	p1110 = 0	Activate negative direction
4	p3334 = 3	Select the three-wire control enable/clockwise/counter-clockwise rotation
5	p3330 = r722.0	DI 0: Enable/OFF1
6	p3331 = r722.1	DI 1: ON clockwise rotation (example)
7	p3332 = r722.2	DI 2: ON counter-clockwise rotation (example)
8	p0840 = r3333.0	Interconnect the signal source for ON/OFF1
9	p1113 = r3333.1	Set the signal source to invert the setpoint
10	p0971 = 1	Save settings

Parameter

Parameter	Description	Factory setting
r0722.0...n	CO/BO: CU digital inputs, status	-
p0840[C]	BI: ON/OFF (OFF1)	0
p1110	BI: Inhibit negative direction	1
p1113[C]	BI: Setpoint inversion	0
p3330[C]	BI: 2/3 wire control command 1	0
p3331[C]	BI: 2/3 wire control command 2	0
p3332[C]	BI: 2/3 wire control command 3	0
r3333.0...n	CO/BO: 2/3 wire control control word	-
p3334	2/3 wire control selection 3: Three-wire control enable/clockwise/counter-clockwise rotation	0

8.3.10.6 Three-wire control, enable/ON/reverse

Function description

The "Enable" command is a precondition for switching on the motor. The "ON" command switches the motor on. The "Reversing" command inverts the motor direction of rotation. Removing the enable switches the motor off (OFF1).

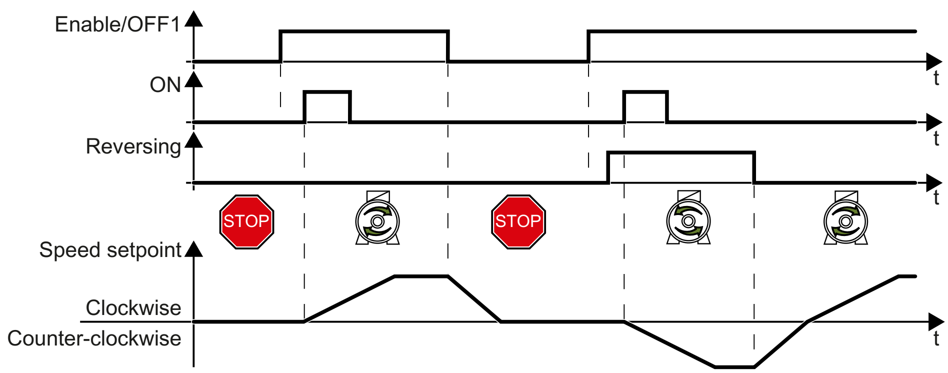


Figure 8-46 Three-wire control, enable/ON/reverse

Assign the following digital inputs to the commands:

- DI 0: ON/OFF1
- DI 1 or other available DI terminals: ON
- DI 2 or other available DI terminals: Reversing

Table 8-55 Function table

Enable / OFF1	ON	Reversing	Function
0	0 or 1	0 or 1	The motor stops.
1	0→1	0	Clockwise motor rotation.
1	0→1	1	Counter-clockwise motor rotation.

Example

The following parameter setting example is based on the default macro p0015 = 41.

Step	Parameter	Description
1	p29650 = -1	Disable the ON/OFF2 function
2	p29652 = 0	Disable the internal interconnection between ON/OFF2 and DI 0
3	p1110 = 0	Activate negative direction
4	p3334 = 4	Select the three-wire control enable/ON/reverse rotation
5	p3330 = r722.0	DI 0: Enable/OFF1
6	p3331 = r722.1	DI 1: ON clockwise rotation (example)
7	p3332 = r722.2	DI 2: ON counter-clockwise rotation (example)
8	p0840 = r3333.0	Interconnect the signal source for ON/OFF1

Step	Parameter	Description
9	p1113 = r3333.1	Sets the signal source to invert the setpoint
10	p0971 = 1	Save settings

Parameter

Parameter	Description	Factory setting
r0722.0...n	CO/BO: CU digital inputs, status	-
p0840[C]	BI: ON/OFF (OFF1)	0
p1110	BI: Inhibit negative direction	1
p1113[C]	BI: Setpoint inversion	0
p3330[C]	BI: 2/3 wire control command 1	0
p3331[C]	BI: 2/3 wire control command 2	0
p3332[C]	BI: 2/3 wire control command 3	0
r3333.0...n	CO/BO: 2/3 wire control control word	-
p3334	2/3 wire control selection 4: Three-wire control enable/ON/reverse	0

8.3.10.7 Function block diagram 2272 - Two-wire control

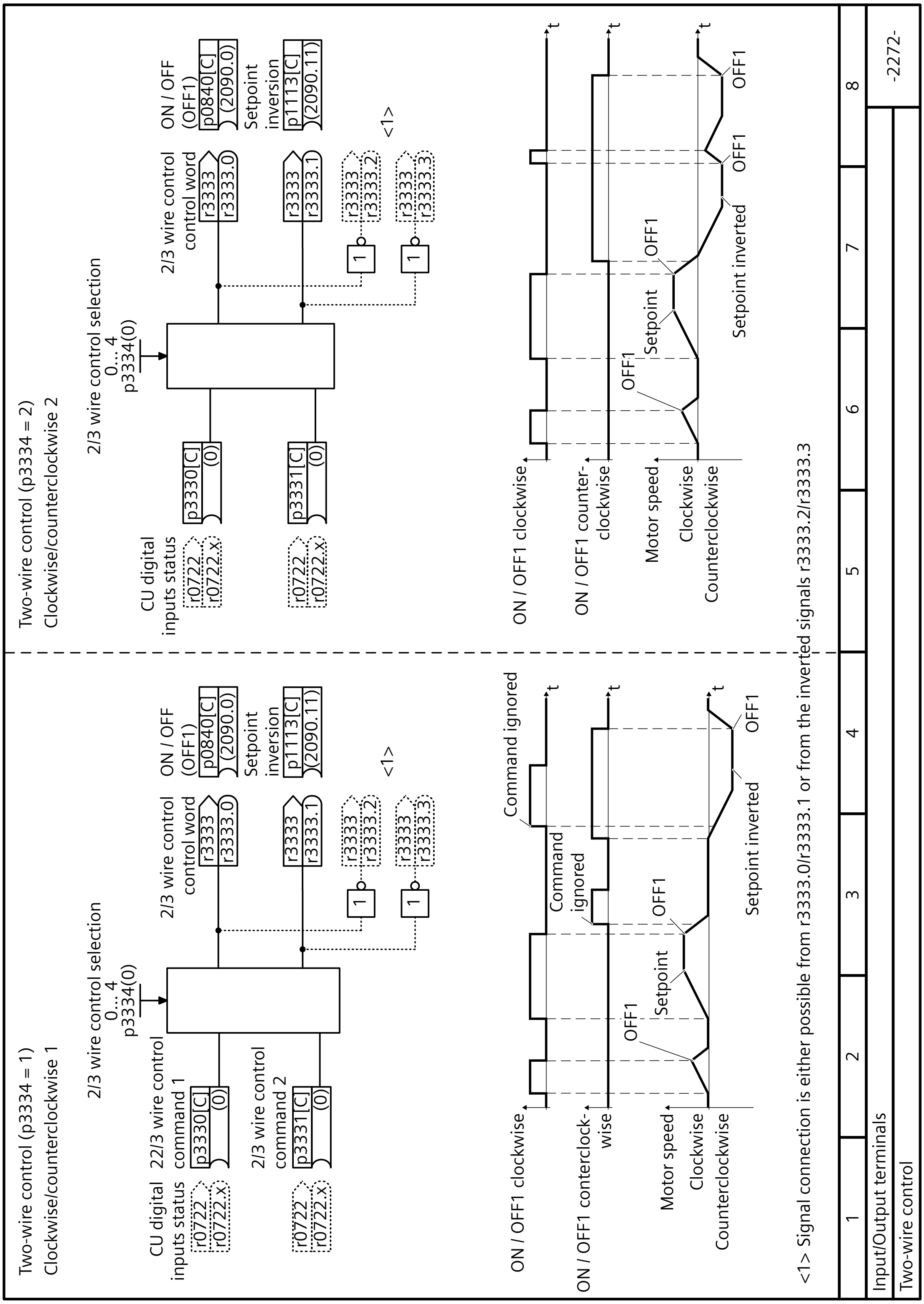


Figure 8-47 FP 2272

8.3.10.8 Function block diagram 2273 - Three-wire control

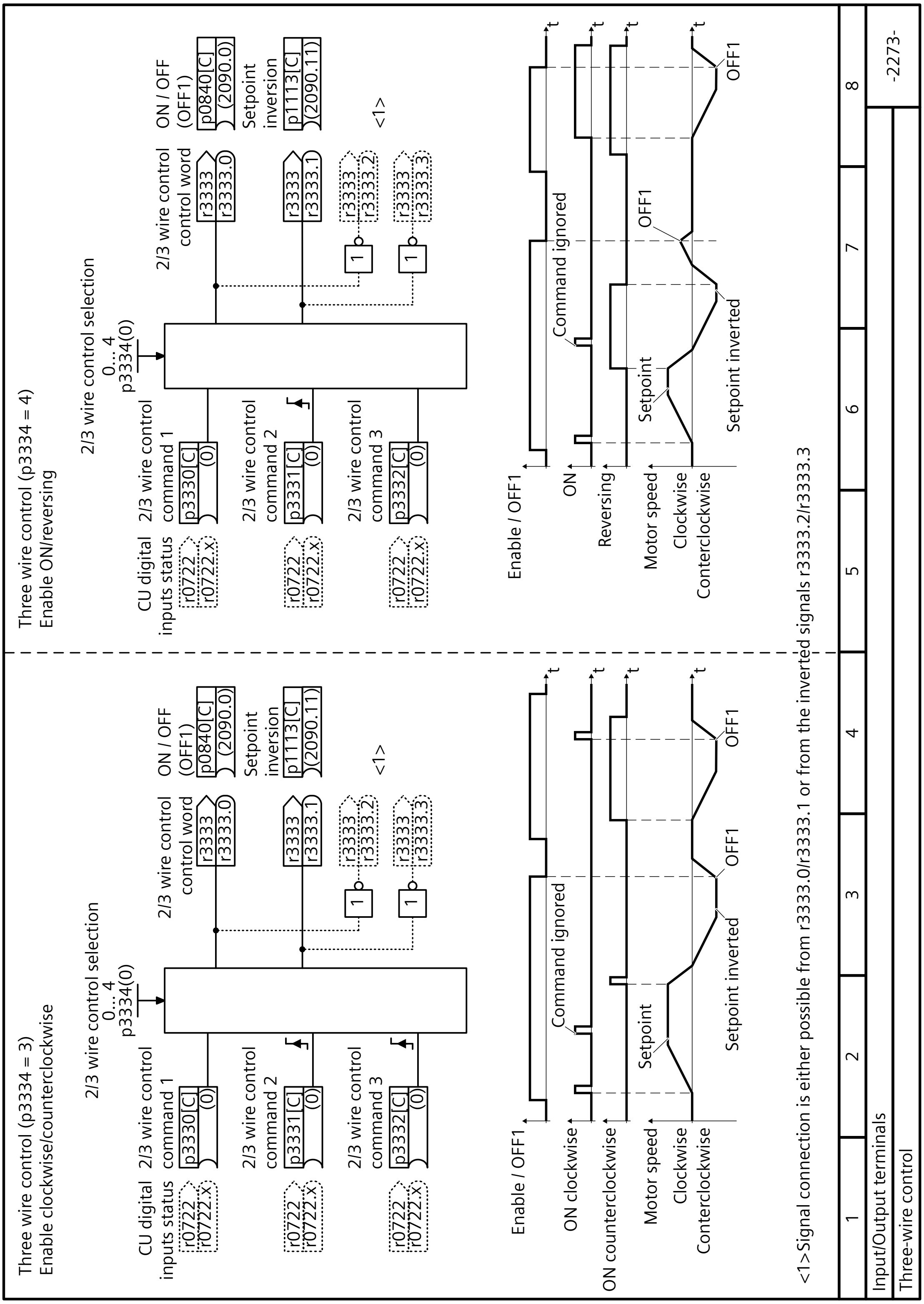


Figure 8-48 FP 2273

8.4 Pump control

8.4.1 Multi-pump control

Overview

Multi-pump control is suitable for applications that require simultaneous operation of up to four pumps, for example, equalizing significantly fluctuating water pressures or flow rates. After the function is enabled, you can configure the following four sub-functions based on your particular requirements:

- Pump switch-in/switch-out (Page 292)
- Stop mode (Page 296)
- Pump switchover (Page 298)
- Service mode (Page 300)

Multi-pump control provides a flexible and cost-effective solution for the following:

- Control up to four pumps without additional I/O module
- Smoothly start and stop every pump to ensure the best performance of the water supply system
- Simplify the control system

Note

It is recommended to use the multi-pump control function on converters with a power rating less than 30 kW.

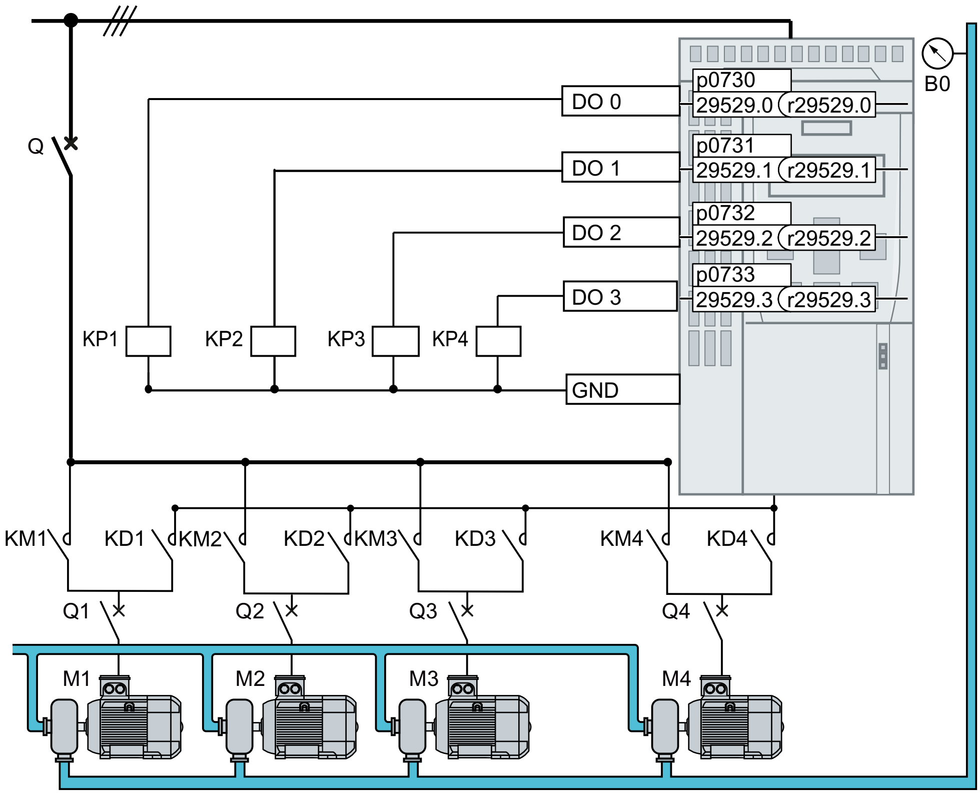
Precondition

Before using the multi-pump control function, make sure that you have connected pumps of the same power rating.

Function description

The converter uses four relays (KP1 to KP4), which are connected to digital outputs DO 0 to DO 3, to switch pumps in and out according to the technology controller deviation (r2273). In addition, two groups of contactors, KDs and KMs, are designed to switch the pumps between converter operation and line operation. Soft pump switching can be realized as all motors start/stop with ramp speeds, so as to minimize the shock to the pipes.

Parameter p29520 is used to enable the multi-pump control.



Q/Q1 ... Q4	Low-voltage circuit breakers
M1 ... M4	Motors
B_0	Pressure sensor. Interconnect the signal of the pressure sensor with the actual-value input of the technology controller.

Figure 8-49 Mains circuit

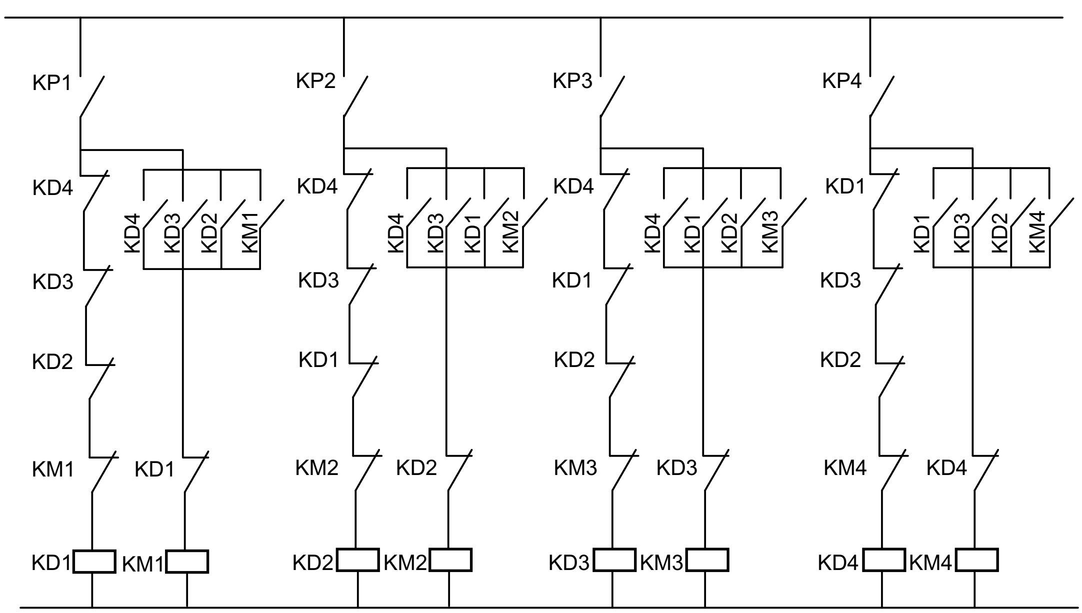


Figure 8-50 External relay control circuit

Note

When using the multi-pump control for the first time, make sure that the circuit breakers are disconnected until the relevant parameters are configured.

Note

When the multi-pump control is enabled (p29520=1), the minimum value and default value of p1274 will be set to 40 ms and 50 ms respectively.

Note

Motor current peaks when switching the motor from converter operation to line operation

If the motor is switched from converter operation to the line supply, this can result in a high surge current > 10 x I_rated in the motor, depending on the random phase shift between converter and line voltage.

Note

The multi-pump control does not support motor direction inversion (p1113).

Note

If you need to reverse the rotation of the line-controlled motor(s) under the ESM mode, extra circuit and control is required.

Further information

Interaction with other functions:

- When activating the essential service mode, if the multi-pump control is active, the motor connection status remains unchanged and the converter-controlled motor switches the speed setpoint to "ESM setpoint source".
- When activating the hibernation mode, if the multi-pump control is active, the hibernation mode only works when there is only one operating motor and the conditions for hibernation are satisfied.

8.4.1.1 Pump switch-in/switch-out

Pump switch-in

If the pump controlled by the converter runs at the maximum speed (p1082) and the technology controller deviation (r2273) exceeds the switch-in threshold (p29523) but is lower than the overcontrol threshold (p29526) for a specified time (p29524), the converter first switches the pump from converter operation to line operation, and then switches on an idle pump. This pump is softly started with a ramp-up speed and runs in converter operation mode.

Note

If the technology controller deviation rises above the overcontrol threshold (p29526), the converter skips the delay time (p29524) and performs the switch-in operation immediately.

Parameter p29522 is used to define the selection mode for switching in motors.

- p29522 = 0: Selecting the next pump according to the fixed sequence. The converter switches in the pump by following the sequence M1 → M2 → M3 → M4.
- p29522 = 1: Selecting the next pump according to the operating hours. The converter switches in the pump with the least absolute operating hours (p29530[0...3]).

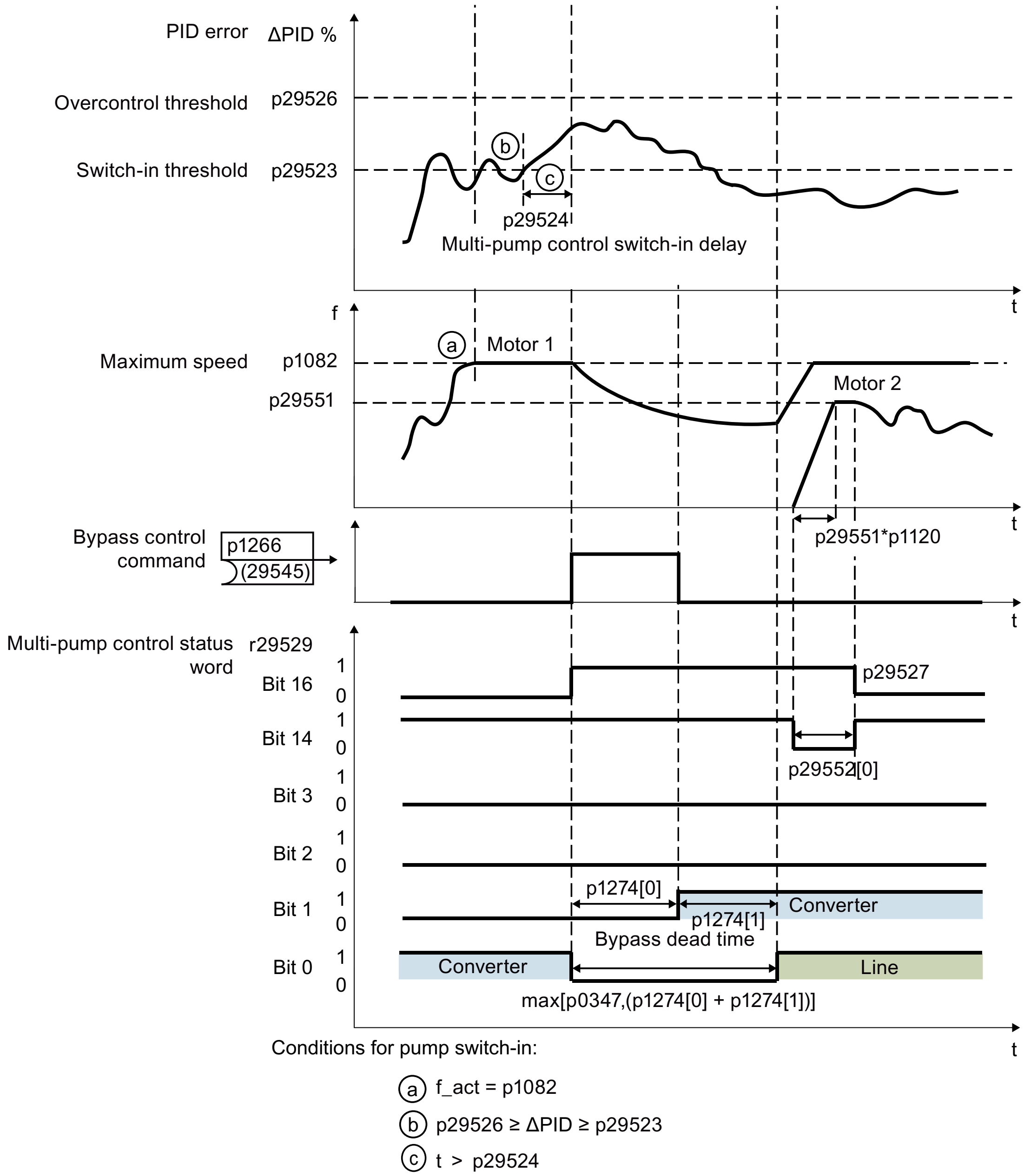


Figure 8-51 Pump switch-in

Pump switch-out

If the pump controlled by the converter runs at a speed lower than the switch-out threshold (p29528 + p1080) and the technology controller deviation is lower than the switch-out threshold (-p29523) for a specified time (p29525), the converter switches off a line-controlled pump based on the selection mode.

Note

If the technology controller deviation drops below the overcontrol threshold (-p29526), the converter skips the delay time (p29525) and performs the switch-out operation immediately.

Parameter p29522 is used to define the selection mode for switching out motors. Bits 00 to 05 of r29529 indicate the motor which is stopped depending on p29522. Only the line-controlled motors switch out and the converter-controlled motor remains unchanged.

- p29522 = 0: Selecting the next pump according to the fixed sequence. The converter switches off the line-controlled pumps, following the reverse sequence they are switched in (M3 → M2 → M1).
- p29522 = 1: Selecting the next pump according to the operating hours. The converter switches off the line-controlled pumps with the most absolute operating hours (p29530[0...3]).

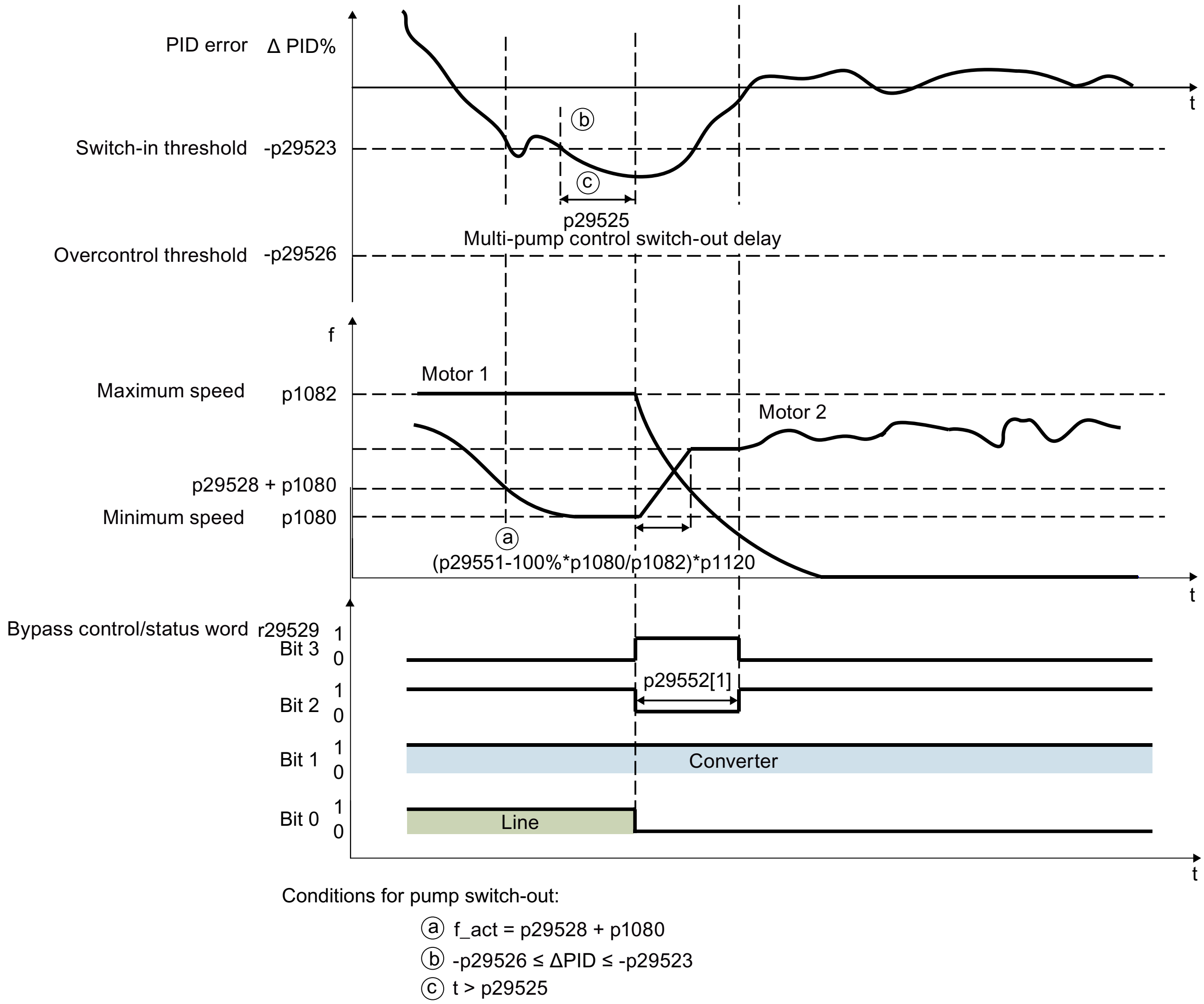


Figure 8-52 Pump switch-out

Parameters

Number	Name	Factory setting
p0730 ... p0733	BI: Signal source for digital outputs DO 0 ... DO 3	-
p1080[0...n]	Minimum speed	Depending on the converter
p1082[0...n]	Maximum speed	1500 rpm
p1120	Ramp-function generator ramp-up time	Depending on the converter
p1274[0...1]	Bypass switch monitoring time	50 ms
p29520	Multi-pump control enable	0
p29521	Multi-pump control motor configuration	0
p29522	Multi-pump control motor selection mode	0

Number	Name	Factory setting
p29523	Multi-pump control switch-in threshold	20%
p29524	Multi-pump control switch-in delay	30 s
p29525	Multi-pump control switch-out delay	30 s
p29526	Multi-pump control overcontrol threshold	25%
p29527	Multi-pump control interlocking time	0 s
p29528	Multi-pump control switch-out speed offset	100 rpm
r29529	BO/CO: Multi-pump control status word	-
p29530[0...3]	Multi-pump control absolute operating hours	0 h
p29537	Multi-pump control disconnection lockout time	0 s
r29538	Multi-pump control variable-speed motor	-
r29545	CO/BO: Multi-pump control bypass command	-
p29546	Multi-pump control deviation threshold	20%
p29551	Multi-pump control switch in/out speed	90%
p29552[0...3]	Multi-pump control holding time for boost	0 s

8.4.1.2 Stop mode

Function description

Two stop modes are available as follows:

- Normal stop: All pumps running in line operation are switched off simultaneously as soon as the stop command is received. The pump in converter operation stops under the control of the converter. Normal stop aims to quickly stop all the pumps under emergency situations such as pipe cracks or leakages.
- Sequence stop: The pumps running in line operation stop one by one in the reverse sequence in which they are switched on. There is a delay time (p29537) between every pump stop. The pump in converter operation stops under the control of the converter after the first pump in line operation is switched off. Sequence stop aims to reduce the water hammer effect to pipes especially in systems with high power range.

After the OFF command is received, the pumps are switched off in either of the two stop modes:

- With OFF1 command received, the pump stop mode is selected in parameter p29533 as follows:
  - p29533 = 0: normal stop
  - p29533 = 1: sequence stop
- With OFF2/OFF3 command received, the pumps are switched off with normal stop.

Note

Sequence stop

During sequence stop, the motors are switched off in the reverse sequence in which they are switched on. It is therefore important that the motor configuration parameter p29521 is not changed while the converter is running. Otherwise, the parameter value may no longer correspond to the mapping of the motors connected.

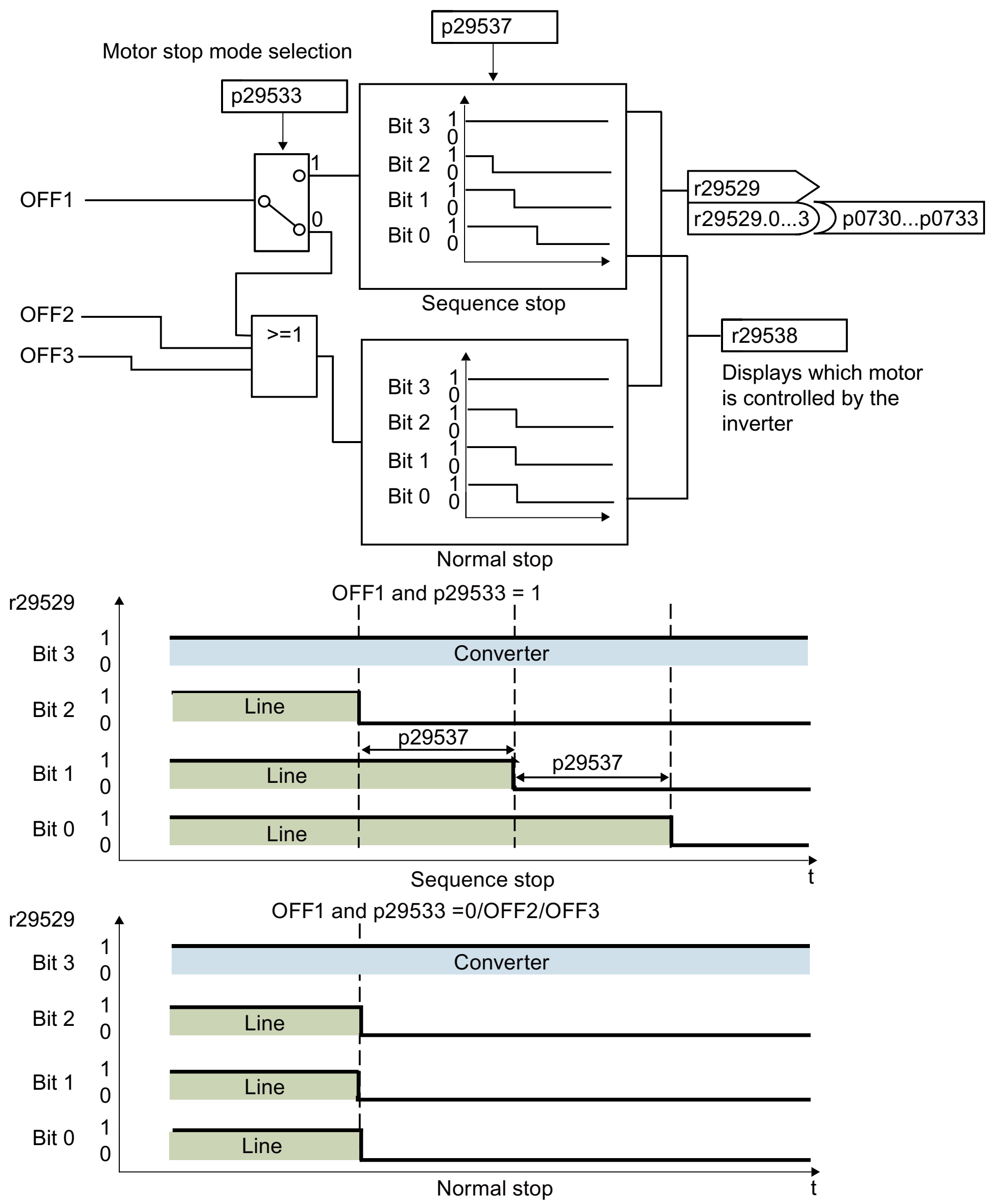


Figure 8-53 Stop mode

Parameters

Number	Name	Factory setting
r29529	CO/BO: Multi-pump control status word	-
p29533	Multi-pump control switch-off sequence	0
p29537	Multi-pump control disconnection lockout time	0 s
r29538	Multi-pump control variable-speed motor	-

8.4.1.3 Pump switchover

Function description

With pump switchover enabled (with p29539), the converter monitors the operation status of all running pumps.

- If the continuous operating hours (p29547) of the pump in converter operation exceed the threshold (p29531), the converter switches off the pump and then switches in an idle pump to keep constant output power.
- If the continuous operating hours (p29547) of a pump in line operation exceed the threshold (p29531), the converter first switches off the pump, switches out the converter-controlled pump to line operation, and then switches in an idle pump to run in converter operation to keep constant output power.

You can use parameter p29522 to define the selection mode for the next pump. The internal counters (p29530[0...3] and p29547[0...3]) are used to calculate the operating hours of the pumps.

- p29522 = 0: Selecting the next pump according to the fixed sequence.
  The converter first switches out the pump with the most continuous operating hours (p29547[0...3]) and then switches in a pump following the sequence of M1 → M2 → M3 → M4.
- p29522 = 1: Selecting the next pump according to the operating hours.
  The converter switches out the pump with the most continuous operating hours (p29547[0...3]) and then switches in the pump with the least absolute operating hours (p29530[0...3]).

When a pump is switched off, the continuous operating hours (p29547) of this pump reset to 0 automatically.

This function balances the operation time of each pump, extends the lifetime expectancy of the system and reduces downtime.

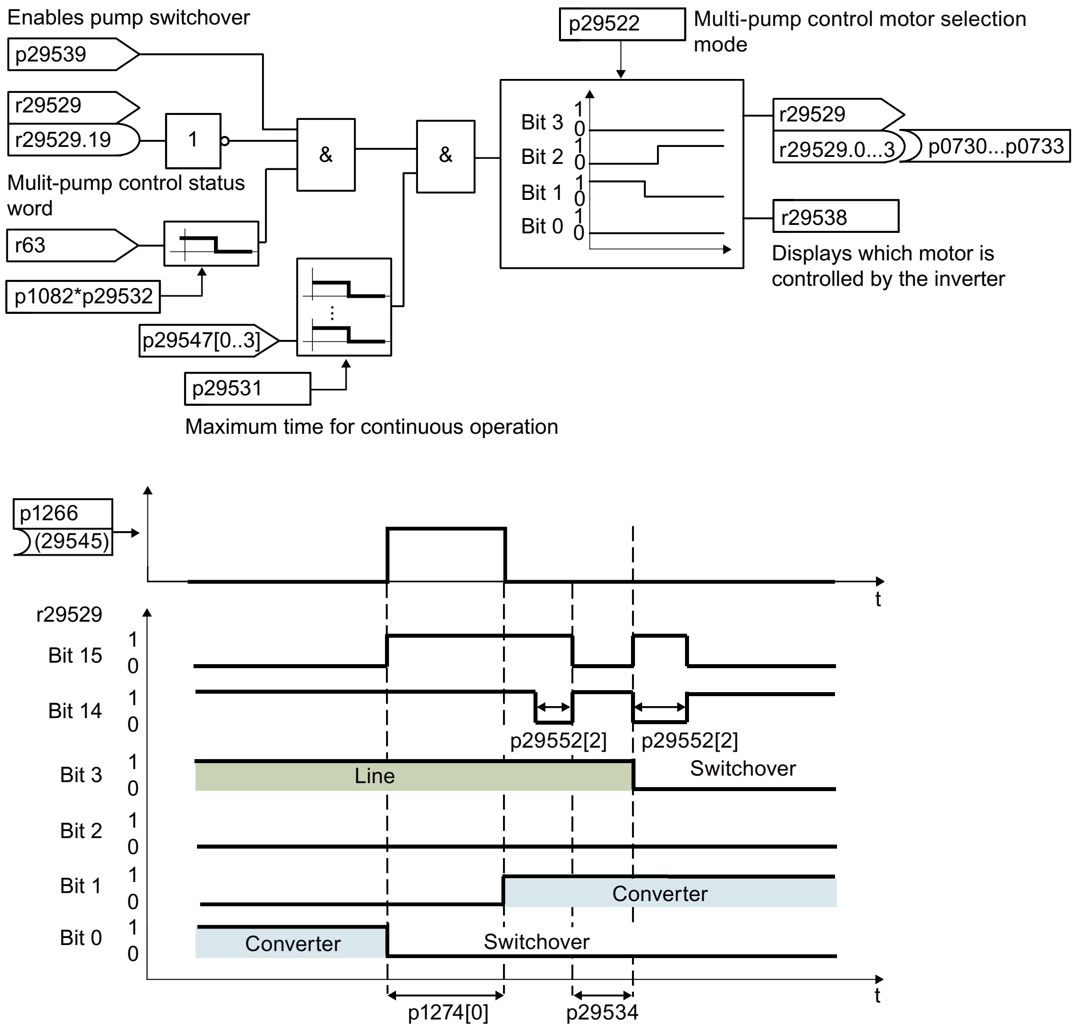


Figure 8-54 Pump switchover

Note

Possible alarms and faults

With pump switchover enabled, if the continuous operating hours (p29547) of the pump exceed the threshold (p29531) while the pump switchover is not possible (r29529.19 = 1), alarm A52962 appears. In this case, increase p29531 or reset p29547 to clear the alarm.

Parameters

Number	Name	Factory setting
p29522	Multi-pump control motor selection mode	0
r29529.19	CO/BO: Multi-pump control status word	-
p29530[0...3]	Multi-pump control motors absolute operating hours	-
p29531	Multi-pump control maximum time for continuous operation	24 h
p29532	Multi-pump control switchover speed threshold	90%

Number	Name	Factory setting
p29534	Multi-pump control switchover lockout time	0.5 h
p29539	Multi-pump control switchover enable	0
p29547[0...3]	Multi-pump control motors continuous operating hours	-
r29538	Multi-pump control variable-speed motor	-

8.4.1.4 Service mode

Function description

When a pump is in the service mode, the converter locks the corresponding relay. Then you can perform troubleshooting of this pump without interrupting the operation of other pumps. You can use parameters p29540 to p29543 to set the pumps to work in service mode respectively. Pumps set to service mode are skipped in further multi-pump control process.

WARNING

Risk of electric shock due to incorrectly connected low-voltage circuit breakers

If a low-voltage circuit breaker is not connected correctly to a pump set in service mode, hazardous voltages can be present at the pump when the converter relay malfunctions. Troubleshooting the service pump can result in serious personal injury or death.

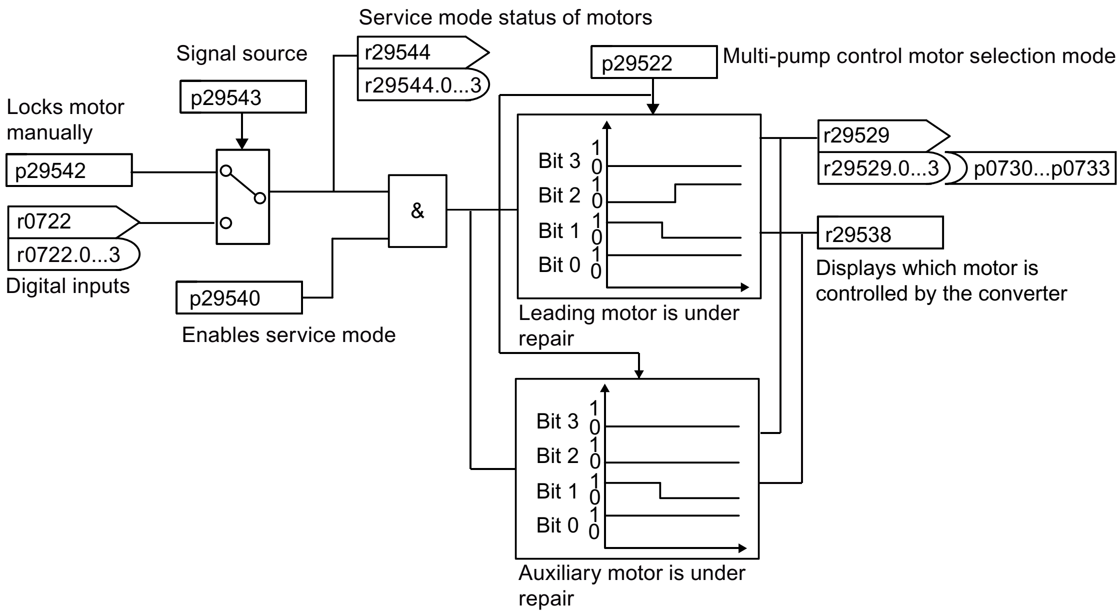
- Make sure that all pumps are connected correctly to the mains and converter through low-voltage circuit breakers.
- After a pump is set in service mode, make sure that its low-voltage circuit breaker is open before performing any troubleshooting operation.

Note

Possible alarms and faults

- If the technology controller deviation r2273 exceeds the threshold p29546 and no pump is available for switch-in, alarm A52963 appears.
- If there is only one pump that is not under service or locked manually, alarm A52964 appears.
- If all motors are under service or locked manually, fault F52965 appears.

For more information about the causes and remedies of the possible alarms and faults, see Section "Warnings, faults and system messages (Page 987)".


Service mode status of motors
Signal source
r29544
r29544.0...3
p29522
Multi-pump control motor selection mode
Locks motor manually
p29543
p29542
r0722
r0722.0...3
Digital inputs
&
p29540
Enables service mode
Bit 3
Bit 2
Bit 1
Bit 0
Leading motor is under repair
r29529
r29529.0...3
p0730...p0733
r29538
Displays which motor is controlled by the converter
Auxiliary motor is under repair

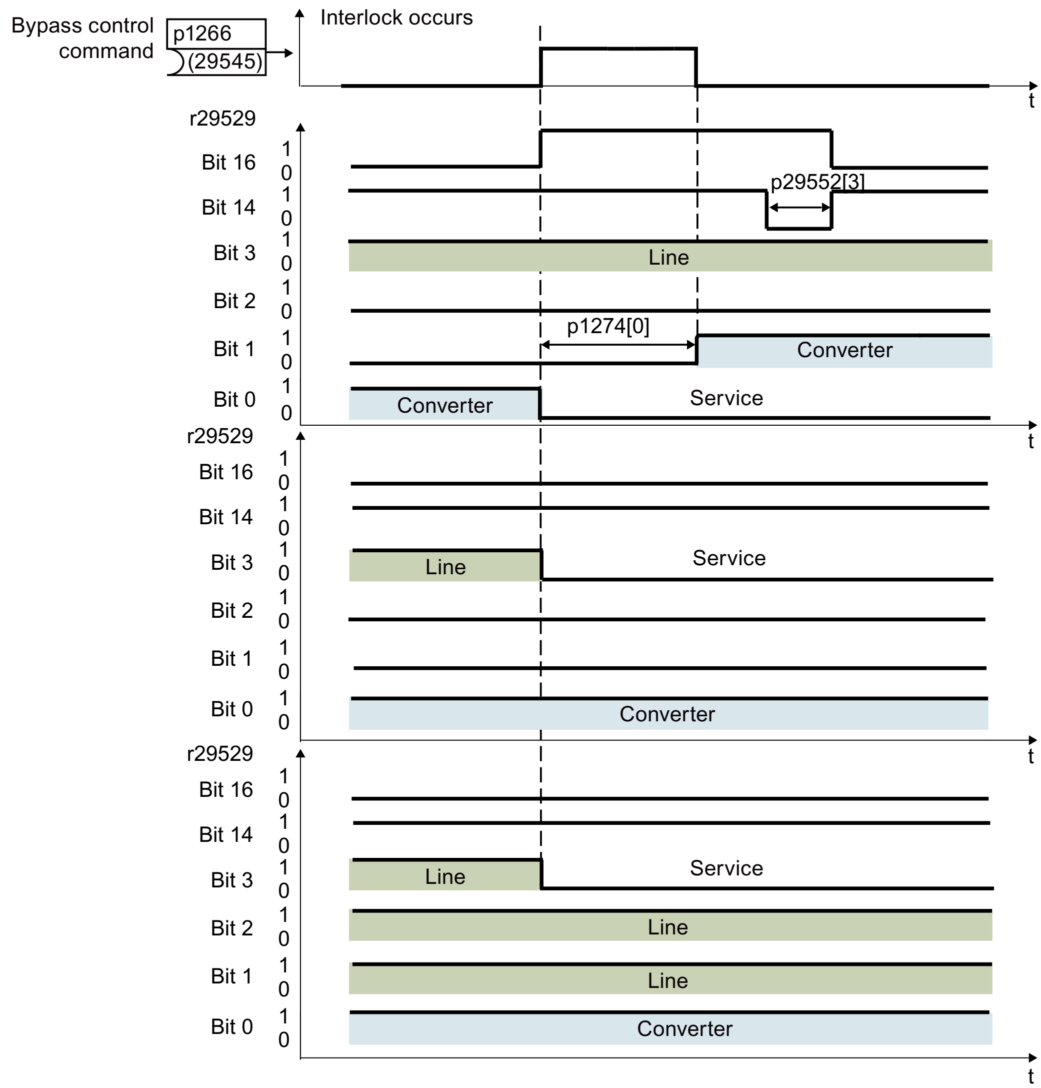


Figure 8-55 Service mode

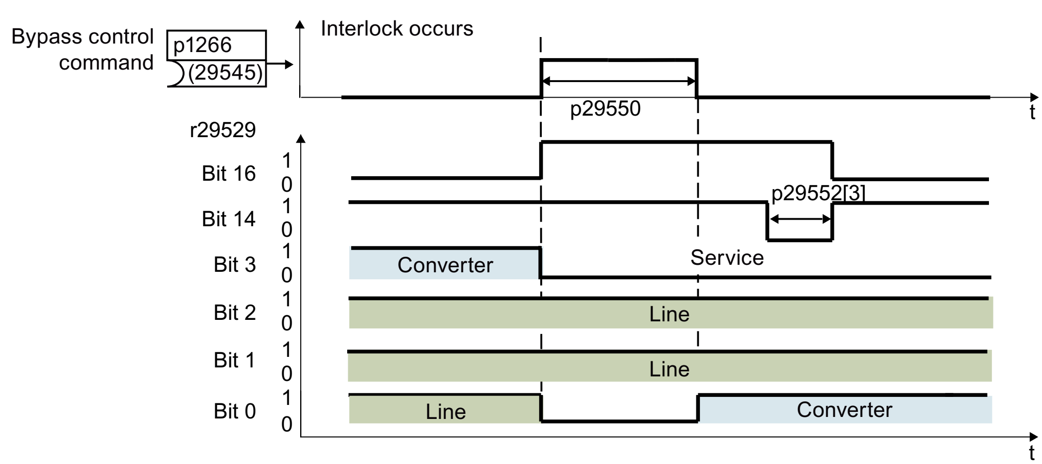


Figure 8-56 Service mode- no idle motor

Parameters

Number	Name	Factory setting
p29522	Multi-pump control motor selection mode	0
r29529.0...19	CO/BO: Multi-pump control status word	-
r29538	Multi-pump control variable-speed motor	-
p29540	Multi-pump control service mode enable	0
p29542	BO/CO: Multi-pump control service mode interlock manually	-
p29543[0...3]	BI: Multi-pump control motor under repair	[0] p29542.0 [1] p29542.1 [2] p29542.2 [3] p29542.3
r29544	Multi-pump control index of motors under repair	-
p29550	Multi-pump control time for motor stopping	3 s

8.4.2 Frost protection

Overview

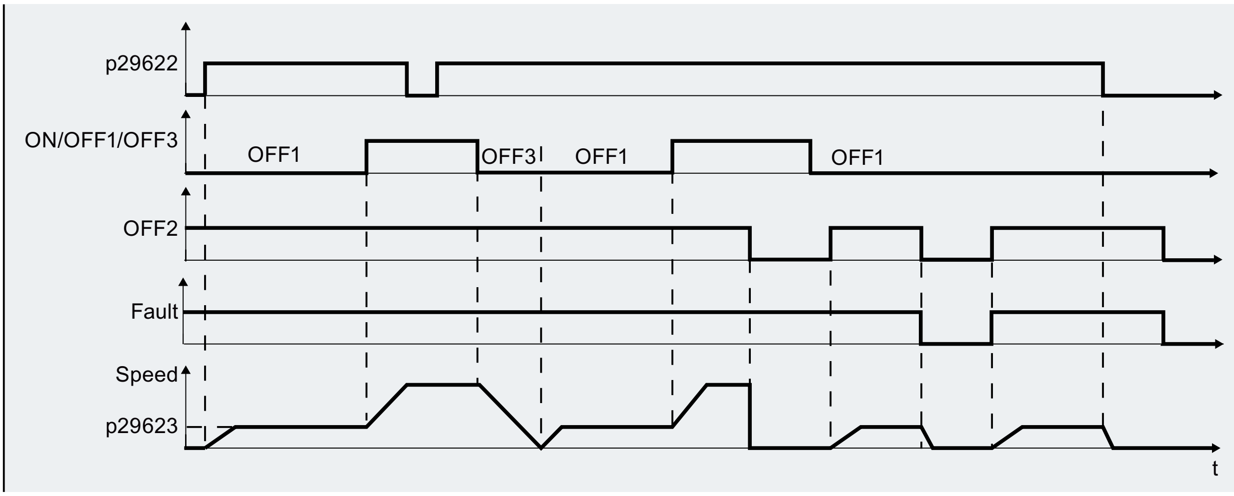
The freezing water inside of the pump will damage the pump. With the frost protection enabled, if the surrounding temperature falls below a given threshold, the motor turns automatically to prevent freezing.

Precondition

Before enabling the frost protection, make sure that p0840 = r29659.0, p0844 = r29659.1, p1143 = r29640.0 and p1144 = r29641.

Function description

- OFF1/OFF3: OFF3 disables frost protection function while OFF1 enables this function again.
- OFF2/fault: The motor stops and the frost protection function is deactivated.



Note

If you want to run frost protection, make sure that Operator Panels (BOP-2 or IOP-2) or G120 Smart Access does not get control of the motor in the JOG/Hand mode.

Parameters

Number	Name	Factory setting
p29622	BI: Frost protection enable	0
p29623	Frost protection speed	0 rpm

8.4.3 Condensation protection

Overview

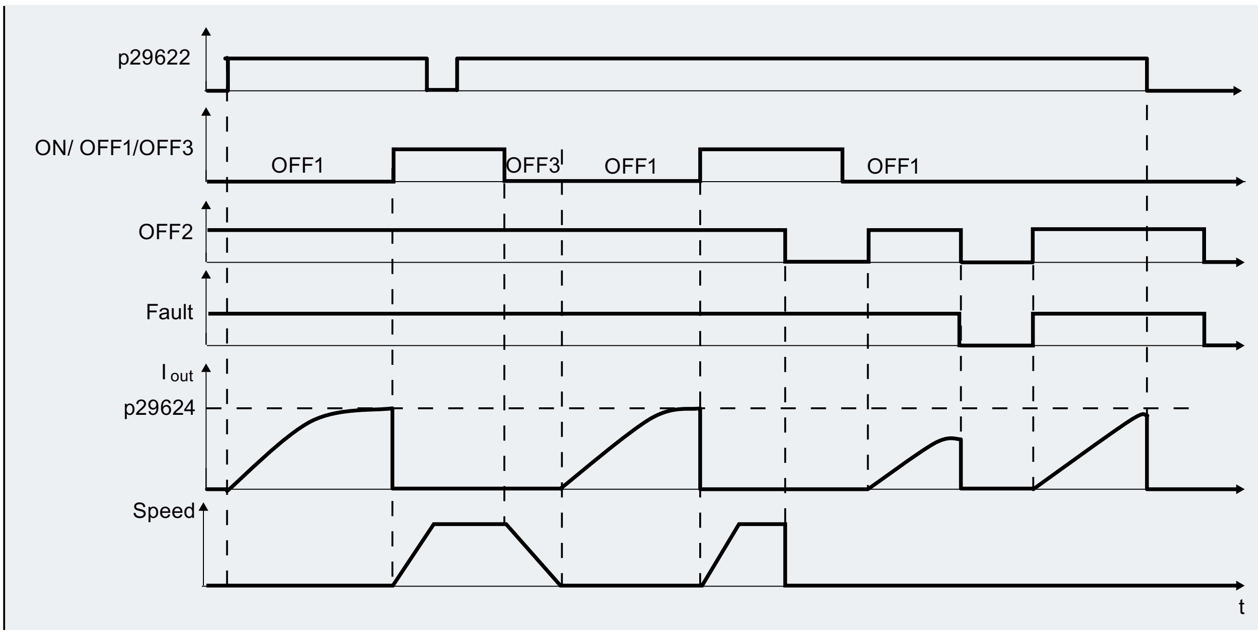
Condensation is a serious problem for motors in the humid and cold environment, resulting in motor failure. This problem can be avoided by slightly increasing the surface temperature of the motor during work break. If an external condensation sensor detects excessive condensation, the converter applies a DC current to keep the motor warm to prevent condensation.

Precondition

Before enabling the condensation protection, make sure that p0840 = r29659.0, p0844 = r29659.1, p1143 = r29640.0 and p1144 = r29641.

Function description

- OFF1/OFF3: OFF3 disables the condensation protection function while OFF1 enables this function again.
- OFF2/fault: The motor stops and the condensation protection function is deactivated.



If the converter is not running and the protection signal becomes active, protection measure is applied as follows:

- If frost protection speed p29623 ≠ 0 (default 0), frost protection is activated by applying the specified speed to the motor.
- If frost protection speed p29623 = 0 and condensation protection current p29624 ≠ 0, condensation protection is activated by applying the specified current to the motor.

Parameters

Number	Name	Factory setting
p29622	BI: Frost protection enable	0
p29624	Condensation protection current	30%

8.4.4 Cavitation protection

Overview

Cavitation occurs when air bubbles are generated around the surface of the impeller, resulting in pump damage, unexpected noise, and decreased flow or pressure of the pipe system. The cavitation protection will generate a fault/warning when cavitation conditions are deemed to be present. If the converter gets no feedback from the pump transducer, it will trip to prevent cavitation damage. This function saves the maintenance efforts and extends the lifetime expectancy of the system.

Function description

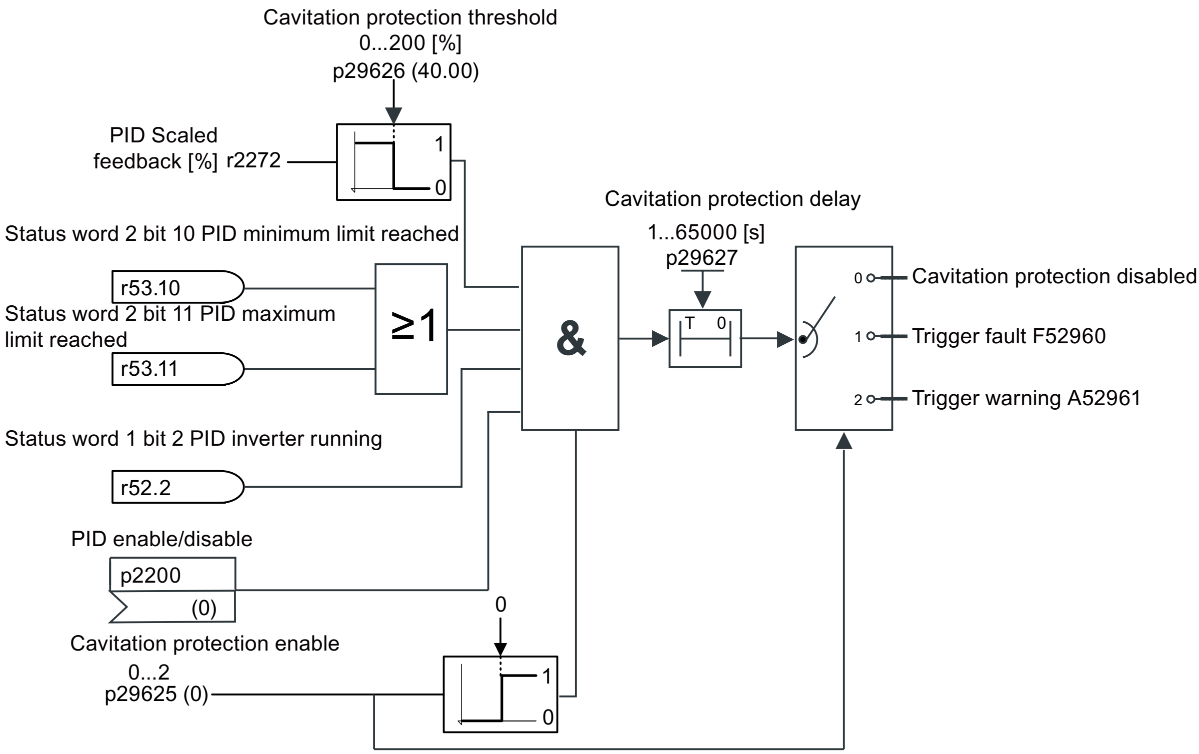
To use cavitation protection, a sensor is required to monitor the actual flow or pressure and feedback value. You can use parameter p29625 to enable/disable cavitation protection:

- p29625 = 0: cavitation protection is disabled
- p29625 = 1: cavitation protection triggers fault F52960
- p29625 = 2: cavitation protection triggers warning A52961

To enable cavitation protection, set p29625 = 1 or 2.

After you have enabled cavitation protection, the following preconditions should also be satisfied to activate cavitation protection:

- Cavitation protection threshold p29626 is set according to experience (The value is lower than the normal actual flow or pressure).
  p29626 is a percentage of feedback output for triggering a fault or warning. r2272 is the scaled actual value of technology controller. For example, if the maximum range for the pressure sensor is 20 mA/25 bar and the actual sensor value is 12 mA/12.5 bar, then r2272 is 50%. If r2272 < p29626, cavitation protection can be triggered after delay time p29627. The range of delay time is 1 s to 65500 s.
- The technology controller has reached the minimum limit (status of r53.10 is 1) or the maximum limit (status of r53.11 is 1).
- The converter operation is enabled (status of r52.2 is 1).
- The technology controller is enabled (p2200 = 1).



Parameters

Number	Name	Factory setting
p29625	Cavitation protection enable	0
p29626	Cavitation protection threshold	40%
p29627	Cavitation protection time	30 s

8.4.5 Deragging

Overview

Blockage (such as blastic bags) in the wastewater pumps can reduce the efficiency of the system and decrease the pump life time. With the deragging (pump clearing) function enabled, any clogs on the pump impellers, pipes or valves can be cleared automatically by executing the forward and reverse rotations of the pumps . This function saves the maintenance efforts for manually cleaning the pumps and also reduces system downtime.

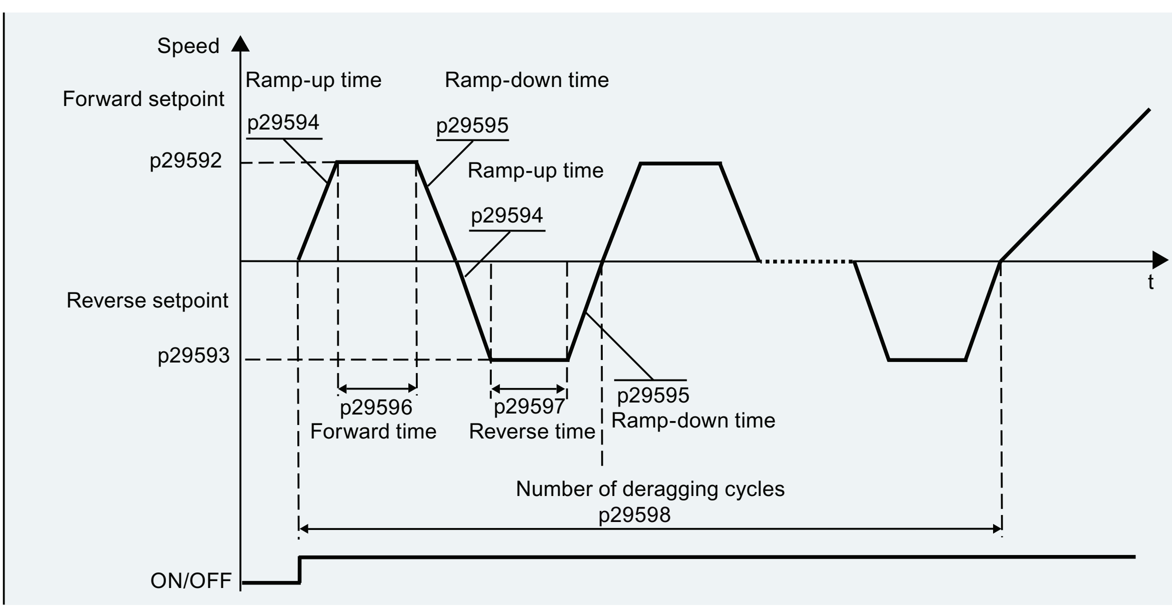
Precondition

Before enabling the deragging, make sure that p1143 = r29640.0 and p1144 = r29641.

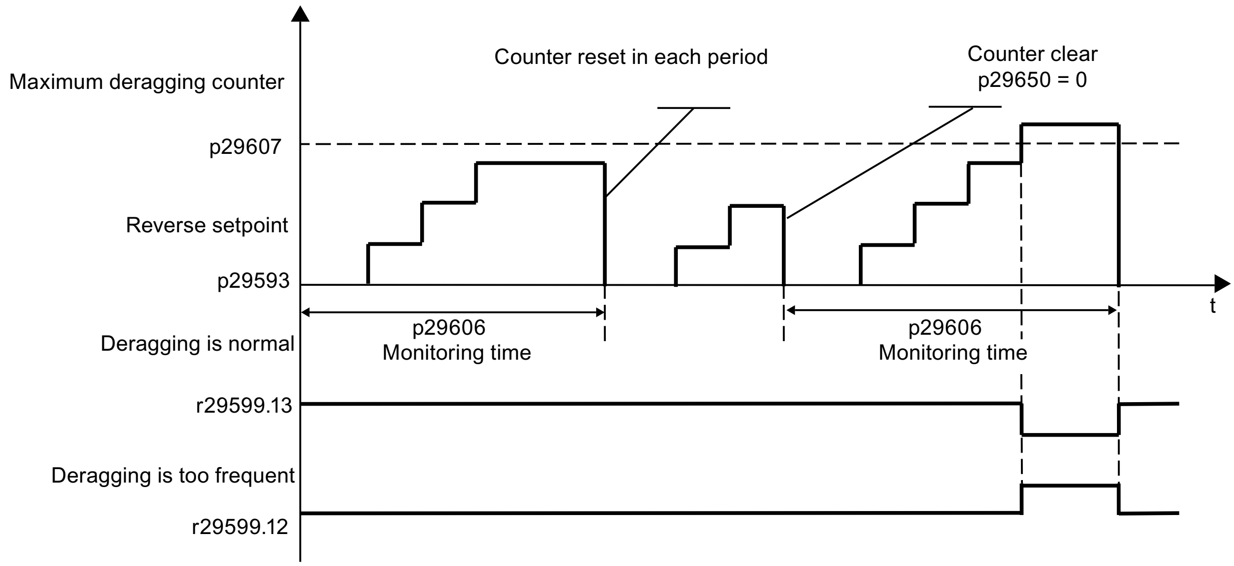
Function description

The deragging mode consists of forward and reverse runs of the motors. Parameter p29590 is used to select the deragging mode.

- p29590 = 1: enabled on first run after power-up
- p29590 = 2: enabled on every run
- p29590 = 3: enabled by a Binector input (p29591)
- p29590 = 4: enabled by a Binector input (p29591) while running



Deragging counter (p29605) is used to display the number of times that deragging is performed during a specific period of time (p29606).



Note

Note: To enable the pipe filling by a Binector input (p29590 = 3), make sure that the converter is in OFF state.

Parameters

Number	Name	Factory setting
p29590	Deragging mode	0
p29591	BI: Deragging enable	0
p29592	Deragging forward speed	500 rpm
p29593	Deragging reverse speed	500 rpm
p29594	Ramp-up time	5 s
p29595	Ramp-down time	5 s
p29596	Deragging forward time	5 s
p29597	Deragging reverse time	5 s
p29598	Deragging cycle	1
r29599	Deragging status word	0
p29605	Deragging counter	0
p29606	Deragging monitoring time	3600 s
p29607	Maximum deragging counter	5

Interaction with other functions

- Deragging signal is ignored if the converter is restarted under the command of essential service mode, bypass operation, automatic restart, hibernation mode or multi-pump switching-in.
- Deragging is interrupted if essential service mode, bypass, or hibernation mode is activated.

8.4.6 Pipe filling

Overview

In the water supply systems, the rapid inrush of water into an empty pipe can cause hammer effect and thus damage the pipe or the valve. With the pipe filling function enabled, the converter fills the pipe slowly and smoothly after each power-up or switch on to avoid hammer effect to the pipe. If the pipe filling is interrupted (for example, fault occurs), the function continues after the converter is recovered. This function is used in horizontal, vertical, and mixed piping systems.

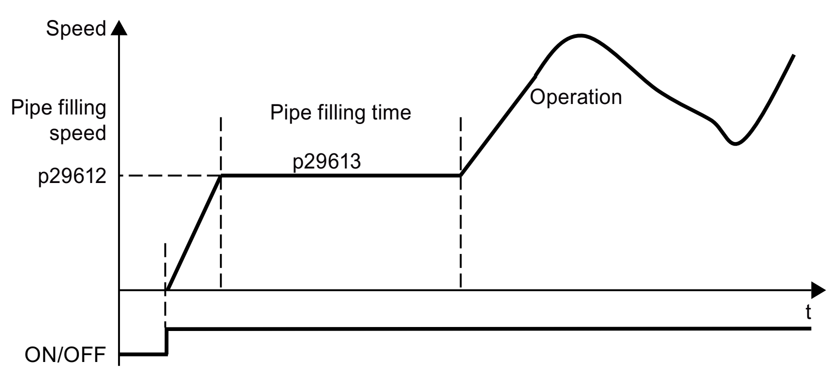
Precondition

Before enabling the pipe filling, make sure that p1143 = r29640.0 and p1144 = r29641.

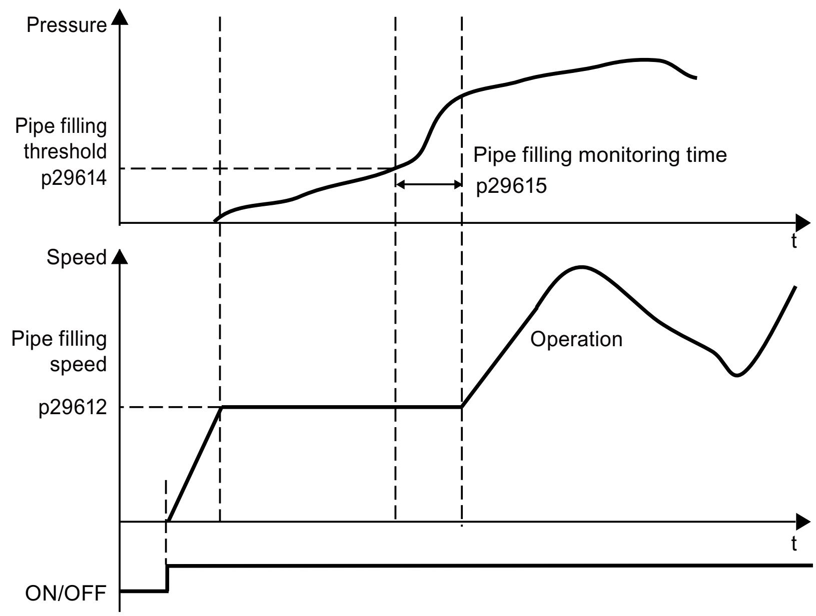
Function description

After the pipe filling is enabled, you can select from the following two filling modes:

- Time mode:
  - p29611 = 0
    The converter fills the pipe with a low speed for a specified time (p29613) after each power-up and then changes the speed to the setpoint.
  - p29611 = 2
    The converter fills the pipe with a low speed for a specified time (p29613) after each switch on and then changes the speed to the setpoint.



- Pressure mode:
  - p29611 = 1
    The converter fills the pipe according to the PID feedback from the pressure sensor after each power-up. The filling stops when the actual pressure (r2272) ≥ the threshold (p29614) for a specified time (p29615).
  - p29611 = 3
    The converter fills the pipe according to the PID feedback from the pressure sensor after each switch on. The filling stops when the actual pressure (r2272) ≥ the threshold (p29614) for a specified time (p29615).



Note

Priority of deragging and pipe filling

The priority of functions is as follows: deragging > pipe filling.

Parameters

Number	Name	Factory setting
p29609	Pipe filling activate	p29610
p29610	Pipe filling enable	0
p29611	Pipe filling mode	0
p29612	Pipe filling speed	900 rpm
p29613	Pipe filling time	50 s
p29614	Pipe filling threshold	10%
p29615	Pipe filling monitoring time	0 s
r29629.0	Status word: application	0
r29640.0	Extended setpoint channel selection output	0

8.5 Setpoints and setpoint processing

8.5.1 Setpoints

Overview

The converter receives its main setpoint from the setpoint source. The main setpoint generally specifies the motor speed.

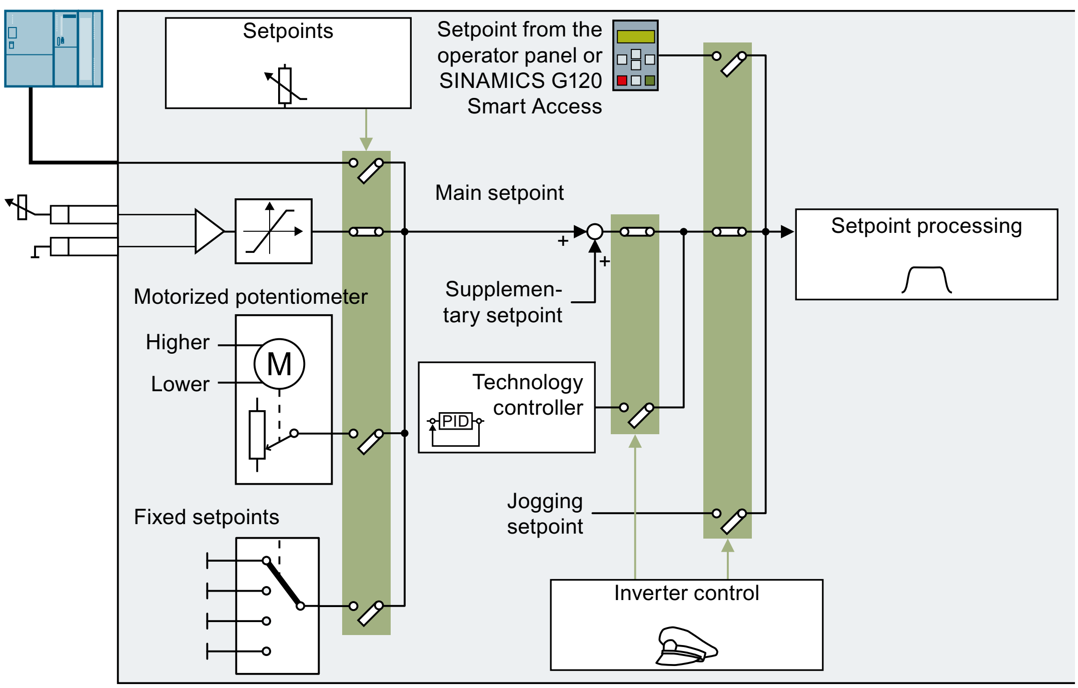


Figure 8-57 Setpoint sources for the converter

You have the following options when selecting the source of the main setpoint:

- Converter fieldbus interface
- Analog input of the converter
- Motorized potentiometer emulated in the converter
- Fixed setpoints saved in the converter

You have the same selection options when selecting the source of the supplementary setpoint.

Under the following conditions, the converter switches from the main setpoint to other setpoints:

- When the technology controller is active and appropriately interconnected, its output specifies the motor speed.
- When jogging is active

- When controlling from an operator panel
- When controlling from SINAMICS G120 Smart Access

8.5.1.1 Analog input as setpoint source

Function description

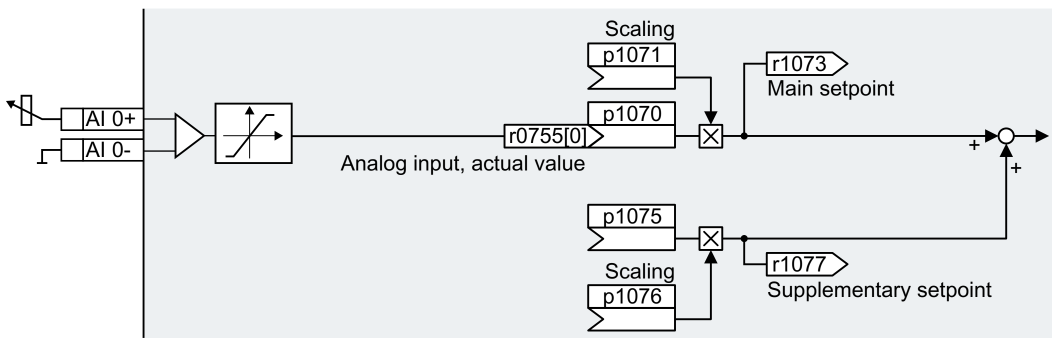


Figure 8-58 Example: Analog input 0 as setpoint source

In the quick commissioning, you define the preassignment for the converter interfaces. Depending on what has been preassigned, after quick commissioning, the analog input can be interconnected with the main setpoint.

Example

Setting with analog input 0 as setpoint source:

Parameter	Description
p1070 = 755[0]	Interconnects main setpoint with analog input 0
p1075 = 755[0]	Interconnects supplementary setpoint with analog input 0

Parameters

Number	Name	Factory setting
r0755[0 ... 1]	CO: CU analog inputs, actual value in percent	- %
p1070[C]	CI: Main setpoint	Dependent on the converter
p1071[C]	CI: Main setpoint scaling	1
r1073	CO: Main setpoint active	- rpm
p1075[C]	CI: Supplementary setpoint	0
p1076[C]	CI: Supplementary setpoint scaling	1
r1077	CO: Supplementary setpoint effective	- rpm

8.5.1.2 Specifying the setpoint via the fieldbus

Function description

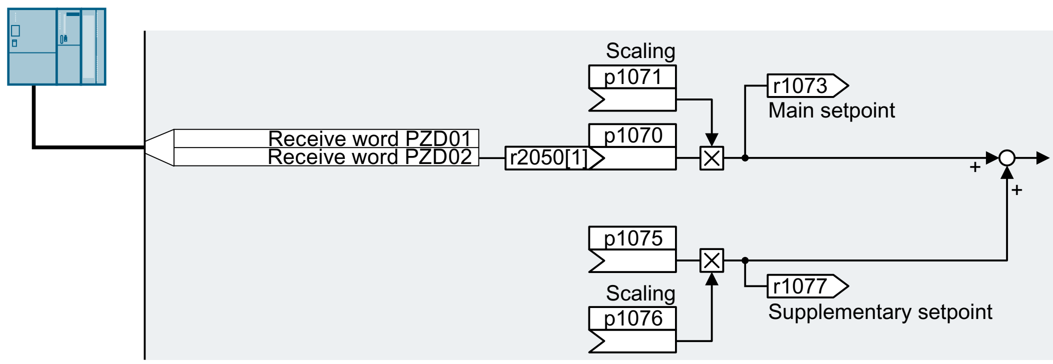


Figure 8-59 Fieldbus as setpoint source

In the quick commissioning, you define the preassignment for the converter interfaces. Depending on what has been preassigned, after quick commissioning, the receive word PZD02 can be interconnected with the main setpoint.

Example

Setting with receive word PZD02 as setpoint source:

Parameter	Description
p1070 = 2050[1]	Interconnects the main setpoint with the receive word PZD02 from the fieldbus.
p1075 = 2050[1]	Interconnects the supplementary setpoint with receive word PZD02 from the field-bus.

Parameters

Number	Name	Factory setting
p1070[C]	CI: Main setpoint	Dependent on the converter
p1071[C]	CI: Main setpoint scaling	1
r1073	CO: Main setpoint active	- rpm
p1075[C]	CI: Supplementary setpoint	0
p1076[C]	CI: Supplementary setpoint scaling	1
r1077	CO: Supplementary setpoint effective	- rpm
r2050[0...11]	CO: PROFIdrive PZD receive word	-

8.5.1.3 Motorized potentiometer as setpoint source

Function description

The "Motorized potentiometer" function emulates an electromechanical potentiometer. The output value of the motorized potentiometer can be set with the "higher" and "lower" control signals.

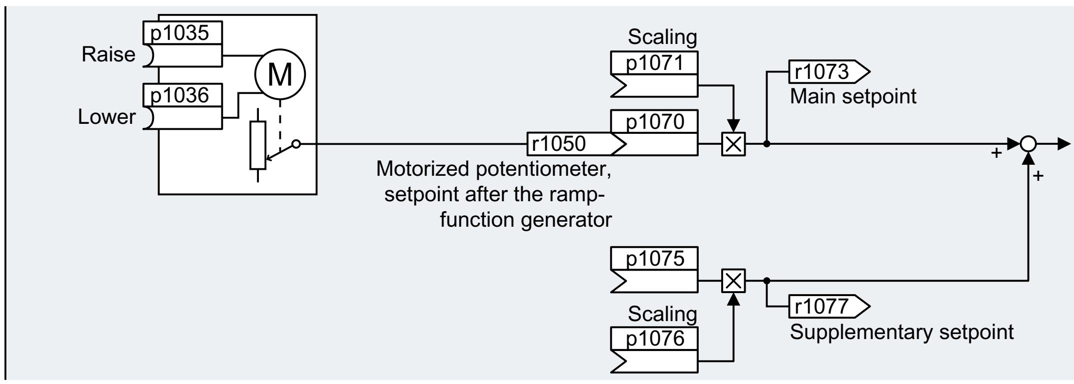


Figure 8-60 Motorized potentiometer as setpoint source

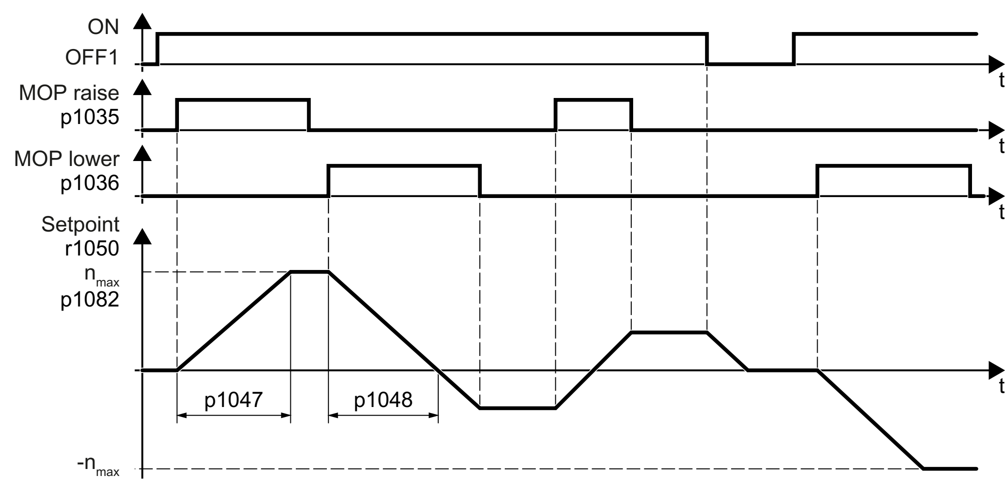


Figure 8-61 Function chart of the motorized potentiometer

Example

Setting with the motorized potentiometer as setpoint source:

Parameter	Description
p1070 = 1050	Interconnects the main setpoint with the motorized potentiometer output.

Parameter

Table 8-56 Basic setup of motorized potentiometer

Number	Name	Factory setting
p1035[C]	BI: Motorized potentiometer setpoint higher	0
p1036[C]	BI: Motorized potentiometer setpoint lower	Dependent on the converter
p1040[D]	Motorized potentiometer start value	0 rpm
p1047[D]	Motorized potentiometer, ramp-up time	10 s
p1048[D]	Motorized potentiometer, ramp-down time	10 s
r1050	Motorized potentiometer, setpoint after the ramp-function generator	- rpm
p1070[C]	CI: Main setpoint	Dependent on the converter
p1071[C]	CI: Main setpoint scaling	1
r1073	CO: Main setpoint active	- rpm
p1075[C]	CI: Supplementary setpoint	0
p1076[C]	CI: Supplementary setpoint scaling	1

Table 8-57 Extended setup of motorized potentiometer

Number	Name	Factory setting
p1030[D]	Motorized potentiometer configuration	0000 0110 bin
p1037[D]	Motorized potentiometer, maximum speed	0 rpm
p1038[D]	Motorized potentiometer, minimum speed	0 rpm
p1043[C]	BI: Motorized potentiometer, accept setting value	0
p1044[C]	CI: Motorized potentiometer, setting value	0

8.5.1.4 Fixed speed setpoint as setpoint source

Function description

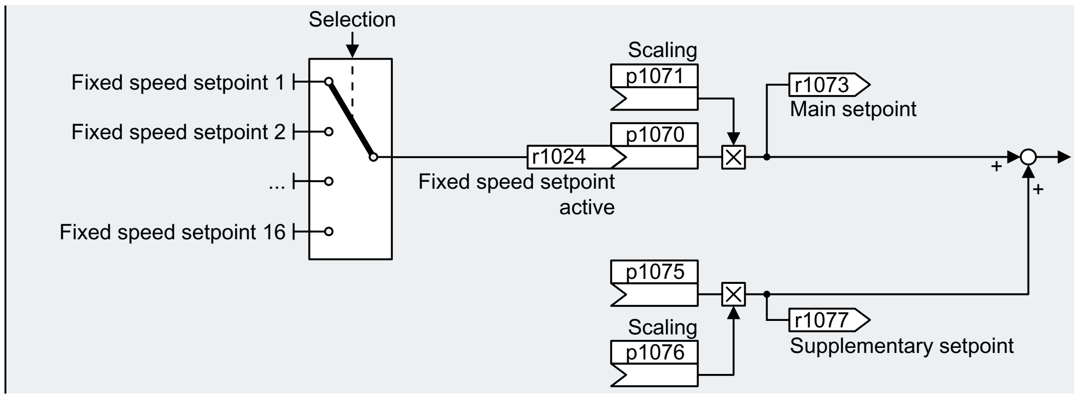


Figure 8-62 Fixed speed setpoint as setpoint source

The converter makes a distinction between two methods when selecting the fixed speed setpoints:

- Direct selection (p1016 = 1)
- Binary selection (p1016 = 2)

Directly selecting a fixed speed setpoint

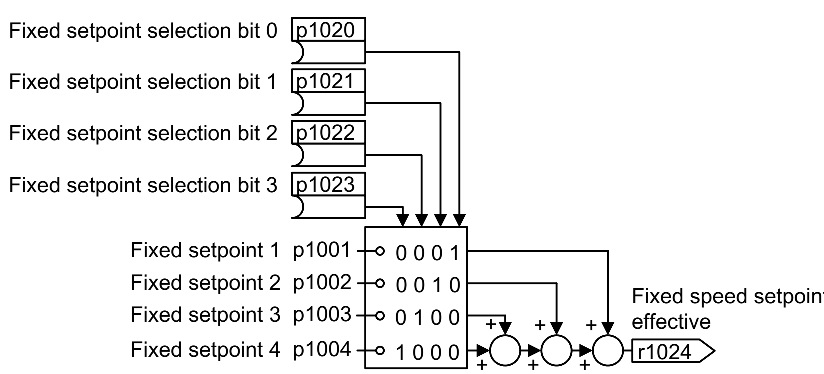


Figure 8-63 Direct selection of the fixed speed setpoint

Table 8-58 Resulting setpoint

p1023	p1022	p1021	p1020	Resulting setpoint
0	0	0	0	0
0	0	0	1	p1001
0	0	1	0	p1002
0	0	1	1	p1001 + p1002
0	1	0	0	p1003
0	1	0	1	p1001 + p1003
0	1	1	0	p1002 + p1003

p1023	p1022	p1021	p1020	Resulting setpoint
0	1	1	1	p1001 + p1002 + p1003
1	0	0	0	p1004
1	0	0	1	p1001 + p1004
1	0	1	0	p1002 + p1004
1	0	1	1	p1001 + p1002 + p1004
1	1	0	0	p1003 + p1004
1	1	0	1	p1001 + p1003 + p1004
1	1	1	0	p1002 + p1003 + p1004
1	1	1	1	p1001 + p1002 + p1003 + p1004

Selecting the fixed speed setpoint, binary

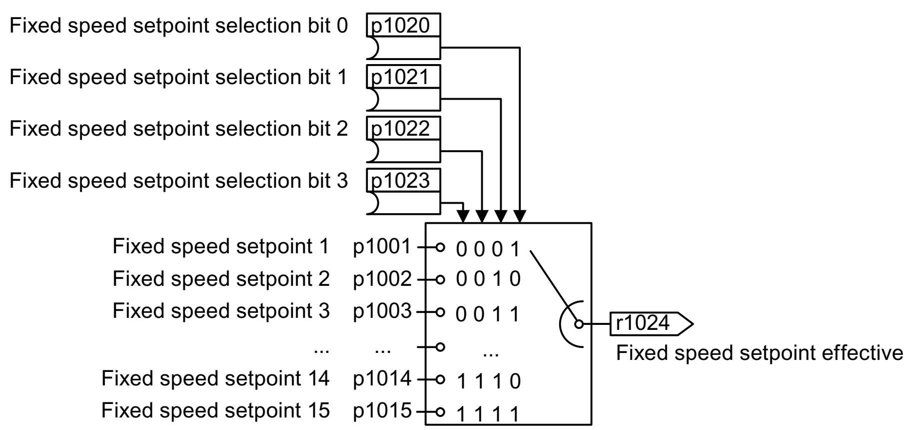


Figure 8-64 Binary selection of the fixed speed setpoint

Table 8-59 Resulting setpoint

p1023	p1022	p1021	p1020	Resulting setpoint
0	0	0	0	0
0	0	0	1	p1001
0	0	1	0	p1002
0	0	1	1	p1003
0	1	0	0	p1004
0	1	0	1	p1005
0	1	1	0	p1006
0	1	1	1	p1007
1	0	0	0	p1008
1	0	0	1	p1009
1	0	1	0	p1010
1	0	1	1	p1011
1	1	0	0	p1012
1	1	0	1	p1013
1	1	1	0	p1014
1	1	1	1	p1015

Parameter

Number	Name	Factory setting
p1001[D]	CO: Fixed speed setpoint 1	0 rpm
p1002[D]	CO: Fixed speed setpoint 2	0 rpm
p1003[D]	CO: Fixed speed setpoint 3	0 rpm
p1004[D]	CO: Fixed speed setpoint 4	0 rpm
p1005[D]	CO: Fixed speed setpoint 5	0 rpm
p1006[D]	CO: Fixed speed setpoint 6	0 rpm
p1007[D]	CO: Fixed speed setpoint 7	0 rpm
p1008[D]	CO: Fixed speed setpoint 8	0 rpm
p1009[D]	CO: Fixed speed setpoint 9	0 rpm
p1010[D]	CO: Fixed speed setpoint 10	0 rpm
p1011[D]	CO: Fixed speed setpoint 11	0 rpm
p1012[D]	CO: Fixed speed setpoint 12	0 rpm
p1013[D]	CO: Fixed speed setpoint 13	0 rpm
p1014[D]	CO: Fixed speed setpoint 14	0 rpm
p1015[D]	CO: Fixed speed setpoint 15	0 rpm
p1016	Fixed speed setpoint selection mode	1
p1020[C]	Fixed speed setpoint selection, bit 0	0
p1021[C]	Fixed speed setpoint selection, bit 1	0
p1022[C]	Fixed speed setpoint selection, bit 2	0
p1023[C]	Fixed speed setpoint selection, bit 3	0
r1024	Fixed speed setpoint active	- rpm
r1025.0	Fixed speed setpoint status	-
p1070[C]	CI: Main setpoint	Dependent on the converter
p1071[C]	CI: Main setpoint scaling	1
r1073	CO: Main setpoint active	- rpm
p1075[C]	CI: Supplementary setpoint	0
p1076	CI: Supplementary setpoint scaling	1
r1077	CO: Supplementary setpoint effective	- rpm

8.5.1.5 Function diagram 3001 - Overview setpoint channel

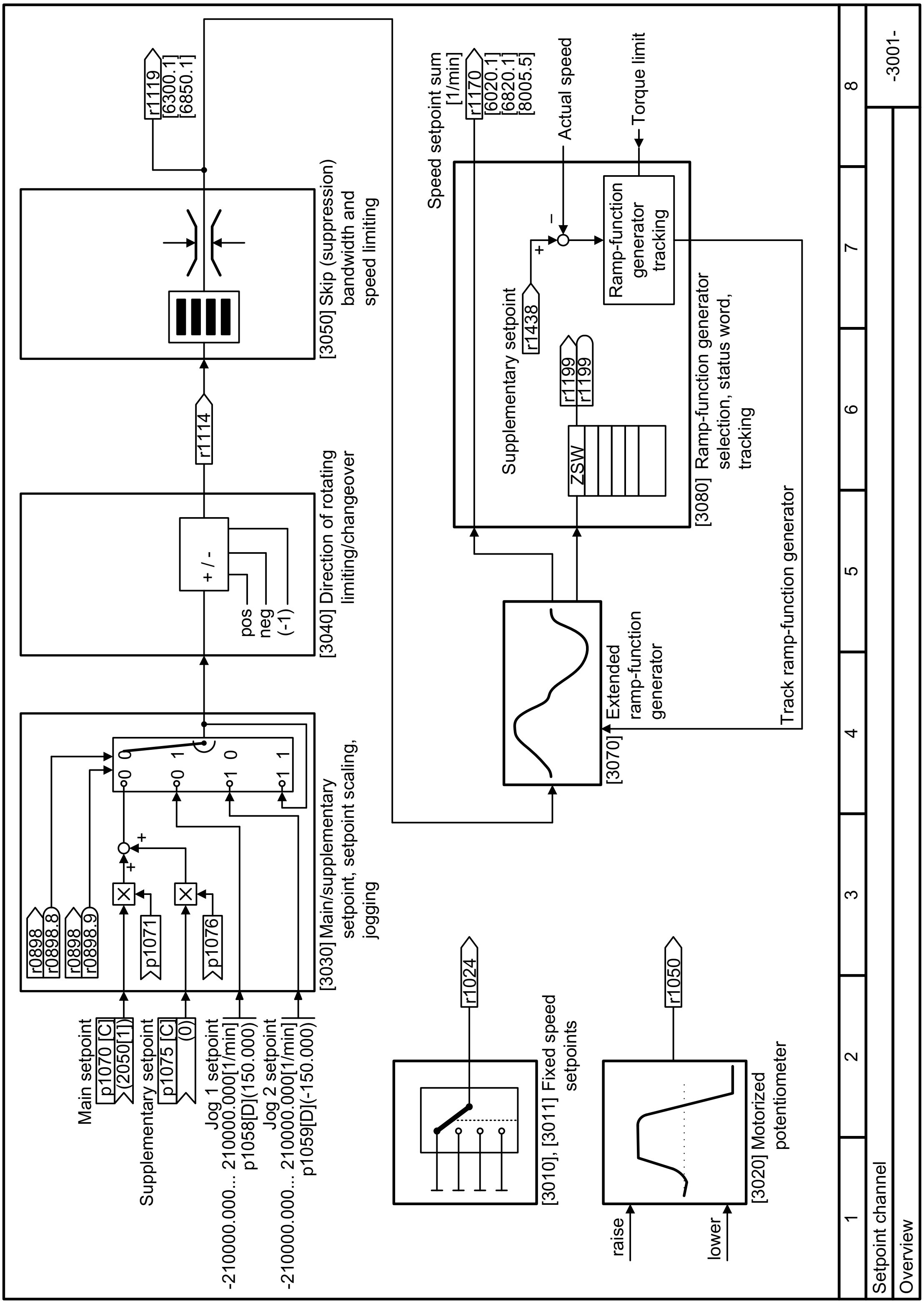


Figure 8-65 FP 3001

8.5.1.6 Function diagram 3010 - Fixed speed setpoints binary selection

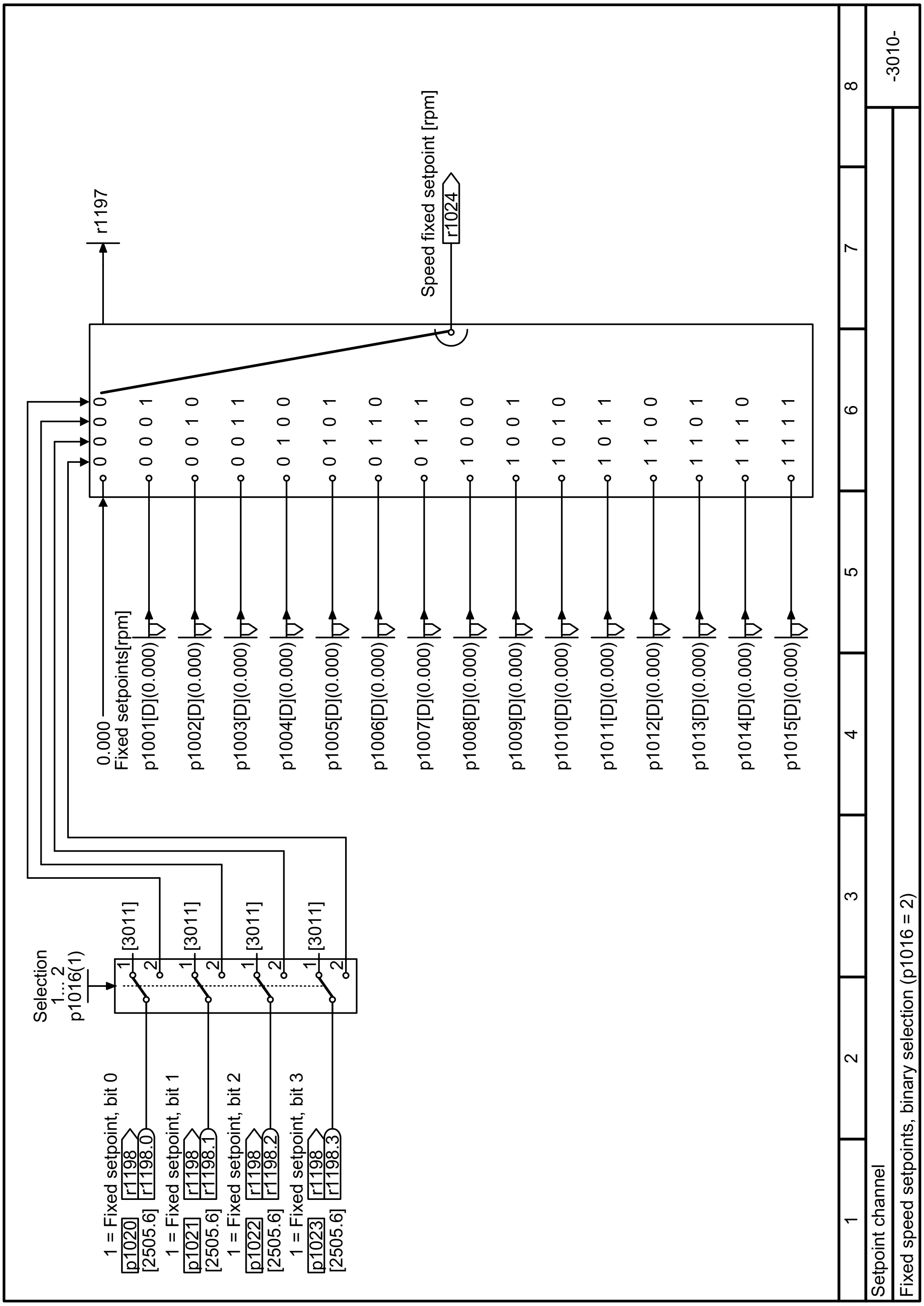


Figure 8-66 FP 3010

8.5.1.7 Function diagram 3011 - Fixed speed setpoints direct selection

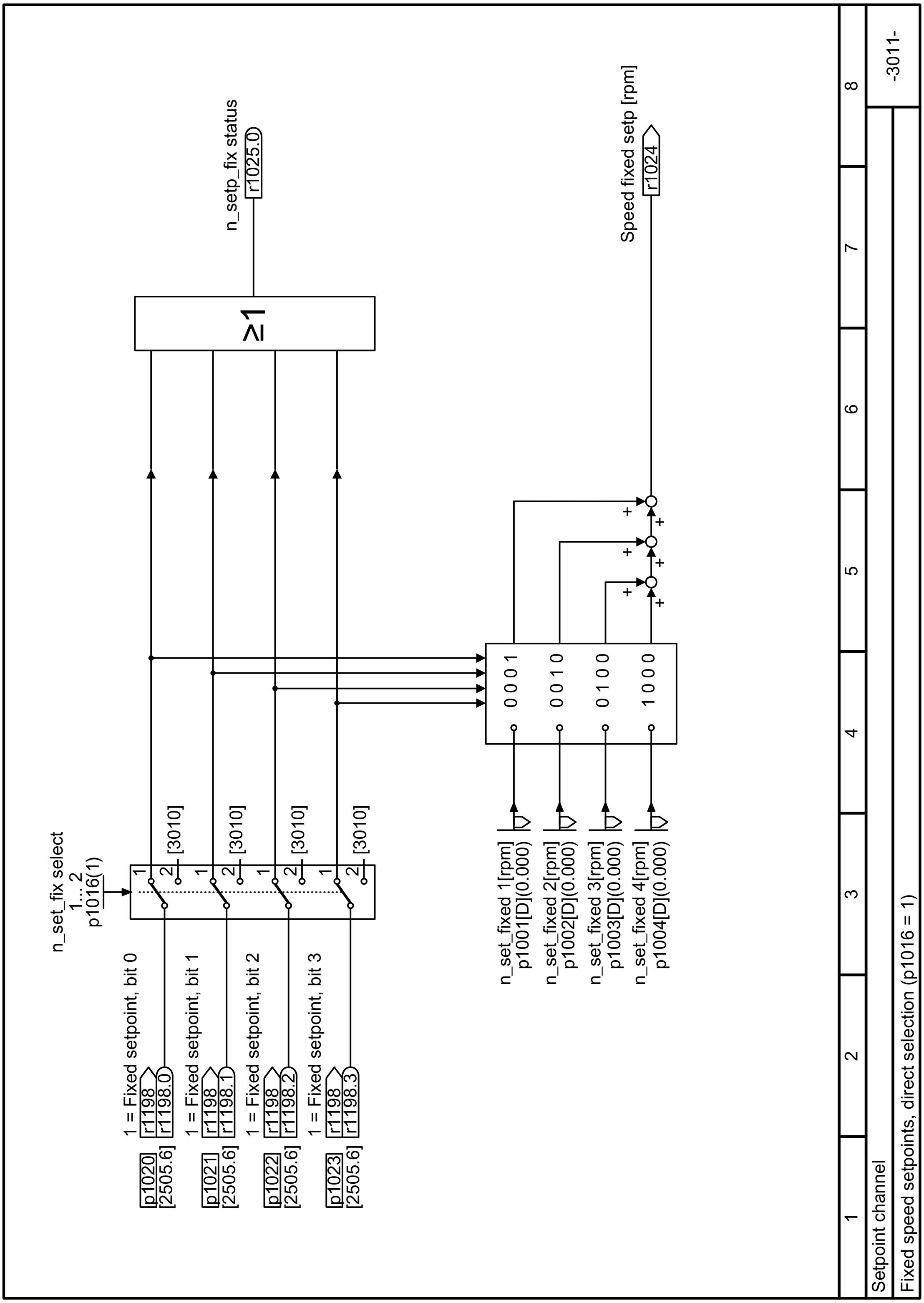


Figure 8-67 FP 3011

8.5.1.8 Function diagram 3020 - Motorized potentiometer

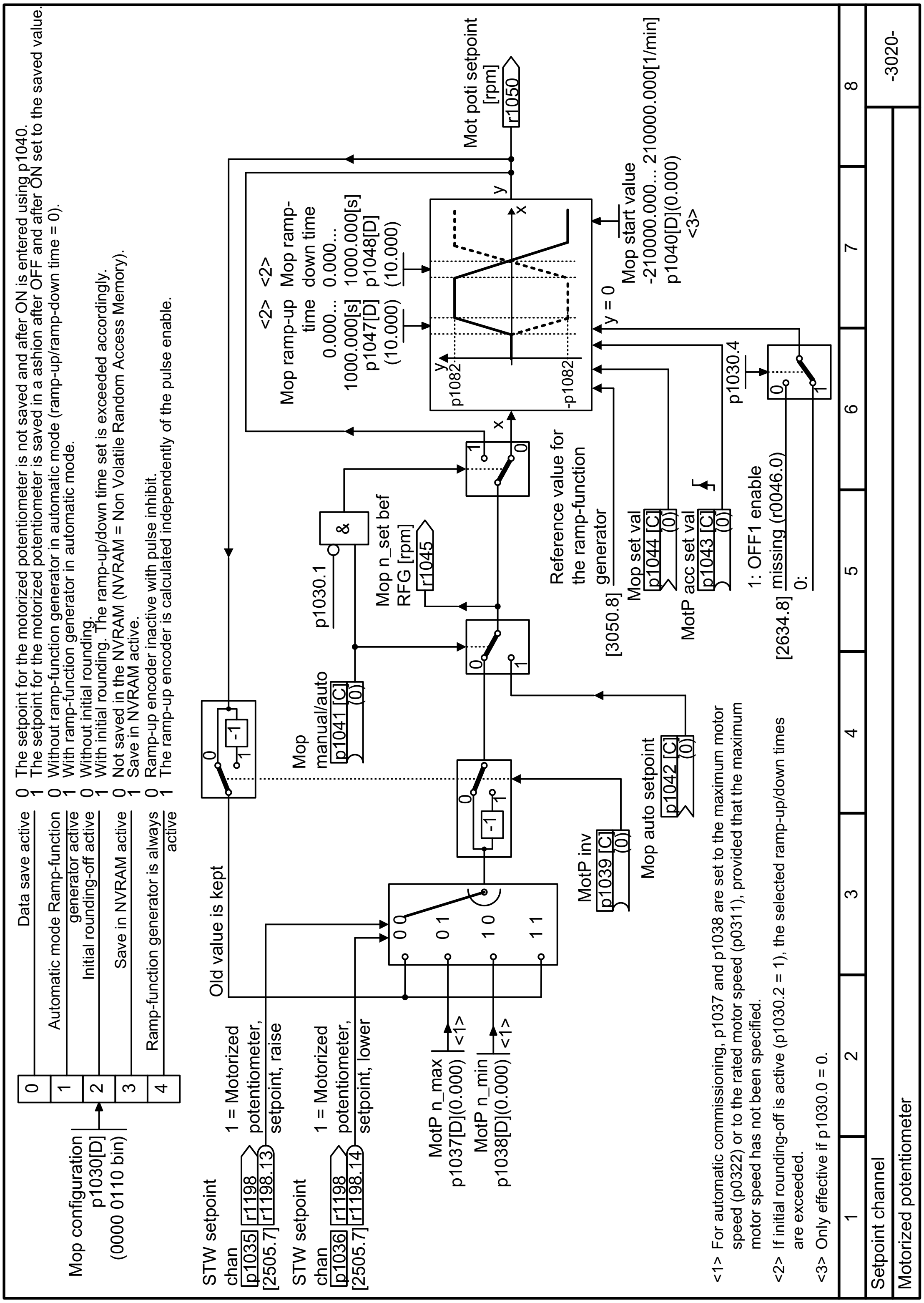


Figure 8-68 FP 3020

8.5.1.9 Function diagram 3030 - Setpoint scaling, jogging

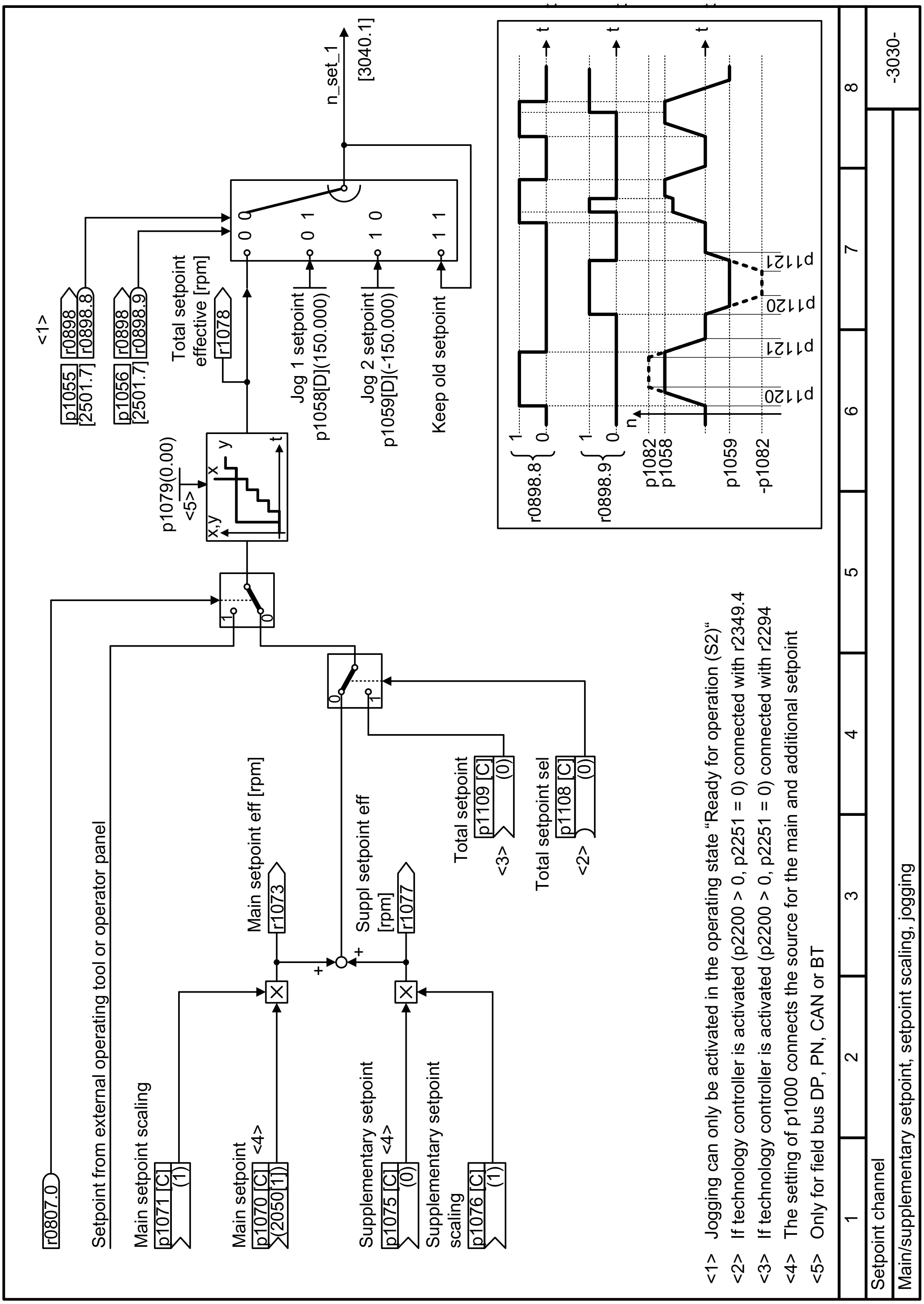


Figure 8-69 FP 3030

8.5.2 Setpoint processing

8.5.2.1 Overview

Overview

Setpoint processing influences the setpoint using the following functions:

- "Invert" inverts the motor direction of rotation.
- The "direction of rotation deactivate" function prevents the motor rotating in the incorrect direction.
- The "Skip frequency bands" prevent the motor from being continuously operated within these skip bands. This function avoids mechanical resonance effects by only permitting the motor to operate briefly at specific speeds.
- The "Speed limitation" function protects the motor and the driven load against excessively high speeds.
- The "Ramp-function generator" function prevents the setpoint from suddenly changing. As a consequence, the motor accelerates and brakes with a reduced torque.

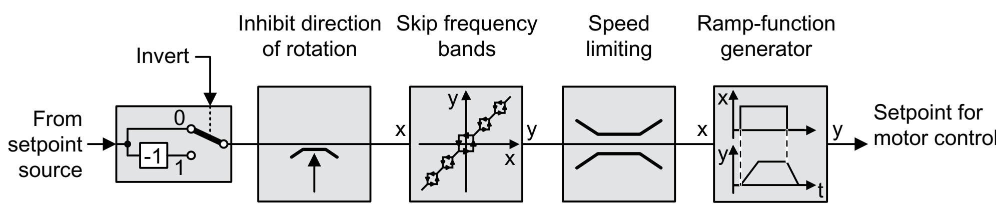
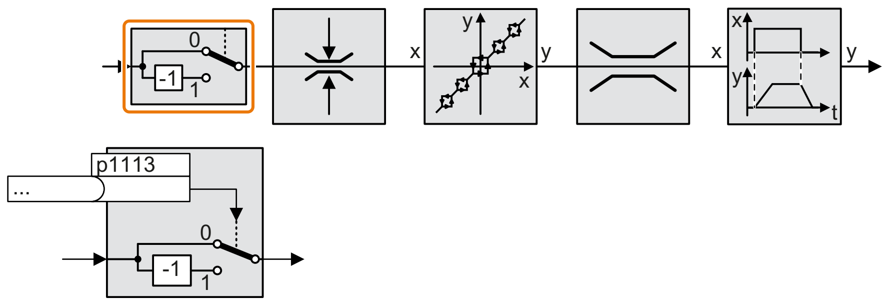


Figure 8-70 Setpoint processing in the converter

8.5.2.2 Invert setpoint

Function description



The function inverts the sign of the setpoint using a binary signal.

Example

To invert the setpoint via an external signal, interconnect parameter p1113 with a binary signal of your choice.

Table 8-60 Application examples showing how a setpoint is inverted

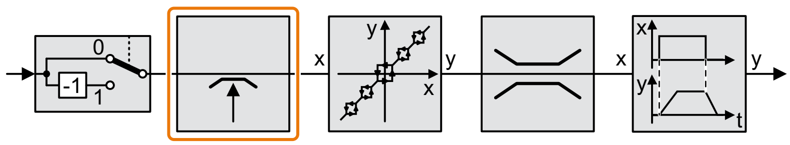
Parameter	Description
p1113 = 722.1	Digital input 1 = 0: Setpoint remains unchanged. Digital input 1 = 1: Converter inverts the setpoint.
p1113 = 2090.11	Inverts the setpoint via the fieldbus (control word 1, bit 11).

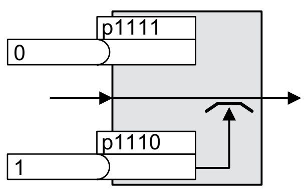
Parameter

Number	Name	Factory setting
p1113[C]	BI: Setpoint inversion	Dependent on the converter

8.5.2.3 Enable direction of rotation

Function description





In the factory setting of the converter, the negative direction of rotation of the motor is inhibited.

Set parameter p1110 = 0 to permanently enable the negative direction of rotation.

Set parameter p1111 = 1 to permanently inhibit the positive direction of rotation.

Parameter

Table 8-61 Application examples for inhibiting and enabling the direction of rotation

Number	Name	Factory setting
p1110	BI: Inhibit negative direction	1
p1111	BI: Inhibit positive direction	0

8.5.2.4 Skip frequency bands and minimum speed

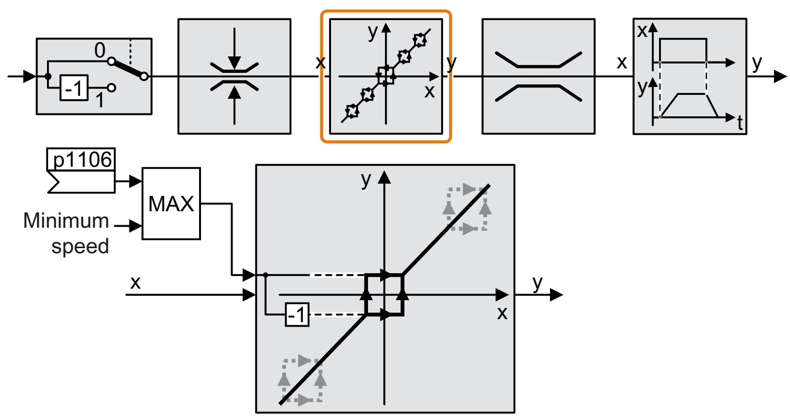
Overview

The converter has a minimum speed and four skip frequency bands:

- The minimum speed prevents continuous motor operation at speeds less than the minimum speed.
- Each skip frequency band prevents continuous motor operation within a specific speed range.

Function description

Minimum speed



Speeds where the absolute value is less than the minimum speed are only possible when the motor is accelerating or braking.

Skip frequency bands

Additional information on the skip frequency bands is provided in the function diagram.

Parameter

Table 8-62 Minimum speed

Number	Name	Factory setting
p1051[C]	CI: Speed limit of ramp-function generator, positive direction of rotation	9733
p1052[C]	CI: Speed limit of ramp-function generator, negative direction of rotation	1086
p1080[D]	Minimum speed	0 rpm
p1083[D]	CO: Speed limit in positive direction of rotation	210000 rpm
r1084	CO: Speed limit positive active	- rpm
p1085[C]	CI: Speed limit in positive direction of rotation	1083

Number	Name	Factory setting
p1091[D]	Skip speed 1	0 rpm
p1092[D]	Skip speed 2	0 rpm
p1093[D]	Skip speed 3	0 rpm
p1094[D]	Skip speed 4	0 rpm
p1098[C]	CI: Skip speed scaling	1
r1099	CO/BO: Skip frequency band of status word	-
p1106	CI: Minimum speed signal source	0
r1112	CO: Speed setpoint according to minimum limit	- rpm
r1114	CO: Setpoint after direction limiting	- rpm
r1119	CO: Ramp-function generator setpoint at the input	- rpm
r1170	CO: Speed controller setpoint sum	- rpm

NOTICE

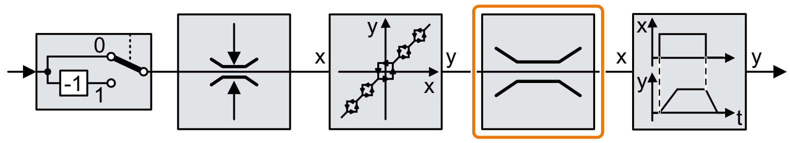
Incorrect direction of motor rotation if the parameterization is not suitable

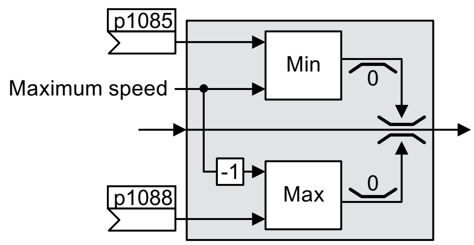
If you are using an analog input as speed setpoint source, then for a setpoint = 0 V, noise voltages can be superimposed on the analog input signal. After the on command, the motor accelerates up to the minimum frequency in the direction of the random polarity of the noise voltage. A motor rotating in the wrong direction can cause significant material damage to the machine or system.

- Inhibit the motor direction of rotation that is not permissible.

8.5.2.5 Speed limitation

The maximum speed limits the speed setpoint range for both directions of rotation.





The converter generates a message (fault or alarm) when the maximum speed is exceeded.

If you must limit the speed depending on the direction of rotation, then you can define speed limits for each direction.

Parameters

Table 8-63 Parameters for the speed limitation

Number	Name	Factory setting
p1082[D]	Maximum speed	1500 rpm
p1083[D]	CO: Speed limit in positive direction of rotation	210000 rpm
p1085[C]	CI: Speed limit in positive direction of rotation	1083
p1086[D]	CO: Speed limit in negative direction of rotation	-210000 rpm
p1088[C]	CI: Speed limit in negative direction of rotation	1086

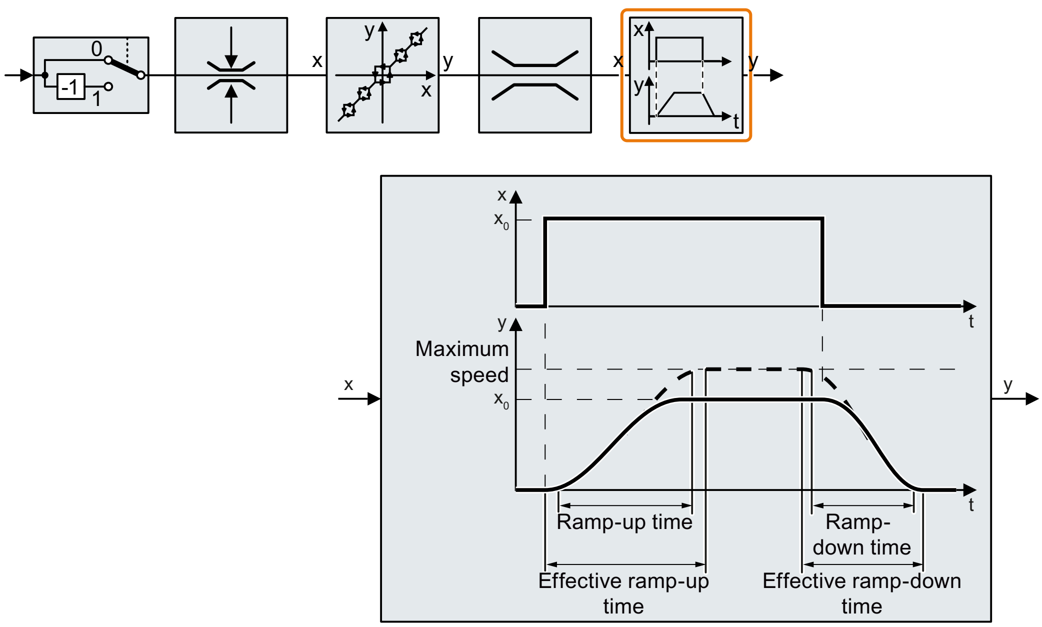
8.5.2.6 Ramp-function generator

The ramp-function generator in the setpoint channel limits the rate change of the speed setpoint (acceleration). A reduced acceleration reduces the accelerating torque of the motor. As a consequence, the motor reduces the stress on the mechanical system of the driven machine.

The extended ramp-function generator not only limits the acceleration, but by rounding the setpoint, also acceleration changes (jerk). This means that the motor does not suddenly generate a torque.

Extended ramp-function generator

The ramp-up and ramp-down times of the extended ramp-function generator can be set independently of each other. The optimal times depend on the application, and can lie in the range from a few 100 ms to several minutes.



Initial and final rounding permit smooth, jerk-free acceleration and braking.

The ramp-up and ramp-down times of the motor are increased by the rounding times:

- Effective ramp-up time = p1120 + 0.5 × (p1130 + p1131).
- Effective ramp-down time = p1121 + 0.5 × (p1130 + p1131).

Parameter

Table 8-64 Additional parameters to set the extended ramp-function generator

Number	Name	Factory setting
p1120[D]	Ramp-function generator ramp-up time	Dependent on the converter
p1121[D]	Ramp-function generator ramp-down time	
p1130[D]	Ramp-function generator initial rounding time	
p1131[D]	Ramp-function generator final rounding time	
p1134[D]	Ramp-function generator rounding type	0 (continuous smoothing)
p1135[D]	OFF3 ramp-down time	Dependent on the converter
p1136[D]	OFF3 initial rounding time	
p1137[D]	OFF3 final rounding time	0 s
p1138[C]	CI: Ramp-function generator ramp-up time scaling	1
p1139[C]	CI: Ramp-function generator ramp-down time scaling	1
p1140[C]	BI: Enable ramp-function generator/disable ramp-function generator	Dependent on the converter
p1141[C]	BI: Continue ramp-function generator/freeze ramp-function generator	
p1142[C]	BI: Enable setpoint/inhibit setpoint	1
p1143[C]	BI: Accept ramp-function generator setting value	0
p1144[C]	CI: Ramp-function generator setting value	0
p1148[D]	Ramp-function generator tolerance for ramp-up and ramp-down active	19.8 rpm
r1149	CO: Ramp-function generator acceleration	-

Setting the extended ramp-function generator

Procedure

1. Enter the highest possible speed setpoint.
2. Switch on the motor.
3. Evaluate your drive response.
   – If the motor accelerates too slowly, then reduce the ramp-up time.
     An excessively short ramp-up time means that the motor will reach its current limiting when accelerating, and will temporarily not be able to follow the speed setpoint. In this case, the drive exceeds the set time.
   – If the motor accelerates too fast, then extend the ramp-up time.
   – Increase the initial rounding if the acceleration is jerky.
   – In most applications, it is sufficient when the final rounding is set to the same value as the initial rounding.
4. Switch off the motor.

5. Evaluate your drive response.
   - If the motor decelerates too slowly, then reduce the ramp-down time.
     The minimum ramp-down time that makes sense depends on your particular application. Depending on the Power Module used, for an excessively short ramp-down time, the converter either reaches the motor current, or the DC link voltage in the converter becomes too high.
   - Extend the ramp-down time if the motor is braked too quickly or the converter goes into a fault condition when braking.
6. Repeat steps 1 ... 5 until the drive behavior meets the requirements of the machine or plant.

You have set the extended ramp-function generator.
❒

8.5.2.7 Dual ramp function

Overview

When operating at low speeds, pumps, e.g. submersible pumps, cannot be adequately lubricated or cooled. This causes the pump to wear out more quickly.

To reduce wear, you can use the "dual ramp function". The "dual ramp function" shortens the time it takes for the pump to operate below a critical speed.

Precondition

Before enabling the dual ramp function, adjust the ramp function generator.

Function description

Enabling

Connect the outputs of the dual ramp function with the scaling inputs of the ramp-function generator

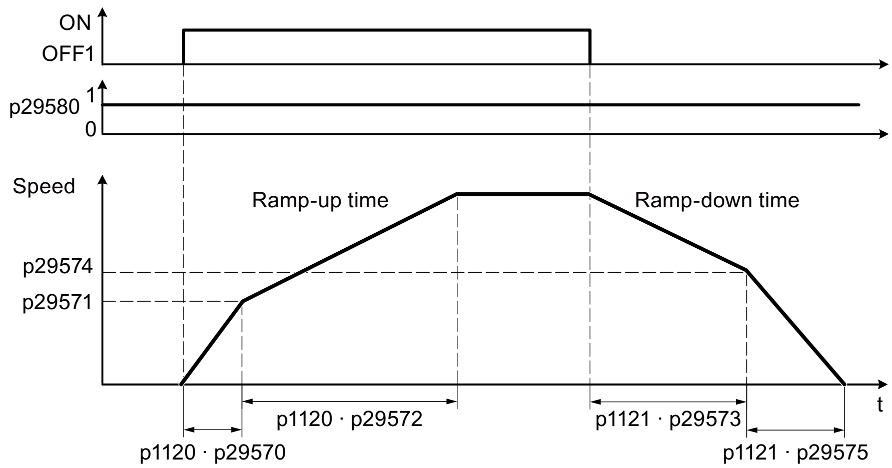
- Set p1138 = r29576
- Set p1139 = r29577
- Set p29580 = 1

Ramp up

- Converter starts ramp-up using ramp time from p1120 · p29570.
- When the actual speed r0063 > p29571, switch to ramp time from p1120 · p29572.

Ramp down

- Converter starts ramp-down using ramp time from p1121 · p29573.
- When the actual speed r0063 < p29574, switch to ramp time from p1121 · p29575.



Parameters

Parameter	Description	Factory setting
p29570[D]	Ramp-up scaling 1	100%
p29571[D]	Threshold speed 2	30 rmp
p29572[D]	Ramp-up scaling 2	100%
p29573[D]	Ramp-down scaling 1	100%
p29574[D]	Threshold speed 3	30 rmp
p29575[D]	Ramp-down scaling 2	100%
r29576	CO: Ramp-up scaling output	-
r29577	CO: Ramp-down scaling output	-
p29578[C]	CI: Ramp-up scaling input	1
p29579[C]	CI: Ramp-down scaling input	1
p29580	BI: Dual ramp enable	0

For more information about the parameters, see Chapter "Parameters (Page 511)".

8.5.2.8 Function diagram 3040 - Direction limitation and direction reversal

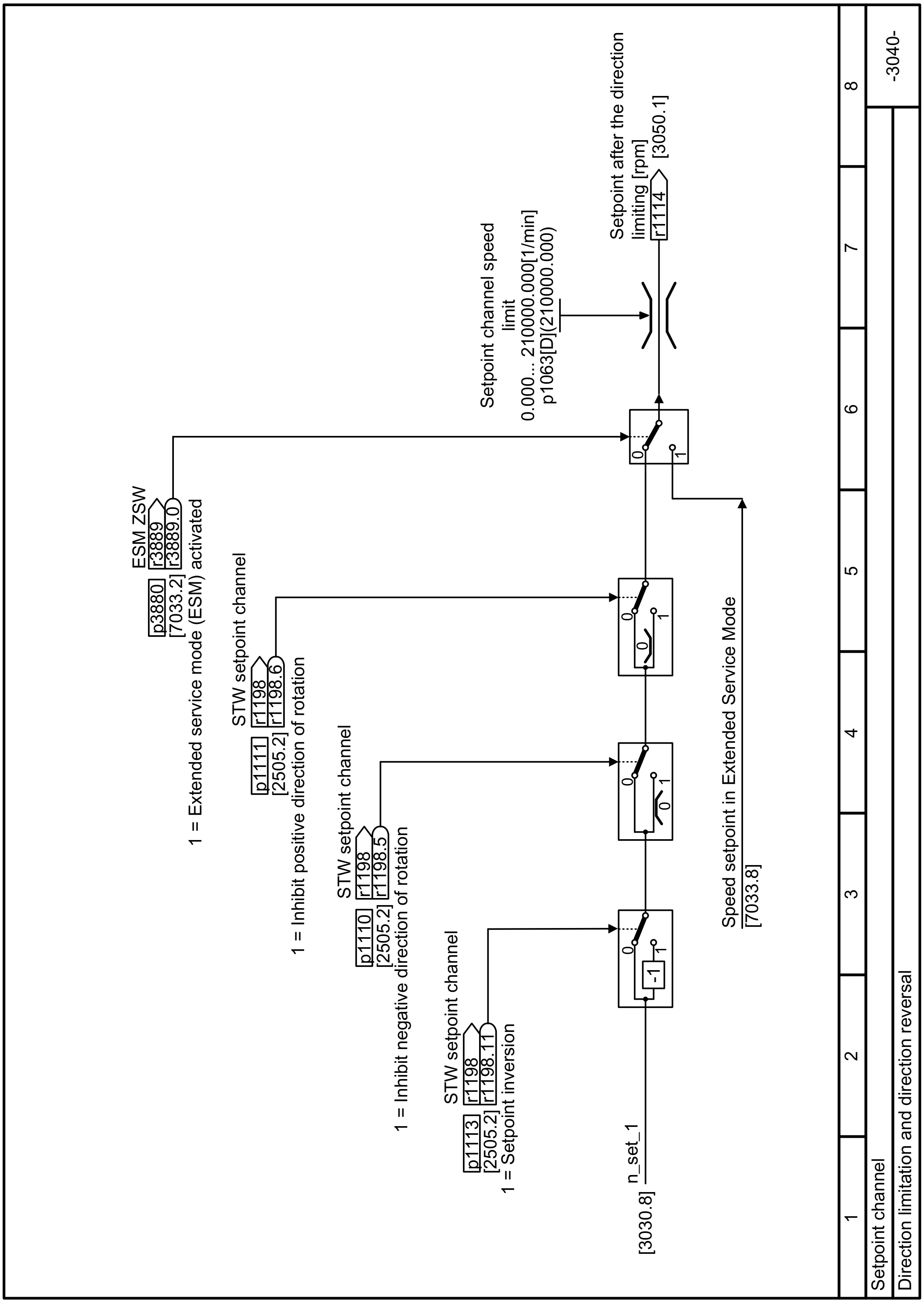


Figure 8-71 FP 3040

8.5.2.9 Function diagram 3050 - Skip frequency bands

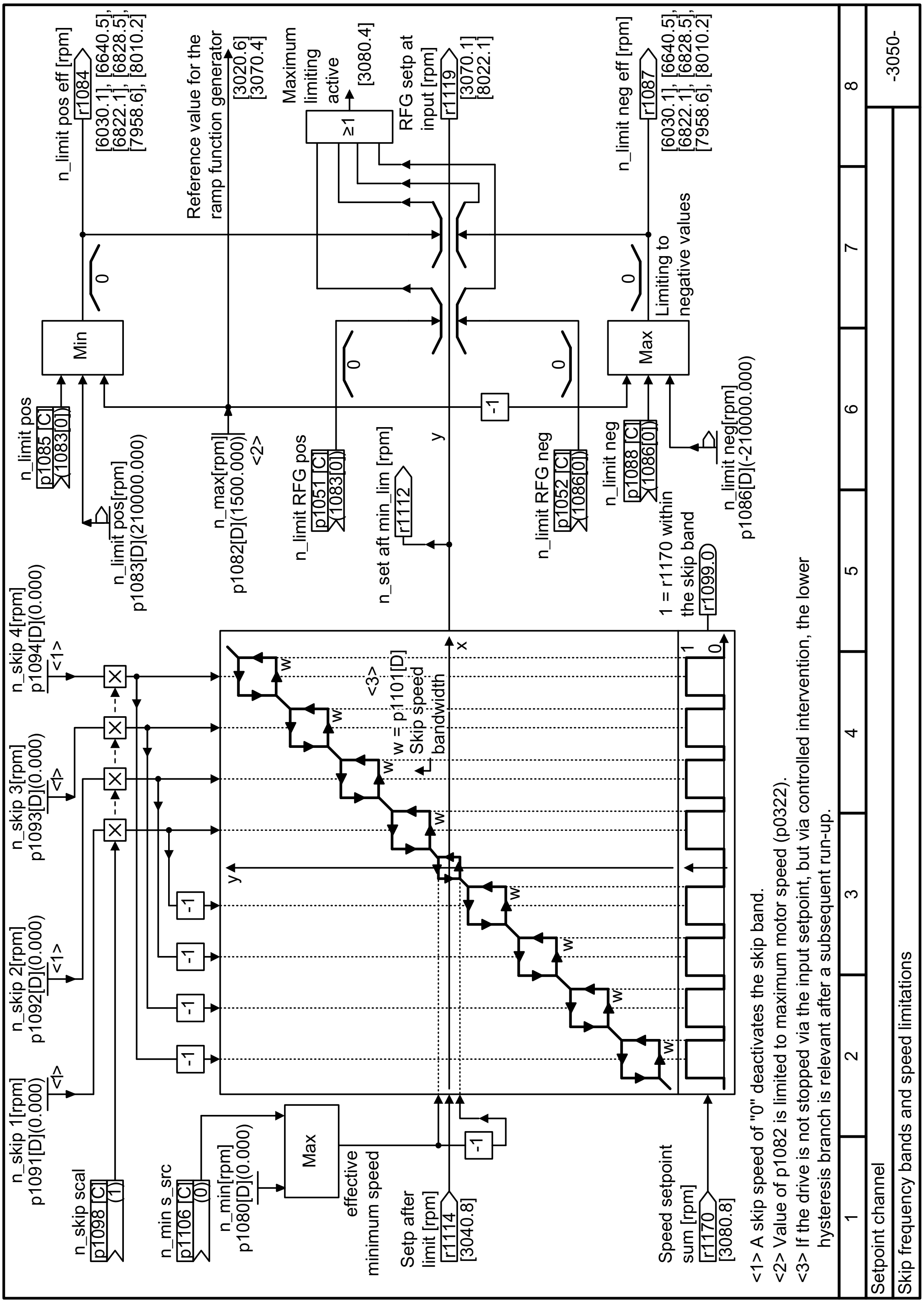


Figure 8-72 FD 3050

8.5.2.10 Function diagram 3070 - Extended ramp-function generator

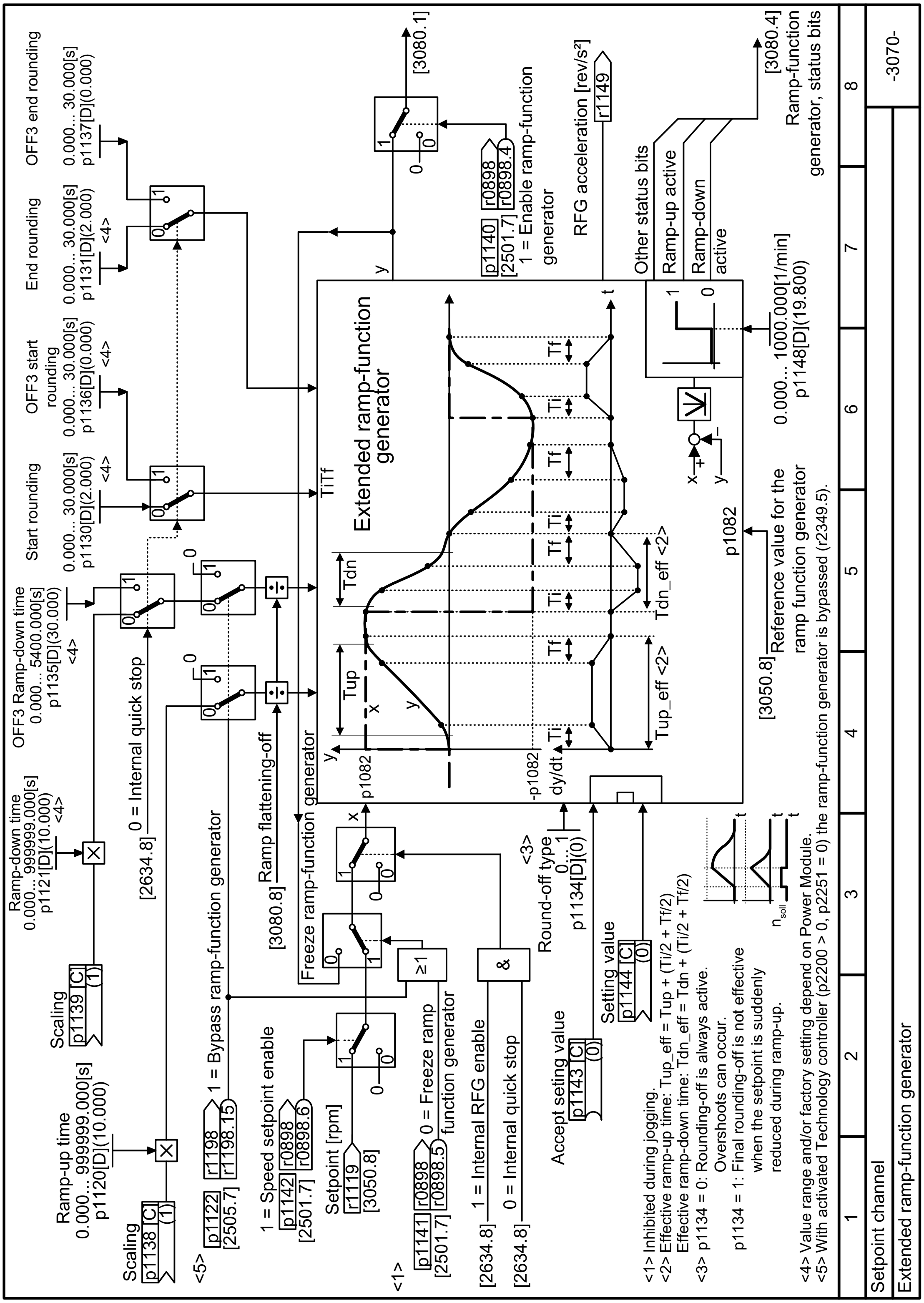


Figure 8-73 FP 3070

8.5.2.11 Function diagram 3080 - Ramp-function generator status word

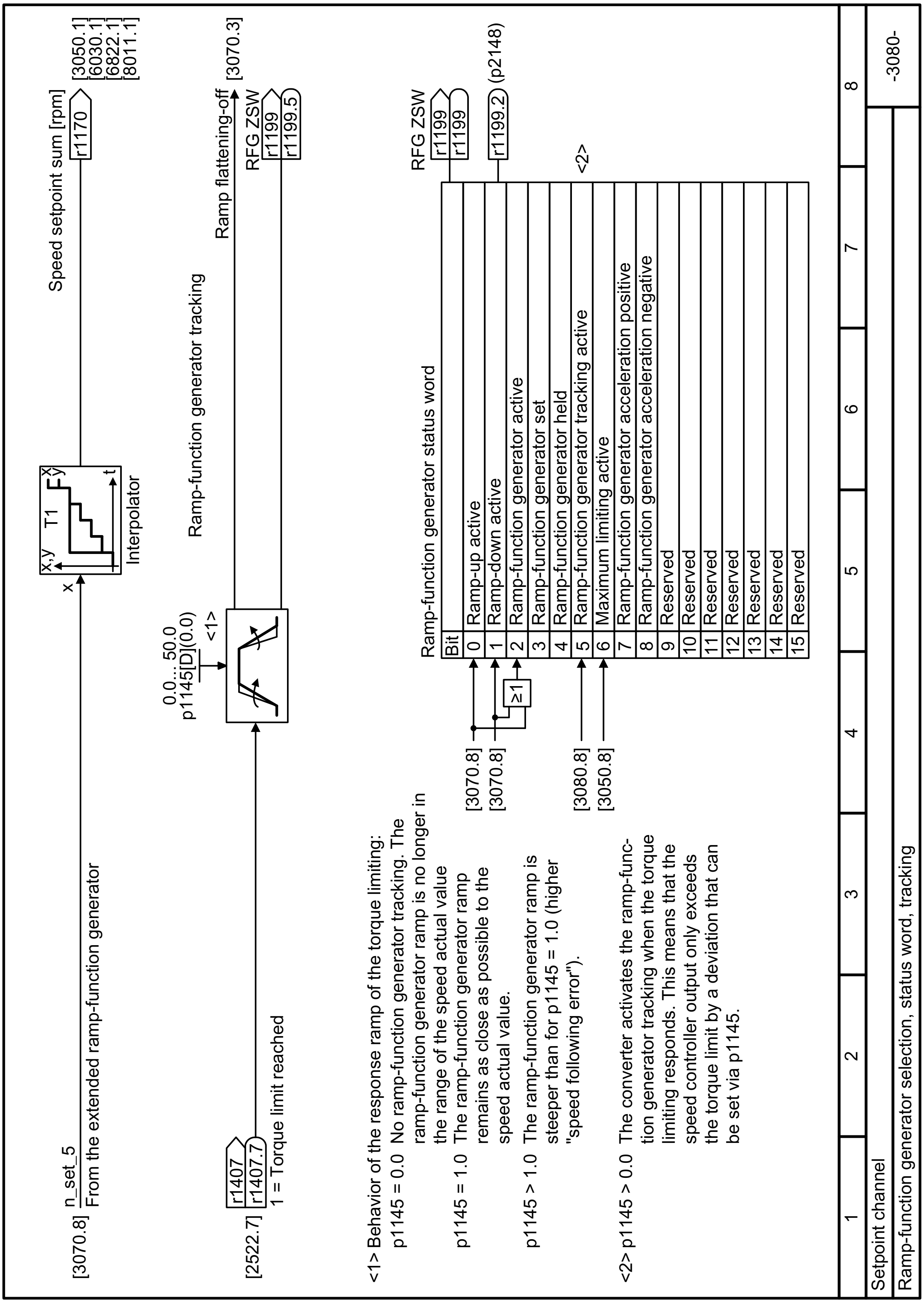


Figure 8-74 FP 3080

8.6 Technology controller

8.6.1 PID technology controller

Overview

The technology controller controls process variables, e.g. pressure, temperature, level or flow.

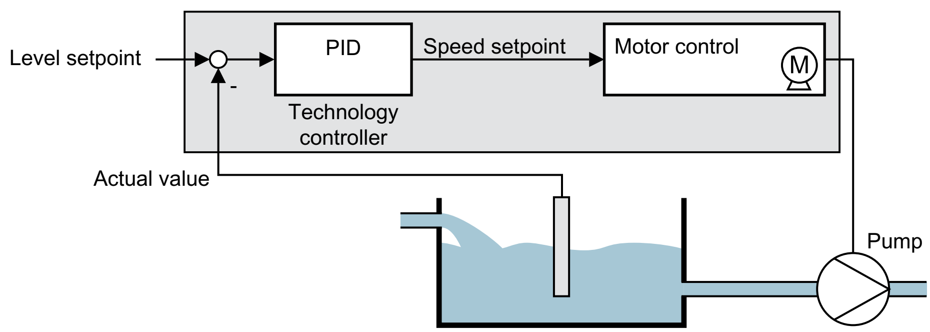


Figure 8-75 Example: Technology controller as a level controller

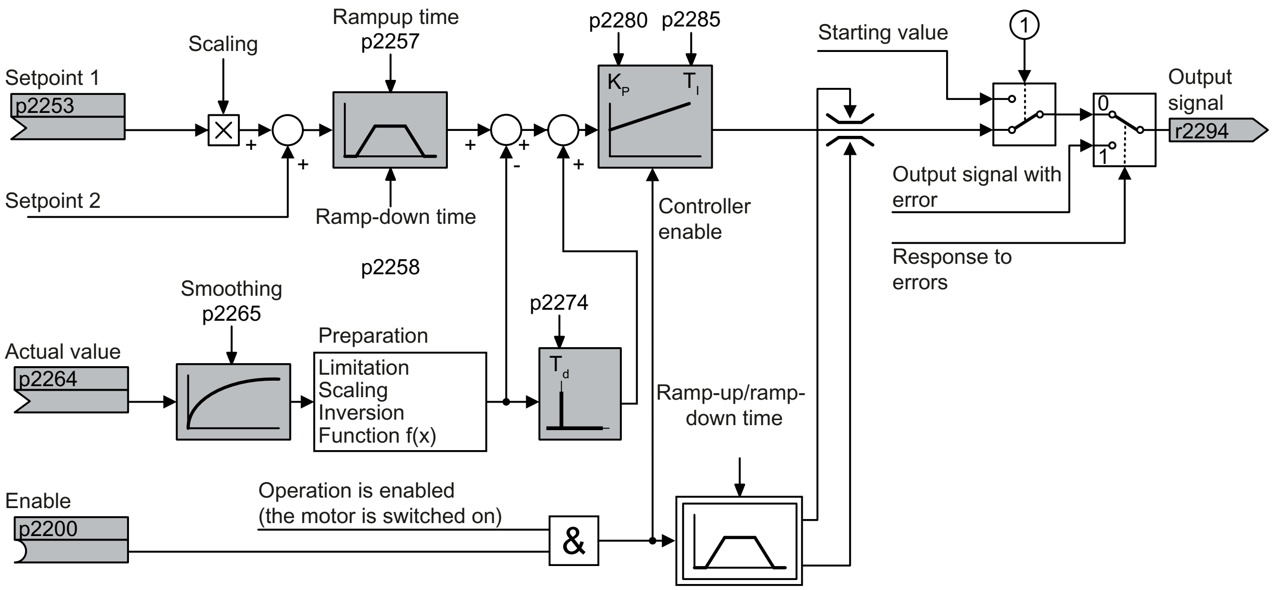
Requirement

The U/f control or the vector control have been set.

Function description

Function diagram

The technology controller is implemented as a PID controller (controller with proportional, integral, and derivative action).



① The converter uses the start value when all the following conditions are simultaneously satisfied:

- The technology controller supplies the main setpoint (p2251 = 0).
- The ramp-function generator output of the technology controller has not yet reached the start value.

Figure 8-76 Simplified representation of the technology controller

Basic settings

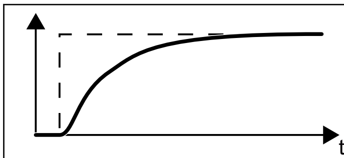
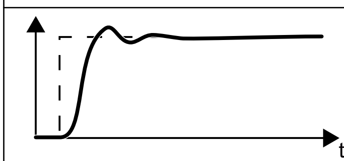
The settings required as a minimum are marked in gray in the function diagram:

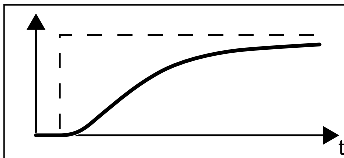
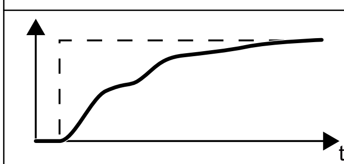
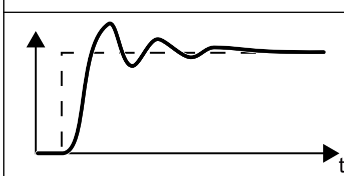
- Interconnect setpoint and actual values with signals of your choice
- Set ramp-function generator and controller parameters K_P, T_I and T_d.

Set controller parameters K_P, T_I and T_d.

Procedure

1. Temporarily set the ramp-up and ramp-down times of the ramp-function generator (p2257 and p2258) to zero.
2. Enter a setpoint step and monitor the associated actual value.
   The slower the response of the process to be controlled, the longer you must monitor the controller response. Under certain circumstances (e.g. for a temperature control), you need to wait several minutes until you can evaluate the controller response.

	Optimum controller response for applications that do not permit any overshoot. The actual value approaches the setpoint without any significant overshoot.
	Optimum controller behavior for fast correction and quick compensation of disturbance components. The actual value approaches the setpoint and slightly overshoots, maximum 10 % of the setpoint step.

	The actual value only slowly approaches the setpoint. • Increase the proportional component K_P (p2280) and reduce the integration time T_I (p2285).
	The actual value only slowly approaches the setpoint with slight oscillation. • Increase the proportional component K_P (p2280) and reduce the rate time T_d (p2274)
	The actual value quickly approaches the setpoint, but overshoots too much. • Decrease the proportional component K_P (p2280) and increase the integration time T_I (p2285).

3. Set the ramp-up and ramp-down times of the ramp-function generator back to their original value.

You have manually set the technology controller.
❒

Limiting the output of the technology controller

In the factory setting, the output of the technology controller is limited to ± maximum speed. You must change this limit, depending on your particular application.
Example: The output of the technology controller supplies the speed setpoint for a pump. The pump should only run in the positive direction.

Parameter

Table 8-65 Basic settings

Number	Name	Factory setting
r0046[0...31]	CO/BO: Missing enable signals	-
r0052[0...15]	CO/BO: Status word 1	-
r0056[0...15]	CO/BO: Status word, closed-loop control	-
r1084	CO: Speed limit positive active	-
r1087	CO: Speed limit negative active	- rpm
p2200[C]	BI: Technology controller enable	0
p2252	Technology controller configuration	See parameter list
p2253[C]	CI: Technology controller setpoint 1	0
p2254[C]	CI: Technology controller setpoint 2	0
p2255	Technology controller setpoint 1 scaling	100%
p2256	Technology controller setpoint 2 scaling	100%
p2257	Technology controller ramp-up time	1 s
p2258	Technology controller ramp-down time	1 s
r2260	CO: Technology controller setpoint after ramp-function generator	- %
p2261	Technology controller setpoint filter time constant	0 s
r2262	CO: Technology controller setpoint after filter	- %
p2263	Technology controller type	0
r2273	CO: Technology controller system deviation	- %
p2274	Technology controller differentiation time constant	0 s
p2280	Technology controller proportional gain	See parameter list
p2285	Technology controller integral time	See parameter list
p2286	BI: Hold technology controller integrator	56.13
p2289[C]	CI: Technology controller precontrol signal	0
p2306	Technology controller system deviation inversion	0
p2339	Technology controller threshold value for I proportion stop at skip speed	- s
r2344	CO: Technology controller last speed setpoint (smoothed)	- %
p2345	Technology controller fault response	0
r2349[0...13]	CO/BO: Technology controller status word	-
r3889[0...10]	CO/BO: ESM status word	-

Table 8-66 Limiting the output of the technology controller

Number	Name	Factory setting
p2290[C]	BI: Technology controller limitation enable	1
p2291	CO: Technology controller maximum limiting	100%
p2292	CO: Technology controller minimum limiting	0%
p2293	Technology controller ramp-up/ramp-down time	1 s

Number	Name	Factory setting
r2294	CO: Technology controller output signal	- %
p2295	CO: Technology controller output scaling	100%
p2296[C]	CI: Technology controller output scaling	2295
p2297[C]	CI: Technology controller maximum limiting signal source	1084
p2298[C]	CI: Technology controller minimum limiting signal source	1087
p2299[C]	CI: Technology controller limitation offset	0
p2302	Technology controller output signal start value	0%

Table 8-67 Adapting the actual value of the technology controller

Number	Name	Factory setting
p2264[C]	CI: Technology controller actual value	0
p2265	Technology controller actual value filter time constant	0 s
p2266	CO: Technology controller actual value after filter	- %
p2267	Technology controller upper limit actual value	100%
p2268	Technology controller lower limit actual value	-100%
p2269	Technology controller gain actual value	100%
p2270	Technology controller actual value function	0
p2271	Technology controller actual value inversion	0
r2272	CO: Technology controller actual value scaled	- %

Table 8-68 PID technology controller, fixed values (binary selection)

Number	Name	Factory setting
p2201[D]	CO: Technology controller fixed value 1	10%
p2202[D]	CO: Technology controller fixed value 2	20%
p2203[D]	CO: Technology controller fixed value 3	30%
p2204[D]	CO: Technology controller fixed value 4	40%
p2205[D]	CO: Technology controller fixed value 5	50%
p2206[D]	CO: Technology controller fixed value 6	60%
p2207[D]	CO: Technology controller fixed value 7	70%
p2208[D]	CO: Technology controller fixed value 8	80%
p2209[D]	CO: Technology controller fixed value 9	90%
p2210[D]	CO: Technology controller fixed value 10	100%
p2211[D]	CO: Technology controller fixed value 11	110%
p2212[D]	CO: Technology controller fixed value 12	120%
p2213[D]	CO: Technology controller fixed value 13	130%
p2214[D]	CO: Technology controller fixed value 14	140%
p2215[D]	CO: Technology controller fixed value 15	150%
p2216[D]	Technology controller fixed value selection method	1
r2224	CO: Technology controller fixed value active	- %

Number	Name	Factory setting
r2225	CO/BO: Technology controller fixed value selection status word	- %
r2229	Technology controller number actual	-

Table 8-69 PID technology controller, fixed values (direct selection)

Number	Name	Factory setting
p2216[D]	Technology controller fixed value selection method	1
p2220[C]	BI: Technology controller fixed value selection bit 0	0
p2221[C]	BI: Technology controller fixed value selection bit 1	0
p2222[C]	BI: Technology controller fixed value selection bit 2	0
p2223[C]	BI: Technology controller fixed value selection bit 3	0
r2224	CO: Technology controller fixed value active	- %
r2225	CO/BO: Technology controller fixed value selection status word	- %
r2229	Technology controller number actual	-

Table 8-70 PID technology controller, motorized potentiometer

Number	Name	Factory setting
r2231	Technology controller motorized potentiometer setpoint memory	- %
p2235[C]	BI: Technology controller motorized potentiometer, setpoint, raise	0
p2236[C]	BI: Technology controller motorized potentiometer, setpoint, lower	0
p2237[D]	Technology controller motorized potentiometer maximum value	100%
p2238[D]	Technology controller motorized potentiometer minimum value	-100%
p2240[D]	Technology controller motorized potentiometer start value	0%
r2245	CO: Technology controller motorized potentiometer, setpoint before RFG	- %
p2247[D]	Technology controller motorized potentiometer ramp-up time	10 s
p2248[D]	Technology controller motorized potentiometer ramp-down time	10 s
r2250	CO: Technology controller motorized potentiometer, setpoint after RFG	- %

Further information

You will find additional information on the following PID controller components on the Internet at:

- Setpoint input: Analog value or fixed setpoint
- Setpoint channel: Scaling, ramp-function generator and filter
- Actual value channel: Filter, limiting and signal processing
- PID controller: Principle of operation of the D component, inhibiting the I component and the control sense
- Enable, limiting the controller output and fault response

FAQ (http://support.automation.siemens.com/WW/view/en/92556266)

8.6.1.1 Autotuning the PID technology controller

Overview

Autotuning is a converter function for the automatic optimization of the PID technology controller.

Requirement

The following requirements apply:

- The motor closed-loop control is set
- The PID technology controller must be set the same as when used in subsequent operation:
  - The actual value is interconnected.
  - Scalings, filter and ramp-function generator have been set.
  - The PID technology controller is enabled (p2200 = 1 signal).

Function description

For active autotuning, the converter interrupts the connection between the PID technology controller and the speed controller. Instead of the PID technology controller output, the autotuning function specifies the speed setpoint.

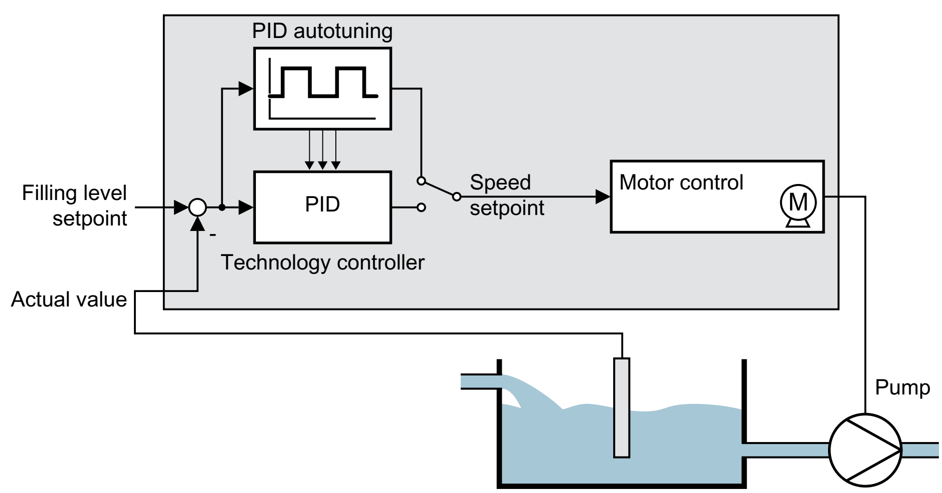


Figure 8-77 Autotuning using closed-loop level control as example

The speed setpoint results from the technology setpoint and a superimposed rectangular signal with amplitude p2355. If actual value = technology setpoint ± p2355, the autotuning function switches the polarity of the superimposed signal. This causes the converter to excite the process variable for an oscillation.

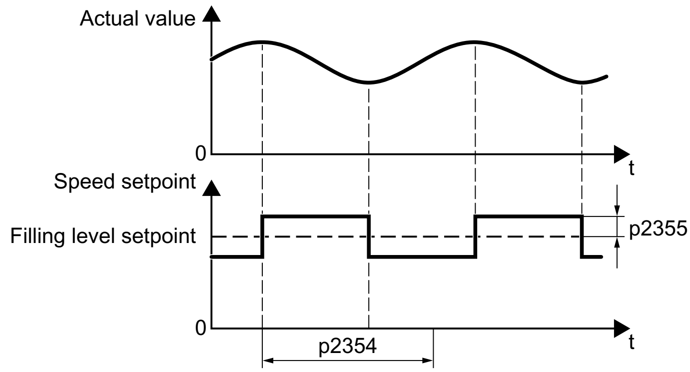


Figure 8-78 Example for speed setpoint and actual process value for autotuning

The converter calculates the parameters of the PID controller from the determined oscillation frequency.

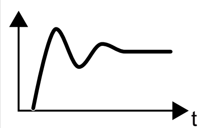
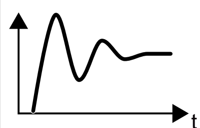
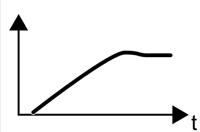
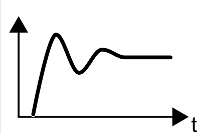
Executing autotuning

1. Select with p2350 the appropriate controller setting.
2. Switch on the motor.
   The converter signals Alarm A07444.
3. Wait until alarm A07444 goes away.
   The converter has recalculated parameters p2280, p2274 and p2285.
   If the converter signals fault F07445:
   - If possible, double p2354 and p2355.
   - Repeat the autotuning with the changed parameters.
4. Back up the calculated values so that they are protected against power failure, e.g. using the BOP-2: OPTIONS → RAM-ROM.

You have auto tuned the PID controller.
❒

Parameter

Number	Name	Factory setting
p2274	Technology controller differentiation time constant	0.0 s
p2280	Technology controller proportional gain	See parameter list
p2285	Technology controller integral time	See parameter list

Number	Name	Factory setting
p2350	Enable PID autotuning Automatic controller setting based on the "Ziegler Nichols" method. After completion of the autotuning, the converter sets p2350 = 0. 0: No function 1: The process variable follows the setpoint after a sudden setpoint change (step function) relatively quickly, however with an overshoot.  2: Faster controller setting than for p2350 = 1 with larger overshoot of the controlled variable.  3: Slower controller setting than for p2350 = 1. Overshoot of the controlled variable is, to a large extent, avoided.  4: Controller setting after completion of the autotuning as for p2350 = 1. Optimize only the P and I action of the PID controller.  	0
p2354	PID autotuning monitoring time	240 s
p2355	PID autotuning offset	5%

8.6.1.2 Function diagram 7950 - Technology controller fixed setpoints binary selection

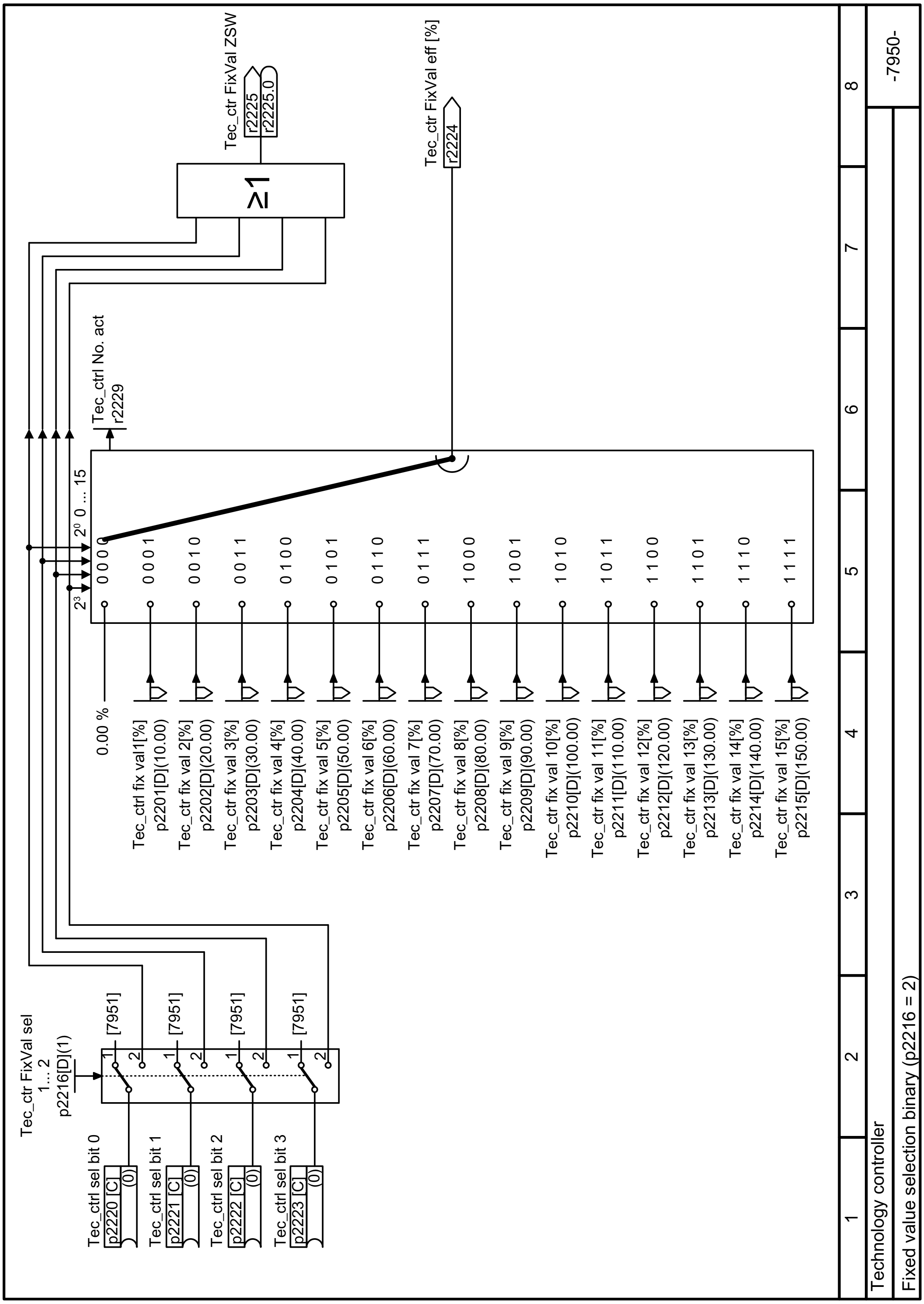


Figure 8-79 FP 7950

8.6.1.3 Function diagram 7951 - Technology controller fixed setpoints direct selection

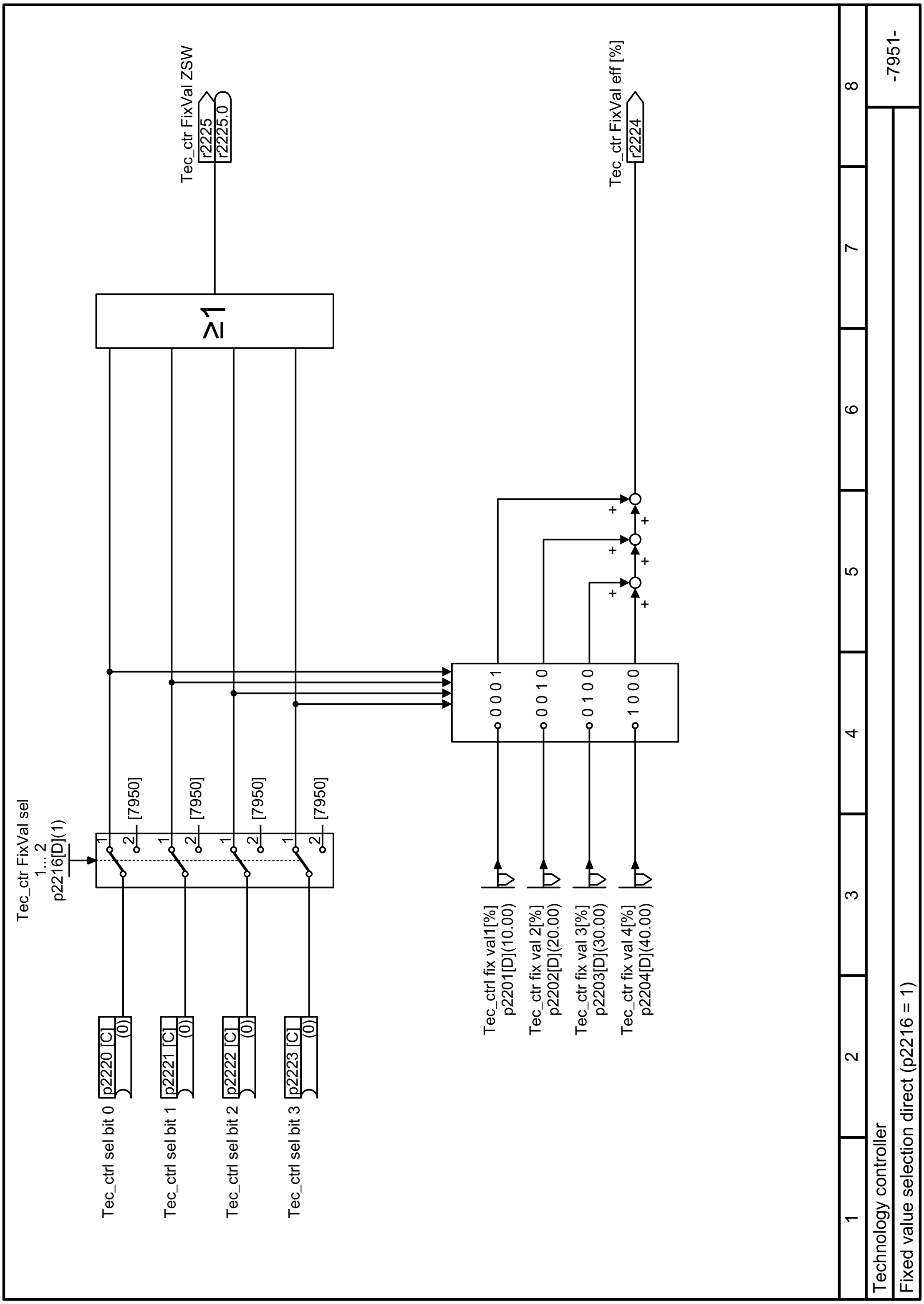


Figure 8-80 FP 7951

8.6.1.4 Function diagram 7954 - Technology controller motorized potentiometer

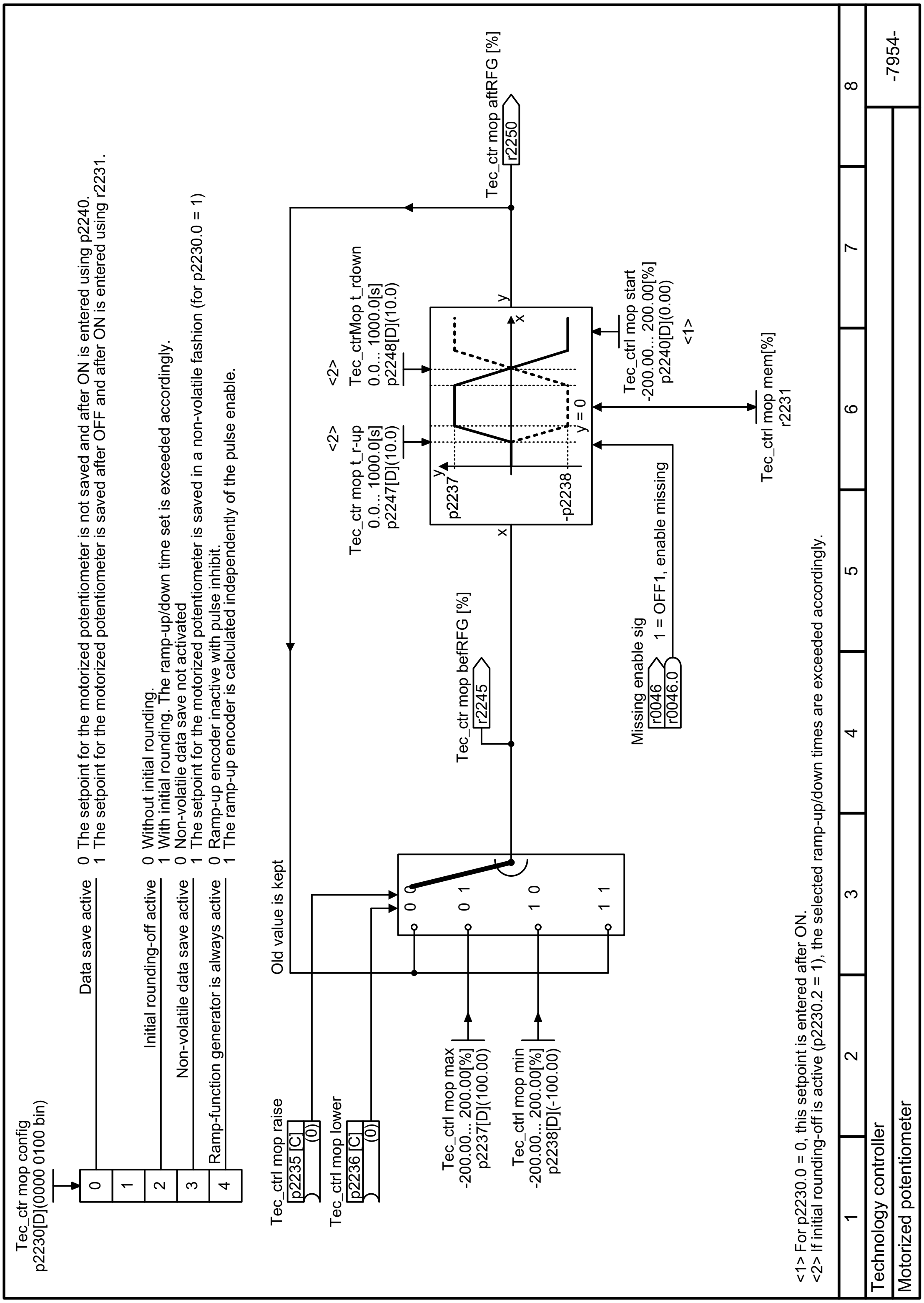


Figure 8-81 FP 7954

8.6.1.5 Function diagram 7958 - Technology controller closed-loop control

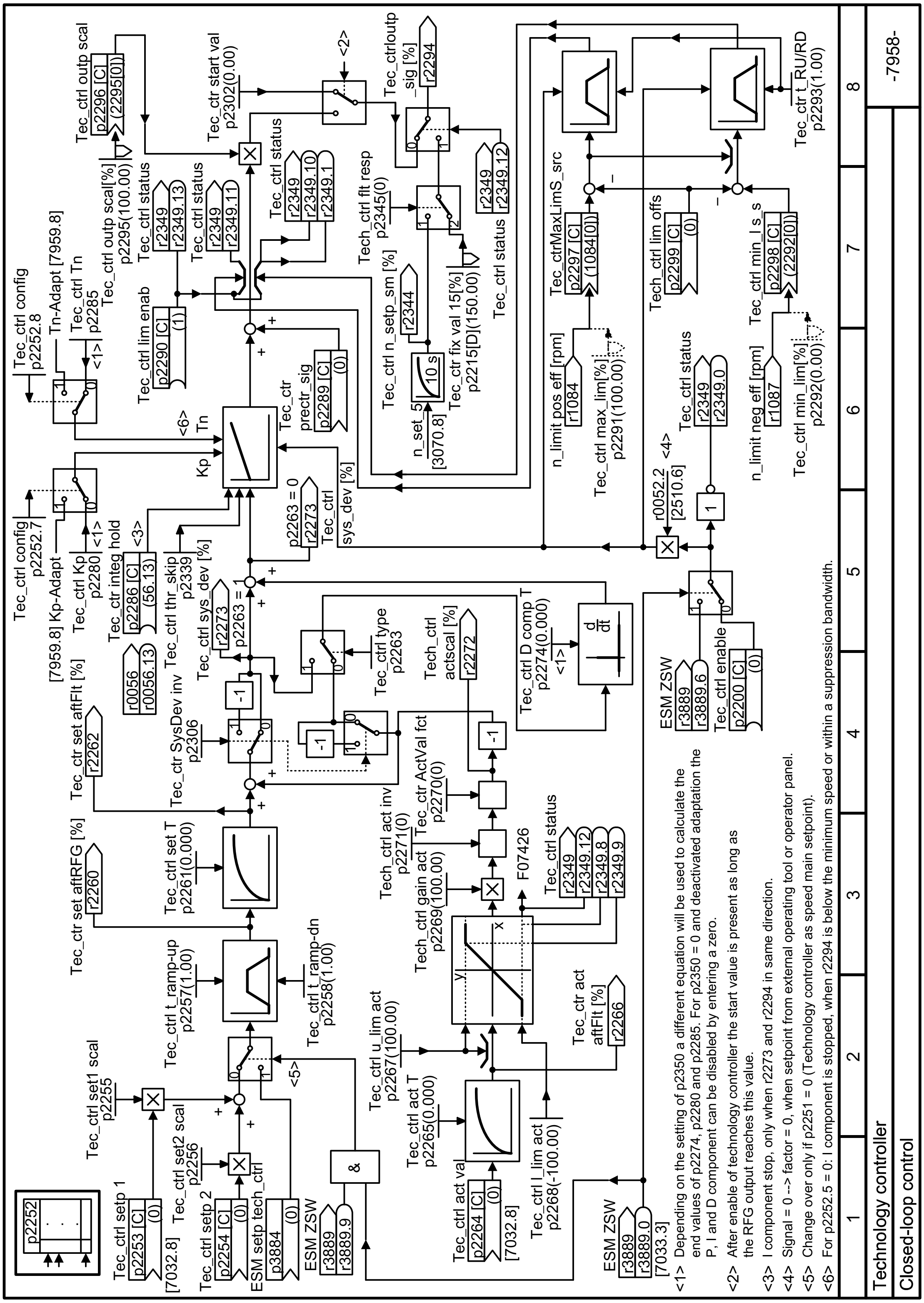


Figure 8-82 FP 7958

8.6.1.6 Function diagram 7959 - Technology controller Kp/Tn adaptation

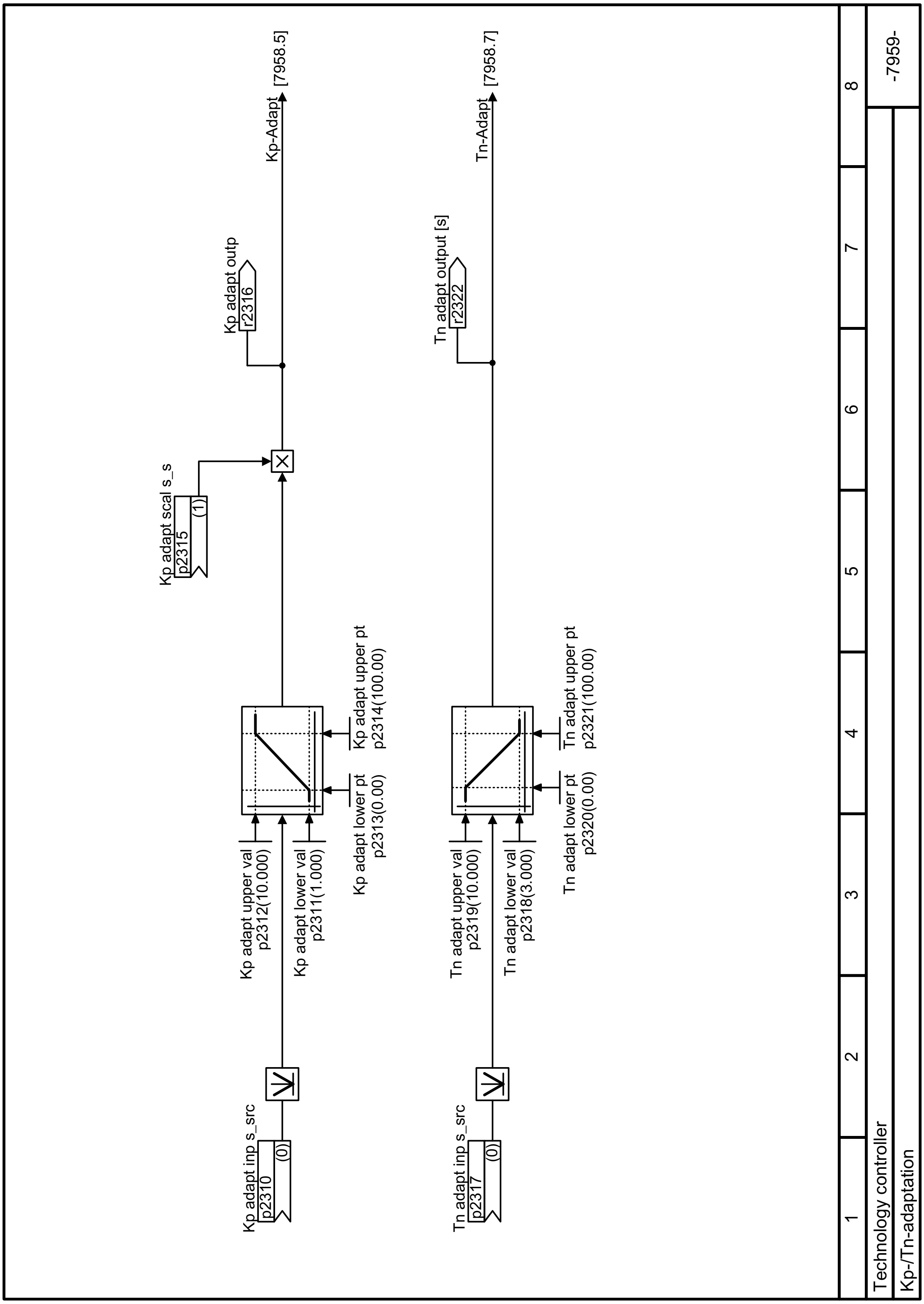


Figure 8-83 FP 7959

8.6.2 Free technology controllers

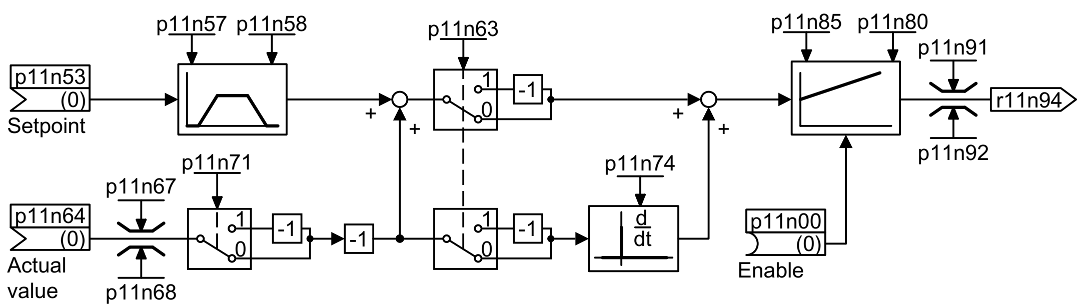
Overview

The converter has three additional technology controllers.

The three "free technology controllers" have fewer setting options compared with the PID technology controller described above.

PID technology controller (Page 339)

Function description



n = 0 Free technology controller 0

n = 1 Free technology controller 1

n = 2 Free technology controller 2

Figure 8-84 Simplified function chart of the additional PID technology controllers, n = 0 ... 2

The additional technology controllers allow several process variables to be simultaneously controlled using one converter.

Example

An HVAC system with heating and cooling valves to process the air:

- The main controller controls the speed of the fan drive.
- The additional technology controllers control the cooling and heating via the two analog outputs.

Parameters

Table 8-71 Parameters for the free technology controller 0

Number	Name	Factory setting
p11000	BI: Free tec_ctrl 0 enable	0
p11026	Free tec_ctrl 0 unit selection	1 (%)
p11027	Free tec_ctrl 0 unit reference variable	1.00
p11028	Free tec_ctrl 0 sampling time	2 (256 ms)
r11049.0...11	CO/BO: Free tec_ctrl 0 status word	-

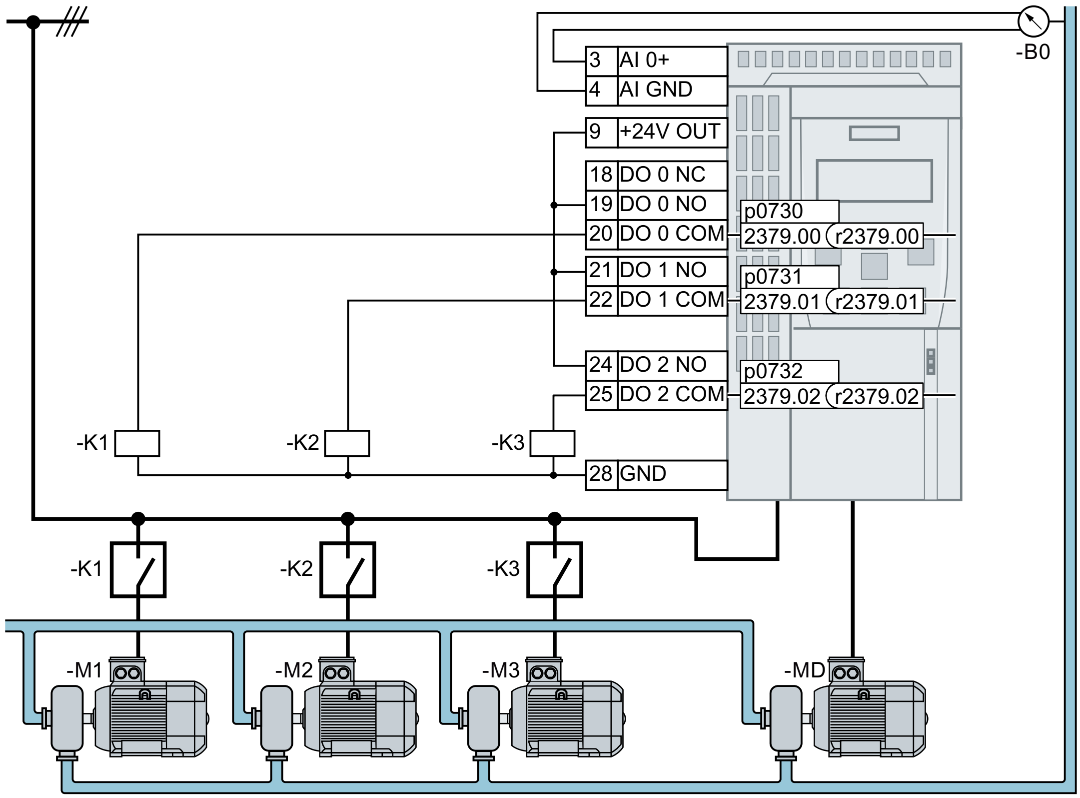
Number	Name	Factory setting
p11053	CI: Free tec_ctrl 0 setpoint signal source	0
p11057	Free tec_ctrl 0 setpoint ramp-up time	1 s
p11058	Free tec_ctrl 0 setpoint ramp-down time	1 s
p11063	Free tec_ctrl 0 error signal inversion	0
p11064	CI: Free tec_ctrl 0 actual value signal source	0
p11065	Free tec_ctrl 0 actual value smoothing time constant	0 s
p11067	Free tec_ctrl 0 actual value upper limit	100%
p11068	Free tec_ctrl 0 actual value lower limit	-100 %
p11071	Free tec_ctrl 0 actual value inversion	0
r11072	CO: Free tec_ctrl 0 actual value after limiter	-
r11073	CO: Free tec_ctrl 0 control deviation	-
p11074	Free tec_ctrl 0 differentiation time constant (T_d)	0 s
p11080	Free tec_ctrl 0 proportional gain (K_P)	1
p11085	Free tec_ctrl 0 integral time (T_i)	30 s
p11091	CO: Free tec_ctrl 0 maximum limit	100%
p11092	CO: Free tec_ctrl 0 minimum limit	0%
p11093	Free tec_ctrl 0 ramp-up/ramp-down time limit	1 s
r11094	CO: Free tec_ctrl 0 output signal	-
p11097	CI: Free tec_ctrl 0 maximum limit signal source	11091[0]
p11098	CI: Free tec_ctrl 0 minimum limit signal source	11092[0]
p11099	CI: Free tec_ctrl 0 offset limit signal source	0

8.6.3 Staging control

Overview

PID

The cascade control is ideal for applications in which, for example, significantly fluctuating pressures or flow rates are equalized.



M_D	Speed-controlled motor
M_1 ... M_3	Uncontrolled motors
B_0	Pressure sensor. Interconnect the signal of the pressure sensor with the actual-value input of the technology controller.

Figure 8-85 Example: Cascade control for the pressure in a liquid pipe

Depending on the control deviation of the technology controller, the converter cascade control switches a maximum of three additional motors directly to the line supply via contactors.

Precondition

To deploy the cascade control, you must activate the technology controller.

Function description

Activate uncontrolled motors M_1 ... M_3

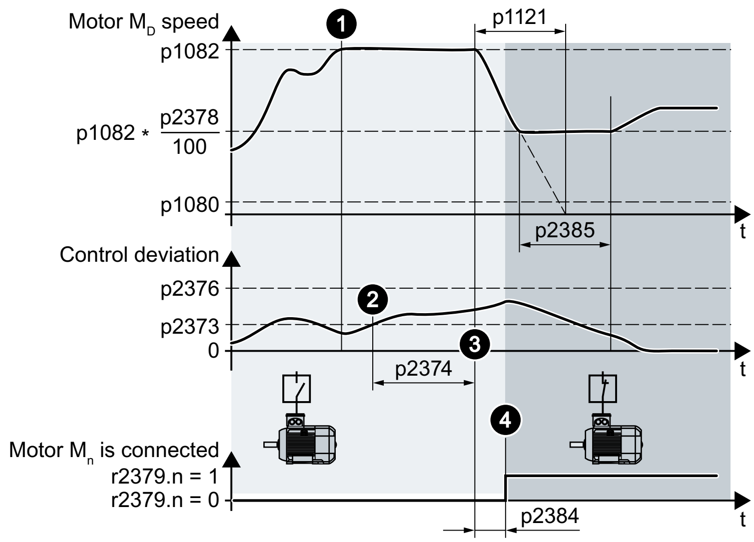


Figure 8-86 Activate uncontrolled motors M_1 ... M_3

Procedure for connecting an uncontrolled motor:

1. The speed-controlled motor turns with maximum speed p1082.
2. The control deviation of the technology controller is greater than p2373.
3. Time p2374 has expired.
   The converter brakes the speed-controlled motor with ramp-down time p1121 to the activation/deactivation speed p2378. Until the activation/deactivation speed p2378 is attained, the converter deactivates the technology controller temporarily.
4. After switch-on delay p2384, the converter connects an uncontrolled motor.

Deactivate uncontrolled motors M_1 ... M_3

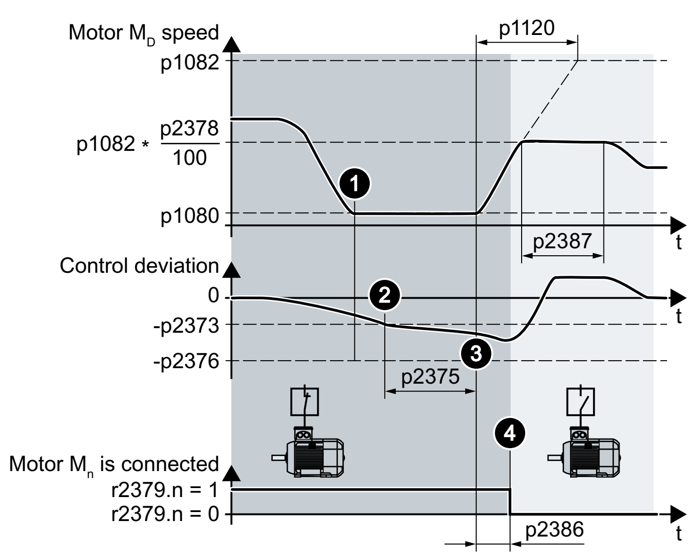


Figure 8-87 Deactivate uncontrolled motors M_1 ... M_3

Procedure for switching off an uncontrolled motor:

1. The speed-controlled motor turns with minimum speed p1080.
2. The control deviation of the technology controller is less than -p2373.
3. Time p2375 has expired.
   The converter accelerates the speed-controlled motor with ramp-up time p1120 to the activation/deactivation speed p2378. Until the activation/deactivation speed p2378 is attained, the converter deactivates the technology controller temporarily.
4. After shutdown delay p2386, the converter disconnects an uncontrolled motor.

Sequence for activating and deactivating the M_1 ... M_3 motors

Table 8-72 p2371 specifies the sequence for activating and deactivating the motors

p2371	→ → → Sequence for activating motors → → → → → → Sequence for deactivating motors → → →						Power of the activated M_1 ... M_3 motors compared with the speed-controlled DM motor		
	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6	1 × M_D	2 × M_D	3 × M_D
1	M_1						M_1	---	---
2	M_1	M_1+M_2					M_1, M_2	---	---
3	M_1	M_2	M_1+M_2				M_1	M_2	---
4	M_1	M_1+M_2	M_1+M_2+M_3				M_1, M_2, M_3	---	---
5	M_1	M_3	M_1+M_3	M_1+M_2+M_3			M_1, M_2	M_3	---
6	M_1	M_2	M_1+M_2	M_2+M_3	M_1+M_2+M_3		M_1	M_2, M_3	---
7	M_1	M_1+M_2	M_3	M_1+M_3	M_1+M_2+M_3		M_1, M_2	---	M_3
8	M_1	M_2	M_3	M_1+M_3	M_2+M_3	M_1+M_2+M_3	M_1	M_2	M_3

Parameter

Parameter	Description	Factory setting
p2200	Technology controller enable	0
p2251	Technology controller mode	0
p2370	Cascade control enable	0
p2371	Cascade control configuration	0
p2372	Cascade control motor selection mode	0
p2373	Cascade control activation threshold	20 %
p2374	Cascade control activation delay	30 s
p2375	Cascade control deactivation delay	30 s
p2376	Cascade control overload threshold	25 %
p2377	Cascade control interlock time	0 s
p2378	Cascade control activation/deactivation speed	50 %
r2379	Cascade control status word	---
p2380	Cascade control operating hours	0 h
p2381	Cascade control maximum time for continuous mode	24 h

Parameter	Description	Factory setting
p2382	Cascade control absolute operating time limit	24 h
p2383	Cascade control deactivation sequence	0
p2384	Cascade control motor switch-on delay	0 s
p2385	Cascade control stop time activation speed	0 s
p2386	Cascade control motor switch-off delay	0 s
p2387	Cascade control stop time deactivation speed	0 s

Additional information is provided in the parameter list and in function diagram 7036.

Further information

Interaction with the "Hibernation mode" function

In order that the "Cascade control" and "Hibernation mode" functions do not influence each other, you must make the following settings in the cascade control:

- p2392 < p2373
  The restart value of the hibernation mode p2392 must be lower than the activation threshold for the cascade control p2373.
- p2373 < p2376
  The activation threshold for the cascade control p2373 must be lower than the overload threshold for the cascade control p2376.
- The actual speed must be higher than the restart speed for hibernation mode (p1080 + p2390) × 1.05.
- The value for the activation delay of the cascade control p2374 must be higher than the ramp-up time t_y from hibernation mode.
  t_y = (p1080 + p2390) × 1.05 × p1120 × p1139/p1082

8.6.4 Real time clock (RTC)

The real-time clock is the basis for time-dependent process controls, e.g.:

- To reduce the temperature of a heating control during the night
- To increase the pressure of a water supply at certain times during the day

Accept the real-time clock in the alarm and fault buffer

Using the real-time clock, you can track the sequence of alarms and faults over time. When an appropriate message occurs, the converter converts the real-time clock into the UTC time format (Universal Time Coordinated):

Date, time ⇒ 01.01.1970, 0:00 + d (days) + m (milliseconds)

The converter takes the number "d" of the days and the number "m" of the milliseconds in the alarm and fault times of the alarm and/or fault buffer.

Warnings, faults and system messages (Page 987)

Converting UTC to RTC

An RTC can again be calculated in the UTC format from the saved fault or alarm time. In the Internet, you will find programs to convert from UTC to RTC, e.g.

UTC to RTC (http://unixtime-converter.com/)

Example:

Saved as alarm time in the alarm buffer:

r2123[0] = 2345 [ms]
r2145[0] = 14580 [days]

Number of seconds = 2345 / 1000 + 14580 × 86400 = 1259712002
Converting this number of seconds to RTC provides the date: 02.12.2009, 01:00:02.

The times specified for alarms and faults always refer to standard time.

Function and settings

The real time clock starts as soon as the converter's power supply is switched on for the first time. The real-time clock comprises the time in a 24 hour format and the date in the "day, month, year" format.

After a power supply interruption, the real time clock continues to run for approx. five days.

If you wish to use the real-time clock, you must set the time and date once when commissioning.

If you restore the converter factory setting, the converter only resets parameters p8402 and p8405 of the real-time clock. P8400 and p8401 are not reset.

Parameters

Number	Name	Factory setting
p8400[0 ... 2]	RTC time	0
p8401[0 ... 2]	RTC date	1.1.1970
p8402[0 ... 8]	RTC daylight saving time setting	0
r8403	RTC daylight saving time actual difference	-
r8404	RTC weekday	-
p8405	Activate/deactivate RTC alarm A01098	1

8.6.5 Time switch (DTC)

The "time switch" (DTC) function, along with the real-time clock in the converter, offers the option of controlling when signals are switched on and off.

Examples:

- Switching temperature control from day to night mode.
- Switching a process control from weekday to weekend.

Principle of operation of the time switch (DTC)

The converter has three independently adjustable time switches. The time switch output can be interconnected with every binector input of your converter, e.g. with a digital output or a technology controller's enable signal.

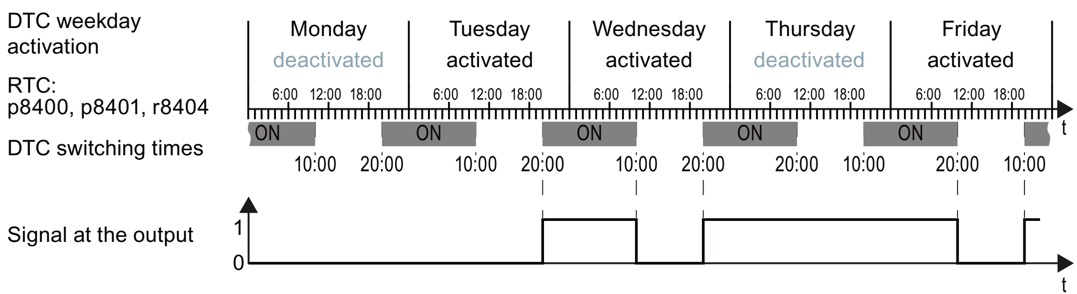


Figure 8-88 Example of the response of the time switch.

Settings for the example with DTC1

- Enable parameterization of the DTC: p8409 = 0.
  As long as the parameterization of the DTC is enabled, the converter holds the output of all three DTC (r84x3, x = 1, 2, 3; r84x3.0 normal, r84x3.1 inverted status message) at LOW.
- Activate/deactivate the weekday
  - p8410[0] = 0 Monday
  - p8410[1] = 1 Tuesday
  - p8410[2] = 1 Wednesday
  - p8410[3] = 0 Thursday
  - p8410[4] = 1 Friday
  - p8410[5] = 1 Saturday
  - p8410[6] = 0 Sunday
- Setting switching times:
  – ON: p8411[0] = 20 (hh), p8411[1] = 0 (MM)
  – OFF: p8412[0] = 10 (hh), p4812[1] = 0 (MM)
- Enable the setting: p8409 = 1.
  The converter re-enables the DTC output.

8.6.6 Function diagram 7030 - Technology functions, free technology controller

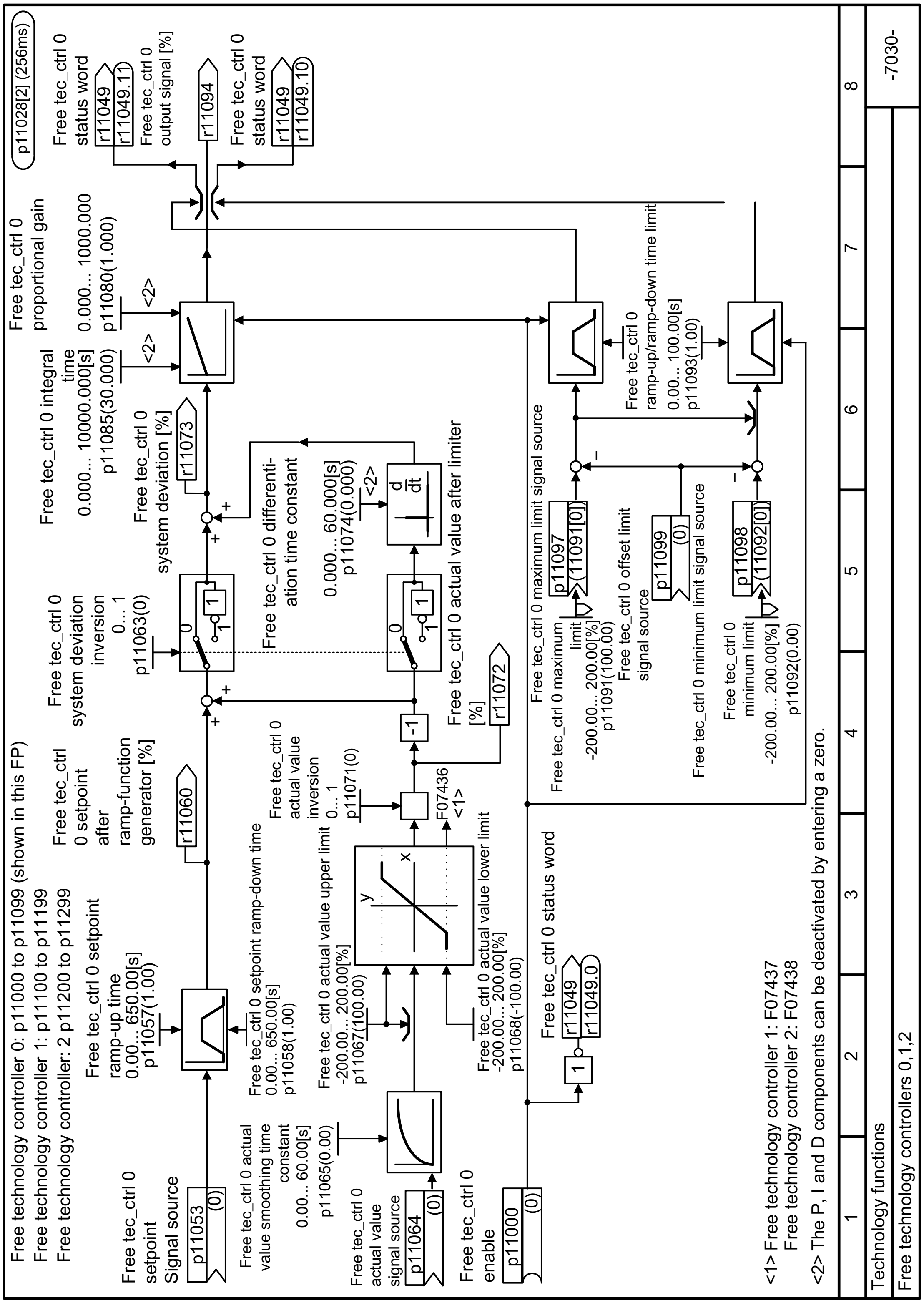


Figure 8-89 FP 7030

8.6.7 Function diagram 7036 - Technology functions, free technology controller

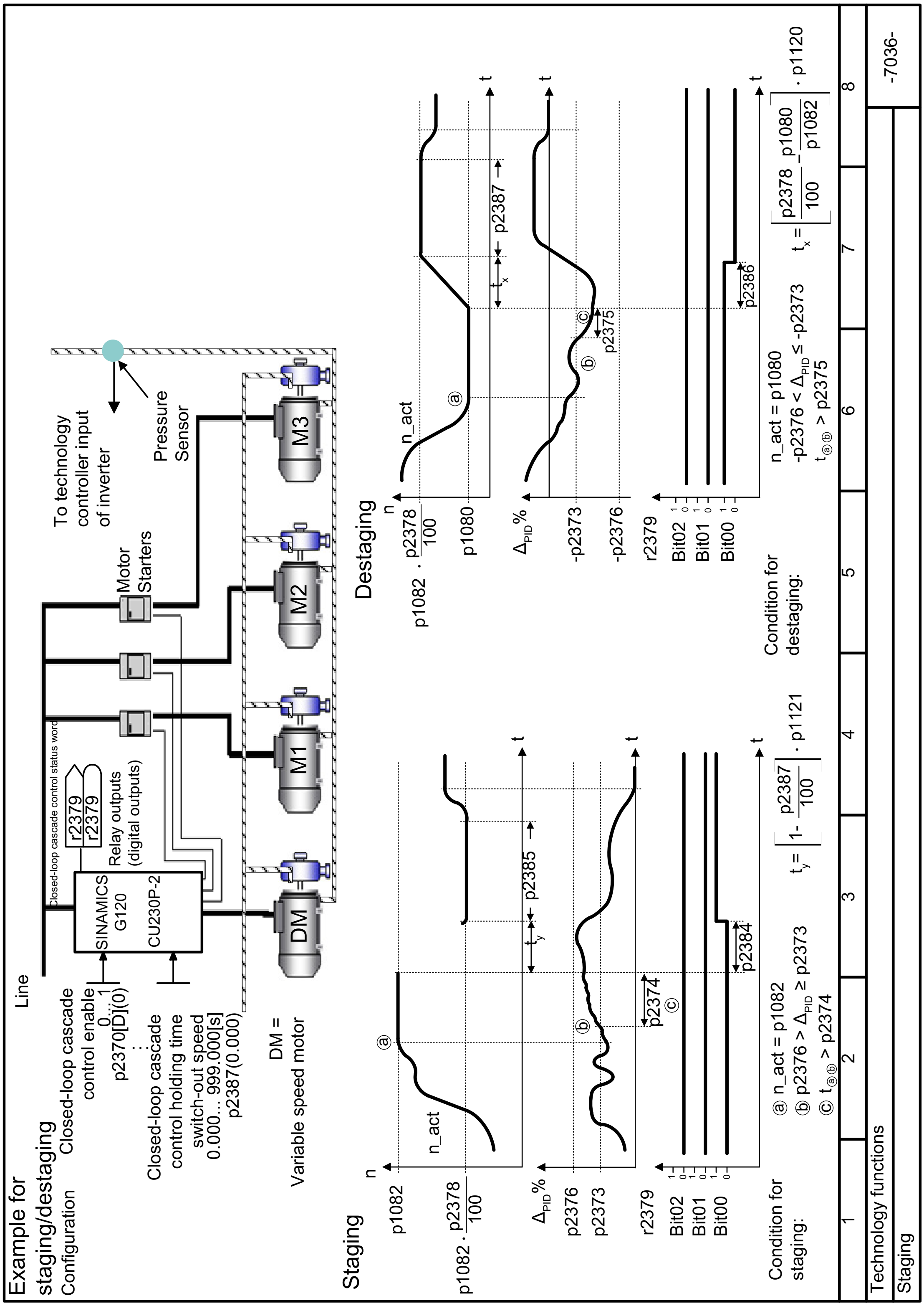


Figure 8-90 FP 7036

8.7 Motor control

Overview

The converter has two alternative methods to ensure the motor speed follows the configured speed setpoint:

- U/f control
- Vector control

8.7.1 Reactor, filter and cable resistance at the converter output

Overview

Components between the converter and the motor influence the closed-loop control quality of the converter:

- Output reactor
  In the factory setting, the converter assumes for the motor data identification that no output reactor is connected at the converter output.
- Motor cable with unusually high cable resistance.
  For the motor data identification, the converter assumes a cable resistance = 20 % of the stator resistance of the cold motor.

Function description

You must correctly set the components between the converter and motor to achieve an optimum closed-loop control quality

Procedure

1. Set p0010 = 2.
2. Set the cable resistance in p0352.
3. Set p0230 to the appropriate value.
4. Set p0235 to the appropriate value.
5. Set p0010 = 0.
6. Carry out the quick commissioning and the motor identification again.
   Quick commissioning using the BOP-2 operator panel (Page 130)
   You have set the reactor, filter and cable resistance between the converter and motor.
   ❒

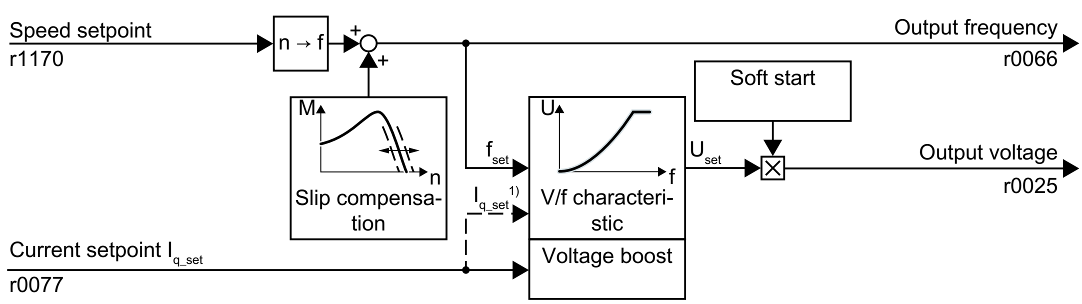
Parameters

Number	Name	Factory setting
p0010	Drive commissioning parameter filter	1
p0230	Drive filter type, motor side	0
p0235	Number of motor reactors in series	1
p0350[M]	Motor stator resistance, cold	0 Ω
p0352[M]	Cable resistance	0 Ω

8.7.2 V/f control

8.7.2.1 U/f control

Overview



1) In the "Flux Current Control (FCC)" U/f version, the converter controls the motor current (starting current) at low speeds.

Figure 8-91 Simplified function diagram of the U/f control

The U/f control is a speed feedforward control with the following properties:

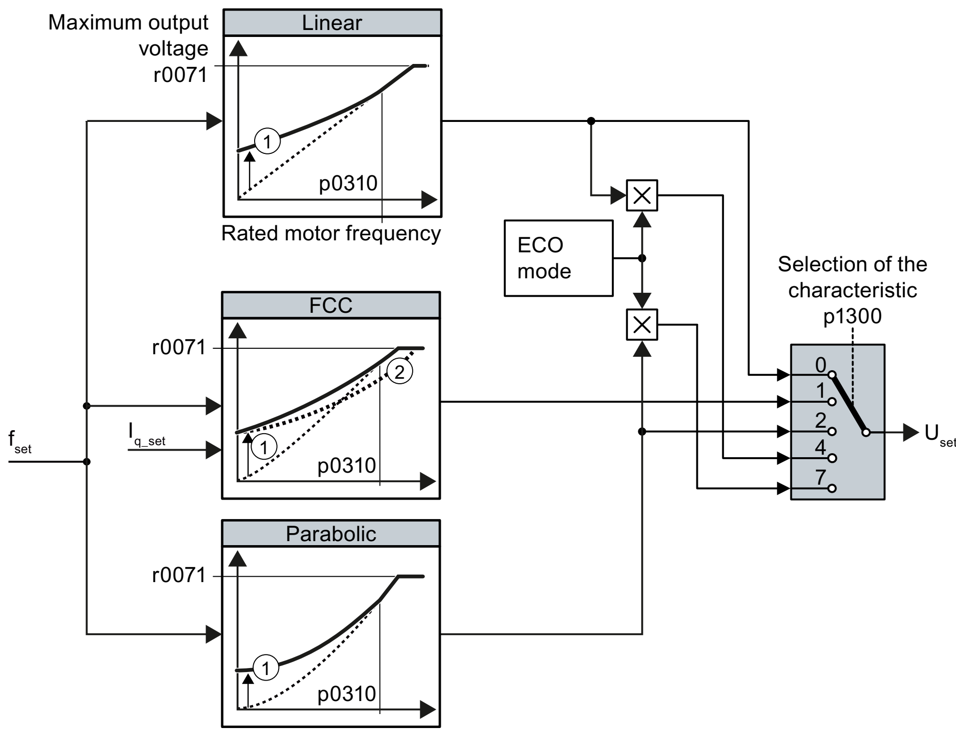
- The converter sets the output voltage on the basis of the U/f characteristic.
- The output frequency is essentially calculated from the speed setpoint and the number of pole pairs of the motor.
- The slip compensation corrects the output frequency depending on the load and thus increases the speed accuracy.
- The omission of a control loop means that the U/f control is stable in all cases.
- In applications with higher speed accuracy requirements, a load-dependent voltage boost can be selected (flux current control, FCC)

For operation of the motor with U/f control, you must set at least the following subfunctions appropriate for your application:

- U/f characteristic
- Voltage boost

Function description

The converter has different U/f characteristics.



① The voltage boost of the characteristic optimizes motor start-up

② With flux current control (FCC), the converter compensates the voltage drop across the stator resistance of the motor

Figure 8-92 U/f characteristics of the converter

With increasing speed or output frequency, the converter increases its output voltage U. The maximum possible output voltage of the converter depends on the line voltage.

The converter can increase the output frequency even at the maximum output voltage. The motor is then operated with field weakening.

The value of the output voltage at the rated motor frequency also depends on the following variables:

The value of the output voltage at the rated motor frequency p0310 also depends on the following variables:

- Ratio between the converter size and the motor size
- Line voltage
- Line impedance
- Actual motor torque

The maximum possible output voltage as a function of the input voltage is provided in the technical data.

General converter technical data (Page 1118)

Table 8-73 Linear and parabolic characteristics

Requirement	Application examples	Remark	Characteristic	Parameter
The required torque is independent of the speed	Eccentric-worm pump, compressor	-	Linear	p1300 = 0
		The converter compensates for the voltage drops across the stator resistance. Recommended for motors less than 7.5 kW. Precondition: The motor data has been set according to the rating plate and the motor has been identified after the basic commissioning.	Linear with Flux Current Control (FCC)	p1300 = 1
The required torque increases with the speed	Centrifugal pumps, radial fans, axial fans, compressors	Lower losses in the motor and converter than for a linear characteristic.	Parabolic	p1300 = 2

Table 8-74 Characteristics for special applications

Requirement	Application examples	Remark	Characteristic	Parameter
Applications with a low dynamic response and constant speed	Centrifugal pumps, radial fans, axial fans	The ECO mode saves more energy than the parabolic characteristic. If the speed setpoint is reached and remains unchanged for 5 seconds, the converter reduces its output voltage again.	ECO mode	p1300 = 4 (linear characteristic ECO) or p1300 = 7 (parabolic characteristic ECO)

Parameters

Number	Name	Factory setting
r0025	CO: Output voltage, smoothed	- Vrms
r0066	CO: Output frequency	- Hz
r0071	Output voltage, maximum	- Vrms
p0304[M]	Rated motor voltage	0 Vrms
p0310[M]	Rated motor frequency	0 Hz
p1300[D]	Open-loop/closed-loop control operating mode	See parameter list
p1333[D]	U/f control FCC starting frequency	0 Hz
p1334[D]	U/f control slip compensation starting frequency	0 Hz
p1335[D]	Slip compensation scaling	0%
p1338[D]	U/f mode resonance damping gain	0

8.7.2.2 Optimizing motor starting

Overview

After selection of the U/f characteristic, no further settings are required in most applications.

In the following circumstances, the motor cannot accelerate to its speed setpoint after it has been switched on:

- Load moment of inertia too high
- Load torque too large
- Ramp-up time p1120 too short

To improve the starting behavior of the motor, a voltage boost can be set for the U/f characteristic at low speeds.

Requirement

The ramp-up time of the ramp-function generator is, depending on the motor rated power, 1 s (< 1 kW) ... 10 s (> 10 kW).

Function description

Setting the voltage boost for U/f control

The converter boosts the voltage corresponding to the starting currents p1310 ... p1312.

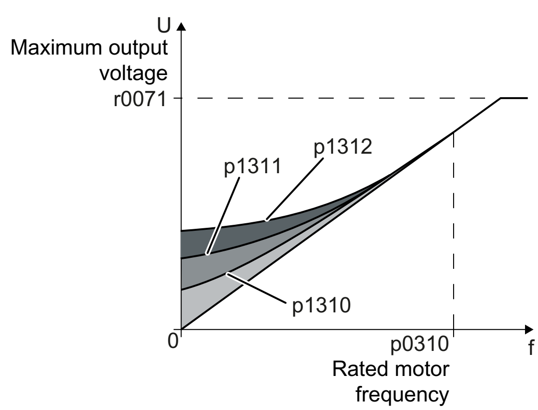


Figure 8-93 The resulting voltage boost using a linear characteristic as example

Increase parameter values p1310 ... p1312 in steps of ≤ 5 %. Excessively high values in p1310 ... p1312 can cause the motor to overheat and switch off (trip) the converter due to overcurrent.

If message A07409 appears, it is not permissible that you further increase the value of any of the parameters.

Procedure

1. Switch on the motor with a setpoint of a few revolutions per minute.
2. Check whether the motor rotates smoothly.

3. If the motor does not rotate smoothly, or even remains stationary, increase the voltage boost p1310 until the motor runs smoothly.
4. Accelerate the motor to the maximum speed with maximum load.
5. Check that the motor follows the setpoint.
6. If necessary, increase the voltage boost p1311 until the motor accelerates without problem.

In applications with a high break loose torque, you must also increase parameter p1312 in order to achieve a satisfactory motor response.

You have set the voltage boost.
❒

Parameter

Number	Name	Factory setting
r0071	Output voltage, maximum	Vrms
p0310[M]	Rated motor frequency	0 Hz
p1310[D]	Starting current (voltage boost) permanent	50%
p1311[D]	Starting current (voltage boost) when accelerating	0%
p1312[D]	Starting current (voltage boost) when starting	0%

8.7.2.3 U/f control with Standard Drive Control application class

Overview

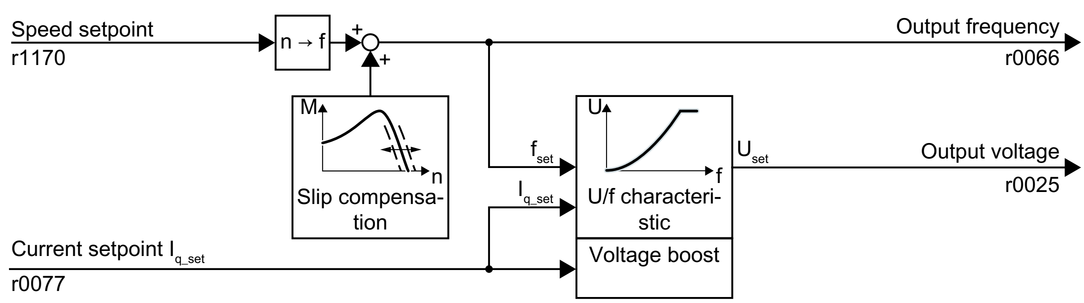


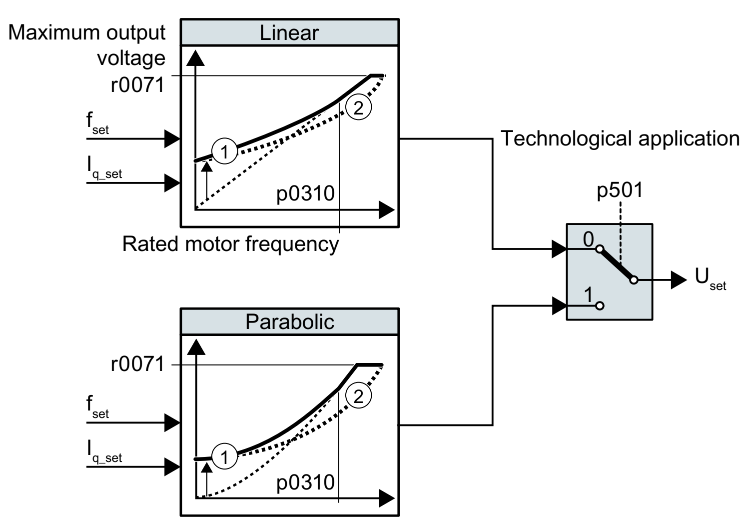
Figure 8-94 Default setting of the U/f control after selecting Standard Drive Control

Selecting application class Standard Drive Control in the quick commissioning adapts the structure and the setting options of the U/f control as follows:

- Starting current closed-loop control: At low speeds, a controlled motor current reduces the tendency of the motor to oscillate.
- With increasing speed, the converter changes from closed-loop starting current control to U/ f control with load-dependent voltage boost.
- The slip compensation is activated.
- Soft starting is not possible.
- Reduced setting options

Function description

Characteristics after selecting the application class Standard Drive Control



① The closed-loop starting current control optimizes the speed control at low speeds

② The converter compensates the voltage drop across the motor stator resistance

Figure 8-95 Characteristics after selecting Standard Drive Control

The application class Standard Drive Control reduces the number of characteristics and setting options:

- A linear and a parabolic characteristic are available.
- Selecting a technological application defines the characteristics.

Table 8-75 Linear and parabolic characteristics

Requirement	Application examples	Remark	Characteristic	Parameter
The required torque is independent of the speed	Eccentric-worm pump, compressor	-	Linear	p0501 = 0
The required torque increases with the speed	Centrifugal pumps, radial fans, axial fans	Lower losses in the motor and converter than for a linear characteristic.	Parabolic	p0501 = 1

Parameter

Number	Name	Factory setting
r0025	CO: Output voltage, smoothed	- Vrms
r0066	CO: Output frequency	- Hz
r0071	Output voltage, maximum	- Vrms
p0310[M]	Rated motor frequency	0 Hz
p501	Technology application	0

8.7.2.4 Optimizing motor starting using Standard Drive Control

Overview

After selecting application class Standard Drive Control, in most applications no additional settings need to be made.

At standstill, the converter ensures that at least the rated motor magnetizing current flows. Magnetizing current p0320 approximately corresponds to the no-load current at 50 % ... 80 % of the rated motor speed.

In the following circumstances, the motor cannot accelerate to its speed setpoint after it has been switched on:

- Load moment of inertia too high
- Load torque too large
- Ramp-up time p1120 too short

The current can be increased at low speeds to improve the starting behavior of the motor.

Requirement

The ramp-up time of the ramp-function generator is, depending on the motor rated power, 1 s (< 1 kW) ... 10 s (> 10 kW).

Function description

Starting current (boost) after selecting the application class Standard Drive Control

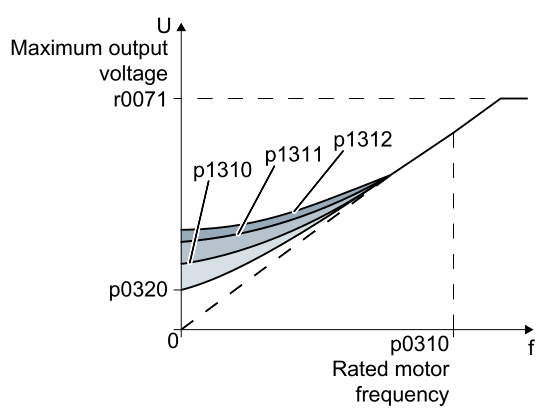


Figure 8-96 The resulting voltage boost using a linear characteristic as example

The converter boosts the voltage corresponding to the starting currents p1310 ... p1312.

Increase parameter values p1310 ... p1312 in steps of ≤ 5 %. Excessively high values in p1310 ... p1312 can cause the motor to overheat and switch off (trip) the converter due to overcurrent.

If message A07409 appears, it is not permissible that you further increase the value of any of the parameters.

Procedure

1. Switch on the motor with a setpoint of a few revolutions per minute.
2. Check whether the motor rotates smoothly.
3. If the motor does not rotate smoothly, or even remains stationary, increase the voltage boost p1310 until the motor runs smoothly.
4. Accelerate the motor with the maximum load.
5. Check that the motor follows the setpoint.
6. If necessary, increase the voltage boost p1311 until the motor accelerates without problem.

In applications with a high break loose torque, you must also increase parameter p1312 in order to achieve a satisfactory motor response.

You have set the voltage boost.
❒

Parameter

Number	Name	Factory setting
r0071	Output voltage, maximum	Vrms
p0310[M]	Rated motor frequency	0 Hz
p0320[M]	Rated motor magnetizing current / short-circuit current	0 Arms
p1310[D]	Starting current (voltage boost) permanent	50%
p1311[D]	Starting current (voltage boost) when accelerating	0%
p1312[D]	Starting current (voltage boost) when starting	0%

8.7.2.5 Function diagram 6300 - U/f control, overview

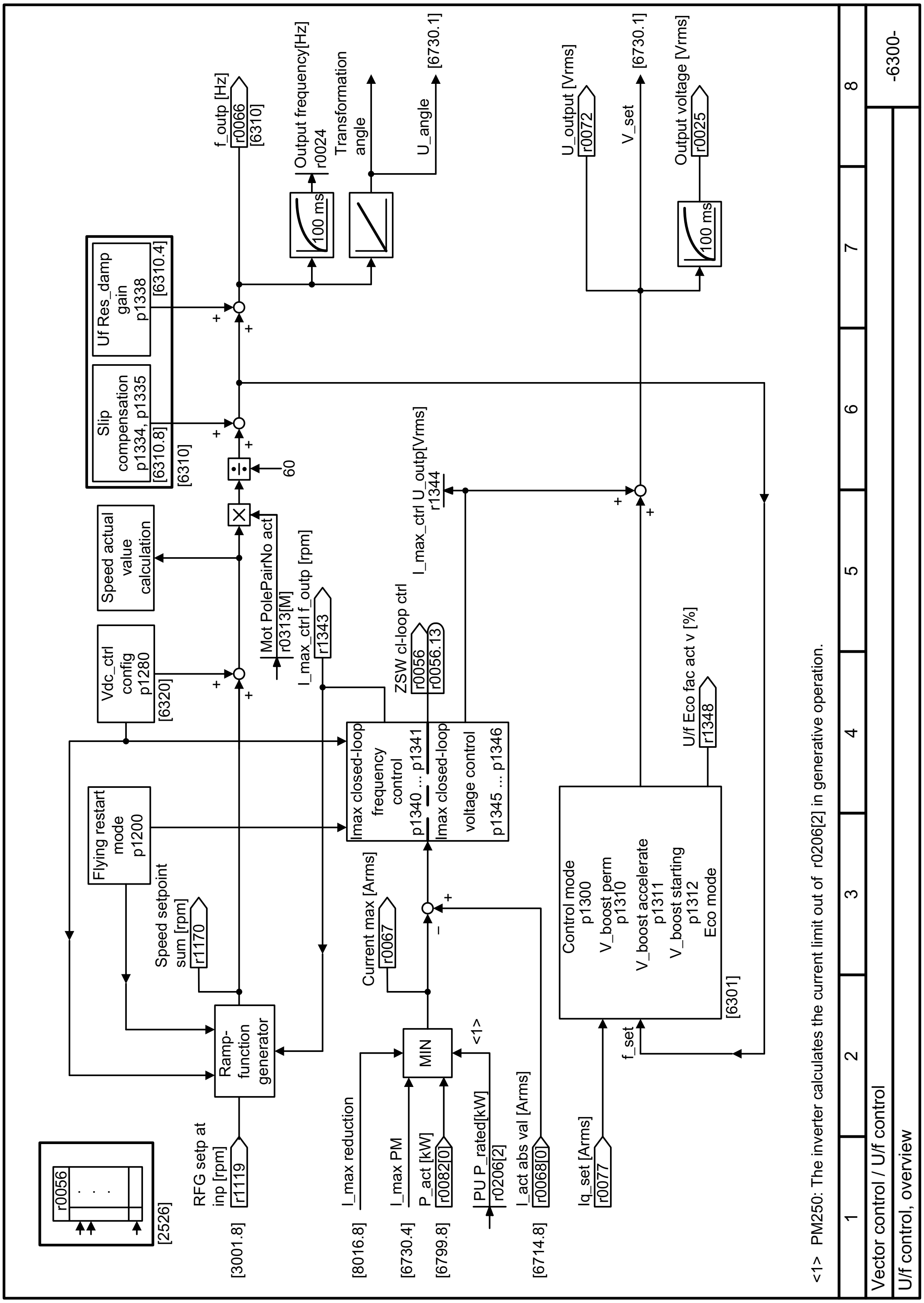


Figure 8-97 FP 6300

8.7.2.6 Function diagram 6301 - U/f control, characteristic and voltage boost

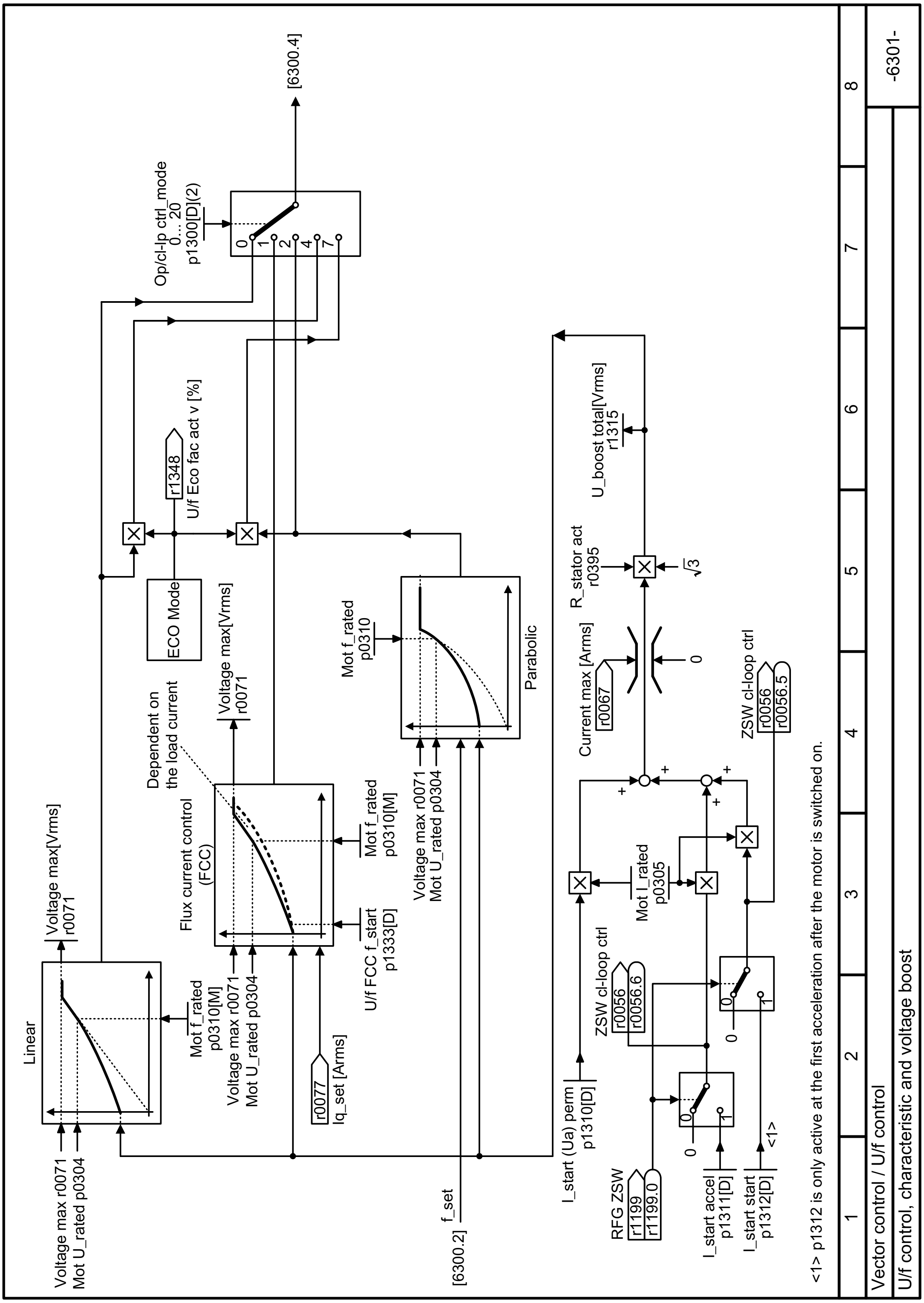


Figure 8-98 FP 6301

8.7.2.7 Function diagram 6310 - U/f control, resonance damping and slip compensation

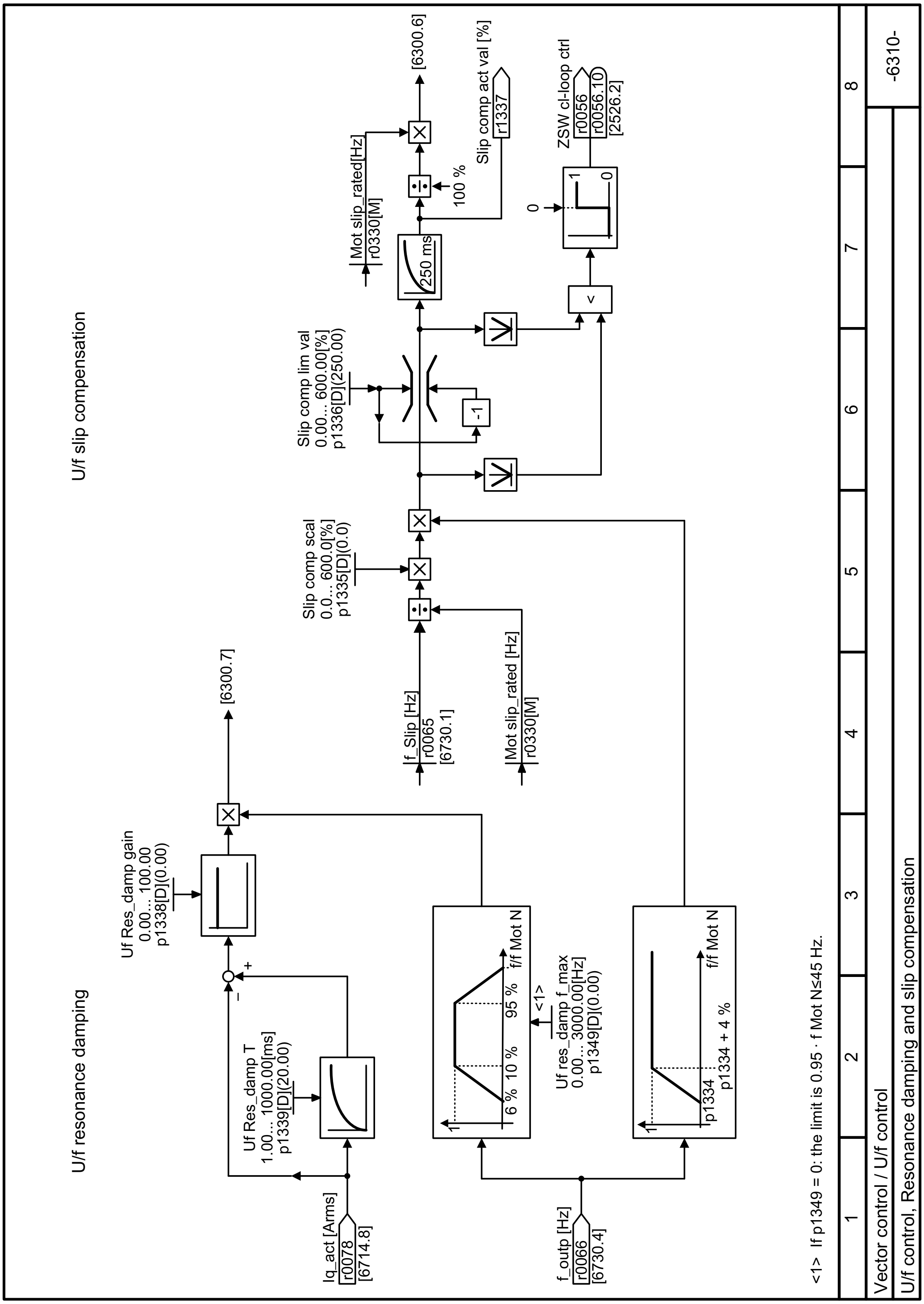


Figure 8-99 FP 6310

8.7.2.8 Function diagram 6320 - U/f control, Vdc_max and Vdc_min controllers

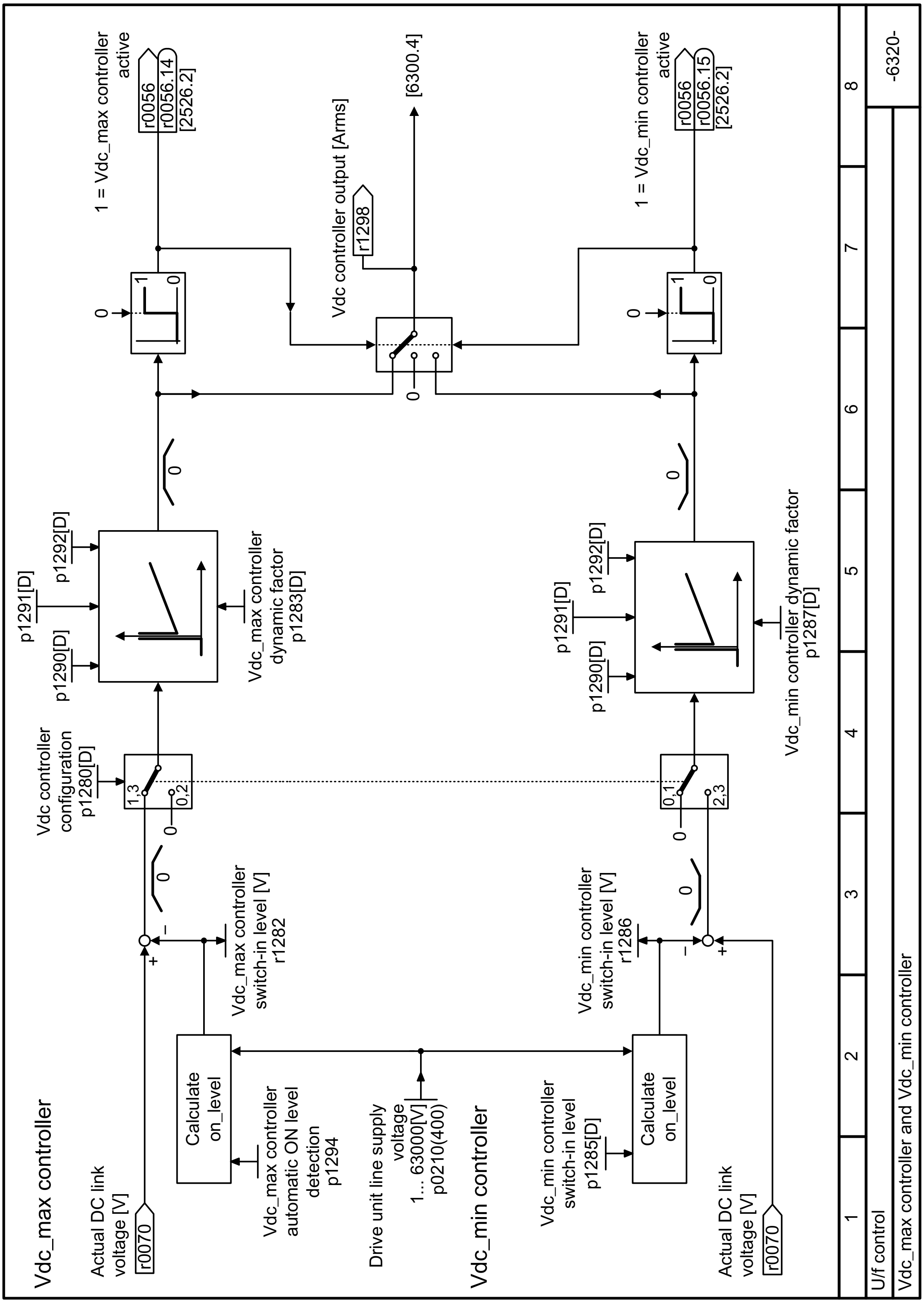


Figure 8-100 FP 6320

8.7.2.9 Function diagram 6850 - Standard Drive Control, overview

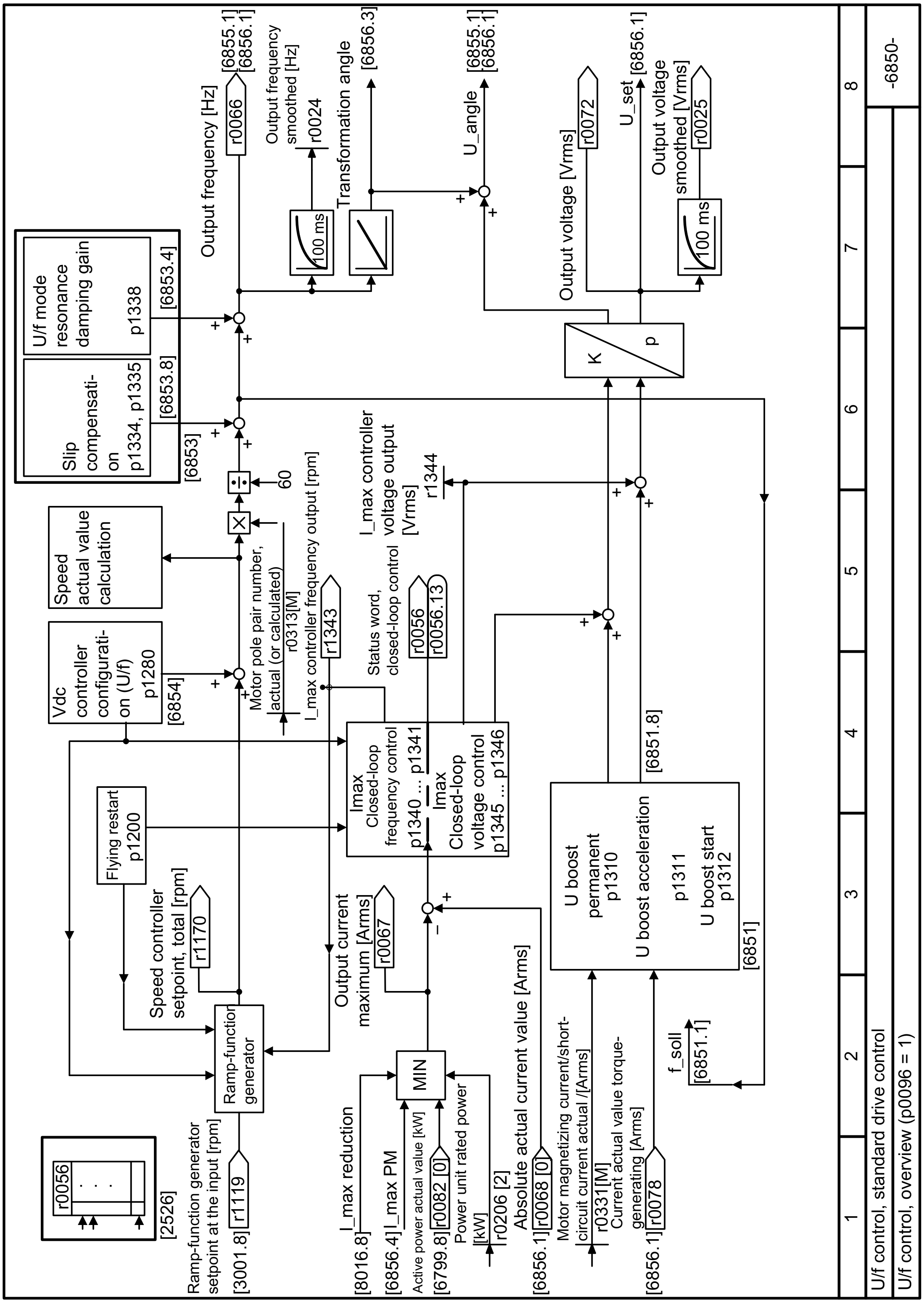


Figure 8-101 FP 6850

8.7.2.10 Function diagram 6851 - Standard Drive Control, characteristic and voltage boost

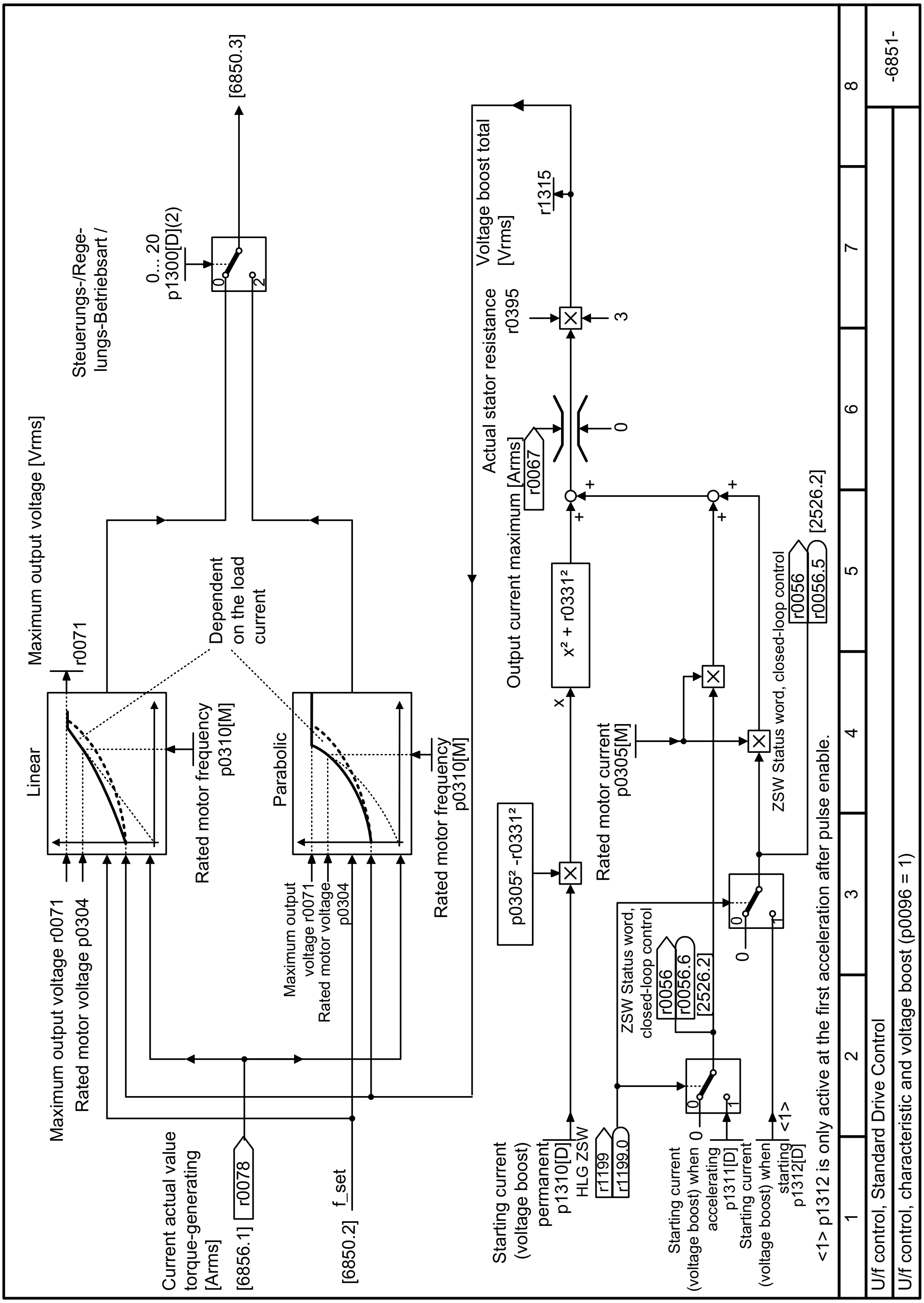


Figure 8-102 FP 6851

8.7.2.11 Function diagram 6853 - Standard Drive Control, resonance damping and slip compensation

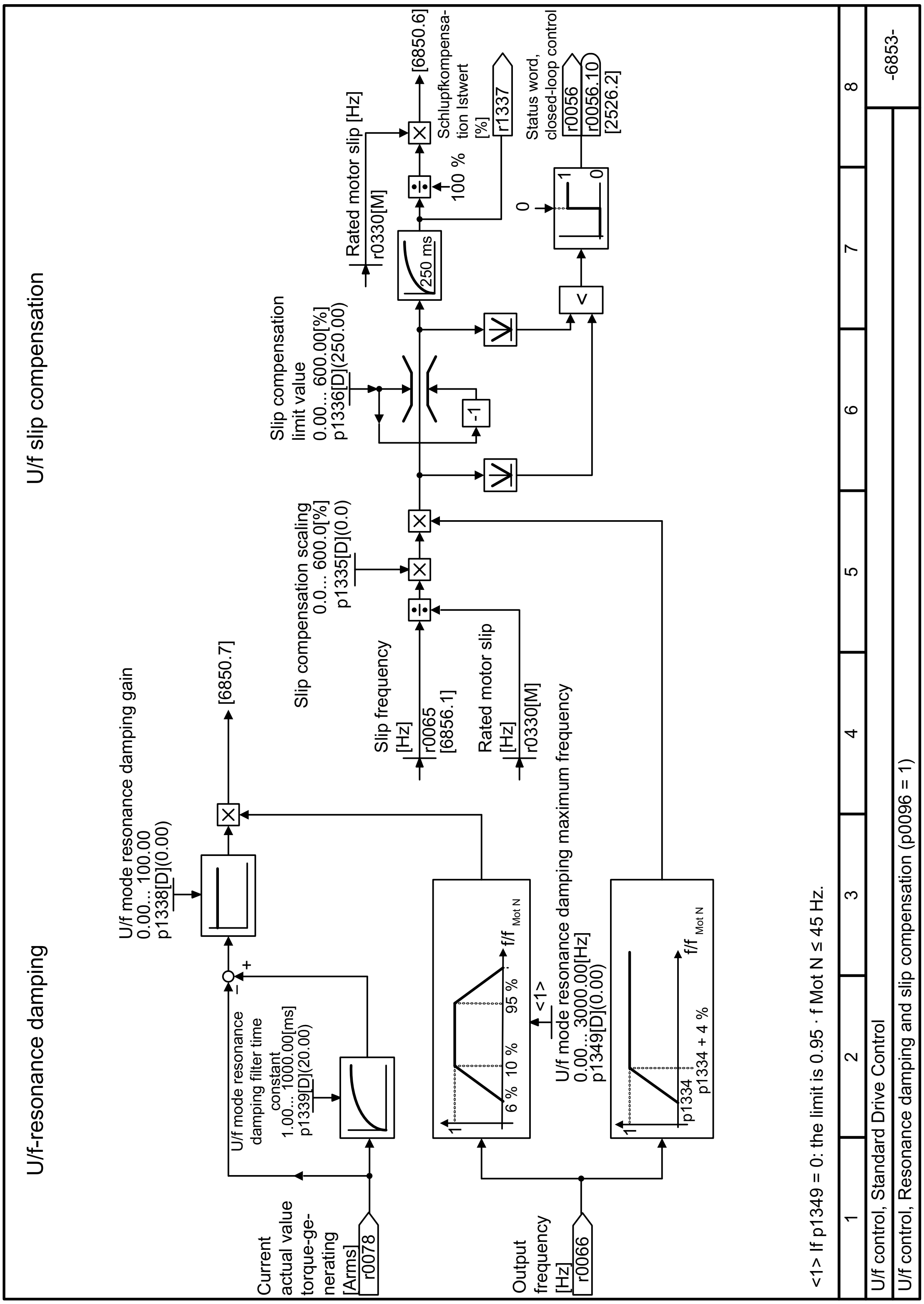


Figure 8-103 FP 6853

8.7.2.12 Function diagram 6854 - Standard Drive Control, Vdc_max and Vdc_min controllers

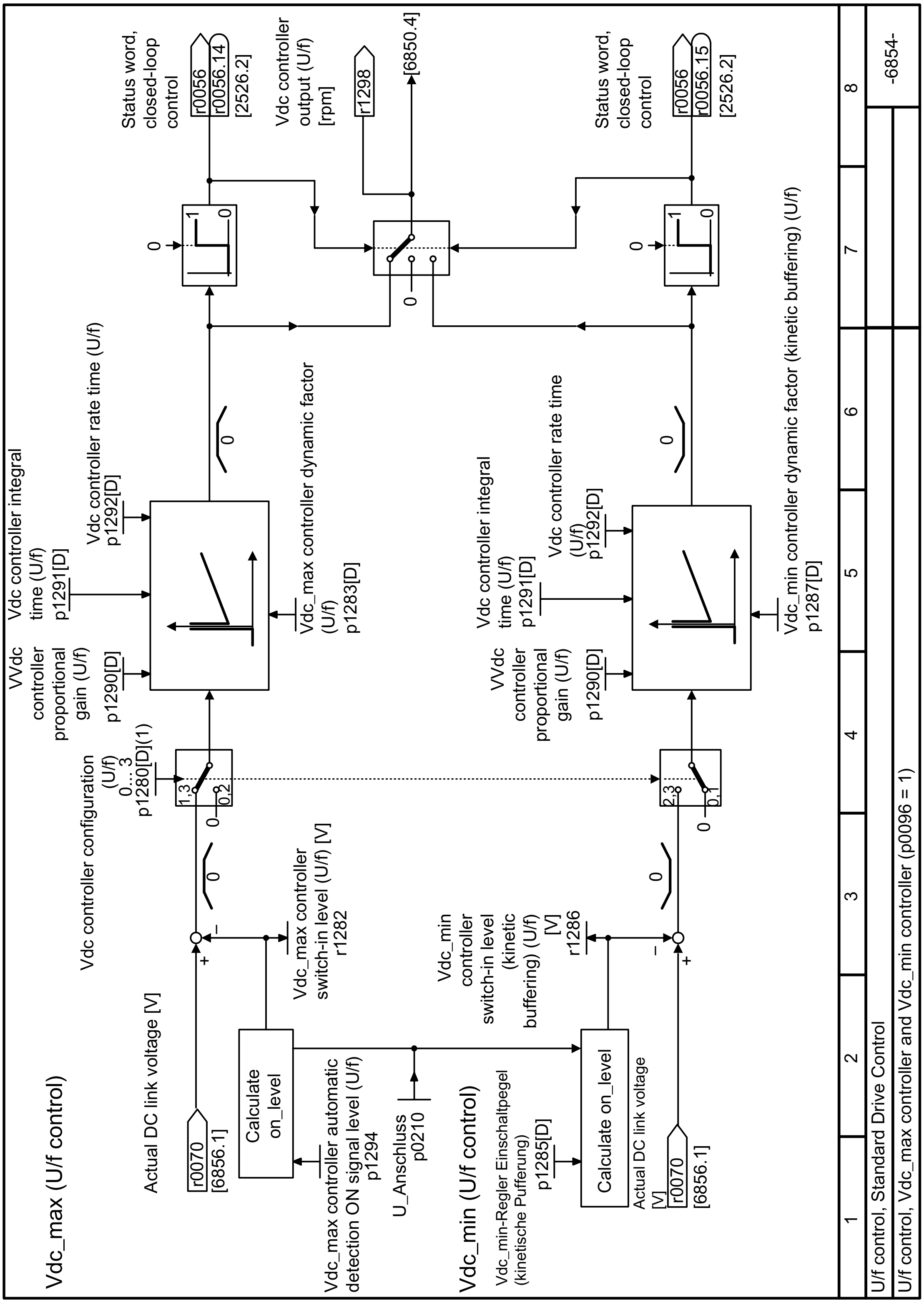


Figure 8-104 FP 6854

8.7.2.13 Function diagram 6855 - Standard Drive Control, DC quantity control

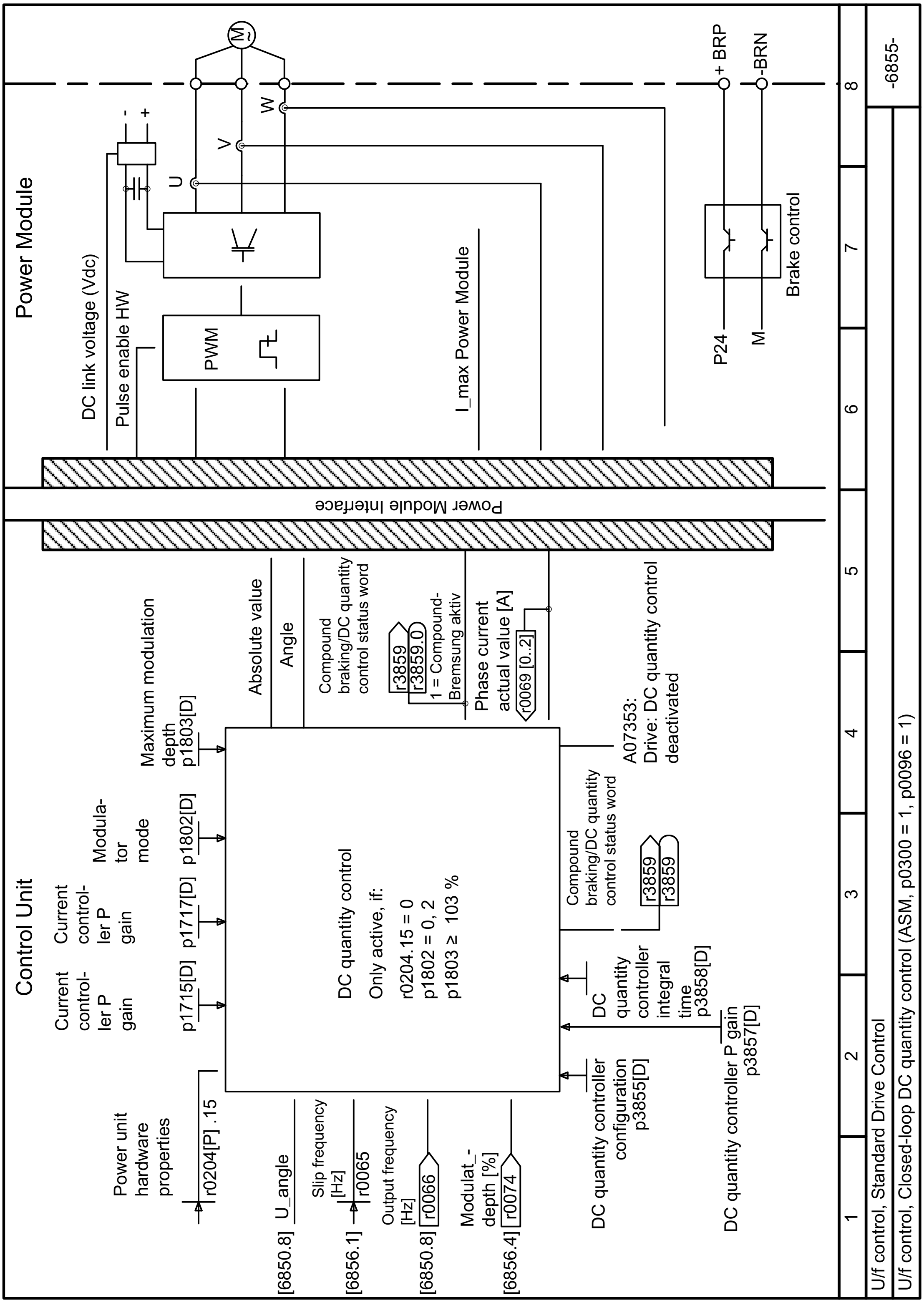


Figure 8-105 FP 6855

8.7.2.14 Function diagram 6856 - Standard Drive Control, interface to the Power Module

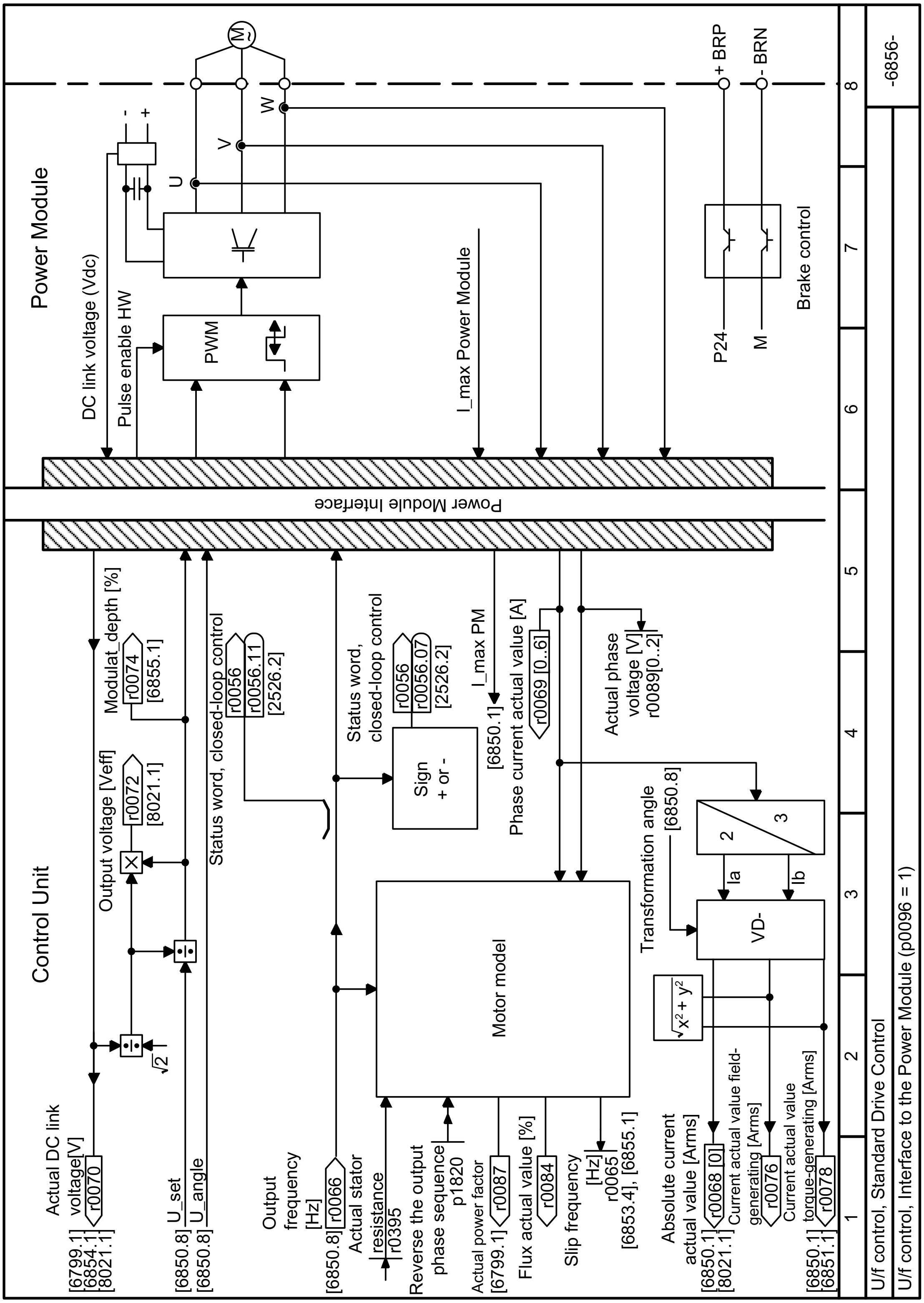


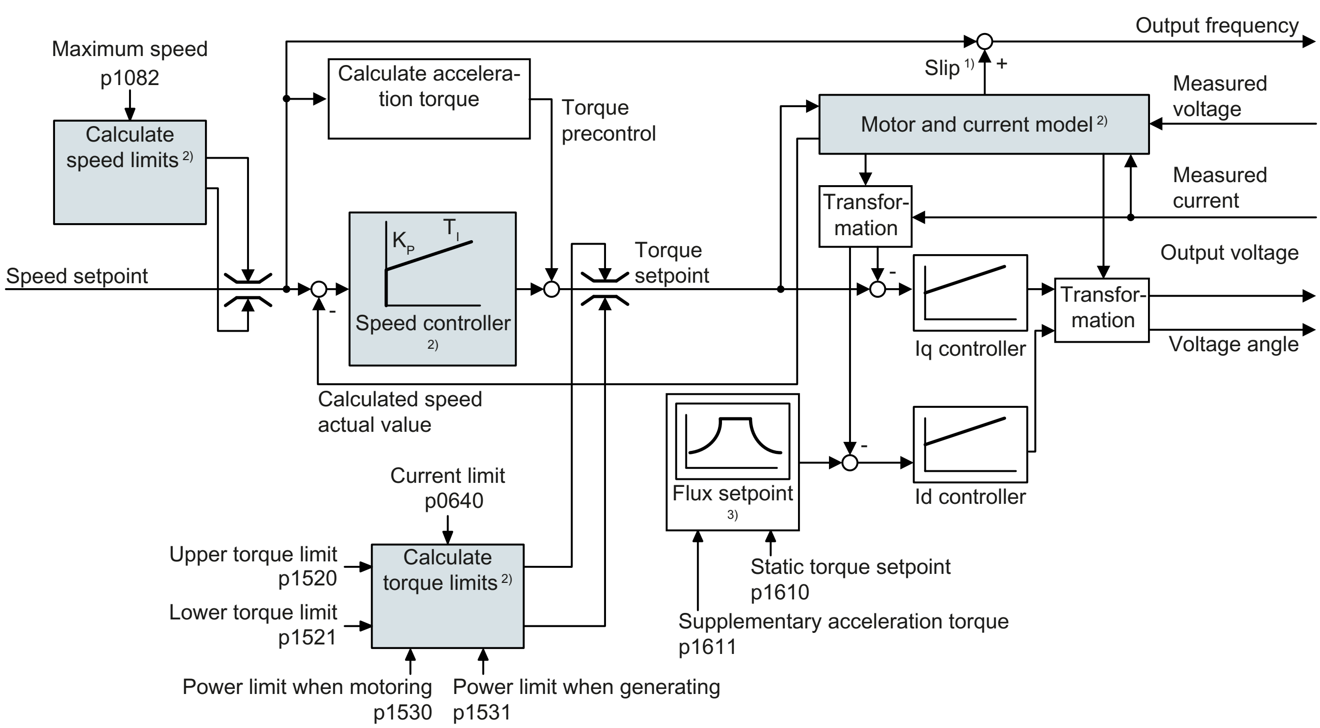
Figure 8-106 FP 6856

8.7.3 Encoderless vector control

8.7.3.1 Structure of vector control without encoder (sensorless)

Overview

The vector control comprises closed-loop current control and a higher-level closed-loop speed control.



[1] for induction motors

[2] Settings that are required

Figure 8-107 Simplified function diagram for sensorless vector control with speed controller

Using the motor model, the converter calculates the following closed-loop control signals from the measured phase currents and the output voltage:

- Current component I_q
- Current component I_q
- Speed actual value

The setpoint of the current component I_d (flux setpoint) is obtained from the motor data. For speeds above the rated speed, the converter reduces the flux setpoint along the field weakening characteristic.

When the speed setpoint is increased, the speed controller responds with a higher setpoint for current component I_q (torque setpoint). The closed-loop control responds to a higher torque setpoint by adding a higher slip frequency to the output frequency. The higher output frequency also results in a higher motor slip, which is proportional to the accelerating torque. I_q and

$I_d$controllers keep the motor flux constant using the output voltage, and adjust the matching current component I_q in the motor.

Settings that are required

Restart quick commissioning and select the vector control in quick commissioning.

Commissioning (Page 123)

In order to achieve a satisfactory control response, as a minimum you must set the partial functions – shown with gray background in the diagram above – to match your particular application:

- **Motor and current model**: In the quick commissioning, correctly set the motor data on the rating plate corresponding to the connection type (Y/Δ), and carry out the motor data identification routine at standstill.
- **Speed limits** and **torque limits**: In the quick commissioning, set the maximum speed (p1082) and current limit (p0640) to match your particular application**.** When exiting quick commissioning, the converter calculates the torque and power limits corresponding to the current limit. The actual torque limits are obtained from the converted current and power limits and the set torque limits.
- **Speed controller**: Start the rotating measurement of the motor data identification. You must manually optimize the controller if the rotating measurement is not possible.

Default settings after selecting the application class Dynamic Drive Control

Selecting application class Dynamic Drive Control adapts the structure of the vector control and reduces the setting options:

	Vector control after selecting the application class Dynamic Drive Control	**Vector control without selecting an application class**
Hold or set the integral component of the speed controller	Not possible	Possible
Acceleration model for precontrol	Default setting	Can be activated
Motor data identification at standstill or with rotating measurement	Shortened, with optional transition into operation	Complete

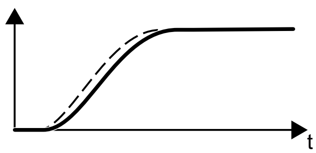
8.7.3.2 Optimizing the speed controller

Optimum control response - post optimization not required

Preconditions for assessing the controller response:

- The moment of inertia of the load is constant and does not depend on the speed
- The converter does not reach the set torque limits during acceleration
- You operate the motor in the range 40 % ... 60 % of its rated speed

If the motor exhibits the following response, the speed control is well set and you do not have to adapt the speed controller manually:

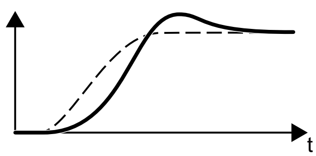


The speed setpoint (broken line) increases with the set ramp-up time and rounding.

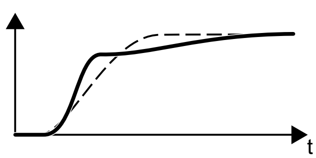
The speed actual value follows the setpoint without any overshoot.

Control optimization required

In some cases, the self optimization result is not satisfactory, or self optimization is not possible as the motor cannot freely rotate.



Initially, the speed actual value follows the speed setpoint with some delay, and then overshoots the speed setpoint.



First, the actual speed value increases faster than the speed setpoint. Before the setpoint reaches its final value, it passes the actual value. Finally, the actual value approaches the setpoint without any significant overshoot.

In the two cases describe above, we recommend that you manually optimize the speed control.

Optimizing the speed controller

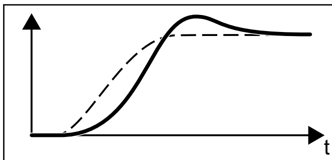
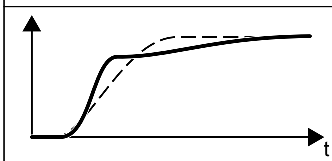
Requirements

- Torque precontrol is active: p1496 = 100 %.
- The load moment of inertia is constant and independent of the speed.
- The converter requires 10 % ... 50 % of the rated torque to accelerate.
  When necessary, adapt the ramp-up and ramp-down times of the ramp-function generator (p1120 and p1121).

Procedure

1. Switch on the motor.
2. Enter a speed setpoint of approximately 40 % of the rated speed.
3. Wait until the actual speed has stabilized.
4. Increase the setpoint up to a maximum of 60% of the rated speed.
5. Monitor the associated characteristic of the setpoint and actual speed.

6. Optimize the controller by adapting the ratio of the moments of inertia of the load and motor (p0342):

<table>
<tr><td>
</td><td>Initially, the speed actual value follows the speed setpoint with some delay, and then overshoots the speed setpoint.
• Increase p0342</td></tr>
<tr><td>
</td><td>Initially, the speed actual value increases faster than the speed setpoint. The setpoint passes the actual value before reaching its final value. Finally, the actual value approaches the setpoint without any overshoot.
• Reduce p0342</td></tr>
</table>

7. Switch off the motor.
8. Set p0340 = 4. The converter again calculates the speed controller parameters.
9. Switch on the motor.
10. Over the complete speed range check as to whether the speed control operates satisfactorily with the optimized settings.

You have optimized the speed controller.
❒

When necessary, set the ramp-up and ramp-down times of the ramp-function generator (p1120 and p1121) back to the value before optimization.

Mastering critical applications

The drive control can become unstable for drives with a high load moment of inertia and gearbox backlash or a coupling between the motor and load that can possibly oscillate. In this case, we recommend the following settings:

- Increase p1452 (smoothing the speed actual value).
- Increase p1472 (integral time T_I): $T_I \geq 4 \cdot$ p1452
- If, after these measures, the speed controller does not operate with an adequate dynamic performance, then increase p1470 (gain K_P) step-by-step.

Parameters

Table 8-76 Encoderless speed control

Number	Name	Factory setting
p0342[M]	Ratio between the total and motor moments of inertia	1
p1452	Speed controller actual speed value smoothing time (encoderless)	10 ms
p1470[D]	Speed controller encoderless operation P gain	0.3
p1472[D]	Speed controller encoderless operation integral time	20 ms
p1496[D]	Acceleration precontrol scaling	0%

8.7.3.3 Function diagram 6020 - Vector control, overview

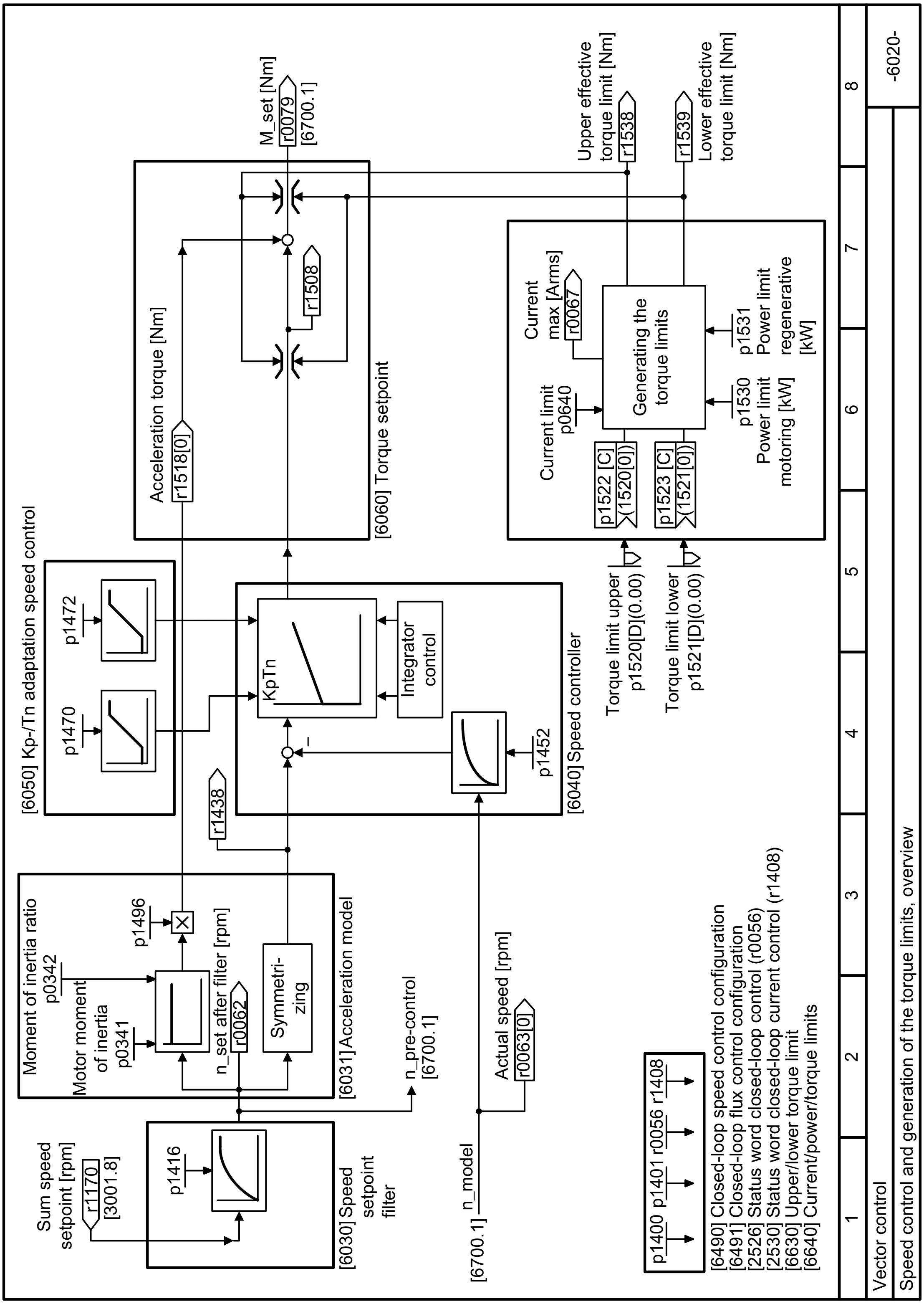


Figure 8-108 FP 6020

8.7.3.4 Function diagram 6030 - Vector control, speed setpoint

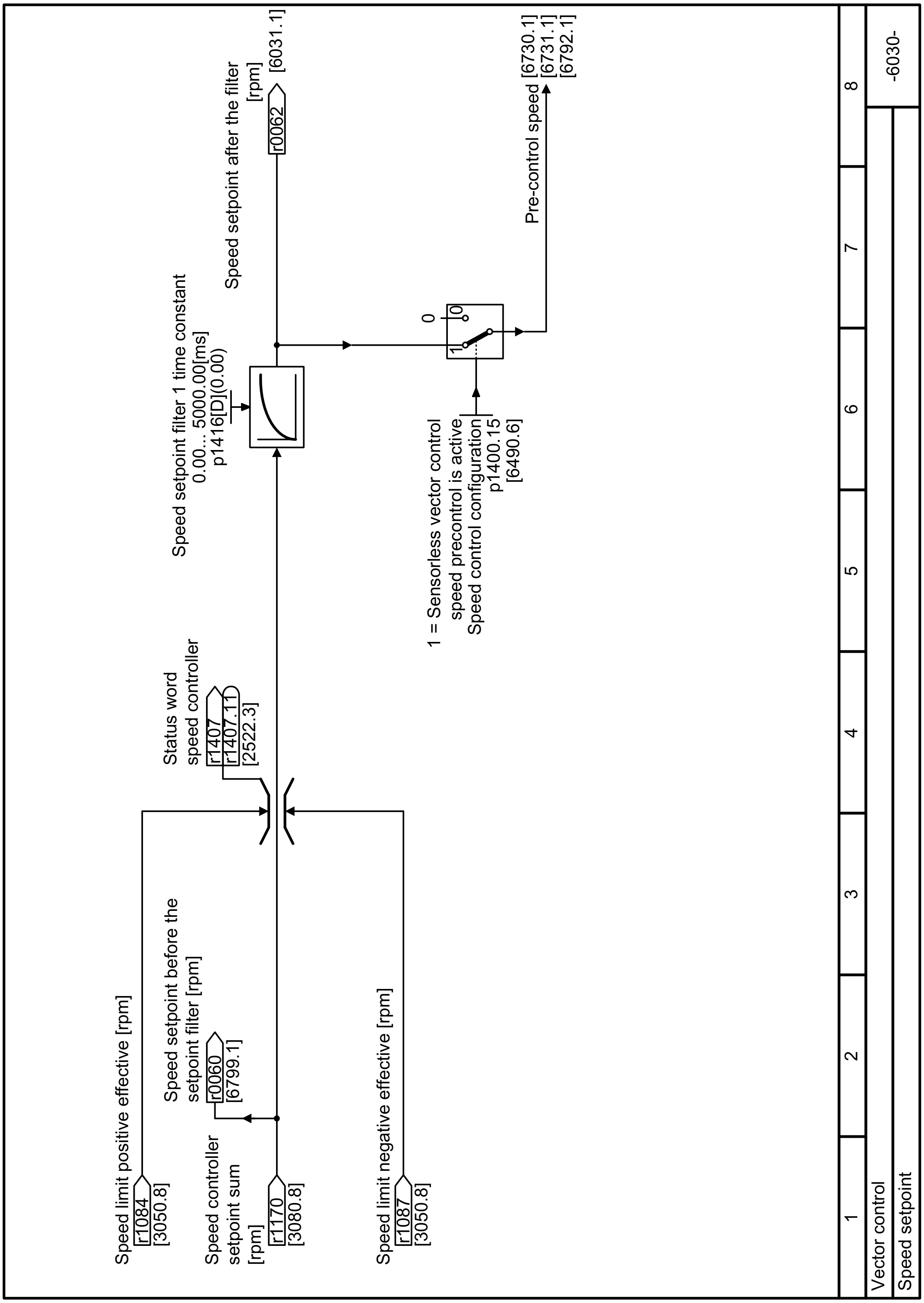


Figure 8-109 FP 6030

8.7.3.5 Function diagram 6031 - Vector control, acceleration model

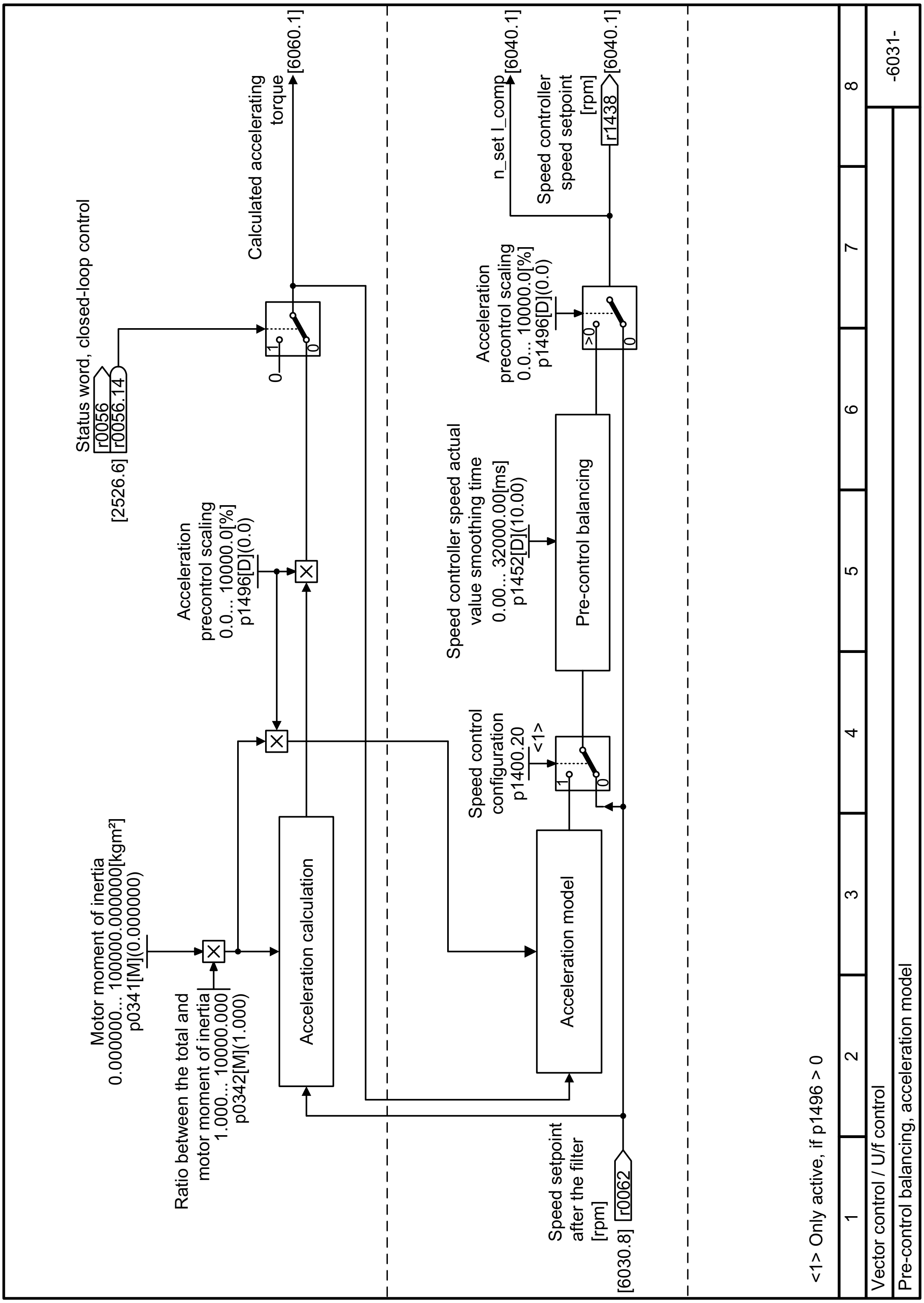


Figure 8-110 FP 6031

8.7.3.6 Function diagram 6040 - Vector control, speed controller

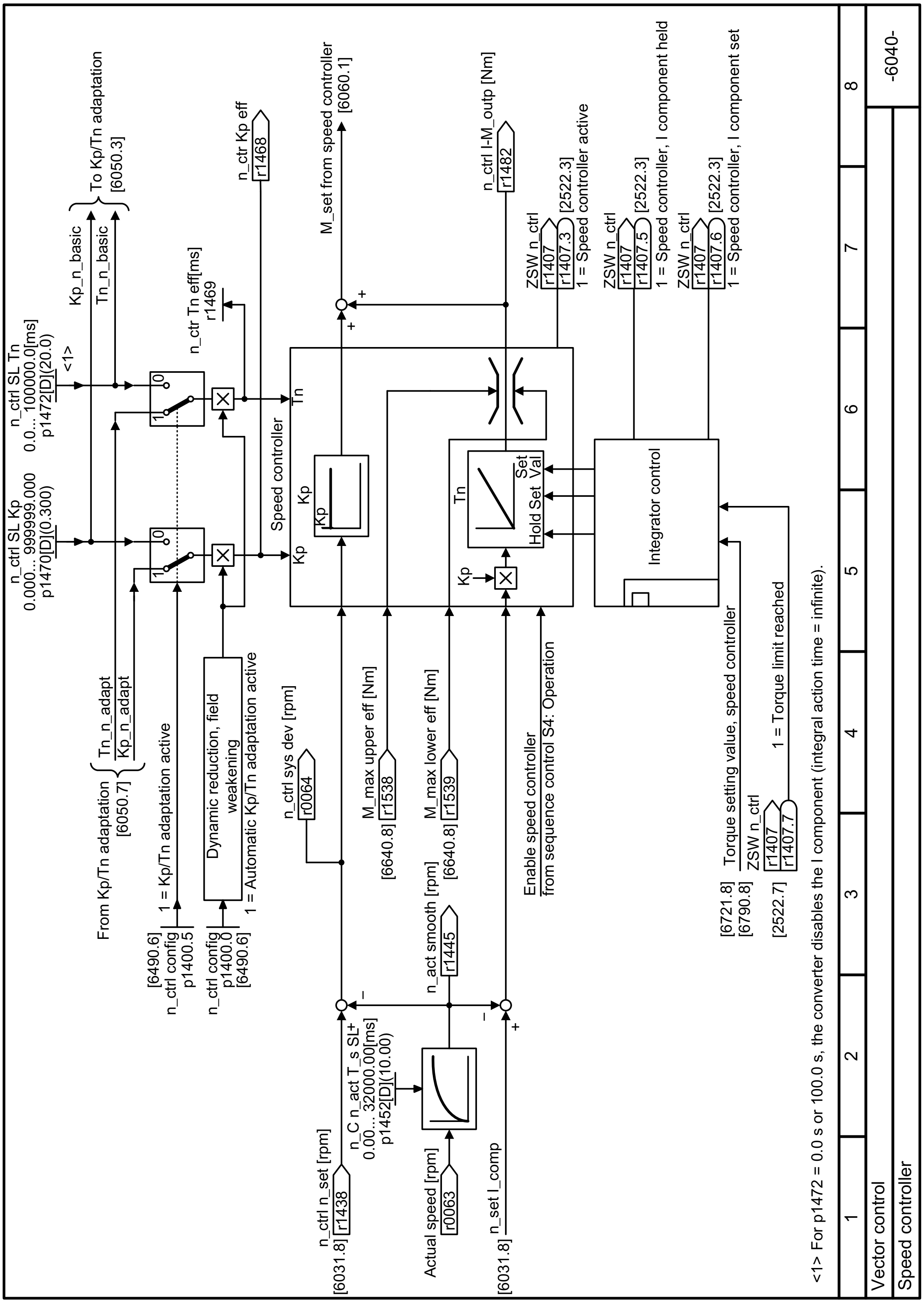


Figure 8-111 FP 6040

8.7.3.7 Function diagram 6050 - Vector control, Kp and Tn adaptation

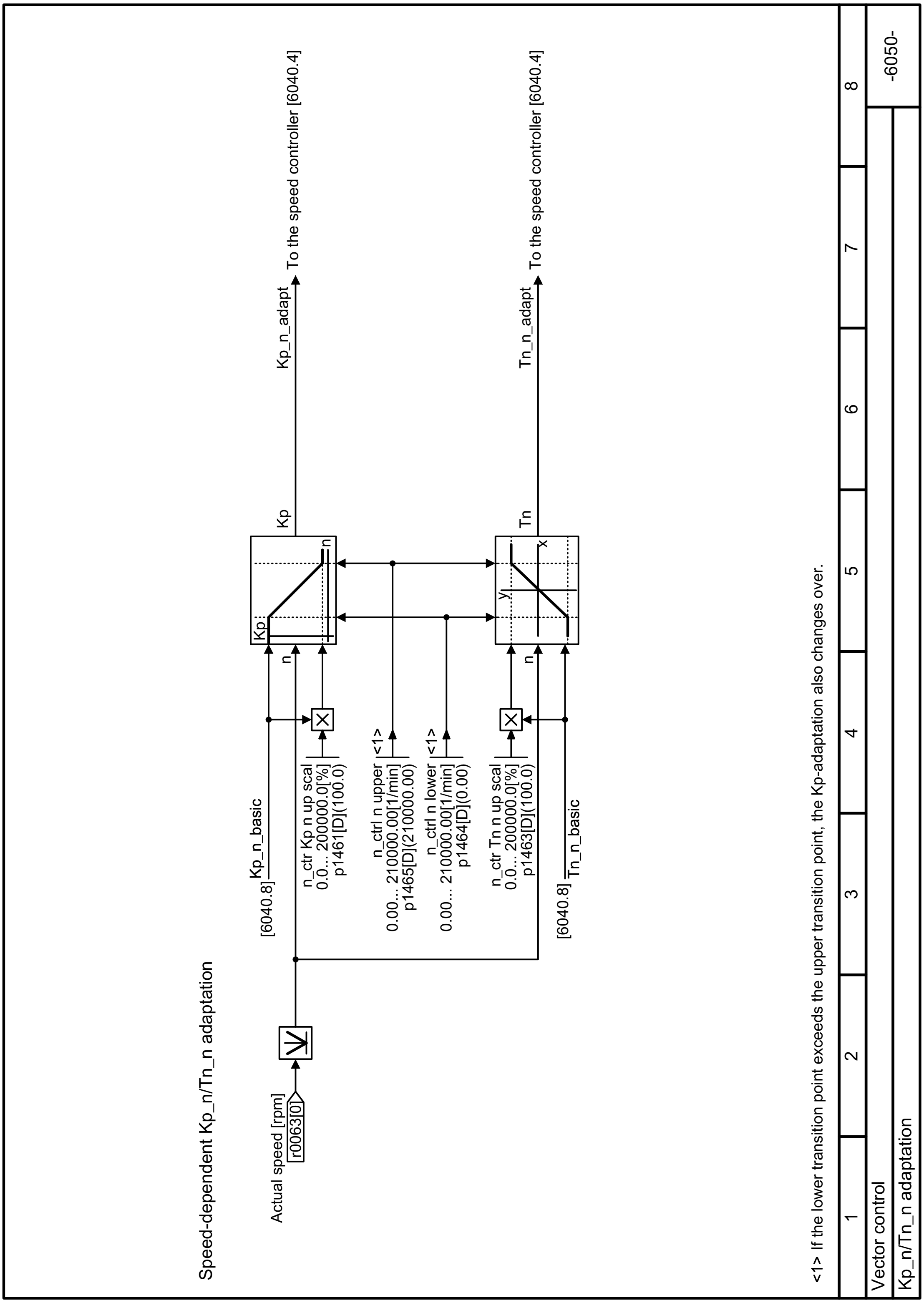


Figure 8-112 FP 6050

8.7.3.8 Function diagram 6060 - Vector control, torque setpoint

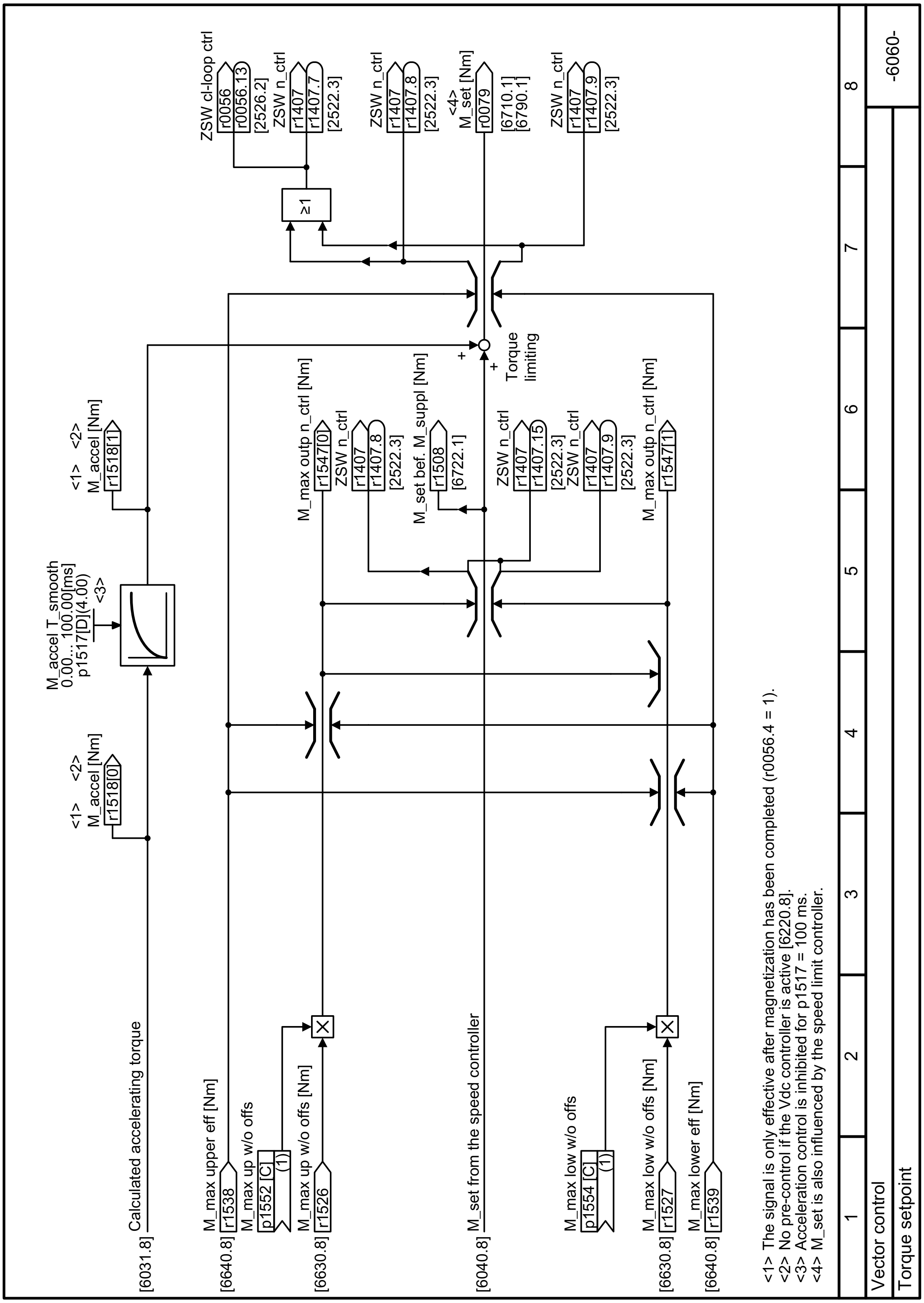


Figure 8-113 FP 6060

8.7.3.9 Function diagram 6220 - Vector control, Vdc_max and Vdc_min controllers

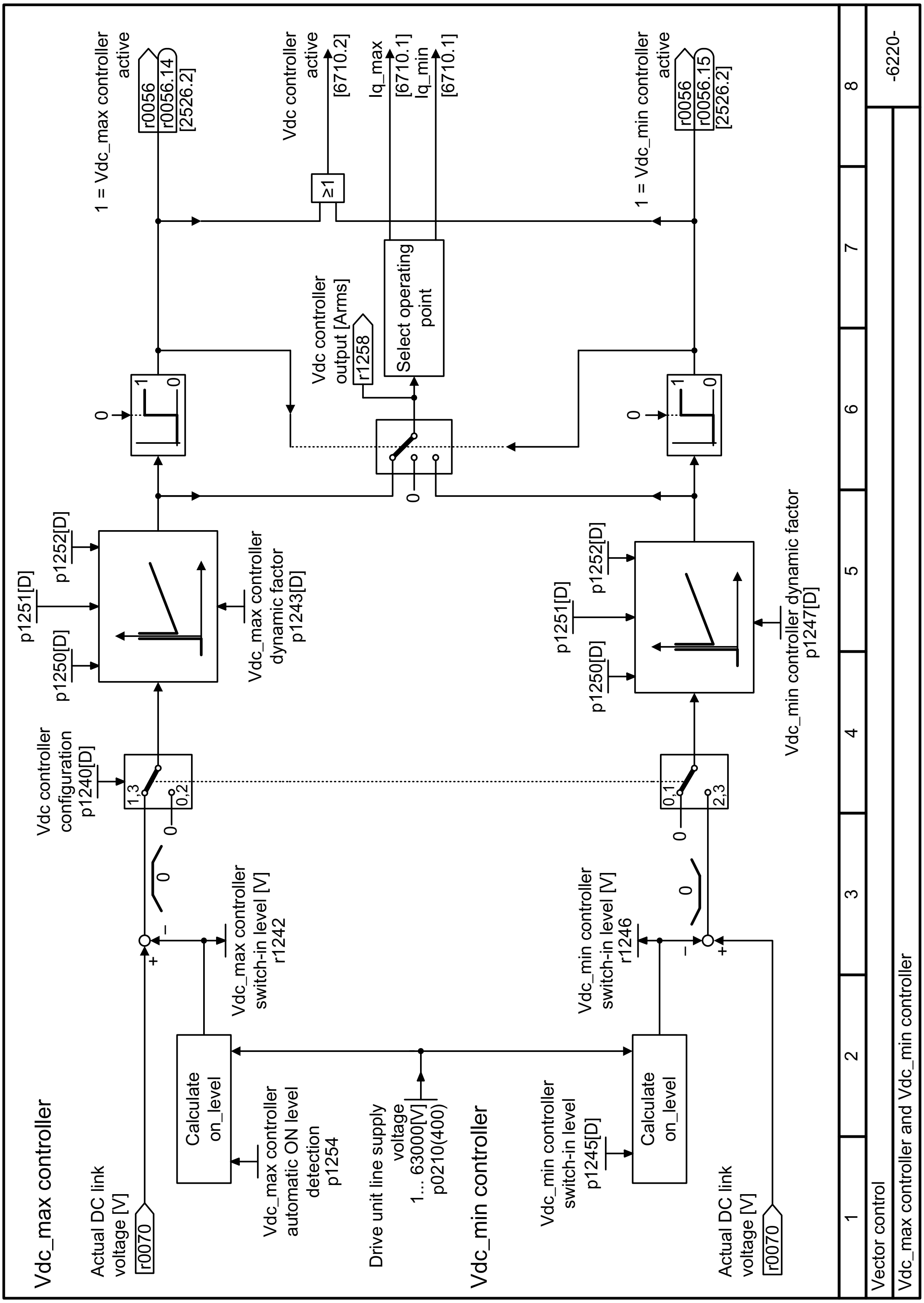


Figure 8-114 FP 6220

8.7.3.10 Function diagram 6490 - Vector control, closed-loop speed control configuration

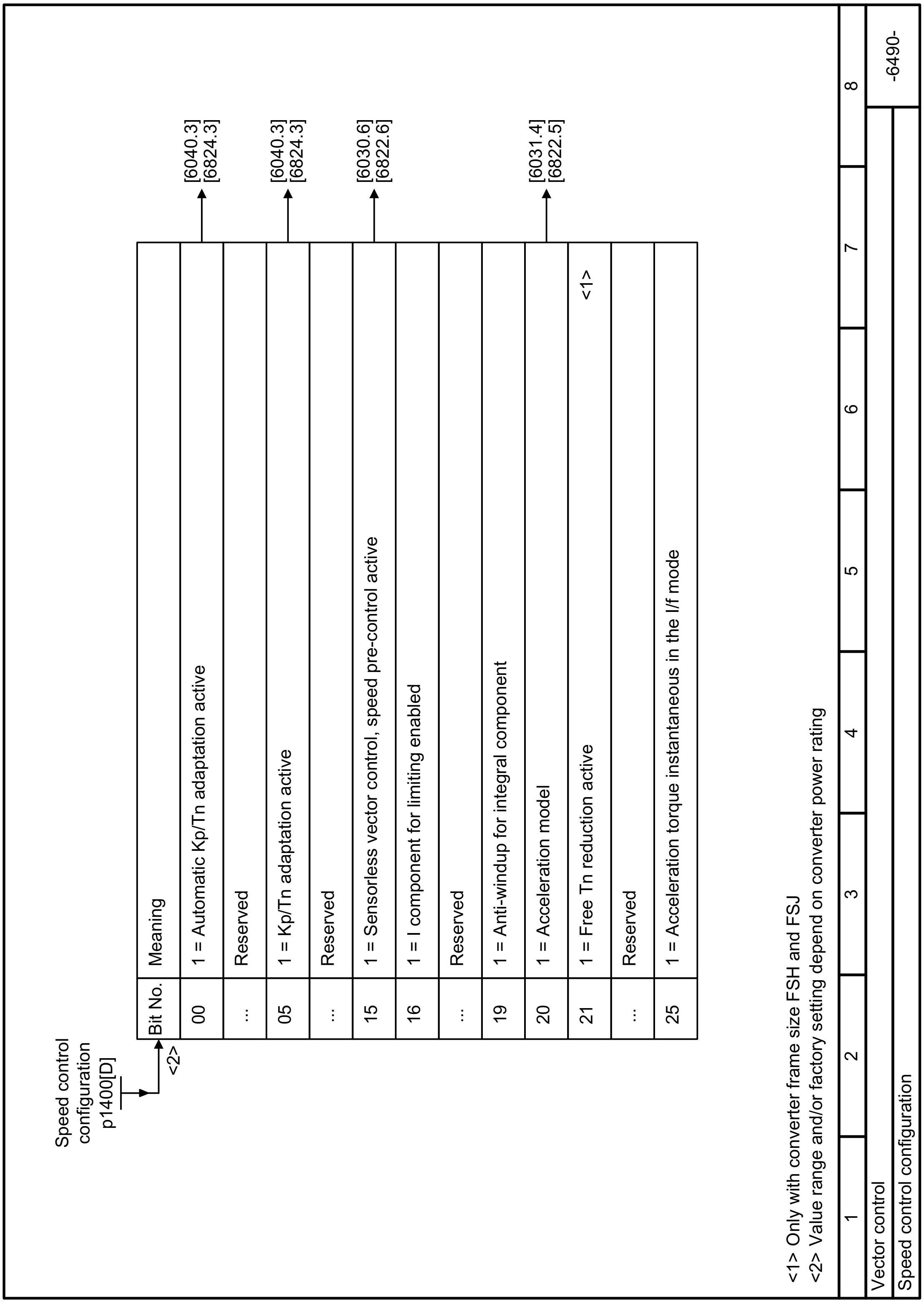


Figure 8-115 FP 6490

8.7.3.11 Function diagram 6491 - Vector control, flux control configuration

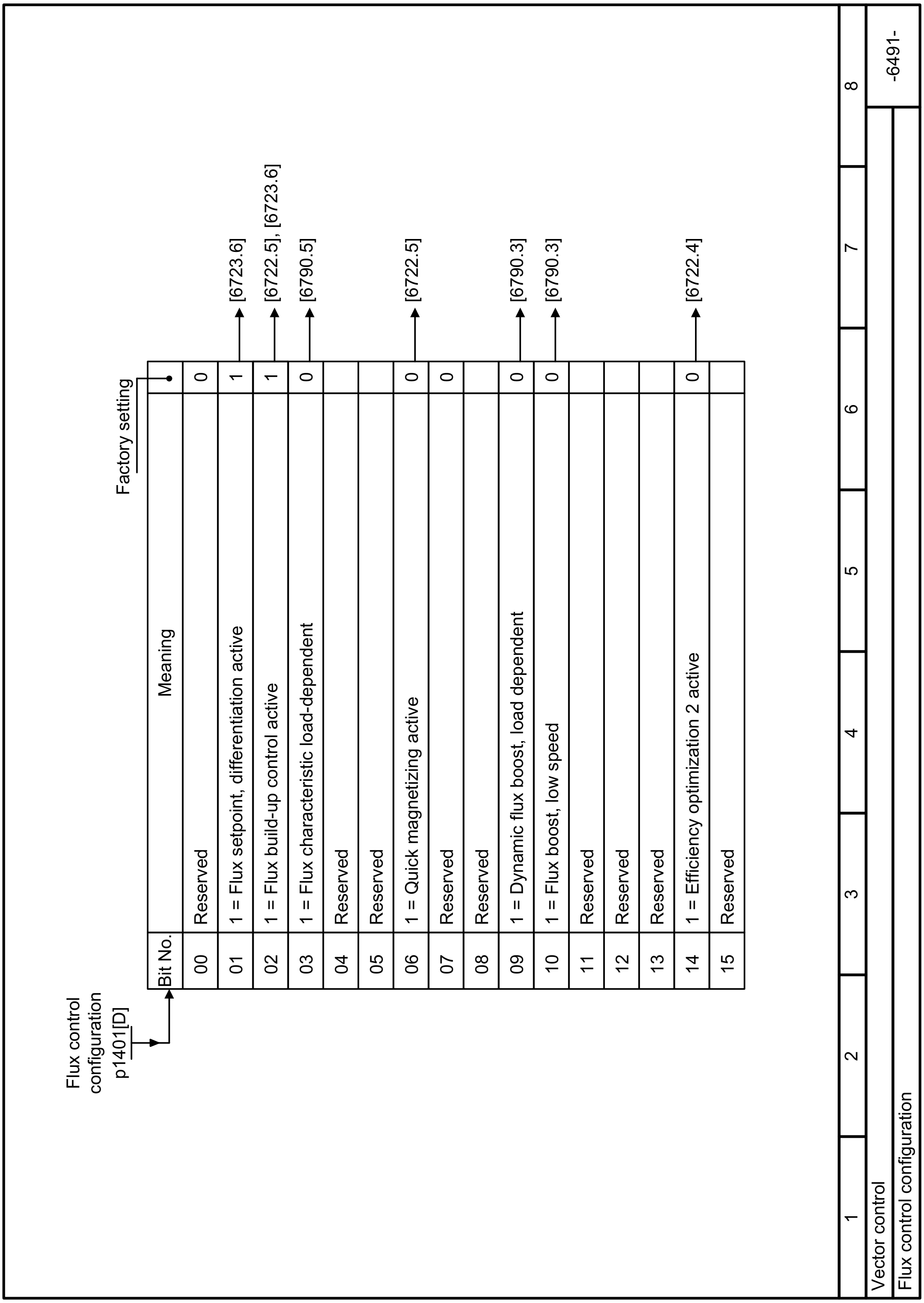


Figure 8-116 FP 6491

8.7.3.12 Function diagram 6630 - Vector control, upper and lower torque limits

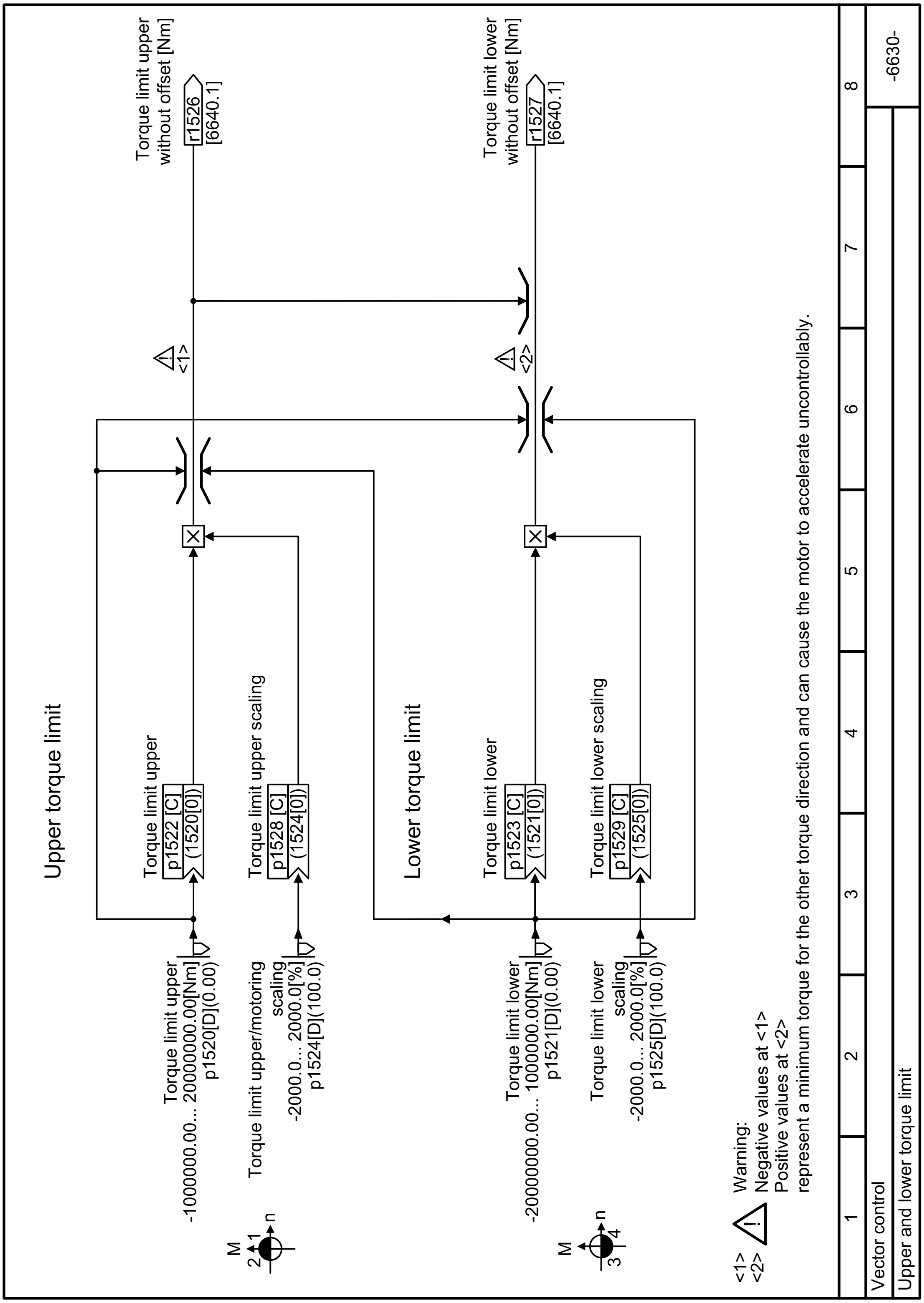


Figure 8-117 FP 6630

8.7.3.13 Function diagram 6640 - Vector control, current/power/torque limits

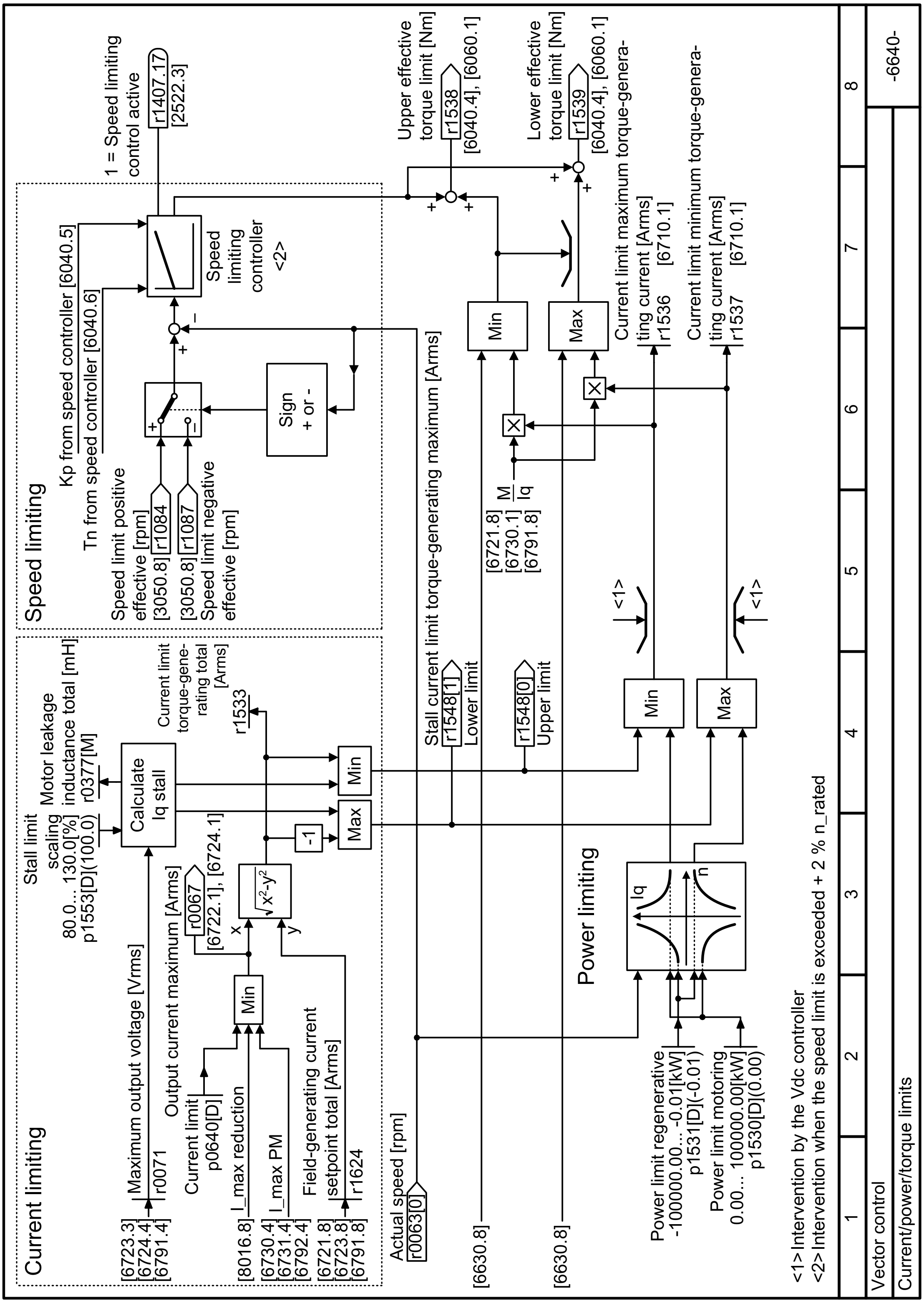


Figure 8-118 FP 6640

8.7.3.14 Function diagram 6700 - Vector control, closed-loop current control overview

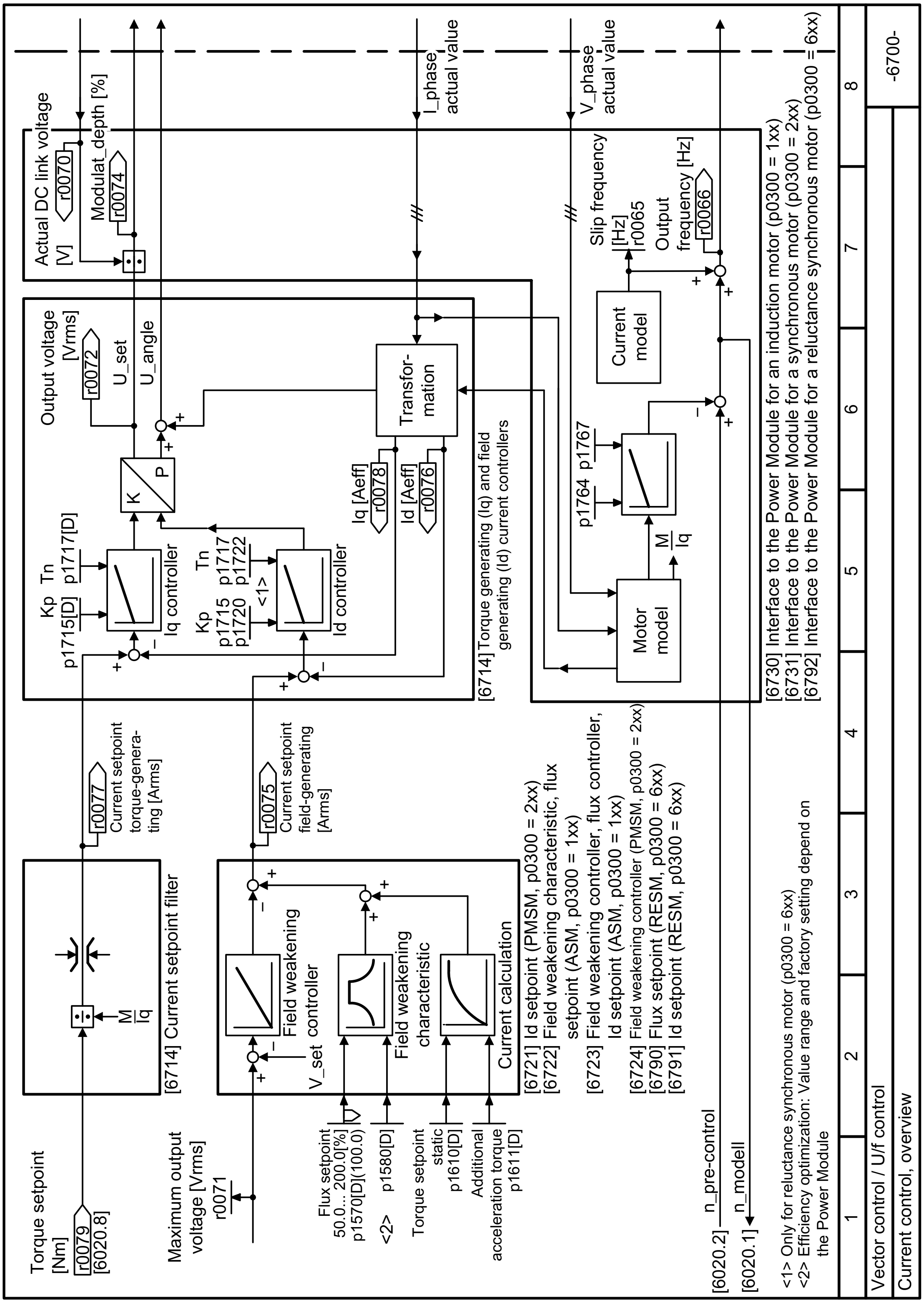


Figure 8-119 FP 6700

8.7.3.15 Function diagram 6710 - Vector control, current setpoint filter

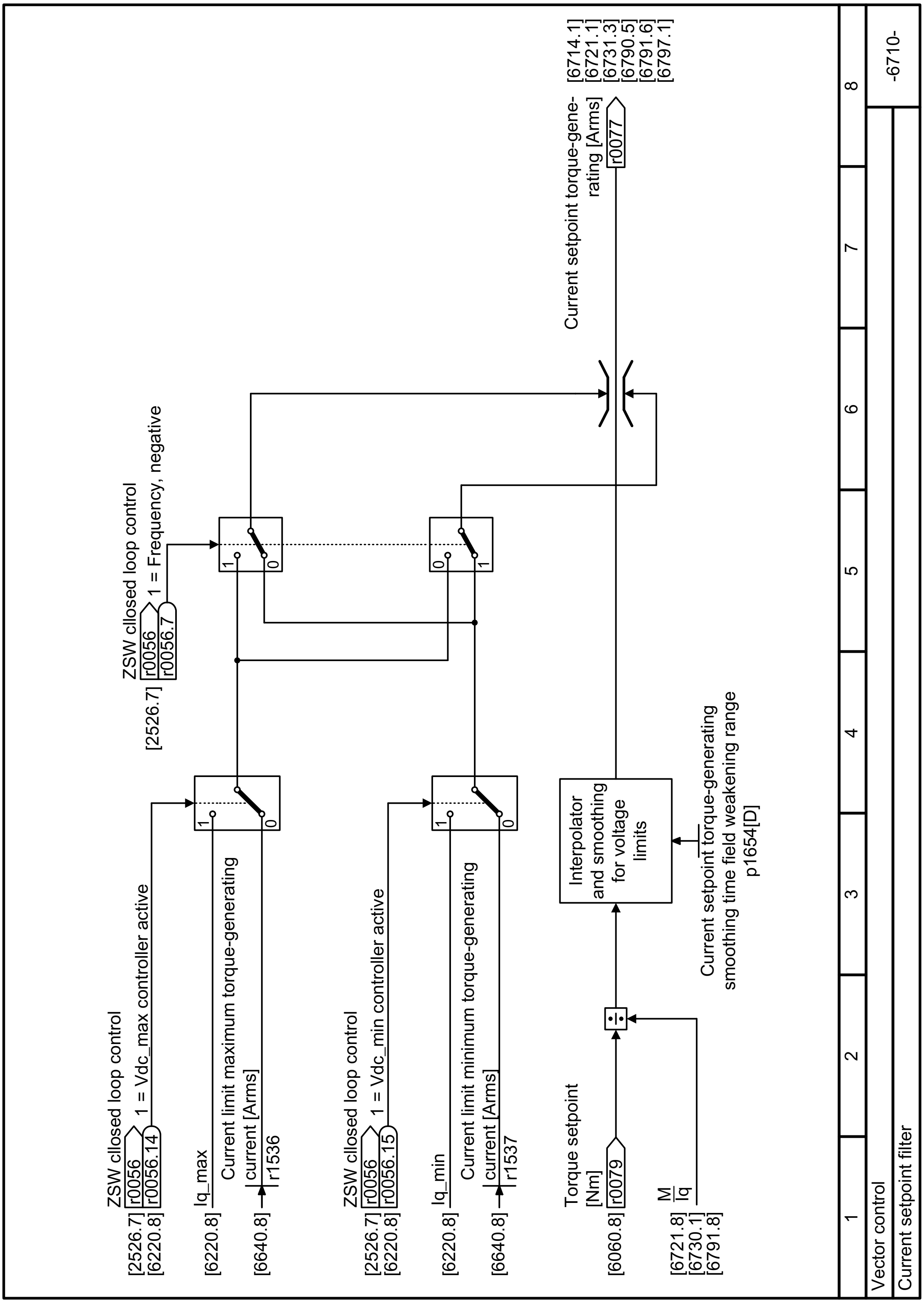


Figure 8-120 FP 6710

8.7.3.16 Function diagram 6714 - Vector control, Iq and Id controllers

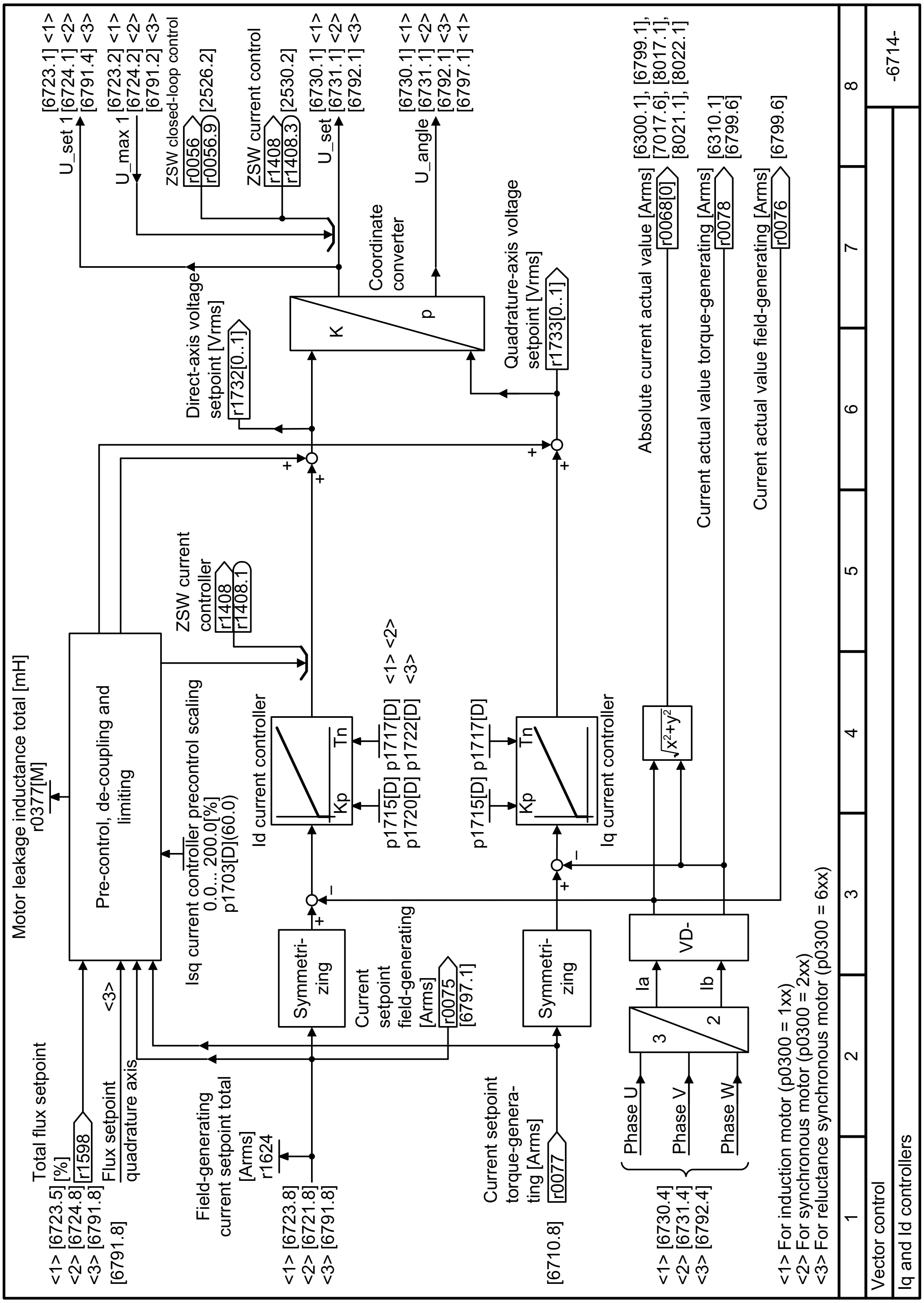


Figure 8-121 FP 6714

8.7.3.17 Function diagram 6721 - Vector control, Id setpoint

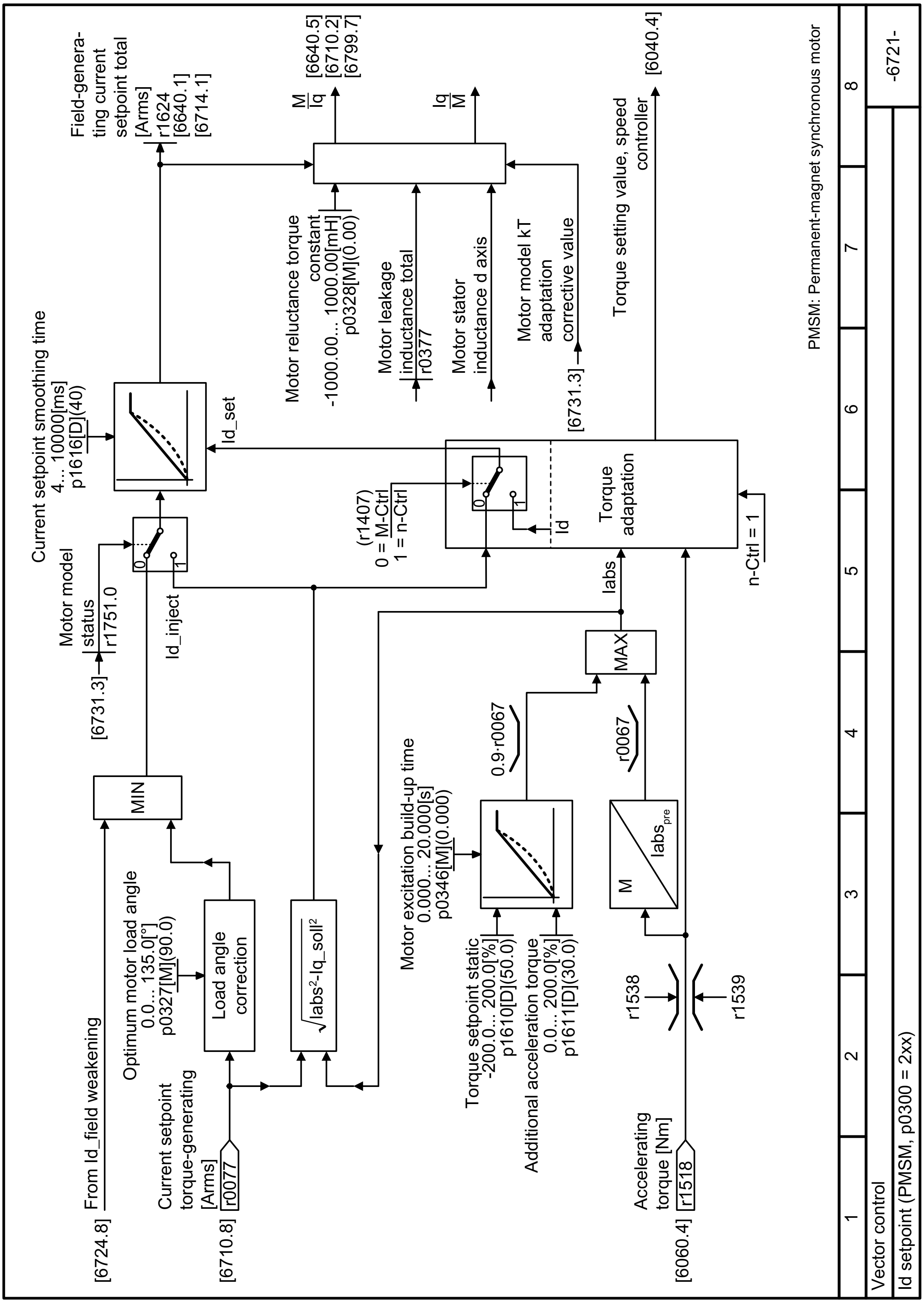


Figure 8-122 FP 6721

8.7.3.18 Function diagram 6722 - Vector control, field weakening characteristic flux setpoint

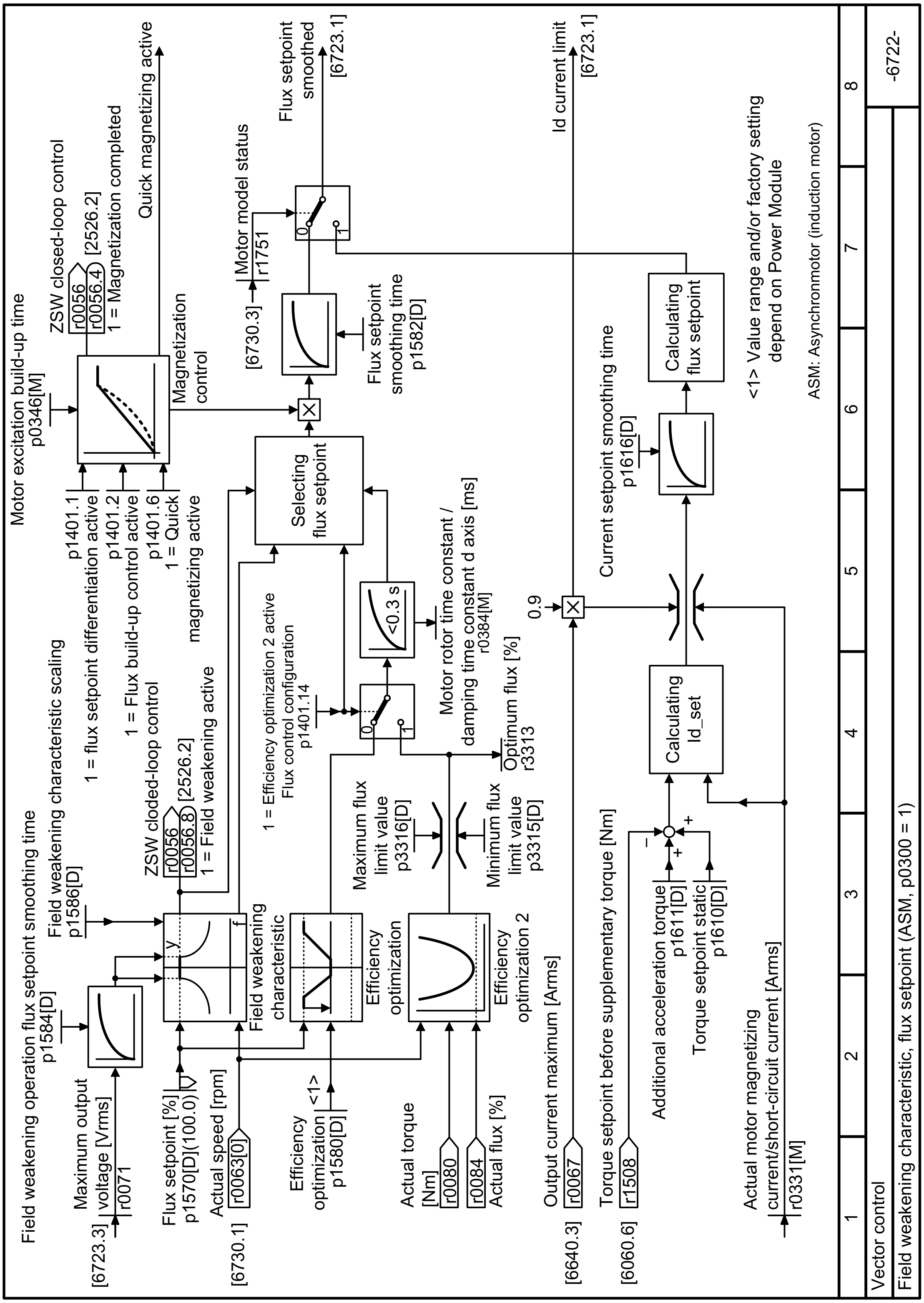


Figure 8-123 FP 6722

8.7.3.19 Function diagram 6723 - Vector control, field weakening controller flux controller

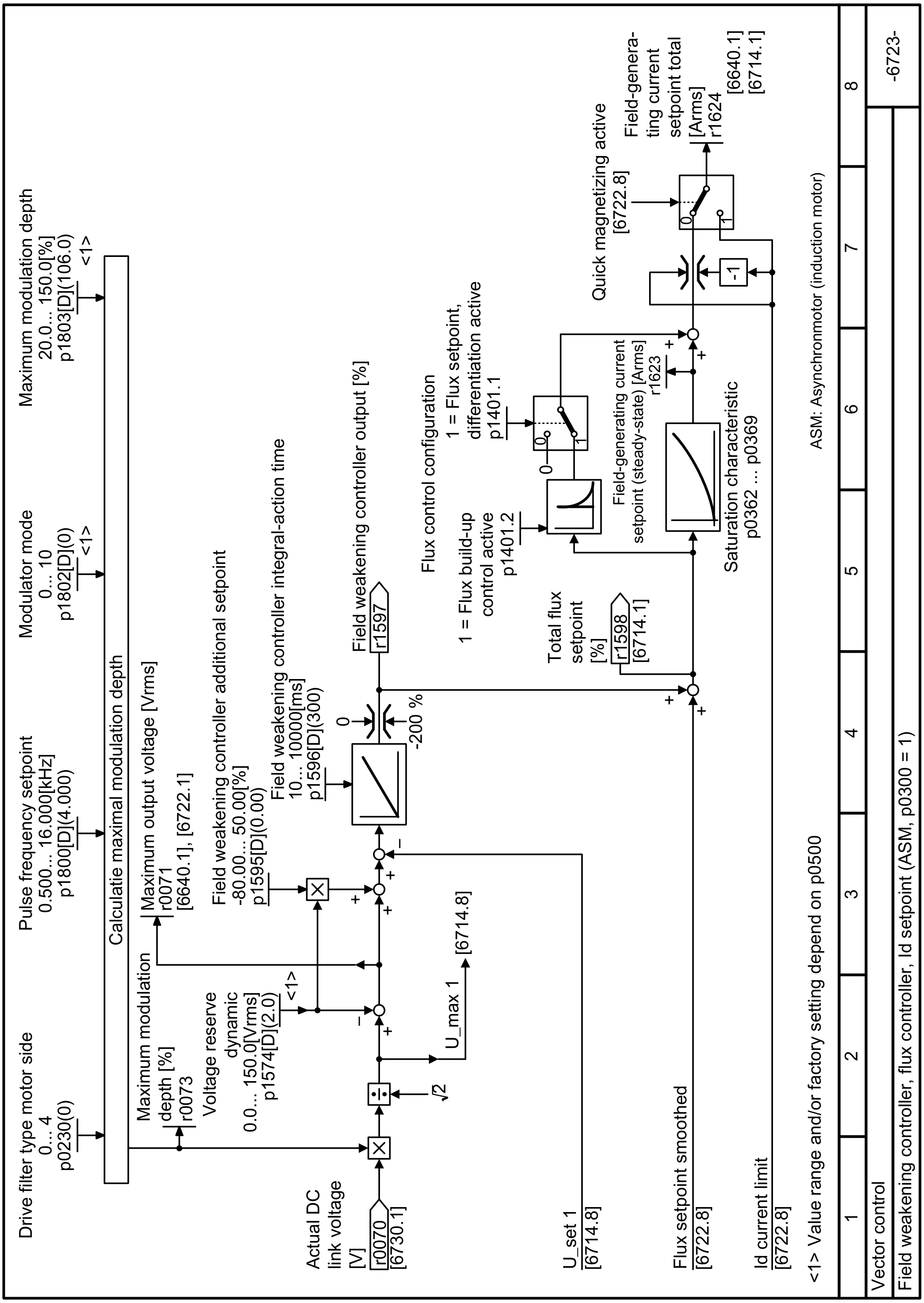


Figure 8-124 FP 6723

8.7.3.20 Function diagram 6724 - Vector control, field weakening controller

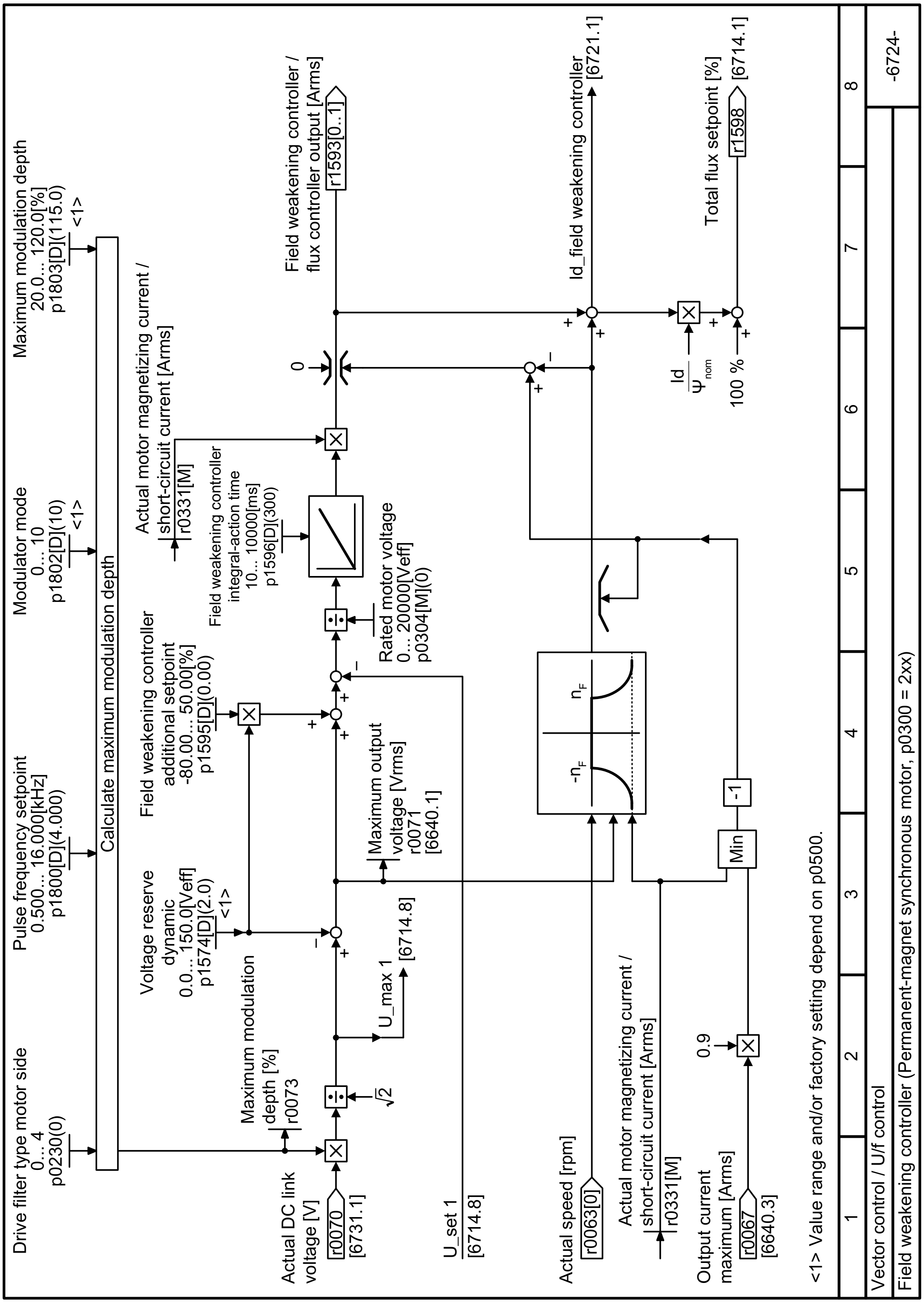


Figure 8-125 FP 6724

8.7.3.21 Function diagram 6730 - Vector control, interface to the induction motor

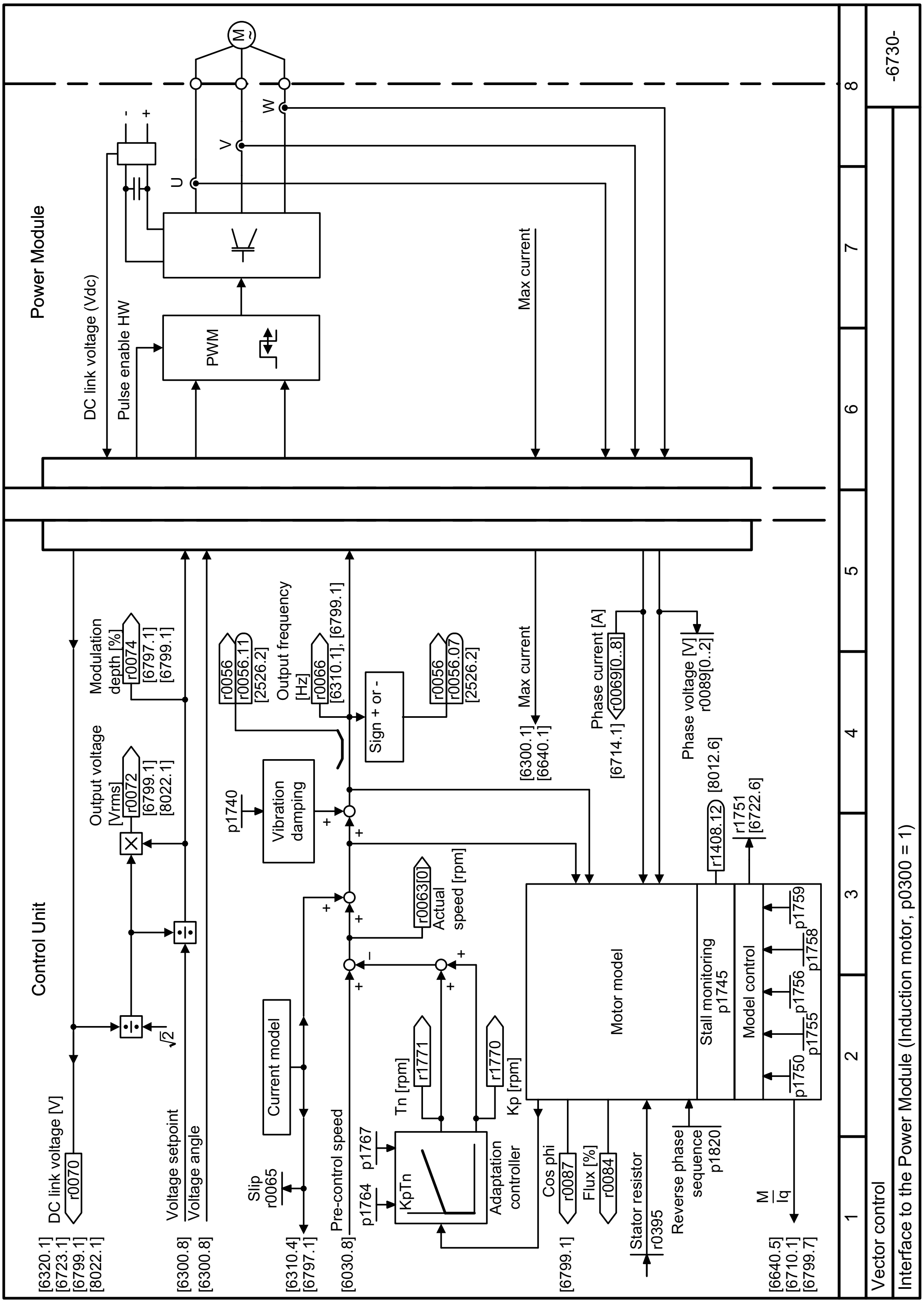


Figure 8-126 FP 6730

8.7.3.22 Function diagram 6731 - Vector control, interface to the synchronous motor

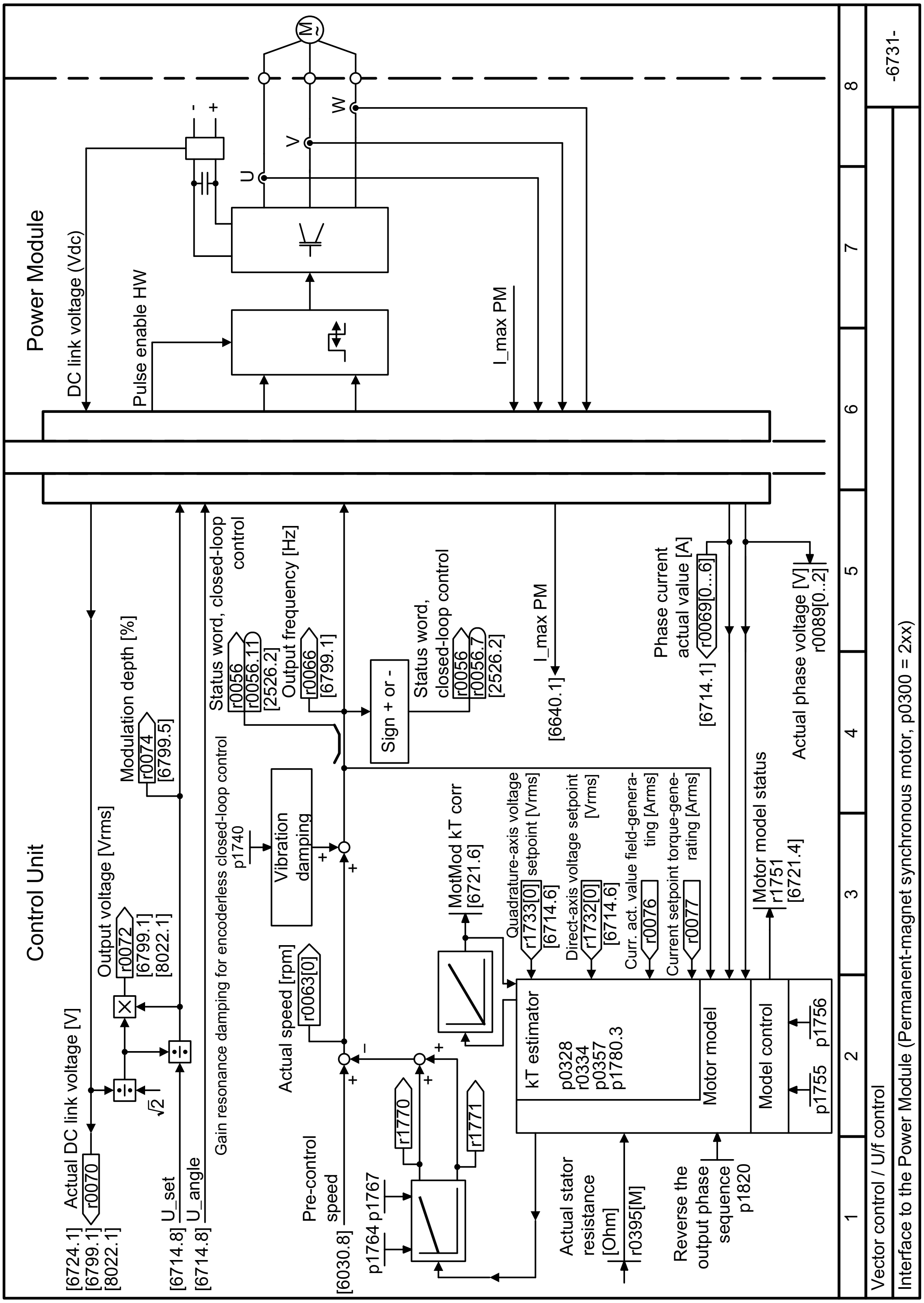


Figure 8-127 FP 6731

8.7.3.23 Function diagram 6790 - Vector control, flux setpoint reluctance motor

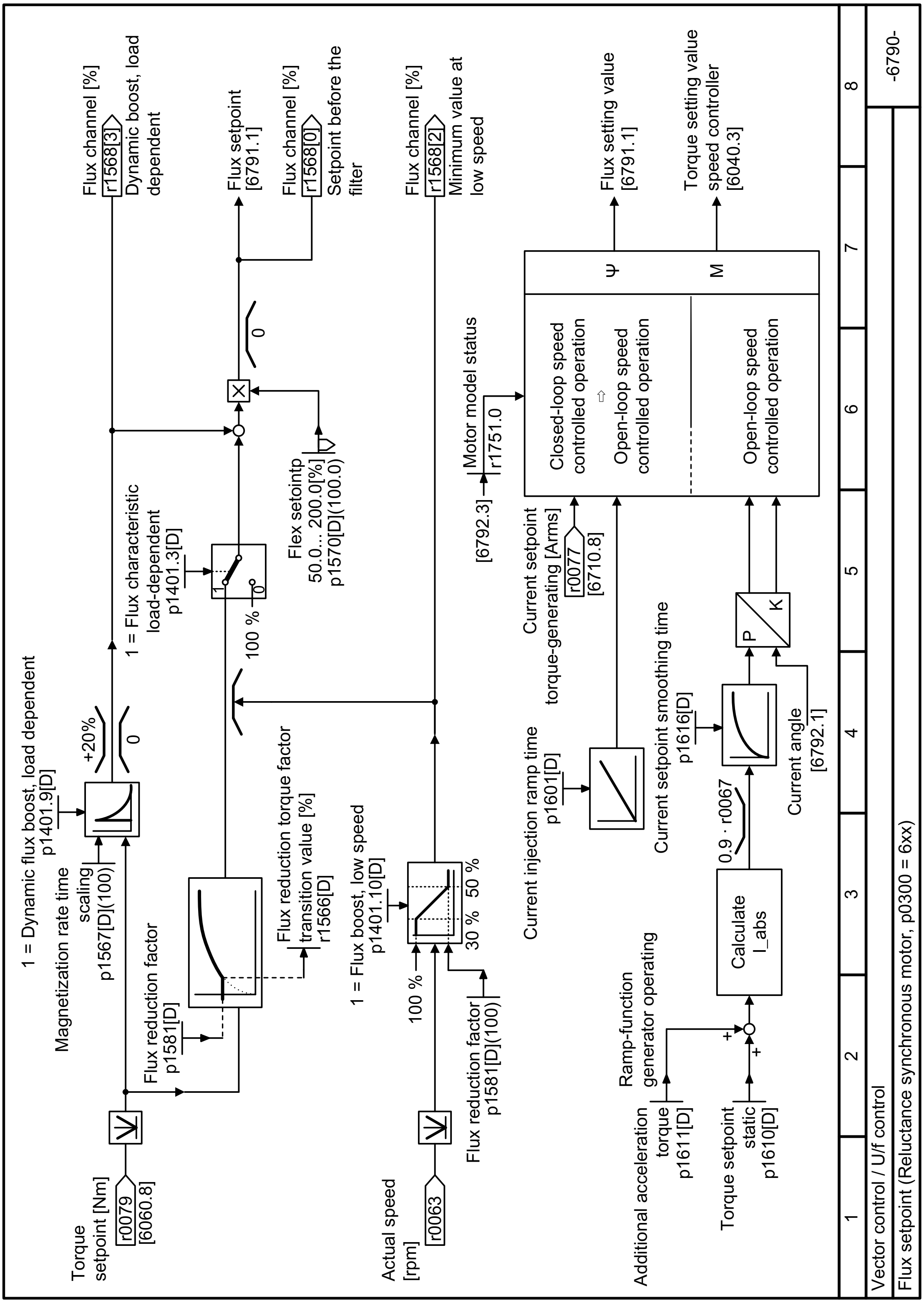


Figure 8-128 FP 6790

8.7.3.24 Function diagram 6791 - Vector control, Id setpoint reluctance motor

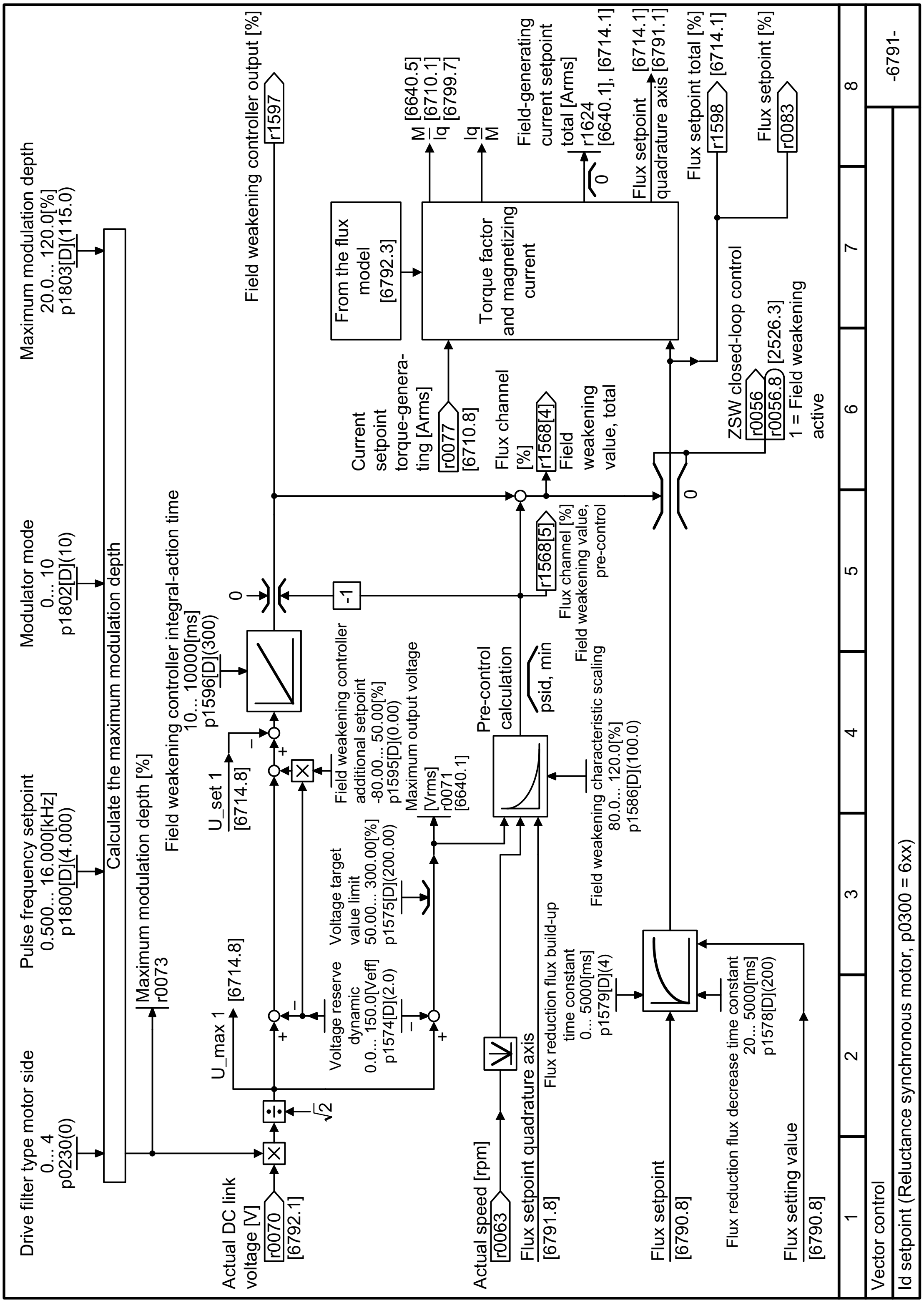


Figure 8-129 FP 6791

8.7.3.25 Function diagram 6792 - Vector control, interface to the reluctance motor

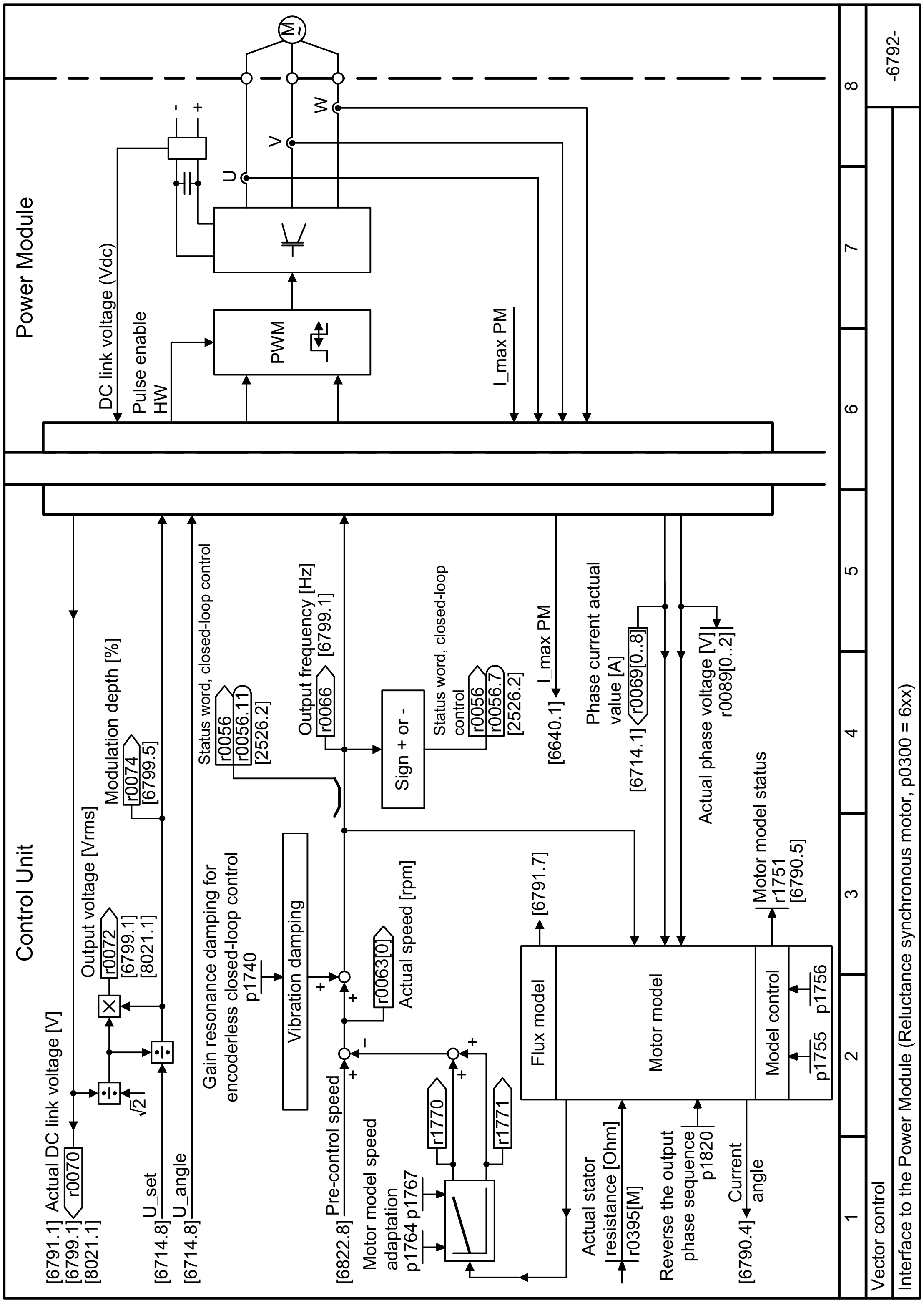


Figure 8-130 FP 6792

8.7.3.26 Function diagram 6797 - Vector control, closed-loop DC quantity control

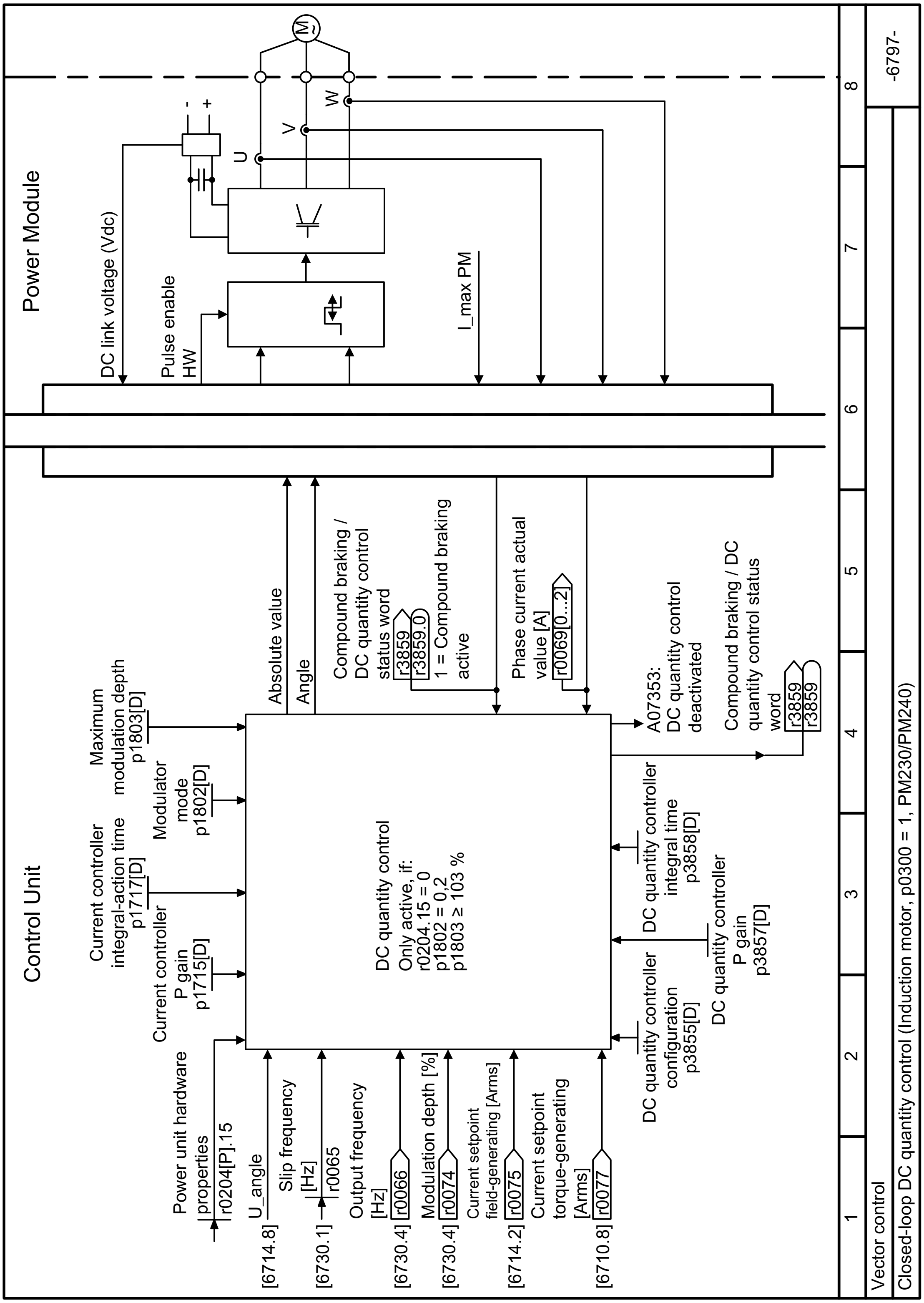


Figure 8-131 FP 6797

8.7.3.27 Function diagram 6799 - Vector control, display signals

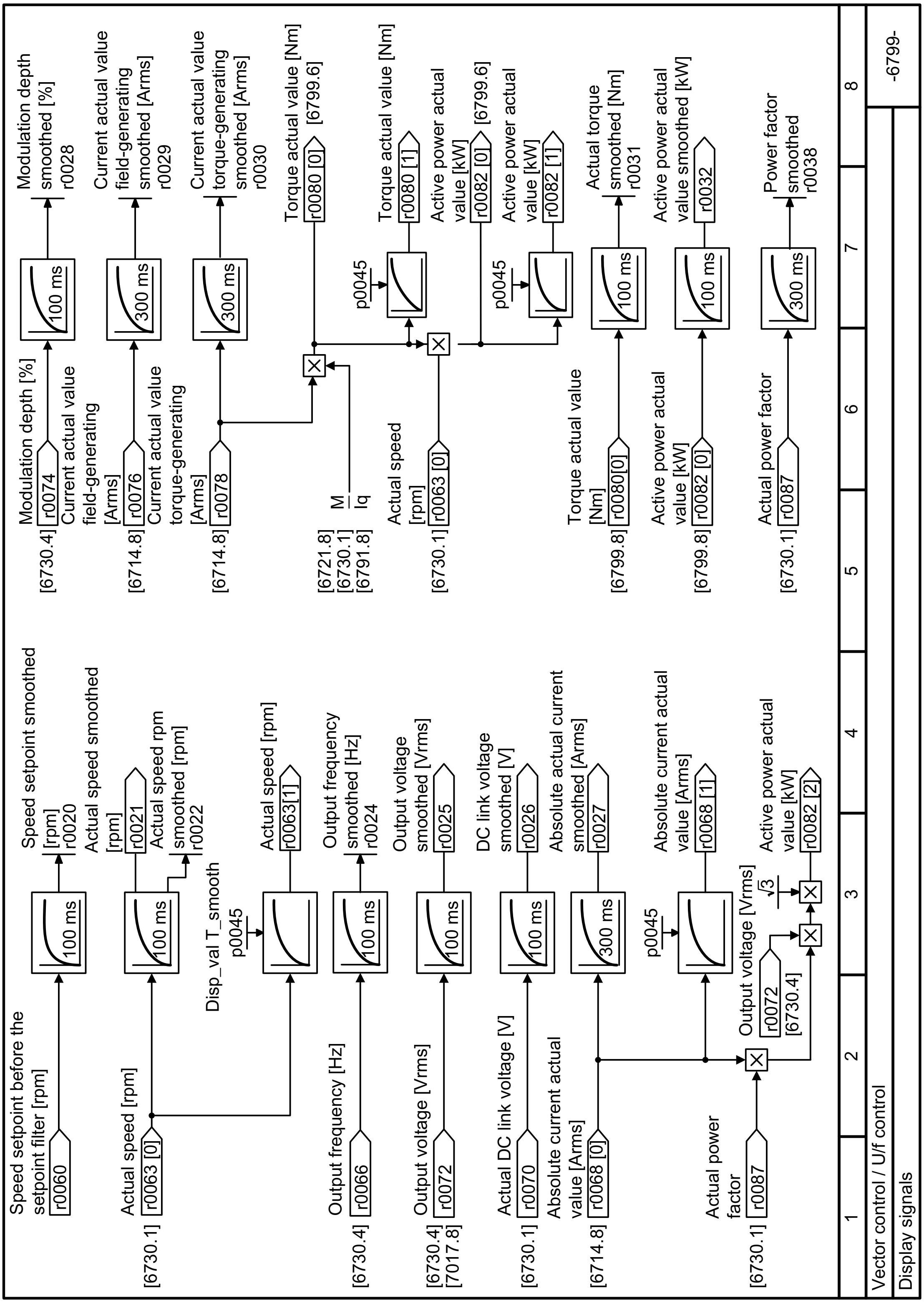


Figure 8-132 FP 6799

8.7.3.28 Function diagram 6820 - Dynamic Drive Control, overview

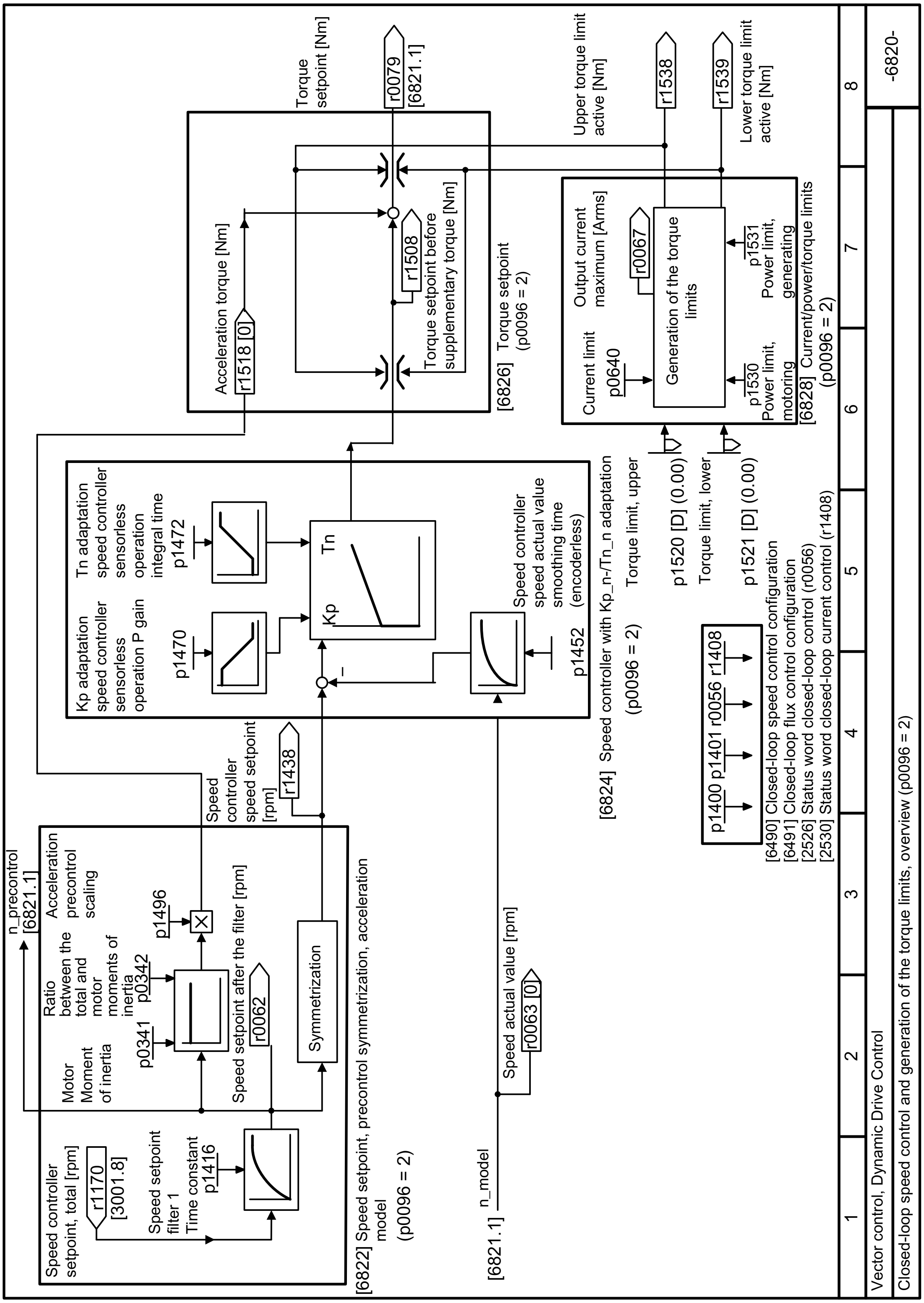


Figure 8-133 FP 6820

8.7.3.29 Function diagram 6821 - Dynamic Drive Control, closed-loop current control

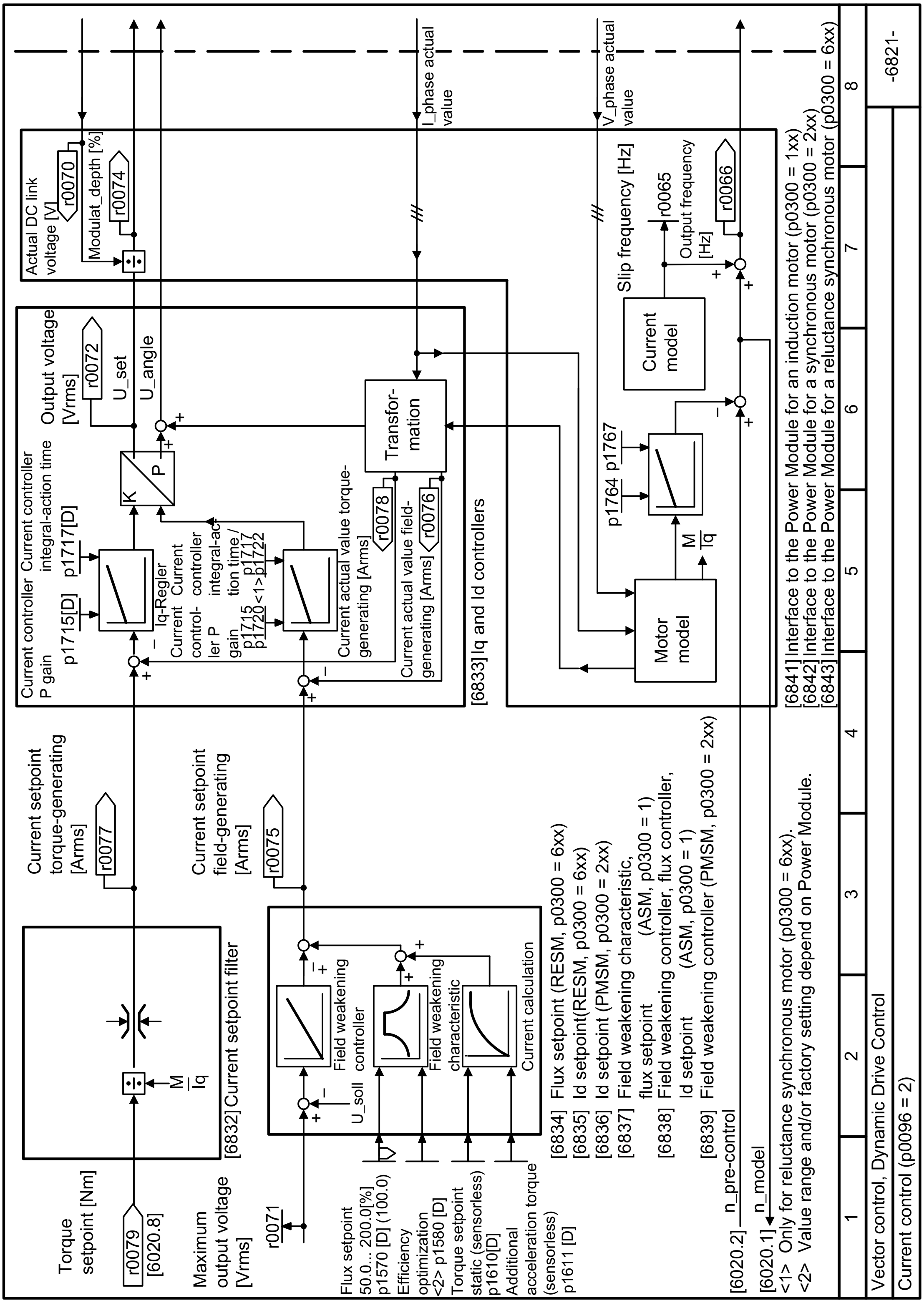


Figure 8-134 FP 6821

8.7.3.30 Function diagram 6822 - Dynamic Drive Control, acceleration model

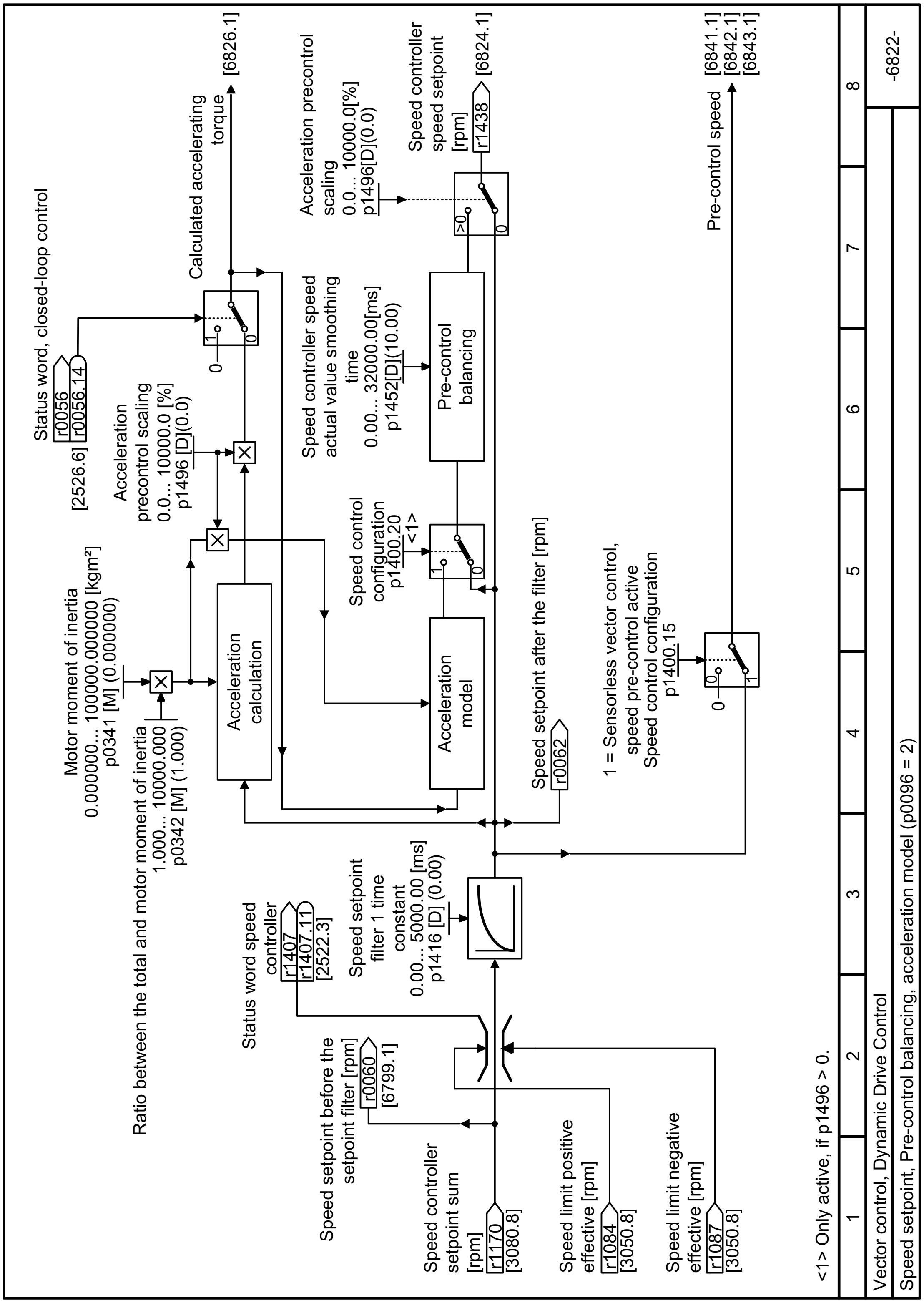


Figure 8-135 FP 6822

8.7.3.31 Function diagram 6824 - Dynamic Drive Control, speed controller

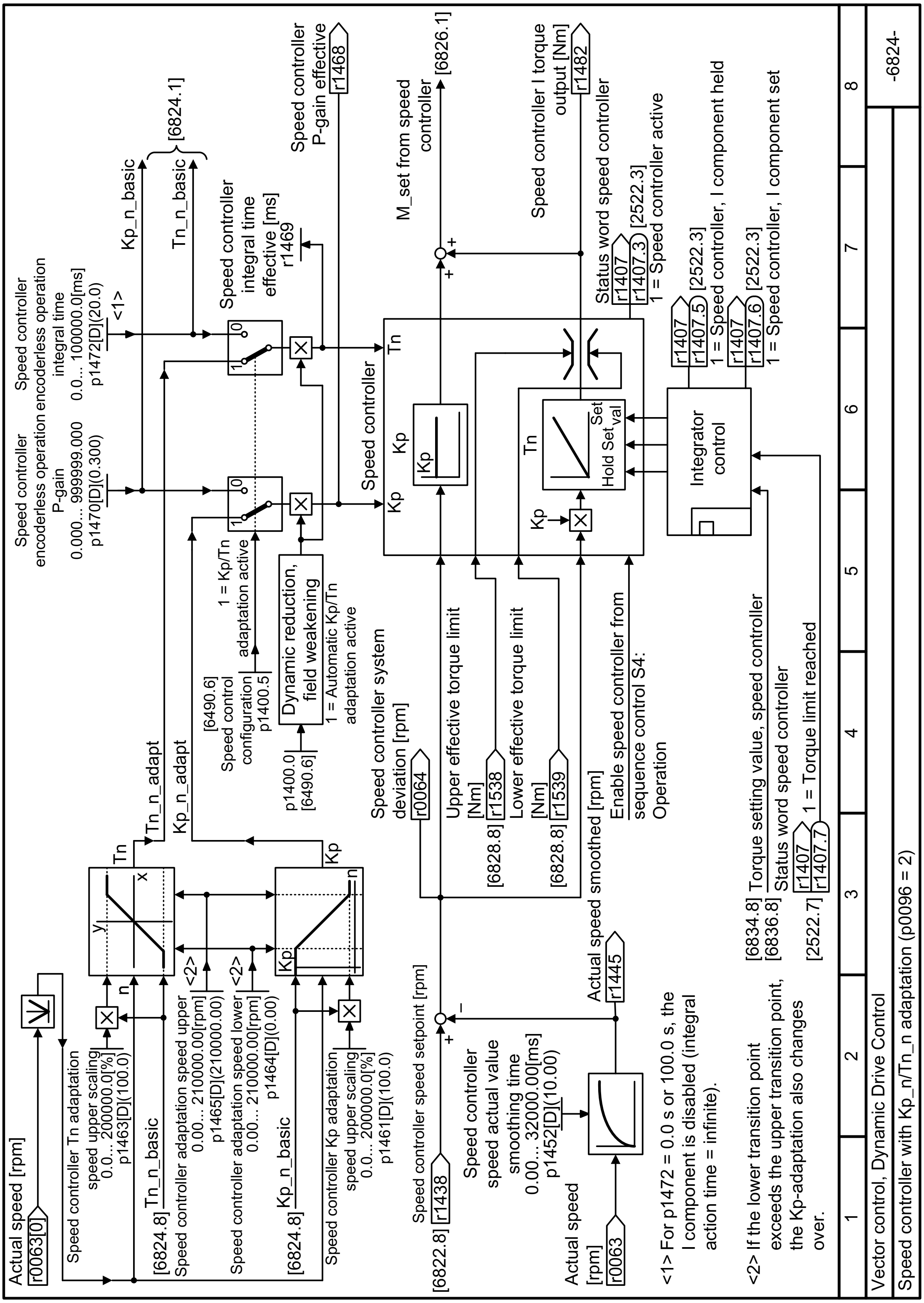


Figure 8-136 FP 6824

8.7.3.32 Function diagram 6826 - Dynamic Drive Control, torque setpoint

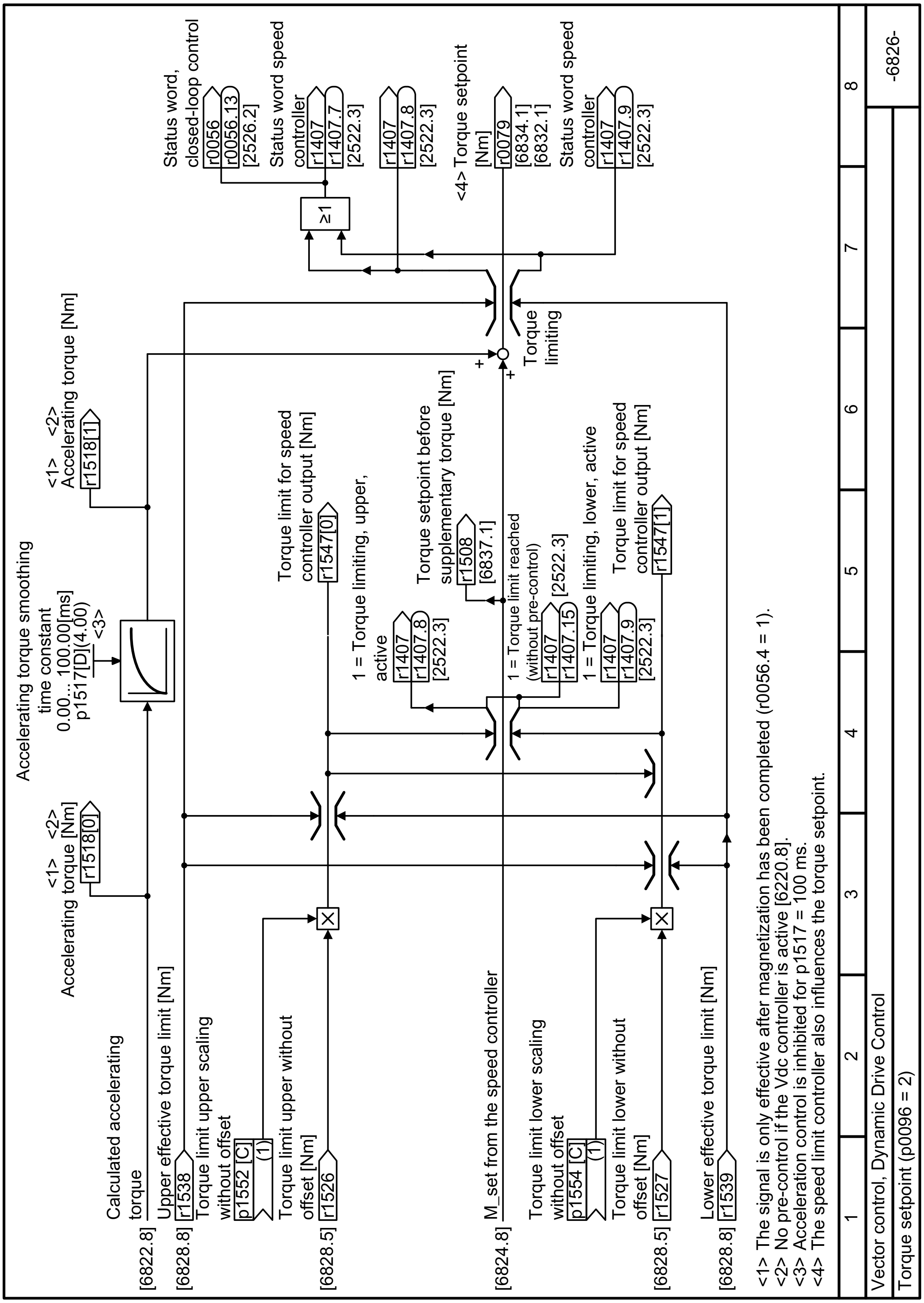


Figure 8-137 FP 6826

8.7.3.33 Function diagram 6827 - Dynamic Drive Control, Vdc_max and Vdc_min controller

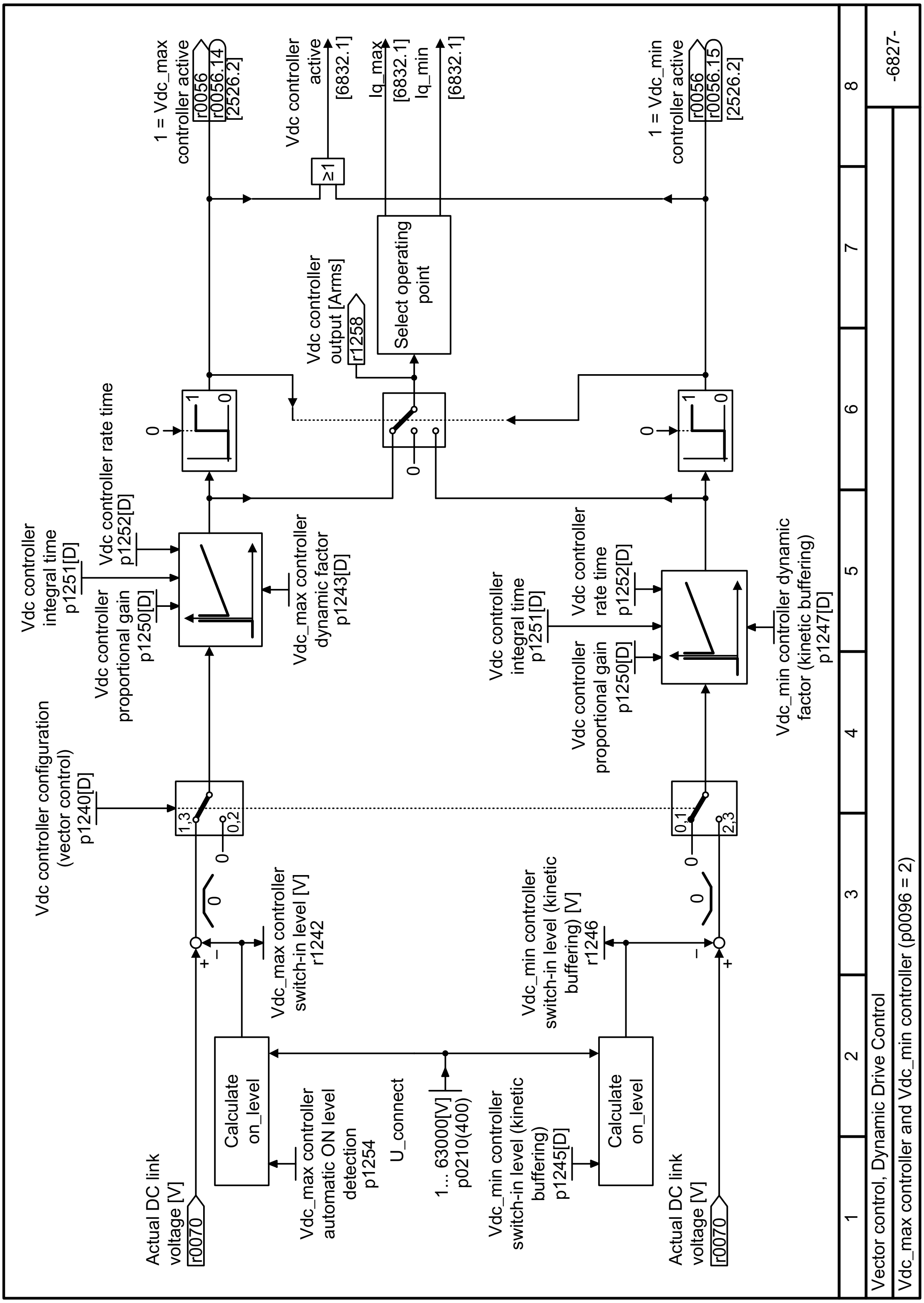


Figure 8-138 FP 6827

8.7.3.34 Function diagram 6828 - Dynamic Drive Control, current/power/torque limits

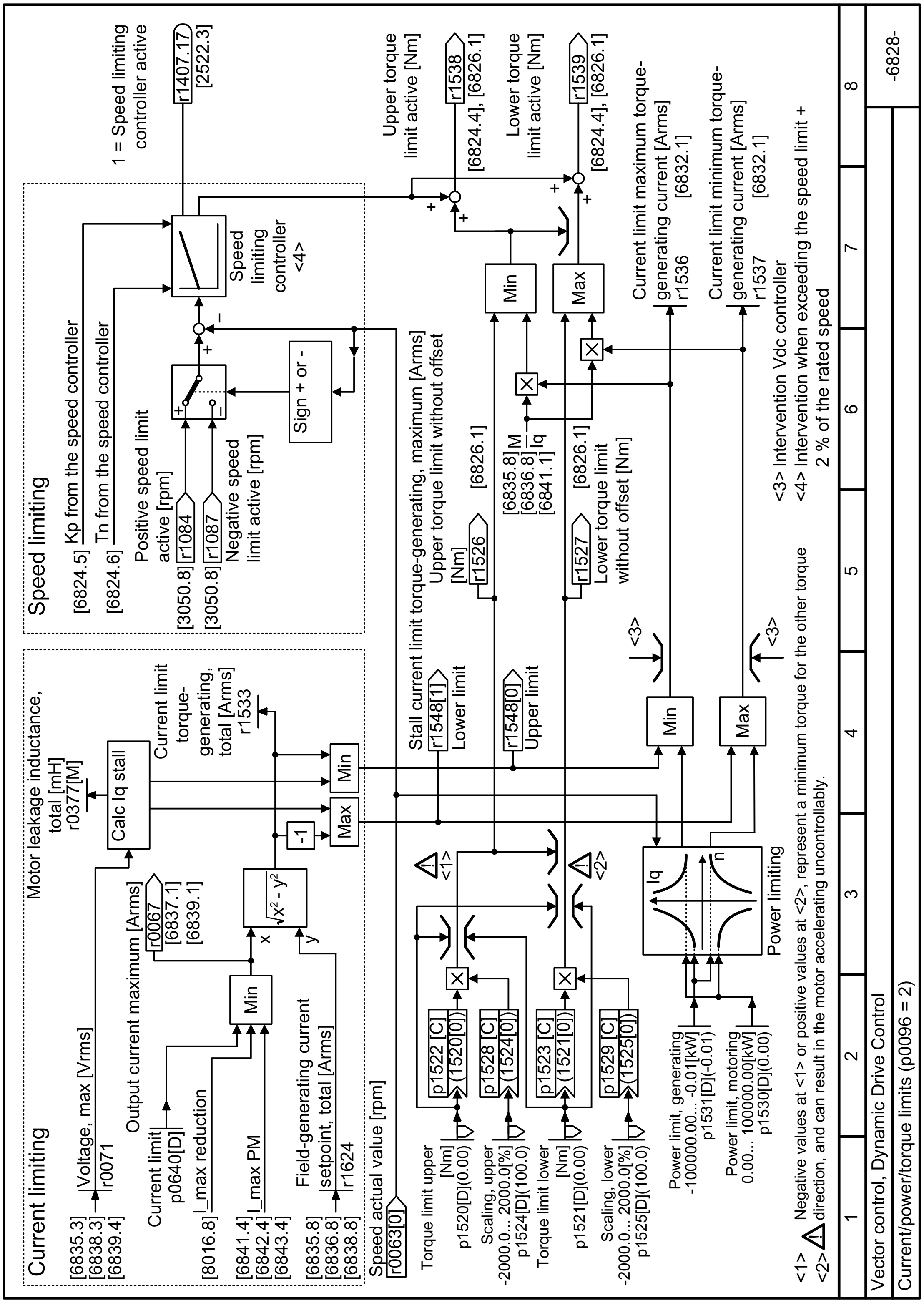


Figure 8-139 FP 6828

8.7.3.35 Function diagram 6832 - Dynamic Drive Control, current setpoint filter

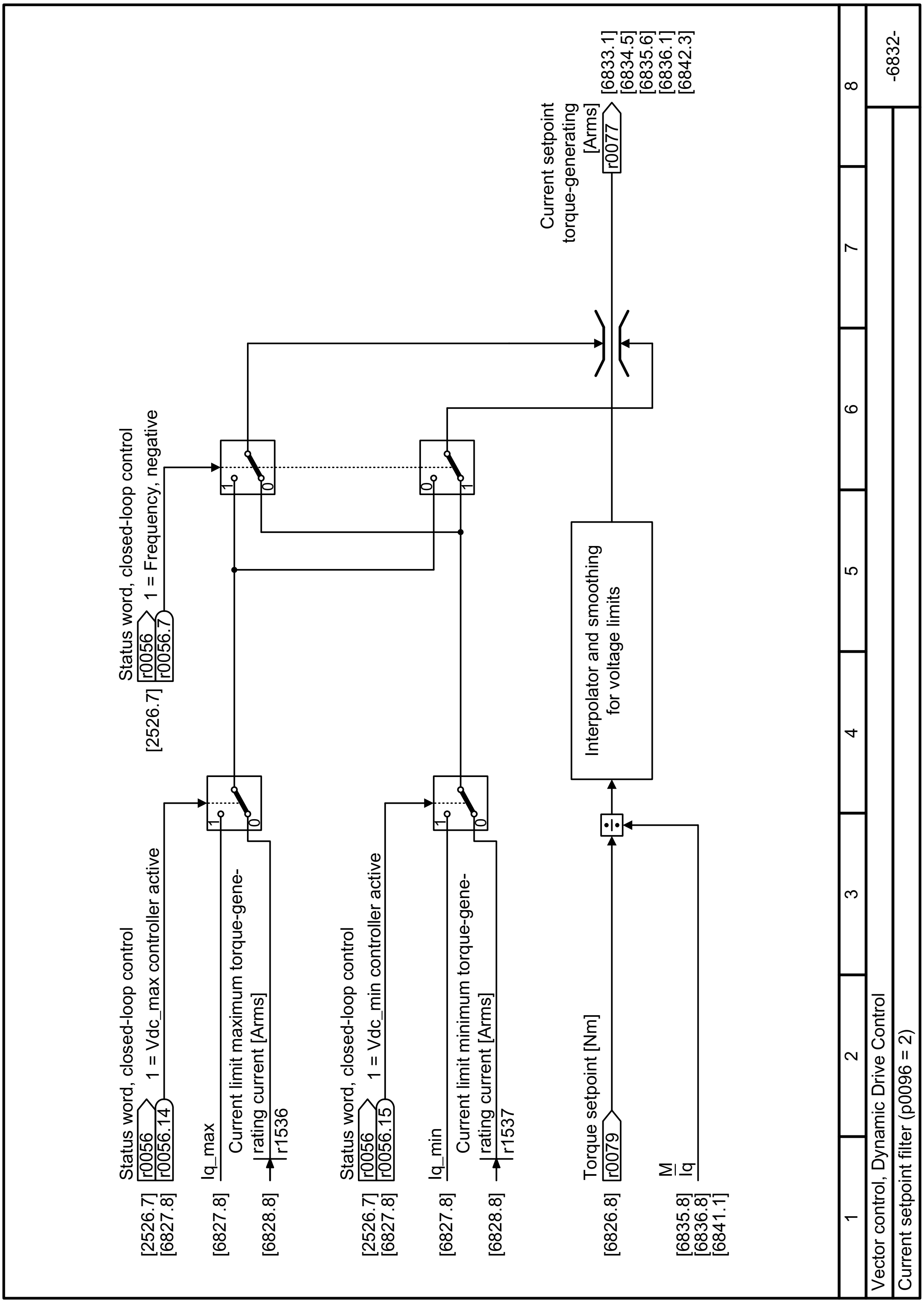


Figure 8-140 FP 6832

8.7.3.36 Function diagram 6833 - Dynamic Drive Control, Iq and Id controllers

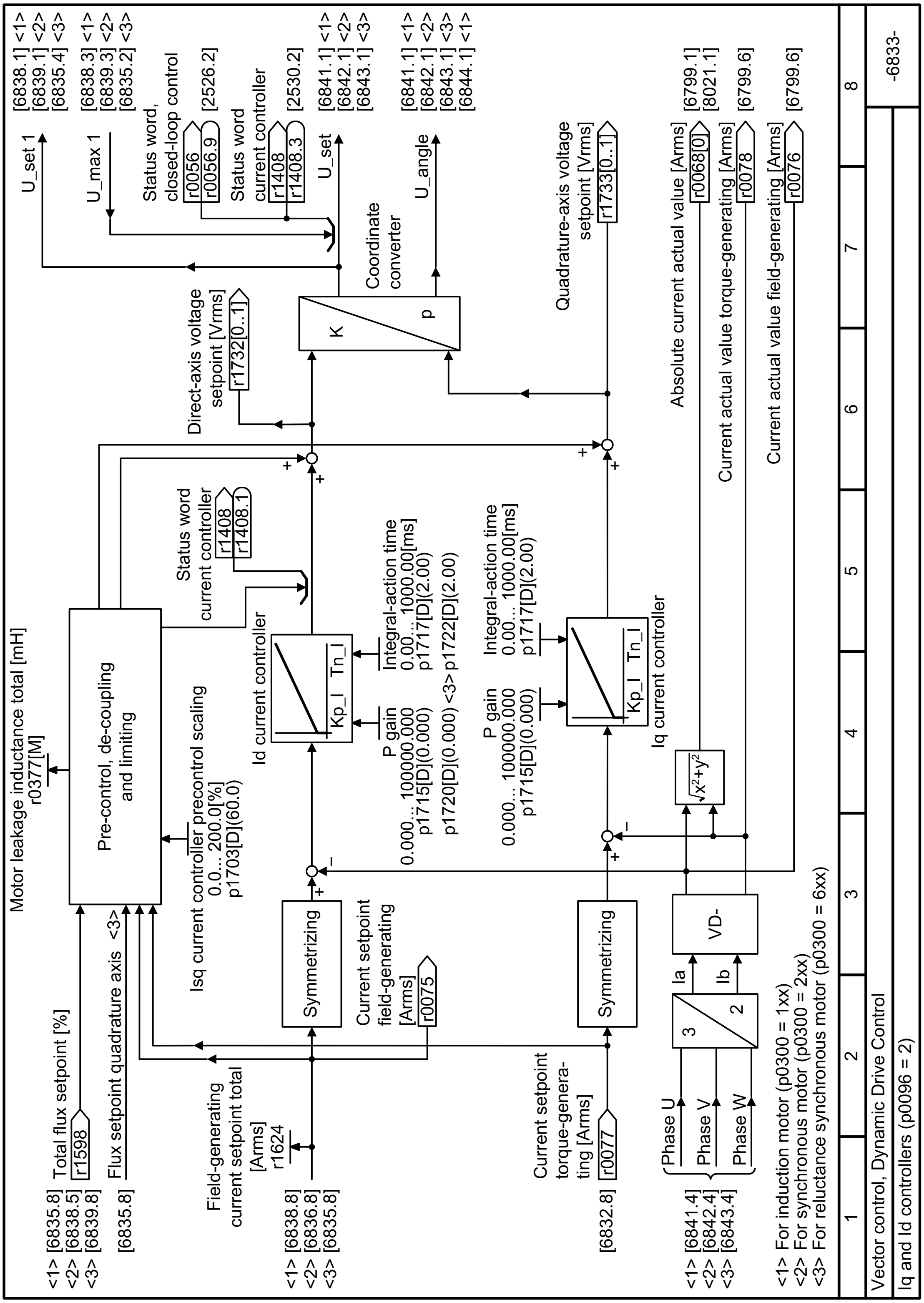


Figure 8-141 FP 6833

8.7.3.37 Function diagram 6834 - Dynamic Drive Control, flux setpoint

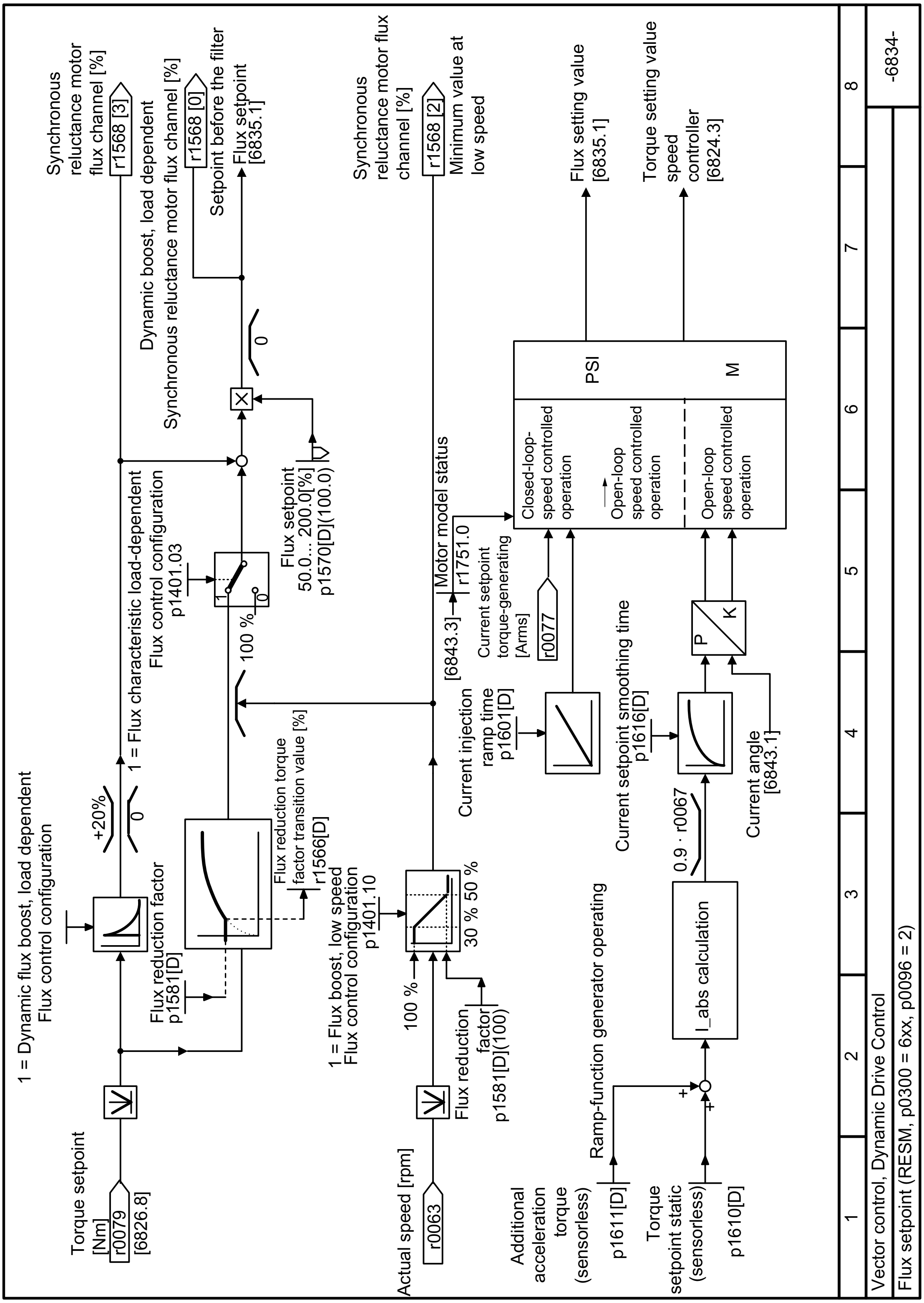


Figure 8-142 FP 6834

8.7.3.38 Function diagram 6835 - Dynamic Drive Control, Id setpoint reluctance motor

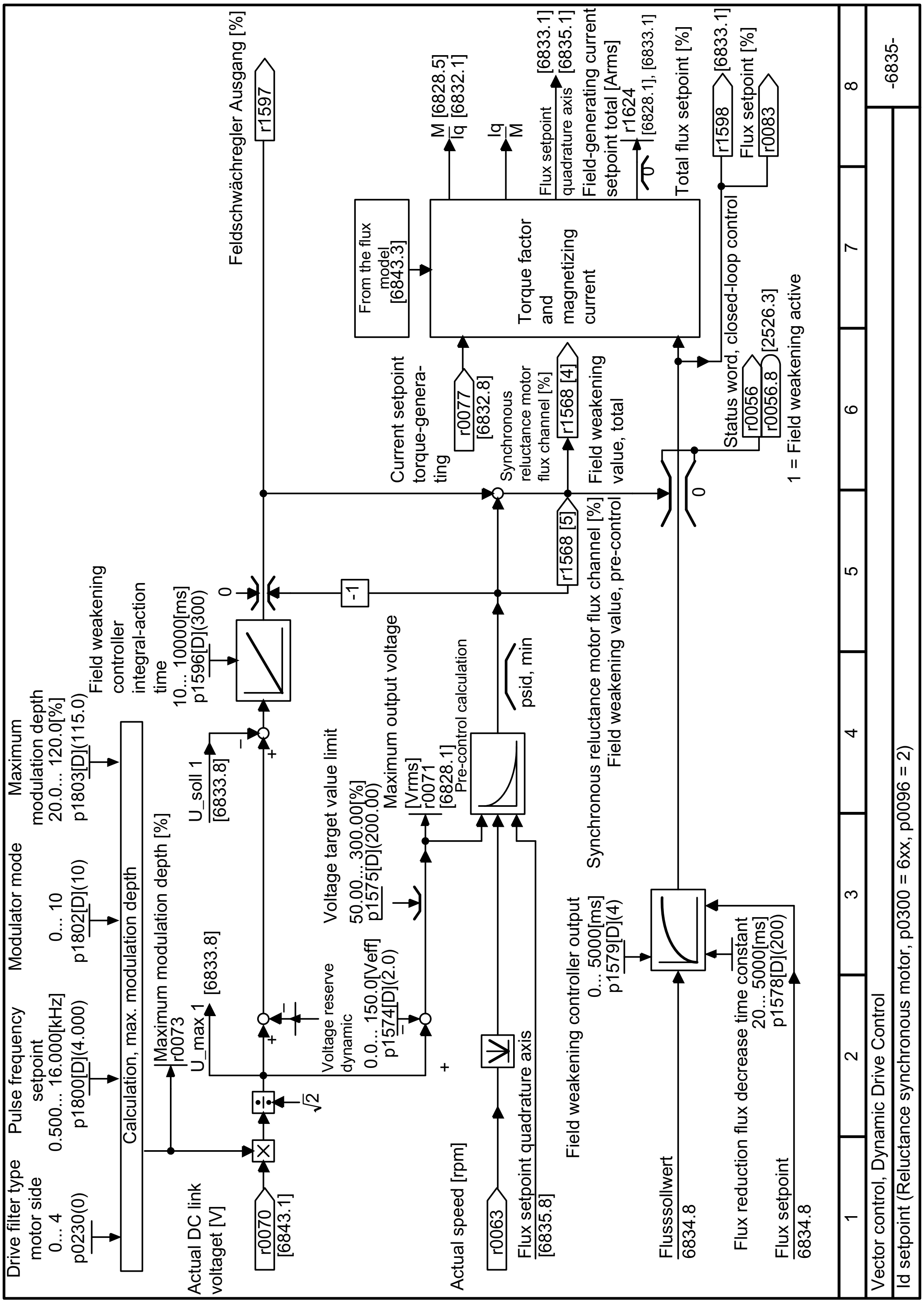


Figure 8-143 FP 6835

8.7.3.39 Function diagram 6836 - Dynamic Drive Control, Id setpoint synchronous motor

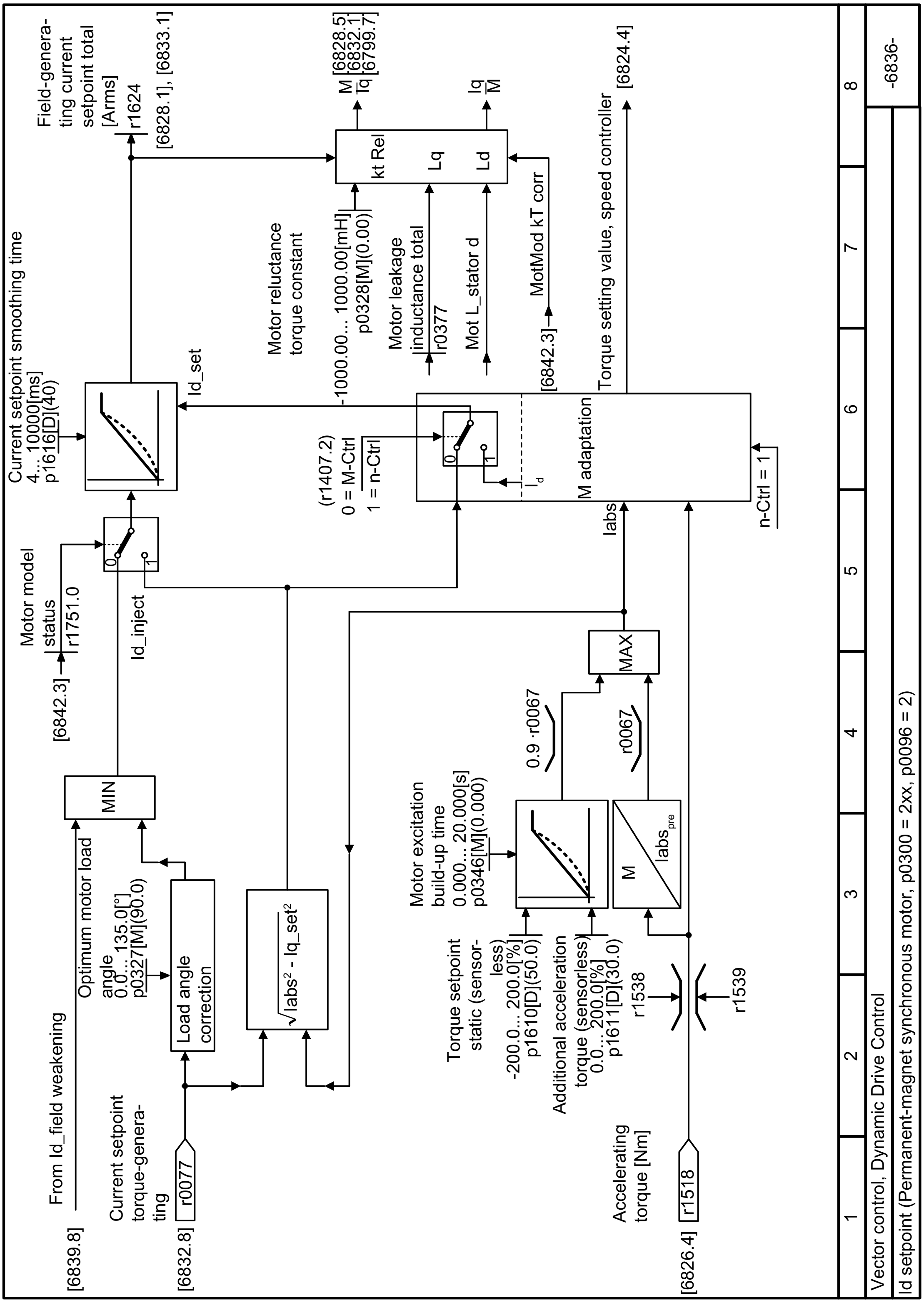


Figure 8-144 FP 6836

8.7.3.40 Function diagram 6837 - Dynamic Drive Control, field weakening characteristic

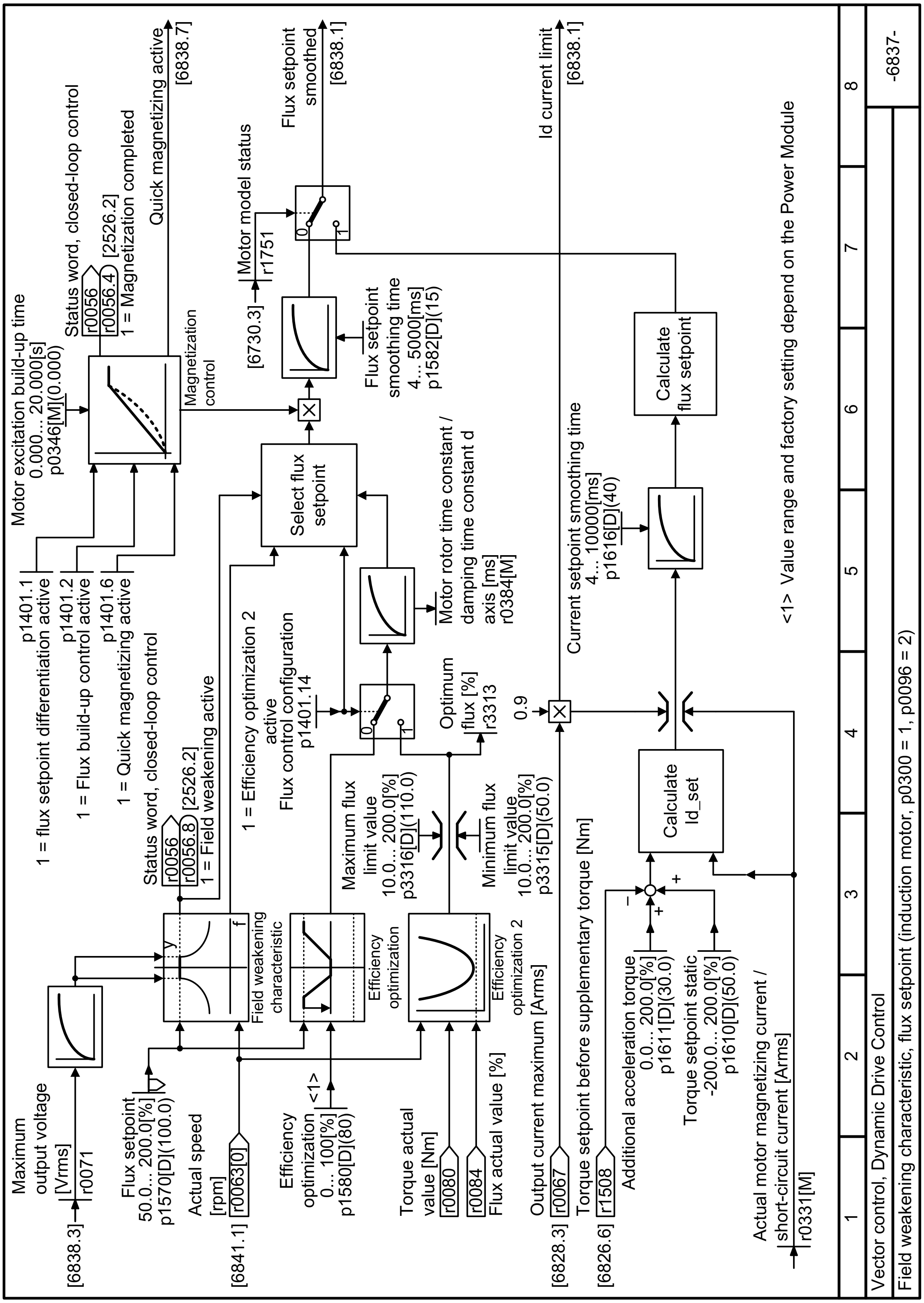


Figure 8-145 FP 6837

8.7.3.41 Function diagram 6838 - Dynamic Drive Control, field weakening controller induction motor

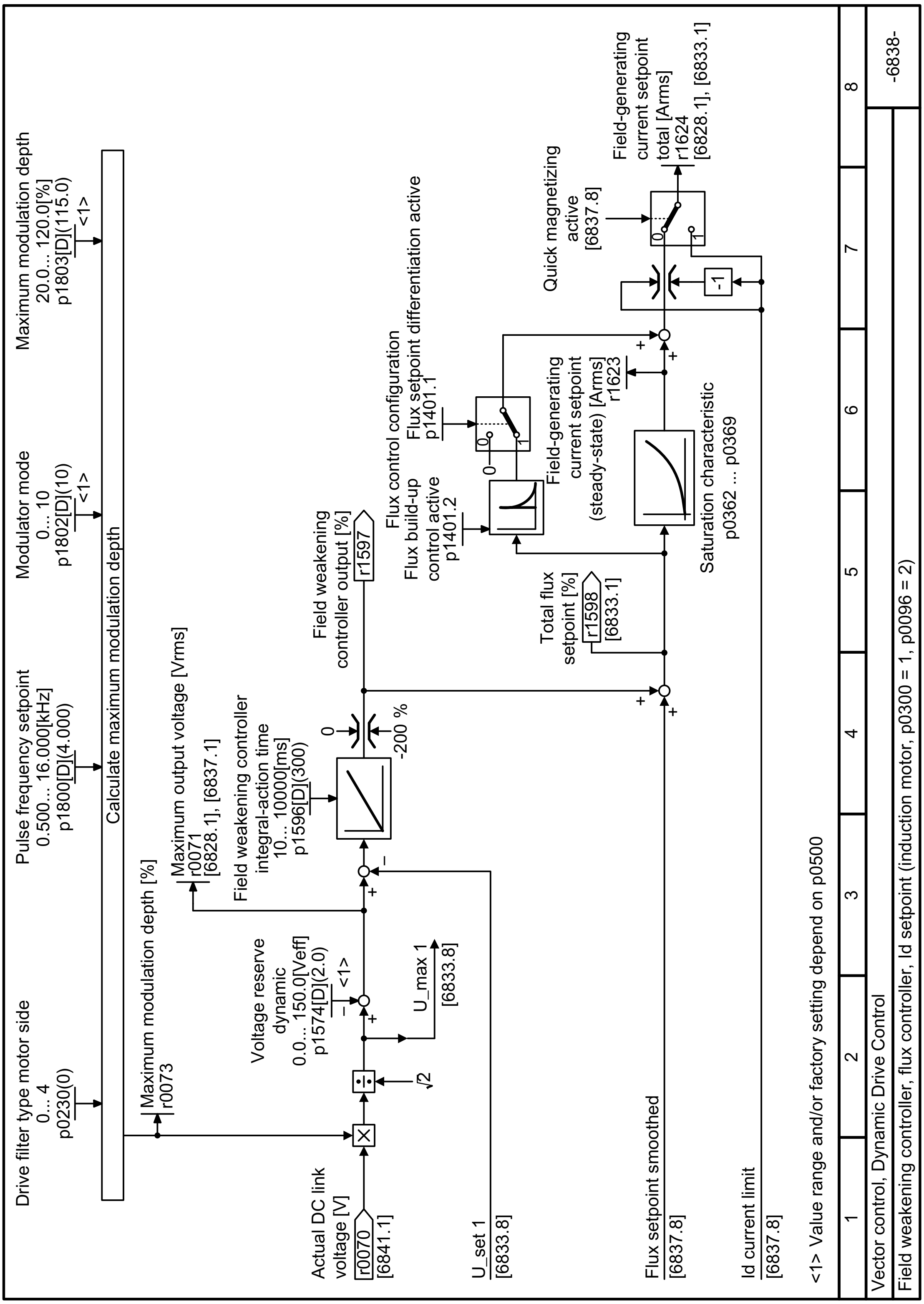


Figure 8-146 FP 6838

8.7.3.42 Function diagram 6839 - Dynamic Drive Control, field weakening controller synchronous motor

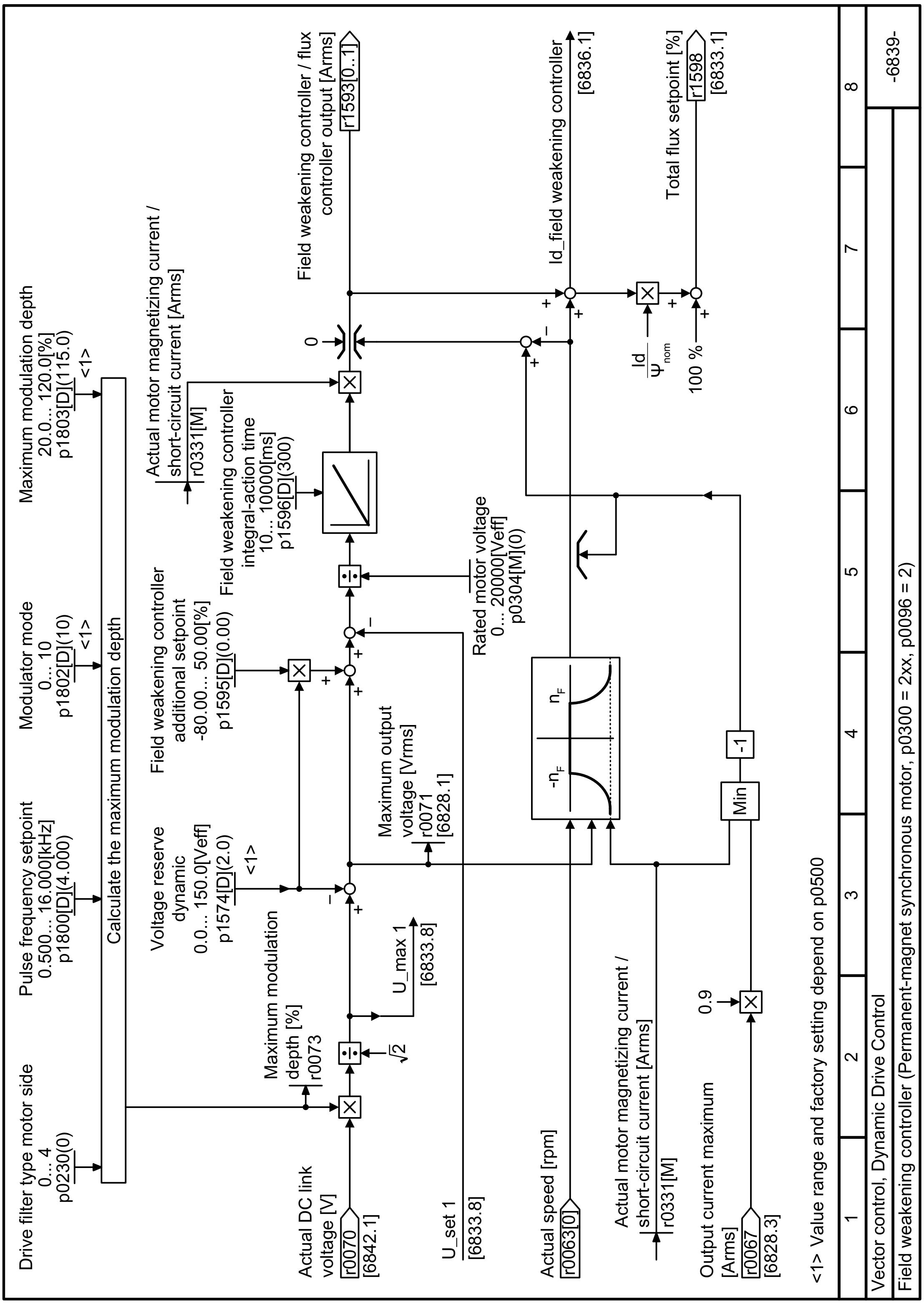


Figure 8-147 FP 6839

8.7.3.43 Function diagram 6841 - Dynamic Drive Control, interface to the induction motor

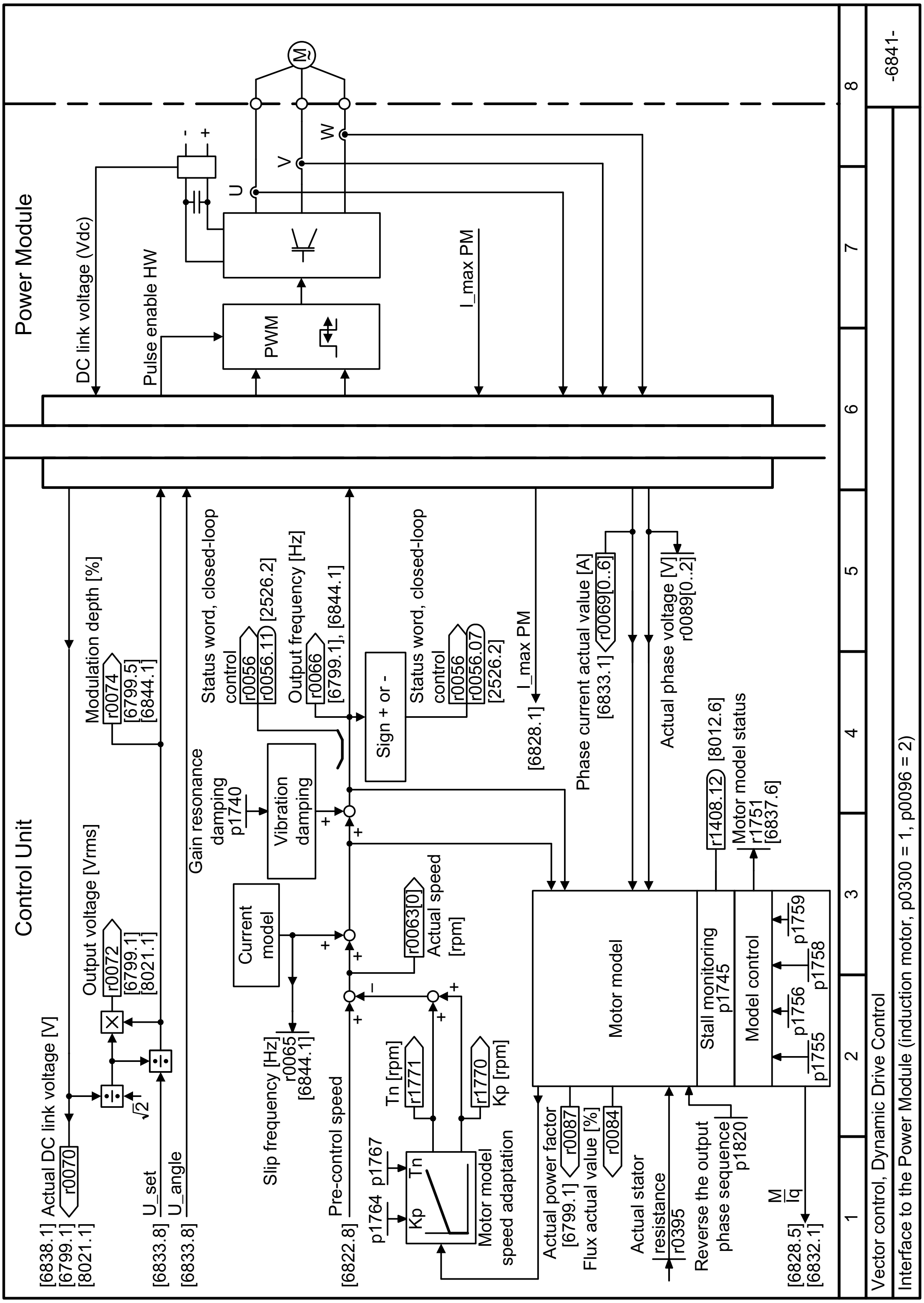


Figure 8-148 FP 6841

8.7.3.44 Function diagram 6842 - Dynamic Drive Control, interface to the synchronous motor

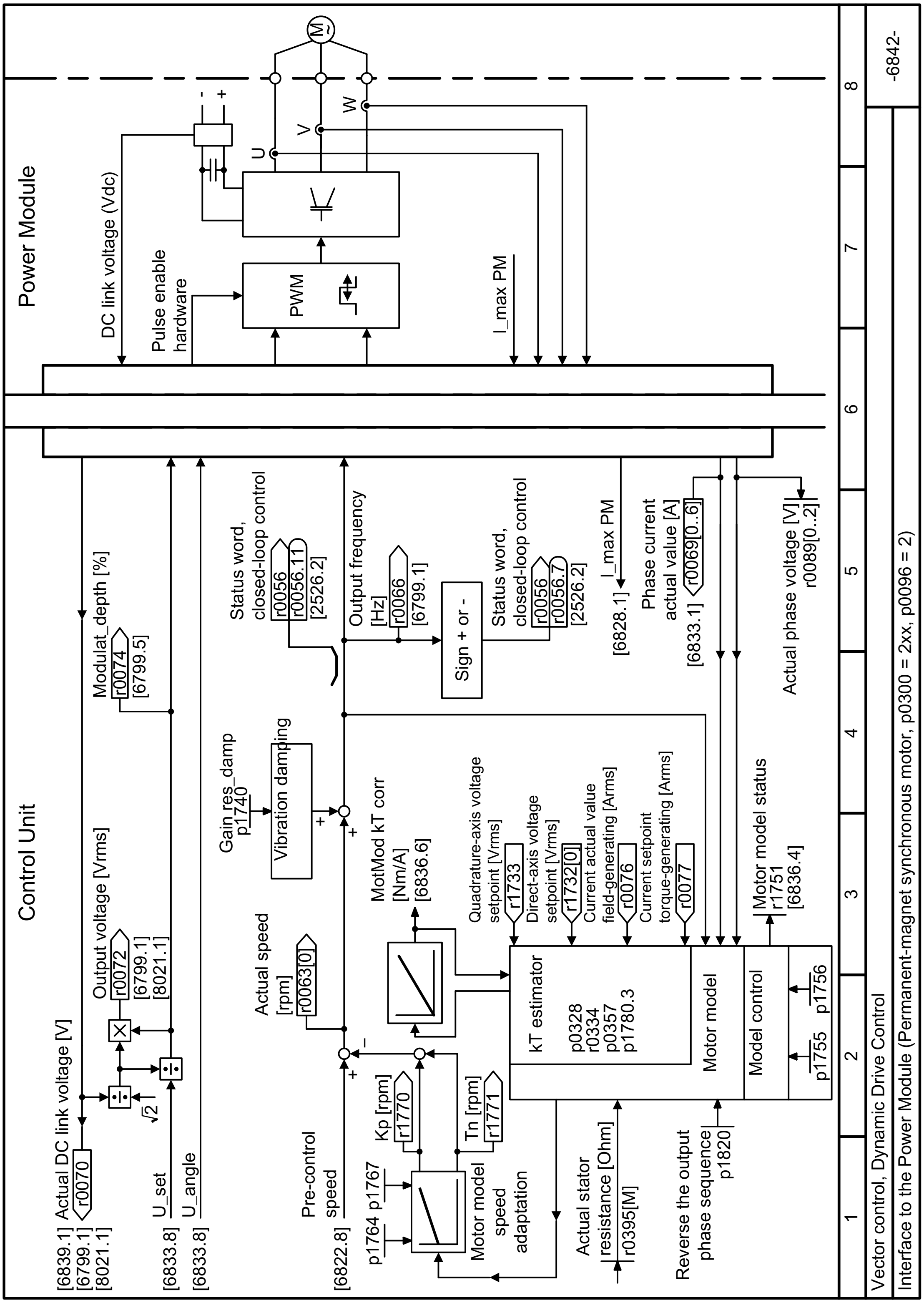


Figure 8-149 FP 6842

8.7.3.45 Function diagram 6843 - Dynamic Drive Control, interface to the reluctance motor

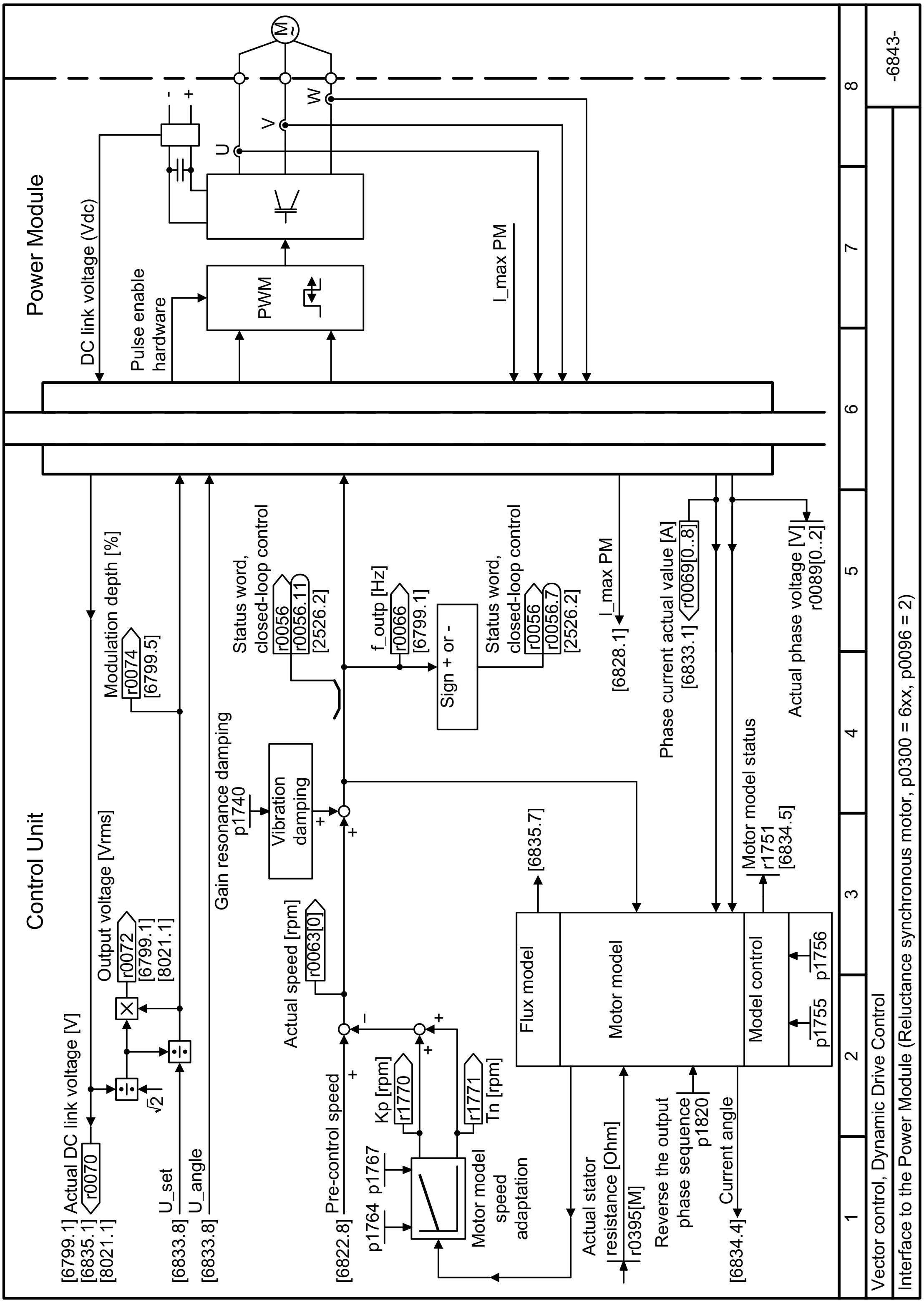


Figure 8-150 FP 6843

8.7.3.46 Function diagram 6844 - Dynamic Drive Control, DC quantity control

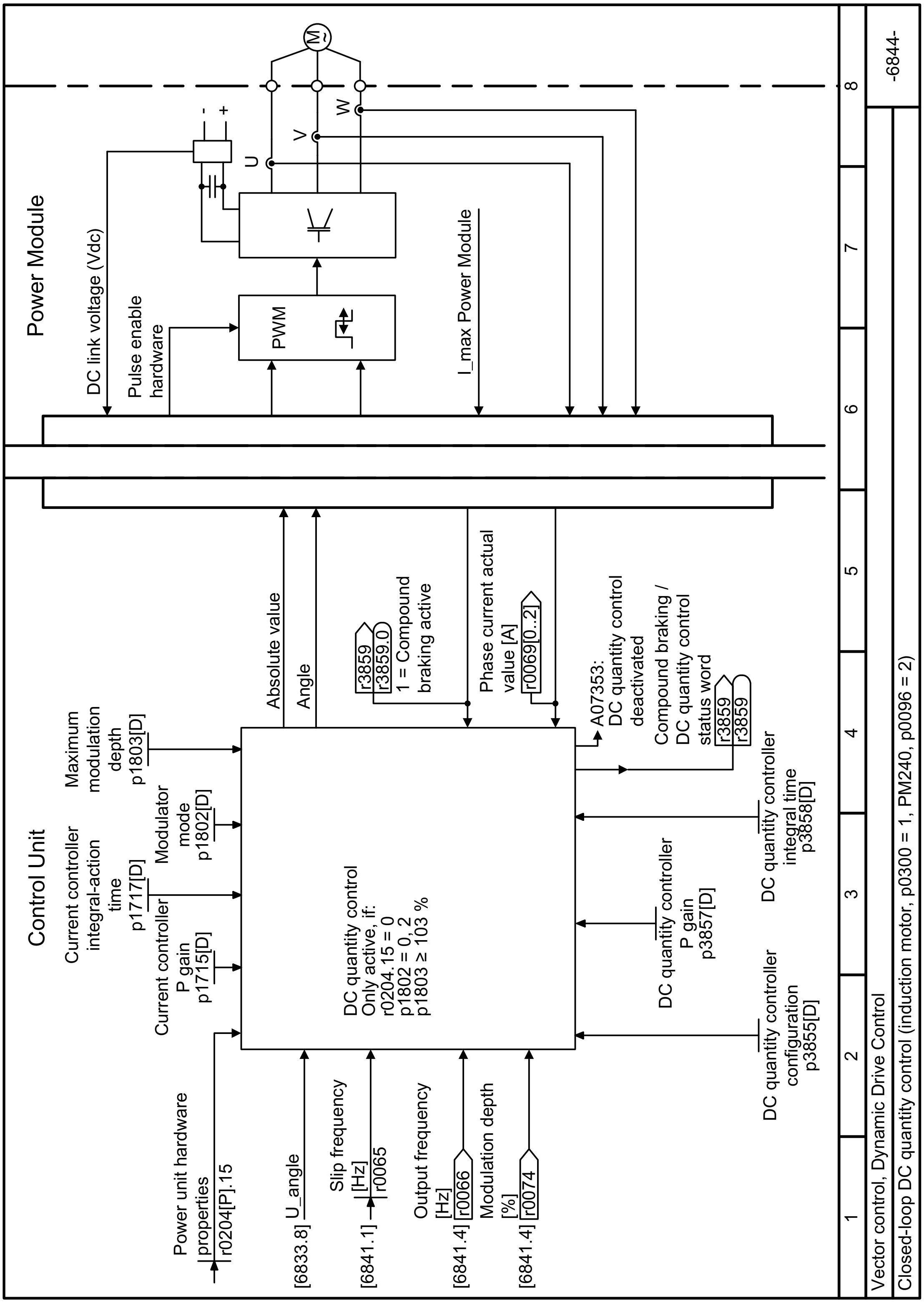


Figure 8-151 FP 6844

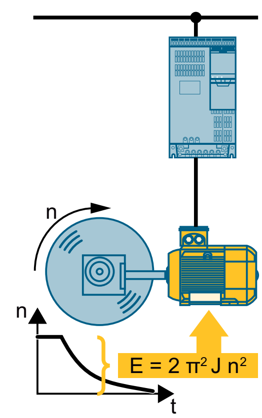
8.7.4 Electrically braking the motor

Overview

Braking with the motor in generator operation

If the motor brakes the connected load electrically, it converts the kinetic energy of the motor into electrical energy. The electrical energy E released on braking the load is proportional to the moment of inertia J of the motor and load and to the square of the speed n. The motor attempts to pass the energy on to the converter.

Main features of the braking functions



DC braking

DC braking prevents the motor from transferring the braking energy to the converter. The converter impresses a DC current into the motor, which brakes the motor. The motor converts the braking energy E of the load into heat.

- *Advantage:* The motor brakes the load without the converter having to process regenerative power.
- *Disadvantages:* significant increase in the motor temperature; no defined braking characteristics; no constant braking torque; no braking torque at standstill; braking energy E is lost as heat; does not function when the power fails

Compound braking

One version of DC braking. The converter brakes the motor with a defined ramp-down time and superimposes a DC current on the output current.

8.7.4.1 DC braking

Function description

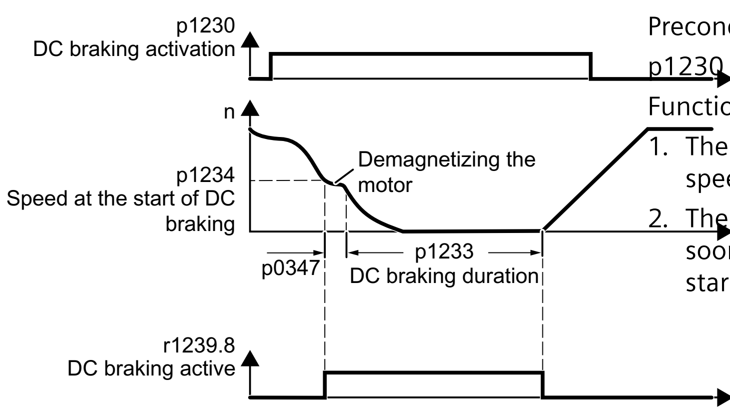
NOTICE
Motor overheating as a result of DC braking
The motor will overheat if you use DC braking too frequently or use it for too long. This may damage the motor. • Monitor the motor temperature. • Allow the motor to adequately cool down between braking operations. • If necessary, select another motor braking method.

With DC braking, the converter outputs an internal OFF2 command for the time that it takes to de-energize the motor p0347 - and then impresses the braking current for the duration of the DC braking.

The DC-braking function is possible only for induction motors.

4 different events initiate DC braking

DC braking when falling below a starting speed



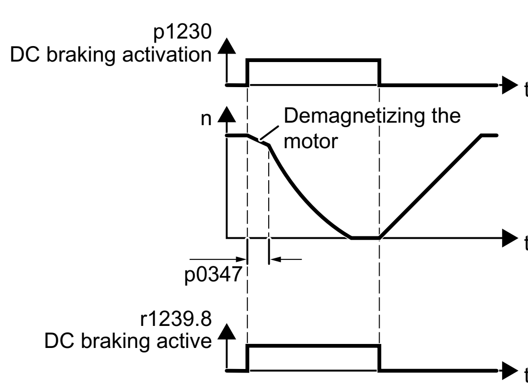
Precondition:

p1230 = 1 and p1231 = 14

Function:

1. The motor speed has exceeded the starting speed.
2. The converter activates the DC braking as soon as the motor speed falls below the starting speed.

DC braking when a fault occurs



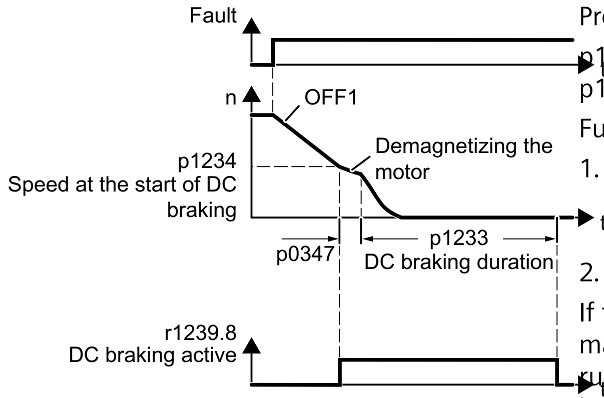
Precondition:

Fault number and fault response are assigned via p2100 and p2101.

Function:

1. A fault occurs, which initiates DC braking as response.
2. The motor brakes along the down ramp to the speed for the start of DC braking.
3. DC braking starts.

DC braking initiated by a control command



Precondition:

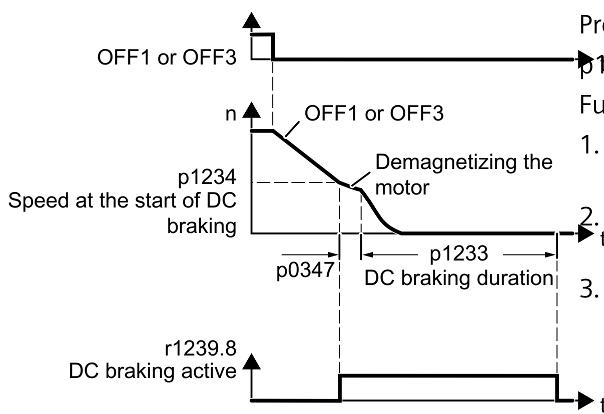
p1231 = 4 and p1230 = control command, e.g. p1230 = 722.3 (control command via DI 3)

Function:

1. The higher-level control issues the command for DC braking, e.g. using DI3: p1230 = 722.3.
2. DC braking starts.

If the higher-level control withdraws the command during DC braking, the converter interrupts DC braking and the motor accelerates to its setpoint.

DC braking when the motor is switched off



Precondition:

p1231 = 5 or p1230 = 1 and p1231 = 14

Function:

1. The higher-level control switches off the motor (OFF1 or OFF3).
2. The motor brakes along the down ramp to the speed for the start of DC braking.
3. DC braking starts.

Parameters

Settings for DC braking

Number	Name	Factory setting
p0347[M]	Motor de-excitation time	0 s
p1230[C]	BI: DC braking activation	0
p1231[M]	Configuring DC braking	0
p1232[M]	DC braking, braking current	0 Arms
p1233[M]	DC braking duration	1 s
p1234[M]	Speed at the start of DC braking	210000 rpm
r1239[8...13]	CO/BO: DC braking status word	-

Table 8-77 Configuring DC braking as a response to faults

Number	Name	Factory setting
p2100[0...19]	Changing the fault reaction, fault number	0
p2101[0...19]	Changing the fault reaction, reaction	0

8.7.4.2 Compound braking

Function description

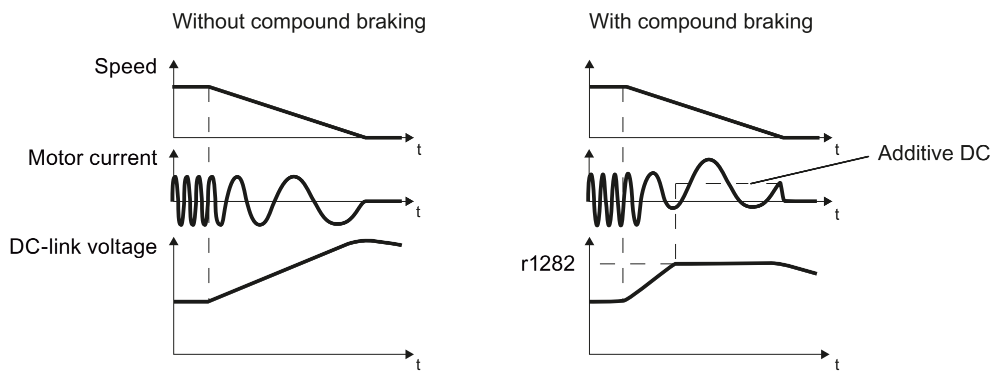


Figure 8-152 Motor brakes with and without active compound braking

Compound braking prevents the DC-link voltage increasing above a critical value. The converter activates compound braking depending on the DC-link voltage. Above a DC-link voltage threshold (r1282), the converter adds a DC current to the motor current. The DC current brakes the motor and prevents an excessive increase in the DC-link voltage.

Note

Compound braking is possible only with the U/f control.

Compound braking does not operate in the following cases:

- The "flying restart" function is active
- DC braking is active
- Vector control is selected

NOTICE
Overheating of the motor due to compound braking
The motor will overheat if you use compound braking too frequently or for too long. This may damage the motor. • Monitor the motor temperature. • Allow the motor to adequately cool down between braking operations. • If necessary, select another motor braking method.

Parameter

Table 8-78 Setting and enabling compound braking

Number	Name	Factory setting
r1282	Vdc_max controller, switch-on level (U/f)	- V
p3856[D]	Compound braking current (%)	0 %
r3859.0	CO/BO: Compound braking/DC quantity control status word	-

8.7.4.3 Function diagram 7017 - Technology functions, DC braking

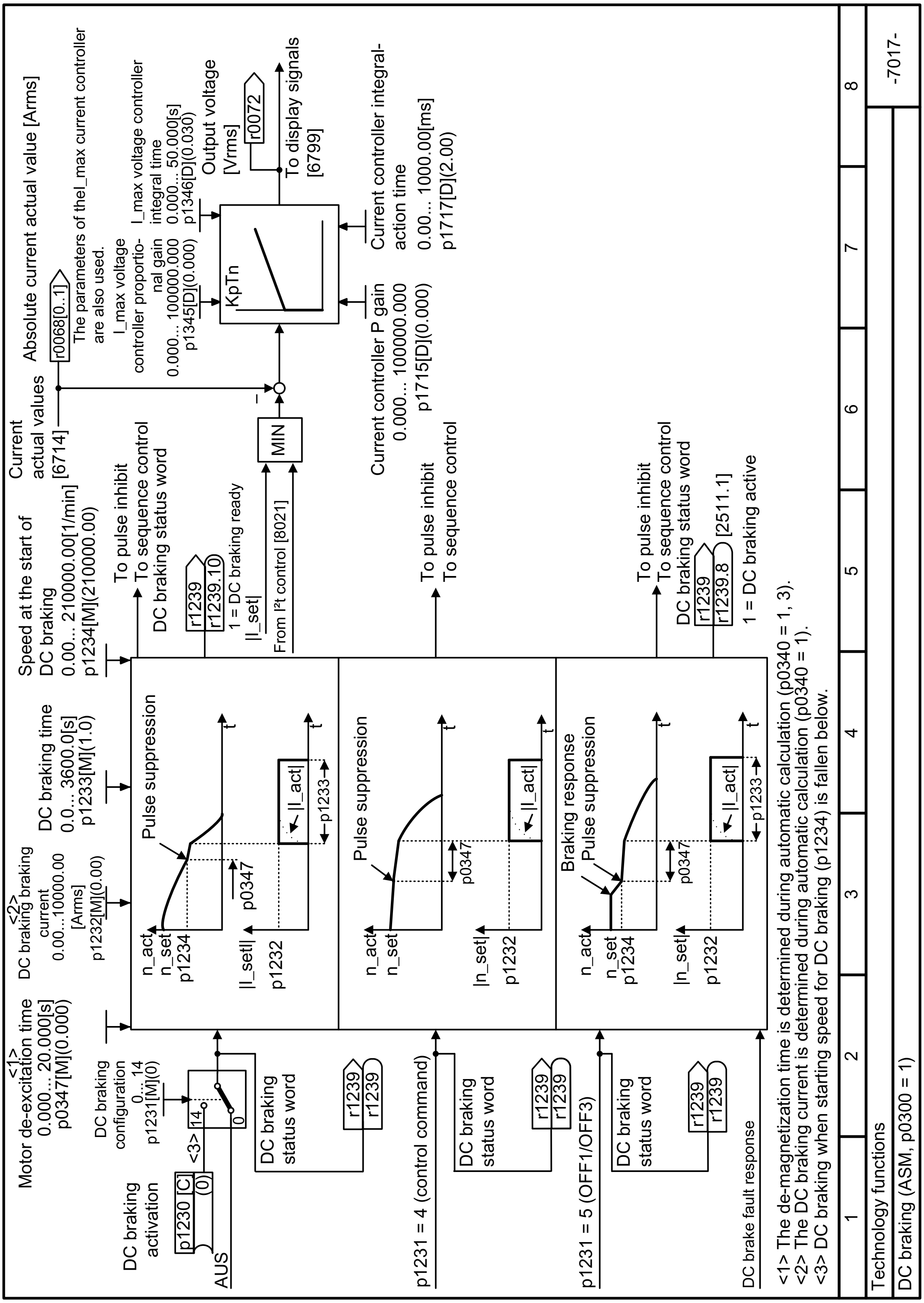


Figure 8-153 FP 7017

8.7.5 Pulse frequency wobbling

Note

This function is only available for the converters of frame sizes FSH and FSJ.

Overview

Pulse frequency wobbling damps the spectral components, which can generate unwanted noise in the motor. Wobbling is activated by default for the converters of frame sizes FSH and FSJ.

Wobbling causes the pulse frequency in a modulation interval to deviate from the setpoint frequency. This means that the actual pulse frequency might be higher than the average pulse frequency required.

A noise generator can be used to vary the pulse frequency around an average value. In this case, the average pulse frequency is equal to the setpoint pulse frequency. The pulse frequency can be varied in every current controller cycle if the cycle is constant. Current measurement errors resulting from asynchronous pulse and control intervals are compensated by a correction in the actual current value.

Parameter p1811[0...n] can be set to adjust the magnitude of variation in the pulse frequency wobble between 0 and 20%. The factory setting is 10%. For a wobble amplitude of p1811 = 0%, the maximum possible pulse frequency is p1800 = 2 × 1/current controller cycle (4 kHz). With a wobble amplitude setting of p1811 > 0, the maximum possible pulse frequency is p1800 = 1/ current controller cycle (2 kHz). These conditions apply to all indices.

Parameters

Parameter	Description	Factory setting
p1811	Pulse frequency wobbulation amplitude	10%

For more information about the parameters, see Chapter "Parameter list (Page 514)".

8.8 Drive protection

8.8.1 Overcurrent protection

Overview

The U/f control prevents too high a motor current by influencing the output frequency and the motor voltage (I-max controller).

Requirement

You have selected U/f control.

The application must allow the motor torque to decrease at a lower speed.

Function description

The I-max controller influences the output frequency and the motor voltage.

If the motor current reaches the current limit during acceleration, the I-max controller extends the acceleration operation.

If the motor load is so high during steady-state operation that the motor current reaches the current limit, then the I-max controller reduces the speed and the motor voltage until the motor current returns to the permissible range again.

If the motor current reaches the current limit during deceleration, the I-max controller extends the deceleration operation.

Changing the settings

The factory setting for proportional gain and the integral time of the I-max controller ensures faultless operation in the vast majority of cases.

The factory setting of the I-max controller must only be changed in the following exceptional cases:

- Speed or torque of the motor tend to cause vibrations upon reaching the current limit.
- The converter goes into the fault state with an overcurrent message.

Parameter

Number	Name	Factory setting
r0056.0 ... 13	CO/BO: Status word, closed-loop control	-
p0305[M]	Rated motor current	0 Arms
p0640[D]	Current limit	0 Arms
p1340[D]	I_max frequency controller proportional gain	0
p1341[D]	I_max frequency controller integral time	0.300 s
r1343	CO: I_max controller frequency output	- rpm

8.8.2 Converter protection using temperature monitoring

Overview

The converter temperature is essentially defined by the following effects:

- The ambient temperature
- The ohmic losses increasing with the output current
- Switching losses increasing with the pulse frequency

Monitoring types

The converter monitors its temperature using the following monitoring types:

- I^2t monitoring (alarm A07805, fault F30005)
- Measuring the chip temperature of the Power Module (alarm A05006, fault F30024)
- Measuring the heat sink temperature of the Power Module (alarm A05000, fault F30004)

Function description

Overload response for p0290 = 0

The converter responds depending on the control mode that has been set:

- In vector control, the converter reduces the output current.
- In U/f control, the converter reduces the speed.

Once the overload condition has been removed, the converter re-enables the output current or speed.

If the measure cannot prevent a converter thermal overload, then the converter switches off the motor with fault F30024.

Overload response for p0290 = 1

The converter immediately switches off the motor with fault F30024.

Overload response for p0290 = 2

We recommend this setting for drives with square-law torque characteristic, e.g. fans.

The converter responds in 2 stages:

1. If you operate the converter with increased pulse frequency setpoint p1800, then the converter reduces its pulse frequency starting at p1800.
   In spite of the temporarily reduced pulse frequency, the base-load output current remains unchanged at the value that is assigned to parameter p1800.

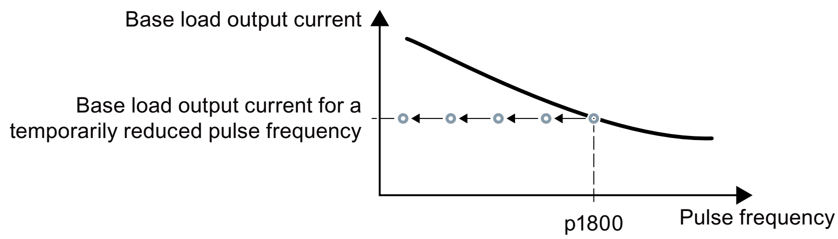


Figure 8-154 Derating characteristic and base load output current for overload

   Once the overload condition has been removed, the converter increases the pulse frequency back to the pulse frequency setpoint p1800.

2. If it is not possible to temporarily reduce the pulse frequency, or the risk of thermal overload cannot be prevented, then stage 2 follows:
   - In vector control, the converter reduces its output current.
   - In U/f control, the converter reduces the speed.

   Once the overload condition has been removed, the converter re-enables the output current or speed.

If both measures cannot prevent a power unit thermal overload, then the converter switches off the motor with fault F30024.

Overload response for p0290 = 3

If you operate the converter with increased pulse frequency, then the converter reduces its pulse frequency starting at the pulse frequency setpoint p1800.

In spite of the temporarily reduced pulse frequency, the maximum output current remains unchanged at the value that is assigned to the pulse frequency setpoint. Also see p0290 = 2.

Once the overload condition has been removed, the converter increases the pulse frequency back to the pulse frequency setpoint p1800.

If it is not possible to temporarily reduce the pulse frequency, or the measure cannot prevent a power unit thermal overload, then the converter switches off the motor with fault F30024.

Overload response for p0290 = 12

The converter responds in 2 stages:

1. If you operate the converter with increased pulse frequency setpoint p1800, then the converter reduces its pulse frequency starting at p1800.
   There is no current derating as a result of the higher pulse frequency setpoint.
   Once the overload condition has been removed, the converter increases the pulse frequency back to the pulse frequency setpoint p1800.
2. If it is not possible to temporarily reduce the pulse frequency, or the risk of converter thermal overload cannot be prevented, then stage 2 follows:
   – In vector control, the converter reduces the output current.
   – In U/f control, the converter reduces the speed.

   Once the overload condition has been removed, the converter re-enables the output current or speed.

If both measures cannot prevent a power unit thermal overload, then the converter switches off the motor with fault F30024.

Overload response for p0290 = 13

We recommend this setting for drives with a high starting torque.

If you operate the converter with increased pulse frequency, then the converter reduces its pulse frequency starting at the pulse frequency setpoint p1800.

There is no current derating as a result of the higher pulse frequency setpoint.

Once the overload condition has been removed, the converter increases the pulse frequency back to the pulse frequency setpoint p1800.

If it is not possible to temporarily reduce the pulse frequency, or the measure cannot prevent a power unit thermal overload, then the converter switches off the motor with fault F30024.

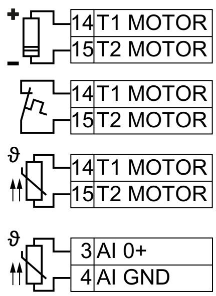
Parameters

Number	Name	Factory setting
r0036	CO: Power unit overload I2t	%
r0037[0...19]	Power unit temperatures	°C
p0290	Power unit overload response	2
p0292[0...1]	Power unit temperature alarm threshold	[0] 5 °C, [1] 15 °C
p0294	Power Module alarm for I2t overload	95%

8.8.3 Motor protection with temperature sensor

Overview

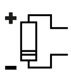
The converter can evaluate one of the following sensors to protect the motor against overtemperature:



- KTY84
- Temperature switch (e.g. bimetallic switch)
- PTC
- Pt1000
- Pt100
  Evaluated via a converter analog input

Function description

KTY84 sensor



Using a KTY sensor, the converter monitors the motor temperature in the range -48 °C ... +248 °C and the sensor itself for wire breakage or short-circuit.

NOTICE
Overheating of the motor due to KTY sensor connected with the incorrect polarity
If a KTY sensor is connected with incorrect polarity, the motor can be damaged by overheating, as the converter cannot detect a motor overtemperature condition. • Connect the KTY sensor with the correct polarity.

Settings:

- Temperature monitoring:
  - Overtemperature alarm (A07910):
    - motor temperature > p0604 and p0610 = 0
  - Overtemperature fault (F07011):
    The converter responds with a fault in the following cases:
    - motor temperature > p0605
    - motor temperature > p0604 and p0610 > 0
- Sensor monitoring (A07015 or F07016):
  - Wire-break:
    The converter interprets a resistance > 2120 Ω as a wire-break and outputs the alarm A07015. After 100 milliseconds, the converter changes to the fault state with F07016.
  - Short-circuit:
    The converter interprets a resistance < 50 Ω as a short-circuit and outputs the alarm A07015. After 100 milliseconds, the converter changes to the fault state with F07016.

Bimetallic switch

The converter interprets a resistance ≥ 100 Ω as an opened bimetallic switch and responds according to the setting for p0610.

PTC sensor

The converter interprets a resistance > 1650 Ω as being an overtemperature and responds according to the setting for p0610.

The converter interprets a resistance < 20 Ω as being a short-circuit and responds with alarm A07015. If the alarm is present for longer than 100 milliseconds, the converter shuts down with fault F07016.

Pt1000 sensor

Using a Pt1000 sensor, the converter monitors the motor temperature in the range -48 °C ... +248 °C and the sensor itself for wire breakage or short-circuit.

Settings:

- Temperature monitoring:
  - Overtemperature alarm (A07910):
    - motor temperature > p0604 and p0610 = 0
  - Overtemperature fault (F07011):
    The converter responds with a fault in the following cases:
    - motor temperature > p0605
    - motor temperature > p0604 and p0610 > 0
- Sensor monitoring (A07015 or F07016):
  - Wire-break:
    The converter interprets a resistance > 2120 Ω as a wire-break and outputs the alarm A07015. After 100 milliseconds, the converter changes to the fault state with F07016.
  - Short-circuit:
    The converter interprets a resistance < 603 Ω as a short-circuit and outputs the alarm A07015. After 100 milliseconds, the converter changes to the fault state with F07016.

Pt100 sensor

Using a Pt100 sensor, the converter monitors the motor temperature.

When using a Pt100 sensor, you require a free analog output and a free analog input of the converter.

You can connect the sensor at analog input AI 0 as well as at analog input AI 1.

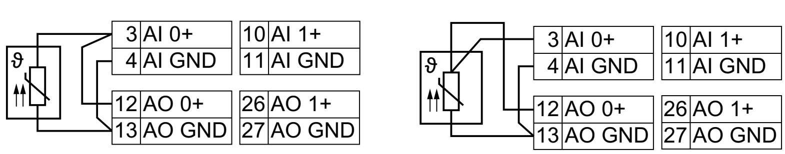


Figure 8-155 Two-wire connection and three-wire connection

Settings:

- Analog output AO and analog input AI:
  p0776[x] = 0: AO x is current output 0 mA ... 20 mA, corresponding to the factory setting 0 % ... 100 %
  p0756[x] = 0: AI x is voltage input 0 V ... 10 V, corresponding to the factory setting 0 % ... 100 %.
  p29701 = r0755[x]. x is the number of the analog input where the Pt100 is connected.
  p771[x] = r29706. x is the number of the analog output where the Pt100 is connected.
- Temperature monitoring: The converter evaluates the motor temperature in the range from -48 °C ... +248 °C.
  – Number of Pt100 connected in series: p29700
  – Overtemperature alarm (A07910):
    - motor temperature > p0604 and p0610 = 0
  – Overtemperature fault (F07011):
    The converter responds with a fault in the following cases:
    - motor temperature > p0605
    - motor temperature > p0604 and p0610 > 0
- The converter does not monitor the sensor.

Parameters

Table 8-79 General parameters

Number	Name	Factory setting
p0335[M]	Type of motor cooling	0
p0601[M]	Motor temperature sensor type	0
p0604[M]	Mot_temp_mod 2/sensor alarm threshold	130 °C
p0605[M]	Mot_temp_mod 1/2/sensor threshold and temperature value	145 °C
p0610[M]	Motor overtemperature response	12
p0640[D]	Current limit	0 Arms

Table 8-80 Additional parameters for Pt100

Number	Name	Factory setting
p29700[D]	Temperature sensor type	0
p29701	CI: Temperature sensor voltage source	0
p29704	Cable resistance	0 Ω
r29705	CO: actual temperature sensor value	[°C]
r29706	CO: temperature sensor excitation current	[%]
r29707	CO: temperature sensor resistance value	[Ω]
p29708	Set temperature sensor excitation current	50 %

8.8.4 Motor protection by calculating the temperature

Overview

The converter calculates the motor temperature based on a thermal motor model. After commissioning, the converter sets the thermal motor type to match the motor.

The thermal motor model responds far faster to temperature increases than a temperature sensor.

If the thermal motor model is used together with a temperature sensor, e.g. a Pt1000, then the converter corrects the model according to the measured temperature.

Function description

Thermal motor model 2 for induction motors

The thermal motor model 2 for induction motors is a thermal 3-mass model, consisting of stator core, stator winding and rotor. Thermal motor model 2 calculates the temperatures - both in the rotor as well as in the stator winding.

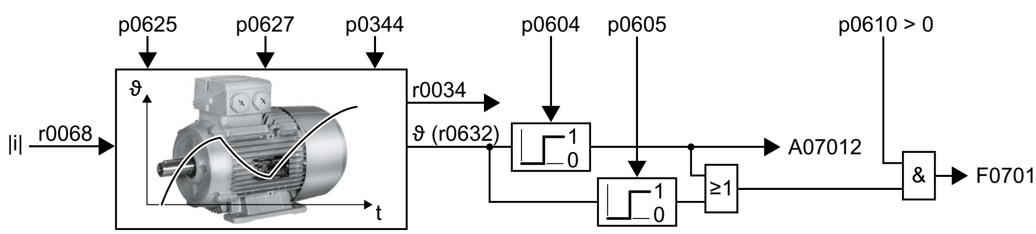


Figure 8-156 Thermal motor model 2 for induction motors

Parameter

Table 8-81 Thermal motor model 2 for induction motors

Number	Name	Factory setting
r0034	CO: Thermal motor load	- %
r0068[0 ... 1]	CO: Absolute actual current value	- Arms
p0344[M]	Motor weight (for thermal motor model)	0 kg
p0604[M]	Mot_temp_mod 2/KTY alarm threshold	130 °C
p0605[M]	Mot_temp_mod 1/2/sensor threshold and temperature value	145 °C
p0610[M]	Motor overtemperature response	12
p0612[M]	Mot_temp_mod activation	0000 0010 0000 0010 bin
p0625[M]	Motor ambient temperature during commissioning	20 °C
p0627[M]	Motor overtemperature, stator winding	80 K
r0632[M]	Mot_temp_mod stator winding temperature	- °C
p0640[D]	Current limit	0 Arms

Thermal motor model 1 for synchronous reluctance motors

Thermal motor model 1 calculates the temperature of the stator winding from the motor current and the thermal time constant of the motor model.

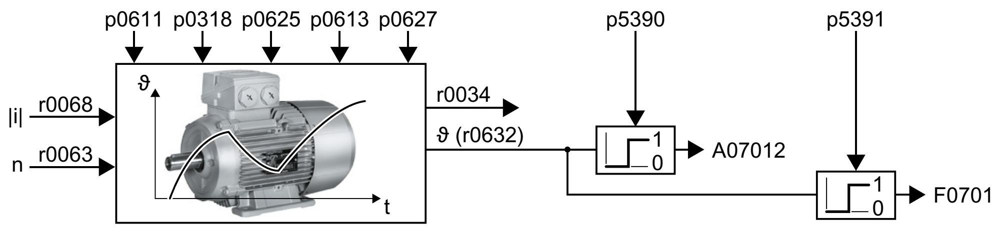


Figure 8-157 Thermal motor model 1 for reluctance motors

Parameters

Table 8-82 Thermal motor model 1 for reluctance motors

Number	Name	Factory setting
r0034	CO: Thermal motor load	- %
r0068[0 ... 1]	CO: Absolute actual current value	- Arms
p0318[M]	Motor stall current	0 Arms
p0610[M]	Motor overtemperature response	12
p0611[M]	I2t thermal motor model time constant	0 s
p0612[M]	Mot_temp_mod activation	0000 0010 0000 0010 bin
p0613[M]	Mot_temp_mod 1/3 ambient temperature	20 °C
p0625[M]	Motor ambient temperature during commissioning	20 °C
p0627[M]	Motor overtemperature, stator winding	80 K
r0632[M]	Mot_temp_mod stator winding temperature	- °C
p5390[M]	Mot_temp_mod 1/3 alarm threshold	110 °C
p5391[M]	Mot_temp_mod 1/3 fault threshold	120 °C

8.8.5 How do I achieve a motor overload protection in accordance with IEC/UL 61800-5-1?

Overview

The thermal motor model of the converter fulfills motor overload protection according to IEC/UL 61800-5-1.

For motor overload protection according to IEC/UL 61800-5-1, some parameters of the thermal motor model may also need to be adjusted.

Requirement

You have correctly entered the motor data during quick commissioning.

NOTICE
Thermal overload of third-party motors due to a trip threshold that is too high
With a Siemens motor, the converter sets the trip threshold of the thermal motor model to match the motor. With a third-party motor, the converter cannot ensure in every case that the trip threshold is exactly right for the motor. A trip threshold that is set too high can lead to a thermal overload, thus causing damage to the motor. • If required for a third-party motor, reduce the corresponding trip threshold p0605, p0615, or p5391.

Procedure

1. Set p0610 = 12.
2. Set the following parameters depending on the motor:
   - Induction motor:
     p0612.1 = 1
     p0612.9 = 1
     For a motor without temperature sensor: p0625 = 40 °C
   - Synchronous motor
     p0612.0 = 1
     p0612.8 = 1
     For a motor without temperature sensor: p0613 = 40 °C

The trip threshold p0605, p0615 or p5391 parameterized in the motor data set may not be increased.

Changing additional parameters of the thermal motor model can lead to the converter no longer satisfying the motor overload protection in accordance with IEC/UL 61800-5-1.

8.8.6 Motor and converter protection by limiting the voltage

Overview

An electric motor converts electrical energy into mechanical energy to drive the load. If the motor is driven by its load, e.g. by the inertia of the load during braking, the energy flow reverses: The motor operates temporarily as a generator, and converts mechanical energy into electrical energy. The electrical energy flows from the motor to the converter. The converter stores the energy in its DC-link capacitors. As a consequence, the DC link voltage Vdc in the converter is higher.

An excessively high DC link voltage damages both the converter and the motor. The converter therefore monitors its DC-link voltage and, when necessary, switches off the connected motor and outputs the fault "DC-link overvoltage".

Function description

Protecting the motor and converter against overvoltage

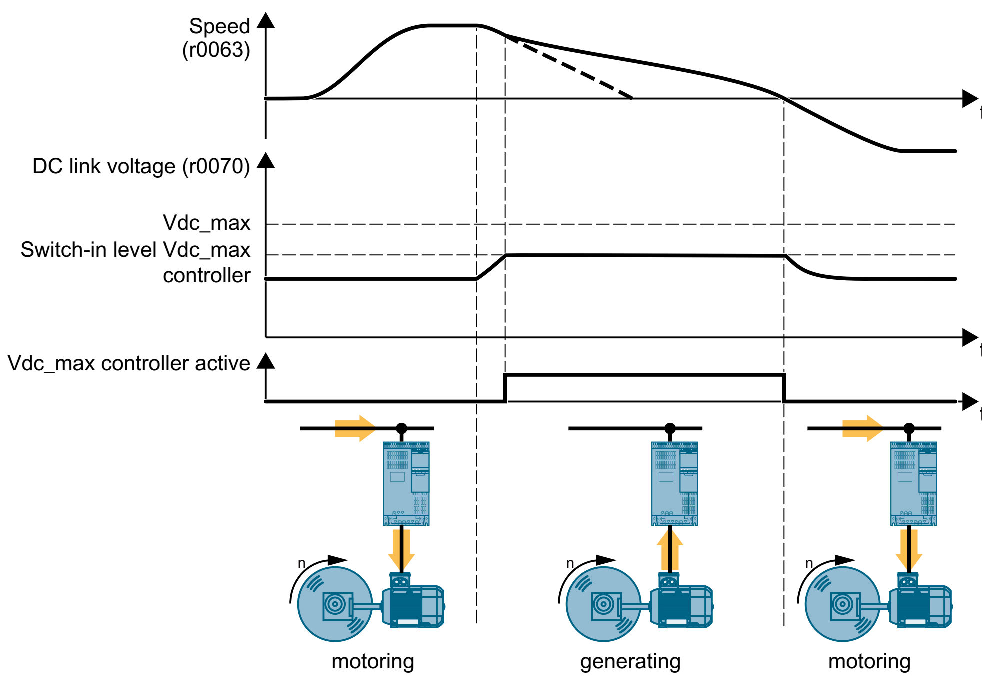


Figure 8-158 Simplified representation of the Vdc_max control

The Vdc_max control lengthens the motor ramp-down time when braking. Consequently, the motor feeds only so much energy back into the converter to cover the losses in the converter. The DC link voltage remains within the permissible range.

Electrically braking the motor (Page 436)

Parameter

The parameters differ depending on the motor control mode.

Table 8-83 Parameters for U/f control

Number	Name	Factory setting
p0210	Device supply voltage	400 V
p1280[D]	Vdc controller configuration (U/f)	1
r1282	Vdc_max controller switch-on level (U/f)	- V
p1283[D]	Vdc_max controller, dynamic factor (U/f)	100%
p1284[D]	Vdc_max controller, time threshold (U/f)	4 s
p1290[D]	Vdc controller proportional gain (U/f)	1
p1291[D]	Vdc controller integral time (U/f)	40 ms
p1292[D]	Vdc controller derivative-action time (U/f)	10 ms
p1294	Vdc_max controller ON level for automatic detection (U/f)	0

Table 8-84 Parameters for vector control

Number	Name	Factory setting
p0210	Device supply voltage	400 V
p1240[D]	Vdc controller configuration (vector control)	1
r1242	Vdc_max controller, switch-on level	- V
p1243[D]	Vdc_max controller, dynamic factor	100%
p1250[D]	Vdc controller proportional gain	1
p1251[D]	Vdc controller integral time	0 ms
p1252[D]	Vdc controller derivative-action time	0 ms
p1254	Vdc_max controller ON level for automatic detection	0

8.8.7 Function diagram 6220 - Vector control, Vdc_max and Vdc_min controllers

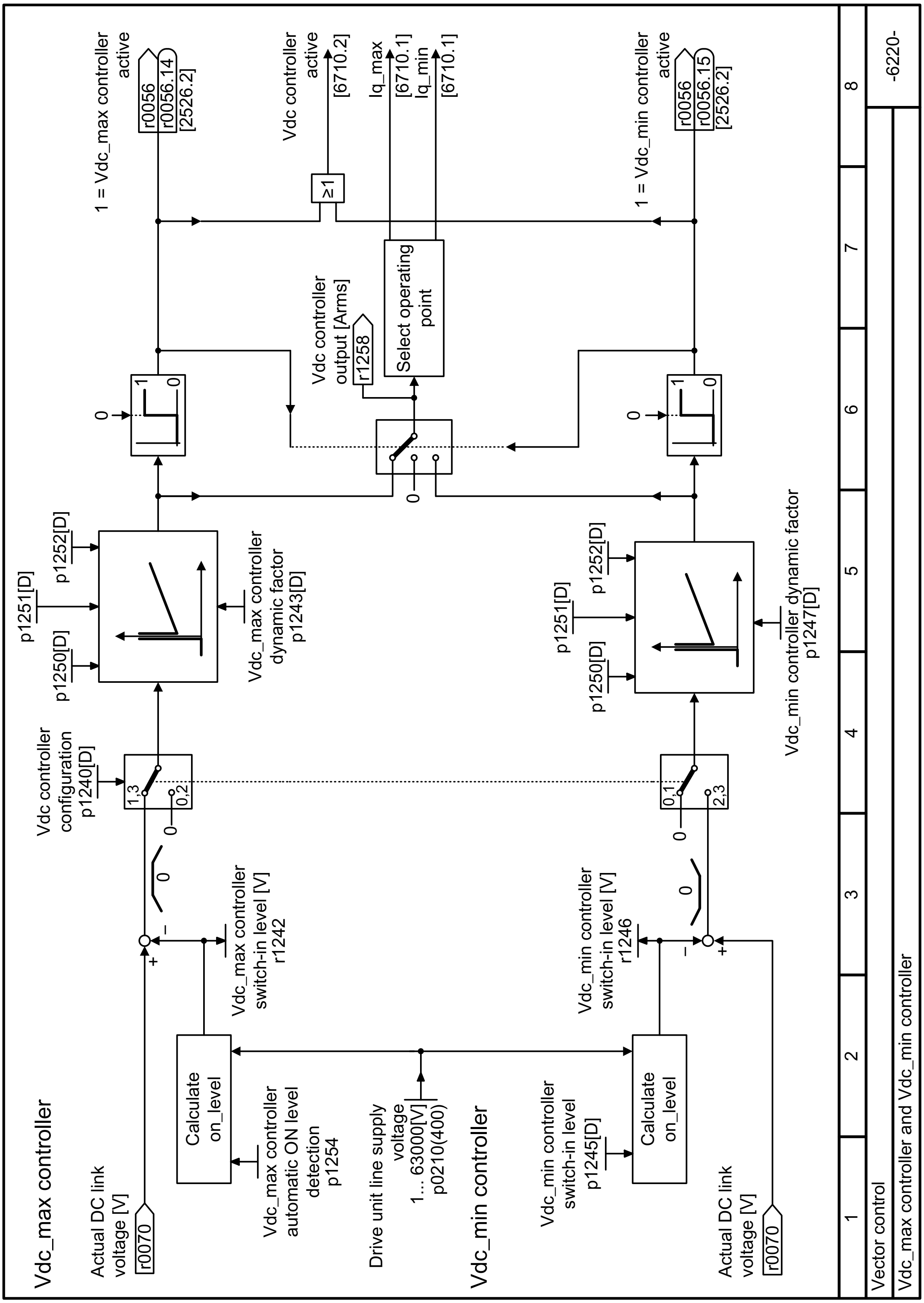


Figure 8-159 FP 6220

8.8.8 Function diagram 6320 - U/f control, Vdc_max and Vdc_min controllers

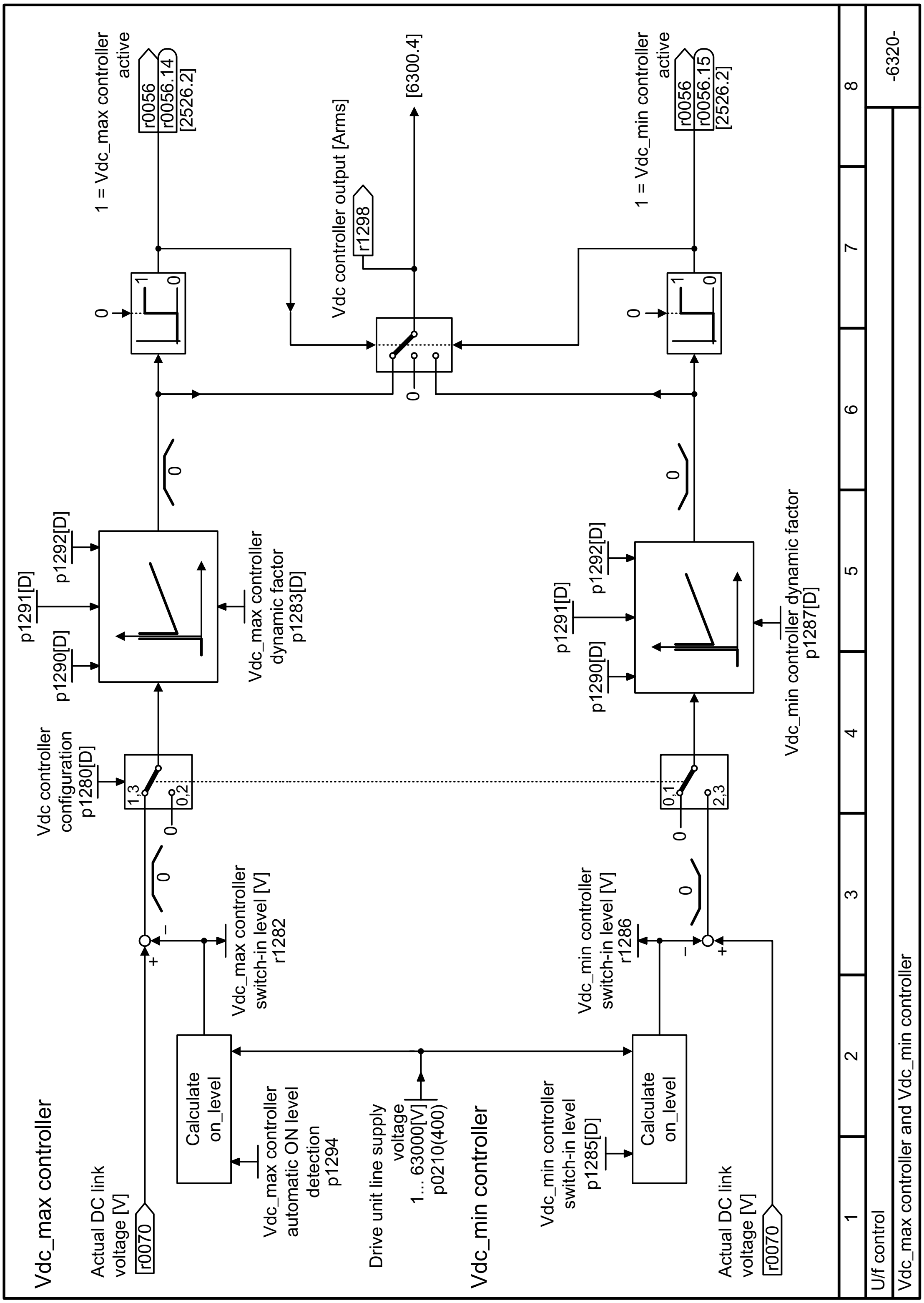


Figure 8-160 FP 6320

8.8.9 Function diagram 6854 - Standard Drive Control, Vdc_max and Vdc_min controllers

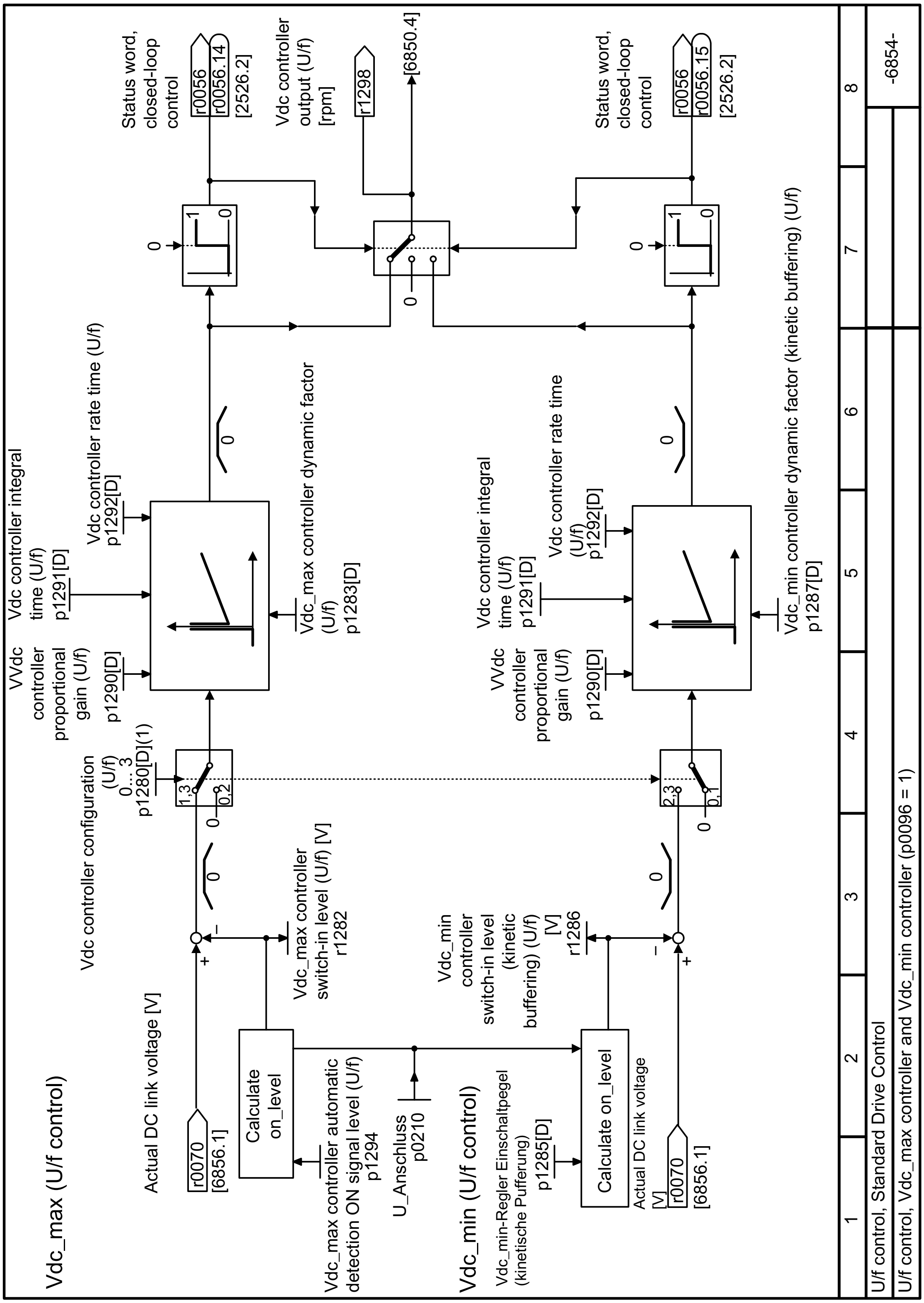


Figure 8-161 FP 6854

8.9 Monitoring the driven load

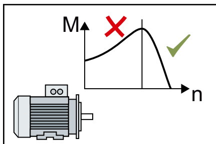
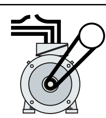
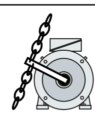
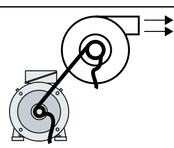
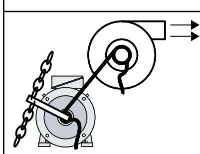
In many applications, the speed and the torque of the motor can be used to determine whether the driven load is in an impermissible operating state. The use of an appropriate monitoring function in the converter prevents failures and damage to the machine or plant.

Examples:

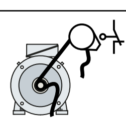
- For fans, an excessively low torque indicates a torn drive belt.
- For pumps, insufficient torque can indicate a leakage or dry-running.
- The motor can be blocked by an excessively high torque at a low speed.

Functions for monitoring the driven load

The converter provides the following options to monitor the driven load based on the output current:

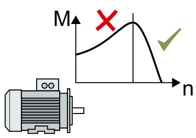
	The stall protection recognizes a stalled asynchronous motor.
	The no-load monitoring evaluates the motor current. An insufficient current can mean that the motor cable is disconnected.
	The blocking protection triggers for a motor current that corresponds to the set current limit coupled with motor standstill.
	The torque monitoring assumes that a specific torque is associated with each speed for pumps and fans. Insufficient torque indicates that the motor and the load are no longer mechanically connected. An excessive torque can indicate problems in the mechanical system of the driven load, e.g. a mechanically blocked load.
	Blocking protection, leakage protection and dry-running protection are a monitoring method for pumps or fans. The monitoring combines a torque monitoring with a blocking protection.

Monitoring the driven load using a binary signal:

	The speed monitoring evaluates a periodic binary signal. A signal failure indicates that the motor and the load are no longer mechanically connected with each other.

8.9.1 Stall protection

Function description



If the load of a standard induction motor exceeds the stall torque of the motor, the motor can also stall during operation on the converter. A stalled motor is stationary and does not develop sufficient torque to accelerate the load.

If the "Motor model fault signal stall detection" r1746 for the time p2178 is present via the "Motor model error threshold stall detection" p1745, the converter signals "Motor stalled" and fault F07902.

Parameter

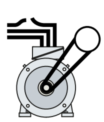
Number	Name	Factory setting
r1408[0 ... 14]	CO/BO: Status word, current controller	-
p1745[D]	Motor model error threshold stall detection	5%
r1746	Motor model fault signal stall detection	- %
p2178[D]	Motor stalled delay time	0.01 s
r2198	CO/BO: Status word monitoring functions 2	-

See also

Blocking protection (Page 462)

8.9.2 No-load monitoring

Function description



An insufficient motor current indicates that the motor cable is disconnected.

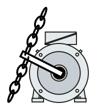
If the motor current for the time p2180 lies below the current level p2179, the converter signals the alarm A07929.

Parameters

Number	Name	Factory setting
r0068[0 ... 1]	CO: Absolute actual current value	- Arms
p2179[D]	Output load detection current limit	0 Arms
p2180[D]	Output load detection delay time	2000 ms
r2197[0 ... 13]	CO/BO: Status word monitoring functions 1	-

8.9.3 Blocking protection

Function description



If the mechanical load is too high, the motor may block. For a blocked motor, the motor current corresponds to the set current limit without the speed reaching the specified setpoint.

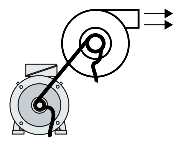
If the speed lies below the speed threshold p2175 for the time p2177 while the motor current reaches the current limit, the converter signals "Motor blocked" and fault F07900.

Parameter

Number	Name	Factory settings
p0045	Display values of smoothing time constant	4 ms
r0063	CO: Speed actual value	- rpm
p2175[D]	Motor blocked speed threshold	120 rpm
p2177[D]	Motor blocked delay time	3 s
r2198	Status word monitoring functions 2	-

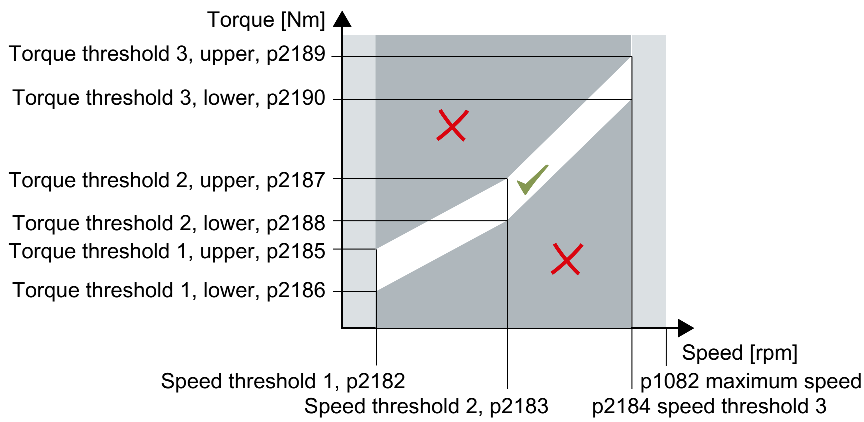
8.9.4 Torque monitoring

Function description



In applications with fans, pumps or compressors with the flow characteristic, the torque follows the speed according to a specific characteristic. An insufficient torque for fans indicates that the power transmission from the motor to the load is interrupted. For pumps, insufficient torque can indicate a leakage or dry-running.

The converter monitors the torque based on the envelope curve depending on the speed against a lower and upper torque.



If the torque lies in the impermissible range longer than time p2192, the converter reacts as specified in p2181.

The monitoring is not active below speed threshold 1 and above speed threshold 3.

Setting monitoring

1. Operate the drive at three different speeds in succession.
2. Set the speed thresholds p2182 ... p2184 to the respective values.
3. Set the torque thresholds for each speed.
   The converter displays the current torque in r0031.
4. Set p2193 = 1.

You have now set monitoring.
❒

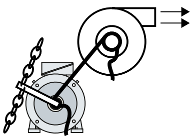
Parameter

Number	Name	Factory setting
r0031	Torque actual value, smoothed	-
p2181[D]	Load monitoring, response	0
p2182[D]	Load monitoring, speed threshold 1	150 rpm
p2183[D]	Load monitoring, speed threshold 2	900 rpm
p2184[D]	Load monitoring, speed threshold 3	1500 rpm

Number	Name	Factory setting
p2185[D]	Load monitoring, torque threshold 1, upper	10000000 Nm
p2186[D]	Load monitoring torque threshold 1, lower	0 Nm
p2187[D]	Load monitoring torque threshold 2, upper	10000000 Nm
p2188[D]	Load monitoring torque threshold 2, lower	0 Nm
p2189[D]	Load monitoring torque threshold 3, upper	10000000 Nm
p2190[D]	Load monitoring torque threshold 3, lower	0 Nm
p2191[D]	Load monitoring torque threshold, no load	0 Nm
p2192[D]	Load monitoring, delay time	10 s
p2193[D]	Load monitoring configuration	1

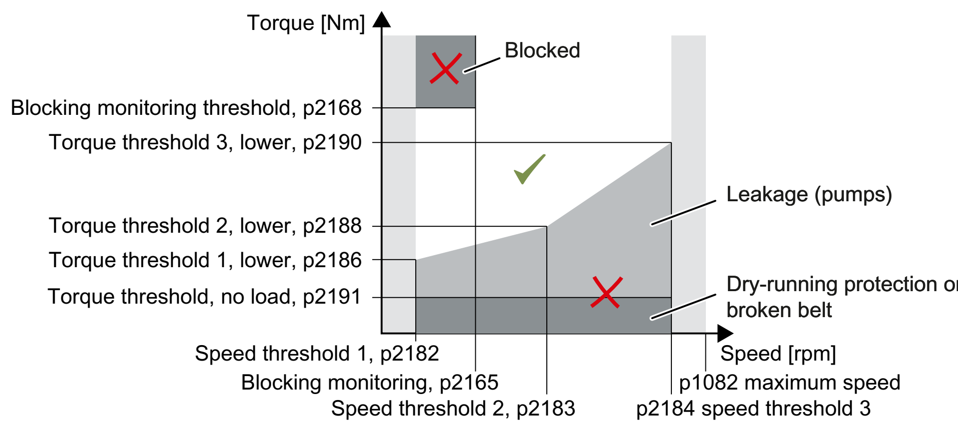
8.9.5 Blocking protection, leakage protection and dry-running protection

Overview



In applications with fans, pumps or compressors with the flow characteristic, the torque follows the speed according to a specific characteristic. An insufficient torque for fans indicates that the power transmission from the motor to the load is interrupted. For pumps, insufficient torque can indicate a leakage or dry-running.

Function description



If the torque and speed lie in the impermissible range longer than time p2192, the converter reacts as specified in p2181.

For applications with pumps, the converter detects the following states of the driven load:

- Blocked
- Leakage
- Dry running

For applications with fans or compressors, the converter detects the following states of the driven load:

- Blocked
- Torn belt

The monitoring is not active below speed threshold 1 and above speed threshold 3.

When using the control mode "U/f control" (p1300 < 10), the "Blocking protection" function becomes active when the current limit is reached.

Blocking protection (Page 462)

Setting pump monitoring

1. Set p2193 = 4.
2. The converter sets the monitoring as shown.

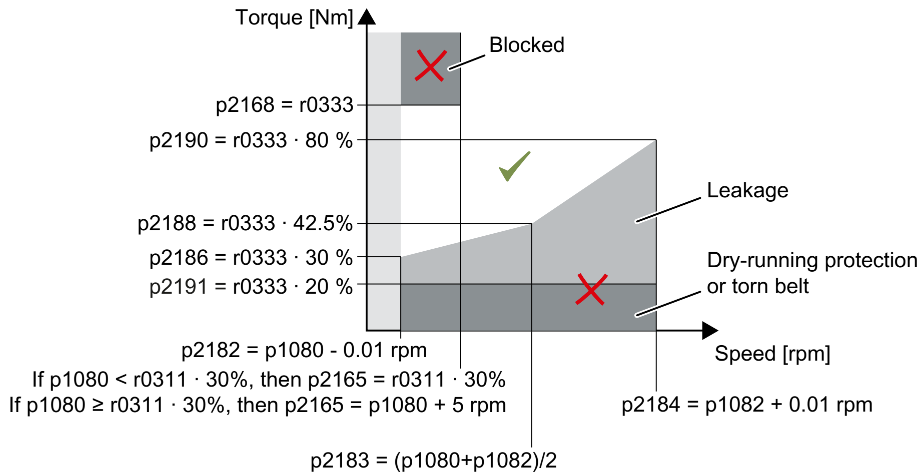


Figure 8-162 Default settings for pumps

3. The converter sets monitoring response p2181 = 7
4. If necessary, adjust the speed thresholds p2182 ... p2184.
5. If necessary, adjust the torque threshold for each speed.
   The converter displays the current torque in r0031.

You have now set monitoring.
❒

Setting fan and compressor monitoring

1. Set p2193 = 5.
2. The converter sets the monitoring as shown.

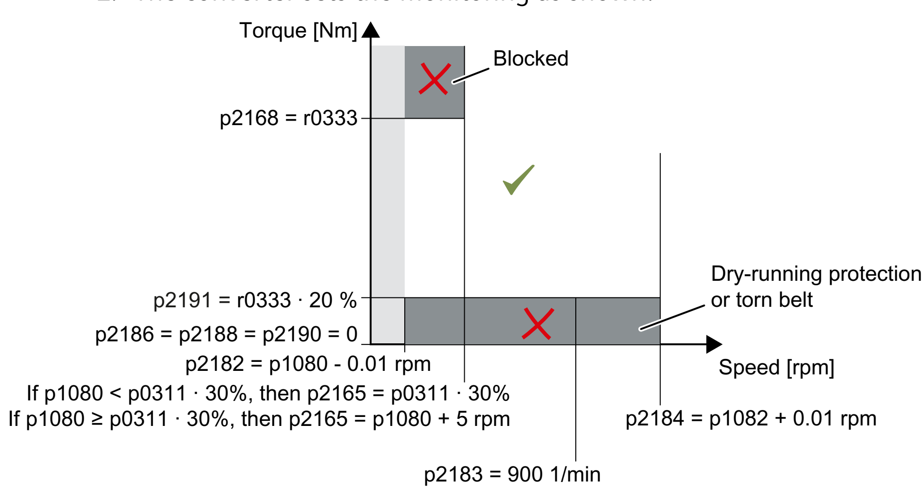


Figure 8-163 Default settings for fans and compressors

3. The converter sets monitoring response p2181 = 7

4. If necessary, adjust the speed thresholds p2182 ... p2184.
5. Set the torque threshold for each speed.
   The converter displays the current torque in r0031.

You have now set monitoring.
❒

Parameter

Number	Name	Factory setting
r0031	Torque actual value, smoothed	-
p0311[M]	Rated motor speed	0 rpm
r0333[M]	Rated motor torque	-
p1080[D]	Minimum speed	0 rpm
p1082[D]	Maximum speed	1500 rpm
p1300[D]	Open-loop/closed-loop control operating mode	See parameter list
p2165[D]	Load monitoring blocking monitoring threshold, upper	0 rpm
p2168[D]	Load monitoring blocking monitoring torque threshold	10000000 Nm
p2181[D]	Load monitoring, response	0
p2182[D]	Load monitoring, speed threshold 1	150 rpm
p2183[D]	Load monitoring, speed threshold 2	900 rpm
p2184[D]	Load monitoring, speed threshold 3	1500 rpm
p2186[D]	Load monitoring torque threshold 1, lower	0 Nm
p2188[D]	Load monitoring torque threshold 2, lower	0 Nm
p2190[D]	Load monitoring torque threshold 3, lower	0 Nm
p2191[D]	Load monitoring torque threshold, no load	0 Nm
p2192[D]	Load monitoring, delay time	10 s
p2193[D]	Load monitoring configuration	1

Further information

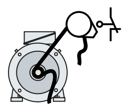
If you deselect monitoring with p2193 < 4, the converter then resets the load monitoring parameters to factory settings.

See also

Torque monitoring (Page 463)

8.9.6 Rotation monitoring

Function description



The converter monitors the speed or velocity of a machine component via an electromechanic or electronic encoder, e.g. a proximity switch. Examples of how the function can be used:

- Drive belt monitoring for fans
- Blocking protection for pumps

The converter checks whether the encoder consistently supplies a 24 V signal during motor operation. If the encoder signal fails for time p2192, the converter signals fault F07936.

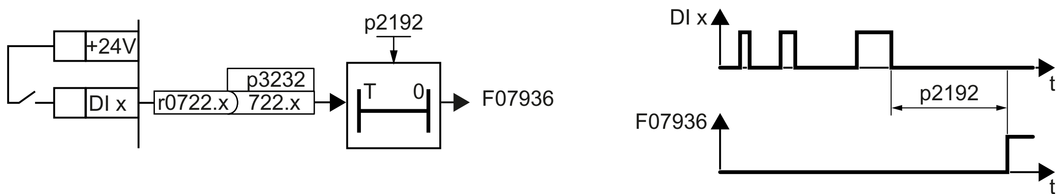


Figure 8-164 Function plan and time response of the speed monitoring

Setting monitoring

1. Set p2193 = 1.
2. Interconnect p3232 with a digital input of your choice.
3. If necessary, adjust the delay time.

You have now set monitoring.
❒

Parameter

Number	Name	Factory setting
r0722	CO/BO: CU digital inputs, status	-
p2192[D]	Load monitoring, delay time	10 s
p2193[D]	Load monitoring configuration	1
p3232[C]	BI: Load monitoring, failure detection	1

8.9.7 Function diagram 8005 - Monitoring, overview

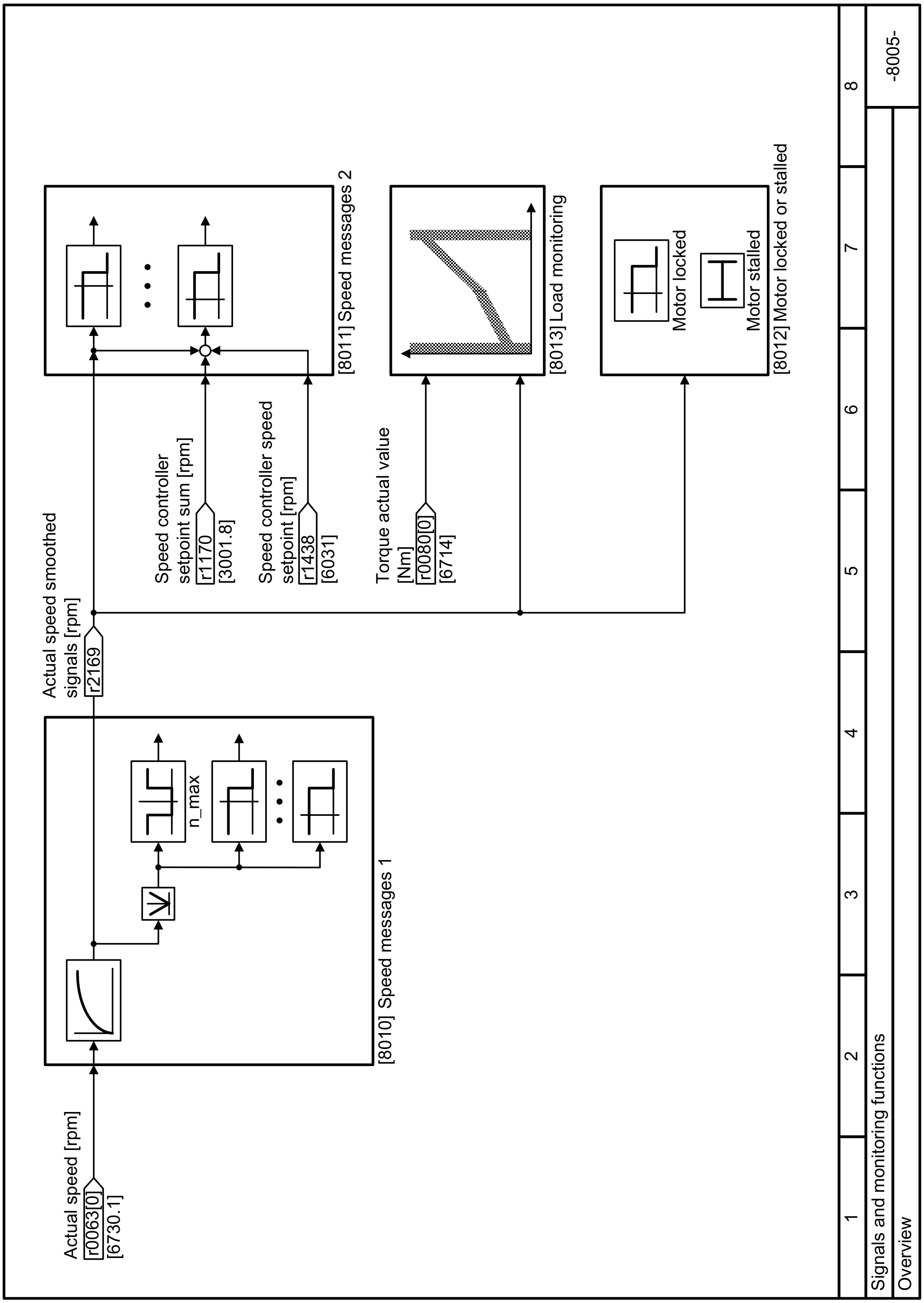


Figure 8-165 FP 8005

8.9.8 Function diagram 8010 - Monitoring, speed signals 1/2

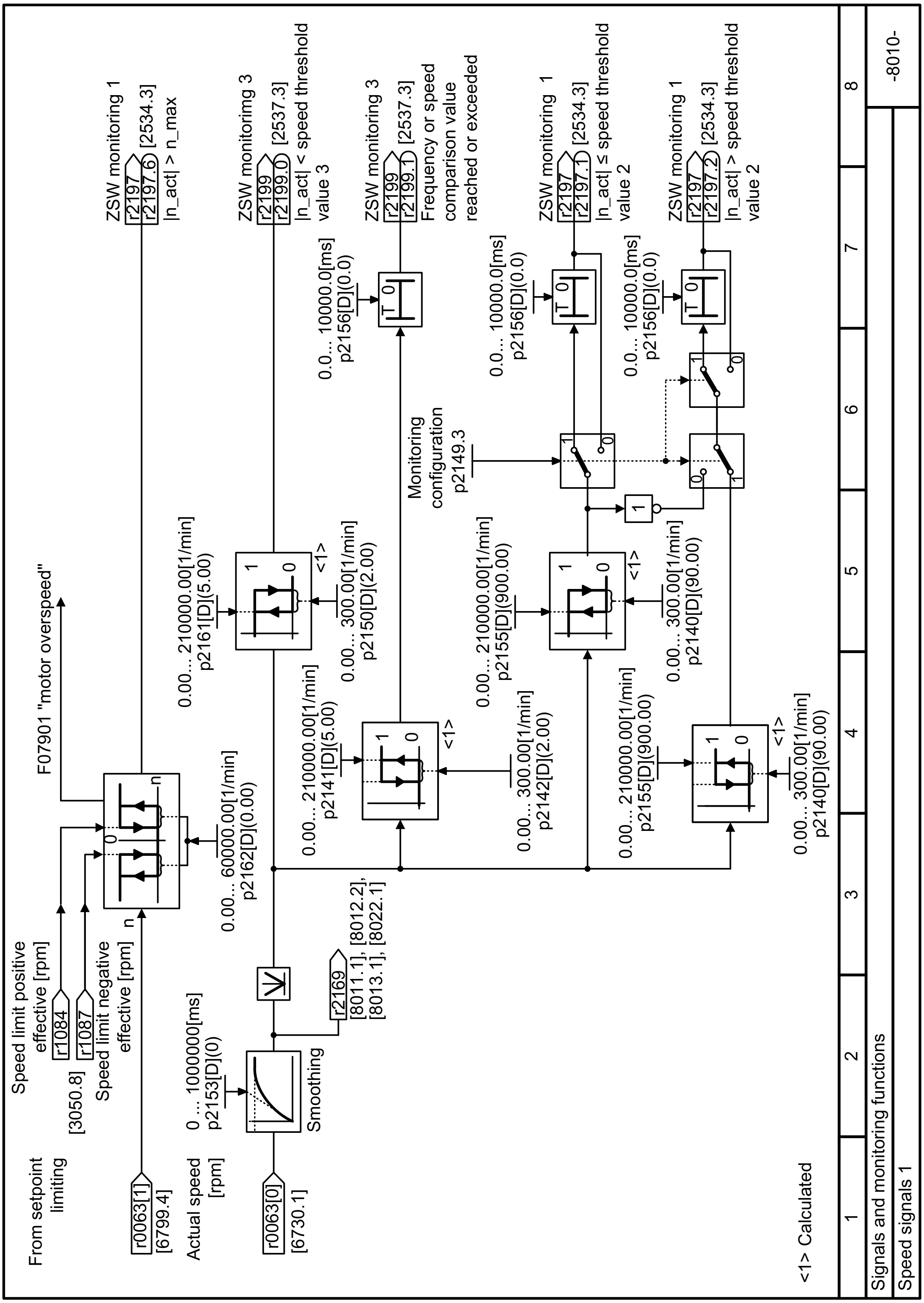


Figure 8-166 FP 8010

8.9.9 Function diagram 8011 - Monitoring, speed signals 2/2

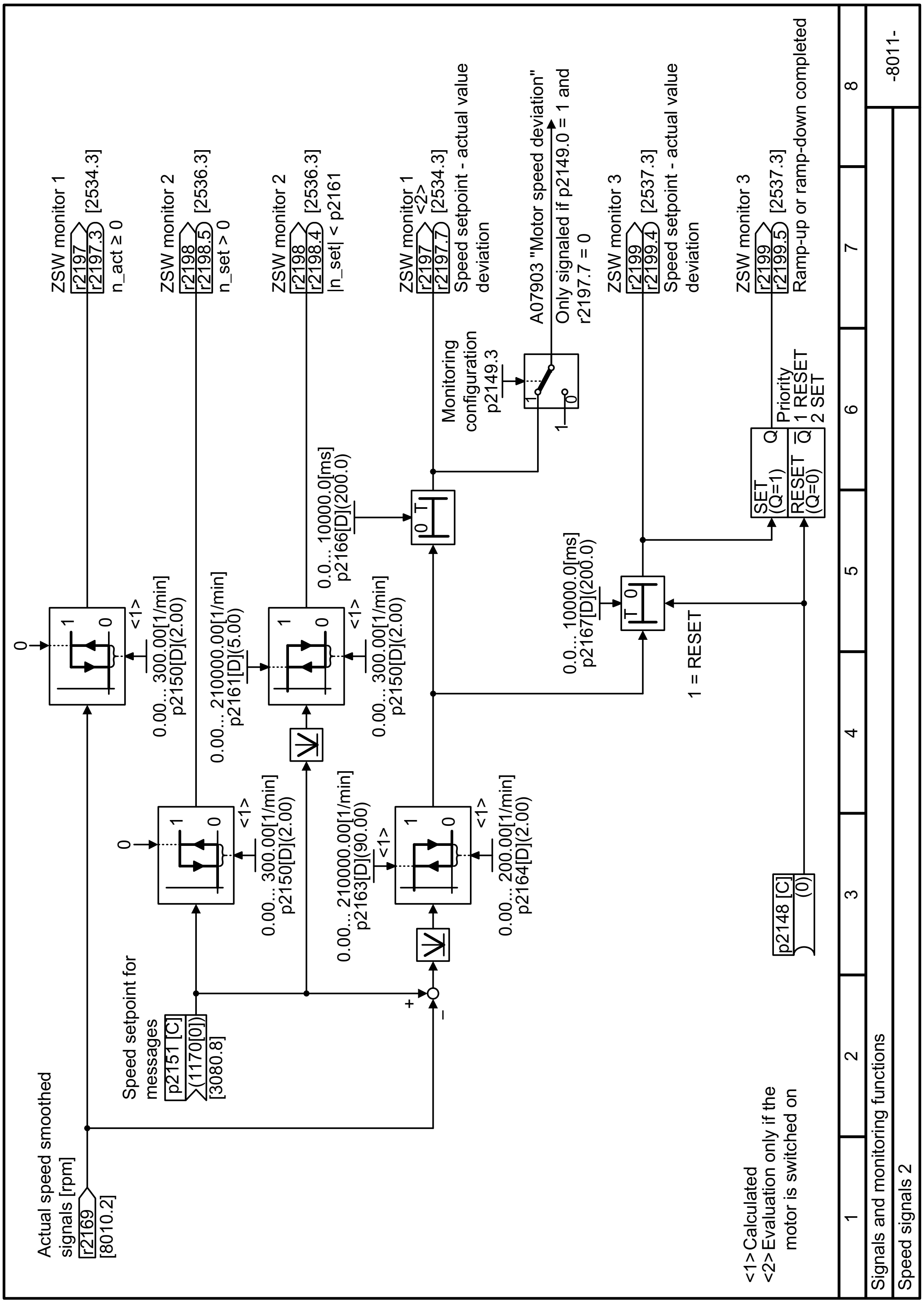


Figure 8-167 FP 8011

8.9.10 Function diagram 8012 - Monitoring, motor blocked

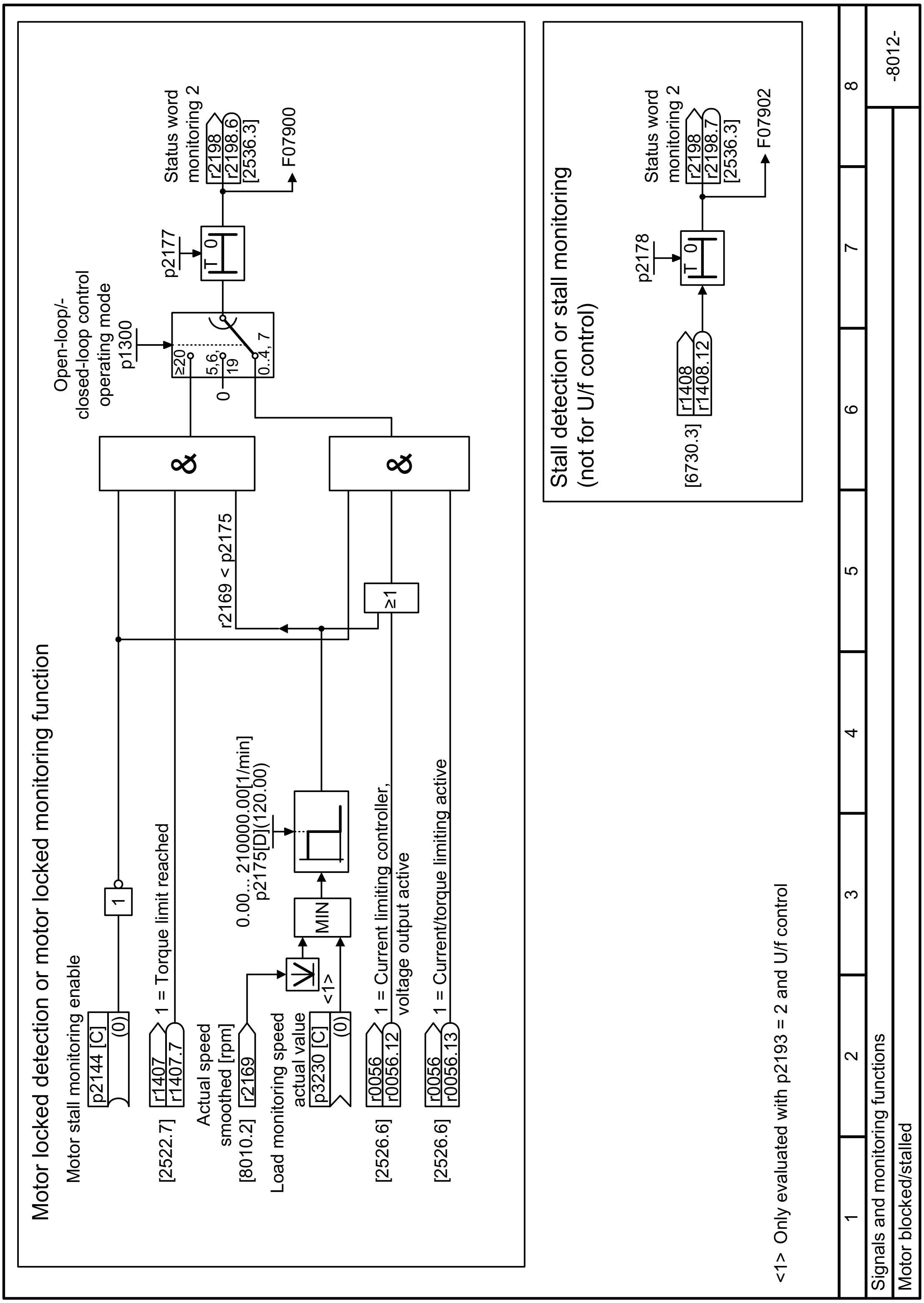


Figure 8-168 FP 8012

8.9.11 Function diagram 8013 - Monitoring, load monitoring 1/2

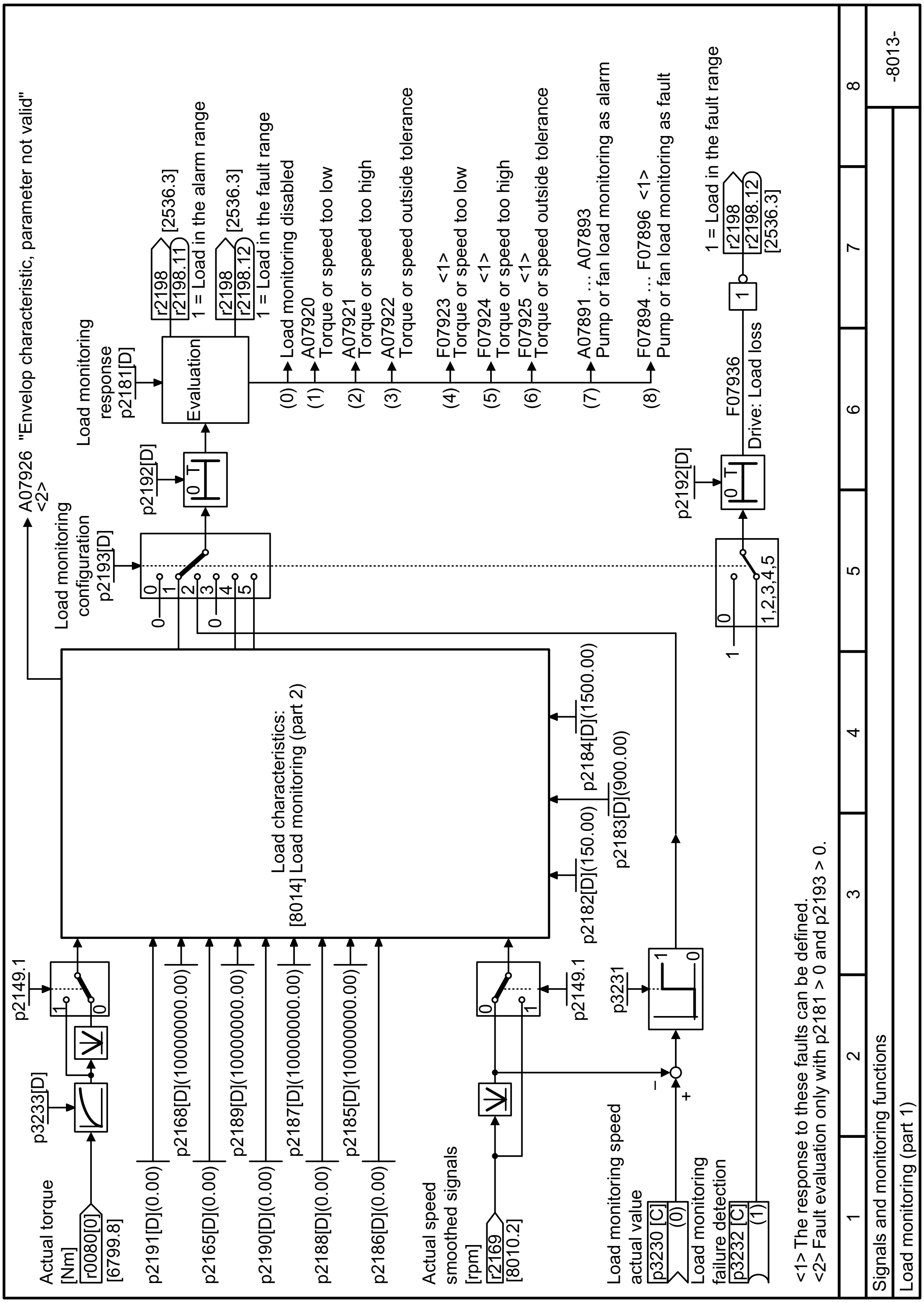


Figure 8-169 FP 8013

8.9.12 Function diagram 8014 - Monitoring, load monitoring 2/2

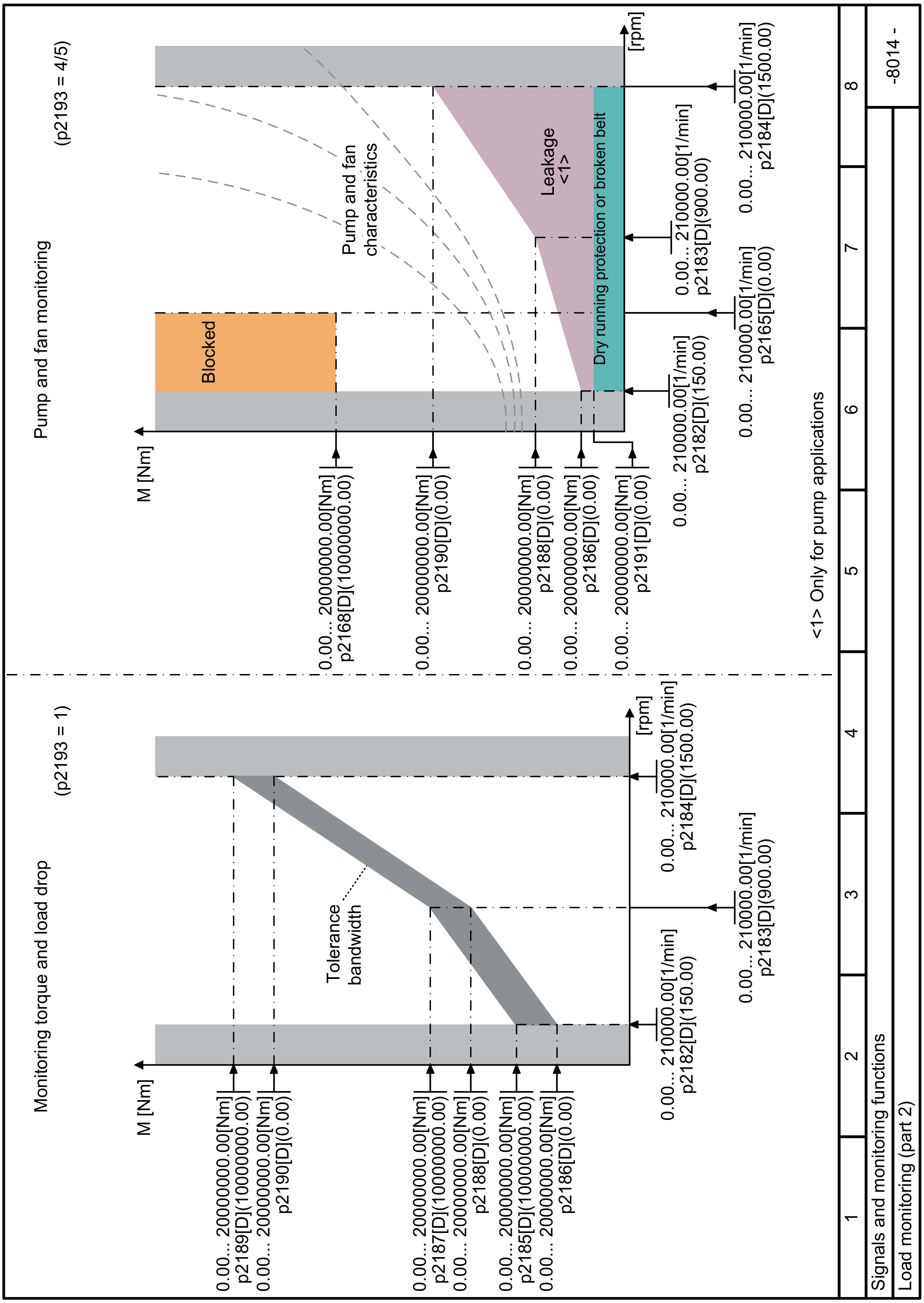


Figure 8-170 FP 8014

8.10 Drive availability

8.10.1 Flying restart – switching on while the motor is running

Overview

If you switch on the motor while it is still rotating, without the "Flying restart" function, there is a high probability that a fault will occur as a result of overcurrent (F30001 or F07801). Examples of applications involving an unintentionally rotating motor directly before switching on:

- The motor rotates after a brief line interruption.
- A flow of air turns the fan impeller.
- A load with a high moment of inertia drives the motor.

Requirement

The converter may operate precisely one motor only.

It is not permissible that you enable the "Flying restart" function if the converter is simultaneously driving several motors. Exception: a mechanical coupling ensures that all of the motors always operate with the same speed.

Function description

The "Flying restart" function comprises the following steps:

1. After the on command, the converter impresses the search current in the motor and increases the output frequency.
2. When the output frequency reaches the actual motor speed, the converter waits for the motor excitation build up time.
3. The converter accelerates the motor to the actual speed setpoint.

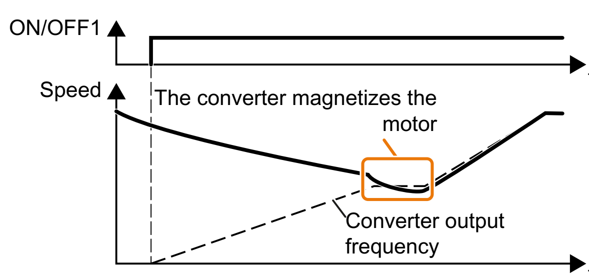


Figure 8-171 Principle of operation of the "flying restart" function

Parameter

Number	Name	Factory setting
p1200[D]	Flying restart operating mode	0
r0331[M]	Actual motor magnetizing current / short-circuit current	- Arms
p0346[M]	Motor excitation build-up time	0 s
p0347[M]	Motor de-excitation time	0 s
p1201[C]	BI: Flying restart enable signal source	1
p1202[D]	Flying restart detection current	90% ... 100%
p1203[D]	Flying restart search rate factor	150% ... 100%

8.10.2 Automatic restart

Overview

The automatic restart includes two different functions:

- The converter automatically acknowledges faults.
- After a fault occurs or after a power failure, the converter automatically switches-on the motor again.

The converter interprets the following events as power failure:

- The converter signals fault F30003 (undervoltage in the DC link), after the converter line voltage has been briefly interrupted.
- All the converter power supplies have been interrupted and all the energy storage devices in the converter have discharged to such a level that the converter electronics fail.

Function description

Setting the automatic restart function

> **WARNING**
>
> **Unexpected machine motion caused by the active automatic restart function**
>
> When the "automatic restart" function is active (p1210 > 1), the motor automatically starts after a line supply phase. Unexpected movement of machine parts can result in serious injury and material damage.
>
> - Block off hazardous areas within the machine to prevent inadvertent access.

If it is possible that the motor is still rotating for a longer period of time after a power failure or after a fault, then you must also activate the "flying restart" function.

Flying restart – switching on while the motor is running (Page 475)

Using p1210, select the automatic restart mode that best suits your application.

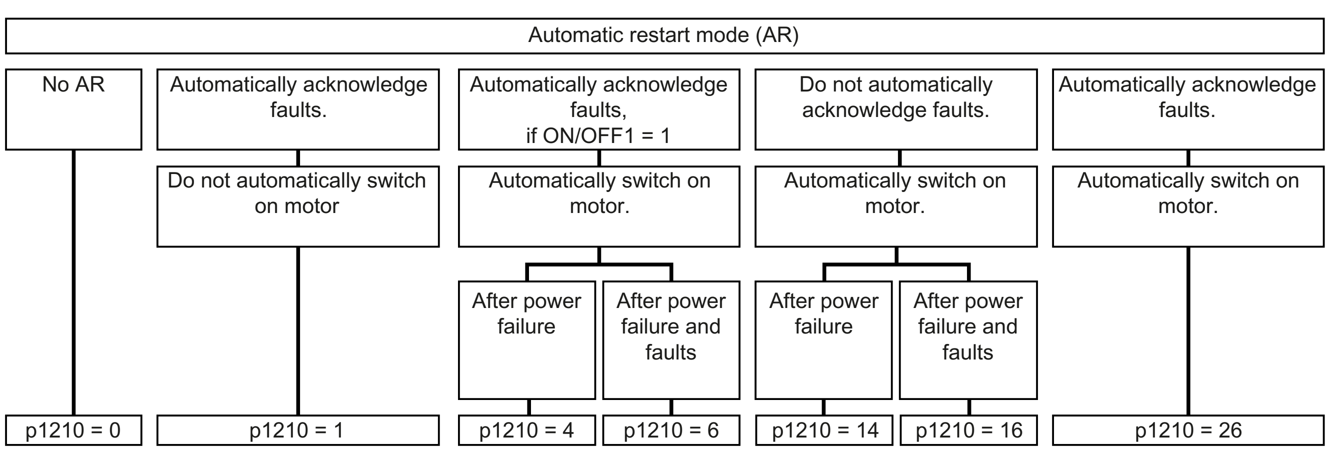
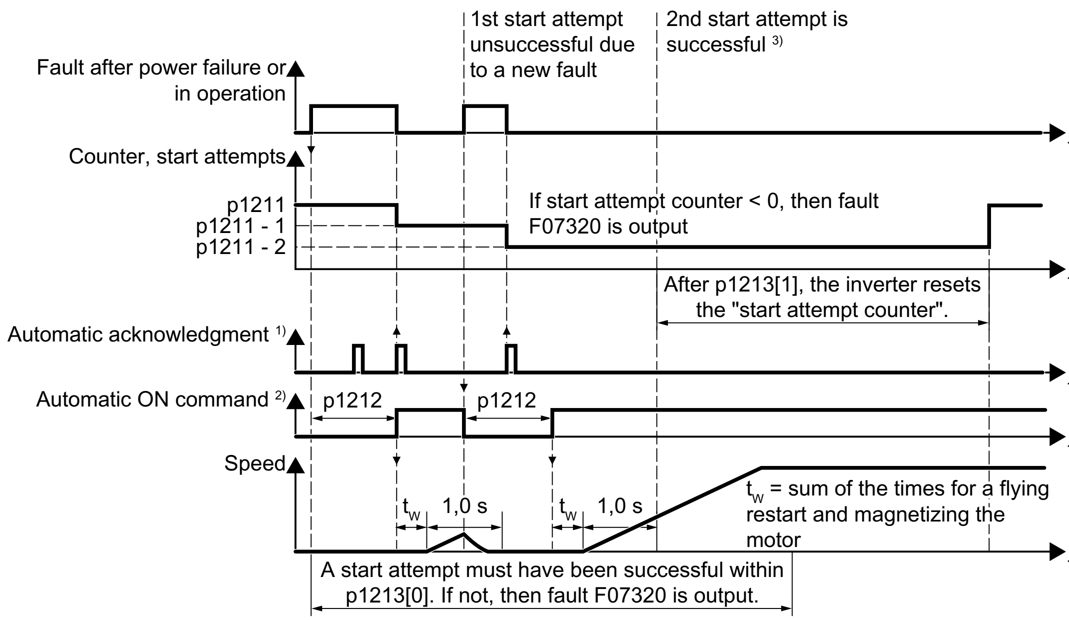


Figure 8-172 Automatic restart modes

The principle of operation of the other parameters is explained in the following diagram and in the table below.



[1] The converter automatically acknowledges faults under the following conditions:

- p1210 = 1 or 26: Always.
- p1210 = 4 or 6: If the command to switch-on the motor is available at a digital input or via the fieldbus (ON/OFF1 = 1).
- p1210 = 14 or 16: Never.

[2] The converter attempts to automatically switch the motor on under the following conditions:

- p1210 = 1: Never.
- p1210 = 4, 6, 14, 16, or 26: If the command to switch-on the motor is available at a digital input or via the fieldbus (ON/OFF1 = 1).

[3] If, after a flying restart and magnetization (r0056.4 = 1) no fault occurs within one second, then the start attempt was successful.

Figure 8-173 Time response of the automatic restart

Advanced settings

If you with to suppress the automatic restart function for certain faults, then you must enter the appropriate fault numbers in p1206[0 ... 9].

Example: p1206[0] = 07331 ⇒ No restart for fault F07331.

Suppressing the automatic restart only functions for the setting p1210 = 6, 16 or 26.

Note

Motor starts in spite of an OFF command via the fieldbus

The converter responds with a fault if fieldbus communication is interrupted. For one of the settings p1210 = 6, 16 or 26, the converter automatically acknowledges the fault and the motor restarts, even if the higher-level control attempts to send an OFF command to the converter.

- In order to prevent the motor automatically starting when the fieldbus communication fails, you must enter the fault number of the communication error in parameter p1206.

Parameter

Number	Name	Factory setting
p1206	Automatic restart faults not active	0
p1210	Automatic restart mode	0
p1211	Automatic restart, start attempts	3
p1212	Automatic restart, wait time start attempts	1 s
p1213[0]	Automatic restart monitoring time for restart	60 s
p1213[1]	Reset automatic restart monitoring time for start-up counter	0 s
p29630	Activate continuous operation	0

8.10.3 Kinetic buffering (Vdc min control)

Overview

Kinetic buffering increases the drive availability. The kinetic buffering utilizes the kinetic energy of the load to buffer line dips and failures. During a line dip, the converter keeps the motor in the switched-on state for as long as possible. One second is a typical maximum buffer time.

Precondition

The following conditions have to be fulfilled to use the "kinetic buffering" function advantageously:

- The driven machine has a sufficiently high inertia.
- The application allows a motor to be braked during a power failure.

Function description

When the line supply dips, the DC-link voltage in the converter decreases. The kinetic buffering ($V_{DC\,min}$ control) intervenes at an adjustable threshold. The $V_{DC\,min}$ control forces the load to go into slightly regenerative operation. As a consequence, the converter covers its power loss and the losses in the motor with the kinetic energy of the load. The load speed decreases, but the DC-link voltage remains constant during the kinetic buffering. After the line supply returns, the converter immediately resumes normal operation.

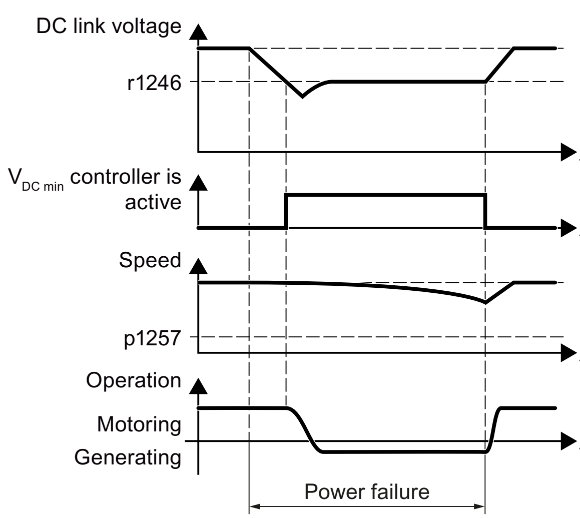


Figure 8-174 Principle mode of operation of kinetic buffering

Parameters

Number	Name	Factory setting
r0056[0...15]	CO/BO: Status word, closed-loop control	-
p0210	Device supply voltage	400 V
p1240[D]	Vdc controller configuration (vector control)	1

Number	Name	Factory setting
p1245[D]	Vdc_min controller, switch-on level (kinetic buffering)	See parameter list
r1246	Vdc_min controller, switch-on level (kinetic buffering)	- V
p1247[D]	Vdc_min controller, dynamic factor (kinetic buffering)	300%
p1255[D]	Vdc_min controller, time threshold	0 s
p1257[D]	Vdc_min controller, speed threshold	50 rpm

8.10.4 Essential service mode

Overview

In essential service mode (ESM), the converter attempts to operate the motor for as long as possible despite irregular ambient conditions.

The converter logs the essential service mode and any faults that occur during essential service mode. The log is accessible only for the service and repair organization.

Note

Warranty is lost in the essential service mode

When the essential service mode is active, and faults occur in the converter, all warranty claims associated with the converter become null and void. The faults can have the following causes:

- Exceptionally high temperatures inside and outside the converter
- Open fire inside and outside the converter
- Emissions of light, noise, particles or gases

Function description

Activating and terminating essential service mode

Signal p3880 = 1 activates the essential service mode:

- If the motor was switched off by activating essential service mode, the converter switches the motor on. The speed setpoint is die "ESM setpoint source".
- If the motor was switched on by activating essential service mode, the converter switches the speed setpoint to "ESM setpoint source".

Signal p3880 = 0 deactivates the essential service mode:

- If one of the OFF1, OFF2 or OFF3 commands is active, the converter switches off the motor.
- If neither OFF1, OFF2 nor OFF3 is active, the converter switches the speed setpoint from the "ESM setpoint source" to the normal setpoint source.

Switch the motor on and off during active essential service mode via other signals

The OFF1, OFF2 and OFF3 commands for switching off the motor have no effect.

The converter blocks all functions that switch off the motor to save energy, e.g. the hibernation mode.

Reaction to faults during active essential service mode

In "essential service mode", the converter does not switch off the motor when faults develop, but rather reacts differently depending on the fault type:

- The converter ignores faults, which do not directly result in the destruction of the converter or the motor.
- Faults with the reaction "OFF2" switch the motor off immediately.
  In this case, the converter attempts to automatically acknowledge the faults using the automatic restart function.
- For faults that cannot be acknowledged, it is possible to switch over the motor to line operation using the bypass function.

Automatic restart during active essential service mode

The converter ignores the settings in p1206 (faults without automatic restart) and works with the setting "restart after a fault with further start attempts" (p1210 = 6).

The converter carries out the maximum number of restart attempts set in p1211 corresponding to the settings in p1212 and p1213. If the restart attempts are unsuccessful, the converter reports the fault F07320.

Speed setpoint during active essential service mode

P3881 specifies the setpoint. If you have defined an analog input as setpoint source using p3881, the converter can switch over to setpoint p3882 in case of wire breakage.

Interaction for bypass and essential service mode

- If, when activating the essential service mode, bypass operation is active, converter operation is selected internally in order to ensure that the setpoint is entered via the source intended for the essential service mode.
- If faults are still present after the number of start attempts parameterized in p1211, then the converter goes into a fault condition with F07320. In this case, there is an option of switching over to bypass operation and then directly connecting the motor to the line supply.

Procedure when commissioning

1. Interconnect a free digital input as signal source for the ESM activation.
   You must use a negated digital input if the essential service mode should also be active for a ground fault – or if the control cable is interrupted.
   Example for negated digital input DI 3: Set p3880 = 723.3.
   It is not permissible to interconnect the digital input for ESM activation with other functions.
2. Set the ESM setpoint source via p3881.
3. Set the alternative ESM setpoint source via p3882.

4. Set the source to select the direction of rotation.
   – p3881 = 0, 1, 2, 3:
     When you interconnect p3883 with a free digital input of your choice, p3883 inverts the direction of rotation during essential service mode.
     For example, to interconnect p3883 with DI 4, set p3883 = 722.4.
   – p3881 = 4:
     The technology setpoint direction of rotation is valid.
5. Optional switching to bypass mode
   If the converter is not able to acknowledge pending faults with automatic restart, it signals fault F07320 and does not make any other attempts to restart.
   If the motor still continues to operate in this case, you must set the following:
   – Set p1266 = 3889.10. The converter switches the motor to bypass mode with r3889.10 = 1.
   – Ensure that the direction of rotation does not change when switching over to bypass operation.
   – Set p1267.0 = 1. The converter switches the motor to bypass mode independent of the speed with control signal p1266.
   – Commission the "Bypass" function.
     Bypass (Page 489)

You have commissioned the essential service mode.
❒

Example

To improve the air circulation in the stairwells, the ventilation control creates an underpressure in the building. With this control, a fire would mean that flue gases enter into the stairwell. This would then mean that the stairs would be blocked as escape or evacuation route.

Using the essential service mode function, the ventilation switches over to the control of an overpressure. The essential service mode prevents the propagation of flue gas in the stairwell, thereby keeping the stairs free as an evacuation route as long as possible.

An application example for the essential service mode can be found on the Internet:

http://support.automation.siemens.com/WW/view/en/63969509 (http://support.automation.siemens.com/WW/view/en/63969509)

Parameters

Parameter	Description	Factory setting
p1206[0...9]	Automatic restart faults not active	0
p1210	Automatic restart mode	0
p1211	Automatic restart, start attempts	3
p1212	Automatic restart, wait time start attempts	1 s
p1213	Automatic restart monitoring time for restart	60 s
p1213	Automatic restart reset monitoring time for start counter	0 s
p1266	BI: Bypass control command	0

Parameter	Description	Factory setting
p1267	Bypass changeover source configuration	0000 bin
p3880	BI: ESM activation signal source	0
p3881	ESM setpoint source	0
p3882	ESM alternative setpoint source	0
p3883	BI: ESM direction of rotation signal source	0
p3884	CI: ESM technology controller setpoint	0
r3889[0...10]	CO/BO: ESM status word	-

8.10.5 Function diagram 7033 - Technology functions, essential service mode

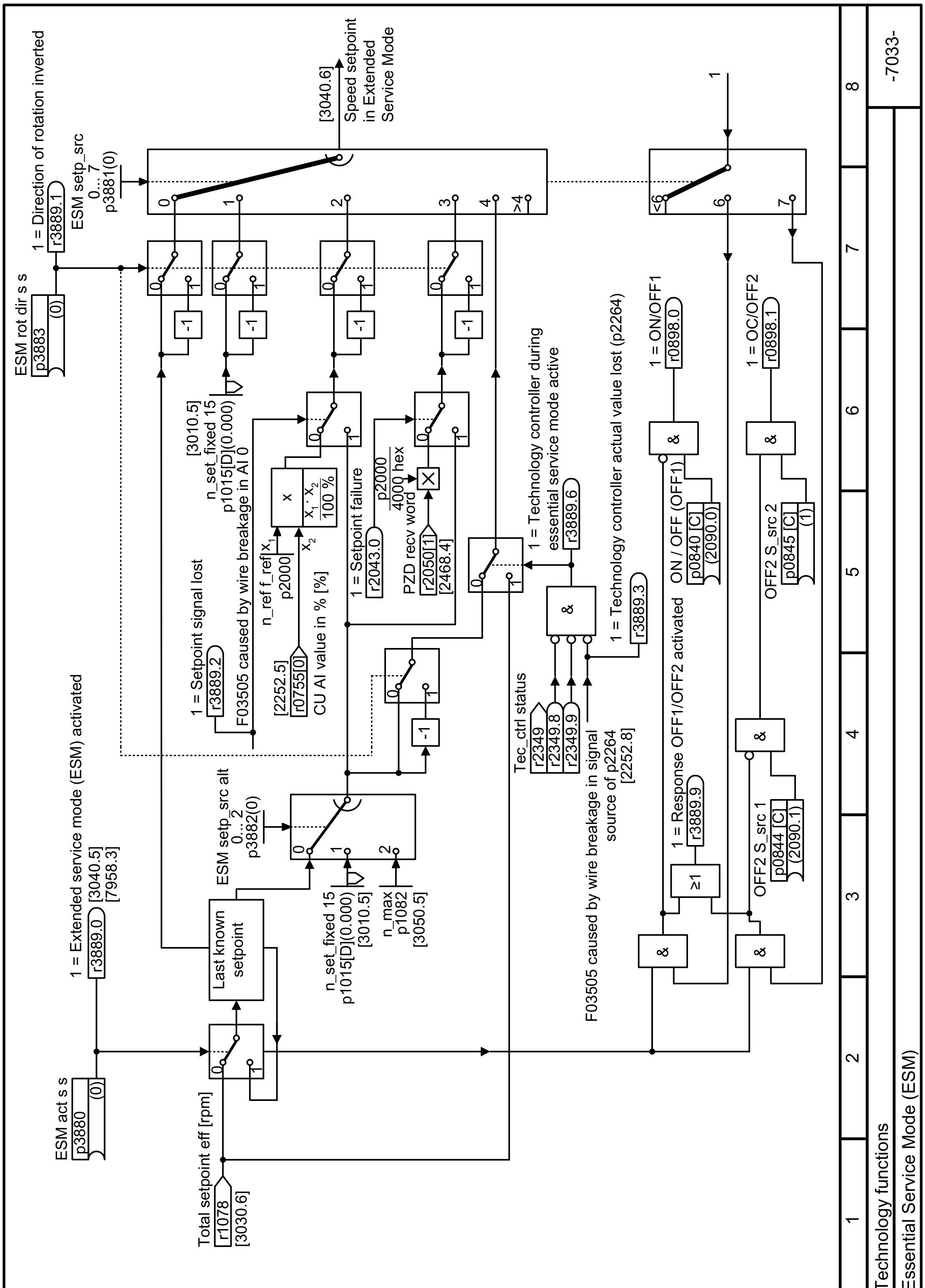


Figure 8-175 FP 7033

8.11 Energy saving

8.11.1 Efficiency optimization

Overview

The efficiency optimization reduces the motor losses as far as possible.

Active efficiency optimization has the following advantages:

- Lower energy costs
- Lower motor temperature rise
- Lower motor noise levels

Active efficiency optimization has the following disadvantage:

- Longer acceleration times and more significant speed dips during torque surges.

The disadvantage is only relevant when the motor must satisfy high requirements relating to the dynamic performance. Even when efficiency optimization is active, the converter closed-loop motor control prevents the motor from stalling.

Precondition

Efficiency optimization functions under the following preconditions:

- Operation with an induction motor
- Vector control is set in the converter.

Function description

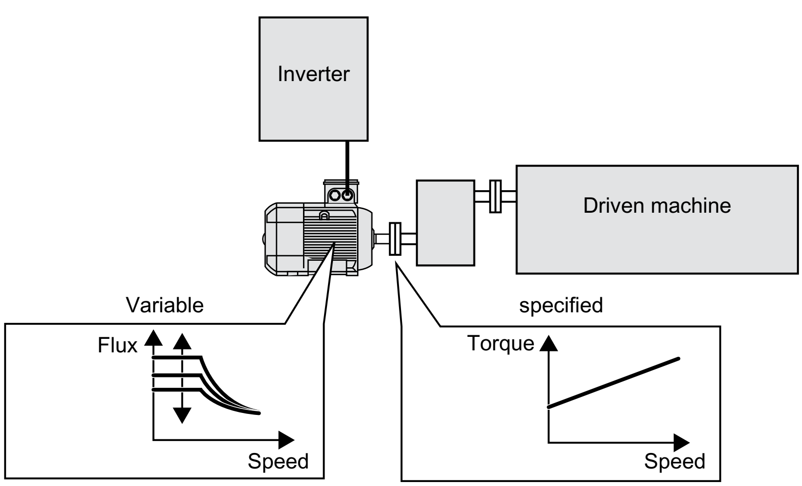


Figure 8-176 Efficiency optimization by changing the motor flux

The three variables that the converter can directly set, which define efficiency of an induction motor, are speed, torque and flux.

However, in all applications, speed and torque are specified by the driven machine. As a consequence, the remaining variable for the efficiency optimization is the flux.

The converter has two different methods of optimizing the efficiency.

Efficiency optimization, method 2

Generally, energy efficiency optimization method 2 achieves a better efficiency than method 1.

We recommend that you set method 2.

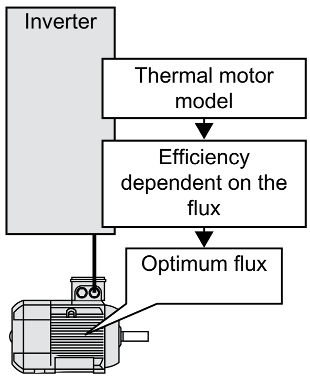


Figure 8-177 Determining the optimum flux from the motor thermal model

Based on its thermal motor model, the converter continually determines - for the actual operating point of the motor - the interdependency between efficiency and flux. The converter then sets the flux to achieve the optimum efficiency.

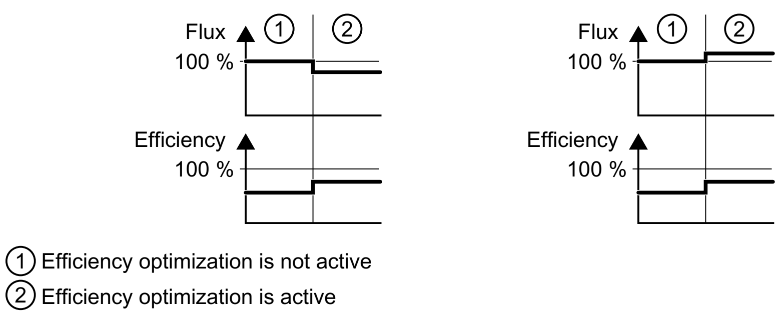


Figure 8-178 Qualitative result of efficiency optimization, method 2

Depending on the motor operating point, the converter either decreases or increases the flux in partial load operation of the motor.

Efficiency optimization, method 1

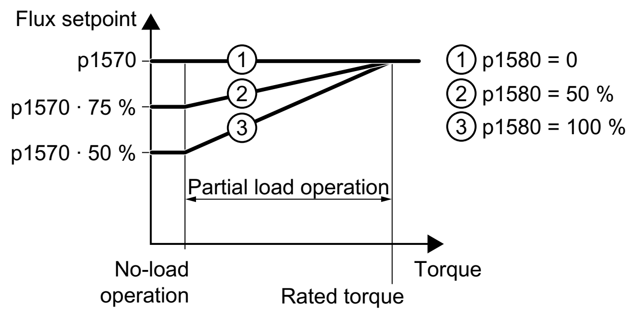


Figure 8-179 Reduce the flux setpoint in the partial load range of the motor

The motor operates in partial load mode between no-load operation and the rated motor torque. Depending on p1580, in the partial load range, the converter reduces the flux setpoint linearly with the torque.

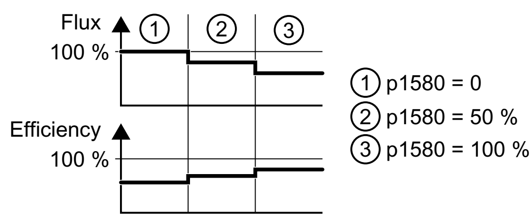


Figure 8-180 Qualitative result of efficiency optimization, method 1

The reduced flux in the motor partial load range results in higher efficiency.

Parameters

The converter calculates the parameters for the thermal motor model based on the motor data that has been set – and the motor data identification.

Table 8-85 Efficiency optimization, method 2

Number	Name	Factory setting
p1401[D]	Flux control configuration	0000 0000 0000 0110 bin
p1570[D]	CO: Flux setpoint	100%
p3315[D]	Efficiency optimization 2 minimum flux limit value	50%
p3316[D]	Efficiency optimization 2 maximum flux limit value	110 %

Table 8-86 Efficiency optimization, method 1

Number	Name	Factory setting
p1570[D]	CO: Flux setpoint	100%
p1580[D]	Efficiency optimization	80%

8.11.2 Bypass

Overview

The "Bypass" function switches the motor between converter and line operation.

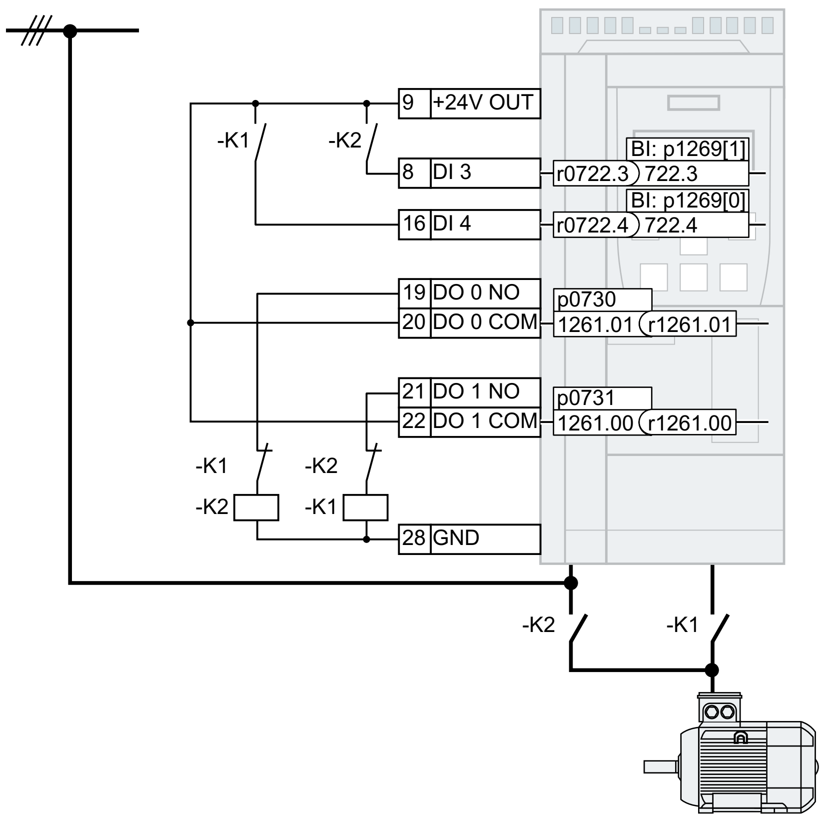


Figure 8-181 Bypass control via converter

Requirements

- The "Bypass" function is supported only for induction motors.
- The K1 converter contactor and K2 line contactor are designed for switching under load.
- The K2 line contactor is designed for switching under inductive load.
- The K1 converter contactor and K2 line contactor are interlocked against closing at the same time.
- The "flying restart" function must be activated (p1200 = 1 or 4).
  Flying restart – switching on while the motor is running (Page 475)

Function description

Switching from converter operation to line operation

1. The converter switches the motor OFF.
2. The converter opens the K1 converter contactor via a digital output.
3. The converter waits for the unlocking time of the motor.
4. The converter waits for the feedback that the K1 converter contactor is open.
5. The converter closes the K2 line contactor via a digital output.

The motor is now operated directly on the line supply.

Note

Current surge when switching from converter operation to line operation

When switching from converter operation to line operation, a current > 10 × rated motor current can flow temporarily. The current depends on the random phase shift between the converter voltage and the line voltage.

Switching from line operation to converter operation

1. The converter opens the K2 line contactor via a digital output.
2. The converter waits for the unlocking time of the motor.
3. The converter waits for the feedback that the K2 line contactor is open.
4. The converter closes the K1 converter contactor via a digital output.
5. The converter switches the motor on.
6. The converter adjusts with the "Flying restart" function its output frequency to the speed of the motor.

The motor is now operated on the converter.

How is the changeover triggered?

The following options are provided to switch between converter operation and line operation:

- Changeover for activation via a control command

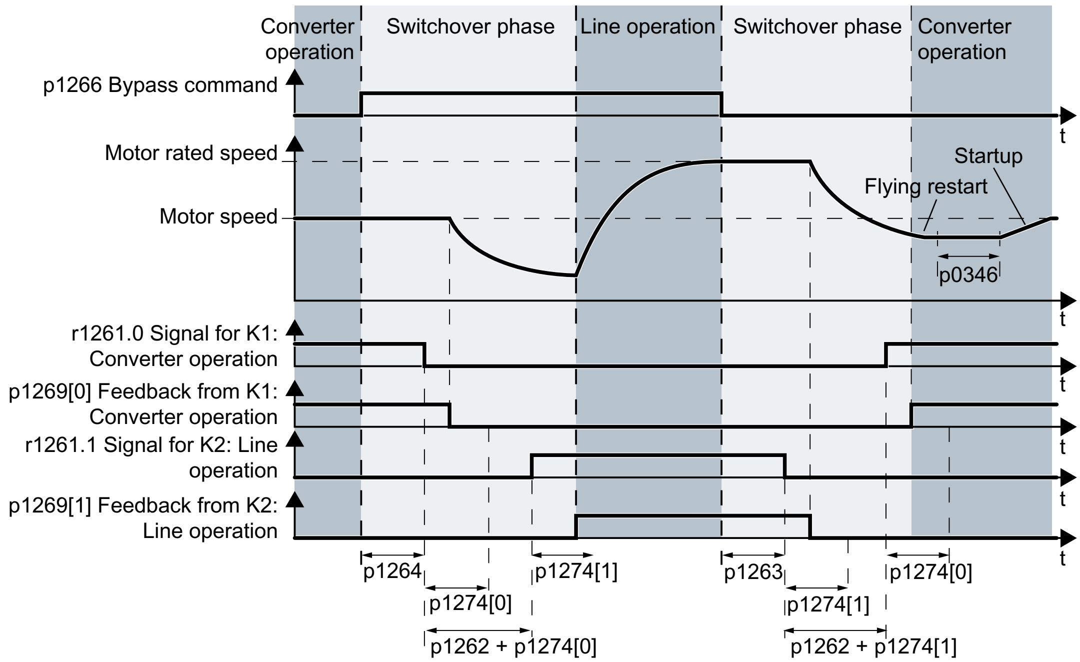


Figure 8-182 Changeover when activating via a control signal (p1267.0 = 1)

The converter switches the motor between converter operation and line operation depending on the bypass control command p1266.

- Changeover depending on the speed

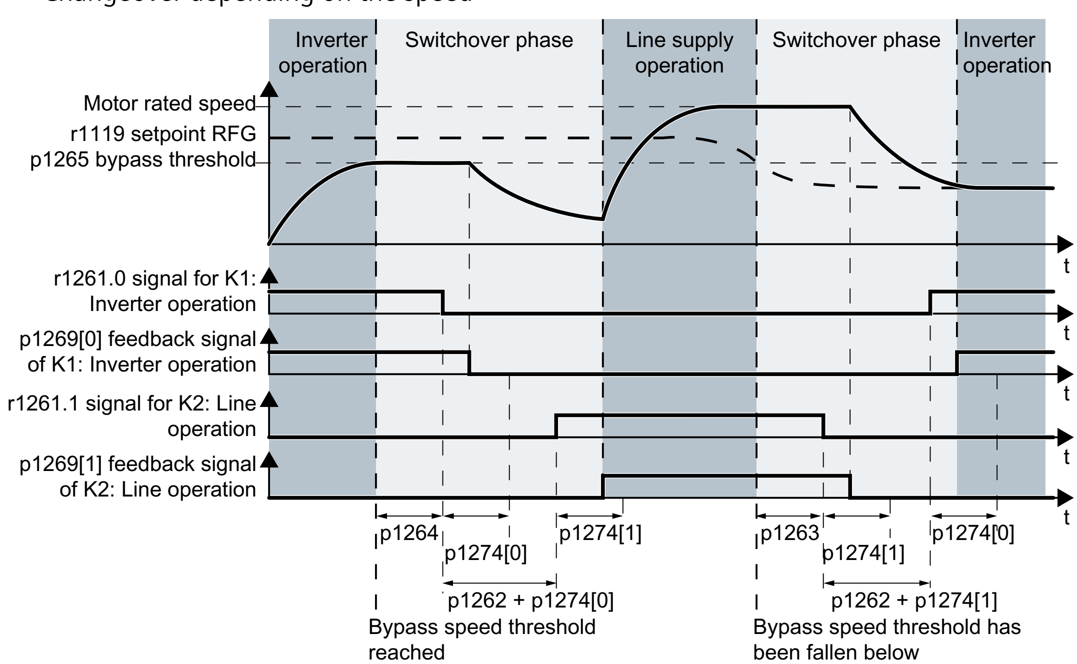


Figure 8-183 Changeover depending on the speed (p1267.1 = 1)

If the speed setpoint r1119 lies above the bypass speed threshold p1265, the converter switches the motor to line operation.
If the speed setpoint falls below the bypass speed threshold, the converter switches the motor to converter operation.

Parameter

Number	Name		Factory setting
p0347[M]	Motor de-excitation time		0 s
p1260	Bypass configuration (factory setting: 0) 0: Bypass is deactivated 3: Bypass without synchronization		0
r1261.0...11	Bypass control/status word		-
	.00	1 signal: Close converter - motor contactor	
	.01	1 signal: Close line - motor contactor	
p1262[D]	Bypass dead time		1 s
p1263	Debypass (revert to drive) delay time		0.1 s
p1264	Bypass delay time		1 s
p1265	Bypass speed threshold		1480 rpm
p1266	BI: Bypass control command		0
p1267	Bypass changeover source configuration		0000 bin
p1269[0...1]	BI: Bypass switch feedback signal		[0] 1261.0 [1] 1261.1
	[0]	1 signal: Converter - motor contactor is closed	
	[1]	1 signal: Line - motor contactor is closed	
p1274[0...1]	Bypass switch monitoring time		1000 ms

More information

Interaction with other functions:

- Essential service mode
  The activated "Essential service mode" function influences the "Bypass" function.
  Essential service mode (Page 481)
- Converter control
  For operation of the motor on the line supply, the converter no longer responds to the OFF1 command, but rather only to OFF2 and OFF3.
- Temperature monitoring for the motor
  The converter evaluates the temperature sensor in the motor, also for line operation of the motor.
  Motor protection with temperature sensor (Page 448)
- Disconnecting the converter from the line supply
  If for line operation of the motor, you disconnect the converter from the line supply, the converter opens the K2 contactor and the motor coasts down.
  To operate the motor on the line supply also for deactivated converter, the higher-level control must supply the signal for the K2 line contactor.

8.11.3 Hibernation mode

Overview

When the hibernation mode is active, the converter switches off the motor once the system conditions allow it.

The hibernation mode saves energy, reduces wear and noise.

Pressure and temperature controls involving pumps and fans are typical applications for the hibernation mode.

Requirement

As long as the cascade control operates a motor directly on the supply system, the converter does not activate the hibernation mode.

Staging control (Page 355)

Function description

Activating hibernation mode

The converter activates the hibernation mode in the following cases:

- After switching the converter on, a wait time starts in the converter. The longest wait time is at the following times:
  - p1120
  - p2391
  - 20 s

  If the motor does not reach the hibernation mode start speed within the wait time, the converter activates the hibernation mode and switches off the motor.
- The motor speed drops below the hibernation mode starting speed.

Deactivating hibernation mode

The converter deactivates the hibernation mode in the following cases:

- With external setpoint value specification:
  The converter deactivates the hibernation mode once the positive setpoint value is greater than the restart speed.
  To monitor the setpoint, set p1110 = 0.
  Activate the motorized potentiometer as ramp-function generator to use the motorized potentiometer of the converter as setpoint for the hibernation mode:
  – Motorized potentiometer: p1030.4 = 1
  – Technology motorized potentiometer: p2230.4 = 1
- If the setpoint value specification is set via the technology controller:
  The converter deactivates the hibernation mode once the positive control deviation of the technology controller is greater than the hibernation mode restart speed (p2392).
  To monitor the value of the control deviation of the technology controller, set p2298 = 2292 and set the minimum threshold in p2292.
- Time-controlled
  To avoid tank deposits, e.g. where liquids are involved, it is possible to deactivate the hibernation mode at the latest after the time p2396 has expired.

Boost speed

The boost speed prevents the motor from being switched on and off too frequently.

Parameter

Table 8-87 Setpoint value specification via the technology controller

Number	Name	Factory setting
p1080	Minimum speed	0 [rpm]
p2200	BI: Technology controller enable 1 signal: Technology controller is enabled	0
r2237	Technology controller motorized potentiometer maximum value	- [%]
p2298	CI: Technology controller minimum limiting signal source	2292[0]
p2390[D]	Hibernation mode start speed	0 [rpm]
p2391[D]	Hibernation mode delay time	120 [s]
p2392	Hibernation mode restart value with technology controller	0 [%]
p2394[D]	Hibernation mode boost period	0 [s]
p2395[D]	Hibernation mode boost speed	0 [rpm]
p2396[D]	Hibernation mode switch-off time maximum	0 [s]
r2397	CO: Hibernation mode output speed current	- [rpm]
p2398	Hibernation mode duty type	0

<table>
<tr><th>Number</th><th colspan="2">Name</th><th>Factory setting</th></tr>
<tr><td rowspan="10">r2399</td><td colspan="2">CO/BO: Hibernation mode status word
00 Hibernation mode enabled (p2398 <> 0)
01 Hibernation mode active
02 Hibernation mode delay time active
03 Hibernation mode boost active
04 Hibernation mode motor switched off
05 Hibernation mode motor switched off, cyclic restart active
06 Energy-saving mode motor restarts
07 Hibernation mode supplies total setpoint of ramp-function generator
08 Hibernation mode bypasses ramp-function generator in setpoint channel</td><td rowspan="10">-</td></tr>
<tr><td>.00</td><td>Hibernation mode enabled (P2398 <> 0)</td></tr>
<tr><td>.01</td><td>Hibernation mode active</td></tr>
<tr><td>.02</td><td>Hibernation mode delay time active</td></tr>
<tr><td>.03</td><td>Hibernation mode boost active</td></tr>
<tr><td>.04</td><td>Hibernation mode motor switched off</td></tr>
<tr><td>.05</td><td>Hibernation mode motor switched off, cyclic restart active</td></tr>
<tr><td>.06</td><td>Hibernation mode motor is restarting</td></tr>
<tr><td>.07</td><td>Hibernation mode supplies total setpoint of ramp-function generator</td></tr>
<tr><td>.08</td><td>Hibernation mode bypasses the ramp-function generator in the setpoint channel</td></tr>
</table>

Table 8-88 Setpoint value specification by means of external setpoint

Number	Name	Factory setting
p1080	Minimum speed	0 [rpm]
p1110	BI: Inhibit negative direction	1
p2390[D]	Hibernation mode start speed	0 [rpm]
p2391[D]	Hibernation mode delay time	120 [s]
p2393[D]	Hibernation mode restart speed relative w/o technology controller	0 [rpm]
p2394[D]	Hibernation mode boost period	0 [s]
p2395[D]	Hibernation mode boost speed	0 [rpm]
p2396[D]	Hibernation mode switch-off time maximum	0 [s]
r2397	CO: Hibernation mode output speed current	- [rpm]
p2398	Hibernation mode duty type	0

<table>
<tr><th>Number</th><th colspan="2">Name</th><th>Factory setting</th></tr>
<tr><td rowspan="10">r2399</td><td colspan="2">CO/BO: Hibernation mode status word

00 Hibernation mode enabled (p2398 <> 0)
01 Hibernation mode active
02 Hibernation mode delay time active
03 Hibernation mode boost active
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05 Hibernation mode motor switched off, cyclic restart active
06 Energy-saving mode motor restarts
07 Hibernation mode supplies total setpoint of ramp-function generator
08 Hibernation mode bypasses ramp-function generator in setpoint channel</td><td rowspan="10">-</td></tr>
<tr><td>.00</td><td>Hibernation mode enabled (P2398 <> 0)</td></tr>
<tr><td>.01</td><td>Hibernation mode active</td></tr>
<tr><td>.02</td><td>Hibernation mode delay time active</td></tr>
<tr><td>.03</td><td>Hibernation mode boost active</td></tr>
<tr><td>.04</td><td>Hibernation mode motor switched off</td></tr>
<tr><td>.05</td><td>Hibernation mode motor switched off, cyclic restart active</td></tr>
<tr><td>.06</td><td>Hibernation mode motor is restarting</td></tr>
<tr><td>.07</td><td>Hibernation mode supplies total setpoint of ramp-function generator</td></tr>
<tr><td>.08</td><td>Hibernation mode bypasses the ramp-function generator in the setpoint channel</td></tr>
</table>

8.11.4 Calculating the energy saving for fluid flow machines

Overview

Fluid flow machines, which mechanically control the flow rate using valves or throttle flaps, operate with a constant speed corresponding to the line frequency.

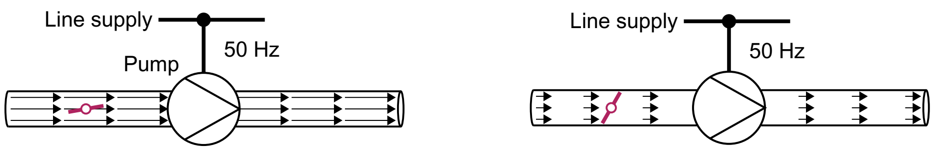


Figure 8-184 Flow control with pump and throttle connected to a 50 Hz line supply

The lower the flow rate, the poorer the efficiency of the fluid flow machine (pump). The fluid flow machine (pump) has the poorest efficiency when the throttle or valve is completely closed. Further, undesirable effects can occur, for example the formation of vapor bubbles in liquids (cavitation) or the temperature of the medium being pumped can increase.

The converter controls the flow rate by appropriately varying the speed of the fluid flow machine. By controlling the flow rate, the fluid flow machine operates at the optimum efficiency for each flow rate. This situation means that in the partial load range less electric power is required than when controlling the flow rate using valves and throttles.

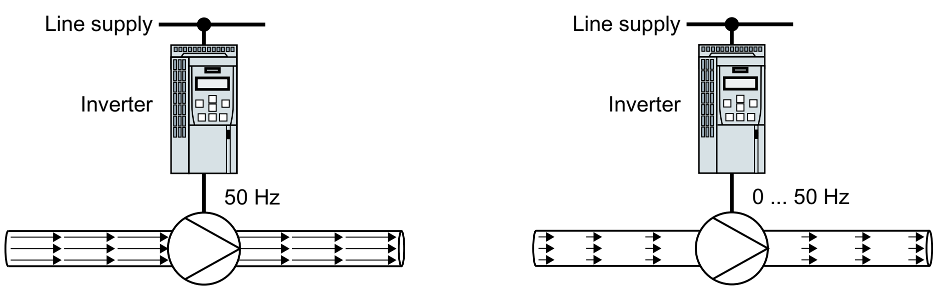
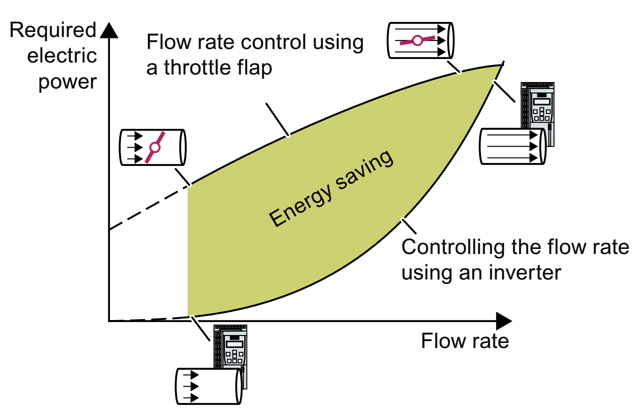


Figure 8-185 Flow control with pump and converter

Function description



The converter calculates the energy saving from the flow characteristic associated with a mechanical flow control and the measured electric power that is drawn.

The calculation is suitable for centrifugal pumps, fans, radial and axial compressors, for instance.

Flow characteristic

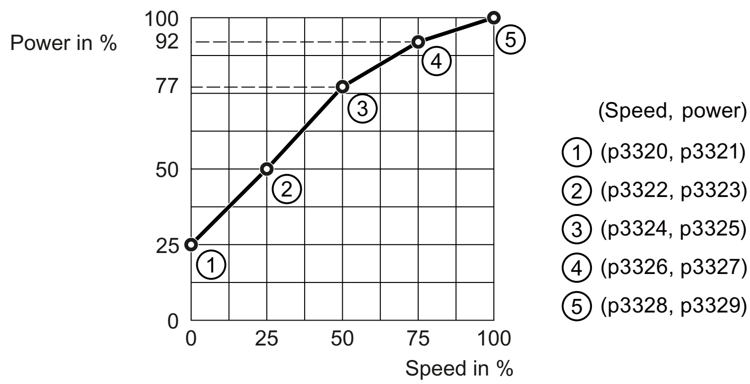


Figure 8-186 Factory setting of the flow characteristic

To set the characteristic, you require the following data from the machine manufacturer for each speed interpolation point:

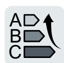
- The flow rate of the fluid-flow machine associated with the 5 selected converter speeds
- At constant speed, the power drawn which is associated with the 5 flow rates corresponds to the line frequency and mechanical throttling of the flow rate.

Parameters

Number	Name	Factory setting
r0039[0...n]	CO: Energy display	-
p0040	Reset energy consumption display	0
r0041	Energy saved	-
r0042[0...n]	CO: Process energy display	-
p0043	BI: Energy consumption display enabled.	0
p3320[0...n]	Fluid flow machine power, point 1	25
p3321[0...n]	Fluid flow machine speed, point 1	0
p3322[0...n]	Fluid flow machine power, point 2	50
p3323[0...n]	Fluid flow machine speed, point 2	25
p3324[0...n]	Fluid flow machine power, point 3	77
p3325[0...n]	Fluid flow machine speed, point 3	50
p3326[0...n]	Fluid flow machine power, point 4	92
p3327[0...n]	Fluid flow machine speed, point 4	75
p3328[0...n]	Fluid flow machine power, point 5	100
p3329[0...n]	Fluid flow machine speed, point 5	100

8.11.5 Flow meter

Overview



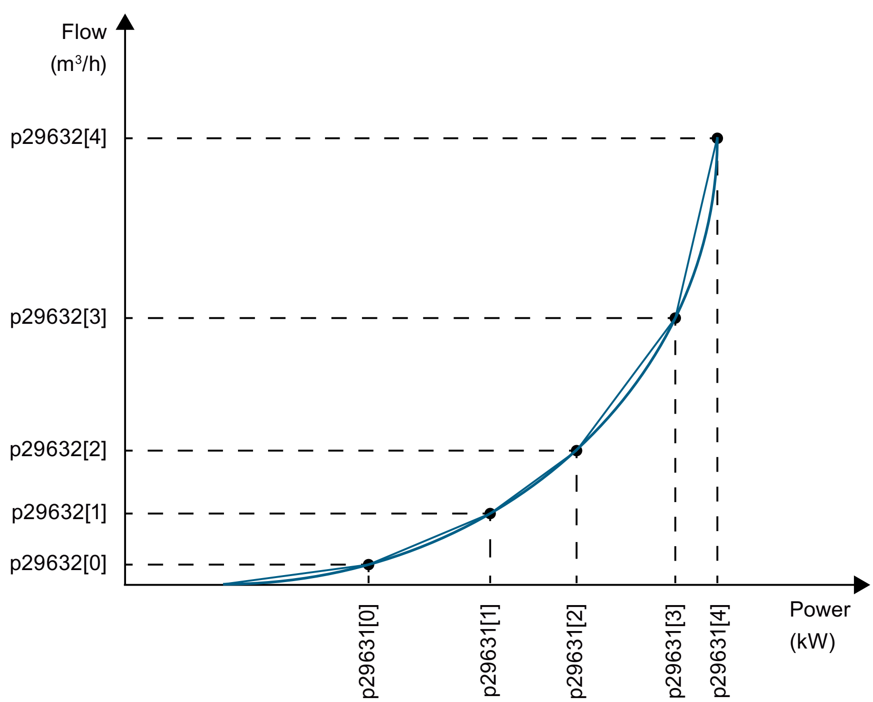
With the flow meter function configured with parameters p29631 and p29632, the converter estimates the real-time flow of the pumps and fans based on the defined characteristic, so as to realize effective flow control and reduces the system power loss.

Function description

The converter calculates the real-time flow according to the flow characteristic derived from the values entered in p29631[0...4] and p29632[0...4]. You can acquire these values from the machine manufacturer.

- p29631[0...4]: five power interpolation points in kW, which should spread across the converter power range;
  Make sure that p29631[0] ≤ p29631[1] ≤ p29631[2] ≤ p29631[3] ≤ p29631[4], or otherwise, the flow calculation result (r29633) is zero.
- p29632[0...4]: five flow values corresponding to the power interpolation points.

The calculation result associated with the output power then displays in parameter r29633. It should be noted that if the power is higher than the value entered in p29631[4], r29633 always displays the flow value entered in p29632[4].



Parameters

Number	Name	Factory setting
p29631[0...4]	Flow meter pump power	0.00 kW
p29632[0...4]	Flow meter pump flow	0.00 m^3/h
r29633	Flow meter calculated flow	- m^3/h

For more information about the parameters, see Chapter "Parameter list (Page 514)".

8.11.6 Function diagram 7035 - Technology functions, bypass

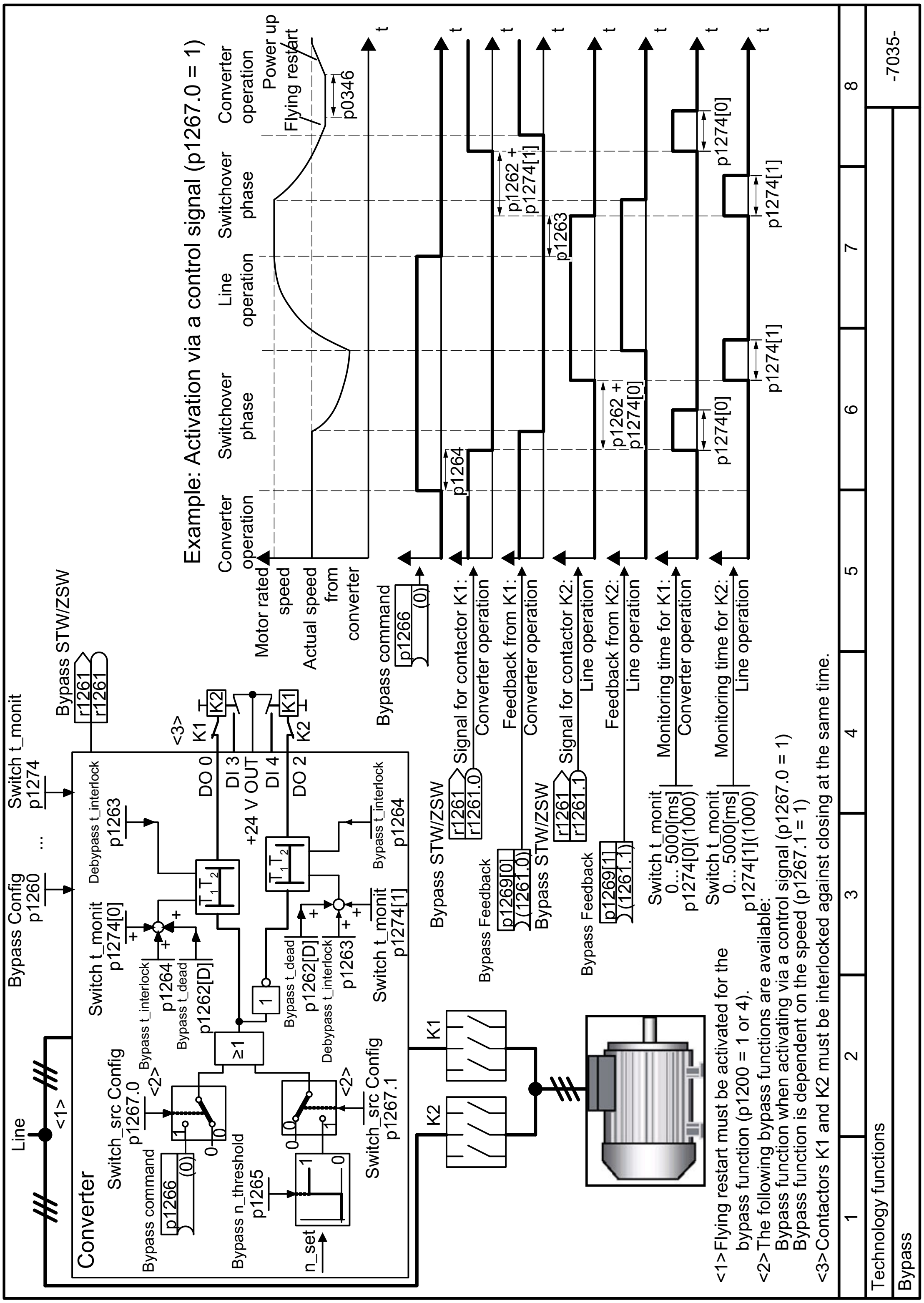


Figure 8-187 FP 7035

8.11.7 Function diagram 7038 - Technology functions, hibernation mode

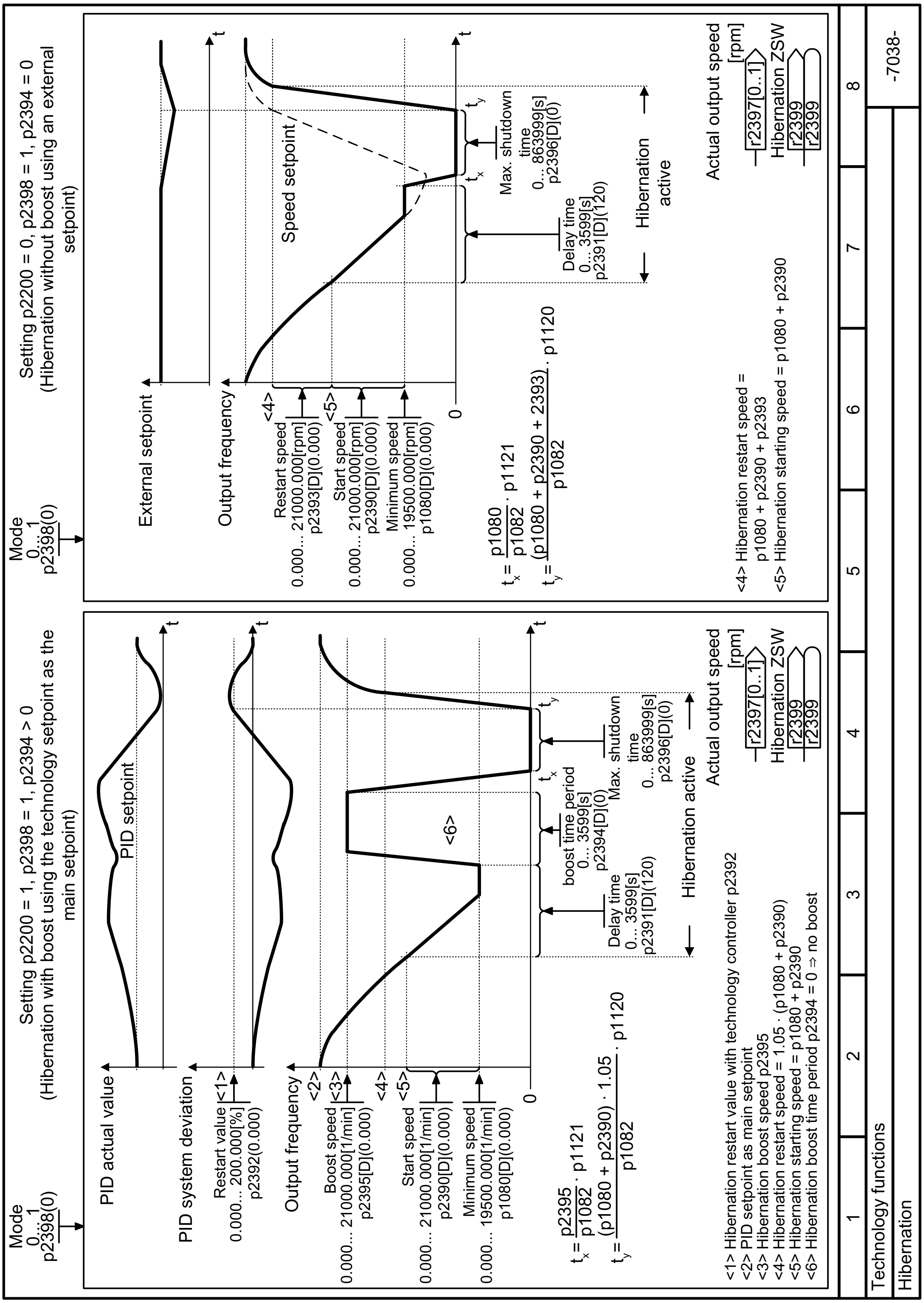


Figure 8-188 FP 7038

8.12 Switchover between different settings

Overview

There are applications that require different converter settings.

Example:

Different motors are operated on one converter. The converter must operate with the motor data of the particular motor and the appropriate ramp-function generator.

Function description

Drive Data Sets (DDS)

Some converter functions can be set differently, and there can be a switch between the different settings.

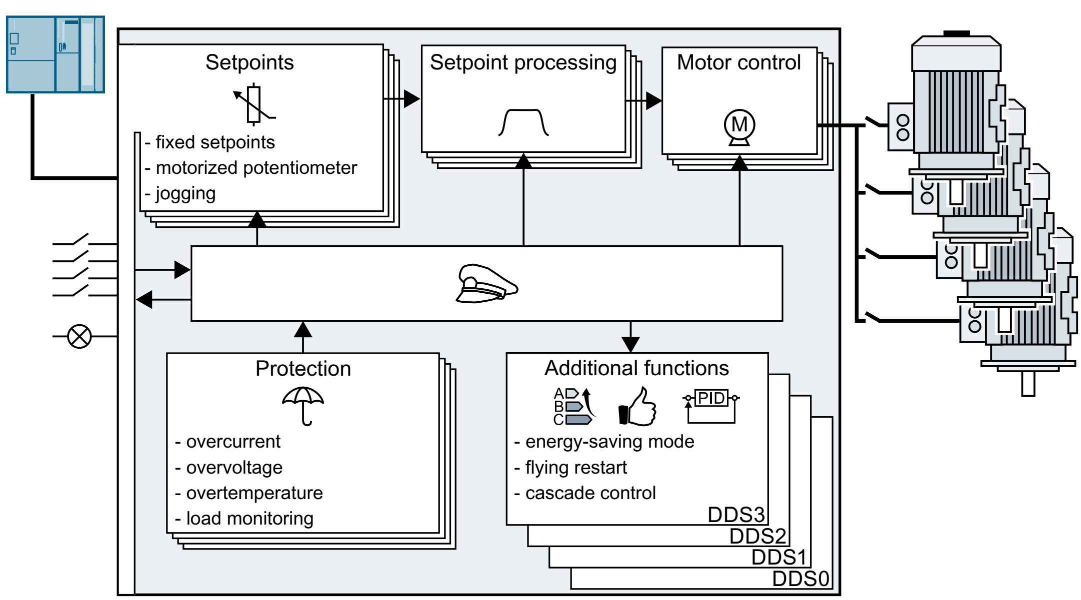
Note

You can only switch over the motor data of the drive data sets in the "ready for operation" state with the motor switched off. The switchover time is approx. 50 ms.

If you do not switch over the motor data together with the drive data sets (i.e. same motor number in p0826), then the drive data sets can also be switched over in operation.

The associated parameters are indexed (index 0, 1, 2, or 3). One of the four indexes is selected with control commands, and thereby one of the four saved settings.

The settings in the converter with the same index are called a drive data set.



Selecting the number of drive data sets

Parameter p0180 defines the number of drive data sets (1 ... 4).

Parameter	Description
p0010 = 0	Drive commissioning: Ready
p0010 = 15	Drive commissioning: Data sets
p0180	Drive data set (DDS) number

Copying the drive data sets

Parameter	Description
p0819[0]	Source drive data set
p0819[1]	Target drive data set
p0819[2] = 1	Starts the copy operation

Parameters

Number	Name	Factory setting
p0010	Drive commissioning parameter filter	1
r0051	CO/BO: Drive data set DDS effective	-
p0180	Drive data set (DDS) number	1
p0819[0 ... 2]	Copy drive data set DDS	0
p0820[C]	BI: Drive data set DDS selection, bit 0	0
p0821[C]	BI: Drive data set DDS selection, bit 1	0
p0826[M]	Motor changeover, motor number	0

8.13 Explanation on the function diagrams

8.13.1 Symbols in the function diagrams

Function description

The symbols used in the function diagrams are explained below.

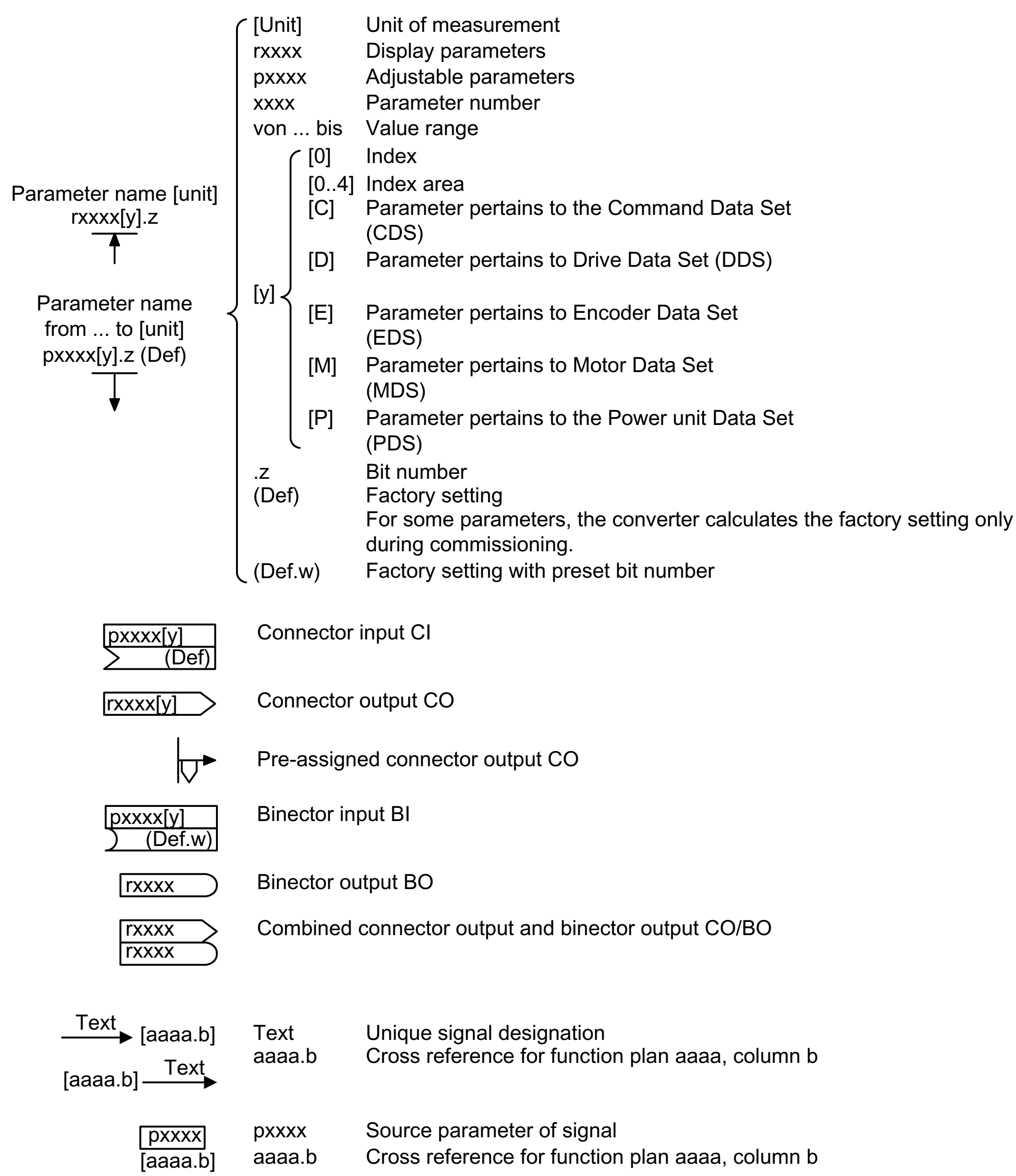


Figure 8-189 Parameter

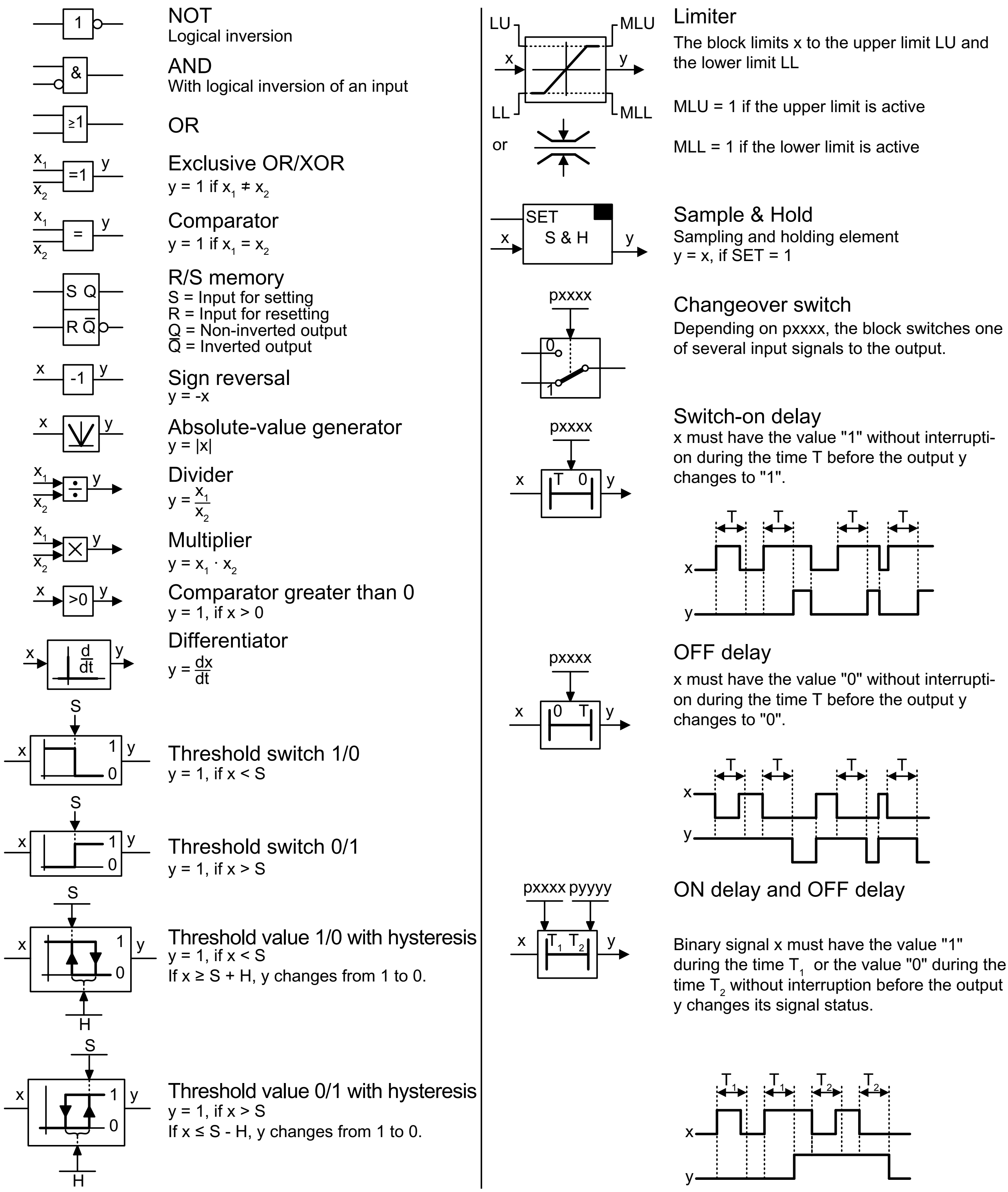
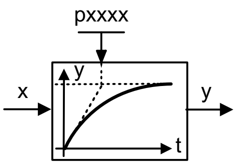


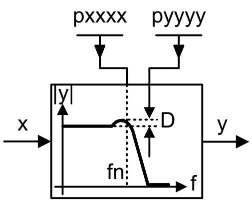
Figure 8-190 Binary and analog blocks



PT1 element

First order delay element

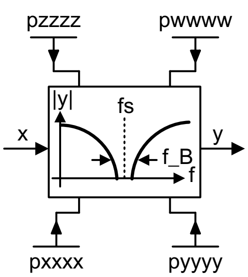
pxxxx = time constant



PT2 lowpass filter

pxxxx = Natural frequency denominator

pyyyy = Attenuation denominator



Filter 2nd order (band-stop/general filter)

pxxxx = Natural frequency denominator

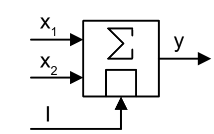
pyyyy = Attenuation denominator

pzzzz = Natural frequency counter

pwwww = Attenuation counter

Use as band filter:

- Center frequency fs: pzzzz = fs
  pxxxx = fs
- Bandwidth f_B: pwwww = 0
  $pyyyy = \frac{f\_B}{2 \cdot fs}$



Activatable adder

With I = 1 signal: y = x1 + x2

With I = 0 signal: y = x1

Figure 8-191 Analog blocks

8.13.2 Interconnecting signals in the converter

The following functions are implemented in the converter:

- Open-loop and closed-loop control functions
- Communication functions
- Diagnosis and operating functions

Every function comprises one or several blocks that are interconnected with one another.

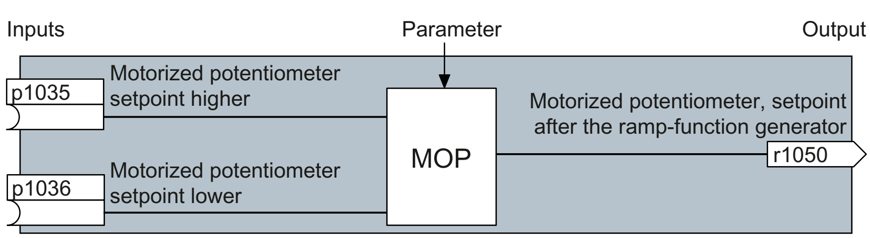


Figure 8-192 Example of a block: Motorized potentiometer (MOP)

Most of the blocks can be adapted to specific applications using parameters.

You cannot change the signal interconnection within the block. However, the interconnection between blocks can be changed by interconnecting the inputs of a block with the appropriate outputs of another block.

The signal interconnection of the blocks is realized, contrary to electric circuitry, not using cables, but in the software.

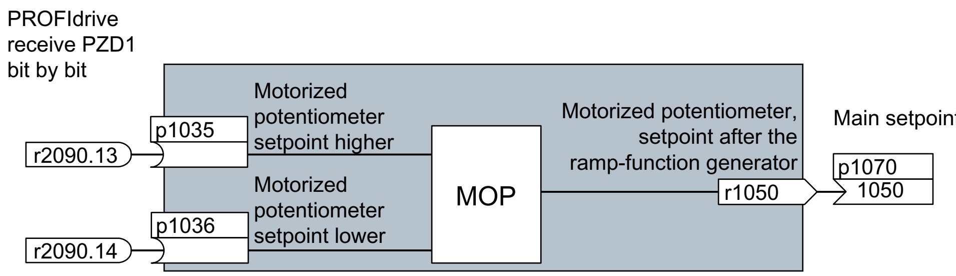


Figure 8-193 Example: Signal interconnection of two blocks for digital input 0

Binectors and connectors

Connectors and binectors are used to exchange signals between the individual blocks:

- Connectors are used to interconnect "analog" signals (e.g. MOP output speed)
- Binectors are used to interconnect digital signals (e.g. "Enable MOP up" command)

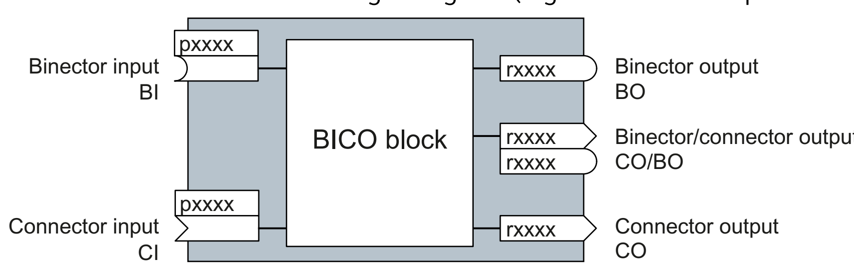


Figure 8-194 Symbols for binector and connector inputs and outputs

Binector/connector outputs (CO/BO) are parameters that combine more than one binector output in a single word (e.g. r0052 CO/BO: status word 1). Each bit in the word represents a digital (binary) signal. This summary reduces the number of parameters and simplifies parameter assignment.

Binector or connector outputs (CO, BO or CO/BO) can be used more than once.

Interconnecting signals

When must you interconnect signals in the converter?

If you change the signal interconnection in the converter, you can adapt the converter to a wide range of requirements. This does not necessarily have to involve highly complex functions.

Example 1: Assign a different function to a digital input.

Example 2: Switch the speed setpoint from the fixed speed to the analog input.

Principle when connecting BICO blocks using BICO technology

When interconnecting the signal, the following principle applies: **Where does the signal come from?**

An interconnection between two BICO blocks consists of a connector or a binector and a BICO parameter. The input of a block must be assigned the output of a different block: In the BICO parameters, enter the parameter numbers of the connector/binector that should supply its output signal to the BICO parameter.

How much care is required when you change the signal interconnection?

Note which changes you make. A subsequent analysis of the set signal interconnections is possible only by evaluating the parameter list.

Where can you find additional information?

- All the binectors and connectors are located in the Parameter list.
- The function diagrams provide a complete overview of the factory setting for the signal interconnections and the setting options.

Parameters 9

9.1 Explanation of the detailed parameter list

Overview

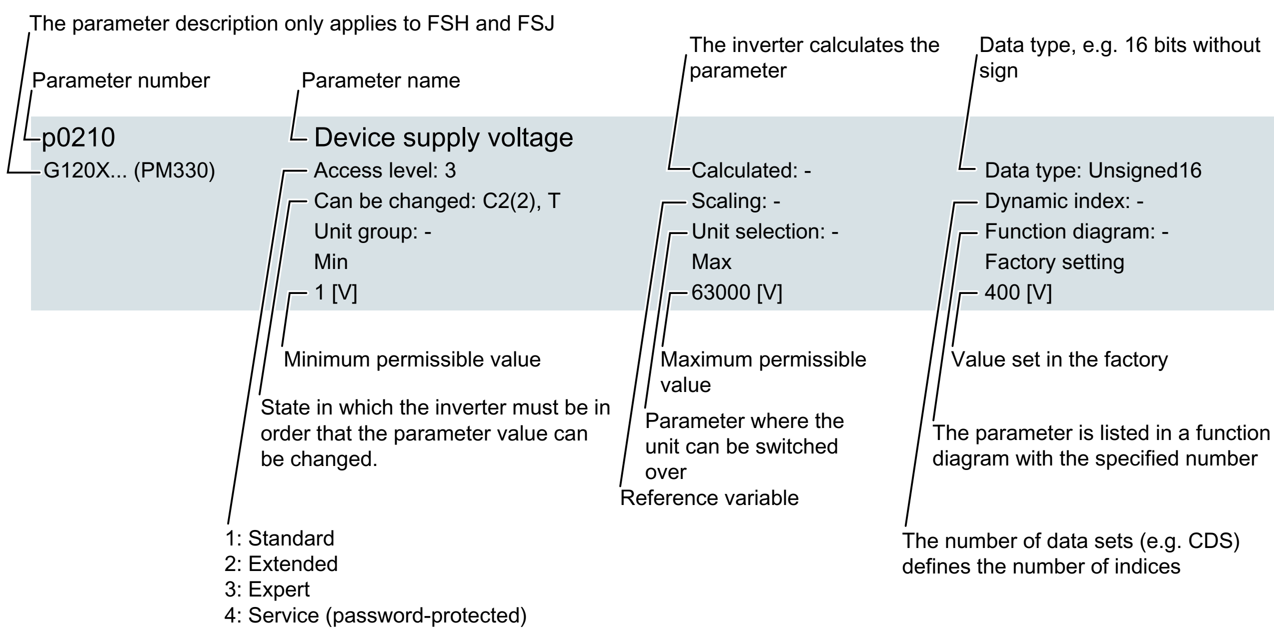


Figure 9-1 Parameter description

Function description

Parameter number

The parameter number is made up of a "p" or "r", followed by a number and optionally the index or bit array.

• p1234	Adjustable parameters (read and write)
• r1234	Display parameters (read-only)
• p1234[0...2]	Adjustable parameters with index 0 to 2
• p1234.0 ... 15	Adjustable parameters with bit 0 to bit 15

• p1234[1]	Adjustable parameter index 1
• p1234.1	Adjustable parameter bit 1

Parameter name

The following abbreviations can appear in front of the names:

BI	Binector input
BO	Binector output
CI	Connector input
CO	Connector output
CO/BO	Connector/binector output

Interconnecting signals in the converter (Page 507)

Can be changed

"-"	The parameter can be changed in any state, and the change becomes immediately effective.
C(x)	The parameter can only be changed for the following settings: C: p0010 > 0 C(x): p0010 = x
U	The motor is switched on
T	The motor is switched off and p0010 = 0

Unit group and unit selection

For parameters where the unit can be switched over.

"Unit group": to which group does the parameter belong?

"Unit selection": with which parameter do you switch over the unit?

Data type

• Integer8	I8	8-bit integer
• Integer16	I16	16-bit integer
• Integer32	I32	32-bit integer
• Unsigned8	U8	8-bit without sign
• Unsigned16	U16	16-bit without sign
• Unsigned32	U32	32-bit without sign
• FloatingPoint32	Float	32-bit floating-point number

Scaling

Specification of the reference variable with which a signal value is automatically converted with a BICO interconnection.

The following reference variables are available:

- p2000 ... p2003: Reference speed, reference voltage, etc.
- PERCENT: 1.0 = 100%
- 4000H: 4000 hex = 100 % (word) or 4000 0000 hex = 100 % (double word)

More information

This parameter list is based on the following firmware:

- Firmware version: V1.03
- Firmware version of the basic system V04712723_1030005

9.2 Parameter list

Version: 4712723

All objects: G120XA_USS

r0002 Drive operating display / Drv op_display

Access level: 2	**Calculated:** -	**Data type:** Integer16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	200	-

Description: Operating display for the drive.

Value:

0:	Operation - everything enabled
10:	Operation - set "enable setpoint" = "1" (p1142)
12:	Operation - RFG frozen, set "RFG start" = "1" (p1141)
13:	Operation - set "enable RFG" = "1" (p1140)
14:	Operation - MotID, excitation running
16:	Operation - withdraw braking with OFF1 using "ON/OFF1" = "1"
17:	Operation - braking with OFF3 can only be interrupted with OFF2
18:	Operation - brake on fault, remove fault, acknowledge
19:	Operation - DC braking active (p1230, p1231)
21:	Ready for operation - set "Enable operation" = "1" (p0852)
22:	Ready for operation - de-magnetizing running (p0347)
31:	Ready for switching on - set "ON/OFF1" = "0/1" (p0840)
35:	Switching on inhibited - carry out first commissioning (p0010)
41:	Switching on inhibited - set "ON/OFF1" = "0" (p0840)
42:	Switching on inhibited - set "OC/OFF2" = "1" (p0844, p0845)
43:	Switching on inhibited - set "OC/OFF3" = "1" (p0848, p0849)
44:	Switching on inhibited - supply STO terminal w/ 24 V (hardware)
45:	Switching on inhibited - remove fault, acknowledge fault
46:	Switching on inhibited - exit commissioning mode (p0010)
70:	Initialization
200:	Wait for booting/partial booting

Dependency: See also: r0046

NOTICE
For several missing enable signals, the corresponding value with the highest number is displayed.

Note

OC: Operating condition
RFG: Ramp-function generator
COMM: Commissioning
MotID: Motor data identification

p0003 Access level / Acc_level

Access level: 1	**Calculated:** -	**Data type:** Integer16
Can be changed: C1, T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
3	4	3

Description: Sets the access level to read and write parameters.

Value:

3:	Expert
4:	Service

Note

A higher set access level also includes the lower one.
Access level 3 (experts):
Expert know-how is required for these parameters (e.g. BICO parameterization).
Access level 4 (service):
For these parameters, it is necessary that authorized service personnel enter the appropriate password (p3950).

p0010 Drive commissioning parameter filter / Drv comm. par_filt

Access level: 1	**Calculated:** -	**Data type:** Integer16
Can be changed: C2(1), T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 2800, 2818
Min:	**Max:**	**Factory setting:**
0	49	1

Description: Sets the parameter filter to commission a drive.
Setting this parameter filters out the parameters that can be written into in the various commissioning steps.

Value:

0:	Ready
1:	Quick commissioning
2:	Power unit commissioning
3:	Motor commissioning
5:	Technological application/units
15:	Data sets
29:	Only Siemens internal
30:	Parameter reset
39:	Only Siemens internal
49:	Only Siemens internal

Dependency: See also: r3996

NOTICE
When the parameter is reset to a value of 0, short-term communication interruptions may occur.

Note

The drive can only be switched on outside the drive commissioning (inverter enable). To realize this, this parameter must be set to 0.
By setting p3900 to a value other than 0, the quick commissioning is completed, and this parameter is automatically reset to 0.
Procedure for "Reset parameter": Set p0010 to 30 and p0970 to 1.
Once the Control Unit has been booted up for the first time, the motor parameters suitable for the power unit have been defined, and the control parameters have been calculated accordingly, p0010 is automatically reset to 0 if application class is SDC as default(p96=1), or set as 1 if DDC as default(p96=2), depending on the power unit that is connected.
p0010 = 3 is used for the subsequent commissioning of additional drive data sets (creating data sets: see p0010 = 15).
p0010 = 29, 39, 49: Only for internal Siemens use!

p0015 Macro drive unit / Macro drv unit

Access level: 1	**Calculated:** -	**Data type:** Unsigned32
Can be changed: C1, C2(1)	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	999999	41

Description: Runs the corresponding macro files(41/42/43/44/45/46/47/48/49/51/52/54/55).
41: Analog control
42: PID with analog control
43: 2-pump with analog control
44: 3-pump with analog control
45: Fixed setpiont control
46: AI control local / remote
47: PID control with internal fixed setpiont
48: 2-pump and internal fixed setpiont
49: 3-pump and internal fixed setpiont
51: MODBUS control
52: MODBUS control local / remote
54: USS control
55: USS control local / remote

Dependency: See also: p1000, r8570

NOTICE
After the value has been modified, no further parameter modifications can be made and the status is shown in r3996. Modifications can be made again when r3996 = 0.
When executing a specific macro, the corresponding programmed settings are made and become active.

r0018 Control Unit firmware version / Firmware version

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	4294967295	-

Description: Displays the firmware version of the Control Unit.

Dependency: See also: r0197, r0198

Note
Example:
The value 1010100 should be interpreted as V01.01.01.00.

r0020 Speed setpoint smoothed / Speed setpoint

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p2000	**Dynamic index:** -
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 5020, 6799
Min:	**Max:**	**Factory setting:**
- [rpm]	- [rpm]	- [rpm]

Description: Displays the currently smoothed speed setpoint at the input of the speed controller or U/f characteristic (after the interpolator).

Dependency: See also: r0060

Note
Smoothing time constant = 100 ms
The signal is not suitable as a process quantity and may only be used as a display quantity.
The speed setpoint is available smoothed (r0020) and unsmoothed (r0060).

r0021 CO: Actual speed smoothed / Actual speed

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p2000	**Dynamic index:** -
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 6799
Min:	**Max:**	**Factory setting:**
- [rpm]	- [rpm]	- [rpm]

Description: Displays the calculated and smoothed rotor speed.
Frequency components from the slip compensation (for induction motors) are not included.

Dependency: See also: r0022, r0063

Note
Smoothing time constant = 100 ms
The signal is not suitable as a process quantity and may only be used as a display quantity.
The speed actual value is available smoothed (r0021, r0022) and unsmoothed (r0063).

r0022 Actual speed rpm smoothed / Actual speed

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p2000	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 6799
Min:	**Max:**	**Factory setting:**
- [rpm]	- [rpm]	- [rpm]

Description: Displays the calculated and smoothed rotor speed.
Frequency components from the slip compensation (for induction motors) are not included.
r0022 is identical to r0021, however, it always has units of rpm and contrary to r0021 cannot be changed over.

Dependency: See also: r0021, r0063

Note
Smoothing time constant = 100 ms
The signal is not suitable as a process quantity and may only be used as a display quantity.
The speed actual value is available smoothed (r0021, r0022) and unsmoothed (r0063).

r0024 Output frequency smoothed / Output frequency

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p2000	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 6300, 6799
Min:	**Max:**	**Factory setting:**
- [Hz]	- [Hz]	- [Hz]

Description: Displays the smoothed output frequency.
Frequency components from the slip compensation (for induction motors) are included.

Dependency: See also: r0066

Note
Smoothing time constant = 100 ms
The signal is not suitable as a process quantity and may only be used as a display quantity.
The output frequency is available smoothed (r0024) and unsmoothed (r0066).

r0025 CO: Output voltage smoothed / Output voltage

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p2001	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 5730, 6300, 6799
Min:	**Max:**	**Factory setting:**
- [Vrms]	- [Vrms]	- [Vrms]

Description: Displays the smoothed output voltage of the power unit.

Dependency: See also: r0072

Note

Smoothing time constant = 100 ms

The signal is not suitable as a process quantity and may only be used as a display quantity.

The output voltage is available smoothed (r0025) and unsmoothed (r0072).

r0026 CO: DC link voltage smoothed / DC link voltage

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p2001	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 6799
Min:	**Max:**	**Factory setting:**
- [V]	- [V]	- [V]

Description: Displays the smoothed actual value of the DC link voltage.

Dependency: See also: r0070

NOTICE

When measuring a DC link voltage < 200 V, for the Power Module (e.g. PM240) a valid measured value is not supplied. In this case, when an external 24 V power supply is connected, a value of approx. 24 V is displayed in the display parameter.

Note

Smoothing time constant = 100 ms

The signal is not suitable as a process quantity and may only be used as a display quantity.

The DC link voltage is available smoothed (r0026) and unsmoothed (r0070).

r0026 sets itself to the lower value of the pulsating DC link voltage.

r0027 CO: Absolute actual current smoothed / Motor current

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p2002	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 5730, 6799, 8850, 8950
Min:	**Max:**	**Factory setting:**
- [Arms]	- [Arms]	- [Arms]

Description: Displays the smoothed absolute actual current value.

Dependency: See also: r0068

NOTICE

This smoothed signal is not suitable for diagnostics or evaluation of dynamic operations. In this case, the unsmoothed value should be used.

Note

Smoothing time constant = 300 ms

The signal is not suitable as a process quantity and may only be used as a display quantity.

The absolute current actual value is available smoothed (r0027) and unsmoothed (r0068).

r0028 Modulation depth smoothed / Mod_depth smth

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p2002	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 5730, 6799, 8950
Min:	**Max:**	**Factory setting:**
- [%]	- [%]	- [%]

Description: Displays the smoothed actual value of the modulation depth.

Dependency: See also: r0074

Note
Smoothing time constant = 100 ms
The signal is not suitable as a process quantity and may only be used as a display quantity.
The modulation depth is available smoothed (r0028) and unsmoothed (r0074).

r0029 Current actual value field-generating smoothed / Id_act smooth

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p2002	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 6799
Min:	**Max:**	**Factory setting:**
- [Arms]	- [Arms]	- [Arms]

Description: Displays the smoothed field-generating actual current.

Dependency: See also: r0076

Note
Smoothing time constant = 300 ms
The signal is not suitable as a process quantity and may only be used as a display quantity.
The field-generating current actual value is available smoothed (r0029) and unsmoothed (r0076).

r0030 Current actual value torque-generating smoothed / Iq_act smooth

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p2002	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 6799
Min:	**Max:**	**Factory setting:**
- [Arms]	- [Arms]	- [Arms]

Description: Displays the smoothed torque-generating actual current.

Dependency: See also: r0078

Note
Smoothing time constant = 300 ms
The signal is not suitable as a process quantity and may only be used as a display quantity.
The torque-generating current actual value is available smoothed (r0030) and unsmoothed (r0078).

r0031 Actual torque smoothed / Actual torque

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p2003	**Dynamic index:** -
Unit group: 7_1	**Unit selection:** p0505	**Function diagram:** 5730, 6799
Min:	**Max:**	**Factory setting:**
- [Nm]	- [Nm]	- [Nm]

Description: Displays the smoothed torque actual value.

Dependency: See also: r0080

Note
Smoothing time constant = 100 ms
The signal is not suitable as a process quantity and may only be used as a display quantity.
The torque actual value is available smoothed (r0031) and unsmoothed (r0080).

r0032 CO: Active power actual value smoothed / Power

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** r2004	**Dynamic index:** -
Unit group: 14_10	**Unit selection:** p0505	**Function diagram:** 5730, 6799, 8750, 8850, 8950
Min:	**Max:**	**Factory setting:**
- [kW]	- [kW]	- [kW]

Description: Displays the smoothed actual value of the active power.

Dependency: See also: r0082

NOTICE
This smoothed signal is not suitable for diagnostics or evaluation of dynamic operations. In this case, the unsmoothed value should be used.

Note
Power delivered at the motor shaft.
The active power is available smoothed (r0032 with 100 ms) and unsmoothed (r0082).

r0034 CO: Motor utilization thermal / Mot_util therm

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 8017
Min:	**Max:**	**Factory setting:**
- [%]	- [%]	- [%]

Description: Display and connector output for the motor utilization from motor temperature model 1 (I2t).
For firmware version < 4.7 SP6 or p0612.12 = 0:
- r0034 = (motor model temperature - 40 K) / (p0605 - 40 K) * 100 %
From firmware version 4.7 SP6 and p0612.12 = 1:
- r0034 = (motor model temperature - p0613) / (p0605 - p0613) * 100 %

Dependency: The thermal motor utilization is only determined when the motor temperature model 1 (I2t) is activated.
The following conditions are a prerequisite for additional information.
- a temperature sensor has not been parameterized (p0600, p0601).
- the current corresponds to the stall current (p0318).
- speed n > 1 [rpm].
For firmware version < 4.7 SP6 or p0612.12 = 0, the following applies:
- the temperature model operates with an ambient temperature of 20 °C.
A motor utilization of 100% is displayed (r0034 = 100 %) when the following conditions are permanently fulfilled:
- the ambient temperature is 40 °C (model 1: p0625 = 40 °C, model 3: p0613 = 40 °C).
From firmware version 4.7 SP6 and p0612.12 = 1, the following applies:
- the ambient temperature can be adapted to the conditions using p0613.
See also: p0605, p0611, p0612, p0613, p0627, r0632
See also: F07011, A07012

NOTICE
After the drive is switched on, the system starts to determine the motor temperature with an assumed model value. This means that the value for the motor utilization is only valid after a stabilization time.

Note
Smoothing time constant = 100 ms
The signal is not suitable as a process quantity and may only be used as a display quantity.
For r0034 = -200.0 %, the following applies:
The value is invalid (e.g. the motor temperature model is not activated or has been incorrectly parameterized).

r0035 CO: Motor temperature / Mot temp

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p2006	**Dynamic index:** -
Unit group: 21_1	**Unit selection:** p0505	**Function diagram:** 8016, 8017
Min:	**Max:**	**Factory setting:**
- [°C]	- [°C]	- [°C]

Description: Display and connector output for the actual temperature in the motor.

Note
For r0035 not equal to -200.0 °C, the following applies:
- this temperature display is valid.
- a KTY/PT1000 temperature sensor is connected.
- the thermal model for the induction motor is activated (p0612 bit 1 = 1 and temperature sensor deactivated: p0600 = 0 or p0601 = 0).

For r0035 equal to -200.0 °C, the following applies:
- this temperature display is not valid (temperature sensor error).
- a PTC sensor or bimetallic NC contact is connected.
- the temperature sensor of the synchronous motor is deactivated (p0600 = 0 or p0601 = 0).

r0036 CO: Power unit overload I2t / PM overload I2t

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 8021
Min:	**Max:**	**Factory setting:**
- [%]	- [%]	- [%]

Description: Displays the power unit overload determined using the I2t calculation.

A current reference value is defined for the I2t monitoring of the power unit. It represents the current that can be conducted by the power unit without any influence of the switching losses (e.g. the continuously permissible current of the capacitors, inductances, busbars, etc.).

If the I2t reference current of the power unit is not exceeded, then an overload (0 %) is not displayed.

In the other case, the degree of thermal overload is calculated, whereby 100% results in a trip.

Dependency: See also: p0290, p0294

See also: F30005

r0037[0...19] CO: Power unit temperatures / PM temperatures

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p2006	**Dynamic index:** -
Unit group: 21_1	**Unit selection:** p0505	**Function diagram:** 8021
Min:	**Max:**	**Factory setting:**
- [°C]	- [°C]	- [°C]

Description: Display and connector output for the temperature in the power unit.

Index:
[0] = Inverter maximum value
[1] = Depletion layer maximum value
[2] = Rectifier maximum value
[3] = Air intake
[4] = Interior of power unit
[5] = Inverter 1
[6] = Inverter 2
[7...10] = Reserved
[11] = Rectifier 1
[12] = Reserved
[13] = Depletion layer 1
[14] = Depletion layer 2
[15] = Depletion layer 3
[16] = Depletion layer 4
[17] = Depletion layer 5
[18] = Depletion layer 6
[19] = Reserved

NOTICE
Only for internal Siemens troubleshooting.

Note
The value of -200 indicates that there is no measuring signal.
r0037[0]: Maximum value of the inverter temperatures (r0037[5...10]).
r0037[1]: Maximum value of the depletion layer temperatures (r0037[13...18]).
r0037[2]: Maximum value of the rectifier temperatures (r0037[11...12]).
The maximum value is the temperature of the hottest inverter, depletion layer, or rectifier.
r0037[2, 3, 6, 11, 14...18] is only relevant for chassis power units.
In the case of a fault, the particular shutdown threshold depends on the power unit, and cannot be read out.

r0037[0...19] CO: Power unit temperatures / PM temperatures

G120XA_USS (PM330)			
	Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
	Can be changed: -	**Scaling:** p2006	**Dynamic index:** -
	Unit group: 21_1	**Unit selection:** p0505	**Function diagram:** 8021
	Min:	**Max:**	**Factory setting:**
	- [°C]	- [°C]	- [°C]

Description: Display and connector output for the temperature in the power unit.

Index:
[0] = Inverter maximum value
[1] = Depletion layer maximum value
[2] = Rectifier maximum value
[3] = Air intake
[4] = Interior of power unit
[5] = Inverter 1
[6] = Inverter 2
[7] = Inverter 3
[8] = Reserved
[9] = Reserved
[10] = Reserved
[11] = Rectifier 1
[12] = Reserved
[13] = Depletion layer 1
[14] = Depletion layer 2
[15] = Depletion layer 3
[16] = Depletion layer 4
[17] = Depletion layer 5
[18] = Depletion layer 6
[19] = Reserved

NOTICE
Only for internal Siemens troubleshooting.

Note
The value of -200 indicates that there is no measuring signal.
r0037[0]: Maximum value of the inverter temperatures (r0037[5...10]).
r0037[1]: Maximum value of the depletion layer temperatures (r0037[13...18]).
r0037[2]: Maximum value of the rectifier temperatures (r0037[11...12]).
The maximum value is the temperature of the hottest inverter, depletion layer, or rectifier.
In the case of a fault, the particular shutdown threshold depends on the power unit, and cannot be read out.

r0038 Power factor smoothed / Cos phi smooth

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 6799, 8850, 8950
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the smoothed actual power factor. This refers to the electrical power of the basic fundamental signals at the converter output terminals.

NOTICE
For infeed units, the following applies: For active powers < 25 % of the rated power, this does not provide any useful information.

Note
Smoothing time constant = 300 ms
The signal is not suitable as a process quantity and may only be used as a display quantity.

r0039[0...2] CO: Energy display / Energy display

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
- [kWh]	- [kWh]	- [kWh]

Description: Displays the energy values at the output terminals of the power unit.

Recommendation: r0042 should be used as process energy display. R0039 supplies as Bico source floating point values in Ws.

Index:
[0] = Energy balance (sum)
[1] = Energy drawn
[2] = Energy fed back

Dependency: See also: p0040

Note
For index 0:
Difference between the energy drawn and energy that is fed back.

p0040 Reset energy consumption display / Energy usage reset

Access level: 3	**Calculated:** -	**Data type:** Unsigned8
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	1	0

Description: Setting to reset the display in r0039 and r0041.
Procedure:
Set p0040 = 0 --> 1
The displays are reset and the parameter is automatically set to zero.

Dependency: See also: r0039

Note
When this display is reset (p0040), then the process energy display (r0042) is also reset.

r0041 Energy consumption saved / Energy cons saved

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
- [kWh]	- [kWh]	- [kWh]

Description: Displays the saved energy referred to 100 operating hours.

Dependency: See also: p0040

Note
This display is used for a fluid-flow machine.
The flow characteristic is entered into p3320 ... p3329.
For an operating time of below 100 hours, the display is interpolated up to 100 hours.

r0042[0...2] CO: Process energy display / Proc energy disp

Access level: 2	**Calculated:** -	**Data type:** Integer32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
- [Wh]	- [Wh]	- [Wh]

Description: Display and connector output for the energy values at the output terminals of the power unit.

Index: [0] = Energy balance (sum)
[1] = Energy drawn
[2] = Energy fed back

Dependency: See also: p0043

Note
The signal can be displayed as process variable (scaling: 1 = 1 Wh).
This is enabled in p0043.
The display is also reset with p0040 = 1.
If an enable is present in r0043 when the Control Unit powers up, then the value from r0039 is transferred into r0042.
As r0039 serves as a reference signal for r0042, due to format reasons, the process energy display can only process values of r0039 up to 2147483 kWh. r0039 should also be reset using this value.

p0043 BI: Enable energy usage display / Enab energy usage

Access level: 2	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source to enable/reset the process energy display in r0042.
BI: p0043 = 1 signal:
The process energy display is enabled in r0042.

Dependency: See also: r0042

p0045 Display values smoothing time constant / Disp_val T_smooth

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 6799
Min:	**Max:**	**Factory setting:**
0.00 [ms]	10000.00 [ms]	4.00 [ms]

Description: Sets the smoothing time constant for the following display values:
r0063[1], r0068[1], r0080[1], r0082[1].

r0046.0...31 CO/BO: Missing enable signal / Missing enable sig

Access level: 1	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 2634
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display and BICO output for missing enable signals that are preventing the closed-loop drive control from being commissioned.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	OFF1 enable missing	Yes	No	7954
01	OFF2 enable missing	Yes	No	-
02	OFF3 enable missing	Yes	No	-
03	Operation enable missing	Yes	No	-
04	DC braking enable missing	Yes	No	-
08	Safety enable missing	Yes	No	-
10	Ramp-function generator enable missing	Yes	No	-
11	Ramp-function generator start missing	Yes	No	-

12	Setpoint enable missing	Yes	No	-
16	OFF1 enable internal missing	Yes	No	-
17	OFF2 enable internal missing	Yes	No	-
18	OFF3 enable internal missing	Yes	No	-
19	Pulse enable internal missing	Yes	No	-
20	DC braking internal enable missing	Yes	No	-
21	Power unit enable missing	Yes	No	-
25	Function bypass active	Yes	No	-
26	Drive inactive or not operational	Yes	No	-
27	De-magnetizing not completed	Yes	No	-
30	Speed controller inhibited	Yes	No	-
31	Jog setpoint active	Yes	No	-

Dependency: See also: r0002

Note

The value r0046 = 0 indicates that all enable signals for this drive are present.
Bit 00 = 1 (enable signal missing), if:
- the signal source in p0840 is a 0 signal.
- there is a "switching on inhibited".
Bit 01 = 1 (enable signal missing), if:
- the signal source in p0844 or p0845 is a 0 signal.
Bit 02 = 1 (enable signal missing), if:
- the signal source in p0848 or p0849 is a 0 signal.
Bit 03 = 1 (enable signal missing), if:
- the signal source in p0852 is a 0 signal.
Bit 04 =1 (DC brake active) when:
- the signal source in p1230 has a 1 signal.
Bit 08 = 1 (enable signal missing), if:
- the "STO via terminals at the Power Module" function is selected.
Bit 10 = 1 (enable signal missing), if:
- the signal source in p1140 is a 0 signal.
Bit 11 = 1 (enable signal missing) if the speed setpoint is frozen, because:
- the signal source in p1141 is a 0 signal.
- the speed setpoint is entered from jogging and the two signal sources for jogging, bit 0 (p1055) and bit 1 (p1056) have a 1 signal.
Bit 12 = 1 (enable signal missing), if:
- the signal source in p1142 is a 0 signal.
Bit 16 = 1 (enable signal missing), if:
- there is an OFF1 fault response. The system is only enabled if the fault is removed and was acknowledged and the "switching on inhibited" withdrawn with OFF1 = 0.
Bit 17 = 1 (enable signal missing), if:
- commissioning mode is selected (p0010 > 0).
- there is an OFF2 fault response.
- the drive is not operational.
Bit 18 = 1 (enable signal missing), if:
- OFF3 has still not been completed or an OFF3 fault response is present.
Bit 19 = 1 (internal pulse enable missing), if:
- sequence control does not have a finished message.
Bit 20 = 1 (internal DC brake active), if:
- the drive is not in the state "Operation" or in "OFF1/OFF3".
- the internal pulse enable is missing (r0046.19 = 0).
Bit 21 = 1 (enable signal missing), if:
- the power unit does not issue an enable signal (e.g. because DC link voltage is too low).
- the hibernation mode is active.
Bit 25 = 1 (function bypass active) if:
- the bypass function is active.
Bit 26 = 1 (enable signal missing), if:
- the drive is not operational.
Bit 27 = 1 (enable signal missing), if:
- de-magnetization not completed.
Bit 30 = 1 (speed controller inhibited), if one of the following reasons is present:
- the pole position identification is active.
- motor data identification is active (only certain steps).
Bit 31 = 1 (enable signal missing), if:
- the speed setpoint from jog 1 or 2 is entered.

r0047 Motor data identification and speed controller optimization / MotID and n_opt

Access level: 1	**Calculated:** -	**Data type:** Integer16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	300	-

Description: Displays the actual status for the motor data identification (stationary measurement) and the speed controller optimization (rotating measurement).

Value:

0:	No measurement
115:	Measurement q leakage inductance (part 2)
120:	Speed controller optimization (vibration test)
140:	Calculate speed controller setting
150:	Measurement moment of inertia
170:	Measurement magnetizing current and saturation characteristic
195:	Measurement q leakage inductance (part 1)
200:	Rotating measurement selected
220:	identification leakage inductance
230:	Identification rotor time constant
240:	Identification stator inductance
250:	Identification stator inductance LQLD
260:	Identification circuit
270:	Identification stator resistance
290:	Identification valve lockout time
300:	Stationary measurement selected

r0047 Motor data identification and speed controller optimization / MotID and n_opt

G120XA_USS (PM330)

Access level: 1	**Calculated:** -	**Data type:** Integer16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	300	-

Description: Displays the actual status for the motor data identification (stationary measurement) and the speed controller optimization (rotating measurement).

Value:

0:	No measurement
115:	Measurement q leakage inductance (part 2)
120:	Speed controller optimization (vibration test)
140:	Calculate speed controller setting
150:	Measurement moment of inertia
170:	Measurement magnetizing current and saturation characteristic
195:	Measurement q leakage inductance (part 1)
200:	Rotating measurement selected
220:	identification leakage inductance
230:	Identification rotor time constant
240:	Identification stator inductance
250:	Identification stator inductance LQLD
270:	Identification stator resistance
290:	Identification valve lockout time
295:	Calibration output voltage measurement
300:	Stationary measurement selected

r0050.0...1 CO/BO: Command Data Set CDS effective / CDS effective

Access level: 3	**Calculated:** -	**Data type:** Unsigned8
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 8560
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the effective Command Data Set (CDS).

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	CDS effective bit 0	ON	OFF	-
01	CDS effective bit 1	ON	OFF	-

Dependency: See also: p0810, p0811, r0836

Note
The Command Data Set selected using a binector input (e.g. p0810) is displayed using r0836.

r0051.0...1 CO/BO: Drive Data Set DDS effective / DDS effective

Access level: 2	**Calculated:** -	**Data type:** Unsigned8
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 8565
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the effective Drive Data Set (DDS).

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	DDS effective bit 0	ON	OFF	-
01	DDS effective bit 1	ON	OFF	-

Dependency: See also: p0820, p0821, r0837

Note
When selecting the motor data identification routine and the rotating measurement, the drive data set changeover is suppressed.

r0052.0...15 CO/BO: Status word 1 / ZSW 1

Access level: 2	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display and connector output for status word 1.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Ready for switching on	Yes	No	-
01	Ready	Yes	No	-
02	Operation enabled	Yes	No	-
03	Fault present	Yes	No	-
04	Coast down active (OFF2)	No	Yes	-
05	Quick Stop active (OFF3)	No	Yes	-
06	Switching on inhibited active	Yes	No	-
07	Alarm present	Yes	No	-
08	Deviation setpoint/actual speed	No	Yes	-
09	Control request	Yes	No	-
10	Maximum speed reached	Yes	No	-

11	I, M, P limit reached	No	Yes	-
13	Alarm motor overtemperature	No	Yes	-
14	Motor rotates forwards	Yes	No	-
15	Alarm drive converter overload	No	Yes	-

NOTICE
p2080 is used to define the signal sources of the PROFIdrive status word interconnection.

Note
For bit 03:
This signal is inverted if it is interconnected to a digital output.
For r0052:
The status bits have the following sources:
Bit 00: r0899 Bit 0
Bit 01: r0899 Bit 1
Bit 02: r0899 Bit 2
Bit 03: r2139 Bit 3 (or r1214.10 for p1210 > 0)
Bit 04: r0899 Bit 4
Bit 05: r0899 Bit 5
Bit 06: r0899 Bit 6
Bit 07: r2139 Bit 7
Bit 08: r2197 Bit 7
Bit 09: r0899 Bit 7
Bit 10: r2197 Bit 6
Bit 11: r0056 Bit 13 (negated)
Bit 13: r2135 Bit 14 (negated)
Bit 14: r2197 Bit 3
Bit 15: r2135 Bit 15 (negated)

r0053.1...11 CO/BO: Status word 2 / ZSW 2

Access level: 2	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display and BICO output for status word 2.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
01	|n_act| > p1226 (n_standstill)	Yes	No	-
02	|n_act| > p1080 (n_min)	Yes	No	-
03	I_act >= p2170	Yes	No	-
04	|n_act| > p2155	Yes	No	-
05	|n_act| <= p2155	Yes	No	-
06	|n_act| >= r1119 (n_set)	Yes	No	-
07	Vdc <= p2172	Yes	No	-
08	Vdc > p2172	Yes	No	-
09	Ramp-up/ramp-down completed	Yes	No	-
10	Technology controller output at the lower limit	Yes	No	-
11	Technology controller output at the upper limit	Yes	No	-

NOTICE
p2081 is used to define the signal sources of the PROFIdrive status word interconnection.

Note
The following status bits are displayed in r0053:
Bit 01: r2197 Bit 5 (negated)
Bit 02: r2197 Bit 0 (negated)
Bit 03: r2197 Bit 8
Bit 04: r2197 Bit 2
Bit 05: r2197 Bit 1
Bit 06: r2197 Bit 4
Bit 07: r2197 Bit 9
Bit 08: r2197 Bit 10
Bit 09: r1199 Bit 2 (negated)
Bit 10: r2349 Bit 10
Bit 11: r2349 Bit 11

r0053.0...11 CO/BO: Status word 2 / ZSW 2

G120XA_USS (DC braking)

Access level: 2	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display and BICO output for status word 2.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	DC braking active	Yes	No	-
01	|n_act| > p1226 (n_standstill)	Yes	No	-
02	|n_act| > p1080 (n_min)	Yes	No	-
03	I_act >= p2170	Yes	No	-
04	|n_act| > p2155	Yes	No	-
05	|n_act| <= p2155	Yes	No	-
06	|n_act| >= r1119 (n_set)	Yes	No	-
07	Vdc <= p2172	Yes	No	-
08	Vdc > p2172	Yes	No	-
09	Ramp-up/ramp-down completed	Yes	No	-
10	Technology controller output at the lower limit	Yes	No	-
11	Technology controller output at the upper limit	Yes	No	-

NOTICE
p2081 is used to define the signal sources of the PROFIdrive status word interconnection.

Note
The following status bits are displayed in r0053:
Bit 00: r1239 Bit 8
Bit 01: r2197 Bit 5 (negated)
Bit 02: r2197 Bit 0 (negated)
Bit 03: r2197 Bit 8
Bit 04: r2197 Bit 2
Bit 05: r2197 Bit 1
Bit 06: r2197 Bit 4
Bit 07: r2197 Bit 9
Bit 08: r2197 Bit 10
Bit 09: r1199 Bit 2 (negated)
Bit 10: r2349 Bit 10
Bit 11: r2349 Bit 11

r0054.0...15 CO/BO: Control word 1 / STW 1

Access level: 2	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays control word 1.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	ON/OFF1	Yes	No	-
01	OC / OFF2	No	Yes	-
02	OC / OFF3	No	Yes	-
03	Enable operation	Yes	No	-
04	Enable ramp-function generator	Yes	No	-
05	Continue ramp-function generator	Yes	No	-
06	Enable speed setpoint	Yes	No	-
07	Acknowledge fault	Yes	No	-
08	Jog bit 0	Yes	No	3030
09	Jog bit 1	Yes	No	3030
10	Master control by PLC	Yes	No	-
11	Direction reversal (setpoint)	Yes	No	-
13	Motorized potentiometer raise	Yes	No	-
14	Motorized potentiometer lower	Yes	No	-
15	CDS bit 0	Yes	No	-

Note

The following control bits are displayed in r0054:
Bit 00: r0898 Bit 0
Bit 01: r0898 Bit 1
Bit 02: r0898 Bit 2
Bit 03: r0898 Bit 3
Bit 04: r0898 Bit 4
Bit 05: r0898 Bit 5
Bit 06: r0898 Bit 6
Bit 07: r2138 Bit 7
Bit 08: r0898 Bit 8
Bit 09: r0898 Bit 9
Bit 10: r0898 Bit 10
Bit 11: r1198 Bit 11
Bit 13: r1198 Bit 13
Bit 14: r1198 Bit 14
Bit 15: r0836 Bit 0

r0055.0...15 CO/BO: Supplementary control word / Suppl STW

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 2513
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display and BICO output for supplementary control word.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Fixed setpoint bit 0	Yes	No	-
01	Fixed setpoint bit 1	Yes	No	-

02	Fixed setpoint bit 2	Yes	No	-
03	Fixed setpoint bit 3	Yes	No	-
04	DDS selection bit 0	Yes	No	-
05	DDS selection bit 1	Yes	No	-
08	Technology controller enable	Yes	No	-
11	Reserved	-	-	-
12	Reserved	-	-	-
13	External fault 1 (F07860)	No	Yes	-
15	CDS bit 1	Yes	No	-

Note
CDS: Command Data Set
DDS: Drive Data Set
The following control bits are displayed in r0055:
Bit 00: r1198.0
Bit 01: r1198.1
Bit 02: r1198.2
Bit 03: r1198.3
Bit 04: r0837.0
Bit 05: r0837.1
Bit 08: r2349.0 (negated)
Bit 13: r2138.13 (negated)
Bit 15: r0836.1

r0055.0...15 CO/BO: Supplementary control word / Suppl STW

G120XA_USS (DC braking)

Access level: 3 | **Calculated:** - | **Data type:** Unsigned16
Can be changed: - | **Scaling:** - | **Dynamic index:** -
Unit group: - | **Unit selection:** - | **Function diagram:** 2513
Min: - | **Max:** - | **Factory setting:** -

Description: Display and BICO output for supplementary control word.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Fixed setpoint bit 0	Yes	No	-
01	Fixed setpoint bit 1	Yes	No	-
02	Fixed setpoint bit 2	Yes	No	-
03	Fixed setpoint bit 3	Yes	No	-
04	DDS selection bit 0	Yes	No	-
05	DDS selection bit 1	Yes	No	-
08	Technology controller enable	Yes	No	-
09	DC braking enable	Yes	No	-
11	Reserved	-	-	-
12	Reserved	-	-	-
13	External fault 1 (F07860)	No	Yes	-
15	CDS bit 1	Yes	No	-

Note
CDS: Command Data Set
DDS: Drive Data Set
The following control bits are displayed in r0055:
Bit 00: r1198.0
Bit 01: r1198.1
Bit 02: r1198.2
Bit 03: r1198.3
Bit 04: r0837.0
Bit 05: r0837.1
Bit 08: r2349.0 (negated)
Bit 09: r1239.11
Bit 13: r2138.13 (negated)
Bit 15: r0836.1

r0056.0...15 CO/BO: Status word, closed-loop control / ZSW cl-loop ctrl

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 2526
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display and BICO output for the status word of the closed-loop control.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Initialization completed	Yes	No	-
01	De-magnetizing completed	Yes	No	-
02	Pulse enable available	Yes	No	-
04	Magnetizing completed	Yes	No	-
05	Voltage boost when starting	Active	Inactive	6301
06	Acceleration voltage	Active	Inactive	6301
07	Frequency negative	Yes	No	-
08	Field weakening active	Yes	No	-
09	Voltage limit active	Yes	No	6714
10	Slip limit active	Yes	No	6310
11	Frequency limit active	Yes	No	-
12	Current limiting controller voltage output active	Yes	No	-
13	Current/torque limiting	Active	Inactive	6060
14	Vdc_max controller active	Yes	No	6220, 6320
15	Vdc_min controller active	Yes	No	6220, 6320

r0060 CO: Speed setpoint before the setpoint filter / n_set before filt.

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p2000	**Dynamic index:** -
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 2701, 6030, 6799, 6822
Min:	**Max:**	**Factory setting:**
- [rpm]	- [rpm]	- [rpm]

Description: Displays the actual speed setpoint at the input of the speed controller or U/f characteristic (after the interpolator).

Dependency: See also: r0020

Note
The speed setpoint is available smoothed (r0020) and unsmoothed (r0060).

r0062 CO: Speed setpoint after the filter / n_set after filter

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p2000	**Dynamic index:** -
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 6020, 6030, 6031, 6822
Min:	**Max:**	**Factory setting:**
- [rpm]	- [rpm]	- [rpm]

Description: Display and connector output for the speed setpoint after the setpoint filters.

r0063[0...2] CO: Actual speed / Actual speed

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p2000	**Dynamic index:** -
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 6020, 6730, 6799, 6841
Min:	**Max:**	**Factory setting:**
- [rpm]	- [rpm]	- [rpm]

Description: Display and connector output for the speed actual value.
Frequency components from the slip compensation (for induction motors) are not included.

Index: [0] = Unsmoothed
[1] = Smoothed with p0045
[2] = Calculated from f_set - f_slip (unsmoothed)

Dependency: See also: r0021, r0022

Note
The speed actual value r0063[0] – smoothed with p0045 – is additionally displayed in r0063[1]. r0063[1] can be used as process variable for the appropriate smoothing time constant p0045.
The speed (r0063[2]) calculated from the output frequency and slip can only be compared with the speed actual value (r0063[0]) in the steady-state.
For U/f control, the mechanical speed calculated from the output frequency and the slip is shown in r0063[2] even if slip compensation is deactivated.

r0064 CO: Speed controller system deviation / n_ctrl sys dev

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p2000	**Dynamic index:** -
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 6040, 6824
Min:	**Max:**	**Factory setting:**
- [rpm]	- [rpm]	- [rpm]

Description: Displays the actual system deviation of the speed controller.

r0065 Slip frequency / f_Slip

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p2000	**Dynamic index:** -
Unit group: 2_1	**Unit selection:** p0505	**Function diagram:** 6310, 6700, 6727, 6730, 6732
Min:	**Max:**	**Factory setting:**
- [Hz]	- [Hz]	- [Hz]

Description: Displays the slip frequency for induction motors (ASM).

r0066 CO: Output frequency / f_outp

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p2000	**Dynamic index:** -
Unit group: 2_1	**Unit selection:** p0505	**Function diagram:** 6730, 6731, 6792, 6799, 6841, 6842, 6843
Min:	**Max:**	**Factory setting:**
- [Hz]	- [Hz]	- [Hz]

Description: Display and connector output for the unsmoothed output frequency of the power unit.

Frequency components from the slip compensation (induction motor) are included.

Dependency: See also: r0024

Note

The output frequency is available smoothed (r0024) and unsmoothed (r0066).

r0067 CO: Output current maximum / Current max

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p2002	**Dynamic index:** -
Unit group: 6_2	**Unit selection:** p0505	**Function diagram:** 6300, 6640, 6724, 6828, 6850
Min:	**Max:**	**Factory setting:**
- [Arms]	- [Arms]	- [Arms]

Description: Display and connector output for the maximum output current of the power unit.

Dependency: The maximum output current is determined by the parameterized current limit and the motor and converter thermal protection.

See also: p0290, p0640

r0068[0...1] CO: Absolute current actual value / I_act abs val

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p2002	**Dynamic index:** -
Unit group: 6_2	**Unit selection:** p0505	**Function diagram:** 6300, 6714, 6799, 7017, 8017, 8021, 8022
Min:	**Max:**	**Factory setting:**
- [Arms]	- [Arms]	- [Arms]

Description: Displays actual absolute current.

Index:
[0] = Unsmoothed
[1] = Smoothed with p0045

Dependency: See also: r0027

NOTICE
The value is updated with the current controller sampling time.

Note

Absolute current value = sqrt(Iq^2 + Id^2)

The absolute value of the current actual value is available smoothed (r0027 with 300 ms, r0068[1] with p0045) and unsmoothed (r0068[0]).

r0069[0...8] CO: Phase current actual value / I_phase act val

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p2002	**Dynamic index:** -
Unit group: 6_5	**Unit selection:** p0505	**Function diagram:** 6730
Min:	**Max:**	**Factory setting:**
- [A]	- [A]	- [A]

Description: Display and connector output for the measured actual phase currents as peak value.

Index:
[0] = Phase U
[1] = Phase V
[2] = Phase W
[3] = Phase U offset
[4] = Phase V offset
[5] = Phase W offset
[6] = Total U, V, W
[7] = Alpha component
[8] = Beta component

Note

In indices 3 ... 5, the offset currents of the 3 phases, which are added to correct the phase currents, are displayed. The sum of the 3 corrected phase currents is displayed in index 6.

r0070 CO: Actual DC link voltage / Vdc act val

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p2001	**Dynamic index:** -
Unit group: 5_2	**Unit selection:** p0505	**Function diagram:** 6723, 6724, 6730, 6731, 6799
Min:	**Max:**	**Factory setting:**
- [V]	- [V]	- [V]

Description: Display and connector output for the measured actual value of the DC link voltage.

Dependency: See also: r0026

NOTICE

When measuring a DC link voltage < 200 V, for the Power Module (e.g. PM240) a valid measured value is not supplied. In this case, when an external 24 V power supply is connected, a value of approx. 24 V is displayed in the display parameter.

Note

The DC link voltage is available smoothed (r0026) and unsmoothed (r0070).

r0071 Maximum output voltage / Voltage max

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p2001	**Dynamic index:** -
Unit group: 5_1	**Unit selection:** p0505	**Function diagram:** 6301, 6640, 6700, 6722, 6723, 6724, 6725, 6727
Min:	**Max:**	**Factory setting:**
- [Vrms]	- [Vrms]	- [Vrms]

Description: Displays the maximum output voltage.

Dependency: The maximum output voltage depends on the actual DC link voltage (r0070) and the maximum modulation depth (p1803).

Note

As the (driven) motor load increases, the maximum output voltage drops as a result of the reduction in DC link voltage.

r0072 CO: Output voltage / U_output

Access level: 3 | **Calculated:** - | **Data type:** FloatingPoint32
Can be changed: - | **Scaling:** p2001 | **Dynamic index:** -
Unit group: 5_1 | **Unit selection:** p0505 | **Function diagram:** 5700, 6730, 6731, 6799

Min: - [Vrms] | **Max:** - [Vrms] | **Factory setting:** - [Vrms]

Description: Display and connector output for the actual output voltage of the power unit.

Dependency: See also: r0025

Note
The output voltage is available smoothed (r0025) and unsmoothed (r0072).

r0073 Maximum modulation depth / Modulat_depth max

Access level: 4 | **Calculated:** - | **Data type:** FloatingPoint32
Can be changed: - | **Scaling:** PERCENT | **Dynamic index:** -
Unit group: - | **Unit selection:** - | **Function diagram:** 6723, 6724

Min: - [%] | **Max:** - [%] | **Factory setting:** - [%]

Description: Displays the maximum modulation depth.

Dependency: See also: p1803

r0074 CO: Modulat_depth / Mod_depth

Access level: 4 | **Calculated:** - | **Data type:** FloatingPoint32
Can be changed: - | **Scaling:** PERCENT | **Dynamic index:** -
Unit group: - | **Unit selection:** - | **Function diagram:** 5730, 6730, 6731, 6799, 8940, 8950

Min: - [%] | **Max:** - [%] | **Factory setting:** - [%]

Description: Display and connector output for the actual modulation depth.

Dependency: See also: r0028

Note
For space vector modulation, 100% corresponds to the maximum output voltage without overcontrol.
Values above 100 % indicate an overcontrol condition - values below 100% have no overcontrol.
The phase voltage (phase-to-phase, rms) is calculated as follows:(r0074 x r0070) / (sqrt(2) x 100 %).
The modulation depth is available smoothed (r0028) and unsmoothed (r0074).

r0075 CO: Current setpoint field-generating / Id_set

Access level: 3 | **Calculated:** - | **Data type:** FloatingPoint32
Can be changed: - | **Scaling:** p2002 | **Dynamic index:** -
Unit group: 6_2 | **Unit selection:** p0505 | **Function diagram:** 6700, 6714, 6725

Min: - [Arms] | **Max:** - [Arms] | **Factory setting:** - [Arms]

Description: Display and connector output for the field-generating current setpoint (Id_set).

Note
This value is irrelevant for the U/f control mode.

r0076 CO: Current actual value field-generating / Id_act

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p2002	**Dynamic index:** -
Unit group: 6_2	**Unit selection:** p0505	**Function diagram:** 5700, 5714, 5730, 6700, 6714, 6799
Min:	**Max:**	**Factory setting:**
- [Arms]	- [Arms]	- [Arms]

Description: Display and connector output for the field-generating current actual value (Id_act).

Dependency: See also: r0029

Note
This value is irrelevant for the U/f control mode.
The field-generating current actual value is available smoothed (r0029) and unsmoothed (r0076).

r0077 CO: Current setpoint torque-generating / Iq_set

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p2002	**Dynamic index:** -
Unit group: 6_2	**Unit selection:** p0505	**Function diagram:** 6700, 6710
Min:	**Max:**	**Factory setting:**
- [Arms]	- [Arms]	- [Arms]

Description: Display and connector output for the torque-generating current setpoint.

Note
This value is irrelevant for the U/f control mode.

r0078 CO: Current actual value torque-generating / Iq_act

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p2002	**Dynamic index:** -
Unit group: 6_2	**Unit selection:** p0505	**Function diagram:** 6310, 6700, 6714, 6799
Min:	**Max:**	**Factory setting:**
- [Arms]	- [Arms]	- [Arms]

Description: Display and connector output for the torque-generating current actual value (Iq_act).

Dependency: See also: r0030

Note
This value is irrelevant for the U/f control mode.
The torque-generating current actual value is available smoothed (r0030 with 300 ms) and unsmoothed (r0078).

r0079 CO: Torque setpoint / M_set

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p2003	**Dynamic index:** -
Unit group: 7_1	**Unit selection:** p0505	**Function diagram:** 6020, 6060, 6710
Min:	**Max:**	**Factory setting:**
- [Nm]	- [Nm]	- [Nm]

Description: Display and connector output for the torque setpoint at the output of the speed controller.

r0080[0...1] CO: Torque actual value / Actual torque

Access level: 3 | **Calculated:** - | **Data type:** FloatingPoint32
Can be changed: - | **Scaling:** p2003 | **Dynamic index:** -
Unit group: 7_1 | **Unit selection:** p0505 | **Function diagram:** 6714, 6799
Min: - [Nm] | **Max:** - [Nm] | **Factory setting:** - [Nm]

Description: Display and connector output for actual torque value.

Index:
[0] = Unsmoothed
[1] = Smoothed with p0045

Dependency: See also: r0031, p0045

Note

The value is available smoothed (r0031 with 100 ms, r0080[1] with p0045) and unsmoothed (r0080[0]).

r0082[0...2] CO: Active power actual value / P_act

Access level: 3 | **Calculated:** - | **Data type:** FloatingPoint32
Can be changed: - | **Scaling:** r2004 | **Dynamic index:** -
Unit group: 14_5 | **Unit selection:** p0505 | **Function diagram:** 6714, 6799
Min: - [kW] | **Max:** - [kW] | **Factory setting:** - [kW]

Description: Displays the instantaneous active power.

Index:
[0] = Unsmoothed
[1] = Smoothed with p0045
[2] = Electric power

Dependency: See also: r0032

Note

The mechanical active power is available smoothed (r0032 with 100 ms, r0082[1] with p0045) and unsmoothed (r0082[0]).

r0083 CO: Flux setpoint / Flex setp

Access level: 4 | **Calculated:** - | **Data type:** FloatingPoint32
Can be changed: - | **Scaling:** PERCENT | **Dynamic index:** -
Unit group: - | **Unit selection:** - | **Function diagram:** 5722
Min: - [%] | **Max:** - [%] | **Factory setting:** - [%]

Description: Displays the flux setpoint.

r0084[0...1] CO: Flux actual value / Actual flux

Access level: 4 | **Calculated:** - | **Data type:** FloatingPoint32
Can be changed: - | **Scaling:** PERCENT | **Dynamic index:** -
Unit group: - | **Unit selection:** - | **Function diagram:** 6730, 6731
Min: - [%] | **Max:** - [%] | **Factory setting:** - [%]

Description: Displays the flux actual value.

Index:
[0] = Unsmoothed
[1] = Smoothed

r0087 CO: Actual power factor / Cos phi act

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the actual active power factor.

This value refers to the electrical power of the basic fundamental signals at the output terminals of the converter.

r0089[0...2] Actual phase voltage / U_phase act val

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p2001	**Dynamic index:** -
Unit group: 5_3	**Unit selection:** p0505	**Function diagram:** 6730
Min:	**Max:**	**Factory setting:**
- [V]	- [V]	- [V]

Description: Displays the actual phase voltage.

Index:
[0] = Phase U
[1] = Phase V
[2] = Phase W

Note
The values are determined from the transistor switch-on duration.

p0096 Application class / Appl_class

Access level: 1	**Calculated:** -	**Data type:** Integer16
Can be changed: C2(1)	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 6019
Min:	**Max:**	**Factory setting:**
0	2	0

Description: Setting the commissioning and control view for various application classes.

Value:
0: Expert
1: Standard Drive Control (SDC)
2: Dynamic Drive Control (DDC)

Dependency: The parameter is preset when commissioning the system for the first time and for the factory setting, depending on the power unit that is connected (Power unit is more than 18KW, p0096=2. Power unit is less than 18KW, p0096=1).

Depending on the setting, the ability to see control parameters is restricted depending on the particular application.

The following applies for p0096 > 0:

The motor data identification routine is preset (p1900 = 2).

The following applies for p0096 = 1:

The motor type (p0300) synchronous or reluctance motor is not possible.

Note
When changing p0096 to 1 or 2, when completing commissioning, fast parameterization should be executed (p3900 > 0).

Depending on the setting, after quick commissioning and/or automatic parameterization, the procedure for motor data identification as well as the setting of the operating mode and parameterization of the closed-loop control must be appropriately adapted.

p0096 Application class / Appl_class

G120XA_USS (PM330)

Access level: 1	**Calculated:** -	**Data type:** Integer16
Can be changed: C2(1)	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 6019
Min:	**Max:**	**Factory setting:**
0	2	0

Description: Setting the commissioning and control view for various application classes.

Value:
0: Expert
2: Dynamic Drive Control (DDC)

Dependency: The parameter is preset when commissioning the system for the first time and for the factory setting, depending on the power unit that is connected

Depending on the setting, the ability to see control parameters is restricted depending on the particular application.

The following applies for p0096 > 0:

The motor data identification routine is preset (p1900 = 2).

Note

When changing p0096 to 2, when completing commissioning, fast parameterization should be executed (p3900 > 0).

Depending on the setting, after quick commissioning and/or automatic parameterization, the procedure for motor data identification as well as the setting of the operating mode and parameterization of the closed-loop control must be appropriately adapted.

p0100 IEC/NEMA Standards / IEC/NEMA Standards

Access level: 1	**Calculated:** -	**Data type:** Integer16
Can be changed: C2(1, 2)	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	2	0

Description: Defines whether the motor and drive converter power settings (e.g. rated motor power, p0307) are expressed in [kW] or [hp].

Depending on the selection, the rated motor frequency (p0310) is either set to 50 Hz or 60 Hz.

For p0100 = 0, 2, the following applies: The power factor (p0308) should be parameterized.

For p0100 = 1, the following applies: The efficiency (p0309) should be parameterized.

Value:
0: IEC (50 Hz line, SI units)
1: NEMA (60 Hz line, US units)
2: NEMA (60 Hz line, SI units)

Dependency: If p0100 is changed, all of the rated motor parameters are reset. Only then are possible unit changeovers made.

The units of all motor parameters are changed that are involved in the selection of IEC or NEMA (e.g. r0206, p0307, r0333, r0334, p0341, p0344, r1969).

See also: r0206, p0210, p0300, p0304, p0305, p0307, p0308, p0309, p0310, p0311, p0314, p0320, p0322, p0323, p0335, r0337, p1800

Note

The parameter value is not reset when the factory setting is restored (p0010 = 30, p0970).

p0124[0...n] CU detection via LED / CU detection LED

Access level: 3	**Calculated:** -	**Data type:** Unsigned8
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	1	0

Description: Identification of the Control Unit using an LED.

Note
While p0124 = 1, the READY LED flashes green/orange or red/orange with 2 Hz at the appropriate Control Unit.

p0133[0...n] Motor configuration / Motor config

Access level: 2	**Calculated:** -	**Data type:** Unsigned16
Can be changed: C2(1, 3)	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	0000 bin

Description: Configuration of the motor when commissioning the motor.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Motor connection type	Delta	Star	-
01	Motor 87 Hz operation	Yes	No	-

Dependency: For standard induction motors (p0301 > 10000), bit 0 is automatically pre-assigned the connection type of the selected data set.

For p0100 > 0 (60 Hz rated motor frequency), it is not possible to select bit 1.

See also: p0304, p0305, p1082

Note
For bit 00:
When changing the bits, the rated motor voltage p0304 and the rated motor current p0305 are automatically converted to the selected connection type (star/delta).
For bit 01:
87 Hz operation is only possible in the delta connection type. When selected, the maximum speed p1082 is automatically pre-assigned for a maximum output frequency of 87 Hz.

p0170 Number of Command Data Sets (CDS) / CDS count

Access level: 2	**Calculated:** -	**Data type:** Unsigned8
Can be changed: C2(15)	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 8560
Min:	**Max:**	**Factory setting:**
2	4	2

Description: Sets the number of Command Data Sets (CDS).

Dependency: See also: p0010, r3996

NOTICE
When the data sets are created, short-term communication interruptions may occur.

Note
It is possible to toggle between command parameters (BICO parameters) using this data set changeover.

p0180 Number of Drive Data Sets (DDS) / DDS count

Access level: 3	**Calculated:** -	**Data type:** Unsigned8
Can be changed: C2(15)	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 8565
Min:	**Max:**	**Factory setting:**
1	4	1

Description: Sets the number of Drive Data Sets (DDS).

Dependency: See also: p0010, r3996

NOTICE
When the data sets are created, short-term communication interruptions may occur.

r0197[0...1] Bootloader version / Bootloader vers

Access level: 4	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the bootloader version.
Index 0:
Displays the bootloader version.
Index 1:
Displays the bootloader version 3 (for CU320-2 and CU310-2)
Value 0 means that boot loader 3 is not available.

Dependency: See also: r0018, r0198

Note
Example:
The value 1010100 should be interpreted as V01.01.01.00.

r0198[0...2] BIOS/EEPROM data version / BIOS/EEPROM vers

Access level: 4	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the BIOS and EEPROM data version.
r0198[0]: BIOS version
r0198[1]: EEPROM data version EEPROM 0
r0198[2]: EEPROM data version EEPROM 1

Dependency: See also: r0018, r0197

Note
Example:
The value 1010100 should be interpreted as V01.01.01.00.

r0200[0...n] Power unit code number actual / PU code no. act

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the unique code number of the power unit.

Note
r0200 = 0: No power unit data found

p0201[0...n] Power unit code number / PU code no

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: C2(2)	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	65535	0

Description: Sets the actual code number from r0200 to acknowledge the power unit being used.
When commissioned for the first time, the code number is automatically transferred from r0200 into p0201.

Note
The parameter is used to identify when the drive is being commissioned for the first time.
The power unit commissioning can only be exited (p0201 = r0200), if the actual and acknowledged code numbers are identical (p0010 = 2).
When the code number is changed, the connection voltage (p0210) is checked and, if necessary, adjusted.

r0203[0...n] Actual power unit type / PU actual type

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
2	400	-

Description: Displays the type of power unit found.

Value:

2:	MICROMASTER 440
3:	MICROMASTER 411
4:	MICROMASTER 410
5:	MICROMASTER 436
6:	MICROMASTER 440 PX
7:	MICROMASTER 430
100:	SINAMICS S
101:	SINAMICS S (value)
102:	SINAMICS S (combi)
103:	SINAMICS S120M (distributed)
112:	PM220 (SINAMICS G120)
113:	PM230 (SINAMICS G120)
114:	PM240 (SINAMICS G120 / S120)
115:	PM250 (SINAMICS G120 / S120)
116:	PM260 (SINAMICS G120)
118:	SINAMICS G120 Px
120:	PM340 (SINAMICS S120 / G120)
126:	SINAMICS ET200PRO
130:	PM250D (SINAMICS G120D)
133:	SINAMICS G120C
135:	SINAMICS PMV40
136:	SINAMICS PMV60
137:	SINAMICS PMV80
138:	SINAMICS G110M
140:	SINAMICS G120X/G120XA
150:	SINAMICS G
151:	PM330 (SINAMICS G120)
200:	SINAMICS GM
250:	SINAMICS SM
260:	SINAMICS MC
300:	SINAMICS GL
350:	SINAMICS SL
400:	SINAMICS DCM

Note
For parallel circuit configurations, the parameter index is assigned to a power unit.

r0204[0...n] Power unit hardware properties / PU HW property

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the properties supported by the power unit hardware.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
01	RFI filter available	Yes	No	-
07	F3E regenerative feedback into the line supply	Yes	No	-
08	Internal Braking Module	Yes	No	-
12	Safe Brake Control (SBC) supported	No	Yes	-
14	Internal LC output filter	Yes	No	-
15	Line voltage	1-phase	3-phase	-

p0205 Power unit application / PU application

Access level: 1	**Calculated:** -	**Data type:** Integer16
Can be changed: C2(1, 2)	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
1	7	1

Description: The duty cycles can be overloaded provided that the drive converter is operated with its base load current before and after the overload. This is based on a load duty cycle of 300 s.

Value:
1: Load duty cycle with low overload for vector drives
6: S1 duty cycle (for internal use)
7: S6 duty cycle (for internal use)

Dependency: See also: r3996

NOTICE
The parameter value is not reset when the factory setting is restored (see p0010 = 30, p0970).
When the power unit use is changed, short-term communication interruptions may occur.

Note
When the parameter is changed, all of the motor parameters (p0305 ... p0311), the technological application (p0500) and the control mode (p1300) are pre-assigned according to the selected application. The parameter has no influence when calculating the thermal overload.
p0205 can only be changed to the settings that are saved in the power unit EEPROM.

p0205 Power unit application / PU application

G120XA_USS (PM330)

Access level: 1	**Calculated:** -	**Data type:** Integer16
Can be changed: C2(1, 2)	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	1	1

Description: The duty cycles can be overloaded provided that the drive converter is operated with its base load current before and after the overload. This is based on a load duty cycle of 300 s.

Value:
0: Load duty cycle with high overload for vector drives
1: Load duty cycle with low overload for vector drives

Dependency: See also: r3996

NOTICE
The parameter value is not reset when the factory setting is restored (see p0010 = 30, p0970). When the power unit use is changed, short-term communication interruptions may occur.

Note

When the parameter is changed, all of the motor parameters (p0305 ... p0311), the technological application (p0500) and the control mode (p1300) are pre-assigned according to the selected application. The parameter has no influence when calculating the thermal overload.

p0205 can only be changed to the settings that are saved in the power unit EEPROM.

r0206[0...4] Rated power unit power / PU P_rated

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: 14_6	**Unit selection:** p0100	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
- [kW]	- [kW]	- [kW]

Description: Displays the rated power unit power for various load duty cycles.

Index:
[0] = Rated value
[1] = Load duty cycle with low overload
[2] = Load duty cycle with high overload
[3] = S1 continous duty cycle
[4] = S6 load duty cycle

Dependency:
IECdrives (p0100 = 0): Units kW
NEMA drives (p0100 = 1): Units hp
See also: p0100, p0205

Note

G120XA doesn't have high overload feature.
r0206[2] is not available in G120XA.

r0207[0...4] Rated power unit current / PU PI_rated

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 8021
Min:	**Max:**	**Factory setting:**
- [Arms]	- [Arms]	- [Arms]

Description: Displays the rated power unit power for various load duty cycles.

Index:
[0] = Rated value
[1] = Load duty cycle with low overload
[2] = Load duty cycle with high overload
[3] = S1 continuous duty cycle
[4] = S6 load duty cycle

Dependency: See also: p0205

Note

G120XA doesn't support supply voltage of 500V-690V.
G120XA doesn't have high overload feature.
r0207[2] is not available in G120XA.

r0207[0...4] Rated power unit current / PU PI_rated

G120XA_USS (PM330)

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 8021
Min:	**Max:**	**Factory setting:**
- [Arms]	- [Arms]	- [Arms]

Description: Displays the rated power unit power for various load duty cycles.

Index:
[0] = Rated value
[1] = Load duty cycle with low overload
[2] = Load duty cycle with high overload
[3] = S1 continuous duty cycle
[4] = S6 load duty cycle

Dependency: See also: p0205

Note
Wide voltage range device 500 V - 690 V:
The rated current displayed refers to a supply voltage of 500 V.

r0208 Rated power unit line supply voltage / PU U_rated

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
- [Vrms]	- [Vrms]	- [Vrms]

Description: Displays the rated line supply voltage of the power unit.
r0208 = 400: 380 - 480 V +/-10 %

Note
G120XA doesn't support supply voltage of 500V-690V.

r0209[0...4] Power unit maximum current / PU I_max

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 8750, 8850, 8950
Min:	**Max:**	**Factory setting:**
- [Arms]	- [Arms]	- [Arms]

Description: Displays the maximum output current of the power unit.

Index:
[0] = Catalog
[1] = Load duty cycle with low overload
[2] = Load duty cycle with high overload
[3] = S1 load duty cycle
[4] = S6 load duty cycle

Dependency: See also: p0205

Note
G120XA doesn't have high overload feature.
r0209[2] is not available in G120XA.

p0210 Drive unit line supply voltage / U_connect

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
1 [V]	63000 [V]	400 [V]

Description: Sets the drive unit supply voltage (rms value of the phase-to-phase line supply voltage).

Dependency: Set p1254, p1294 (automatic detection of the Vdc switch-on levels) = 0.

The switch-in thresholds of the Vdc_max controller (r1242, r1282) are then directly determined using p0210.

NOTICE
If, in the switched-off state (pulse inhibit), the supply voltage is higher than the entered value, the Vdc controller may be automatically deactivated in some cases to prevent the motor from accelerating the next time the system is switched on. In this case, an appropriate alarm A07401 is output.

Note

Setting ranges for p0210 as a function of the rated power unit voltage:
U_rated = 230 V:
- p0210 = 200 ... 240 V
U_rated = 400 V:
- p0210 = 380 ... 480 V

p0230 Drive filter type motor side / Drv filt type mot

Access level: 1	**Calculated:** -	**Data type:** Integer16
Can be changed: C2(1, 2)	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	4	0

Description: Sets the type of the filter at the motor side.

Value:

0:	No filter
1:	Motor reactor
2:	dv/dt filter
3:	Sine-wave filter Siemens
4:	Sine-wave filter third-party

Dependency: The following parameters are influenced using p0230:

p0230 = 1:

--> p0233 (power unit, motor reactor) = filter inductance

p0230 = 3:

--> p0233 (power unit, motor reactor) = filter inductance

--> p0234 (power unit sine-wave filter capacitance) = filter capacitance

--> p0290 (power unit overload response) = inhibit pulse frequency reduction

--> p1082 (maximum speed) = Fmax filter / pole pair number

--> p1800 (pulse frequency) >= nominal pulse frequency of the filter

--> p1802 (modulator modes) = space vector modulation without overcontrol

p0230 = 4:

--> p0290 (power unit overload response) = inhibit pulse frequency reduction

--> p1802 (modulator modes) = space vector modulation without overcontrol

The user must set the following parameters according to the data sheet of the sine-wave filter and also the user must check whether they are permitted.

--> p0233 (power unit, motor reactor) = filter inductance

--> p0234 (power unit sine-wave filter capacitance) = filter capacitance

--> p1082 (maximum speed) = Fmax filter / pole pair number

--> p1800 (pulse frequency) >= nominal pulse frequency of the filter

See also: p0233, p0234, p0290, p1082, p1800, p1802

Note

The parameter cannot be changed if the power unit (e.g. PM260) is equipped with an internal sine-wave filter.

For sine-wave filters, the test pulse evaluation to detect short-circuits is always deactivated.

Only motor reactor filter type can be selected for a synchronous reluctance motor (RESM).

If a filter type cannot be selected, then this filter type is not permitted for the power unit.

p0230 = 1:

Power units with output reactor are limited to output frequencies of 150 Hz.

p0230 = 3:

Power units with sine-wave filter are limited to output frequencies of 200 Hz.

p0230 Drive filter type motor side / Drv filt type mot

G120XA_USS (PM330)

Access level: 1	**Calculated:** -	**Data type:** Integer16
Can be changed: C2(1, 2)	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	2	0

Description: Sets the type of the filter at the motor side.

Value:

0: No filter

1: Motor reactor

2: dv/dt filter

Dependency: The following parameters are influenced using p0230:

p0230 = 1:

--> p0233 (power unit, motor reactor) = filter inductance

See also: p0233, p0234, p0290, p1082, p1800, p1802

Note

If a filter type cannot be selected, then this filter type is not permitted for the power unit.

p0230 = 1:

Power units with output reactor are limited to output frequencies of 150 Hz.

r0231[0...1] Power cable length maximum / Cable length max

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
- [m]	- [m]	- [m]

Description: Displays the maximum permissible cable lengths between the drive unit and motor.

Index: [0] = Unshielded
[1] = Shielded

Note
The display value is used to provide information for service and maintenance.

p0233 Power unit motor reactor / PU mot reactor

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: C2(1), T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.000 [mH]	1000.000 [mH]	0.000 [mH]

Description: Enter the inductance of a filter connected at the power unit output.

Dependency: This parameter is automatically pre-set when you select a filter via p0230 if a SIEMENS filter is defined for the power unit.
See also: p0230

Note
When exiting the quick commissioning using p3900 = 1, the parameter value is set to the value of the defined SIEMENS filter or to zero. For this reason, the parameter value of a third-party filter only has to be entered outside the commissioning phase (p0010 = 0) and then the controller calculation (p0340 = 3) is carried out.
The parameter cannot be changed if the power unit (e.g. PM260) is equipped with an internal sine-wave filter.

p0234 Power unit sine-wave filter capacitance / PU sine filter C

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: C2(1), T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.000 [µF]	1000.000 [µF]	0.000 [µF]

Description: Enters the capacitance of a sine-wave filter connected at the power unit output.

Dependency: This parameter is automatically pre-set when you select a filter via p0230 if a SIEMENS filter is defined for the power unit.
See also: p0230

Note
The parameter value includes the sum of all of the capacitances of a phase connected in series (phase - ground).
When exiting the quick commissioning using p3900 = 1, the parameter value is set to the value of the defined SIEMENS filter or to zero. For this reason, the parameter value of a third-party filter only has to be entered outside the commissioning phase (p0010 = 0).
The parameter cannot be changed if the power unit (e.g. PM260) is equipped with an internal sine-wave filter.

p0235 Motor reactor in series number / L_mot in SeriesQty

Access level: 2	**Calculated:** -	**Data type:** Unsigned8
Can be changed: C2(1, 2)	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
1	3	1

Description: Sets the number of reactors connected in series at the power unit output.

Dependency: See also: p0230

NOTICE
The reactor inductances should be the same. If the number of motor reactors connected in series does not correspond to this parameter value, then this can result in an unfavorable control behavior.

r0238 Internal power unit resistance / PU R internal

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
- [ohm]	- [ohm]	- [ohm]

Description: Displays the internal resistance of the power unit (IGBT and line resistance).

p0247 Voltage measurement configuring / U_mes config

G120XA_USS (PM330)

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	0000 0000 0010 0000 bin

Description: Sets the configuration for the output voltage measurement of the power unit.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Activate voltage measurement	Yes	No	-
01	Siemens internal	Yes	No	-
02	Siemens internal	Yes	No	-
05	Use voltage measured values for flying restart	Yes	No	-
07	Voltage calibration when switching on	Yes	No	-
08	Voltage monitoring when switching on	Yes	No	-
09	Voltage monitoring cyclic	Yes	No	-

Note

The motor data identification must be executed when using the voltage measurement.

p0251[0...n] Operating hours counter power unit fan / PU fan t_oper

G120XA_USS (PM330)

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0 [h]	4294967295 [h]	0 [h]

Description: Displays the power unit fan operating hours.

The number of hours operated can only be reset to 0 in this parameter (e.g. after a fan has been replaced).

Dependency: See also: p0252

See also: A30042

Note

For liquid-cooled chassis power units, the operating hours of the inner fan are displayed in p0251 and not in p0254.

p0252 Maximum operating time power unit fan / PU fan t_oper max

G120XA_USS (PM330)

Access level: 4	**Calculated:** -	**Data type:** Unsigned32
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0 [h]	100000 [h]	40000 [h]

Description: Sets the maximum operating time of the power unit fan.

The prealarm (warning) is output 500 hours before this set value.

The monitoring is deactivated with p0252 = 0.

Dependency: See also: p0251

See also: A30042

Note

For PM330 power units, the maximum operating time of the fan on the power unit is saved and displayed in p0252. The "Restore factory setting" function or a project download does not influence p0252. Users can manually change the maximum operating time of the fan. The modified value is also saved to the power unit.

p0254[0...n] Operating hours counter power unit fan inside the converter / PU inner fan t_op

G120XA_USS (PM330)

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0 [h]	4294967295 [h]	0 [h]

Description: Displays the power unit fan operating hours of the internal fan in the power unit.

The number of hours operated can only be reset to 0 in this parameter (e.g. after a fan has been replaced).

Dependency: See also: A30042

Note

For liquid-cooled chassis power units, the operating hours of the inner fan are displayed in p0251 and not in p0254.

p0287[0...1] Ground fault monitoring thresholds / Gnd flt threshold

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.0 [%]	100.0 [%]	[0] 6.0 [%] [1] 16.0 [%]

Description: Sets the shutdown thresholds for the ground fault monitoring.

The setting is made as a percentage of the maximum current of the power unit (r0209).

Index: [0] = Threshold at which precharging starts

[1] = Threshold at which precharging stops

Dependency: See also: p1901

See also: F30021

Note

This parameter is only relevant for chassis power units.

r0289 CO: Maximum power unit output current / PU I_outp max

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p2002	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
- [Arms]	- [Arms]	- [Arms]

Description: Displays the actual maximum output current of the power unit taking into account derating factors.

p0290 Power unit overload response / PU overld response

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 8021
Min:	**Max:**	**Factory setting:**
0	13	2

Description: Sets the response to a thermal overload condition of the power unit.

The following quantities can result in a response to thermal overload:

- heat sink temperature (r0037[0]).
- chip temperature (r0037[1]).
- power unit overload I2t (r0036).

Possible measures to avoid thermal overload:

- reduce the output current limit r0289 and r0067 (for closed-loop speed control) or the output frequency (for U/f control indirectly via the output current limit and the intervention of the current limiting controller).
- reduce the pulse frequency.

A reduction, if parameterized, is always realized after an appropriate alarm is output.

Value:

0:	Reduce output current or output frequency
1:	No reduction shutdown when overload threshold is reached
2:	Reduce I_output or f_output and f_pulse (not using I2t)
3:	Reduce the pulse frequency (not using I2t)
12:	I_output or f_output and automatic pulse frequency reduction
13:	Automatic pulse frequency reduction

Dependency: If a sine-wave filter is parameterized as output filter (p0230 = 3, 4), then only responses can be selected without pulse frequency reduction (p0290 = 0, 1).

For a thermal power unit overload, an appropriate alarm or fault is output, and r2135.15 or r2135.13 set.

See also: r0036, r0037, p0230, r2135

See also: A05000, A05001, A07805

NOTICE

If the thermal overload of the power unit is not sufficiently reduced by the actions taken, the drive is always shut down. This means that the power unit is always protected irrespective of the setting of this parameter.

Note

The setting p0290 = 0, 2 is only practical if the load decreases with decreasing speed (e.g. for applications with variable torque such as for pumps and fans).

Under overload conditions, the current and torque limit are reduced, and therefore the motor is braked and forbidden speed ranges (e.g. minimum speed p1080 and suppression [skip] speeds p1091 ... p1094) can be passed through.

For p0290 = 2, 3, 12, 13, the I2t overload detection of the power unit does not influence the response "Reduce pulse frequency".

When the motor data identification routine is selected, p0290 cannot be changed.

For short-circuit/ground fault detection, when the test pulse evaluation is active via p1901 "Test pulse evaluation configuration", the pulse frequency at the instant of switch on is briefly reduced.

p0290 Power unit overload response / PU overld response

G120XA_USS (PM330)

Access level: 4	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 8021
Min:	**Max:**	**Factory setting:**
0	3	2

Description: Sets the response to a thermal overload condition of the power unit.

The following quantities can result in a response to thermal overload:

- heat sink temperature (r0037[0]).

- chip temperature (r0037[1]).

- power unit overload I2t (r0036).

Possible measures to avoid thermal overload:

- reduce the output current limit r0289 and r0067 (for closed-loop speed control) or the output frequency (for U/f control indirectly via the output current limit and the intervention of the current limiting controller).

- reduce the pulse frequency.

A reduction, if parameterized, is always realized after an appropriate alarm is output.

Value:

0: Reduce output current or output frequency

1: No reduction shutdown when overload threshold is reached

2: Reduce I_output or f_output and f_pulse (not using I2t)

3: Reduce the pulse frequency (not using I2t)

Dependency: If a sine-wave filter is parameterized as output filter (p0230 = 3, 4), then only responses can be selected without pulse frequency reduction (p0290 = 0, 1).

For a thermal power unit overload, an appropriate alarm or fault is output, and r2135.15 or r2135.13 set.

See also: r0036, r0037, p0230, r2135

See also: A05000, A05001, A07805

NOTICE

If the thermal overload of the power unit is not sufficiently reduced by the actions taken, the drive is always shut down. This means that the power unit is always protected irrespective of the setting of this parameter.

Note

The setting p0290 = 0, 2 is only practical if the load decreases with decreasing speed (e.g. for applications with variable torque such as for pumps and fans).

Under overload conditions, the current and torque limit are reduced, and therefore the motor is braked and forbidden speed ranges (e.g. minimum speed p1080 and suppression [skip] speeds p1091 ... p1094) can be passed through.

For p0290 = 2, 3, the I2t overload detection of the power unit does not influence the response "Reduce pulse frequency".

When the motor data identification routine is selected, p0290 cannot be changed.

For short-circuit/ground fault detection, when the test pulse evaluation is active via p1901 "Test pulse evaluation configuration", the pulse frequency at the instant of switch on is briefly reduced.

p0292[0...1] Power unit temperature alarm threshold / PU T_alrm thresh

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 8021
Min:	**Max:**	**Factory setting:**
0 [°C]	25 [°C]	[0] 5 [°C] [1] 15 [°C]

Description: Sets the alarm threshold for power unit overtemperatures. The value is set as a difference to the tripping (shutdown) temperature.

Drive:

If this threshold is exceeded, an overload alarm is generated and the system responds as parameterized in p0290.

Infeed:

When the threshold value is exceeded, only an overload alarm is output.

Index: [0] = Overtemperature heat sink
[1] = Temperature rise power semiconductor (chip)

Dependency: See also: r0037, p0290
See also: A05000, A05001

p0294 Power unit alarm with I2t overload / PU I2t alrm thresh

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 8021
Min:	**Max:**	**Factory setting:**
10.0 [%]	100.0 [%]	95.0 [%]

Description: Sets the alarm threshold for the I2t power unit overload.
If this threshold is exceeded, an overload alarm is generated and the system responds as parameterized in p0290.

Dependency: See also: r0036, p0290
See also: A07805

Note
The I2t fault threshold is 100 %. If this value is exceeded, fault F30005 is output.

p0295 Fan run-on time / Fan run-on time

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0 [s]	600 [s]	0 [s]

Description: Sets the fan run-on time after the pulses for the power unit have been canceled.

Note
- Under certain circumstances, the fan can continue to run for longer than was set (e.g. as a result of the excessively high heat sink temperature).
- For values less than 1 s, a 1 s run on time for the fan is active.
- for a PM230 power unit, sizes D - F the parameter is ineffective.

r0296 DC link voltage undervoltage threshold / Vdc U_lower_thresh

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
- [V]	- [V]	- [V]

Description: Threshold to detect a DC link undervoltage.
If the DC link voltage falls below this threshold, the drive unit is tripped due to a DC link undervoltage condition.

Dependency: See also: F30003

r0297 DC link voltage overvoltage threshold / Vdc U_upper_thresh

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 8750, 8760, 8850, 8864, 8950, 8964
Min:	**Max:**	**Factory setting:**
- [V]	- [V]	- [V]

Description: Threshold to detect a DC link overvoltage.
If the DC link voltage exceeds the threshold specified here, the drive unit is tripped due to DC link overvoltage.

Dependency: See also: F30002

p0300[0...n] Motor type selection / Mot type sel

Access level: 2	**Calculated:** -	**Data type:** Integer16
Can be changed: C2(1, 3)	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 6310
Min:	**Max:**	**Factory setting:**
0	603	0

Description: Selecting the motor type.

The first digit of the parameter value always defines the general motor type and corresponds to the third-party motor belonging to a motor list:

1 = induction motor

2 = synchronous motor

6 = synchronous reluctance motor

xx = motor without code number

xxx = motor with code number

The type information must be entered to filter motor-specific parameters and to optimize the operating characteristics and behavior. For example, for synchronous motors, power factor (p0308) is neither used nor displayed (in the BOP/IOP).

The following applies for values < 100:

Motor data must be manually entered.

The following applies for values >= 100:

Motor data are automatically loaded from an internal list.

Value:

0:	No motor
1:	Induction motor
2:	Synchronous motor
6:	Reluctance motor
10:	1LE1 induction motor (not a code number)
13:	1LG6 induction motor (not a code number)
17:	1LA7 induction motor (not a code number)
19:	1LA9 induction motor (not a code number)
100:	1LE1 induction motor
101:	1PC1 induction motor
105:	1LE5 induction motor
108:	1PH8 induction motor
600:	1FP1 synchronous reluctance motor
603:	1FP3 synchronous reluctance motor OEM

Dependency: When selecting p0300 = 10 ... 19, parameters p0335, p0626, p0627, and p0628 of the thermal motor model are pre-assigned as a function of p0307 and p0311.

For p0096 = 1 (Standard Drive Control) synchronous motor types cannot be selected.

⚠ CAUTION
If a motor is selected, which is not contained in the motor lists (p0300 < 100), then the motor code number must be reset (p0301 = 0), if previously a motor was parameterized from the motor list.

NOTICE
If a catalog motor is selected (p0300 >= 100) and an associated motor code number (p0301), then the parameters that are associated with this list cannot be changed (write protection). The write protection is canceled if the motor type p0300 is set to a non-Siemens motor that matches p0301 (e.g. p0300 = 1 for p0301 = 1xxxx). Write protection is automatically canceled when the results of motor data identification are copied to the motor parameters. The motor type of a catalog motor corresponds to the upper three digits of the code number or the following assignment (if the particular motor type is listed): Type/code number ranges 100 / 100xx, 110xx, 120xx, 130xx, 140xx, 150xx 108 / 108xx, 118xx, 128xx, 138xx, 148xx, 158xx

Note

Once the Control Unit has been switched on for the first time or if the factory settings have been defined accordingly, the motor type is preconfigured to induction motor (p0300 = 1).

If a motor type has not been selected (p0300 = 0), then the drive commissioning routine cannot be exited.

A motor type with a value above p0300 >= 100 describes motors for which a motor parameter list exists.

p0300[0...n] Motor type selection / Mot type sel

G120XA_USS (PM330)

Access level: 2	**Calculated:** -	**Data type:** Integer16
Can be changed: C2(1, 3)	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 6310
Min:	**Max:**	**Factory setting:**
0	105	0

Description:

Selecting the motor type.

The first digit of the parameter value always defines the general motor type and corresponds to the third-party motor belonging to a motor list:

1 = induction motor

2 = synchronous motor

xx = motor without code number

xxx = motor with code number

The type information must be entered to filter motor-specific parameters and to optimize the operating characteristics and behavior. For example, for synchronous motors, power factor (p0308) is neither used nor displayed (in the BOP/IOP).

The following applies for values < 100:

Motor data must be manually entered.

The following applies for values >= 100:

Motor data are automatically loaded from an internal list.

Value:

0:	No motor
1:	Induction motor
2:	Synchronous motor
10:	1LE1 induction motor (not a code number)
13:	1LG6 induction motor (not a code number)
14:	1xx1 SIMOTICS FD induction motor (not a code number)
17:	1LA7 induction motor (not a code number)
18:	1LA8 / 1PQ8 standard induction motor series
19:	1LA9 induction motor (not a code number)
100:	1LE1 induction motor
105:	1LE5 induction motor

Dependency:

When the motor type is changed, the code number in p0301 may be reset to 0.

When selecting p0300 = 10 ... 19, parameters p0335, p0626, p0627, and p0628 of the thermal motor model are pre-assigned as a function of p0307 and p0311.

⚠ CAUTION
If a motor is selected, which is not contained in the motor lists (p0300 < 100), then the motor code number must be reset (p0301 = 0), if previously a motor was parameterized from the motor list.

NOTICE
If a catalog motor is selected (p0300 >= 100) and an associated motor code number (p0301), then the parameters that are associated with this list cannot be changed (write protection). The write protection is canceled if the motor type p0300 is set to a non-Siemens motor that matches p0301 (e.g. p0300 = 1 for p0301 = 1xxxx). Write protection is automatically canceled when the results of motor data identification are copied to the motor parameters. The motor type of a catalog motor corresponds to the upper three digits of the code number or the following assignment (if the particular motor type is listed): Type/code number ranges 100 / 100xx, 110xx, 120xx, 130xx, 140xx, 150xx

Note

Once the Control Unit has been switched on for the first time or if the factory settings have been defined accordingly, the motor type is preconfigured to induction motor (p0300 = 1).

If a motor type has not been selected (p0300 = 0), then the drive commissioning routine cannot be exited.

A motor type with a value above p0300 >= 100 describes motors for which a motor parameter list exists.

p0301[0...n] Motor code number selection / Mot code No. sel

Access level: 2	**Calculated:** -	**Data type:** Unsigned16
Can be changed: C2(1, 3)	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	65535	0

Description: The parameter is used to select a motor from a motor parameter list.

When changing the code number (with the exception to the value 0), all of the motor parameters are pre-assigned from the internally available parameter lists.

Dependency: Code numbers can only be selected for motor types that correspond to the motor type selected in p0300.

See also: p0300

Note

The motor code number can only be changed if the matching catalog motor was first selected in p0300.

When selecting a catalog motor (p0300 >= 100), drive commissioning can only be exited if a code number is selected.

If a change is made to a non-catalog motor, then the motor code number should be reset (p0301 = 0).

p0304[0...n] Rated motor voltage / Mot U_rated

Access level: 1	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: C2(1, 3)	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 6301, 6724
Min:	**Max:**	**Factory setting:**
0 [Vrms]	20000 [Vrms]	0 [Vrms]

Description: Sets the rated motor voltage (rating plate).

NOTICE
When selecting a catalog motor (p0301), this parameter is automatically pre-assigned and is write protected. Information in p0300 should be carefully observed when removing write protection.

Note

When the parameter value is entered the connection type of the motor (star-delta) must be taken into account.

Once the Control Unit has booted for the first time or if the factory settings have been restored, the parameter is pre-assigned to match the power unit.

p0305[0...n] Rated motor current / Mot I_rated

Access level: 1	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: C2(1, 3)	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 6301
Min:	**Max:**	**Factory setting:**
0.00 [Arms]	10000.00 [Arms]	0.00 [Arms]

Description: Sets the rated motor current (rating plate).

NOTICE

When selecting a catalog motor (p0301), this parameter is automatically pre-assigned and is write protected.
Information in p0300 should be carefully observed when removing write protection.
If p0305 is changed during quick commissioning (p0010 = 1), then the maximum current p0640 is pre-assigned accordingly.

Note

When the parameter value is entered the connection type of the motor (star-delta) must be taken into account.
Once the Control Unit has booted for the first time or if the factory settings have been restored, the parameter is pre-assigned to match the power unit.

p0306[0...n] Number of motors connected in parallel / Motor qty

Access level: 1	**Calculated:** -	**Data type:** Unsigned8
Can be changed: C2(1, 3)	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
1	50	1

Description: Sets the number (count) of motors that can be operated in parallel using one motor data set.
Depending on the motor number entered, internally an equivalent motor is calculated.
The following should be observed in motors connected in parallel:
Rating plate data should only be entered for one motor: p0305, p0307
The following parameters are also only valid for one motor: p0320, p0341, p0344, p0350 ... p0361
All other motor parameters take into account the replacement/equivalent motor (e.g. r0331, r0333).

Recommendation: For motors connected in parallel, external thermal protection should be provided for each individual motor.

Dependency: Not visible with application class:"Standard Drive Control"(SDC, p0096=1), "Dynamic Drive Control" (DDC, p0096=2)
See also: r0331, r0370, r0373, r0374, r0376, r0377, r0382

⚠ CAUTION

The motors to be connected in parallel must be of the same type and size (same order no. (MLFB)).
The mounting regulations when connecting motors in parallel must be carefully maintained!
The number of motors set must correspond to the number of motors that are actually connected in parallel.
After changing p0306, it is imperative that the control parameters are adapted (e.g. using automatic calculation with p0340 = 1, p3900 > 0).
For induction motors that are connected in parallel, but which are not mechanically coupled with one another, then the following applies:
- an individual motor must not be loaded beyond its stall point.

NOTICE

If p0306 is changed during quick commissioning (p0010 = 1), then the maximum current p0640 is appropriately pre-assigned.

Note

Only operation with U/f characteristic makes sense if more than 10 identical motors are connected in parallel.

p0307[0...n] Rated motor power / Mot P_rated

Access level: 1	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: C2(1, 3)	**Scaling:** -	**Dynamic index:** -
Unit group: 14_6	**Unit selection:** p0100	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.00 [kW]	100000.00 [kW]	0.00 [kW]

Description: Sets the rated motor power (rating plate).

Dependency: IECdrives (p0100 = 0): Units kW

NEMA drives (p0100 = 1): Units hp

NEMA drives (p0100 = 2): Unit kW

See also: p0100

NOTICE

When selecting a catalog motor (p0301), this parameter is automatically pre-assigned and is write protected. Information in p0300 should be carefully observed when removing write protection.

Note

Once the Control Unit has booted for the first time or if the factory settings have been restored, the parameter is pre-assigned to match the power unit.

p0308[0...n] Rated motor power factor / Mot cos phi rated

Access level: 1	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: C2(1, 3)	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.000	1.000	0.000

Description: Sets the rated motor power factor (cos phi, rating plate).

For a parameter value of 0.000, the power factor is internally calculated and displayed in r0332.

Dependency: This parameter is only available for p0100 = 0, 2.

See also: p0100, p0309, r0332

NOTICE

When selecting a catalog motor (p0301), this parameter is automatically pre-assigned and is write protected. Information in p0300 should be carefully observed when removing write protection.

Note

The parameter is not used for synchronous motors (p0300 = 2xx).

Once the Control Unit has booted for the first time or if the factory settings have been restored, the parameter is pre-assigned to match the power unit.

p0309[0...n] Rated motor efficiency / Mot eta_rated

Access level: 1	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: C2(1, 3)	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.0 [%]	99.9 [%]	0.0 [%]

Description: Sets the rated motor efficiency (rating plate).

For a parameter value of 0.0, the power factor is internally calculated and displayed in r0332.

Dependency: This parameter is only visible for NEMA motors (p0100 = 1, 2).

See also: p0100, p0308, r0332

Note

The parameter is not used for synchronous motors.

p0310[0...n] Rated motor frequency / Mot f_rated

Access level: 1	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: C2(1, 3)	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 6301
Min:	**Max:**	**Factory setting:**
0.00 [Hz]	650.00 [Hz]	0.00 [Hz]

Description: Sets the rated motor frequency (rating plate).

Dependency: The number of pole pairs (r0313) is automatically re-calculated when the parameter is changed (together with p0311), if p0314 = 0.

The rated frequency is restricted to values between 1.00 Hz and 650.00 Hz.

See also: p0311, r0313, p0314

NOTICE

When selecting a catalog motor (p0301), this parameter is automatically pre-assigned and is write protected. Information in p0300 should be carefully observed when removing write protection.

If p0310 is changed during quick commissioning (p0010 = 1), the maximum speed p1082, which is also associated with quick commissioning, is pre-assigned accordingly. The pre-assignment has been completed if the status display r3996 returns to zero.

Note

Once the Control Unit has been booted up for the first time or if the factory settings have been defined accordingly, the parameter is defined in accordance with the power unit.

p0310[0...n] Rated motor frequency / Mot f_rated

G120XA_USS (PM330)

Access level: 1	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: C2(1, 3)	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 6301
Min:	**Max:**	**Factory setting:**
0.00 [Hz]	103.00 [Hz]	0.00 [Hz]

Description: Sets the rated motor frequency (rating plate).

Dependency: The number of pole pairs (r0313) is automatically re-calculated when the parameter is changed (together with p0311), if p0314 = 0.

The rated frequency is restricted to values between 1.00 Hz and 100.00 Hz.

See also: p0311, r0313, p0314

NOTICE

When selecting a catalog motor (p0301), this parameter is automatically pre-assigned and is write protected. Information in p0300 should be carefully observed when removing write protection.

If p0310 is changed during quick commissioning (p0010 = 1), the maximum speed p1082, which is also associated with quick commissioning, is pre-assigned accordingly. The pre-assignment has been completed if the status display r3996 returns to zero.

Note

Once the Control Unit has been booted up for the first time or if the factory settings have been defined accordingly, the parameter is defined in accordance with the power unit.

p0311[0...n] Rated motor speed / Mot n_rated

Access level: 1	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: C2(1, 3)	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.0 [rpm]	210000.0 [rpm]	0.0 [rpm]

Description: Sets the rated motor speed (rating plate).

For p0311 = 0, the rated motor slip of induction motors is internally calculated and displayed in r0330.

It is especially important to correctly enter the rated motor speed for vector control and slip compensation for U/f control.

Dependency: If p0311 is changed and for p0314 = 0, the pole pair (r0313) is re-calculated automatically.

See also: p0310, r0313, p0314

NOTICE
When selecting a catalog motor (p0301), this parameter is automatically pre-assigned and is write protected. Information in p0300 should be carefully observed when removing write protection. If p0311 is changed during quick commissioning (p0010 = 1), the maximum speed p1082, which is also associated with quick commissioning, is pre-assigned accordingly. The pre-assignment has been completed if the status display r3996 returns to zero.

Note

Once the Control Unit has been booted up for the first time or if the factory settings have been defined accordingly, the parameter is defined in accordance with the power unit.

r0313[0...n] Motor pole pair number, actual (or calculated) / Mot PolePairNo act

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 5300
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the number of motor pole pairs. The value is used for internal calculations.

r0313 = 1: 2-pole motor

r0313 = 2: 4-pole motor, etc.

Dependency: For p0314 > 0, the entered value is displayed in r0313.

For p0314 = 0, the pole pair number (r0313) is automatically calculated from the rated power (p0307), rated frequency (p0310) and rated speed (p0311).

See also: p0307, p0310, p0311, p0314

Note

For the automatic calculation, the pole pair number is set to the value of 2 if the rated speed or the rated frequency is zero.

p0314[0...n] Motor pole pair number / Mot pole pair No.

Access level: 4	**Calculated:** -	**Data type:** Unsigned16
Can be changed: C2(1, 3)	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	255	0

Description: Sets the motor pole pair number.

p0314 = 1: 2-pole motor

p0314 = 2: 4-pole motor, etc.

Dependency: For p0314 = 0, the pole pair number is automatically calculated from the rated frequency (p0310) and the rated speed (p0311) and displayed in r0313.

NOTICE
If p0314 is changed during quick commissioning (p0010 = 1), the maximum speed p1082, which is also associated with quick commissioning, is pre-assigned accordingly. For induction motors, it is only necessary to enter the value if the rated motor slip is so high that the pole pair number r0313, obtained when making the calculation based on the rated frequency and rated speed, is too low.

p0316[0...n] Motor torque constant / Mot kT

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: C2(1), T, U	**Scaling:** -	**Dynamic index:** -
Unit group: 28_1	**Unit selection:** p0100	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.00 [Nm/A]	400.00 [Nm/A]	0.00 [Nm/A]

Description: Sets the torque constant of the synchronous motor.

p0316 = 0:

The torque constant is calculated from the motor data.

p0316 > 0:

The selected value is used as torque constant.

NOTICE

When selecting a catalog motor (p0301), this parameter is automatically pre-assigned and is write protected. Information in p0300 should be carefully observed when removing write protection.

Note

This parameter is not used for induction motors (p0300 = 1xx).

p0318[0...n] Motor stall current / Mot I_standstill

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: C2(3)	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 8017
Min:	**Max:**	**Factory setting:**
0.00 [Arms]	10000.00 [Arms]	0.00 [Arms]

Description: Sets the stall current for synchronous motors (p0300 = 2xx), as well as for synchronous reluctance motors (p0300 = 6xx).

NOTICE

When selecting a catalog motor (p0301), this parameter is automatically pre-assigned and is write protected. Information in p0300 should be carefully observed when removing write protection.

Note

The parameter is used for the I2t monitoring of the motor (refer to p0611).
This parameter is not used for induction motors (p0300 = 1xx).

p0320[0...n] Motor rated magnetizing current/short-circuit current / Mot I_mag_rated

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.000 [Arms]	5000.000 [Arms]	0.000 [Arms]

Description: Induction motors:

Sets the rated motor magnetizing current.

For p0320 = 0.000 the magnetizing current is internally calculated and displayed in r0331.

Synchronous motors:

Sets the rated motor short-circuit current.

NOTICE

When selecting a catalog motor (p0301), this parameter is automatically pre-assigned and is write protected. Information in p0300 should be carefully observed when removing write protection.

Note
The magnetizing current p0320 for induction motors is reset when quick commissioning is exited with p3900 > 0.
If, for induction motors, the magnetizing current p0320 is changed outside the commissioning phase (p0010 > 0), then the magnetizing inductance p0360 is changed so that the EMF r0337 remains constant.

p0322[0...n] Maximum motor speed / Mot n_max

Access level: 1	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: C2(1, 3)	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.0 [rpm]	210000.0 [rpm]	0.0 [rpm]

Description: Sets the maximum motor speed.

Dependency: See also: p1082

NOTICE
When selecting a catalog motor (p0301), this parameter is automatically pre-assigned and is write protected. Information in p0300 should be carefully observed when removing write protection.
If p0322 is changed during quick commissioning (p0010 = 1), the maximum speed p1082, which is also associated with quick commissioning, is pre-assigned accordingly.

Note
The parameter has no significance for a value of p0322 = 0.

p0323[0...n] Maximum motor current / Mot I_max

Access level: 1	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: C2(1, 3)	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.00 [Arms]	20000.00 [Arms]	0.00 [Arms]

Description: Sets the maximum permissible motor current (e.g. de-magnetizing current for synchronous motors).

NOTICE
When selecting a catalog motor (p0301), this parameter is automatically pre-assigned and is write protected. Information in p0300 should be carefully observed when removing write protection.
If p0323 is changed during quick commissioning (p0010 = 1), then the maximum current p0640 is pre-assigned accordingly.

Note
The parameter has no effect for induction motors.
The parameter has not effect for synchronous motors if a value of 0.0 is entered. The user-selectable current limit is entered into p0640.

p0325[0...n] Motor pole position identification current 1st phase / Mot PolID I 1st Ph

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.000 [Arms]	10000.000 [Arms]	0.000 [Arms]

Description: Sets the current for the 1st phase of the two-stage technique for pole position identification routine.
The current of the 2nd phase is set in p0329.
The two-stage technique is selected with p1980 = 4.

Dependency: See also: p0329, p1980, r1992

NOTICE
When the motor code (p0301) is changed, it is possible that p0325 is not pre-assigned. p0325 can be pre-assigned using p0340 = 3.

Note

The value is automatically pre-assigned for the following events:
- For p0325 = 0 and automatic calculation of the closed-loop control parameters (p0340 = 1, 2, 3).
- for quick commissioning (p3900 = 1, 2, 3).

p0327[0...n] Optimum motor load angle / Mot phi_load opt

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 6721, 6838
Min:	**Max:**	**Factory setting:**
0.0 [°]	135.0 [°]	90.0 [°]

Description: Sets the optimum load angle for synchronous motors with reluctance torque.
The load angle is measured at the rated motor current.

NOTICE
When selecting a catalog motor (p0301), this parameter is automatically pre-assigned and is write protected. Information in p0300 should be carefully observed when removing write protection.

Note

This parameter has no significance for induction motors.
For synchronous motors without reluctance torque, a angle of 90 degrees must be set.
When quick commissioning is exited with p3900 > 0, then the parameter is reset if a catalog motor has not been selected (p0300).

p0328[0...n] Motor reluctance torque constant / Mot kT_reluctance

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 6721, 6836
Min:	**Max:**	**Factory setting:**
-1000.00 [mH]	1000.00 [mH]	0.00 [mH]

Description: Sets the reluctance torque constant for synchronous motors with reluctance torque (e.g. 1FE ... motors).
This parameter has no significance for induction motors.

NOTICE
When selecting a catalog motor (p0301), this parameter is automatically pre-assigned and is write protected. Information in p0300 should be carefully observed when removing write protection.

Note

For synchronous motors without reluctance torque, the value 0 must be set.

p0329[0...n] Motor pole position identification current / Mot PolID current

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.0000 [Arms]	10000.0000 [Arms]	0.0000 [Arms]

Description: Sets the current for the pole position identification routine (p1980 = 1).
For a two-stage technique (p1980 = 4), the current is set for the 2nd phase.
The current for the 1st phase is set in p0325.

Dependency: The following applies for vector drives:

If a maximum current (p0323) was not parameterized, then p0329 is limited to the rated motor current.

See also: p0325, p1980, r1992

NOTICE
When selecting a catalog motor (p0301), this parameter is automatically pre-assigned and is write protected. Information in p0300 should be carefully observed when removing write protection.

r0330[0...n] Rated motor slip / Mot slip_rated

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
- [Hz]	- [Hz]	- [Hz]

Description: Displays the rated motor slip.

Dependency: The rated slip is calculated from the rated frequency, rated speed and number of pole pairs.

See also: p0310, p0311, r0313

Note

The parameter is not used for synchronous motors (p0300 = 2xx).

r0331[0...n] Actual motor magnetizing current/short-circuit current / Mot I_mag_rtd act

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 6722
Min:	**Max:**	**Factory setting:**
- [Arms]	- [Arms]	- [Arms]

Description: Induction motor:

Displays the rated magnetizing current from p0320.

For p0320 = 0, the internally calculated magnetizing current is displayed.

Synchronous motor:

Displays the rated short-circuit current from p0320.

Dependency: If p0320 was not entered, then the parameter is calculated from the rating plate parameters.

r0332[0...n] Rated motor power factor / Mot cos phi rated

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the rated power factor for induction motors.

For IEC motors, the following applies (p0100 = 0):

For p0308 = 0, the internally calculated power factor is displayed.

For p0308 > 0, this value is displayed.

For NEMA motors, the following applies (p0100 = 1, 2):

For p0309 = 0, the internally calculated power factor is displayed.

For p0309 > 0, this value is converted into the power factor and displayed.

Dependency: If p0308 is not entered, the parameter is calculated from the rating plate parameters.

Note

The parameter is not used for synchronous motors (p0300 = 2xx).

r0333[0...n] Rated motor torque / Mot M_rated

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: 7_4	**Unit selection:** p0100	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
- [Nm]	- [Nm]	- [Nm]

Description: Displays the rated motor torque.

Dependency: IEC drives (p0100 = 0): unit Nm
NEMA drives (p0100 = 1): unit lbf ft

Note
For induction motors, r0333 is calculated from p0307 and p0311.
For synchronous motors, r0333 is calculated from p0305, p0316, p0327 and p0328.

p0335[0...n] Motor cooling type / Mot cool type

Access level: 2	**Calculated:** -	**Data type:** Integer16
Can be changed: C2(1), T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	128	0

Description: Sets the motor cooling system used.

Value:

0:	Natural ventilation
1:	Forced cooling
2:	Liquid cooling
128:	No fan

Dependency: For 1LA7 motors (p0300), the parameter is pre-set as a function of p0307 and p0311.

NOTICE
When selecting a catalog motor (p0301), this parameter is automatically pre-assigned and is write protected. Information in p0300 should be carefully observed when removing write protection.

Note
The parameter influences the thermal 3-mass motor model.
1LA7 motors, frame size 56 are operated without fan.

r0337[0...n] Rated motor EMF / Mot EMF_rated

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
- [Vrms]	- [Vrms]	- [Vrms]

Description: Displays the rated EMF of the motor.

Note
EMF: Electromotive force

p0340[0...n] Automatic calculation motor/control parameters / Calc auto par

Access level: 2	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	5	0

Description: Setting to automatically calculate motor parameters and U/f open-loop and closed-loop control parameters from the rating plate data.

Value:
0: No calculation
1: Complete calculation
2: Calculation of equivalent circuit diagram parameters
3: Calculation of closed-loop control parameters
4: Calculation of controller parameters
5: Calculation of technological limits and threshold values

NOTICE

After the value has been modified, no further parameter modifications can be made and the status is shown in r3996. Modifications can be made again when r3996 = 0.

The following parameters are influenced using p0340:
p0340 = 1:
--> All of the parameters influenced for p0340 = 2, 3, 4, 5
--> p0341, p0342, p0344, p0612, p0640, p1082, p1231, p1232, p1333, p1349, p1611, p1654, p1726, p1825, p1828 ... p1832, p1909, p1959, p2000, p2001, p2002, p2003, p3927, p3928
p0340 = 2:
--> p0350, p0354 ... p0360
--> p0625 (matching p0350), p0626 ... p0628
p0340 = 3:
--> All of the parameters influenced for p0340 = 4, 5
--> p0346, p0347, p0622, p1320 ... p1327, p1582, p1584, p1616, p1755, p1756, p2178
p0340 = 4:
--> p1290, p1292, p1293, p1338, p1339, p1340, p1341, p1345, p1346, p1461, p1463, p1464, p1465, p1470, p1472, p1703, p1715, p1717, p1740, p1756, p1764, p1767, p1780, p1781, p1783, p1785, p1786, p1795
p0340 = 5:
--> p1037, p1038, p1520, p1521, p1530, p1531, p1570, p1580, p1574, p1750, p1759, p1802, p1803, p2140, p2142, p2148, p2150, p2161, p2162, p2163, p2164, p2170, p2175, p2177, p2194, p2390, p2392, p2393

Note

p0340 = 1 contains the calculations of p0340 = 2, 3, 4, 5.
p0340 = 2 calculates the motor parameters (p0350 ... p0360).
p0340 = 3 contains the calculations of p0340 = 4, 5.
p0340 = 4 only calculates the controller parameters.
p0340 = 5 only calculates the controller limits.
When quick commissioning is exited using p3900 > 0, p0340 is automatically set to 1.
At the end of the calculations, p0340 is automatically set to 0.

p0341[0...n] Motor moment of inertia / Mot M_mom of inert

Access level: 3	**Calculated:** CALC_MOD_ALL	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: 25_1	**Unit selection:** p0100	**Function diagram:** 6020, 6030, 6031, 6822
Min:	**Max:**	**Factory setting:**
0.000000 [kgm²]	100000.000000 [kgm²]	0.000000 [kgm²]

Description: Sets the motor moment of inertia (without load).

Dependency: IEC drives (p0100 = 0): unit kg m^2

NEMA drives (p0100 = 1): unit lb ft^2

The parameter value is included, together with p0342, in the rated starting time of the motor.

See also: p0342, r0345

NOTICE

When selecting a catalog motor (p0301), this parameter is automatically pre-assigned and is write protected. Information in p0300 should be carefully observed when removing write protection.

Note
The product of p0341 * p0342 is used when the speed controller (p0340 = 4) is calculated automatically.

p0342[0...n] Ratio between the total and motor moment of inertia / Mot MomInert Ratio

Access level: 3	**Calculated:** CALC_MOD_ALL	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 6020, 6030, 6031, 6822
Min:	**Max:**	**Factory setting:**
1.000	10000.000	1.000

Description: Sets the ratio between the total moment of inertia/mass (load + motor) and the intrinsic motor moment of inertia/mass (no load).

Dependency: This means that together with p0341, the rated starting (accelerating time) of the motor is calculated for a vector drive.
See also: p0341, r0345

Note
The product of p0341 * p0342 is used when the speed controller (p0340 = 4) is calculated automatically.

r0343[0...n] Rated motor current identified / Mot I_rated ident

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.00 [Arms]	10000.00 [Arms]	- [Arms]

Description: Displays the identified rated motor current.

p0344[0...n] Motor weight (for the thermal motor model) / Mot weight th mod

Access level: 3	**Calculated:** CALC_MOD_ALL	**Data type:** FloatingPoint32
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: 27_1	**Unit selection:** p0100	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.0 [kg]	50000.0 [kg]	0.0 [kg]

Description: Sets the motor weight.

Dependency: IEC drives (p0100 = 0): unit kg
NEMA drives (p0100 = 1): unit lb

NOTICE
When selecting a catalog motor (p0301), this parameter is automatically pre-assigned and is write protected. Information in p0300 should be carefully observed when removing write protection.

Note
The parameter influences the thermal 3 mass model of the induction motor.
The parameter is not used for synchronous motors (p0300 = 2xx).

r0345[0...n] Nominal motor starting time / Mot t_start_rated

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
- [s]	- [s]	- [s]

Description: Displays the rated motor starting time.

This time corresponds to the time from standstill up to reaching the motor rated speed and the acceleration with motor rated torque (r0333).

Dependency: See also: r0313, r0333, p0341, p0342

p0346[0...n] Motor excitation build-up time / Mot t_excitation

Access level: 3	**Calculated:** CALC_MOD_REG	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.000 [s]	20.000 [s]	0.000 [s]

Description: Sets the excitation build-up time of the motor.

This involves the delay time between enabling the pulses and enabling the ramp-function generator. The induction motor is magnetized during this time.

⚠ CAUTION

If there is insufficient magnetization under load or if the acceleration rate is too high, then an induction motor can stall (refer to the note).

Note

The parameter is calculated using p0340 = 1, 3.

For induction motors, the result depends on the rotor time constant (r0384). If this time is excessively reduced, this can result in an inadequate magnetizing of the induction motor. This is the case if the current limit is reached while building up magnetizing. For induction motors, the parameter cannot be set to 0 s (internal limit: 0.1 * r0384).

For permanent-magnet synchronous motors and vector control, the value depends on the stator time constant (r0386). Here, it defines the time to establish the current for encoderless operation immediately after the pulses have been enabled.

p0347[0...n] Motor de-excitation time / Mot t_de-excitat

Access level: 3	**Calculated:** CALC_MOD_REG	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.000 [s]	20.000 [s]	0.000 [s]

Description: Sets the de-magnetizing time (for induction motors) after the inverter pulses have been canceled.

The inverter pulses cannot be switched in (enabled) within this delay time.

Note

The parameter is calculated using p0340 = 1, 3.

For induction motors, the result depends on the rotor time constant (r0384).

if this time is shortened too much, then this can result in an inadequate de-magnetizing of the induction motor and in an overcurrent condition when the pulses are subsequently enabled (only when the flying restart function is activated and the motor is rotating).

p0350[0...n] Motor stator resistance cold / Mot R_stator cold

Access level: 3	**Calculated:** CALC_MOD_EQU	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.00000 [ohm]	2000.00000 [ohm]	0.00000 [ohm]

Description: Sets the stator resistance of the motor at ambient temperature p0625 (phase value).

Dependency: See also: p0625, r1912

NOTICE
When selecting a catalog motor (p0301), this parameter is automatically pre-assigned and is write protected. Information in p0300 should be carefully observed when removing write protection.

Note

The motor identification routine determines the stator resistance from the total stator resistance minus the cable resistance (p0352).

p0352[0...n] Cable resistance / R_cable

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.00000 [ohm]	120.00000 [ohm]	0.00000 [ohm]

Description: Resistance of the power cable between the power unit and motor.

⚠ CAUTION
The cable resistance should be entered prior to motor data identification. If it is used subsequently, the difference by which p0352 was changed must be subtracted from the stator resistance p0350 or motor data identification must be repeated.

Note

The parameter influences the temperature adaptation of the stator resistance.

The motor identification sets the cable resistance to 20% of the measured total resistance if p0352 is zero at the time that the measurement is made. If p0352 is not zero, then the value is subtracted from the measured total stator resistance to calculate stator resistance p0350. In this case, p0350 is a minimum of 10% of the measured value.

The cable resistance is reset when quick commissioning is exited with p3900 > 0.

p0352[0...n] Cable resistance / R_cable

G120XA_USS (PM330)

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.00000 [ohm]	120.00000 [ohm]	0.00000 [ohm]

Description: Resistance of the power cable between the power unit and motor.

⚠ CAUTION
The cable resistance should be entered prior to motor data identification. If it is used subsequently, the difference by which p0352 was changed must be subtracted from the stator resistance p0350 or motor data identification must be repeated. The difference with which p0352 was manually changed, must also be subtracted from reference parameter p0629 of the Rs measurement.

Note

The parameter influences the temperature adaptation of the stator resistance.

The motor identification sets the cable resistance to 20% of the measured total resistance if p0352 is zero at the time that the measurement is made. If p0352 is not zero, then the value is subtracted from the measured total stator resistance to calculate stator resistance p0350. In this case, p0350 is a minimum of 10% of the measured value.

The cable resistance is reset when quick commissioning is exited with p3900 > 0.

p0354[0...n] Motor rotor resistance cold / Mot R_r cold

Access level: 3	**Calculated:** CALC_MOD_EQU	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 6727
Min:	**Max:**	**Factory setting:**
0.00000 [ohm]	300.00000 [ohm]	0.00000 [ohm]

Description: Sets the rotor/secondary section resistance of the motor at the ambient temperature p0625.

This parameter value is automatically calculated using the motor model (p0340 = 1, 2) or using the motor data identification routine (p1910).

Dependency: See also: p0625

NOTICE

When selecting a catalog motor (p0301), this parameter is automatically pre-assigned and is write protected. Information in p0300 should be carefully observed when removing write protection.

Note

The parameter is not used for synchronous motors (p0300 = 2).

p0356[0...n] Motor stator leakage inductance / Mot L_stator leak.

Access level: 3	**Calculated:** CALC_MOD_EQU	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.00000 [mH]	1000.00000 [mH]	0.00000 [mH]

Description: Induction machine: sets the stator leakage inductance of the motor.

Synchronous motor: Sets the stator quadrature axis inductance of the motor.

This parameter value is automatically calculated using the motor model (p0340 = 1, 2) or using the motor identification routine (p1910).

NOTICE

When selecting a catalog motor (p0301), this parameter is automatically pre-assigned and is write protected. Information in p0300 should be carefully observed when removing write protection.

Note

If the stator leakage inductance (p0356) for induction motors is changed outside the commissioning phase (p0010 > 0), the magnetizing inductance (p0360) is automatically adapted to the new EMF (r0337). You are then advised to repeat the measurement for the saturation characteristic (p1960).

For permanent-magnet synchronous motors (p0300 = 2), this is the non-saturated value and is, therefore, ideal for a low current.

For a controlled reluctance motor (p0300 = 6), this is the direct axis stator inductance at the rated operating point.

p0357[0...n] Motor stator inductance d axis / Mot L_stator d

Access level: 3	**Calculated:** CALC_MOD_EQU	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.00000 [mH]	1000.00000 [mH]	0.00000 [mH]

Description: Sets the stator direct-axis inductance of the synchronous motor.

This parameter value is automatically calculated using the motor model (p0340 = 1, 2) or using the motor identification routine (p1910).

Note

For permanent-magnet synchronous motors (p0300 = 2), this is the non-saturated value and is ideal for a low current.

For a controlled reluctance motor (p0300 = 6), this is the direct axis stator inductance at the rated operating point.

p0358[0...n] Motor rotor leakage inductance / Mot L_rot leak

Access level: 3	**Calculated:** CALC_MOD_EQU	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 6727
Min:	**Max:**	**Factory setting:**
0.00000 [mH]	1000.00000 [mH]	0.00000 [mH]

Description: Sets the rotor/secondary section leakage inductance of the motor.

The value is automatically calculated using the motor model (p0340 = 1, 2) or using the motor identification routine (p1910).

NOTICE
When selecting a catalog motor (p0301), this parameter is automatically pre-assigned and is write protected. Information in p0300 should be carefully observed when removing write protection.

Note

If the rotor leakage inductance (p0358) for induction motors is changed outside the commissioning phase (p0010 > 0), then the magnetizing inductance (p0360) is automatically adapted to the new EMF (r0337). You are then advised to repeat the measurement for the saturation characteristic (p1960).

p0360[0...n] Motor magnetizing inductance / Mot Lh

Access level: 3	**Calculated:** CALC_MOD_EQU	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 6727
Min:	**Max:**	**Factory setting:**
0.00000 [mH]	10000.00000 [mH]	0.00000 [mH]

Description: Sets the magnetizing inductance of the motor.

This parameter value is automatically calculated using the motor model (p0340 = 1, 2) or using the motor identification routine (p1910).

NOTICE
When selecting a catalog motor (p0301), this parameter is automatically pre-assigned and is write protected. Information in p0300 should be carefully observed when removing write protection.

Note

The parameter is not used for synchronous motors (p0300 = 2).

p0362[0...n] Motor saturation characteristic flux 1 / Mot saturat.flux 1

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 6723, 6838
Min:	**Max:**	**Factory setting:**
10.0 [%]	800.0 [%]	60.0 [%]

Description: The saturation characteristics (flux as a function of the magnetizing current) is defined using 4 points.

This parameter specifies the y coordinate (flux) for the 1st value pair of the characteristic.

Sets the first flux value of the saturation characteristic as a [%] referred to the rated motor flux (100 %).

Dependency: The following applies for the flux values:

p0362 < p0363 < p0364 < p0365

See also: p0366

Note

For induction motors, p0362 = 100 % corresponds to the rated motor flux.

When quick commissioning is exited with p3900 > 0, then the parameter is reset if a catalog motor has not been selected (p0300).

p0363[0...n] Motor saturation characteristic flux 2 / Mot saturat.flux 2

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 6723, 6838
Min:	**Max:**	**Factory setting:**
10.0 [%]	800.0 [%]	85.0 [%]

Description: The saturation characteristics (flux as a function of the magnetizing current) is defined using 4 points.

This parameter specifies the y coordinate (flux) for the 2nd value pair of the characteristic.

Sets the second flux value of the saturation characteristic as a [%] referred to the rated motor flux (100 %).

Dependency: The following applies for the flux values:

p0362 < p0363 < p0364 < p0365

See also: p0367

Note

For induction motors, p0363 = 100 % corresponds to the rated motor flux.

When quick commissioning is exited with p3900 > 0, then the parameter is reset if a catalog motor has not been selected (p0300).

p0364[0...n] Motor saturation characteristic flux 3 / Mot saturat.flux 3

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 6723, 6838
Min:	**Max:**	**Factory setting:**
10.0 [%]	800.0 [%]	115.0 [%]

Description: The saturation characteristics (flux as a function of the magnetizing current) is defined using 4 points.

This parameter specifies the y coordinate (flux) for the 3rd value pair of the characteristic.

Sets the third flux value of the saturation characteristic as a [%] referred to the rated motor flux (100 %).

Dependency: The following applies for the flux values:

p0362 < p0363 < p0364 < p0365

See also: p0368

Note

For induction motors, p0364 = 100 % corresponds to the rated motor flux.

When quick commissioning is exited with p3900 > 0, then the parameter is reset if a catalog motor has not been selected (p0300).

p0365[0...n] Motor saturation characteristic flux 4 / Mot saturat.flux 4

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 6723, 6838
Min:	**Max:**	**Factory setting:**
10.0 [%]	800.0 [%]	125.0 [%]

Description: The saturation characteristics (flux as a function of the magnetizing current) is defined using 4 points.

This parameter specifies the y coordinate (flux) for the 4th value pair of the characteristic.

Sets the fourth flux value of the saturation characteristic as a [%] referred to the rated motor flux (100 %).

Dependency: The following applies for the flux values:

p0362 < p0363 < p0364 < p0365

See also: p0369

Note

For induction motors, p0365 = 100 % corresponds to the rated motor flux.

When quick commissioning is exited with p3900 > 0, then the parameter is reset if a catalog motor has not been selected (p0300).

p0366[0...n] Motor saturation characteristic I_mag 1 / Mot sat. I_mag 1

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 6723, 6838
Min:	**Max:**	**Factory setting:**
5.0 [%]	800.0 [%]	50.0 [%]

Description: The saturation characteristics (flux as a function of the magnetizing current) is defined using 4 points.

This parameter specifies the x coordinate (magnetizing current) for the 1st value pair of the characteristic.

Sets the first magnetization current of the saturation characteristic in [%] with reference to the rated magnetization current (r0331).

Dependency: The following applies for the magnetizing currents:

p0366 < p0367 < p0368 < p0369

See also: p0362

Note

When quick commissioning is exited with p3900 > 0, then the parameter is reset if a catalog motor has not been selected (p0300).

p0367[0...n] Motor saturation characteristic I_mag 2 / Mot sat. I_mag 2

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 6723, 6838
Min:	**Max:**	**Factory setting:**
5.0 [%]	800.0 [%]	75.0 [%]

Description: The saturation characteristics (flux as a function of the magnetizing current) is defined using 4 points.

This parameter specifies the x coordinate (magnetizing current) for the 2nd value pair of the characteristic.

Sets the second magnetization current of the saturation characteristic in [%] with reference to the rated magnetization current (r0331).

Dependency: The following applies for the magnetizing currents:

p0366 < p0367 < p0368 < p0369

See also: p0363

Note

When quick commissioning is exited with p3900 > 0, then the parameter is reset if a catalog motor has not been selected (p0300).

p0368[0...n] Motor saturation characteristic I_mag 3 / Mot sat. I_mag 3

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 6723, 6838
Min:	**Max:**	**Factory setting:**
5.0 [%]	800.0 [%]	150.0 [%]

Description: The saturation characteristics (flux as a function of the magnetizing current) is defined using 4 points.

This parameter specifies the x coordinate (magnetizing current) for the 3rd value pair of the characteristic.

Sets the third magnetization current of the saturation characteristic in [%] with reference to the rated magnetization current (r0331).

Dependency: The following applies for the magnetizing currents:

p0366 < p0367 < p0368 < p0369

See also: p0364

Note

When quick commissioning is exited with p3900 > 0, then the parameter is reset if a catalog motor has not been selected (p0300).

p0369[0...n] Motor saturation characteristic I_mag 4 / Mot sat. I_mag 4

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 6723, 6838
Min:	**Max:**	**Factory setting:**
5.0 [%]	800.0 [%]	210.0 [%]

Description: The saturation characteristics (flux as a function of the magnetizing current) is defined using 4 points.

This parameter specifies the x coordinate (magnetizing current) for the 4th value pair of the characteristic.

Sets the fourth magnetization current of the saturation characteristic in [%] with reference to the rated magnetization current (r0331).

Dependency: The following applies for the magnetizing currents:

p0366 < p0367 < p0368 < p0369

See also: p0365

Note

When quick commissioning is exited with p3900 > 0, then the parameter is reset if a catalog motor has not been selected (p0300).

r0370[0...n] Motor stator resistance cold / Mot R_stator cold

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
- [ohm]	- [ohm]	- [ohm]

Description: Displays the motor stator resistance at an ambient temperature (p0625).

The value does not include the cable resistance.

Dependency: See also: p0625

r0372[0...n] Cable resistance / Mot R_cable

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
- [ohm]	- [ohm]	- [ohm]

Description: Displays the total cable resistance between power unit and motor, as well as the internal converter resistance.

Dependency: See also: r0238, p0352

r0373[0...n] Motor rated stator resistance / Mot R_stator rated

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
- [ohm]	- [ohm]	- [ohm]

Description: Displays the rated motor stator resistance at rated temperature (total of p0625 and p0627).

Dependency: See also: p0627

Note

The parameter is not used for synchronous motors (p0300 = 2xx).

r0374[0...n] Motor rotor resistance cold / Mot R_r cold

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
- [ohm]	- [ohm]	- [ohm]

Description: Displays the motor rotor resistance at an ambient temperature p0625.

Dependency: See also: p0625

Note
The parameter is not used for synchronous motors (p0300 = 2xx).

r0376[0...n] Rated motor rotor resistance / Mot rated R_rotor

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
- [ohm]	- [ohm]	- [ohm]

Description: Displays the nominal rotor resistance of the motor at the rated temperature.
The rated temperature is the sum of p0625 and p0628.

Dependency: See also: p0628

Note
The parameter is not used for synchronous motors (p0300 = 2xx).

r0377[0...n] Motor leakage inductance total / Mot L_leak total

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 6640, 6714, 6721, 6828, 6834, 6836
Min:	**Max:**	**Factory setting:**
- [mH]	- [mH]	- [mH]

Description: Displays the stator leakage inductance of the motor including the motor reactor (p0233).

r0382[0...n] Motor magnetizing inductance transformed / Mot L_magn transf

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
- [mH]	- [mH]	- [mH]

Description: Displays the magnetizing inductance of the motor.

Note
The parameter is not used for synchronous motors (p0300 = 2xx).

r0384[0...n] Motor rotor time constant / damping time constant d axis / Mot T_rotor/T_Dd

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 6722, 6837
Min:	**Max:**	**Factory setting:**
- [ms]	- [ms]	- [ms]

Description: Displays the rotor time constant.

Note
The parameter is not used for synchronous motors.
The value is calculated from the total of the inductances on the rotor side (p0358, p0360) divided by the rotor resistance (p0354). The temperature adaptation of the rotor resistance for induction motors is not taken into account.

r0386[0...n] Motor stator leakage time constant / Mot T_stator leak

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
- [ms]	- [ms]	- [ms]

Description: Displays the stator leakage time constant.

Note
The value is calculated from the total of all leakage inductances (p0233, p0356, p0358) divided by the total of all motor resistances (p0350, p0352, p0354). The temperature adaptation of the resistances is not taken into account.

r0394[0...n] Rated motor power / Mot P_rated

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: 14_6	**Unit selection:** p0100	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
- [kW]	- [kW]	- [kW]

Description: Displays the rated motor power.

Note
The parameter displays p0307. For p0307 = 0, r0394 is calculated from p0304 and p0305 (only for induction motors).
Depending on the actual motor type, deviations can occur from the actual rated motor power.

r0395[0...n] Actual stator resistance / R_stator act

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
- [ohm]	- [ohm]	- [ohm]

Description: Displays the actual stator resistance (phase value).
The parameter value also contains the temperature-independent cable resistance.

Dependency: In the case of induction motors the parameter is also affected by the motor temperature model.
See also: p0350, p0352, p0620

Note
In each case, only the stator resistance of the active Motor Data Set is included with the stator temperature of the thermal motor model.

r0396[0...n] Actual rotor resistance / R_rotor act

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
- [ohm]	- [ohm]	- [ohm]

Description: Displays the actual rotor resistance (phase value).
The parameter is affected by the motor temperature model.

Dependency: See also: p0354, p0620

Note
In each case, only the rotor resistance of the active Motor Data Set is included with the rotor temperature of the thermal motor model.
This parameter is not used for synchronous motors (p0300 = 2xx).

p0500 Technology application / Tec application

Access level: 2	**Calculated:** -	**Data type:** Integer16
Can be changed: C2(1), T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	5	0

Description: Sets the technology application.
The parameter influences the calculation of open-loop and closed-loop control parameters that is e.g. initiated using p0340 = 5.

Value:
0: Standard drive
1: Pumps and fans
2: Sensorless closed-loop control down to f = 0 (passive loads)
3: Pumps and fans, efficiency optimization
5: Starting with a high break loose torque

Dependency: For p0096 = 1, 2 (Standard, Dynamic Drive Control) p0500 cannot be changed.

NOTICE
If the technological application is set to p0500 = 0 ... 3 during commissioning (p0010 = 1, 5, 30), the operating mode (p1300) is pre-set accordingly.

Note

The calculation of parameters dependent on the technology application can be called up as follows:
- when exiting quick commissioning using p3900 > 0
- when writing p0340 = 1, 3, 5

For p0500 = 0 and when the calculation is initiated, the following parameters are set:
- p1574 = 10 V
- p1750.2 = 0
- p1802 = 4 (SVM/FLB without overcontrol) (PM240: p1802 = 0, PM260: p1802 = 2)
- p1803 = 106 % (PM260: p1803 = 103 %)

For p0500 = 1 and when the calculation is initiated, the following parameters are set:
- p1574 = 2 V
- p1750.2 = 0
- p1802 = 4 (SVM/FLB without overcontrol) (PM240: p1802 = 0)
- p1803 = 106 % (PM260: p1803 = 103 %)

For p0500 = 2 and when the calculation is initiated, the following parameters are set:
- p1574 = 2 V (separately excited synchronous motor: 4 V)
- p1750.2 = 1
- p1802 = 4 (SVM/FLB without overcontrol) (PM240: p1802 = 0)
- p1803 = 106 % (PM260: p1803 = 103 %)

For p0500 = 3 and when the calculation is initiated, the following parameters are set:
- p1574 = 2 V
- p1750.2 = 1
- p1802 = 4 (SVM/FLB without overcontrol) (PM240: p1802 = 0)
- p1803 = 106 % (PM260: p1803 = 103 %)

For p0500 = 5:
- p1574, p1750.2, p1802, p1803 same as for p0500 = 0
- p1610 = 80 %, p1611 = 80 % (average up to higher starting torque)
- p1310 = 80 %, p1311 = 30 %

In all cases, the DC component compensation is activated (p3855 = 7).

For p1750:

The setting of p1750 is only relevant for induction motors.

p1750.2 = 1: Encoderless control of the induction motor is effective down to zero frequency.

This operating mode is possible for passive loads. These include applications where the load does not generate regenerative torque when breaking away and the motor comes to a standstill (zero speed) itself when the pulses are inhibited.

For p1802 / p1803:

p1802 and p1803 are only changed, in all cases, if a sine-wave output filter (p0230 = 3, 4) has not been selected.

p0500 Technology application / Tec application

G120XA_USS (PM330)			
	Access level: 2	**Calculated:** -	**Data type:** Integer16
	Can be changed: C2(1), T	**Scaling:** -	**Dynamic index:** -
	Unit group: -	**Unit selection:** -	**Function diagram:** -
	Min:	**Max:**	**Factory setting:**
	1	3	3

Description: Sets the technology application.

The parameter influences the calculation of open-loop and closed-loop control parameters that is e.g. initiated using p0340 = 5.

Value:

1: Pumps and fans

3: Pumps and fans, efficiency optimization

Dependency: For p0096 = 2 (Dynamic Drive Control) p0500 cannot be changed.

NOTICE
If the technological application is set to p0500 = 0 ... 3 during commissioning (p0010 = 1, 5, 30), the operating mode (p1300) is pre-set accordingly.

Note
The calculation of parameters dependent on the technology application can be called up as follows:
- when exiting quick commissioning using p3900 > 0
- when writing p0340 = 1, 3, 5
For p0500 = 1 and when the calculation is initiated, the following parameters are set:
- p1570 = 100 %
- p1580 = 0 % (no efficiency optimization)
- p1574 = 2 V
- p1750.2 = 0
- p1802 = 9 or 19 (optimized pulse pattern for p0300 = 14)
- p1803 = 106 %
For p0500 = 3 and when the calculation is initiated, the following parameters are set:
- p1570 = 103 % (flux boost for full load)
- p1580 = 100 % (efficiency optimization)
- p1574 = 2 V
- p1750.2 = 1: Encoderless control of the induction motor is effective down to zero frequency.
- p1802 = 9 or 19 (optimized pulse pattern for p0300 = 14)
- p1803 = 106 %

p0501 Technological application (Standard Drive Control) / Techn appl SDC

Access level: 2	**Calculated:** -	**Data type:** Integer16
Can be changed: C2(1), T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	1	0

Description: Sets the technology application.
The parameter influences the calculation of open-loop and closed-loop control parameters that is e.g. initiated using p0340 = 5.

Value:
0: Constant load (linear characteristic)
1: Speed-dependent load (parabolic characteristic)

Dependency: See also: p1300

NOTICE
If the technological application is set to p0501 = 0, 1 during commissioning (p0010 = 1, 5, 30), the operating mode (p1300) is pre-set accordingly.

Note
The calculation of parameters dependent on the technology application can be called up as follows:
- when exiting quick commissioning using p3900 > 0
- when writing p0340 = 1, 3, 5
For p0501 = 0, 1 and when the calculation is initiated, the following parameters are set:
- p1802 = 0
- p1803 = 106 %
- p3855.0 = 1 (DC quantity control on)
For p1802 / p1803:
These parameters are only changed, in all cases, if a sine-wave output filter (p0230 = 3, 4) has not been selected.

p0502 Technological application (Dynamic Drive Control) / Techn appl DDC

Access level: 2	**Calculated:** -	**Data type:** Integer16
Can be changed: C2(1), T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	5	0

Description: Sets the technology application for dynamic applications (p0096 = 2).

The parameter influences the calculation of open-loop and closed-loop control parameters that is e.g. initiated using p0340 or p3900.

Value:
0: Standard drive (e.g. pumps, fans)
1: Dynamic starting or reversing
5: Heavy-duty starting (e.g. extruders, compressors)

Dependency: The calculation of parameters dependent on the technology application can be called up as follows:

- when exiting quick commissioning using p3900 > 0
- when writing p0340 = 1, 3 or 5

See also: p1610, p1750

Note

When entering p0502 and initiating the calculation, the following parameters are set:
p0502 = 0:
- p1750.0/1/7 = 1 (start and reverse in open-loop control with rugged switchover limits)
- p1610 = 50 %, p1611 = 30 % (low up to average starting torque)
p0502 = 1:
- p1750.0/1/7 = 0 (start and reverse in closed-loop speed control with shorter acceleration times)
- p1610 = 50 %, p1611 = 30 % (only effective, if the drive is switched-on with a speed setpoint of zero)
p0502 = 5:
- p1750.0/1/7 = 1 (start and reverse in open-loop control with rugged switchover limits)
- p1610 = 80 %, p1611 = 80 % (average up to higher starting torque)
p1750.6 = 1 is always set, p1574 (voltage reserve) is preassigned, depending on p0205 (power unit application).

p0502 Technological application (Dynamic Drive Control) / Techn appl DDC

G120XA_USS (PM330)

Access level: 2	**Calculated:** -	**Data type:** Integer16
Can be changed: C2(1), T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
3	3	3

Description: Sets the technology application for dynamic applications (p0096 = 2).

The parameter influences the calculation of open-loop and closed-loop control parameters that is e.g. initiated using p0340 or p3900.

Value:
3: Pumps and fans, efficiency optimization

Dependency: The calculation of parameters dependent on the technology application can be called up as follows:

- when exiting quick commissioning using p3900 > 0
- when writing p0340 = 1, 3 or 5

See also: p1610, p1750

Note

The calculation of parameters dependent on the technology application can be called up as follows:
- when exiting quick commissioning using p3900 > 0
- when writing p0340 = 1, 3, 5
For p0500 = 3 and when the calculation is initiated, the following parameters are set:
- p1570 = 103 % (flux boost for full load)
- p1580 = 100 % (efficiency optimization)
- p1574 = 2 V
- p1750.2 = 1: Encoderless control of the induction motor is effective down to zero frequency.
- p1802 = 9 or 19 (optimized pulse pattern for p0300 = 14)
- p1803 = 106 %

p0505 Selecting the system of units / Unit sys select

Access level: 1	**Calculated:** -	**Data type:** Integer16
Can be changed: C2(5)	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
1	4	1

Description: Sets the actual system of units.

Value:
1: SI system of units
2: System of units referred/SI
3: US system of units
4: System of units referred/US

Dependency: The parameter can only be changed in an offline project using the commissioning software.

⚠ CAUTION

If a per unit representation is selected and if the reference parameters (e.g. p2000) are subsequently changed, then the physical significance of several control parameters is also adapted at the same time. As a consequence, the control behavior can change (see p1744, p1752, p1755).

Note

Reference parameter for the unit system % are, for example, p2000 ... p2004. Depending on what has been selected, these are displayed using either SI or US units.

p0514[0...9] Scaling-specific reference values / Scal spec ref val

Access level: 3	**Calculated:** CALC_MOD_ALL	**Data type:** FloatingPoint32
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.000001	10000000.000000	1.000000

Description: Sets the reference values for the specific scaling of BICO parameters.

The specific scaling is active when interconnecting with other BICO parameters, and can be used in the following cases:

1. Parameter with the marking "Scaling: p0514".
2. Changing the standard scaling for parameters with the marking "Scaling: p2000" ... "Scaling: p2007".

Relative values refer to the corresponding reference value. The reference value corresponds to 100% or 4000 hex (word) or 4000 0000 hex (double word).

To specifically scale BICO parameters, proceed as follows:

- set the reference value (p0514[0...9]).
- set the numbers of the parameters, which should be active for the scaling, corresponding to the index of p0514 (p0515[0...19] ... p0524[0...19]).

For parameters with the marking "Scaling: p0514", which are not entered in p0515[0...19] to p0524[0...19], the reference value 1.0 (factory setting) applies.

Index:
[0] = Parameters in p0515[0...19]
[1] = Parameters in p0516[0...19]
[2] = Parameters in p0517[0...19]
[3] = Parameters in p0518[0...19]
[4] = Parameters in p0519[0...19]
[5] = Parameters in p0520[0...19]
[6] = Parameters in p0521[0...19]
[7] = Parameters in p0522[0...19]
[8] = Parameters in p0523[0...19]
[9] = Parameters in p0524[0...19]

Dependency: See also: p0515, p0516, p0517, p0518, p0519, p0520, p0521, p0522, p0523, p0524

p0515[0...19] Scaling specific parameters referred to p0514[0] / Scal spec p514[0]

Access level: 3	**Calculated:** CALC_MOD_ALL	**Data type:** Unsigned32
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	4294967295	0

Description: Sets the parameters with reference value in p0514[0] for the specific scaling.
p0515[0]: parameter number
p0515[1]: parameter number
p0515[2]: parameter number
...
p0515[19]: parameter number

Dependency: See also: p0514

p0516[0...19] Scaling specific parameters referred to p0514[1] / Scal spec p514[1]

Access level: 3	**Calculated:** CALC_MOD_ALL	**Data type:** Unsigned32
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	4294967295	0

Description: Sets the parameters with reference value in p0514[1] for the specific scaling.
p0516[0]: parameter number
p0516[1]: parameter number
p0516[2]: parameter number
...
p0516[19]: parameter number

Dependency: See also: p0514

p0517[0...19] Scaling specific parameters referred to p0514[2] / Scal spec p514[2]

Access level: 3	**Calculated:** CALC_MOD_ALL	**Data type:** Unsigned32
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	4294967295	0

Description: Sets the parameters with reference value in p0514[2] for the specific scaling.
p0517[0]: parameter number
p0517[1]: parameter number
p0517[2]: parameter number
...
p0517[19]: parameter number

Dependency: See also: p0514

p0518[0...19] Scaling specific parameters referred to p0514[3] / Scal spec p514[3]

Access level: 3	**Calculated:** CALC_MOD_ALL	**Data type:** Unsigned32
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	4294967295	0

Description: Sets the parameters with reference value in p0514[3] for the specific scaling.
p0518[0]: parameter number
p0518[1]: parameter number
p0518[2]: parameter number
...
p0518[19]: parameter number

Dependency: See also: p0514

p0519[0...19] Scaling specific parameters referred to p0514[4] / Scal spec p514[4]

Access level: 3	**Calculated:** CALC_MOD_ALL	**Data type:** Unsigned32
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	4294967295	0

Description: Sets the parameters with reference value in p0514[4] for the specific scaling.
p0519[0]: parameter number
p0519[1]: parameter number
p0519[2]: parameter number
...
p0519[19]: parameter number

Dependency: See also: p0514

p0520[0...19] Scaling specific parameters referred to p0514[5] / Scal spec p514[5]

Access level: 3	**Calculated:** CALC_MOD_ALL	**Data type:** Unsigned32
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	4294967295	0

Description: Sets the parameters with reference value in p0514[5] for the specific scaling.
p0520[0]: parameter number
p0520[1]: parameter number
p0520[2]: parameter number
...
p0520[19]: parameter number

Dependency: See also: p0514

p0521[0...19] Scaling specific parameters referred to p0514[6] / Scal spec p514[6]

Access level: 3	**Calculated:** CALC_MOD_ALL	**Data type:** Unsigned32
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	4294967295	0

Description: Sets the parameters with reference value in p0514[6] for the specific scaling.
p0521[0]: parameter number
p0521[1]: parameter number
p0521[2]: parameter number
...
p0521[19]: parameter number

Dependency: See also: p0514

p0522[0...19] Scaling specific parameters referred to p0514[7] / Scal spec p514[7]

Access level: 3	**Calculated:** CALC_MOD_ALL	**Data type:** Unsigned32
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	4294967295	0

Description: Sets the parameters with reference value in p0514[7] for the specific scaling.
p0522[0]: parameter number
p0522[1]: parameter number
p0522[2]: parameter number
...
p0522[19]: parameter number

Dependency: See also: p0514

p0523[0...19] Scaling specific parameters referred to p0514[8] / Scal spec p514[8]

Access level: 3	**Calculated:** CALC_MOD_ALL	**Data type:** Unsigned32
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	4294967295	0

Description: Sets the parameters with reference value in p0514[8] for the specific scaling.
p0523[0]: parameter number
p0523[1]: parameter number
p0523[2]: parameter number
...
p0523[19]: parameter number

Dependency: See also: p0514

p0524[0...19] Scaling specific parameters referred to p0514[9] / Scal spec p514[9]

Access level: 3	**Calculated:** CALC_MOD_ALL	**Data type:** Unsigned32
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	4294967295	0

Description: Sets the parameters with reference value in p0514[9] for the specific scaling.
p0524[0]: parameter number
p0524[1]: parameter number
p0524[2]: parameter number
...
p0524[19]: parameter number

Dependency: See also: p0514

p0530[0...n] Bearing version selection / Bearing vers sel

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: C2(1, 3)	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	104	0

Description: Sets the bearing version.

Corresponding to the bearing version entered, its code number (p0531) is automatically set.

0 = No data

1 = Manual entry

101 = STANDARD

102 = PERFORMANCE

103 = HIGH PERFORMANCE

104 = ADVANCED LIFETIME

Dependency: See also: p0301, p0531, p0532, p1082

NOTICE

For p0530 = 101, 102, 103, 104, the maximum bearing speed (p0532) is write protected. Write protection is withdrawn with p0530 = 1.

If p0530 is changed during quick commissioning (p0010 = 1), then the maximum speed p1082, which is also associated with quick commissioning, is pre-assigned appropriately. This is not the case when commissioning the motor (p0010 = 3). The maximum speed of the bearing is factored into the limit for the maximum speed p1082.

Note

For a motor with DRIVE-CLiQ, p0530 can only be set to 1.

p0531[0...n] Bearing code number selection / Bearing codeNo sel

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: C2(3)	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	65535	0

Description: Display and setting the code number of the bearing.

When setting p0301 and p0530 the code number is automatically pre-assigned and is write protected. The information in p0530 should be observed when removing write protection.

Dependency: See also: p0301, p0530, p0532, p1082

NOTICE

If p0531 is changed during quick commissioning (p0010 = 1), then the maximum speed p1082, which is also associated with quick commissioning, is pre-assigned appropriately. This is not the case when commissioning the motor (p0010 = 3). The maximum speed of the bearing is factored into the limit for the maximum speed p1082.

Note

p0531 cannot be changed on a motor with DRIVE-CLiQ.

p0532[0...n] Bearing maximum speed / Bearing n_max

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: C2(1, 3)	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.0 [rpm]	210000.0 [rpm]	0.0 [rpm]

Description: Sets the maximum speed of the bearing.

The following applies when calculating the maximum speed (p1082):

- for p0324 = 0 or p0532 = 0, p0322 is used.

- for p0324 > 0 and p0532 > 0, the minimum value from the two parameters is used.

Dependency: See also: p0301, p0322, p0530, p1082

NOTICE
This parameter is pre-assigned in the case of motors from the motor list (p0301) if a bearing version (p0530) is selected. When selecting a catalog motor, this parameter cannot be changed (write protection). The information in p0530 should be observed when removing write protection. If p0532 is changed during quick commissioning (p0010 = 1), then the maximum speed p1082, which is also associated with quick commissioning, is pre-assigned appropriately. This is not the case when commissioning the motor (p0010 = 3).

p0573 Inhibit automatic reference value calculation / Inhibit calc

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	1	0

Description: Setting to inhibit the calculation of reference parameters (e.g. p2000) when automatically calculating the motor and closed-loop control parameters (p0340, p3900).

Value:

0: No
1: Yes

NOTICE
The inhibit for the reference value calculation is canceled when new motor parameters (e.g. p0305) are entered and only one drive data set exists (p0180 = 1). This is the case during initial commissioning. Once the motor and control parameters have been calculated (p0340, p3900), the inhibit for the reference value calculation is automatically re-activated.

Note

If value = 0:
The automatic calculation (p0340, p3900) overwrites the reference parameters.
If value = 1:
The automatic calculation (p0340, p3900) does not overwrite the reference parameters.

p0595 Technological unit selection / Tech unit select

Access level: 1	**Calculated:** -	**Data type:** Integer16
Can be changed: C2(5)	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
1	48	1

Description: Selects the units for the parameters of the technology controller.
For p0595 = 1, 2, the reference quantity set in p0596 is not active.

Value:

1: %
2: 1 referred no dimensions
3: bar
4: °C
5: Pa
6: ltr/s
7: m^3/s
8: ltr/min
9: m^3/min
10: ltr/h
11: m^3/h
12: kg/s
13: kg/min

14:	kg/h
15:	t/min
16:	t/h
17:	N
18:	kN
19:	Nm
20:	psi
21:	°F
22:	gallon/s
23:	inch³/s
24:	gallon/min
25:	inch³/min
26:	gallon/h
27:	inch³/h
28:	lb/s
29:	lb/min
30:	lb/h
31:	lbf
32:	lbf ft
33:	K
34:	rpm
35:	parts/min
36:	m/s
37:	ft³/s
38:	ft³/min
39:	BTU/min
40:	BTU/h
41:	mbar
42:	inch wg
43:	ft wg
44:	m wg
45:	% r.h.
46:	g/kg
47:	ppm
48:	kg/cm²

Dependency: Only the unit of the technology controller parameters are switched over (unit group 9_1).

See also: p0596

Note

When switching over from % into another unit, the following sequence applies:
- set p0596
- set p0595 to the required unit

p0596 Technological unit reference quantity / Tech unit ref qty

Access level: 1	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.01	340.28235E36	1.00

Description: Sets the reference quantity for the technological units.

When changing over using changeover parameter p0595 to absolute units, all of the parameters involved refer to the reference quantity.

Dependency: See also: p0595

NOTICE
When changing over from one technological unit into another, or when changing the reference parameter, a changeover is not made.

p0601[0...n] Motor temperature sensor type / Mot_temp_sens type

Access level: 2	**Calculated:** -	**Data type:** Integer16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 8016
Min:	**Max:**	**Factory setting:**
0	6	0

Description: Sets the sensor type for the motor temperature monitoring.

Value:

0:	No sensor
1:	PTC alarm & timer
2:	KTY84
4:	Bimetallic NC contact alarm & timer
6:	PT1000

Dependency: A thermal motor model is calculated corresponding to p0612.

⚠ CAUTION
For p0601 = 2, 6: If the motor temperature sensor is not connected but another encoder, then the temperature adaptation of the motor resistances must be switched out (p0620 = 0). Otherwise, in controlled-loop operation, torque errors will occur that will mean that the motor will not be able to be stopped.

Note

For p0601 = 1:

Tripping resistance = 1650 Ohm. Wire breakage and short-circuit monitoring.

For PT100:

When PT100 measurement is enabled(p29700 > 0), the set value of p0601 is no impact.

p0604[0...n] Mot_temp_mod 2/sensor alarm threshold / Mod 2/sens A_thr

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: 21_1	**Unit selection:** p0505	**Function diagram:** 8016
Min:	**Max:**	**Factory setting:**
0.0 [°C]	240.0 [°C]	130.0 [°C]

Description: Sets the alarm threshold for monitoring the motor temperature for motor temperature model 2 or KTY/PT1000.

Alarm A07910 is output after the alarm threshold is exceeded.

Dependency: See also: p0612

See also: F07011, A07910

NOTICE
When selecting a catalog motor (p0301), this parameter is automatically pre-assigned and is write protected. Information in p0300 should be carefully observed when removing write protection.

Note

The hysteresis is 2 K.

When quick commissioning is exited with p3900 > 0, then the parameter is reset if a catalog motor has not been selected (p0300).

p0605[0...n] Mot_temp_mod 1/2/sensor threshold and temperature value / Mod1/2/sens T_thr

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: 21_1	**Unit selection:** p0505	**Function diagram:** 8016, 8017
Min:	**Max:**	**Factory setting:**
0.0 [°C]	240.0 [°C]	145.0 [°C]

Description: Sets the threshold and temperature value to monitor the motor temperature.

Temperature model 1 (I2t, p0612.0 = 1):

The following applies for firmware version < 4.7 SP6 or p0612.8 = 0:

- sets the alarm threshold. If the model temperature (r0034) exceeds the alarm threshold, then alarm A07012 is output.
- this value is simultaneously used as rated winding temperature.

The following applies from firmware version 4.7 SP6 and p0612.8 = 1:

- p5390: when commissioning a catalog motor for the first time, p0605 is copied to p5390.
- p5390: p5390 is of significance when evaluating the alarm threshold.
- p5390: the stator winding temperature (r0632) is used to initiate the signal.
- p0627: when a catalog motor is commissioned for the first time, p0605 -40 °C is copied to p0627.
- p0627: p0627 is of significance for the rated temperature.

Motor temperature model 2 (p0612.1 = 1) or measurement:

- sets the fault threshold. If the temperature (r0035) exceeds the fault threshold, then fault F07011 is output.

Dependency: See also: r0034, p0611, p0612

See also: F07011, A07012

NOTICE

When selecting a catalog motor (p0301), this parameter is automatically pre-assigned and is write protected. Information in p0300 should be carefully observed when removing write protection.

Motor temperature model 1 (I2t):

The following applies for firmware version < 4.7 SP6 or p0612.8 = 0:

p0605 also defines the final temperature of the model for r0034 = 100 %. Therefore, p0605 has no influence on the time up to alarm A07012 being issued. The time is only determined by time constant p0611, the actual current and the reference value p0318. For p0318 = 0, the rated motor current is used as reference value.

Note

The hysteresis is 2 K.

When quick commissioning is exited with p3900 > 0, then the parameter is reset if a catalog motor has not been selected (p0300).

p0610[0...n] Motor overtemperature response / Mot temp response

Access level: 2	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 8016, 8017, 8018
Min:	**Max:**	**Factory setting:**
0	12	12

Description: Sets the system response when the motor temperature reaches the alarm threshold.

Value:

0:	No response only alarm no reduction of I_max
1:	Messages, reduction of I_max
2:	Messages, no reduction of I_max
12:	Messages, no reduction of I_max, temperature storage

Dependency: See also: p0601, p0604, p0605, p0614, p0615

See also: F07011, A07012, A07910

Note

The I_max reduction is not executed for PTC (p0601 = 1) or bimetallic NC contact (p0601 = 4).
The I_max reduction results in a lower output frequency.
If value = 0:
An alarm is output and I_max is not reduced.
If value = 1:
An alarm is output and a timer is started. A fault is output if the alarm is still active after this timer has expired.
- for KTY/PT1000, the following applies: I_max. is reduced
- for PTC, the following is valid: I_max. is not reduced
If value = 2:
An alarm is output and a timer is started. A fault is output if the alarm is still active after this timer has expired.
If value = 12:
Behavior is always the same as for value 2.
For motor temperature monitoring without temperature sensor, when switching off, the model temperature is saved in a non-volatile fashion. When switching on, the same value (reduced by p0614) is taken into account in the model calculation. As a consequence, the UL508C specification is fulfilled.

p0611[0...n] I2t motor model thermal time constant / I2t mot_mod T

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: C2(1), T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 8017
Min:	**Max:**	**Factory setting:**
0 [s]	20000 [s]	0 [s]

Description: Sets the winding time constant.

The time constant specifies the warm-up time of the cold stator winding when loaded with the motor standstill current (rated motor current, if the motor standstill current is not parameterized) up until a temperature rise of 63 % of the continuously permissible winding temperature has been reached.

Dependency: The parameter is only used for synchronous motors (p0300 = 2xx, 4) and synchronous reluctance motors (p0300 = 6xx).

See also: r0034, p0612, p0615

See also: F07011, A07012, A07910

NOTICE

This parameter is automatically pre-set from the motor database for motors from the motor list (p0301).
When selecting a catalog motor, this parameter cannot be changed (write protection). Information in p0300 should be carefully observed when removing write protection.
When exiting commissioning, p0612 is checked, and where relevant, is pre-assigned to a value that matches the motor power, if a temperature sensor was not parameterized (see p0601).

Note

When parameter p0611 is reset to 0, then this switches out the thermal I2t motor model (refer to p0612).
If no temperature sensor is parameterized, then the ambient temperature for the thermal motor model is referred to p0625.

p0612[0...n] Mot_temp_mod activation / Mot_temp_mod act

Access level: 2	**Calculated:** CALC_MOD_ALL	**Data type:** Unsigned16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 8017, 8018
Min:	**Max:**	**Factory setting:**
-	-	0000 0010 0000 0010 bin

Description: Setting to activate the motor temperature model.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Activate mot_temp_mod 1 (I2t)	Yes	No	-
01	Activate mot_temp_mod 2	Yes	No	-
08	Activate mot_temp_mod 1 (I2t) extensions	Yes	No	-

09	Activate mot_temp_mod 2 extensions	Yes	No	-
12	Mot_temp_mod 1 (I2t) ambient temperature can be adjusted	Yes (via p0613)	No (fixed 20 °C)	-

Dependency: For synchronous motors and synchronous reluctance motors, when exiting commissioning, temperature model 1 is automatically activated if a time constant has been entered in p0611.

See also: r0034, p0604, p0605, p0611, p0613, p0615, p0625, p0626, p0627, p0628, r0630, r0631, r0632, r0633, p5350, r5389, p5390, p5391

See also: F07011, A07012, F07013, A07014, A07910

NOTICE

For bit 00:

This bit is only automatically activated for permanent-magnet 1FT7 synchronous motors and synchronous reluctance motors. For other permanent-magnet synchronous motors, the user himself must activate motor temperature model 1 (I2t).

It is only possible to activate this motor temperature model (I2t) for a time constant greater than zero (p0611 > 0).

Note

Mot_temp_mod: motor temperature model

For bit 00:

This bit is used to activate/deactivate the motor temperature model for permanent-magnet synchronous motors and synchronous reluctance motors.

For bit 01 (see also bit 9):

This bit is used to activate/deactivate the motor temperature model for induction motors.

For bit 08:

This bit is used to extend the motor temperature model 1 (I2t).

The following applies for firmware version < 4.7 SP6 (only bit 0):

- this bit has no function. Temperature model 1 operates in the standard mode.

Overtemperature at rated load: p0605 - 40 °C

Alarm threshold: p0605

Fault threshold: p0615

The following applies from firmware version 4.7 SP6 (bits 0 and 8):

- temperature model 1 operates in the extended mode.

Overtemperature at rated load: p0627

Alarm threshold: p5390

Fault threshold: p5391

For bit 09:

This bit is used to extend the motor temperature model 2.

For firmware version < 4.7 following applies (only bit 1):

- this bit has no function. Temperature model 2 operates in the standard mode.

From firmware version 4.7 the following applies (bits 1 and 9):

- this bit should be set. Temperature model 2 then operates in the extended mode and the result of the model is more precise.

For bit 12 (only effective if a temperature sensor has not been parameterized):

This bit is used to set the ambient temperature for the motor temperature model 1 (I2t).

The following applies for firmware version < 4.7 SP6 (only bit 0):

- this bit has no function. Temperature model 1 operates with an ambient temperature of 20 °C.

The following applies from firmware version 4.7 SP6 (bits 0 and 12):

- the ambient temperature can be adapted to the conditions using p0613.

p0613[0...n] Mot_temp_mod 1/3 ambient temperature / Mod 1/3 amb_temp

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: 21_1	**Unit selection:** p0505	**Function diagram:** 8017
Min:	**Max:**	**Factory setting:**
-40 [°C]	100 [°C]	20 [°C]

Description: Sets the ambient temperature for motor temperature model 1 or 3.
- temperature model 1 (I2t, p0612.0 = 1):
For firmware version < 4.7 SP6 or p0612.12 = 0, the following applies:
The parameter is not relevant.
From firmware version 4.7 SP6 and p0612.12 = 1, the following applies:
The parameter defines the current ambient temperature.
- temperature model 3 (p0612.2 = 1):
The parameter defines the current ambient temperature.

Dependency: See also: p0612
See also: F07011, A07012

p0614[0...n] Thermal resistance adaptation reduction factor / Therm R_adapt red

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0 [%]	100 [%]	30 [%]

Description: Sets the reduction factor for the overtemperature of the thermal adaptation of the stator/rotor resistance.
The value is a starting value when switching on. Internally, after switch-on, the reduction factor has no effect corresponding to the thermal time constant.

Dependency: See also: p0610

Note
The reduction factor is only effective for p0610 = 12, and refers to the overtemperature.

p0615[0...n] Mot_temp_mod 1 (I2t) fault threshold / I2t F thresh

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: 21_1	**Unit selection:** p0505	**Function diagram:** 8017
Min:	**Max:**	**Factory setting:**
0.0 [°C]	220.0 [°C]	180.0 [°C]

Description: Sets the fault threshold for monitoring the motor temperature for motor temperature model 1 (I2t).
The following applies for firmware version < 4.7 SP6:
- fault F07011 is output after the fault threshold is exceeded.
- fault threshold for r0034 = 100 % * (p0615 - 40) / (p0605 - 40).
The following applies from firmware version 4.7 SP6 and p0612.8 = 1:
- the fault threshold in p0615 is preset when commissioning.
- when a catalog motor with motor temperature model 1 (I2t) is being commissioned for the first time, the threshold value is copied from p0615 to p5391.
- p5391 is of significance for evaluating the fault threshold.

Dependency: The parameter is only used for motor temperature model 1 (I2t).
See also: r0034, p0611, p0612
See also: F07011, A07012

NOTICE
When selecting a catalog motor (p0301), this parameter is automatically pre-assigned and is write protected. Information in p0300 should be carefully observed when removing write protection.

Note
The hysteresis is 2 K.

p0620[0...n] Thermal adaptation, stator and rotor resistance / Mot therm_adapt R

Access level: 4	**Calculated:** CALC_MOD_ALL	**Data type:** Integer16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	2	1

Description: Sets the thermal adaptation of the stator/primary section resistance and rotor/secondary section resistance according to r0395 and r0396.

Value:
0: No thermal adaptation of stator and rotor resistances
1: Resistances adapted to the temperatures of the thermal model
2: Resistances adapted to the measured stator winding temperature

Note
For p0620 = 1, the following applies:
The stator resistance is adapted using the temperature in r0035 and the rotor resistance together with the model temperature in r0633.
For p0620 = 2, the following applies:
The stator resistance is adapted using the temperature in r0035. If applicable, the rotor temperature for adapting the rotor resistance is calculated from the stator temperature (r0035) as follows:
theta_R = (r0628 + r0625) / (r0627 + r0625) * r0035

p0621[0...n] Identification stator resistance after restart / Rst_ident Restart

Access level: 2	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	2	0

Description: Selects the identification of the stator resistance of induction motors after the Control Unit runs-up (only for vector control).

The identification is used to measure the actual stator resistance and from the ratio of the result of motor data identification (p0350) to the matching ambient temperature (p0625) the actual mean temperature of the stator winding is calculated. The result is used to initialize the thermal motor model.

p0621 = 1:

Identification of the stator resistance only when the drive is switched on for the first time (pulse enable) after booting the Control Unit.

p0621 = 2:

Identification of the stator resistance every time the drive is switched on (pulse enable).

Value:
0: No Rs identification
1: Rs identification after switching-on again
2: Rs identification after switching-on each time

Dependency:
- perform motor data identification (see p1910) with cold motor.
- enter ambient temperature at time of motor data identification in p0625.

See also: p0622, r0623

NOTICE

The determined stator temperature of the induction motor can only be compared with the measured value of a temperature sensor (KTY/PT1000) to a certain extent, as the sensor is usually the warmest point of the stator winding, whereas the measured value of identification reflects the mean value of the stator winding.
Furthermore this is a short-time measurement with limited accuracy that is performed during the magnetizing phase of the induction motor.

Note

The measurement is carried out:

- For induction motors
- When vector control is active (see p1300)
- if a temperature sensor (KTY/PT1000) has not been connected
- When the motor is at a standstill when switched on

When a flying restart is performed on a rotating motor, the temperatures of the thermal motor model are set to a third of the overtemperatures. This occurs only once, however, when the CU is booted (e.g. after a power failure).

If identification is activated, the magnetizing time is determined via p0622 and not via p0346. Quick magnetizing (p1401.6) is de-energized internally and alarm A07416 is displayed. The speed is enabled after completion of the measurement.

p0621[0...n] Identification stator resistance after restart / Rst_ident Restart

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Access level: 2	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	2	0

Description:

Selects the identification of the stator resistance of induction motors after the Control Unit runs-up (only for vector control).

The identification is used to measure the actual stator resistance and from the ratio of the result of motor data identification (p0350) to the matching ambient temperature (p0625) the actual mean temperature of the stator winding is calculated. The result is used to initialize the thermal motor model.

p0621 = 1:

Identification of the stator resistance only when the drive is switched on for the first time (pulse enable) after booting the Control Unit.

p0621 = 2:

Identification of the stator resistance every time the drive is switched on (pulse enable).

If a reference value for the stator resistance at an ambient temperature is entered into p0629, then the setting value for the stator temperature is generated from this value and not from p0350.

When activating the measurement (p0621 = 1, 2), p0629 is determined when first starting the drive. p0629 should be saved for subsequent use. In order that p0629 matches the ambient temperature (p0625), the function should be activated with the motor in the cold condition.

Value:

0:	No Rs identification
1:	Rs identification after switching-on again
2:	Rs identification after switching-on each time

Dependency:

- perform motor data identification (see p1910) with cold motor.
- enter ambient temperature at time of motor data identification in p0625.
- Reference stator resistance p0629 saved after it has been determined.

See also: p0622, r0623, p0629

NOTICE
The calculated stator temperature can only be compared with the measured value of a temperature sensor (KTY/PT1000) to a certain extent, as the sensor is usually the warmest point of the stator winding, whereas the measured value of identification reflects the mean value of the stator winding. The accuracy depends very heavily on how precisely the motor feeder cable resistance is known (see p0352). The accuracy of the measurement can be improved by entering the feeder cable resistance p0352 and by determining the reference stator resistance p0629 for the ambient temperature. p0629 is the measured value r0623, which was determined immediately after the first commissioning with the motor in a cold state. For p0621 = 1, p0629 is also measured when switching on for the first time and not after the Control Unit has switched on.

Note
The measurement is carried out:
- For induction motors
- When vector control is active (see p1300)
- if a temperature sensor (KTY/PT1000) has not been connected
- When the motor is at a standstill when switched on

When a flying restart is performed on a rotating motor, the temperatures of the thermal motor model are set to a third of the overtemperatures. This occurs only once, however, when the CU is booted (e.g. after a power failure).
If identification is activated, the magnetizing time is determined via p0622 and not via p0346. Quick magnetizing (p1401.6) is de-energized internally and alarm A07416 is displayed. The speed is enabled after completion of the measurement.

p0622[0...n] Motor excitation time for Rs_ident after switching on again / t_excit Rs_id

Access level: 3	**Calculated:** CALC_MOD_REG	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.000 [s]	20.000 [s]	0.000 [s]

Description: Sets the excitation time of the motor for the stator resistance identification after switching on again (restart).

Dependency: See also: p0621, r0623

Note
For p0622 < p0346 the following applies:
If identification is activated, the magnetizing time is influenced by p0622. The speed is enabled after measurement is complete, but not before the time in p0346 has elapsed (see r0056 bit 4). The time taken for measurement also depends on the settling time of the measured current.
For p0622 >= p0346 the following applies:
Parameter p0622 is internally limited to the magnetizing time p0346, so that p0346 represents the maximum possible magnetizing time during identification. The entire measurement period (magnetizing plus measurement settling time plus measuring time) will always be greater than p0346.

r0623 Rs identification stator resistance after switch on again / Rs-id Rs aft sw-on

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
- [ohm]	- [ohm]	- [ohm]

Description: Displays the stator resistance determined using the Rs identification after switching on again.

Dependency: See also: p0621, p0622

p0625[0...n] Motor ambient temperature during commissioning / Mot T_ambient

Access level: 3	**Calculated:** CALC_MOD_EQU	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: 21_1	**Unit selection:** p0505	**Function diagram:** 8017, 8018
Min:	**Max:**	**Factory setting:**
-40 [°C]	80 [°C]	20 [°C]

Description: Defines the ambient temperature of the motor for calculating the motor temperature model.

Dependency: See also: p0350, p0354

Note
The parameters for stator and rotor resistance (p0350, p0354) refer to this temperature.
If the thermal I2t motor model is activated for permanent-magnet synchronous motors (refer to p0611), p0625 is included in the model calculation if a temperature sensor is not being used (see p0601).

p0626[0...n] Motor overtemperature, stator core / Mot T_over core

Access level: 4	**Calculated:** CALC_MOD_EQU	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: 21_2	**Unit selection:** p0505	**Function diagram:** 8018
Min:	**Max:**	**Factory setting:**
10 [K]	200 [K]	50 [K]

Description: Defines the rated overtemperature of the stator iron referred to ambient temperature in the motor temperature model 2 (p0612.1 = 1).

Dependency: For 1LA7 motors (p0300), the parameter is pre-set as a function of p0307 and p0311.

See also: p0625

NOTICE

When selecting a standard induction motor listed in the catalog (p0300 > 100, p0301 > 10000), this parameter is automatically pre-assigned and is write protected. Information in p0300 should be carefully observed when removing write protection.

Note

When quick commissioning is exited with p3900 > 0, then the parameter is reset if a catalog motor has not been selected (p0300).

p0627[0...n] Motor overtemperature, stator winding / Mot T_over stator

Access level: 2	**Calculated:** CALC_MOD_EQU	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: 21_2	**Unit selection:** p0505	**Function diagram:** 8017, 8018
Min:	**Max:**	**Factory setting:**
15 [K]	200 [K]	80 [K]

Description: Defines the rated overtemperature of the stator winding referred to the ambient temperature.

- motor temperature model 1 (I2t, p0612.0 = 1):

The following applies for firmware version < 4.7 SP6 or p0612.8 = 0:

p0605 is of significance for the rated temperature.

The following applies from firmware version 4.7 SP6 and p0612.8 = 1:

Overtemperature at the rated operating point.

- motor temperature model 2 (p0612.1 = 1):

Overtemperature at the rated operating point.

Dependency: For 1LA5 and 1LA7 motors (p0300 = 15, 17), the parameter is pre-set as a function of p0307 and p0311.

See also: p0625

NOTICE

When selecting a standard induction motor listed in the catalog (p0300 > 100, p0301 > 10000), this parameter is automatically pre-assigned and is write protected. Information in p0300 should be carefully observed when removing write protection.

Note

When quick commissioning is exited with p3900 > 0, then the parameter is reset if a catalog motor has not been selected (p0300).

The signal is not suitable as a process quantity and may only be used as a display quantity.

p0628[0...n] Motor overtemperature rotor / Mot T_over rotor

Access level: 4	**Calculated:** CALC_MOD_EQU	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: 21_2	**Unit selection:** p0505	**Function diagram:** 8018
Min:	**Max:**	**Factory setting:**
20 [K]	200 [K]	100 [K]

Description: Defines the rated overtemperature of the squirrel cage rotor referred to ambient temperature in the motor temperature model 2 (p0612.1 = 1).

Dependency: For 1LA7 motors (p0300), the parameter is pre-set as a function of p0307 and p0311.

See also: p0625

NOTICE
When selecting a standard induction motor listed in the catalog (p0300 > 100, p0301 > 10000), this parameter is automatically pre-assigned and is write protected. Information in p0300 should be carefully observed when removing write protection.

Note

When quick commissioning is exited with p3900 > 0, then the parameter is reset if a catalog motor has not been selected (p0300).

p0629[0...n] Stator resistance reference / R_stator ref

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Access level: 3	**Calculated:** CALC_MOD_EQU	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.00000 [ohm]	2000.00000 [ohm]	0.00000 [ohm]

Description: Reference value for the identification of the stator resistance every time the drive is switched on.

Dependency: The measurement of the reference value is activated by the automatic calculation (p0340 = 1, 2), if the following conditions apply:

- the motor temperature is at this instant in time less than 30 °C (r0035).

- a temperature sensor is not being used (p0601).

See also: p0621, r0623

Note

The reference value to identify the stator resistance is determined at the first identification. This must be realized when the motor is in a cold state, as the value refers to the ambient temperature p0625. The feeder cable resistance should be entered into p0352 before the measurement.

The result must be saved after the first measurement so that the reference is available after the CU has powered up. When changing p0350 or p0352, the reference value p0629 should be re-determined.

r0630[0...n] Mot_temp_mod ambient temperature / Mod T_ambient

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p2006	**Dynamic index:** -
Unit group: 21_1	**Unit selection:** p0505	**Function diagram:** 8018
Min:	**Max:**	**Factory setting:**
- [°C]	- [°C]	- [°C]

Description: Displays the ambient temperature of the motor temperature model (models 2 and 3).

r0631[0...n] Mot_temp_mod stator iron temperature / Mod T_stator

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p2006	**Dynamic index:** -
Unit group: 21_1	**Unit selection:** p0505	**Function diagram:** 8018
Min:	**Max:**	**Factory setting:**
- [°C]	- [°C]	- [°C]

Description: Displays the stator iron temperature of the motor temperature model (models 2 and 3).

Note

For motor temperature model 1 (p0612.0 = 1), this parameter is not valid:

r0632[0...n]	Mot_temp_mod stator winding temperature / Mod T_winding		
	Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
	Can be changed: -	**Scaling:** p2006	**Dynamic index:** -
	Unit group: 21_1	**Unit selection:** p0505	**Function diagram:** 8017, 8018
	Min:	**Max:**	**Factory setting:**
	- [°C]	- [°C]	- [°C]

Description: Displays the stator winding temperature of the motor temperature model.

Dependency: See also: F07011, A07012, A07910

r0633[0...n]	Mot_temp_mod rotor temperature / Mod rotor temp		
	Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
	Can be changed: -	**Scaling:** p2006	**Dynamic index:** -
	Unit group: 21_1	**Unit selection:** p0505	**Function diagram:** 8018
	Min:	**Max:**	**Factory setting:**
	- [°C]	- [°C]	- [°C]

Description: Displays the rotor temperature of the motor temperature model (models 2 and 3).

Note

For motor temperature model 1 (p0612.0 = 1), this parameter is not valid:

p0640[0...n]	Current limit / Current limit		
	Access level: 2	**Calculated:** CALC_MOD_ALL	**Data type:** FloatingPoint32
	Can be changed: C2(1), T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
	Unit group: -	**Unit selection:** -	**Function diagram:** 6640, 6828
	Min:	**Max:**	**Factory setting:**
	0.00 [Arms]	10000.00 [Arms]	0.00 [Arms]

Description: Sets the current limit.

Dependency: See also: r0209, p0323

Note

The parameter is part of the quick commissioning (p0010 = 1); this means that it is appropriately pre-assigned when changing p0305. The current limit p0640 is limited to r0209.

The resulting current limit is displayed in r0067 and if required, r0067 is reduced by the thermal model of the power unit.

The torque and power limits (p1520, p1521, p1530, p1531) matching the current limit are automatically calculated when exiting the quick commissioning using p3900 > 0 or using the automatic parameterization with p0340 = 3, 5.

p0640 is limited to 4.0 x p0305.

p0640 is pre-assigned for the automatic self commissioning routine (e.g. to 1.5 x p0305, with p0305 = r0207[1]).

p0640 must be entered when commissioning the system. This is the reason that p0640 is not calculated by the automatic parameterization when exiting the quick commissioning (p3900 > 0).

p0641[0...n]	CI: Current limit, variable / Curr lim var		
	Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / FloatingPoint32
	Can be changed: T	**Scaling:** PERCENT	**Dynamic index:** CDS, p0170
	Unit group: -	**Unit selection:** -	**Function diagram:** 6640
	Min:	**Max:**	**Factory setting:**
	-	-	1

Description: Sets the signal source for the variable current limit.

The value is referred to p0640.

p0644[0...n] Current limit excitation induction motor / Imax excitat ASM

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Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
50.0 [%]	300.0 [%]	300.0 [%]

Description: Maximum excitation current of the induction motor referred to the permissible rated current of the power unit (r0207[0]).

Dependency: Only effective for vector control.

Note
The parameter is pre-assigned in the automatic calculation for chassis power units.

p0650[0...n] Actual motor operating hours / Oper hours motor

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0 [h]	4294967295 [h]	0 [h]

Description: Displays the operating hours for the corresponding motor.

The motor operating time counter continues to run when the pulses are enabled. When the pulse enable is withdrawn, the counter is held and the value saved.

Dependency: See also: p0651

See also: A01590

Note
For p0651 = 0, the operating hours counter is disabled.
The operating hours counter in p0650 can only be reset to 0.
The operating hours counter only runs with drive data set 0 and 1 (DDS).

p0651[0...n] Motor operating hours maintenance interval / Mot t_op maint

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0 [h]	150000 [h]	0 [h]

Description: Sets the service/maintenance intervals in hours for the appropriate motor.

An appropriate message is output when the operating hours set here are reached.

Dependency: See also: p0650

See also: A01590

Note
For p0651 = 0, the operating hours counter is disabled.
When setting p0651 to 0, then p0650 is automatically set to 0.
The operating hours counter only runs with drive data set 0 and 1 (DDS).

r0720[0...4] CU number of inputs and outputs / CU I/O count

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 2119
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the number of inputs and outputs.

Index:
[0] = Number of digital inputs
[1] = Number of digital outputs
[2] = Number of digital input/outputs bidirectional
[3] = Number of analog inputs
[4] = Number of analog outputs

r0721 CU digital inputs terminal actual value / CU DI term act val

Access level: 2	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 2201, 2221, 2256
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the actual value at the digital inputs.

This means that the actual input signal can be checked at terminal DI x or DI/DO x prior to switching from the simulation mode (p0795.x = 1) to terminal mode (p0795.x = 0).

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	DI 0 (X133. 5)	High	Low	-
01	DI 1 (X133. 6)	High	Low	-
02	DI 2 (X133. 7)	High	Low	-
03	DI 3 (X133. 8)	High	Low	-
04	DI 4 (X133. 16)	High	Low	-
05	DI 5 (X133. 17)	High	Low	-
11	DI 11 (X131. 3, 4) AI 0	High	Low	-
12	DI 12 (X131. 10, 11) AI 1	High	Low	-

Note
AI: Analog Input
DI: Digital Input

r0722.0...12 CO/BO: CU digital inputs status / CU DI status

Access level: 2	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 2201, 2221, 2256
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the status of the digital inputs.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	DI 0 (X133. 5)	High	Low	-
01	DI 1 (X133. 6)	High	Low	-
02	DI 2 (X133. 7)	High	Low	-
03	DI 3 (X133. 8)	High	Low	-
04	DI 4 (X133. 16)	High	Low	-
05	DI 5 (X133. 17)	High	Low	-
11	DI 11 (X131. 3, 4) AI 0	High	Low	-
12	DI 12 (X131. 10, 11) AI 1	High	Low	-

Dependency: See also: r0723

Note
AI: Analog Input
DI: Digital Input

r0723.0...12 CO/BO: CU digital inputs status inverted / CU DI status inv

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 2119, 2120, 2121, 2130, 2131, 2132, 2133
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the inverted status of the digital inputs.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	DI 0 (X133. 5)	High	Low	-
01	DI 1 (X133. 6)	High	Low	-
02	DI 2 (X133. 7)	High	Low	-
03	DI 3 (X133. 8)	High	Low	-
04	DI 4 (X133. 16)	High	Low	-
05	DI 5 (X133. 17)	High	Low	-
11	DI 11 (X131. 3, 4) AI 0	High	Low	-
12	DI 12 (X131. 10, 11) AI 1	High	Low	-

Dependency: See also: r0722

Note
AI: Analog Input
DI: Digital Input

p0724 CU digital inputs debounce time / CU DI t_debounce

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.000 [ms]	20.000 [ms]	4.000 [ms]

Description: Sets the debounce time for digital inputs.

Note
The digital inputs are read in cyclically every 2 ms (DI 11, DI 12 every 4 ms).
To debounce the signals, the set debounce time is converted into integer multiple debounce clock cycles Tp (Tp = p0724 / 2 ms).
DI: Digital Input

p0730 BI: CU signal source for terminal DO 0 / CU s_s DO 0

Access level: 2	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 2119, 2030, 2130
Min:	**Max:**	**Factory setting:**
-	-	52.3

Description: Sets the signal source for terminal DO 0 (NO: X134. 19 / NC: X134. 18).

Recommendation:
r0052.0 Ready for switching on
r0052.1 Ready for operation
r0052.2 Operation enabled
r0052.3 Fault present
r0052.4 Coast down active (OFF2)
r0052.5 Quick stop active (OFF3)
r0052.6 Switching on inhibited active
r0052.7 Alarm present
r0052.9 Control request
r0052.14 Motor rotates forwards
r0053.0 DC braking active
r0053.1 n_act > p2167 (n_off)
r0053.2 n_act <= p1080 (n_min)
r0053.3 I_act > p2170
r0053.4 n_act > p2155
r0053.5 n_act <= p2155
r0053.6 n_act >= n_set
r0053.10 Technology controller output at the lower limit
r0053.11 Technology controller output at the upper limit

Note
DO: Digital Output
Relay output: NO = normally open, NC = normally closed

p0731 BI: CU signal source for terminal DO 1 / CU s_s DO 1

Access level: 2	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 2119, 2030, 2130
Min:	**Max:**	**Factory setting:**
-	-	52.2

Description: Sets the signal source for terminal DO 1 (NO: X134. 21).

Recommendation:
r0052.0 Ready for switching on
r0052.1 Ready for operation
r0052.2 Operation enabled
r0052.3 Fault present
r0052.4 Coast down active (OFF2)
r0052.5 Quick stop active (OFF3)
r0052.6 Switching on inhibited active
r0052.7 Alarm present
r0052.9 Control request
r0052.14 Motor rotates forwards
r0053.0 DC braking active
r0053.1 n_act > p2167 (n_off)
r0053.2 n_act <= p1080 (n_min)
r0053.3 I_act > p2170
r0053.4 n_act > p2155
r0053.5 n_act <= p2155
r0053.6 n_act >= n_set
r0053.10 Technology controller output at the lower limit
r0053.11 Technology controller output at the upper limit

Note
DO: Digital Output
Relay output: NO = normally open, NC = normally closed

p0732 BI: CU signal source for terminal DO 2 / CU s_s DO 2

Access level: 2	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 2119, 2030, 2130
Min:	**Max:**	**Factory setting:**
-	-	52.0

Description: Sets the signal source for terminal DO 2 (NO: X134.24).

Recommendation:
r0052.0 Ready for switching on
r0052.1 Ready for operation
r0052.2 Operation enabled
r0052.3 Fault present
r0052.4 Coast down active (OFF2)
r0052.5 Quick stop active (OFF3)
r0052.6 Switching on inhibited active
r0052.7 Alarm present
r0052.9 Control request
r0052.14 Motor rotates forwards
r0053.0 DC braking active
r0053.1 n_act > p2167 (n_off)
r0053.2 n_act <= p1080 (n_min)
r0053.3 I_act > p2170
r0053.4 n_act > p2155
r0053.5 n_act <= p2155
r0053.6 n_act >= n_set
r0053.10 Technology controller output at the lower limit
r0053.11 Technology controller output at the upper limit

Note
DO: Digital Output
Relay output: NO = normally open, NC = normally closed

p0733 BI: CU signal source for terminal DO 3 / CU s_s DO 3

Access level: 2	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	52.7

Description: Sets the signal source for terminal DO 3 (NO: X134.51).

r0747 CU digital outputs status / CU DO status

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 2130, 2131, 2132, 2133
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the status of digital outputs.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	DO 0 (NO: X134. 19 / NC: X134. 18)	High	Low	-
01	DO 1 (NO: X134. 21)	High	Low	-
02	DO 2 (NO: X134. 24)	High	Low	-
03	DO 3 (NO: X134. 51)	High	Low	-

Note
DO: Digital Output
Relay output: NO = normally open, NC = normally closed
Inversion using p0748 has been taken into account.

p0748 CU invert digital outputs / CU DO inv

Access level: 3 | **Calculated:** - | **Data type:** Unsigned32
Can be changed: T, U | **Scaling:** - | **Dynamic index:** -
Unit group: - | **Unit selection:** - | **Function diagram:** 2201, 2242
Min: - | **Max:** - | **Factory setting:** 0000 bin

Description: Setting to invert the signals at the digital outputs.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	DO 0 (NO: X134. 19 / NC: X134. 18)	Inverted	Not inverted	-
01	DO 1 (NO: X134. 21)	Inverted	Not inverted	-
02	DO 2 (NO: X134. 24)	Inverted	Not inverted	-
03	DO 3 (NO: X134. 51)	Inverted	Not inverted	-

Note
DO: Digital Output
Relay output: NO = normally open, NC = normally closed

r0751.0...11 BO: CU analog inputs status word / CU AI status word

Access level: 3 | **Calculated:** - | **Data type:** Unsigned16
Can be changed: - | **Scaling:** - | **Dynamic index:** -
Unit group: - | **Unit selection:** - | **Function diagram:** 2251, 2252
Min: - | **Max:** - | **Factory setting:** -

Description: Display and binector output for the status of the analog inputs.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Analog input AI0 wire breakage	Yes	No	-
01	Analog input AI1 wire breakage	Yes	No	-
02	Analog input AI2 wire breakage	Yes	No	-
03	Analog input AI3 wire breakage	Yes	No	-
08	Analog input AI0 no wire breakage	Yes	No	-
09	Analog input AI1 no wire breakage	Yes	No	-
10	Analog input AI2 no wire breakage	Yes	No	-
11	Analog input AI3 no wire breakage	Yes	No	-

Note
AI: Analog Input

r0752[0...3] CO: CU analog inputs input voltage/current actual / CU AI U/I_inp act

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p0514	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 9566, 9568, 9576
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the actual input voltage in V when set as voltage input.
Displays the actual input current in mA when set as current input and with the load resistor switched in.
Displays the actual temperature in °C when set as temperature sensor and the voltage divider is switched in.

Index:
[0] = AI0 (X131 3/4)
[1] = AI1 (X131 10/11)
[2] = Reserved
[3] = Reserved

Dependency: The type of analog input AIx (voltage, current or temperature input) is set using p0756.
See also: p0756

Note
AI: Analog Input

p0753[0...3] CU analog inputs smoothing time constant / CU AI T_smooth

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 9566, 9568, 9576
Min:	**Max:**	**Factory setting:**
0.0 [ms]	1000.0 [ms]	0.0 [ms]

Description: Sets the smoothing time constant of the 1st order lowpass filter for the analog inputs.

Index:
[0] = AI0 (X131 3/4)
[1] = AI1 (X131 10/11)
[2] = Reserved
[3] = Reserved

Note
AI: Analog Input
T: Terminal

r0755[0...3] CO: CU analog inputs actual value in percent / CU AI value in %

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 9566, 9568, 9576
Min:	**Max:**	**Factory setting:**
- [%]	- [%]	- [%]

Description: Displays the currently referred input value of the analog inputs.
When interconnected, the signals are referred to the reference quantities p200x and p205x.

Index:
[0] = AI0 (X131 3/4)
[1] = AI1 (X131 10/11)
[2] = Reserved
[3] = Reserved

Note
AI: Analog Input

p0756[0...3] CU analog inputs type / CU AI type

Access level: 2	**Calculated:** -	**Data type:** Integer16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 9566, 9568, 9576
Min:	**Max:**	**Factory setting:**
0	4	[0] 4 [1] 4 [2] 0 [3] 0

Description: Sets the type of analog inputs.

p0756[0...1] = 0, 1, 4 corresponds to a voltage input (r0752, p0757, p0759 are displayed in V).

p0756[0...1] = 2, 3 corresponds to a current input (r0752, p0757, p0759 are displayed in mA).

Value:

0: Unipolar voltage input (0 V ... +10 V)
1: Unipolar voltage input monitored (+2 V ... +10 V)
2: Unipolar current input (0 mA ... +20 mA)
3: Unipolar current input monitored (+4 mA to +20 mA)
4: Bipolar voltage input (-10 V ... +10 V)

Index:

[0] = AI0 (X131 3/4)
[1] = AI1 (X131 10/11)
[2] = Reserved
[3] = Reserved

Dependency: See also: A03520

⚠ WARNING

The maximum voltage difference between analog input terminals AI+, AI-, and the ground must not exceed 35 V.

If the system is operated when the load resistor is switched on, the voltage between differential inputs AI+ and AI- must not exceed 10 V or the injected 80 mA current otherwise the input will be damaged.

Note

When changing p0756, the parameters of the scaling characteristic (p0757, p0758, p0759, p0760) are overwritten with the following default values:

For p0756 = 0, 4, p0757 is set to 0.0 V, p0758 = 0.0 %, p0759 = 10.0 V and p0760 = 100.0 %.

For p0756 = 1, p0757 is set to 2.0 V, p0758 = 0.0 %, p0759 = 10.0 V and p0760 = 100.0 %.

For p0756 = 2, p0757 is set to 0.0 mA, p0758 = 0.0 %, p0759 = 20.0 mA and p0760 = 100.0 %.

For p0756 = 3, p0757 is set to 4.0 mA, p0758 = 0.0 %, p0759 = 20.0 mA and p0760 = 100.0 %.

p0757[0...3] CU analog inputs characteristic value x1 / CU AI char x1

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 9566, 9568, 9576
Min:	**Max:**	**Factory setting:**
-50.000	160.000	0.000

Description: Sets the scaling characteristic for the analog inputs.

The scaling characteristic for the analog inputs is defined using 2 points.

This parameter specifies the x coordinate (V, mA, °C) of the 1st value pair of the characteristic.

Index:

[0] = AI0 (X131 3/4)
[1] = AI1 (X131 10/11)
[2] = Reserved
[3] = Reserved

Note
The parameters for the characteristic do not have a limiting effect.

p0758[0...3] CU analog inputs characteristic value y1 / CU AI char y1

Access level: 2 | **Calculated:** - | **Data type:** FloatingPoint32
Can be changed: T, U | **Scaling:** - | **Dynamic index:** -
Unit group: - | **Unit selection:** - | **Function diagram:** 9566, 9568, 9576

Min: -1000.00 [%] | **Max:** 1000.00 [%] | **Factory setting:** 0.00 [%]

Description: Sets the scaling characteristic for the analog inputs.
The scaling characteristic for the analog inputs is defined using 2 points.
This parameter specifies the y coordinate (percentage) of the 1st value pair of the characteristic.

Index: [0] = AI0 (X131 3/4)
[1] = AI1 (X131 10/11)
[2] = Reserved
[3] = Reserved

Note
The parameters for the characteristic do not have a limiting effect.

p0759[0...3] CU analog inputs characteristic value x2 / CU AI char x2

Access level: 2 | **Calculated:** - | **Data type:** FloatingPoint32
Can be changed: T, U | **Scaling:** - | **Dynamic index:** -
Unit group: - | **Unit selection:** - | **Function diagram:** 9566, 9568, 9576

Min: -50.000 | **Max:** 160.000 | **Factory setting:**
[0] 10.000
[1] 10.000
[2] 20.000
[3] 100.000

Description: Sets the scaling characteristic for the analog inputs.
The scaling characteristic for the analog inputs is defined using 2 points.
This parameter specifies the x coordinate (V, mA, °C) of the 2nd value pair of the characteristic.

Index: [0] = AI0 (X131 3/4)
[1] = AI1 (X131 10/11)
[2] = Reserved
[3] = Reserved

Note
The parameters for the characteristic do not have a limiting effect.

p0760[0...3] CU analog inputs characteristic value y2 / CU AI char y2

Access level: 2 | **Calculated:** - | **Data type:** FloatingPoint32
Can be changed: T, U | **Scaling:** - | **Dynamic index:** -
Unit group: - | **Unit selection:** - | **Function diagram:** 9566, 9568, 9576

Min: -1000.00 [%] | **Max:** 1000.00 [%] | **Factory setting:** 100.00 [%]

Description: Sets the scaling characteristic for the analog inputs.
The scaling characteristic for the analog inputs is defined using 2 points.
This parameter specifies the y coordinate (percentage) of the 2nd value pair of the characteristic.

Index: [0] = AI0 (X131 3/4)
[1] = AI1 (X131 10/11)
[2] = Reserved
[3] = Reserved

Note
The parameters for the characteristic do not have a limiting effect.

p0761[0...3] CU analog inputs wire breakage monitoring response threshold / CU WireBrkThresh

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 9566, 9568
Min:	**Max:**	**Factory setting:**
0.00	20.00	2.00

Description: Sets the response threshold for the wire breakage monitoring of the analog inputs.
The unit for the parameter value depends on the set analog input type.

Index: [0] = AI0 (X131 3/4)
[1] = AI1 (X131 10/11)
[2] = Reserved
[3] = Reserved

Dependency: For the following analog input type, the wire breakage monitoring is active:
p0756[0...1] = 1 (unipolar voltage input monitored (+2 V ... +10 V)), unit [V]
p0756[0...2] = 3 (unipolar current input monitored (+4 mA ... +20 mA)), unit [mA]
p0756[3]: Wire breakage monitoring is not supported for this analog input.
See also: p0756

Note
AI: Analog Input
When p0761 = 0, wire breakage monitoring is not carried out.

p0762[0...3] CU analog inputs wire breakage monitoring delay time / CU wire brk t_del

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 9566, 9568
Min:	**Max:**	**Factory setting:**
0 [ms]	1000 [ms]	100 [ms]

Description: Sets the delay time for the wire breakage monitoring of the analog inputs.

Index: [0] = AI0 (X131 3/4)
[1] = AI1 (X131 10/11)
[2] = Reserved
[3] = Reserved

Note
AI: Analog Input

p0764[0...3] CU analog inputs dead zone / CU AI dead zone

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 2251
Min:	**Max:**	**Factory setting:**
0.000	20.000	0.000

Description: Determines the width of the dead zone at the analog input.

Analog input type unipolar (e.g. 0 ... +10 V):

The dead zone starts with the characteristic value x1/y1 (p0757/p0758).

Analog input type bipolar (e.g. -10 V ... +10 V):

The dead zone is located at the symmetrical center between characteristic value x1/y1 (p0757/p0758) and x2/y2 (p0759/p0760). The set value doubles the dead zone.

Index:
[0] = AI0 (131 3/4)
[1] = AI1 (131 10/11)
[2] = Reserved
[3] = Reserved

Note
AI: Analog Input

p0771[0...2] CI: CU analog outputs signal source / CU AO s_s

Access level: 2	**Calculated:** -	**Data type:** Unsigned32 / FloatingPoint32
Can be changed: T, U	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 2261
Min:	**Max:**	**Factory setting:**
-	-	[0] 21[0] [1] 27[0] [2] 0

Description: Sets the signal source for the analog outputs.

Index:
[0] = AO0 (X132 12/13)
[1] = AO1 (X131 26/X132 27)
[2] = Reserved

Note
AO: Analog Output

r0772[0...2] CU analog outputs output value currently referred / CU AO outp act ref

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 9572
Min:	**Max:**	**Factory setting:**
- [%]	- [%]	- [%]

Description: Displays the actual referred output value of the analog outputs.

Index:
[0] = AO0 (X132 12/13)
[1] = AO1 (X131 26/X132 27)
[2] = Reserved

Note
AO: Analog Output

p0773[0...2] CU analog outputs smoothing time constant / CU AO T_smooth

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 9572
Min:	**Max:**	**Factory setting:**
0.0 [ms]	1000.0 [ms]	0.0 [ms]

Description: Sets the smoothing time constant of the 1st order lowpass filter for the analog outputs.

Index: [0] = AO0 (X132 12/13)
[1] = AO1 (X131 26/X132 27)
[2] = Reserved

Note
AO: Analog Output

r0774[0...2] CU analog outputs output voltage/current actual / CU AO U/I_outp

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p2001	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 9572
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the actual output voltage or output current at the analog outputs.

Index: [0] = AO0 (X132 12/13)
[1] = AO1 (X131 26/X132 27)
[2] = Reserved

Dependency: See also: p0776

Note
AO: Analog Output

p0775[0...2] CU analog outputs activate absolute value generation / CU AO absVal act

Access level: 2	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 9572
Min:	**Max:**	**Factory setting:**
0	1	0

Description: Activates the absolute value generation for the analog outputs.

Value:
0: No absolute value generation
1: Absolute value generation switched in

Index: [0] = AO0 (X132 12/13)
[1] = AO1 (X131 26/X132 27)
[2] = Reserved

Note
AO: Analog Output

p0776[0...2] CU analog outputs type / CU AO type

Access level: 2	**Calculated:** -	**Data type:** Integer16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 9572
Min:	**Max:**	**Factory setting:**
0	2	0

Description: Sets the analog output type.
p0776[x] = 1 corresponds to a voltage output (p0774, p0778, p0780 are displayed in V).
p0776[x] = 0, 2 corresponds to a current output (p0774, p0778, p0780 are displayed in mA).

Value:
0: Current output (0 mA ... +20 mA)
1: Voltage output (0 V ... +10 V)
2: Current output (+4 mA ... +20 mA)

Index: [0] = AO0 (X132 12/13)
[1] = AO1 (X131 26/X132 27)
[2] = Reserved

Note
When changing p0776, the parameters of the scaling characteristic (p0777, p0778, p0779, p0780) are overwritten with the following default values:
For p0776 = 0, p0777 is set to 0.0 %, p0778 = 0.0 mA, p0779 = 100.0 % and p0780 to 20.0 mA.
For p0776 = 1, p0777 is set to 0.0 %, p0778 = 0.0 V, p0779 = 100.0 % and p0780 to 10.0 V.
For p0776 = 2, p0777 is set to 0.0 %, p0778 = 4.0 mA, p0779 = 100.0 % and p0780 to 20.0 mA.

p0777[0...2] CU analog outputs characteristic value x1 / CU AO char x1

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 9572
Min:	**Max:**	**Factory setting:**
-1000.00 [%]	1000.00 [%]	0.00 [%]

Description: Sets the scaling characteristic for the analog outputs.
The scaling characteristic for the analog outputs is defined using 2 points.
This parameter specifies the x coordinate (percentage) of the 1st value pair of the characteristic.

Index: [0] = AO0 (X132 12/13)
[1] = AO1 (X131 26/X132 27)
[2] = Reserved

Dependency: See also: p0776

NOTICE
This parameter is automatically overwritten when changing p0776 (type of analog outputs).

Note
The parameters for the characteristic do not have a limiting effect.

p0778[0...2] CU analog outputs characteristic value y1 / CU AO char y1

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 9572
Min:	**Max:**	**Factory setting:**
-20.000 [V]	20.000 [V]	0.000 [V]

Description: Sets the scaling characteristic for the analog outputs.
The scaling characteristic for the analog outputs is defined using 2 points.
This parameter specifies the y coordinate (output voltage in V or output current in mA) of the 1st value pair of the characteristic.

Index: [0] = AO0 (X132 12/13)
[1] = AO1 (X131 26/X132 27)
[2] = Reserved

Dependency: The unit of this parameter (V or mA) depends on the analog output type.
See also: p0776

NOTICE
This parameter is automatically overwritten when changing p0776 (type of analog outputs).

Note
The parameters for the characteristic do not have a limiting effect.

p0779[0...2] CU analog outputs characteristic value x2 / CU AO char x2

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 9572
Min:	**Max:**	**Factory setting:**
-1000.00 [%]	1000.00 [%]	100.00 [%]

Description: Sets the scaling characteristic for the analog outputs.
The scaling characteristic for the analog outputs is defined using 2 points.
This parameter specifies the x coordinate (percentage) of the 2nd value pair of the characteristic.

Index: [0] = AO0 (X132 12/13)
[1] = AO1 (X131 26/X132 27)
[2] = Reserved

Dependency: See also: p0776

NOTICE
This parameter is automatically overwritten when changing p0776 (type of analog outputs).

Note
The parameters for the characteristic do not have a limiting effect.

p0780[0...2] CU analog outputs characteristic value y2 / CU AO char y2

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 9572
Min:	**Max:**	**Factory setting:**
-20.000 [V]	20.000 [V]	20.000 [V]

Description: Sets the scaling characteristic for the analog outputs.
The scaling characteristic for the analog outputs is defined using 2 points.
This parameter specifies the y coordinate (output voltage in V or output current in mA) of the 2nd value pair of the characteristic.

Index: [0] = AO0 (X132 12/13)
[1] = AO1 (X131 26/X132 27)
[2] = Reserved

Dependency: The unit of this parameter (V or mA) depends on the analog output type.
See also: p0776

NOTICE
This parameter is automatically overwritten when changing p0776 (type of analog outputs).

Note
The parameters for the characteristic do not have a limiting effect.

p0782[0...2] BI: CU analog outputs invert signal source / CU AO inv s_s

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 9572
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source to invert the analog output signals.

Index: [0] = AO0 (X132 12/13)
[1] = AO1 (X131 26/X132 27)
[2] = Reserved

Note
AO: Analog Output

r0785.0...1 BO: CU analog outputs status word / CU AO ZSW

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 9572
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the status of analog outputs.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	AO 0 negative	Yes	No	-
01	AO 1 negative	Yes	No	-

Note
AO: Analog Output

p0791[0...2] CO: Fieldbus analog outputs / Fieldbus AO

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-200.000 [%]	200.000 [%]	0.000 [%]

Description: Setting and connector output to control the analog outputs via fieldbus.

Index:
[0] = AO0 (X132 12/13)
[1] = AO1 (X131 26/X132 27)
[2] = Reserved

Dependency: See also: p0771

Note
AO: Analog Output
The following interconnections must be established to control the analog outputs via fieldbus:
- AO 0: p0771[0] with p0791[0]
- AO 1: p0771[1] with p0791[1]

p0795 CU digital inputs simulation mode / CU DI simulation

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 2201, 2221, 2256
Min:	**Max:**	**Factory setting:**
-	-	0000 0000 0000 0000 bin

Description: Sets the simulation mode for digital inputs.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	DI 0 (X133. 5)	Simulation	Terminal eval	-
01	DI 1 (X133. 6)	Simulation	Terminal eval	-
02	DI 2 (X133. 7)	Simulation	Terminal eval	-
03	DI 3 (X133. 8)	Simulation	Terminal eval	-
04	DI 4 (X133. 16)	Simulation	Terminal eval	-
05	DI 5 (X133. 17)	Simulation	Terminal eval	-
11	DI 11 (X131. 3, 4) AI 0	Simulation	Terminal eval	-

Bit	Signal name	1 signal	0 signal	FP
12	DI 12 (X131.10, 11) AI 1	Simulation	Terminal eval	-

Dependency: The setpoint for the input signals is specified using p0796.

See also: p0796

Note

This parameter is not saved when data is backed up (p0971).

AI: Analog Input

DI: Digital Input

p0796 CU digital inputs simulation mode setpoint / CU DI simul setp

Access level: 3 | **Calculated:** - | **Data type:** Unsigned32

Can be changed: T, U | **Scaling:** - | **Dynamic index:** -

Unit group: - | **Unit selection:** - | **Function diagram:** 2201, 2221, 2256

Min: - | **Max:** - | **Factory setting:** 0000 0000 0000 0000 bin

Description: Sets the setpoint for the input signals in the digital input simulation mode.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	DI 0 (X133. 5)	Simulation	Terminal eval	-
01	DI 1 (X133. 6)	Simulation	Terminal eval	-
02	DI 2 (X133. 7)	Simulation	Terminal eval	-
03	DI 3 (X133. 8)	Simulation	Terminal eval	-
04	DI 4 (X133. 16)	Simulation	Terminal eval	-
05	DI 5 (X133. 17)	Simulation	Terminal eval	-
11	DI 11 (X131. 3, 4) AI 0	Simulation	Terminal eval	-
12	DI 12 (X131.10, 11) AI 1	Simulation	Terminal eval	-

Dependency: The simulation of a digital input is selected using p0795.

See also: p0795

Note

This parameter is not saved when data is backed up (p0971).

AI: Analog Input

DI: Digital Input

p0797[0...3] CU analog inputs simulation mode / CU AI sim_mode

Access level: 3 | **Calculated:** - | **Data type:** Integer16

Can be changed: T, U | **Scaling:** - | **Dynamic index:** -

Unit group: - | **Unit selection:** - | **Function diagram:** -

Min: 0 | **Max:** 1 | **Factory setting:** 0

Description: Sets the simulation mode for the analog inputs.

Value:

0: Terminal evaluation for analog input x

1: Simulation for analog input x

Index:

[0] = AI0 (X131 3/4)

[1] = AI1 (X131 10/11)

[2] = Reserved

[3] = Reserved)

Dependency: The setpoint for the input voltage is specified via p0798.

See also: p0798

Note
This parameter is not saved when data is backed up (p0971).
AI: Analog Input

p0798[0...3] CU analog inputs simulation mode setpoint / CU AI sim setp

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-50.000	2000.000	0.000

Description: Sets the setpoint for the input value in the simulation mode of the analog inputs.

Index:
[0] = AI0 (X131 3/4)
[1] = AI1 (X131 10/11)
[2] = Reserved
[3] = Reserved

Dependency: The simulation of an analog input is selected using p0797.
If AI x is parameterized as a voltage input (p0756), the setpoint is a voltage in V.
If AI x is parameterized as a current input (p0756), the setpoint is a current in mA.
See also: p0756, p0797

Note
This parameter is not saved when data is backed up (p0971).
AI: Analog Input

p0802 Data transfer: memory card as source/target / mem_card src/targ

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	100	0

Description: Sets the number for data transfer of a parameter backup from/to memory card.
Transfer from memory card to device memory (p0804 = 1):
- sets the source of parameter backup (e.g. p0802 = 48 --> PS048xxx.ACX is the source).
Transfer from non-volatile device memory to memory card (p0804 = 2):
- sets the target of parameter backup (e.g. p0802 = 23 --> PS023xxx.ACX is the target).

Dependency: See also: p0803, p0804

Note
The volatile device memory is not influenced by data transfer.

p0803 Data transfer: device memory as source/target / Dev_mem src/targ

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	30	0

Description: Sets the number for data transfer of a parameter backup from/to the non-volatile device memory.
Transfer from memory card to device memory (p0804 = 1):
- sets the target of the parameter backup (e.g. p0803 = 10 --> PS010xxx.ACX is the target).
Transfer from non-volatile device memory to memory card (p0804 = 2):
- sets the source of the parameter backup (e.g. p0803 = 11 --> PS011xxx.ACX is the source).

Value:	0:	Source/target standard
	10:	Source/target with setting 10
	11:	Source/target with setting 11
	12:	Source/target with setting 12
	30:	Source/target with setting 30

Dependency: See also: p0802, p0804

Note
The volatile device memory is not influenced by data transfer.

p0804 Data transfer start / Data transf start

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	1100	0

Description: Sets the transfer direction and start of data transfer between the memory card and non-volatile device memory.

Example 1:

The parameter backup is to be transferred from the non-volatile device memory to the memory card with setting 0. The parameter backup is to be stored on the memory card with setting 22.

p0802 = 22 (parameter backup stored on memory card as target with setting 22)

p0803 = 0 (parameter backup stored in device memory as source with setting 0)

p0804 = 2 (start data transfer from device memory to memory card)

--> PS000xxx.ACX is transferred from device memory to memory card and stored as PS022xxx.ACX.

--> the parameter backup PS022xxx.ACX on the memory card can be used for data backup.

Example 2:

The parameter backup is to be transferred from the memory card to the non-volatile device memory with setting 22. The parameter backup is to be stored in the device memory as setting 10.

p0802 = 22 (parameter backup stored on memory card as source with setting 22)

p0803 = 10 (define parameter backup with setting 10 as target in the device memory)

p0804 = 1 (start data transfer from memory card to device memory)

--> PS022xxx.ACX is transferred from memory card to device memory and stored as PS010xxx.ACX.

--> this parameter backup can be loaded to the volatile device memory using p0010 = 30 and p0970 = 10.

--> to permanently save in the device memory and also on the memory card, this parameter backup should be saved using p0971 = 1.

Value:	0:	Inactive
	1:	Memory card to device memory
	2:	Device memory to memory card
	1001:	File on memory card cannot be opened
	1002:	File in device memory cannot be opened
	1003:	Memory card not found
	1100:	File cannot be transferred

Recommendation: When switching off/switching on, a possibly valid parameter backup is loaded to the memory card with setting 0. Therefore, we do not recommend parameter backup with setting 0 (p0803 = 0) in the non-volatile device memory.

Dependency: See also: p0802, p0803

NOTICE
The memory card must not be removed while data is being transferred.

Note

If a parameter backup with setting 0 is detected on the memory card when the Control Unit is switched on (PS000xxx.ACX), this is transferred automatically to the device memory.

When the memory card is inserted, a parameter backup with setting 0 (PS000xxx.ACX) is automatically written to the memory card when the parameters are saved in a non-volatile memory (e.g. by means of "Copy RAM to ROM").

Once the data has been successfully transferred, this parameter is automatically reset to 0. If an error occurs, the parameter is set to a value > 1000. Possible fault causes:

p0804 = 1001:

The parameter backup set in p0802 as the source on the memory card does not exist or there is not sufficient memory space available on the memory card.

p0804 = 1002:

The parameter backup set in p0803 as the source in the device memory does not exist or there is not sufficient memory space available in the device memory.

p0804 = 1003:

No memory card has been inserted.

p0806 BI: Inhibit master control / PcCtrl inhibit

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source to block the master control.

Dependency: See also: r0807

Note

The commissioning software (drive control panel) uses the master control, for example.

r0807.0 BO: Master control active / PcCtrl active

Access level: 3	**Calculated:** -	**Data type:** Unsigned8
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays what has the master control.

The drive can be controlled via the BICO interconnection or from external (e.g. the commissioning software).

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Master control active	Yes	No	3030

Dependency: See also: p0806

NOTICE

The master control only influences control word 1 and speed setpoint 1. Other control word/setpoints can be transferred from another automation device.

Note

Bit 0 = 0: BICO interconnection active

Bit 0 = 1: Master control for PC/AOP

The commissioning software (drive control panel) uses the master control, for example.

p0809[0...2] Copy Command Data Set CDS / Copy CDS

Access level: 2	**Calculated:** -	**Data type:** Unsigned8
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 8560
Min:	**Max:**	**Factory setting:**
0	3	0

Description: Copies one Command Data Set (CDS) into another.

Index:
[0] = Source Command Data Set
[1] = Target Command Data Set
[2] = Start copying procedure

Dependency: See also: r3996

NOTICE
When the command data sets are copied, short-term communication interruptions may occur.

Note
When copying a command data set (CDS), the values in p0700, p1000 and p1500 are not accepted. As a consequence, the associated macros are not executed and inconsistencies are avoided.
Procedure:
1. In Index 0, enter which command data set should be copied.
2. In index 1, enter the command data set that is to be copied into.
3. Start copying: set index 2 from 0 to 1.
p0809[2] is automatically set to 0 when copying is completed.

p0810 BI: Command data set selection CDS bit 0 / CDS select., bit 0

Access level: 2	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 8560
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source to select the Command Data Set bit 0 (CDS bit 0).

Dependency: See also: r0050, p0811, r0836

Note
The Command Data Set selected using the binector inputs is displayed in r0836.
The currently effective command data set is displayed in r0050.
A Command Data Set can be copied using p0809.

p0811 BI: Command data set selection CDS bit 1 / CDS select., bit 1

Access level: 2	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 8560
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source to select the Command Data Set bit 1 (CDS bit 1).

Dependency: See also: r0050, p0810, r0836

Note
The Command Data Set selected using the binector inputs is displayed in r0836.
The currently effective command data set is displayed in r0050.
A Command Data Set can be copied using p0809.

p0819[0...2] Copy Drive Data Set DDS / Copy DDS

Access level: 2	**Calculated:** -	**Data type:** Unsigned8
Can be changed: C2(15)	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 8565
Min:	**Max:**	**Factory setting:**
0	3	0

Description: Copies one Drive Data Set (DDS) into another.

Index:
[0] = Source Drive Data Set
[1] = Target Drive Data Set
[2] = Start copying procedure

Dependency: See also: r3996

NOTICE
When the drive data sets are copied, short-term communication interruptions may occur.

Note

Procedure:
1. In Index 0, enter which drive data set is to be copied.
2. In index 1, enter the drive data set data that is to be copied into.
3. Start copying: set index 2 from 0 to 1.

p0819[2] is automatically set to 0 when copying is completed.

p0820[0...n] BI: Drive Data Set selection DDS bit 0 / DDS select., bit 0

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 8565
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source to select the Drive Data Set, bit 0 (DDS, bit 0).

Dependency: See also: r0051, p0826, r0837

p0821[0...n] BI: Drive Data Set selection DDS bit 1 / DDS select., bit 1

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 8565, 8570
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source to select the Drive Data Set, bit 1 (DDS, bit 1).

Dependency: See also: r0051, r0837

p0826[0...n] Motor changeover motor number / Mot_chng mot No.

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	3	0

Description: Sets the freely assignable motor number for the drive data set changeover.

If the same motor is driven by different drive data sets, the same motor number must also be entered in these data sets.

If the motor is also switched with the drive data set, different motor numbers must be used. In this case, the data set can only be switched when the pulse inhibit is set.

Note
If the motor numbers are identical, the same thermal motor model is used for calculation after data set changeover. If different motor numbers are used, different models are also used for calculating (the inactive motor cools down in each case).
For the same motor number, the correction values of the Rs, Lh or kT adaptation are applied for the data set changeover (refer to r1782, r1787, r1797).

r0835.2...8 CO/BO: Data set changeover status word / DDS_ZSW

Access level: 2	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 8575
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the status word for the drive data set changeover.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
02	Internal parameter calculation active	Yes	No	-
04	Armature short circuit active	Yes	No	-
05	Identification running	Yes	No	-
07	Rotating measurement running	Yes	No	-
08	Motor data identification running	Yes	No	-

Note
For bit 02:
A data set changeover is delayed by the time required for the internal parameter calculation.
For bit 04:
A data set changeover is only carried out when the armature short circuit is not activated.
For bit 05:
A data set changeover is only carried out when pole position identification is not running.
For bit 07:
A data set changeover is only carried out when rotating measurement is not running.
For bit 08:
A data set changeover is only carried out when motor data identification is not running.

r0836.0...1 CO/BO: Command Data Set CDS selected / CDS selected

Access level: 3	**Calculated:** -	**Data type:** Unsigned8
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 8560
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the command data set (CDS) selected via the binector input.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	CDS selection bit 0	ON	OFF	-
01	CDS selection bit 1	ON	OFF	-

Dependency: See also: r0050, p0810, p0811

Note
Command data sets are selected via binector input p0810 and following.
The currently effective command data set is displayed in r0050.

r0837.0...1 CO/BO: Drive Data Set DDS selected / DDS selected

Access level: 3	**Calculated:** -	**Data type:** Unsigned8
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 8565
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the drive data set (DDS) selected via the binector input.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	DDS selection bit 0	ON	OFF	-
01	DDS selection bit 1	ON	OFF	-

Dependency: See also: r0051, p0820, p0821

Note
Drive data sets are selected via binector input p0820 and following.
The currently effective drive data set is displayed in r0051.
If there is only one data set, then a value of 0 is displayed in this parameter and not the selection via binector inputs.

p0840[0...n] BI: ON / OFF (OFF1) / ON / OFF (OFF1)

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 2501, 2512
Min:	**Max:**	**Factory setting:**
-	-	[0] 29659.0 [1] 0 [2] 0 [3] 0

Description: Sets the signal source for the command "ON/OFF (OFF1)".
For the PROFIdrive profile, this command corresponds to control word 1 bit 0 (STW1.0).

Recommendation: When the setting for this binector input is changed, the motor can only be switched on by means of an appropriate signal change of the source.

Dependency: See also: p1055, p1056

⚠ CAUTION
When "master control from PC" is activated, this binector input is ineffective.

NOTICE
For binector input p0840 = 0 signal, the motor can be moved, jogging using binector input p1055 or p1056.
The command "ON/OFF (OFF1)" can be issued using binector input p0840 or p1055/p1056.
For binector input p0840 = 0 signal, the switching on inhibited is acknowledged.
Only the signal source that originally switched on can also switch off again.

p0844[0...n] BI: No coast-down / coast-down (OFF2) signal source 1 / OFF2 S_s 1

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 2501, 8720, 8820, 8920
Min:	**Max:**	**Factory setting:**
-	-	[0] 29659.1 [1] 1 [2] 1 [3] 1

Description: Sets the first signal source for the command "No coast down/coast down (OFF2)".
The following signals are AND'ed:
- BI: p0844 "No coast-down / coast-down (OFF2) signal source 1"
- BI: p0845 "No coast-down / coast-down (OFF2) signal source 2"
For the PROFIdrive profile, the result of the AND logic operation corresponds to control word 1 bit 1 (STW1.1).
BI: p0844 = 0 signal or BI: p0845 = 0 signal
- OFF2 (immediate pulse suppression and switching on inhibited)
BI: p0844 = 1 signal and BI: p0845 = 1 signal
- no OFF2 (enable is possible)

⚠ CAUTION
When "master control from PC" is activated, this binector input is ineffective.

p0845[0...n] BI: No coast-down / coast-down (OFF2) signal source 2 / OFF2 S_s 2

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 2501, 8720, 8820, 8920
Min:	**Max:**	**Factory setting:**
-	-	1

Description: Sets the second signal source for the command "No coast down/coast down (OFF2)".
The following signals are AND'ed:
- BI: p0844 "No coast-down / coast-down (OFF2) signal source 1"
- BI: p0845 "No coast-down / coast-down (OFF2) signal source 2"
For the PROFIdrive profile, the result of the AND logic operation corresponds to control word 1 bit 1 (STW1.1).
BI: p0844 = 0 signal or BI: p0845 = 0 signal
- OFF2 (immediate pulse suppression and switching on inhibited)
BI: p0844 = 1 signal and BI: p0845 = 1 signal
- no OFF2 (enable is possible)

⚠ CAUTION
When "master control from PC" is activated, this binector input is effective.

p0845[0...n] BI: No coast-down / coast-down (OFF2) signal source 2 / OFF2 S_s 2

G120XA_USS (PM330)

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 2501, 8720, 8820, 8920
Min:	**Max:**	**Factory setting:**
-	-	4022.3

Description: Sets the second signal source for the command "No coast down/coast down (OFF2)".
The following signals are AND'ed:
- BI: p0844 "No coast-down / coast-down (OFF2) signal source 1"
- BI: p0845 "No coast-down / coast-down (OFF2) signal source 2"
For the PROFIdrive profile, the result of the AND logic operation corresponds to control word 1 bit 1 (STW1.1).
BI: p0844 = 0 signal or BI: p0845 = 0 signal
- OFF2 (immediate pulse suppression and switching on inhibited)
BI: p0844 = 1 signal and BI: p0845 = 1 signal
- no OFF2 (enable is possible)

⚠ CAUTION
When "master control from PC" is activated, this binector input is effective.

p0848[0...n] BI: No Quick Stop / Quick Stop (OFF3) signal source 1 / OFF3 S_s 1

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 2501
Min:	**Max:**	**Factory setting:**
-	-	1

Description: Sets the first signal source for the command "No quick stop/quick stop (OFF3)".
The following signals are AND'ed:
- BI: p0848 "No quick stop / quick stop (OFF3) signal source 1"
- BI: p0849 "No quick stop / quick stop (OFF3) signal source 2"
For the PROFIdrive profile, the result of the AND logic operation corresponds to control word 1 bit 2 (STW1.2).
BI: p0848 = 0 signal or BI: p0849 = 0 signal
- OFF3 (braking along the OFF3 ramp (p1135), then pulse suppression and switching on inhibited)
BI: p0848 = 1 signal and BI: p0849 = 1 signal
- no OFF3 (enable is possible)

⚠ CAUTION
When "master control from PC" is activated, this binector input is ineffective.

p0849[0...n] BI: No Quick Stop / Quick Stop (OFF3) signal source 2 / OFF3 S_s 2

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 2501
Min:	**Max:**	**Factory setting:**
-	-	1

Description: Sets the second signal source for the command "No quick stop/quick stop (OFF3)".
The following signals are AND'ed:
- BI: p0848 "No quick stop / quick stop (OFF3) signal source 1"
- BI: p0849 "No quick stop / quick stop (OFF3) signal source 2"
For the PROFIdrive profile, the result of the AND logic operation corresponds to control word 1 bit 2 (STW1.2).
BI: p0848 = 0 signal or BI: p0849 = 0 signal
- OFF3 (braking along the OFF3 ramp (p1135), then pulse suppression and switching on inhibited)
BI: p0848 = 1 signal and BI: p0849 = 1 signal
- no OFF3 (enable is possible)

⚠ CAUTION
When "master control from PC" is activated, this binector input is effective.

p0849[0...n] BI: No Quick Stop / Quick Stop (OFF3) signal source 2 / OFF3 S_s 2

G120XA_USS (PM330)

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 2501
Min:	**Max:**	**Factory setting:**
-	-	4022.2

Description: Sets the second signal source for the command "No quick stop/quick stop (OFF3)".
The following signals are AND'ed:
- BI: p0848 "No quick stop / quick stop (OFF3) signal source 1"
- BI: p0849 "No quick stop / quick stop (OFF3) signal source 2"
For the PROFIdrive profile, the result of the AND logic operation corresponds to control word 1 bit 2 (STW1.2).
BI: p0848 = 0 signal or BI: p0849 = 0 signal
- OFF3 (braking along the OFF3 ramp (p1135), then pulse suppression and switching on inhibited)
BI: p0848 = 1 signal and BI: p0849 = 1 signal
- no OFF3 (enable is possible)

⚠ CAUTION
When "master control from PC" is activated, this binector input is effective.

p0852[0...n] BI: Enable operation/inhibit operation / Enable operation

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 2501
Min:	**Max:**	**Factory setting:**
-	-	1

Description: Sets the signal source for the command "enable operation/inhibit operation".
For the PROFIdrive profile, this command corresponds to control word 1 bit 3 (STW1.3).
BI: p0852 = 0 signal
Inhibit operation (suppress pulses).
BI: p0852 = 1 signal
Enable operation (pulses can be enabled).

⚠ CAUTION
When "master control from PC" is activated, this binector input is ineffective.

p0854[0...n] BI: Control by PLC/no control by PLC / Master ctrl by PLC

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 2501
Min:	**Max:**	**Factory setting:**
-	-	1

Description: Sets the signal source for the command "control by PLC/no control by PLC".
For the PROFIdrive profile, this command corresponds to control word 1 bit 10 (STW1.10).
BI: p0854 = 0 signal
No control by PLC
BI: p0854 = 1 signal
Master control by PLC.

⚠ CAUTION
When "master control from PC" is activated, this binector input is ineffective.

Note

This bit is used to initiate a response for the drives when the control fails (F07220). If there is no control available, then binector input p0854 should be set to 1.
If a control is available, then STW1.10 must be set to 1 (PZD1) so that the received data is updated. This applies regardless of the setting in p0854 and even in the case of free telegram configuration (p0922 = 999).

p0857 Power unit monitoring time / PU t_monit

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 8760, 8864, 8964
Min:	**Max:**	**Factory setting:**
100.0 [ms]	60000.0 [ms]	10000.0 [ms]

Description: Sets the monitoring time for the power unit.

The monitoring time is started after an 0/1 edge of the ON/OFF1 command. If the power unit does not return a READY signal within the monitoring time, fault F07802 is output.

Dependency: See also: F07802, F07840, F30027

NOTICE

The maximum time to precharge the DC link is monitored in the power unit and cannot be changed. The maximum precharging duration depends on the power unit.

The monitoring time for the precharging is started after the ON command (BI: p0840 = 0/1 signal). Fault F30027 is output when the maximum precharging duration is exceeded.

Note

The factory setting for p0857 depends on the power unit.

The monitoring time for the ready signal of the power unit includes the time to precharge the DC link and, if relevant, the de-bounce time of the contactors.

If an excessively low value is entered into p0857, then after enable, this results in the corresponding fault.

p0860 BI: Line contactor feedback signal / Line contact feedb

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 2634
Min:	**Max:**	**Factory setting:**
-	-	863.1

Description: Sets the signal source for the feedback signal from the line contactor.

Recommendation: When the monitoring is activated (BI: p0860 not equal to r0863.1), then to control the line contactor, signal BO: r0863.1 of its own drive object should be used.

Dependency: See also: p0861, r0863

See also: F07300

NOTICE

The line contactor monitoring is deactivated if the control signal of the particular drive object is set as the signal source for the feedback signal of the line contactor (BI: p0860 = r0863.1).

Note

The state of the line contactor is monitored depending on signal BO: r0863.1.

When the monitoring is activated (BI: p0860 not equal to r0863.1), fault F07300 is then also output if the contactor is closed before it is controlled using r0863.1.

p0861 Line contactor monitoring time / LineContact t_mon

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 2634
Min:	**Max:**	**Factory setting:**
0 [ms]	5000 [ms]	100 [ms]

Description: Sets the monitoring time of the line contactor.

This time starts each time that the line contactor switches (r0863.1). If a feedback signal is not received from the line contactor within the time, a message is output.

Dependency: See also: p0860, r0863
See also: F07300

Note
The monitoring function is disabled for the factory setting of p0860.

r0863.0...1 CO/BO: Drive coupling status word/control word / CoupleZSW/STW

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display and BICO output for the status word and control word of the drive coupling.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Closed-loop control operation	Yes	No	-
01	Energize contactor	Yes	No	2634

Note
For bit 01:
Bit 1 is used to control an external line contactor.

p0867 Power unit main contactor holding time after OFF1 / PU t_MC after OFF1

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.0 [ms]	500.0 [ms]	50.0 [ms]

Description: Sets the main contactor holding time after OFF1

Dependency: See also: p0869

Note
After withdrawing the OFF1 enable (source of p0840), the main contactor is opened after the main contactor holding time has elapsed.
For p0869 = 1 (keep main contactor closed for STO), after withdrawing STO, the switching on inhibited must be acknowledged via the source of p0840 = 0 (OFF1) – and before the main contactor holding time expires, should go back to 1, otherwise the main contactor will open.
When operating a drive connected to SINUMERIK, which only closes the main contactor with the OFF1 command (blocksize, chassis), p0867 should be set as a minimum to 50 ms.

p0868 Power unit thyristor rectifier wait time / PU thy_rect t

G120XA_USS (PM330)

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0 [ms]	65000 [ms]	0 [ms]

Description: Sets the debounce time for the DC circuit breaker for power units in the "chassis" format.

Dependency: The parameter is only active for PM330 power units.

Note
The following applies if p0868 = 65000 ms:
The debounce time defined internally in the power unit's EEPROM is implemented.

p0869 Sequence control configuration / Seq_ctrl config

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	0000 bin

Description: Sets the configuration for the sequence control.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Keep main contactor closed for STO	Yes	No	-

Dependency: See also: p0867

Note

For bit 00:

After withdrawing the OFF1 enable (source of p0840), the main contactor is opened after the main contactor holding time has elapsed.

For p0869.0 = 1, after withdrawing STO, the switching on inhibited must be acknowledged via the source of p0840 = 0 (OFF1) – and before the main contactor holding time expires (p0867), should go back to 1, otherwise the main contactor will open.

p0870 BI: Close main contactor / Close main cont

Access level: 2	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source to close the main contactor.

Note

The main contactor is also closed when the converter is switched on after issuing the necessary enable signals. A binector input p0870 = 1 signal prevents the main contactor from being opened when enable signals are withdrawn.

r0898.0...10 CO/BO: Control word sequence control / STW seq_ctrl

Access level: 2	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 2501
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display and connector output for the control word of the sequence control.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	ON/OFF1	Yes	No	-
01	OC / OFF2	Yes	No	-
02	OC / OFF3	Yes	No	-
03	Enable operation	Yes	No	-
04	Enable ramp-function generator	Yes	No	-
05	Continue ramp-function generator	Yes	No	-
06	Enable speed setpoint	Yes	No	-
08	Jog 1	Yes	No	3001
09	Jog 2	Yes	No	3001
10	Master control by PLC	Yes	No	-

Note

OC: Operating condition

r0899.0...11 CO/BO: Status word sequence control / ZSW seq_ctrl

Access level: 2	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 2503
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display and BICO output for the status word of the sequence control.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Ready for switching on	Yes	No	-
01	Ready	Yes	No	-
02	Operation enabled	Yes	No	-
03	Jog active	Yes	No	-
04	No coasting active	OFF2 inactive	OFF2 active	-
05	No Quick Stop active	OFF3 inactive	OFF3 active	-
06	Switching on inhibited active	Yes	No	-
07	Drive ready	Yes	No	-
08	Controller enable	Yes	No	-
09	Control request	Yes	No	-
11	Pulses enabled	Yes	No	-

Note
For bits 00, 01, 02, 04, 05, 06, 09:
For PROFIdrive, these signals are used for status word 1.

r0944 CO: Counter for fault buffer changes / Fault buff change

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 8060
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display and connector output for the counter for changes of the fault buffer.
This counter is incremented every time the fault buffer changes.

Recommendation: Used to check whether the fault buffer has been read out consistently.

Dependency: See also: r0945, r0947, r0948, r0949, r2109

r0945[0...63] Fault code / Fault code

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 8050, 8060
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the numbers of faults that have occurred.

Dependency: See also: r0947, r0948, r0949, r2109, r2130, r2133, r2136, r3120, r3122

NOTICE
The properties of the fault buffer should be taken from the corresponding product documentation.

Note
The buffer parameters are cyclically updated in the background (refer to status signal in r2139).
Fault buffer structure (general principle):
r0945[0], r0949[0], r0948[0], r2109[0] --> actual fault case, fault 1
. . .
r0945[7], r0949[7], r0948[7], r2109[7] --> actual fault case, fault 8
r0945[8], r0949[8], r0948[8], r2109[8] --> 1st acknowledged fault case, fault 1
. . .
r0945[15], r0949[15], r0948[15], r2109[15] --> 1st acknowledged fault case, fault 8
. . .
r0945[56], r0949[56], r0948[56], r2109[56] --> 7th acknowledged fault case, fault 1
. . .
r0945[63], r0949[63], r0948[63], r2109[63] --> 7th acknowledged fault case, fault 8

r0946[0...65534] Fault code list / Fault code list

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 8060
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Lists the fault codes stored in the drive unit.
The indices can only be accessed with a valid fault code.

Dependency: The parameter assigned to the fault code is entered in r0951 under the same index.

r0947[0...63] Fault number / Fault number

Access level: 2	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 8050, 8060
Min:	**Max:**	**Factory setting:**
-	-	-

Description: This parameter is identical to r0945.

r0948[0...63] Fault time received in milliseconds / t_fault recv ms

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 8050, 8060
Min:	**Max:**	**Factory setting:**
- [ms]	- [ms]	- [ms]

Description: Displays the system runtime in milliseconds when the fault occurred.

Dependency: See also: r0945, r0947, r0949, r2109, r2130, r2133, r2136, p8400

NOTICE
The time comprises r2130 (days) and r0948 (milliseconds).

Note
The buffer parameters are cyclically updated in the background (refer to status signal in r2139).
The structure of the fault buffer and the assignment of the indices is shown in r0945.
When the parameter is read via PROFIdrive, the TimeDifference data type applies.

r0949[0...63] Fault value / Fault value

Access level: 3	**Calculated:** -	**Data type:** Integer32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 8050, 8060
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays additional information about the fault that occurred (as integer number).

Dependency: See also: r0945, r0947, r0948, r2109, r2130, r2133, r2136, r3120, r3122

Note

The buffer parameters are cyclically updated in the background (refer to status signal in r2139).
The structure of the fault buffer and the assignment of the indices is shown in r0945.

p0952 Fault cases counter / Fault cases qty

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 6700, 8060
Min:	**Max:**	**Factory setting:**
0	65535	0

Description: Number of fault situations that have occurred since the last reset.

Dependency: The fault buffer is deleted (cleared) by setting p0952 to 0.
See also: r0945, r0947, r0948, r0949, r2109, r2130, r2133, r2136

r0964[0...6] Device identification / Device ident

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the device identification.

Index:
[0] = Company (Siemens = 42)
[1] = Device type
[2] = Firmware version
[3] = Firmware date (year)
[4] = Firmware date (day/month)
[5] = Number of drive objects
[6] = Firmware patch/hot fix

Note

Example:
r0964[0] = 42 --> SIEMENS
r0964[1] = device type, see below
r0964[2] = 403 --> first part of the firmware version V04.03 (for second part, refer to index 6)
r0964[3] = 2010 --> year 2010
r0964[4] = 1705 --> 17th of May
r0964[5] = 2 --> 2 drive objects
r0964[6] = 200 --> second part, firmware version (complete version: V04.03.02.00)
Device type:
r0964[1] = 5713 --> SINAMICS G120XA USS

p0969 System runtime relative / t_System relative

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 8050, 8060
Min:	**Max:**	**Factory setting:**
0 [ms]	4294967295 [ms]	0 [ms]

Description: Displays the system runtime in ms since the last POWER ON.

Note

The value in p0969 can only be reset to 0.

The value overflows after approx. 49 days.

When the parameter is read via PROFIdrive, the TimeDifference data type applies.

p0970 Reset drive parameters / Drive par reset

Access level: 1	**Calculated:** -	**Data type:** Unsigned16
Can be changed: C2(1, 30)	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	300	0

Description: The parameter is used to initiate the reset of the drive parameters.

Parameters p0100, p0205 are not reset.

The following motor parameters are defined in accordance with the power unit: p0300 ... p0311.

Value:

0:	Inactive
1:	Start a parameter reset
3:	Start download of volatile parameters from RAM
10:	Start loading the parameters saved with p0971=10
11:	Start loading the parameters saved with p0971=11
12:	Start loading the parameters saved with p0971=12
30:	Start loading the delivery state saved with p0971=30
100:	Start a BICO interconnection reset
300:	Only Siemens internal

NOTICE

After the value has been modified, no further parameter modifications can be made and the status is shown in r3996. Modifications can be made again when r3996 = 0.

Note

A factory setting run can only be started if p0010 was first set to 30 (parameter reset).

At the end of the calculations, p0970 is automatically set to 0.

Parameter reset is completed with p0970 = 0 and r3996[0] = 0.

The following generally applies:

One index of parameters p2100, p2101, p2118, p2119, p2126, p2127 is not reset, if a parameterized message is precisely active in this index.

p0971 Save parameters / Save par

Access level: 1	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	30	0

Description: Setting to save parameters in the non-volatile memory.

When saving, only the adjustable parameters intended to be saved are taken into account.

Value:

0:	Inactive
1:	Save drive object
10:	Save in non-volatile memory as setting 10
11:	Save in non-volatile memory as setting 11
12:	Save in non-volatile memory as setting 12
30:	State when delivered, save in non-volatile memory as setting 30

Dependency: See also: p0970, p1960, r3996

⚠ CAUTION

If a memory card (optional) is inserted – and the USB interface is not used, the following applies:
The parameters are also saved on the card and therefore overwrite any existing data!

NOTICE

The Control Unit power supply may only be switched off after data has been saved (i.e. after data save has been started, wait until the parameter again has the value 0).
Writing to parameters is inhibited while saving.
The progress while saving is displayed in r3996.
For p0971 = 30:
The original state when delivered is overwritten when executing this memory function.

Note

Parameters saved with p0971 = 10, 11, 12 can be loaded again with p0970 = 10, 11 or 12.
Identification and maintenance data (I&M data, p8806 and following) are only saved for p0971 = 1.

p0972 Drive unit reset / Drv_unit reset

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	3	0

Description: Sets the required procedure to execute a hardware reset for the drive unit.

Value:

0:	Inactive
1:	Hardware-Reset immediate
2:	Hardware reset preparation
3:	Hardware reset after cyclic communication has failed

⚠ DANGER

It must be absolutely ensured that the system is in a safe condition.
The memory card/device memory of the Control Unit must not be accessed.

Note
If value = 1:
Reset is immediately executed and communications interrupted.
After communications have been established, check the reset operation (refer below).
If value = 2:
Help to check the reset operation.
Firstly, set p0972 = 2 and then read back. Secondly, set p0972 = 1 (it is possible that this request is possibly no longer acknowledged). The communication is then interrupted.
After communications have been established, check the reset operation (refer below).
If value = 3:
The reset is executed after interrupting cyclic communication. This setting is used to implement a synchronized reset by a control for several drive units.
If cyclic communication is not active, then the reset is immediately executed.
After communications have been established, check the reset operation (refer below).
To check the reset operation:
After the drive unit has been restarted and communications have been established, read p0972 and check the following:
p0972 = 0? --> the reset was successfully executed.
p0972 = 0? --> the reset was not executed.

r0980[0...299] List of existing parameters 1 / List avail par 1

Access level: 4	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the parameters that exist for this drive.

Dependency: See also: r0981, r0989

Note
Modified parameters are displayed in indices 0 to 298. If an index contains the value 0, then the list ends here. In a long list, index 299 contains the parameter number at which position the list continues.
This list consists solely of the following parameters:
r0980[0...299], r0981[0...299] ... r0989[0...299]
The parameters in this list are not displayed in the expert list of the commissioning software. However, they can be read from a higher-level control system (e.g. PROFIBUS master).

r0981[0...299] List of existing parameters 2 / List avail par 2

Access level: 4	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the parameters that exist for this drive.

Dependency: See also: r0980, r0989

Note
Modified parameters are displayed in indices 0 to 298. If an index contains the value 0, then the list ends here. In a long list, index 299 contains the parameter number at which position the list continues.
This list consists solely of the following parameters:
r0980[0...299], r0981[0...299] ... r0989[0...299]
The parameters in this list are not displayed in the expert list of the commissioning software. However, they can be read from a higher-level control system (e.g. PROFIBUS master).

r0989[0...299] List of existing parameters 10 / List avail par 10

Access level: 4	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the parameters that exist for this drive.

Dependency: See also: r0980, r0981

Note

Modified parameters are displayed in indices 0 to 298. If an index contains the value 0, then the list ends here.
This list consists solely of the following parameters:
r0980[0...299], r0981[0...299] ... r0989[0...299]
The parameters in this list are not displayed in the expert list of the commissioning software. However, they can be read from a higher-level control system (e.g. PROFIBUS master).

r0990[0...99] List of modified parameters 1 / List chang par 1

Access level: 4	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays those parameters with a value other than the factory setting for this drive.

Dependency: See also: r0991, r0999

Note

Modified parameters are displayed in indices 0 to 98. If an index contains the value 0, then the list ends here. In a long list, index 99 contains the parameter number at which position the list continues.
This list consists solely of the following parameters:
r0990[0...99], r0991[0...99] ... r0999[0...99]
The parameters in this list are not displayed in the expert list of the commissioning software. However, they can be read from a higher-level control system (e.g. PROFIBUS master).

r0991[0...99] List of modified parameters 2 / List chang par 2

Access level: 4	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays those parameters with a value other than the factory setting for this drive.

Dependency: See also: r0990, r0999

Note

Modified parameters are displayed in indices 0 to 98. If an index contains the value 0, then the list ends here. In a long list, index 99 contains the parameter number at which position the list continues.
This list consists solely of the following parameters:
r0990[0...99], r0991[0...99] ... r0999[0...99]
The parameters in this list are not displayed in the expert list of the commissioning software. However, they can be read from a higher-level control system (e.g. PROFIBUS master).

r0999[0...99] List of modified parameters 10 / List chang par 10

Access level: 4	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays those parameters with a value other than the factory setting for this drive.

Dependency: See also: r0990, r0991

Note

Modified parameters are displayed in indices 0 to 98. If an index contains the value 0, then the list ends here.
This list consists solely of the following parameters:
r0990[0...99], r0991[0...99] ... r0999[0...99]
The parameters in this list are not displayed in the expert list of the commissioning software. However, they can be read from a higher-level control system (e.g. PROFIBUS master).

p1000[0...n] Speed setpoint selection / n_set sel

Access level: 1	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	200	2

Description: Sets the source for the speed setpoint.
For single-digit values, the following applies:
The value specifies the main setpoint.
For double-digit values, the following applies:
The left-hand digit specifies the supplementary setpoint, the right-hand digit the main setpoint.
Example:
Value = 26
--> The analog setpoint (2) supplies the supplementary setpoint.
--> The fieldbus (6) supplies the main setpoint.

Value:

0:	No main setpoint
1:	Motorized potentiometer
2:	Analog setpoint
3:	Fixed speed setpoint
6:	Fieldbus
7:	Analog setpoint 2
10:	Motor potentiometer + no main setpoint
11:	Motor potentiometer + motor potentiometer
12:	Motor potentiometer + analog setpoint
13:	Motor potentiometer + fixed speed setpoint
16:	Motor potentiometer + fieldbus
17:	Motor potentiometer + analog setpoint 2
20:	Analog setpoint + no main setpoint
21:	Analog setpoint + motor potentiometer
22:	Analog setpoint + analog setpoint
23:	Analog setpoint + fixed speed setpoint
26:	Analog setpoint + fieldbus
27:	Analog setpoint + analog setpoint 2
30:	Fixed speed setpoint + no main setpoint
31:	Fixed speed setpoint + motor potentiometer

32:	Fixed speed setpoint + analog setpoint
33:	Fixed speed setpoint + fixed speed setpoint
36:	Fixed speed setpoint + fieldbus
37:	Fixed speed setpoint + analog setpoint 2
60:	Fieldbus + no main setpoint
61:	Fieldbus + motor potentiometer
62:	Fieldbus + analog setpoint
63:	Fieldbus + fixed speed setpoint
66:	Fieldbus+fieldbus
67:	Fieldbus + analog setpoint 2
70:	Analog setpoint 2 + no main setpoint
71:	Analog setpoint 2 + motor potentiometer
72:	Analog setpoint 2 + analog setpoint
73:	Analog setpoint 2 + fixed speed setpoint
76:	Analog setpoint 2 + fieldbus
77:	Analog setpoint 2 + analog setpoint 2
200:	Analog output connection

Dependency: When changing this parameter, the following settings are influenced:
See also: p1070, p1071, p1075, p1076

> ⚠ **CAUTION**
> If p1000 is selected as the main setpoint of the fieldbus, the following BICO interconnection is set automatically:
> p2051[1] = r0063

p1001[0...n] CO: Fixed speed setpoint 1 / n_set_fixed 1

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** p2000	**Dynamic index:** DDS, p0180
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 3010
Min:	**Max:**	**Factory setting:**
-210000.000 [rpm]	210000.000 [rpm]	0.000 [rpm]

Description: Setting and connector output for fixed speed setpoint 1.

Dependency: See also: p1020, p1021, p1022, p1023, r1024, r1197

> **NOTICE**
> A BICO interconnection to a parameter that belongs to a drive data set always acts on the effective data set.

p1002[0...n] CO: Fixed speed setpoint 2 / n_set_fixed 2

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** p2000	**Dynamic index:** DDS, p0180
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 3010
Min:	**Max:**	**Factory setting:**
-210000.000 [rpm]	210000.000 [rpm]	0.000 [rpm]

Description: Setting and connector output for fixed speed setpoint 2.

Dependency: See also: p1020, p1021, p1022, p1023, r1024, r1197

> **NOTICE**
> A BICO interconnection to a parameter that belongs to a drive data set always acts on the effective data set.

p1003[0...n] CO: Fixed speed setpoint 3 / n_set_fixed 3

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** p2000	**Dynamic index:** DDS, p0180
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 3010
Min:	**Max:**	**Factory setting:**
-210000.000 [rpm]	210000.000 [rpm]	0.000 [rpm]

Description: Setting and connector output for fixed speed setpoint 3.

Dependency: See also: p1020, p1021, p1022, p1023, r1024, r1197

NOTICE
A BICO interconnection to a parameter that belongs to a drive data set always acts on the effective data set.

p1004[0...n] CO: Fixed speed setpoint 4 / n_set_fixed 4

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** p2000	**Dynamic index:** DDS, p0180
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 3010
Min:	**Max:**	**Factory setting:**
-210000.000 [rpm]	210000.000 [rpm]	0.000 [rpm]

Description: Setting and connector output for fixed speed setpoint 4.

Dependency: See also: p1020, p1021, p1022, p1023, r1024, r1197

NOTICE
A BICO interconnection to a parameter that belongs to a drive data set always acts on the effective data set.

p1005[0...n] CO: Fixed speed setpoint 5 / n_set_fixed 5

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** p2000	**Dynamic index:** DDS, p0180
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 3010
Min:	**Max:**	**Factory setting:**
-210000.000 [rpm]	210000.000 [rpm]	0.000 [rpm]

Description: Setting and connector output for fixed speed setpoint 5.

Dependency: See also: p1020, p1021, p1022, p1023, r1024, r1197

NOTICE
A BICO interconnection to a parameter that belongs to a drive data set always acts on the effective data set.

p1006[0...n] CO: Fixed speed setpoint 6 / n_set_fixed 6

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** p2000	**Dynamic index:** DDS, p0180
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 3010
Min:	**Max:**	**Factory setting:**
-210000.000 [rpm]	210000.000 [rpm]	0.000 [rpm]

Description: Setting and connector output for fixed speed setpoint 6.

Dependency: See also: p1020, p1021, p1022, p1023, r1024, r1197

NOTICE
A BICO interconnection to a parameter that belongs to a drive data set always acts on the effective data set.

p1007[0...n] CO: Fixed speed setpoint 7 / n_set_fixed 7

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** p2000	**Dynamic index:** DDS, p0180
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 3010
Min:	**Max:**	**Factory setting:**
-210000.000 [rpm]	210000.000 [rpm]	0.000 [rpm]

Description: Setting and connector output for fixed speed setpoint 7.

Dependency: See also: p1020, p1021, p1022, p1023, r1024, r1197

NOTICE
A BICO interconnection to a parameter that belongs to a drive data set always acts on the effective data set.

p1008[0...n] CO: Fixed speed setpoint 8 / n_set_fixed 8

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** p2000	**Dynamic index:** DDS, p0180
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 3010
Min:	**Max:**	**Factory setting:**
-210000.000 [rpm]	210000.000 [rpm]	0.000 [rpm]

Description: Setting and connector output for fixed speed setpoint 8.

Dependency: See also: p1020, p1021, p1022, p1023, r1024, r1197

NOTICE
A BICO interconnection to a parameter that belongs to a drive data set always acts on the effective data set.

p1009[0...n] CO: Fixed speed setpoint 9 / n_set_fixed 9

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** p2000	**Dynamic index:** DDS, p0180
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 3010
Min:	**Max:**	**Factory setting:**
-210000.000 [rpm]	210000.000 [rpm]	0.000 [rpm]

Description: Setting and connector output for fixed speed setpoint 9.

Dependency: See also: p1020, p1021, p1022, p1023, r1024, r1197

NOTICE
A BICO interconnection to a parameter that belongs to a drive data set always acts on the effective data set.

p1010[0...n] CO: Fixed speed setpoint 10 / n_set_fixed 10

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** p2000	**Dynamic index:** DDS, p0180
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 3010
Min:	**Max:**	**Factory setting:**
-210000.000 [rpm]	210000.000 [rpm]	0.000 [rpm]

Description: Setting and connector output for fixed speed setpoint 10.

Dependency: See also: p1020, p1021, p1022, p1023, r1024, r1197

NOTICE
A BICO interconnection to a parameter that belongs to a drive data set always acts on the effective data set.

p1011[0...n] CO: Fixed speed setpoint 11 / n_set_fixed 11

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** p2000	**Dynamic index:** DDS, p0180
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 3010
Min:	**Max:**	**Factory setting:**
-210000.000 [rpm]	210000.000 [rpm]	0.000 [rpm]

Description: Setting and connector output for fixed speed setpoint 11.

Dependency: See also: p1020, p1021, p1022, p1023, r1024, r1197

NOTICE
A BICO interconnection to a parameter that belongs to a drive data set always acts on the effective data set.

p1012[0...n] CO: Fixed speed setpoint 12 / n_set_fixed 12

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** p2000	**Dynamic index:** DDS, p0180
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 3010
Min:	**Max:**	**Factory setting:**
-210000.000 [rpm]	210000.000 [rpm]	0.000 [rpm]

Description: Setting and connector output for fixed speed setpoint 12.

Dependency: See also: p1020, p1021, p1022, p1023, r1024, r1197

NOTICE
A BICO interconnection to a parameter that belongs to a drive data set always acts on the effective data set.

p1013[0...n] CO: Fixed speed setpoint 13 / n_set_fixed 13

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** p2000	**Dynamic index:** DDS, p0180
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 3010
Min:	**Max:**	**Factory setting:**
-210000.000 [rpm]	210000.000 [rpm]	0.000 [rpm]

Description: Setting and connector output for fixed speed setpoint 13.

Dependency: See also: p1020, p1021, p1022, p1023, r1024, r1197

NOTICE
A BICO interconnection to a parameter that belongs to a drive data set always acts on the effective data set.

p1014[0...n] CO: Fixed speed setpoint 14 / n_set_fixed 14

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** p2000	**Dynamic index:** DDS, p0180
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 3010
Min:	**Max:**	**Factory setting:**
-210000.000 [rpm]	210000.000 [rpm]	0.000 [rpm]

Description: Setting and connector output for fixed speed setpoint 14.

Dependency: See also: p1020, p1021, p1022, p1023, r1024, r1197

NOTICE
A BICO interconnection to a parameter that belongs to a drive data set always acts on the effective data set.

p1015[0...n] CO: Fixed speed setpoint 15 / n_set_fixed 15

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** p2000	**Dynamic index:** DDS, p0180
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 3010
Min:	**Max:**	**Factory setting:**
-210000.000 [rpm]	210000.000 [rpm]	0.000 [rpm]

Description: Setting and connector output for fixed speed setpoint 15.

Dependency: See also: p1020, p1021, p1022, p1023, r1024, r1197

NOTICE
A BICO interconnection to a parameter that belongs to a drive data set always acts on the effective data set.

p1016 Fixed speed setpoint select mode / n_set_fix select

Access level: 2	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 3010, 3011
Min:	**Max:**	**Factory setting:**
1	2	1

Description: Sets the mode to select the fixed speed setpoint.

Value:
1: Direct
2: Binary

Note
For p1016 = 1:
In this mode, the setpoint is entered via the fixed speed setpoints p1001 ... p1004.
Up to 16 different setpoints are obtained by adding the individual fixed speed setpoints.
For p1016 = 2:
In this mode, the setpoint is entered via the fixed speed setpoints p1001 ... p1015.

p1020[0...n] BI: Fixed speed setpoint selection Bit 0 / n_set_fixed Bit 0

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 2505, 3010, 3011
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source for selecting the fixed speed setpoint.

Dependency: Selects the required fixed speed setpoint using p1020 ... p1023.
Displays the number of the actual fixed speed setpoint in r1197.
Sets the values for the fixed speed setpoints 1 ... 15 using p1001 ... p1015.
See also: p1021, p1022, p1023, r1197

Note
If a fixed speed setpoint has not been selected (p1020 ... p1023 = 0, r1197 = 0), then r1024 = 0 (setpoint = 0).

p1021[0...n] BI: Fixed speed setpoint selection Bit 1 / n_set_fixed Bit 1

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 2505, 3010, 3011
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source for selecting the fixed speed setpoint.

Dependency: Selects the required fixed speed setpoint using p1020 ... p1023.
Displays the number of the actual fixed speed setpoint in r1197.
Sets the values for the fixed speed setpoints 1 ... 15 using p1001 ... p1015.
See also: p1020, p1022, p1023, r1197

Note
If a fixed speed setpoint has not been selected (p1020 ... p1023 = 0, r1197 = 0), then r1024 = 0 (setpoint = 0).

p1022[0...n] BI: Fixed speed setpoint selection Bit 2 / n_set_fixed Bit 2

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 2505, 3010, 3011
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source for selecting the fixed speed setpoint.

Dependency: Selects the required fixed speed setpoint using p1020 ... p1023.
Displays the number of the actual fixed speed setpoint in r1197.
Sets the values for the fixed speed setpoints 1 ... 15 using p1001 ... p1015.
See also: p1020, p1021, p1023, r1197

Note
If a fixed speed setpoint has not been selected (p1020 ... p1023 = 0, r1197 = 0), then r1024 = 0 (setpoint = 0).

p1023[0...n] BI: Fixed speed setpoint selection Bit 3 / n_set_fixed Bit 3

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 2505, 3010, 3011
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source for selecting the fixed speed setpoint.

Dependency: Selects the required fixed speed setpoint using p1020 ... p1023.
Displays the number of the actual fixed speed setpoint in r1197.
Sets the values for the fixed speed setpoints 1 ... 15 using p1001 ... p1015.
See also: p1020, p1021, p1022, r1197

Note
If a fixed speed setpoint has not been selected (p1020 ... p1023 = 0, r1197 = 0), then r1024 = 0 (setpoint = 0).

r1024 CO: Fixed speed setpoint effective / Speed fixed setp

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p2000	**Dynamic index:** -
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 3001, 3010, 3011
Min:	**Max:**	**Factory setting:**
- [rpm]	- [rpm]	- [rpm]

Description: Display and connector output for the selected and active fixed speed setpoint.
This setpoint is the output value for the fixed speed setpoints and must be appropriately interconnected (e.g. with the main setpoint).

Recommendation: Interconnect the signal with the main setpoint (CI: p1070 = r1024).

Dependency: Selects the required fixed speed setpoint using p1020 ... p1023.
Displays the number of the actual fixed speed setpoint in r1197.
Sets the values for the fixed speed setpoints 1 ... 15 using p1001 ... p1015.
See also: p1070, r1197

Note
If a fixed speed setpoint has not been selected (p1020 ... p1023 = 0, r1197 = 0), then r1024 = 0 (setpoint = 0).

r1025.0 BO: Fixed speed setpoint status / n_setp_fix status

Access level: 3	**Calculated:** -	**Data type:** Unsigned8
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display and binector output for the status when selecting the fixed speed setpoints.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Fixed speed setpoint selected	Yes	No	3011

Dependency: See also: p1016

Note
For bit 00:
When the fixed speed setpoints are directly selected (p1016 = 1), this bit is set if at least 1 fixed speed setpoint is selected.

p1030[0...n] Motorized potentiometer configuration / Mop configuration

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 3020
Min:	**Max:**	**Factory setting:**
-	-	0000 0110 bin

Description: Sets the configuration for the motorized potentiometer.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Data save active	Yes	No	-
01	Automatic mode ramp-function generator active	Yes	No	-
02	Initial rounding-off active	Yes	No	-
03	Save in NVRAM active	Yes	No	-
04	Ramp-function generator always active	Yes	No	-

Note

For bit 00:

0: The setpoint for the motorized potentiometer is not saved and after ON is entered using p1040.

1: The setpoint for the motorized potentiometer is saved after OFF and after ON set to the saved value. In order to save in a non-volatile fashion, bit 03 should be set to 1.

For bit 01:

0: Without ramp-function generator in the automatic mode (ramp-up/ramp-down time = 0).

1: With ramp-function generator in the automatic mode.

For manual operation (0 signal via BI: p1041), the ramp-function generator is always active.

For bit 02:

0: Without initial rounding-off

1: With initial rounding-off. The selected ramp-up/down time is correspondingly exceeded. The initial rounding-off is a sensitive way of specifying small changes (progressive reaction when keys are pressed).

The jerk for the initial rounding-off is independent of the ramp-up time and only depends on the selected maximum speed (p1082). It is calculated as follows:

r = 0.01 % * p1082 [1/s] / 0.13^2 [s^2]

The jerk acts up until the maximum acceleration is reached (a_max = p1082 [1/s] / p1047 [s]), and then the drive continues to run linearly with a constant rate of acceleration. The higher the maximum acceleration (the lower that p1047 is), the longer the ramp-up time increases with respect to the set ramp-up time.

For bit 03:

0: Non-volatile data save deactivated.

1: The setpoint for the motorized potentiometer is saved in a non-volatile fashion (for bit 00 = 1).

For bit 04:

When the bit is set, the ramp-function generator is computed independent of the pulse enable. The actual output value of the motorized potentiometer is always in r1050.

p1035[0...n] BI: Motorized potentiometer setpoint raise / Mop raise

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 2505, 3020
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source to continually increase the setpoint for the motorized potentiometer.

The setpoint change (CO: r1050) depends on the set ramp-up time (p1047) and the duration of the signal that is present (BI: p1035).

Dependency: See also: p1036

p1036[0...n] BI: Motorized potentiometer lower setpoint / Mop lower

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 2505, 3020
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source to continuously lower the setpoint for the motorized potentiometer.

The setpoint change (CO: r1050) depends on the set ramp-down time (p1048) and the duration of the signal that is present (BI: p1036).

Dependency: See also: p1035

p1037[0...n] Motorized potentiometer maximum speed / MotP n_max

Access level: 3	**Calculated:** CALC_MOD_LIM_REF	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 3020
Min:	**Max:**	**Factory setting:**
-210000.000 [rpm]	210000.000 [rpm]	0.000 [rpm]

Description: Sets the maximum speed/velocity for the motorized potentiometer.

Note

This parameter is automatically pre-assigned in the commissioning phase.
The setpoint output from the motorized potentiometer is limited to this value (see function diagram 3020).

p1038[0...n] Motorized potentiometer minimum speed / MotP n_min

Access level: 3	**Calculated:** CALC_MOD_LIM_REF	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 3020
Min:	**Max:**	**Factory setting:**
-210000.000 [rpm]	210000.000 [rpm]	0.000 [rpm]

Description: Sets the minimum speed/velocity for the motorized potentiometer.

Note

This parameter is automatically pre-assigned in the commissioning phase.
The setpoint output from the motorized potentiometer is limited to this value (see function diagram 3020).

p1039[0...n] BI: Motorized potentiometer inversion / MotP inv

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 3020
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source to invert the minimum speed/velocity or the maximum speed/velocity for the motorized potentiometer.

Dependency: See also: p1037, p1038

Note

The inversion is only active during "motorized potentiometer raise" or "motorized potentiometer lower".

p1040[0...n] Motorized potentiometer starting value / Mop start value

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 3020
Min:	**Max:**	**Factory setting:**
-210000.000 [rpm]	210000.000 [rpm]	0.000 [rpm]

Description: Sets the starting value for the motorized potentiometer. This starting value becomes effective after the drive has been switched on.

Dependency: Only effective if p1030.0 = 0.

See also: p1030

p1041[0...n] BI: Motorized potentiometer manual/automatic / Mop manual/auto

Access level: 3 | **Calculated:** - | **Data type:** Unsigned32 / Binary
Can be changed: T | **Scaling:** - | **Dynamic index:** CDS, p0170
Unit group: - | **Unit selection:** - | **Function diagram:** 3020
Min: - | **Max:** - | **Factory setting:** 0

Description: Sets the signal source to change over from manual to automatic when using a motorized potentiometer.

In the manual mode, the setpoint is changed using two signals - raise and lower. In the automatic mode, the setpoint must be interconnected via a connector input.

Dependency: See also: p1030, p1035, p1036, p1042

Note
The effectiveness of the internal ramp-function generator can be set in automatic mode.

p1042[0...n] CI: Motorized potentiometer automatic setpoint / Mop auto setpoint

Access level: 3 | **Calculated:** - | **Data type:** Unsigned32 / FloatingPoint32
Can be changed: T | **Scaling:** p2000 | **Dynamic index:** CDS, p0170
Unit group: - | **Unit selection:** - | **Function diagram:** 3020
Min: - | **Max:** - | **Factory setting:** 0

Description: Sets the signal source for the setpoint of the motorized potentiometer in the automatic mode.

Dependency: See also: p1041

p1043[0...n] BI: Motorized potentiometer accept setting value / MotP acc set val

Access level: 3 | **Calculated:** - | **Data type:** Unsigned32 / Binary
Can be changed: T | **Scaling:** - | **Dynamic index:** CDS, p0170
Unit group: - | **Unit selection:** - | **Function diagram:** 3020
Min: - | **Max:** - | **Factory setting:** 0

Description: Sets the signal source to accept the setting value for the motorized potentiometer.

Dependency: See also: p1044

Note
The setting value (CI: p1044) becomes effective for a 0/1 edge of the setting command (BI: p1043).

p1044[0...n] CI: Motorized potentiometer setting value / Mop set val

Access level: 3 | **Calculated:** - | **Data type:** Unsigned32 / FloatingPoint32
Can be changed: T | **Scaling:** p2000 | **Dynamic index:** CDS, p0170
Unit group: - | **Unit selection:** - | **Function diagram:** 3020
Min: - | **Max:** - | **Factory setting:** 0

Description: Sets the signal source for the setting value for the motorized potentiometer.

Dependency: See also: p1043

Note
The setting value (CI: p1044) becomes effective for a 0/1 edge of the setting command (BI: p1043).

r1045 CO: Mot. potentiometer speed setp. in front of ramp-fct. gen. / Mop n_set bef RFG

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p2000	**Dynamic index:** -
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 3020
Min:	**Max:**	**Factory setting:**
- [rpm]	- [rpm]	- [rpm]

Description: Sets the effective setpoint in front of the internal motorized potentiometer ramp-function generator.

p1047[0...n] Motorized potentiometer ramp-up time / Mop ramp-up time

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 3020
Min:	**Max:**	**Factory setting:**
0.000 [s]	1000.000 [s]	10.000 [s]

Description: Sets the ramp-up time for the internal ramp-function generator for the motorized potentiometer.

The setpoint is changed from zero up to the speed/velocity limit (p1082) within this time (if no initial rounding-off has been activated).

Dependency: See also: p1030, p1048, p1082

Note

When the initial rounding-off is activated (p1030.2) the ramp-up time is correspondingly extended.

p1048[0...n] Motorized potentiometer ramp-down time / Mop ramp-down time

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 3020
Min:	**Max:**	**Factory setting:**
0.000 [s]	1000.000 [s]	10.000 [s]

Description: Sets the ramp-down time for the internal ramp-function generator for the motorized potentiometer.

The setpoint is changed from the speed/velocity limit (p1082) to zero within this time (if no initial rounding-off has been activated).

Dependency: See also: p1030, p1047, p1082

Note

The deceleration time is extended corresponding to the activated initial rounding-off (p1030.2).

r1050 CO: Motorized potentiometer setpoint after ramp-function generator / Mot poti setpoint

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p2000	**Dynamic index:** -
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 3001, 3020
Min:	**Max:**	**Factory setting:**
- [rpm]	- [rpm]	- [rpm]

Description: Sets the effective setpoint after the internal motorized potentiometer ramp-function generator.

This setpoint is the output value of the motorized potentiometer and must be appropriately interconnected onwards (e.g. with the main setpoint).

Recommendation: Interconnect the signal with main setpoint (p1070).

Dependency: See also: p1070

Note

For "With ramp-function generator", after an OFF1, OFF2, OFF3 or for a 0 signal via BI: p0852 (inhibit operation, suppress pulses) the ramp-function generator output (r1050) is set to the starting value (configuration via p1030.0).

p1051[0...n] CI: Speed limit RFG positive direction of rotation / n_limit RFG pos

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / FloatingPoint32
Can be changed: T	**Scaling:** p2000	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 3050
Min:	**Max:**	**Factory setting:**
-	-	1083[0]

Description: Sets the signal source for the speed limit of the positive direction on the ramp-function generator input.

Note
The OFF3 ramp-down time (p1135) is effective when the limit is reduced.

p1052[0...n] CI: Speed limit RFG negative direction of rotation / n_limit RFG neg

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / FloatingPoint32
Can be changed: T	**Scaling:** p2000	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 3050
Min:	**Max:**	**Factory setting:**
-	-	1086[0]

Description: Sets the signal source for the speed limit of the negative direction on the ramp-function generator input.

Note
The OFF3 ramp-down time (p1135) is effective when the limit is reduced.

p1055[0...n] BI: Jog bit 0 / Jog bit 0

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 2501, 3030
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source for jog 1.

Recommendation: When the setting for this binector input is changed, the motor can only be switched on by means of an appropriate signal change of the source.

Dependency: See also: p0840, p1058

NOTICE
The drive is enabled for jogging using BI: p1055 or BI: p1056.
The command "ON/OFF1" can be issued using BI: p0840 or using BI: p1055/p1056.
Only the signal source that was used to switch on can also be used to switch off again.

p1056[0...n] BI: Jog bit 1 / Jog bit 1

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 2501, 3030
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source for jog 2.

Recommendation: When the setting for this binector input is changed, the motor can only be switched on by means of an appropriate signal change of the source.

Dependency: See also: p0840, p1059

NOTICE
The drive is enabled for jogging using BI: p1055 or BI: p1056. The command "ON/OFF1" can be issued using BI: p0840 or using BI: p1055/p1056. Only the signal source that was used to switch on can also be used to switch off again.

p1058[0...n] Jog 1 speed setpoint / Jog 1 n_set

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 3001, 3030
Min:	**Max:**	**Factory setting:**
-210000.000 [rpm]	210000.000 [rpm]	150.000 [rpm]

Description: Sets the speed for jog 1.
Jogging (JOG) is level-triggered, and allows the motor to be incrementally traversed.

Dependency: See also: p1055, p1056

p1059[0...n] Jog 2 speed setpoint / Jog 2 n_set

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 3001, 3030
Min:	**Max:**	**Factory setting:**
-210000.000 [rpm]	210000.000 [rpm]	-150.000 [rpm]

Description: Sets the speed for jog 2.
Jogging (JOG) is level-triggered, and allows the motor to be incrementally traversed.

Dependency: See also: p1055, p1056

p1063[0...n] Setpoint channel speed limit / Setp_chan n_lim

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 3040
Min:	**Max:**	**Factory setting:**
0.000 [rpm]	210000.000 [rpm]	210000.000 [rpm]

Description: Sets the speed limit effective in the setpoint channel.

Dependency: See also: p1082, p1083, p1085, p1086, p1088

p1070[0...n] CI: Main setpoint / Main setpoint

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / FloatingPoint32
Can be changed: T	**Scaling:** p2000	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 3001, 3030
Min:	**Max:**	**Factory setting:**
-	-	[0] 755[0] [1] 0 [2] 0 [3] 0

Description: Sets the signal source for the main setpoint.
Examples:
r1024: Fixed speed setpoint effective
r1050: Motor. potentiometer setpoint after the ramp-function generator

Dependency: See also: p1071, r1073, r1078

p1071[0...n] CI: Main setpoint scaling / Main setp scal

Access level: 3
Calculated: -
Data type: Unsigned32 / FloatingPoint32
Can be changed: T
Scaling: PERCENT
Dynamic index: CDS, p0170
Unit group: -
Unit selection: -
Function diagram: 3001, 3030

Min:	Max:	Factory setting:
-	-	1

Description: Sets the signal source for scaling the main setpoint.

r1073 CO: Main setpoint effective / Main setpoint eff

Access level: 3
Calculated: -
Data type: FloatingPoint32
Can be changed: -
Scaling: p2000
Dynamic index: -
Unit group: 3_1
Unit selection: p0505
Function diagram: 3030

Min:	Max:	Factory setting:
- [rpm]	- [rpm]	- [rpm]

Description: Displays the effective main setpoint.
The value shown is the main setpoint after scaling.

p1075[0...n] CI: Supplementary setp / Suppl setp

Access level: 3
Calculated: -
Data type: Unsigned32 / FloatingPoint32
Can be changed: T
Scaling: p2000
Dynamic index: CDS, p0170
Unit group: -
Unit selection: -
Function diagram: 3001, 3030

Min:	Max:	Factory setting:
-	-	0

Description: Sets the signal source for the supplementary setpoint.
Dependency: See also: p1076, r1077, r1078

p1076[0...n] CI: Supplementary setpoint scaling / Suppl setp scal

Access level: 3
Calculated: -
Data type: Unsigned32 / FloatingPoint32
Can be changed: T
Scaling: PERCENT
Dynamic index: CDS, p0170
Unit group: -
Unit selection: -
Function diagram: 3001, 3030

Min:	Max:	Factory setting:
-	-	1

Description: Sets the signal source for scaling the supplementary setpoint.

r1077 CO: Supplementary setpoint effective / Suppl setpoint eff

Access level: 3
Calculated: -
Data type: FloatingPoint32
Can be changed: -
Scaling: p2000
Dynamic index: -
Unit group: 3_1
Unit selection: p0505
Function diagram: 3030

Min:	Max:	Factory setting:
- [rpm]	- [rpm]	- [rpm]

Description: Displays the effective supplementary setpoint. The value shown is the additional setpoint after scaling.

r1078 CO: Total setpoint effective / Total setpoint eff

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p2000	**Dynamic index:** -
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 3030
Min:	**Max:**	**Factory setting:**
- [rpm]	- [rpm]	- [rpm]

Description: Displays the total effective setpoint.

The value indicates the sum of the effective main setpoint and supplementary setpoint.

Note

If the fixed speed setpoint is the source for the speed setpoint, then when the extended service mode is activated (r3889.0 = 1) fixed speed setpoint 15 is displayed.

p1080[0...n] Minimum speed / n_min

Access level: 1	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: C2(1), T	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 3050, 8022
Min:	**Max:**	**Factory setting:**
0.000 [rpm]	19500.000 [rpm]	0.000 [rpm]

Description: Sets the lowest possible motor speed.

This value is not undershot in operation.

Dependency: See also: p1106

⚠ WARNING
The minimum speed is preassigned to 20% of the rated motor speed. After all of the enable signal have been switched on, with the appropriate direction specified, the motor accelerates to this minimum speed.

NOTICE
The effective minimum speed is formed from p1080 and p1106.

Note

The parameter value applies for both motor directions.

In exceptional cases, the motor can operate below this value (e.g. when reversing).

p1081 Maximum speed scaling / n_max scal

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 3050, 3095
Min:	**Max:**	**Factory setting:**
100.00 [%]	105.00 [%]	100.00 [%]

Description: Sets the scaling for the maximum speed (p1082).

For a higher-level speed control, this scaling allows the maximum speed to be briefly exceeded.

Dependency: See also: p1082

NOTICE
Continuous operation above a scaling of 100 % is not permitted.

p1082[0...n] Maximum speed / n_max

Access level: 1	**Calculated:** CALC_MOD_ALL	**Data type:** FloatingPoint32
Can be changed: C2(1), T	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 3020, 3050, 3070
Min:	**Max:**	**Factory setting:**
0.000 [rpm]	210000.000 [rpm]	1500.000 [rpm]

Description: Sets the highest possible speed.

Example:

Induction motor p0310 = 50 / 60 Hz without output filter and Blocksize power unit

p1082 <= 60 x 240 Hz / r0313 (vector control)

p1082 <= 60 x 550 Hz / r0313 (U/f control)

Dependency: For vector control, the maximum speed is restricted to 60.0 / (8.333 x 500 µs x r0313). This can be identified by a reduction in r1084. p1082 is not changed in this process due to the fact that the operating mode p1300 can be changed over.

If a sine-wave filter (p0230 = 3) is parameterized as output filter, then the maximum speed is limited corresponding to the maximum permissible filter output frequency (refer to the filter data sheet). When using sine-wave filters (p0230 = 3, 4), the maximum speed r1084 is limited to 70% of the resonant frequency of the filter capacitance and the motor leakage inductance.

For reactors and dU/dt filters, it is limited to 120 Hz / r0313.

See also: p0230, r0313, p0322

NOTICE
After the value has been modified, no further parameter modifications can be made and the status is shown in r3996. Modifications can be made again when r3996 = 0.

Note

The parameter applies for both motor directions.

The parameter has a limiting effect and is the reference quantity for all ramp-up and ramp-down times (e.g. down ramps, ramp-function generator, motor potentiometer).

The parameter is part of the quick commissioning (p0010 = 1); this means that it is appropriately pre-assigned when changing p0310, p0311, p0322.

The following limits are always effective for p1082:

p1082 <= 60 x minimum (15 x p0310, 550 Hz) / r0313

p1082 <= 60 x maximum power unit pulse frequency / (k x r0313), with k = 12 (vector control), k = 6.5 (U/f control)

During automatic calculation (p0340 = 1, p3900 > 0), the parameter value is assigned the maximum motor speed (p0322). For p0322 = 0 the rated motor speed (p0311) is used as default (pre-assignment) value. For induction motors, the synchronous no-load speed is used as the default value (p0310 x 60 / r0313).

For synchronous motors, the following additionally applies:

During automatic calculation (p0340, p3900), p1082 is limited to speeds where the EMF does not exceed the DC link voltage.

p1082 is also available in the quick commissioning (p0010 = 1); this means that when exiting via p3900 > 0, the value is not changed.

p1082[0...n] Maximum speed / n_max

G120XA_USS (PM330)

Access level: 1	**Calculated:** CALC_MOD_ALL	**Data type:** FloatingPoint32
Can be changed: C2(1), T	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 3020, 3050, 3070
Min:	**Max:**	**Factory setting:**
0.000 [rpm]	210000.000 [rpm]	1500.000 [rpm]

Description: Sets the highest possible speed setpoint.

Dependency: The maximum speed is limited to: p1082 <= 60 x 150 Hz / r0313

See also: p0230, p0310, r0313, p0322

NOTICE
After the value has been modified, no further parameter modifications can be made and the status is shown in r3996. Modifications can be made again when r3996 = 0.

Note

The parameter applies for both motor directions.

The parameter has a limiting effect and is the reference quantity for all ramp-up and ramp-down times (e.g. down ramps, ramp-function generator, motor potentiometer).

The parameter is part of the quick commissioning (p0010 = 1); this means that it is appropriately pre-assigned when changing p0310, p0311 and p0322 (p0310 x 60 / r0313, for p0322 = 0).

p1083[0...n] CO: Speed limit in positive direction of rotation / n_limit pos

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** p2000	**Dynamic index:** DDS, p0180
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 3050
Min:	**Max:**	**Factory setting:**
0.000 [rpm]	210000.000 [rpm]	210000.000 [rpm]

Description: Sets the maximum speed for the positive direction.

NOTICE
A BICO interconnection to a parameter that belongs to a drive data set always acts on the effective data set.

r1084 CO: Speed limit positive effective / n_limit pos eff

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p2000	**Dynamic index:** -
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 3050, 7958
Min:	**Max:**	**Factory setting:**
- [rpm]	- [rpm]	- [rpm]

Description: Display and connector output for the active positive speed limit.

Dependency: See also: p1082, p1083, p1085

Note

Vector control: r1084 <= 60 x 240 Hz / r0313

p1085[0...n] CI: Speed limit in positive direction of rotation / n_limit pos

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / FloatingPoint32
Can be changed: T	**Scaling:** p2000	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 3050
Min:	**Max:**	**Factory setting:**
-	-	1083[0]

Description: Sets the signal source for the speed limit of the positive direction.

p1086[0...n] CO: Speed limit in negative direction of rotation / n_limit neg

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** p2000	**Dynamic index:** DDS, p0180
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 3050
Min:	**Max:**	**Factory setting:**
-210000.000 [rpm]	0.000 [rpm]	-210000.000 [rpm]

Description: Sets the speed limit for the negative direction.

NOTICE
A BICO interconnection to a parameter that belongs to a drive data set always acts on the effective data set.

r1087 CO: Speed limit negative effective / n_limit neg eff

Access level: 3 | **Calculated:** - | **Data type:** FloatingPoint32
Can be changed: - | **Scaling:** p2000 | **Dynamic index:** -
Unit group: 3_1 | **Unit selection:** p0505 | **Function diagram:** 3050, 7958
Min: - [rpm] | **Max:** - [rpm] | **Factory setting:** - [rpm]

Description: Display and connector output for the active negative speed limit.

Dependency: See also: p1082, p1086, p1088

Note
Vector control: r1087 >= -60 x 240 Hz / r0313

p1088[0...n] CI: Speed limit in negative direction of rotation / n_limit neg

Access level: 3 | **Calculated:** - | **Data type:** Unsigned32 / FloatingPoint32
Can be changed: T | **Scaling:** p2000 | **Dynamic index:** CDS, p0170
Unit group: - | **Unit selection:** - | **Function diagram:** 3050
Min: - | **Max:** - | **Factory setting:** 1086[0]

Description: Sets the signal source for the speed/velocity limit of the negative direction.

p1091[0...n] Skip speed 1 / n_skip 1

Access level: 3 | **Calculated:** - | **Data type:** FloatingPoint32
Can be changed: T, U | **Scaling:** p2000 | **Dynamic index:** DDS, p0180
Unit group: 3_1 | **Unit selection:** p0505 | **Function diagram:** 3050
Min: 0.000 [rpm] | **Max:** 210000.000 [rpm] | **Factory setting:** 0.000 [rpm]

Description: Sets skip speed 1.

Dependency: See also: p1092, p1093, p1094, p1101

NOTICE
Skip bandwidths can also become ineffective as a result of the downstream limits in the setpoint channel.

Note
The skip (suppression) speeds can be used to prevent the effects of mechanical resonance.

p1092[0...n] Skip speed 2 / n_skip 2

Access level: 3 | **Calculated:** - | **Data type:** FloatingPoint32
Can be changed: T, U | **Scaling:** p2000 | **Dynamic index:** DDS, p0180
Unit group: 3_1 | **Unit selection:** p0505 | **Function diagram:** 3050
Min: 0.000 [rpm] | **Max:** 210000.000 [rpm] | **Factory setting:** 0.000 [rpm]

Description: Sets skip speed 2.

Dependency: See also: p1091, p1093, p1094, p1101

NOTICE
Skip bandwidths can also become ineffective as a result of the downstream limits in the setpoint channel.

p1093[0...n] Skip speed 3 / n_skip 3

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** p2000	**Dynamic index:** DDS, p0180
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 3050
Min:	**Max:**	**Factory setting:**
0.000 [rpm]	210000.000 [rpm]	0.000 [rpm]

Description: Sets skip speed 3.

Dependency: See also: p1091, p1092, p1094, p1101

NOTICE
Skip bandwidths can also become ineffective as a result of the downstream limits in the setpoint channel.

p1094[0...n] Skip speed 4 / n_skip 4

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** p2000	**Dynamic index:** DDS, p0180
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 3050
Min:	**Max:**	**Factory setting:**
0.000 [rpm]	210000.000 [rpm]	0.000 [rpm]

Description: Sets skip speed 4.

Dependency: See also: p1091, p1092, p1093, p1101

NOTICE
Skip bandwidths can also become ineffective as a result of the downstream limits in the setpoint channel.

p1098[0...n] CI: Skip speed scaling / n_skip scal

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / FloatingPoint32
Can be changed: T	**Scaling:** PERCENT	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 3050
Min:	**Max:**	**Factory setting:**
-	-	1

Description: Sets the signal source for scaling the skip speeds.

Dependency: See also: p1091, p1092, p1093, p1094

r1099.0 CO/BO: Skip band status word / Skip band ZSW

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display and BICO output for the skip bands.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	r1170 within the skip band	Yes	No	3050

Dependency: See also: r1170

Note
For bit 00:
With the bit set, the setpoint speed is within the skip band after the ramp-function generator (r1170).
The signal can be used to switch over the drive data set (DDS).

p1101[0...n] Skip speed bandwidth / n_skip bandwidth

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** p2000	**Dynamic index:** DDS, p0180
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 3050
Min:	**Max:**	**Factory setting:**
0.000 [rpm]	210000.000 [rpm]	0.000 [rpm]

Description: Sets the bandwidth for the skip speeds/velocities 1 to 4.

Dependency: See also: p1091, p1092, p1093, p1094

Note

The setpoint (reference) speeds are skipped (suppressed) in the range of the skip speed +/-p1101.
Steady-state operation is not possible in the skipped (suppressed) speed range. The skip (suppression) range is skipped.
Example:
p1091 = 600 and p1101 = 20
--> setpoint speeds between 580 and 620 [rpm] are skipped.
For the skip bandwidths, the following hysteresis behavior applies:
For a setpoint speed coming from below, the following applies:
r1170 < 580 [rpm] and 580 [rpm] <= r1114 <= 620 [rpm] --> r1119 = 580 [rpm]
For a setpoint speed coming from above, the following applies:
r1170 > 620 [rpm] and 580 [rpm] <= r1114 <= 620 [rpm] --> r1119 = 620 [rpm]

p1106[0...n] CI: Minimum speed signal source / n_min s_s

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / FloatingPoint32
Can be changed: T	**Scaling:** p2000	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 3050
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source for lowest possible motor speed.

Dependency: See also: p1080

NOTICE
The effective minimum speed is formed from p1080 and p1106.

p1108[0...n] BI: Total setpoint selection / Total setp sel

Access level: 4	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 3030
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source to select the total setpoint.

Dependency: The selection of the total speed setpoint is automatically interconnected to the status word of the technology controller (r2349.4) if the technology controller is selected (p2200 > 0) and operated in the mode p2251 = 0.

If the "hibernation mode" function is activated (p2398 = 1), an interconnection is made to r2399.7.

See also: p1109

⚠ CAUTION
If the technology controller is to supply the total setpoint using p1109, then it is not permissible to disable the interconnection to its status word (r2349.4). If the "hibernation mode" function is activated, then it is not permissible to disable the interconnection to status word r2399.

p1109[0...n] CI: Total setpoint / Total setp

Access level: 4	**Calculated:** -	**Data type:** Unsigned32 / FloatingPoint32
Can be changed: T	**Scaling:** p2000	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 3030
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source for the total setpoint.

For p1108 = 1 signal, the total setpoint is read in via p1109.

Dependency: The signal source of the total setpoint is automatically interconnected to the output of the technology controller (r2294) if the technology controller is selected (p2200 > 0) and operated in the mode p2251 = 0.

If the "hibernation mode" function is activated (p2398 = 1), an interconnection is made to r2397[0].

See also: p1108

> ⚠ **CAUTION**
>
> If the technology controller is to supply the total setpoint using p1109, then it is not permissible to disable the interconnection to its output (r2294).
> If the "hibernation mode" function is activated, then it is not permissible to withdraw the interconnection to setpoint r2397[0].

p1110[0...n] BI: Inhibit negative direction / Inhib neg dir

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 2505, 3040
Min:	**Max:**	**Factory setting:**
-	-	1

Description: Sets the signal source to disable the negative direction.

Dependency: See also: p1111

p1111[0...n] BI: Inhibit positive direction / Inhib pos dir

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 2505, 3040
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source to disable the positive direction.

Dependency: See also: p1110

r1112 CO: Speed setpoint after minimum limiting / n_set aft min_lim

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p2000	**Dynamic index:** -
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 3050
Min:	**Max:**	**Factory setting:**
- [rpm]	- [rpm]	- [rpm]

Description: Displays the speed setpoint after the minimum limiting.

Dependency: See also: p1091, p1092, p1093, p1094, p1101

p1113[0...n] BI: Setpoint inversion / Setp inv

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 2441, 2442, 2505, 3040
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source to invert the setpoint.

Dependency: See also: r1198

⚠ CAUTION

If the technology controller is being used as the speed main setpoint (p2251 = 0), do not invert the setpoint using p1113 when the technology controller is enabled because this can cause the speed to change suddenly and lead to positive couplings in the control loop.

r1114 CO: Setpoint after the direction limiting / Setp after limit

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p2000	**Dynamic index:** -
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 3001, 3040, 3050
Min:	**Max:**	**Factory setting:**
- [rpm]	- [rpm]	- [rpm]

Description: Displays the speed/velocity setpoint after the changeover and limiting the direction.

r1119 CO: Ramp-function generator setpoint at the input / RFG setp at inp

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p2000	**Dynamic index:** -
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 3050, 3070, 6300, 8022
Min:	**Max:**	**Factory setting:**
- [rpm]	- [rpm]	- [rpm]

Description: Displays the setpoint at the input of the ramp-function generator.

Note

The setpoint is influenced by other functions, e.g. skip (suppressed) speeds, minimum and maximum limits.

p1120[0...n] Ramp-function generator ramp-up time / RFG ramp-up time

Access level: 1	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: C2(1), T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 3070
Min:	**Max:**	**Factory setting:**
0.000 [s]	999999.000 [s]	10.000 [s]

Description: The ramp-function generator ramps-up the speed setpoint from standstill (setpoint = 0) up to the maximum speed (p1082) in this time.

Dependency: See also: p1082, p1123

Note

The ramp-up time can be scaled via connector input p1138.

The parameter is adapted during the rotating measurement (p1960 > 0). This is the reason that during the rotating measurement, the motor can accelerate faster than was originally parameterized.

For U/f control and sensorless vector control (see p1300), a ramp-up time of 0 s does not make sense. The setting should be based on the startup times (r0345) of the motor.

p1120[0...n] Ramp-function generator ramp-up time / RFG ramp-up time

G120XA_USS (PM330)

Access level: 1	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: C2(1), T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 3070
Min:	**Max:**	**Factory setting:**
0.000 [s]	999999.000 [s]	20.000 [s]

Description: The ramp-function generator ramps-up the speed setpoint from standstill (setpoint = 0) up to the maximum speed (p1082) in this time.

Dependency: See also: p1082, p1123

Note

The ramp-up time can be scaled via connector input p1138.

The parameter is adapted during the rotating measurement (p1960 > 0). This is the reason that during the rotating measurement, the motor can accelerate faster than was originally parameterized.

For U/f control and sensorless vector control (see p1300), a ramp-up time of 0 s does not make sense. The setting should be based on the startup times (r0345) of the motor.

p1121[0...n] Ramp-function generator ramp-down time / RFG ramp-down time

Access level: 1	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: C2(1), T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 3070
Min:	**Max:**	**Factory setting:**
0.000 [s]	999999.000 [s]	10.000 [s]

Description: Sets the ramp-down time for the ramp-function generator.

The ramp-function generator ramps-down the speed setpoint from the maximum speed (p1082) down to standstill (setpoint = 0) in this time.

Further, the ramp-down time is always effective for OFF1.

Dependency: See also: p1082, p1127

Note

For U/f control and sensorless vector control (see p1300), a ramp-down time of 0 s does not make sense. The setting should be based on the startup times (r0345) of the motor.

p1121[0...n] Ramp-function generator ramp-down time / RFG ramp-down time

G120XA_USS (PM330)

Access level: 1	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: C2(1), T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 3070
Min:	**Max:**	**Factory setting:**
0.000 [s]	999999.000 [s]	30.000 [s]

Description: Sets the ramp-down time for the ramp-function generator.

The ramp-function generator ramps-down the speed setpoint from the maximum speed (p1082) down to standstill (setpoint = 0) in this time.

Further, the ramp-down time is always effective for OFF1.

Dependency: The parameter is pre-assigned depending on the size of the power unit.

See also: p1082, p1127

Note

For U/f control and sensorless vector control (see p1300), a ramp-down time of 0 s does not make sense. The setting should be based on the startup times (r0345) of the motor.

p1122[0...n] BI: Bypass ramp-function generator / Bypass RFG

Access level: 4	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T, U	**Scaling:** -	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 2505
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source for bypassing the ramp generator (ramp-up and ramp-down times = 0).

⚠ CAUTION

If the technology controller is operated in mode p2251 = 0 (technology controller as main speed setpoint), or the "hibernation mode" function is activated, then it is not permissible to disable the interconnection to the relevant status word (r2349, r2399).

NOTICE

The parameter may be protected as a result of p0922 or p2079 and cannot be changed.

Note

In the case of sensorless vector control, the ramp-function generator must not be bypassed, other than indirectly by means of interconnection with r2349 or r2399.

p1123[0...n] Ramp-function generator minimum ramp-up time / RFG t_RU min

Access level: 4	**Calculated:** CALC_MOD_ALL	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.000 [s]	999999.000 [s]	0.000 [s]

Description: Sets the minimum ramp-up time.

The ramp-up time (p1120) is limited internally to this minimum value.

Dependency: See also: p1082

Note

The setting should be based on the startup times (r0345) of the motor.

If the maximum speed p1082 changes, p1123 is re-calculated.

p1127[0...n] Ramp-function generator minimum ramp-down time / RFG t_RD min

Access level: 3	**Calculated:** CALC_MOD_ALL	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.000 [s]	999999.000 [s]	0.000 [s]

Description: Sets the minimum ramp-down time.

The ramp-down time (p1121) is limited internally to this minimum value.

The parameter cannot be set shorter than the minimum ramp-up time (p1123).

Dependency: See also: p1082

Note

For U/f control and sensorless vector control (see p1300), a ramp-down time of 0 s does not make sense. The setting should be based on the startup times (r0345) of the motor.

If the maximum speed p1082 changes, p1127 is re-calculated.

If a braking resistor is connected to the DC link (p0219 > 0), then the minimum ramp-down time is automatically adapted using p1127.

p1130[0...n] Ramp-function generator initial rounding-off time / RFG t_start_round

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 3070
Min:	**Max:**	**Factory setting:**
0.000 [s]	30.000 [s]	0.000 [s]

Description: Sets the initial rounding-off time for the extended ramp generator. The value applies to ramp-up and ramp-down.

Note

Rounding-off times avoid an abrupt response and prevent damage to the mechanical system.
Rounding off is not active if the technology controller is used as main speed setpoint (p2251 = 0).

p1130[0...n] Ramp-function generator initial rounding-off time / RFG t_start_round

G120XA_USS (PM330)

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 3070
Min:	**Max:**	**Factory setting:**
0.000 [s]	30.000 [s]	2.000 [s]

Description: Sets the initial rounding-off time for the extended ramp generator. The value applies to ramp-up and ramp-down.

Note

Rounding-off times avoid an abrupt response and prevent damage to the mechanical system.
Rounding off is not active if the technology controller is used as main speed setpoint (p2251 = 0).

p1131[0...n] Ramp-function generator final rounding-off time / RFG t_end_delay

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 3070
Min:	**Max:**	**Factory setting:**
0.000 [s]	30.000 [s]	0.000 [s]

Description: Sets the final rounding-off time for the extended ramp generator.
The value applies to ramp-up and ramp-down.

Note

Rounding-off times avoid an abrupt response and prevent damage to the mechanical system.
Rounding off is not active if the technology controller is used as main speed setpoint (p2251 = 0).

p1131[0...n] Ramp-function generator final rounding-off time / RFG t_end_delay

G120XA_USS (PM330)

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 3070
Min:	**Max:**	**Factory setting:**
0.000 [s]	30.000 [s]	3.000 [s]

Description: Sets the final rounding-off time for the extended ramp generator.
The value applies to ramp-up and ramp-down.

Note

Rounding-off times avoid an abrupt response and prevent damage to the mechanical system.
Rounding off is not active if the technology controller is used as main speed setpoint (p2251 = 0).

p1134[0...n] Ramp-function generator rounding-off type / RFG round-off type

Access level: 2	**Calculated:** -	**Data type:** Integer16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 3070
Min:	**Max:**	**Factory setting:**
0	1	0

Description: Sets the smoothed response to the OFF1 command or the reduced setpoint for the extended ramp-function generator.

Value:
0: Continuous smoothing
1: Discontinuous smoothing

Dependency: No effect up to initial rounding-off time (p1130) > 0 s.

Note

p1134 = 0 (continuous smoothing)

If the setpoint is reduced while ramping-up, initially a final rounding-off is carried out and then the ramp-up completed. During the final rounding-off, the output of the ramp-function generator continues to go in the direction of the previous setpoint (overshoot). After the final rounding-off has been completed, the output goes toward the new setpoint.

p1134 = 1 (discontinuous smoothing)

If the setpoint is reduced while ramping-up, then the output goes immediately in the direction of the new setpoint. For the setpoint change there is no rounding-off.

p1135[0...n] OFF3 ramp-down time / OFF3 t_RD

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: C2(1), T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 3070
Min:	**Max:**	**Factory setting:**
0.000 [s]	5400.000 [s]	0.000 [s]

Description: Sets the ramp-down time from the maximum speed down to zero speed for the OFF3 command.

Note

This time can be exceeded if the DC link voltage reaches its maximum value.

p1135[0...n] OFF3 ramp-down time / OFF3 t_RD

G120XA_USS (PM330)

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: C2(1), T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 3070
Min:	**Max:**	**Factory setting:**
0.000 [s]	5400.000 [s]	3.000 [s]

Description: Sets the ramp-down time from the maximum speed down to zero speed for the OFF3 command.

Dependency: The parameter is pre-assigned depending on the size of the power unit.

Note

This time can be exceeded if the DC link voltage reaches its maximum value.

p1136[0...n] OFF3 initial rounding-off time / RFGOFF3 t_strt_rnd

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 3070
Min:	**Max:**	**Factory setting:**
0.000 [s]	30.000 [s]	0.000 [s]

Description: Sets the initial rounding-off time for OFF3 for the extended ramp generator.

p1136[0...n] OFF3 initial rounding-off time / RFGOFF3 t_strt_rnd

G120XA_USS (PM330)

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 3070
Min:	**Max:**	**Factory setting:**
0.000 [s]	30.000 [s]	0.500 [s]

Description: Sets the initial rounding-off time for OFF3 for the extended ramp generator.

p1137[0...n] OFF3 final rounding-off time / RFG OFF3 t_end_del

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 3070
Min:	**Max:**	**Factory setting:**
0.000 [s]	30.000 [s]	0.000 [s]

Description: Sets the final rounding-off time for OFF3 for the extended ramp generator.

p1138[0...n] CI: Ramp-function generator ramp-up time scaling / RFG t_RU scal

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / FloatingPoint32
Can be changed: T	**Scaling:** PERCENT	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 3070
Min:	**Max:**	**Factory setting:**
-	-	1

Description: Sets the signal source for scaling the ramp-up time of the ramp-function generator.

Dependency: See also: p1120

Note

The ramp-up time is set in p1120.

p1139[0...n] CI: Ramp-function generator ramp-down time scaling / RFG t_RD scal

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / FloatingPoint32
Can be changed: T	**Scaling:** PERCENT	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 3070
Min:	**Max:**	**Factory setting:**
-	-	1

Description: Sets the signal source for scaling the ramp-down time of the ramp-function generator.

Dependency: See also: p1121

Note

The ramp-down time is set in p1121.

p1140[0...n] BI: Enable ramp-function generator/inhibit ramp-function generator / Enable RFG

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 2501
Min:	**Max:**	**Factory setting:**
-	-	1

Description: Sets the signal source for the command "enable ramp-function generator/inhibit ramp-function generator".
For the PROFIdrive profile, this command corresponds to control word 1 bit 4 (STW1.4).
BI: p1140 = 0 signal:
Inhibits the ramp-function generator (the ramp-function generator output is set to zero).
BI: p1140 = 1 signal:
Enable ramp-function generator.

Dependency: See also: r0054, p1141, p1142

⚠ CAUTION
When "master control from PC" is activated, this binector input is ineffective.

p1141[0...n] BI: Continue ramp-function generator/freeze ramp-function generator / Continue RFG

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 2501
Min:	**Max:**	**Factory setting:**
-	-	1

Description: Sets the signal source for the command "continue ramp-function generator/freeze ramp-function generator".
For the PROFIdrive profile, this command corresponds to control word 1 bit 5 (STW1.5).
BI: p1141 = 0 signal:
Freezes the ramp-function generator.
BI: p1141 = 1 signal:
Continue ramp-function generator.

Dependency: See also: r0054, p1140, p1142

⚠ CAUTION
When "master control from PC" is activated, this binector input is ineffective.

NOTICE
The ramp-function generator is, independent of the state of the signal source, active in the following cases: - OFF1/OFF3. - ramp-function generator output within the suppression bandwidth. - ramp-function generator output below the minimum speed.

p1142[0...n] BI: Enable setpoint/inhibit setpoint / Setpoint enable

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 2501
Min:	**Max:**	**Factory setting:**
-	-	1

Description: Sets the signal source for the command "enable setpoint/inhibit setpoint".
For the PROFIdrive profile, this command corresponds to control word 1 bit 6 (STW1.6).
BI: p1142 = 0 signal
Inhibits the setpoint (the ramp-function generator input is set to zero).
BI: p1142 = 1 signal
Setpoint enable.

Dependency: See also: p1140, p1141

⚠ CAUTION
When "master control from PC" is activated, this binector input is ineffective.

Note
When the function module "position control" (r0108.3 = 1) is activated, this binector input is interconnected as follows as standard:
BI: p1142 = 0 signal

p1143[0...n] BI: Ramp-function generator, accept setting value / RFG accept set v

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 3070
Min:	**Max:**	**Factory setting:**
-	-	29640.0

Description: Sets the signal source for accepting the setting value of the ramp-function generator.

Dependency: The signal source for the ramp-function generator setting value is set using parameters.

See also: p1144

Note
0/1 signal:
The ramp-function generator output is immediately (without delay) set to the setting value of the ramp-function generator.
1 signal:
The setting value of the ramp-function generator is effective.
1/0 signal:
The input value of the ramp-function generator is effective. The ramp-function generator output is adapted to the input value using the ramp-up time or the ramp-down time.
0 signal:
The input value of the ramp-function generator is effective.

p1144[0...n] CI: Ramp-function generator setting value / RFG setting value

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / FloatingPoint32
Can be changed: T, U	**Scaling:** p2000	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 3070
Min:	**Max:**	**Factory setting:**
-	-	29641[0]

Description: Sets the signal source for the ramp-function generator setting value.

Dependency: The signal source for accepting the setting value is set using parameters.

See also: p1143

p1145[0...n] Ramp-function generator tracking intensity. / RFG track intens

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 3080
Min:	**Max:**	**Factory setting:**
0.0	50.0	0.0

Description: Sets the ramp-function generator tracking.

The output value of the ramp-function generator is tracked (corrected) corresponding to the maximum possible drive acceleration.

The reference value is the deviation at the speed controller/velocity controller input that is necessary to ensure that the motor accelerates at the torque/force limit.

Recommendation: If at least one speed setpoint filter/velocity setpoint filter is activated (p1414), then the ramp-function generator tracking should be deactivated (p1145 = 0.0). When the speed setpoint filter is activated, the output value of the ramp-function generator can no longer be tracked (corrected) corresponding to the maximum possible drive acceleration.

For p1145 = 0.0:

This value deactivates the ramp-function generator tracking.

For p1145 = 0.0 ... 1.0:

Generally, these values are not practical. They cause the motor to accelerate below its torque limit. The lower the selected value, the greater the margin between the controller and torque limit when accelerating.

For p1145 > 1.0:

The greater the value, the higher the permissible deviation between the speed setpoint and speed actual value.

NOTICE
If ramp-function generator tracking is activated and the ramp time is set too short, this can cause unsteady acceleration. Remedy: - deactivate ramp-function generator tracking (p1145 = 0). - increase the ramp-up/ramp-down time (p1120, p1121).

Note

In the U/f mode, ramp-function generator tracking is not active.

The speed difference is reduced if the integral component of the speed controller is not maintained when the torque limit is reached (p1400.16 = 1).

p1148[0...n] Ramp-function gen. tolerance for ramp-up and ramp-down active / RFG tol HL/RL act

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 3070
Min:	**Max:**	**Factory setting:**
0.000 [rpm]	1000.000 [rpm]	19.800 [rpm]

Description: Sets the tolerance value for the status of the ramp-function generator (ramp-up active, ramp-down active).

If the input of the ramp-function generator does not change in comparison to the output by more than the entered tolerance time, then the status bits "ramp-up active" and "ramp-down active" are not influenced.

Dependency: See also: r1199

r1149 CO: Ramp-function generator acceleration / RFG acceleration

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p2007	**Dynamic index:** -
Unit group: 39_1	**Unit selection:** p0505	**Function diagram:** 3070
Min:	**Max:**	**Factory setting:**
- [rev/s²]	- [rev/s²]	- [rev/s²]

Description: Displays the acceleration of the ramp-function generator.

Dependency: See also: p1145

r1170 CO: Speed controller setpoint sum / Speed setpoint sum

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p2000	**Dynamic index:** -
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 3001, 3080, 6300
Min:	**Max:**	**Factory setting:**
- [rpm]	- [rpm]	- [rpm]

Description: Display and connector output for the speed setpoint after selecting the ramp-function generator.

The value is the sum of speed setpoint 1 (p1155) and speed setpoint 2 (p1160).

r1197 Fixed speed setpoint number actual / n_set_fixed No act

Access level: 4	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 3010
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the number of the selected fixed speed/velocity setpoint.

Dependency: See also: p1020, p1021, p1022, p1023

Note

If a fixed speed setpoint has not been selected (p1020 ... p1023 = 0, r1197 = 0), then r1024 = 0 (setpoint = 0).

r1198.0...15 CO/BO: Control word setpoint channel / STW setpoint chan

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 2505
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display and BICO output for the control word of the setpoint channel.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Fixed setpoint bit 0	Yes	No	3010
01	Fixed setpoint bit 1	Yes	No	3010
02	Fixed setpoint bit 2	Yes	No	3010
03	Fixed setpoint bit 3	Yes	No	3010
05	Inhibit negative direction	Yes	No	3040
06	Inhibit positive direction	Yes	No	3040
11	Setpoint inversion	Yes	No	3040
13	Motorized potentiometer raise	Yes	No	3020
14	Motorized potentiometer lower	Yes	No	3020
15	Bypass ramp-function generator	Yes	No	3070

r1199.0...8 CO/BO: Ramp-function generator status word / RFG ZSW

Access level: 4	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 3001, 3080
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the status word for the ramp-function generator (RFG).

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Ramp-up active	Yes	No	-
01	Ramp-down active	Yes	No	-
02	RFG active	Yes	No	-
03	Ramp-function generator set	Yes	No	-
04	Ramp-function generator held	Yes	No	-
05	Ramp-function generator tracking active	Yes	No	-
06	Maximum limit active	Yes	No	-
07	Ramp-function generator acceleration positive	Yes	No	-
08	Ramp-function generator acceleration negative	Yes	No	-

Note
For bit 02:
The bit is the result of the OR logic operation - bit 00 and bit 01.

p1200[0...n] Flying restart operating mode / FlyRest op_mode

Access level: 2	**Calculated:** -	**Data type:** Integer16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 6300, 6850
Min:	**Max:**	**Factory setting:**
0	4	0

Description: Sets the operating mode for flying restart.

The flying restart allows the drive converter to be switched on while the motor is still rotating. In so doing, the drive converter output frequency is changed until the actual motor speed/velocity is found. The motor then accelerates up to the setpoint at the ramp-function generator setting.

Value:
0: Flying restart inactive
1: Flying restart always active (start in setpoint direction)
4: Flying restart always active (start only in setpoint direction)

Dependency: A differentiation is made between flying restart for U/f control and for vector control (p1300).

Flying restart, U/f control: p1202, p1203, r1204

Flying restart, vector control: p1202, p1203, r1205

For synchronous motors, flying restart cannot be activated.

See also: p1201

See also: F07330, F07331

NOTICE
The "flying restart" function must be used in cases where the motor may still be running (e.g. after a brief line supply interruption) or is being driven by the load. The system might otherwise shut down as a result of overcurrent.

Note
For p1200 = 1, 4, the following applies:
Flying restart is active after faults, OFF1, OFF2, OFF3.
For p1200 = 1, the following applies:
The search is made in both directions.
For p1200 = 4, the following applies:
The search is only made in the setpoint direction.
For U/f control (p1300 < 20), the following applies:
The speed can only be sensed for values above approx. 5 % of the rated motor speed. For lower speeds, it is assumed that the motor is at a standstill.
If p1200 is changed during commissioning (p0010 > 0), then it is possible that the old value will no longer be able to be set. The reason for this is that the dynamic limits of p1200 have been changed by a parameter that was set when the drive was commissioned (e.g. p0300).

p1201[0...n] BI: Flying restart enable signal source / Fly_res enab s_s

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	1

Description: Sets the signal source to enable the "flying restart" function.

Dependency: See also: p1200

Note
Withdrawing the enable signal has the same effect as setting p1200 = 0.

p1202[0...n] Flying restart search current / FlyRest I_srch

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
10 [%]	400 [%]	100 [%]

Description: Sets the search current for the "flying restart" function.

The value is referred to the motor magnetizing current.

Dependency: See also: r0331

> ⚠ **CAUTION**
>
> An unfavorable parameter value can result in the motor behaving in an uncontrollable fashion.

> **NOTICE**
>
> The following applies for a synchronous reluctance motor:
> The minimum search current is limited (p1202 >= 50 %).

Note

In U/f control mode, the parameter serves as a threshold value for establishing the current at the beginning of the flying restart function. When the threshold value is reached, the actual search current is set as a function of the frequency based on the voltage setpoints.

Reducing the search current can also improve flying restart performance (if the system moment of inertia is not very high, for example).

The following applies for a synchronous reluctance motor:

Adjusting the search current only has an effect if a motor data identification run is then performed (see p1909 bit 22).

It is possible that a value exceeding 100% cannot be reached if the motor rated power is significantly less than that of the power unit.

If the motor rated power is significantly higher than that of the power unit, then the search current should be increased for the higher speed range.

p1203[0...n] Flying restart search rate factor / FlyRst v_Srch Fact

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
10 [%]	4000 [%]	100 [%]

Description: Sets the factor for the search speed for flying restart.

The value influences the rate at which the output frequency is changed during a flying restart . A higher value results in a longer search time.

Recommendation: For sensorless vector control and motor cables longer than 200 m, set the factor p1203 >= 300 %.

> ⚠ **CAUTION**
>
> An unfavorable parameter value can result in the motor behaving in an uncontrollable fashion.
> For vector control, a value that is too low or too high can cause flying restart to become unstable.

Note

The parameter factory setting is selected so that standard induction motors that are rotating can be found and restarted as quickly as possible (fast flying restart).

With this pre-setting, if the motor is not found (e.g. for motors that are accelerated as a result of active loads or with U/f control and low speeds), we recommend that the search rate is reduced (by increasing p1203).

For the flying restart of a reluctance motor, the minimum search velocity is limited (p1203 >= 50 %).

r1204.0...13 CO/BO: Flying restart U/f control status / FlyRest Uf st

Access level: 4	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the status for checking and monitoring flying restart states in the U/f control mode.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Current impressed	Yes	No	-
01	No current flow	Yes	No	-
02	Voltage input	Yes	No	-
03	Voltage reduced	Yes	No	-
04	Start ramp-function generator	Yes	No	-
05	Wait for execution	Yes	No	-
06	Slope filter act	Yes	No	-
07	Positive gradient	Yes	No	-
08	Current < threshold	Yes	No	-
09	Current minimum	Yes	No	-
10	Search in the positive direction	Yes	No	-
11	Stop after positive direction	Yes	No	-
12	Stop after negative direction	Yes	No	-
13	No result	Yes	No	-

r1204.0...15 CO/BO: Flying restart U/f control status / FlyRest Uf st

G120XA_USS (PM330)

Access level: 4	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the status for checking and monitoring flying restart states in the U/f control mode.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Current impressed	Yes	No	-
01	No current flow	Yes	No	-
02	Voltage input	Yes	No	-
03	Voltage reduced	Yes	No	-
04	Start ramp-function generator	Yes	No	-
05	Wait for execution	Yes	No	-
06	Slope filter act	Yes	No	-
07	Positive gradient	Yes	No	-
08	Current < threshold	Yes	No	-
09	Current minimum	Yes	No	-
10	Search in the positive direction	Yes	No	-
11	Stop after positive direction	Yes	No	-
12	Stop after negative direction	Yes	No	-
13	No result	Yes	No	-
14	Fast flying restart w/ voltage model for induction motor activ.	Yes	No	-
15	Flying restart with VSM active	Yes	No	-

r1205.0...21 CO/BO: Flying restart vector control status / FlyRest vector st

Access level: 4	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display and connector output for the status for checking and monitoring flying restart states in the vector control mode.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Speed adaptation circuit record angle	Yes	No	-
01	Speed adaptation circuit set gain to 0	Yes	No	-
02	Isd channel enable	Yes	No	-
03	Speed control switched out	Yes	No	-
04	Quadrature arm switched in	Yes	No	-
05	Special transformation active	Yes	No	-
06	Speed adaptation circuit set I component to 0	Yes	No	-
07	Current control on	Yes	No	-
08	Isd_set = 0 A	Yes	No	-
09	Frequency held	Yes	No	-
10	Search in the positive direction	Yes	No	-
11	Search Started	Yes	No	-
12	Current impressed	Yes	No	-
13	Search interrupted	Yes	No	-
14	Speed adaptation circuit deviation = 0	Yes	No	-
15	Speed control activated	Yes	No	-
21	Voltage pulse active	Yes	No	-

Note

For bit 00 ... 09:
Used to control internal sequences during the flying restart.
Depending on the motor type (p0300), the number of active bits differs.
For bits 10 ... 15:
Are used to monitor the flying restart sequence.

r1205.0...20 CO/BO: Flying restart vector control status / FlyRest vector st

G120XA_USS (PM330)

Access level: 4	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display and connector output for the status for checking and monitoring flying restart states in the vector control mode.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Speed adaptation circuit record angle	Yes	No	-
01	Speed adaptation circuit set gain to 0	Yes	No	-
02	Isd channel enable	Yes	No	-
03	Speed control switched out	Yes	No	-
04	Quadrature arm switched in	Yes	No	-
05	Special transformation active	Yes	No	-
06	Speed adaptation circuit set I component to 0	Yes	No	-
07	Current control on	Yes	No	-
08	Isd_set = 0 A	Yes	No	-

09	Frequency held	Yes	No	-
10	Search in the positive direction	Yes	No	-
11	Search Started	Yes	No	-
12	Current impressed	Yes	No	-
13	Search interrupted	Yes	No	-
14	Speed adaptation circuit deviation = 0	Yes	No	-
15	Speed control activated	Yes	No	-
16	Fast flying restart w/ voltage model for induction motor activ.	Yes	No	-
17	Fast flying restart w/ voltage model for induction motor exited	Yes	No	-
18	Apply VSM voltage to the monitor	Yes	No	-
19	Preassign flux ramp	Yes	No	-
20	Adaptation current controller and speed adapt. controller gain	Yes	No	-

Note
For bit 00 ... 09:
Used to control internal sequences during the flying restart.
Depending on the motor type (p0300), the number of active bits differs.
For bits 10 ... 15:
Are used to monitor the flying restart sequence.

p1206[0...9] Automatic restart faults not active / AR fault not act

Access level: 3 | **Calculated:** - | **Data type:** Unsigned16
Can be changed: T, U | **Scaling:** - | **Dynamic index:** -
Unit group: - | **Unit selection:** - | **Function diagram:** -
Min: 0 | **Max:** 65535 | **Factory setting:** 0

Description: Sets faults for which automatic restart should not be effective.

Dependency: The setting is only effective for p1210 = 6, 16, 26.
See also: p1210

p1210 Automatic restart mode / AR mode

Access level: 2 | **Calculated:** - | **Data type:** Integer16
Can be changed: T, U | **Scaling:** - | **Dynamic index:** -
Unit group: - | **Unit selection:** - | **Function diagram:** -
Min: 0 | **Max:** 26 | **Factory setting:** 0

Description: Sets the automatic restart mode (AR).
The parameters must be saved in the non-volatile memory p0971 = 1 in order that the setting becomes effective.

Value:
0: Inhibit automatic restart
1: Acknowledge all faults without restarting
4: Restart after line supply failure w/o additional start attempts
6: Restart after fault with additional start attempts
14: Restart after line supply failure following man. acknowledgment
16: Restart after fault following manual acknowledgment
26: Acknowledging all faults and reclosing for an ON command

Recommendation: For brief line supply failures, the motor shaft may still be rotating when restarting. The "flying restart" function (p1200) might need to be activated to restart while the motor shaft is still rotating.

Dependency: The automatic restart requires an active ON command (e.g., via a digital input). If, for p1210 > 1, there is no active ON command, then the automatic restart is interrupted.

When using an Operator Panel in the LOCAL mode, then there is no automatic start.

For p1210 = 14, 16, a manual acknowledgment is required for an automatic restart.

See also: p0840, p0857, p1267

See also: F30003

⚠ DANGER
If the automatic restart is activated (p1210 > 1) if there is an ON command (refer to p0840), the drive is switched on as soon as any fault messages that are present can be acknowledged. This also occurs after the line supply returns or the Control Unit boots if the DC link voltage is present again. This automatic switching-on operation can only be interrupted by withdrawing the ON command.

NOTICE
A change is only accepted and made in the state "initialization" (r1214.0) and "wait for alarm" (r1214.1). When faults are present, therefore, the parameter cannot be changed. For p1210 > 1, the motor is automatically started.

Note

For p1210 = 1:

Faults that are present are automatically acknowledged. If new faults occur after a successful fault acknowledgment, then these are also automatically acknowledged again. p1211 has no influence on the number of acknowledgment attempts.

For p1210 = 4:

An automatic restart is only performed if fault F30003 has occurred on the power unit. If additional faults are present, then these faults are also acknowledged and when successful, starting continues.

For p1210 = 6:

An automatic restart is carried out if any fault has occurred.

For p1210 = 14:

as for p1210 = 4. However, active faults must be manually acknowledged.

For p1210 = 16:

as for p1210 = 6. However, active faults must be manually acknowledged.

For p1210 = 26:

as for p1210 = 6. For this mode, the switch-on command can be entered with a delay. The restart is interrupted with either OFF2 or OFF3. Alarm A07321 is only displayed if the cause of the fault has been removed and the drive is restarted by setting the switch-on command.

p1211 Automatic restart start attempts / AR start attempts

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	10	3

Description: Sets the start attempts of the automatic restart function for p1210 = 4, 6, 14, 16, 26.

Dependency: A change is only accepted and made in the state "initialization" (r1214.0) and "wait for alarm" (r1214.1).

See also: p1210, r1214

See also: F07320

NOTICE
After fault F07320 occurs, the switch-on command must be withdrawn and all of the faults acknowledged so that the automatic restart function is re-activated. After a complete power failure (blackout) the start counter always starts with the counter value that applied before the power failure, and decrements this start attempt by 1. If a further attempt to acknowledge is started by the automatic restart function prior to power failure, e.g. when the CU remains active on power failure longer than the time p1212 / 2, the fault counter will already have been decremented once. In this case, the start counter is thus decreased by the value 2.

Note

A start attempt starts immediately when a fault occurs. The start attempt is considered to been completed if the motor was magnetized (r0056.4 = 1) and an additional delay time of 1 s has expired.

As long as a fault is present, an acknowledge command is generated in the time intervals of p1212 / 2. When successfully acknowledged, the start counter is decremented. If, after this, a fault re-occurs before a restart has been completed, then acknowledgment starts again from the beginning.

Fault F07320 is output if, after several faults occur, the number of parameterized start attempts has been reached. After a successful start attempt, i.e. a fault/error has no longer occurred up to the end of the magnetizing phase, the start counter is again reset to the parameter value after 1 s. If a fault re-occurs - the parameterized number of start attempts is again available.

At least one start attempt is always carried out.

After a line supply failure, acknowledgment is immediate and when the line supply returns, the system is switched on. If, between successfully acknowledging the line fault and the line supply returning, another fault occurs, then its acknowledgment also causes the start counter to be decremented.

For p1210 = 26:

The start counter is decremented if after a successful fault acknowledgment, the on command is present.

p1212 Automatic restart delay time start attempts / AR t_wait start

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.1 [s]	1000.0 [s]	1.0 [s]

Description: Sets the delay time up to restart.

Dependency: This parameter setting is active for p1210 = 4, 6, 26.

For p1210 = 1, the following applies:

Faults are only automatically acknowledged in half of the waiting time, no restart.

See also: p1210, r1214

NOTICE
A change is only accepted and made in the state "initialization" (r1214.0) and "wait for alarm" (r1214.1).

Note

The faults are automatically acknowledged after half of the delay time has expired and the full delay time.

If the cause of a fault is not removed in the first half of the delay time, then it is no longer possible to acknowledge in the delay time.

p1213[0...1] Automatic restart monitoring time / AR t_monit

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.0 [s]	10000.0 [s]	[0] 60.0 [s] [1] 0.0 [s]

Description: Sets the monitoring time of the automatic restart (AR).

Index: [0] = Restart

[1] = Reset start counter

Dependency: See also: p1210, r1214

NOTICE
A change is only accepted and made in the state "initialization" (r1214.0) and "wait for alarm" (r1214.1). After fault F07320 occurs, the switch-on command must be withdrawn and all of the faults acknowledged so that the automatic restart function is re-activated.

Note

For index 0:

The monitoring time starts when the faults are detected. If the automatic acknowledgments are not successful, the monitoring time runs again. If, after the monitoring time has expired, the drive has still not successfully started again (flying restart and magnetizing of the motor must have been completed: r0056.4 = 1), then fault F07320 is output.

The monitoring is deactivated with p1213 = 0. If p1213 is set lower than the sum of p1212, the magnetizing time p0346 and the additional delay time due to the flying restart, then fault F07320 is generated at each restart. If, for p1210 = 1, the time in p1213 is set lower than in p1212, then fault F07320 is also generated at each restart.

The monitoring time must be extended if the faults that occur cannot be immediately and successfully acknowledged (e.g. for faults that are permanently present).

In the case of p1210 = 14, 16, the faults which are present must be acknowledged manually within the time in p1213[0]. Otherwise, fault F07320 is generated after the set time.

For index 1:

The start counter (refer to r1214) is only set back to the starting value p1211 if, after successful restart, the time in p1213[1] has expired. The delay time is not effective for fault acknowledgment without automatic restart (p1210 = 1). After a power failure (blackout) the delay time only starts after the line supply returns and the Control Unit boots. The start counter is set to p1211, if F07320 occurred, the switch-on command is withdrawn and the fault is acknowledged.

The start counter is immediately updated if the starting value p1211 or the mode p1210 is changed.

For p1210 = 26, the fault must have been successfully acknowledged and the switch-on command issued within the time in p1213[0]. Otherwise, fault F07320 is generated after the set time.

r1214.0...15 CO/BO: Automatic restart status / AR status

Access level: 4	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the status of the automatic restart (AR).

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Initialization	Yes	No	-
01	Wait for alarm	Yes	No	-
02	Auto restart act	Yes	No	-
03	Setting the acknowledgment command	Yes	No	-
04	Acknowledge alarms	Yes	No	-
05	Restart	Yes	No	-
06	Delay time running after automatic switch-on	Yes	No	-
07	Fault	Yes	No	-
10	Effective fault	Yes	No	-
12	Start counter bit 0	ON	OFF	-
13	Start counter bit 1	ON	OFF	-
14	Start counter bit 2	ON	OFF	-
15	Start counter bit 3	ON	OFF	-

Note
For bit 00:
State to display the single initialization after POWER ON.
For bit 01:
State in which the automatic restart function waits for faults (initial state).
For bit 02:
General display that a fault has been identified and that the restart or acknowledgment has been initiated.
For bit 03:
Displays the acknowledge command within the "acknowledge alarms" state (bit 4 = 1). For bit 5 = 1 or bit 6 = 1, the acknowledge command is continually displayed.
For bit 04:
State in which the faults that are present are acknowledged. The state is exited again after successful acknowledgment. A change is only made into the next state if it is signaled that a fault is no longer present after an acknowledgment command (bit 3 = 1).
For bit 05:
State in which the drive is automatically switched on (only for p1210 = 4, 6).
For bit 06:
State in which the system waits after having been switched on, to the end of the start attempt (to the end of the magnetizing process).
For p1210 = 1, this signal is directly set after the faults have been successfully acknowledged.
For bit 07:
State which is assumed after a fault occurs within the automatic restart function. This is only reset after acknowledging the fault and withdrawing the switch-on command.
For bit 10:
When the automatic restart function is active, r1214.7 is displayed, otherwise the active fault r2139.3.
The bit is set if the automatic restart can no longer acknowledge a fault, and cancels with fault F07320.
For bits 12 ... 15:
Actual state of the start counter (binary coded).
For bit 04 in addition:
For p1210 = 26, the system waits in this state until the switch-on command is available.

p1226[0...n] Threshold for zero speed detection / n_standst n_thresh

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 8022
Min:	**Max:**	**Factory setting:**
0.00 [rpm]	210000.00 [rpm]	20.00 [rpm]

Description: Sets the speed threshold for the standstill identification.
Acts on the actual value and setpoint monitoring.
When braking with OFF1 or OFF3, when the threshold is undershot, standstill is identified.

Dependency: See also: p1227

⚠ CAUTION
The following applies for encoderless speed control:
If p1226 is set to values under approx. 1 % of the rated motor speed, then the model switchover limits of the vector control must be increased in order to guarantee reliable shutdown (see p1755, p1750.7).

NOTICE
For reasons relating to the compatibility to earlier firmware versions, a parameter value of zero in indices 1 to 31 is overwritten with the parameter value in index 0 when the Control Unit boots.

Note
Standstill is identified in the following cases:
- the speed actual value falls below the speed threshold in p1226 and the time started after this in p1228 has expired.
- the speed setpoint falls below the speed threshold in p1226 and the time started after this in p1227 has expired.
The actual value sensing is subject to measuring noise. For this reason, standstill cannot be detected if the speed threshold is too low.

p1227 Zero speed detection monitoring time / n_standst t_monit

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.000 [s]	300.000 [s]	300.000 [s]

Description: Sets the monitoring time for the standstill identification.
When braking with OFF1 or OFF3, standstill is identified after this time has expired, after the setpoint speed has fallen below p1226 (also refer to p1145).

Dependency: The parameter is pre-assigned depending on the size of the power unit.
See also: p1226

NOTICE
For p1145 > 0.0 (RFG tracking) the setpoint is not equal to zero dependent on the selected value. This can therefore cause the monitoring time in p1227 to be exceeded. In this case, for a driven motor, the pulses are not suppressed.

Note
Standstill is identified in the following cases:
- the speed actual value falls below the speed threshold in p1226 and the time started after this in p1228 has expired.
- the speed setpoint falls below the speed threshold in p1226 and the time started after this in p1227 has expired.
For p1227 = 300.000 s the following applies:
Monitoring is deactivated.
For p1227 = 0.000 s, the following applies:
With OFF1 or OFF3 and a ramp-down time = 0, the pulses are immediately suppressed and the motor "coasts" down.
Once the Control Unit has been booted up for the first time or if the factory settings have been defined accordingly, the parameter is defined in accordance with the power unit.

p1228 Pulse suppression delay time / Pulse suppr t_del

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 8022
Min:	**Max:**	**Factory setting:**
0.000 [s]	299.000 [s]	0.010 [s]

Description: Sets the delay time for pulse suppression.
After OFF1 or OFF3, the pulses are canceled, if at least one of the following conditions is fulfilled:
- the speed actual value falls below the threshold in p1226 and the time started after this in p1228 has expired.
- the speed setpoint falls below the threshold in p1226 and the time started after this in p1227 has expired.

Dependency: See also: p1226, p1227

p1230[0...n] BI: DC braking activation / DC brake act

G120XA_USS (DC braking)

Access level: 2	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T, U	**Scaling:** -	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 7017
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source to activate DC braking.

Dependency: See also: p1231, p1232, p1233, p1234, r1239

Note

1 signal: DC braking activated.
0 signal: DC braking deactivated.

p1231[0...n] DC braking configuration / DCBRK config

G120XA_USS (DC braking)

Access level: 2	**Calculated:** -	**Data type:** Integer16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7014, 7016, 7017
Min:	**Max:**	**Factory setting:**
0	14	0

Description: Setting to activate DC braking.

Value:

0:	No function
4:	DC braking
5:	DC braking for OFF1/OFF3
14:	DC braking below starting speed

Dependency: See also: p0300, p1232, p1233, p1234, r1239

Note

DCBRK: DC Braking
For p1231 = 4:
The function is activated as soon as the activation criterion is fulfilled.
- the function can be superseded by an OFF2 response.
Activation criterion (one of the following criteria is fulfilled):
- binector input p1230 = 1 signal (DC braking activation, depending on the operating mode).
- the drive is not in the state "S4: Operation" or in "S5x".
- the internal pulse enable is missing (r0046.19 = 0).
DC braking can only be withdrawn (p1231 = 0) if it is not being used as a fault response in p2101.
In order that DC braking is active as fault response, the corresponding fault number must be entered in p2100 and fault response p2101 set = 6.
For p1231 = 5:
DC braking is activated if the OFF1 or OFF3 command is present. Binector input p1230 is ineffective. If the drive speed still lies above the speed threshold p1234, then initially, the drive is ramped-down to this threshold, demagnetized (see p0347) and is then switched into DC braking for the time set in p1233. After this, the drive is switched-off. If, at OFF1, the drive speed is below p1234, then it is immediately demagnetized and switched into DC braking. The system switches back to normal operation if the OFF1 command is withdrawn prematurely (the system waits for demagnetization). Flying restart must be activated if the motor is still rotating.
DC braking by means of fault response continues to be possible.
For p1231 = 14:
In addition to the function for p1231 = 5, binector input p1230 is evaluated.
DC braking is only automatically activated when the speed threshold p1234 is fallen below if binector input p1230 = 1 signal. This is also the case, if no OFF command is present.
After demagnetization and after the time in p1233 has expired, the drive changes back into normal operation or is switched-off (for OFF1/OFF3).
If a 0 signal is applied to binector input p1230, for OFF1 and OFF3 no DC braking is executed.

p1232[0...n] DC braking braking current / DCBRK I_brake

G120XA_USS (DC braking)

Access level: 2	**Calculated:** CALC_MOD_ALL	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7017
Min:	**Max:**	**Factory setting:**
0.00 [Arms]	10000.00 [Arms]	0.00 [Arms]

Description: Sets the braking current for DC braking.

Dependency: See also: p1230, p1231, p1233, p1234, r1239, p1345, p1346

Note

A change to the braking current becomes effective the next time that DC braking is switched on.

The value for p1232 is specified as an rms value in the 3-phase system. The magnitude of the braking current is the same as that of an identical output current at frequency zero (see r0067, r0068, p0640). The braking current is internally limited to r0067.

For the current controller, the settings of parameters p1345 and p1346 (I_max limiting controller) are used.

p1233[0...n] DC braking time / DCBRK time

G120XA_USS (DC braking)

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7017
Min:	**Max:**	**Factory setting:**
0.0 [s]	3600.0 [s]	1.0 [s]

Description: Sets the DC braking time (as fault response).

Dependency: See also: p1230, p1231, p1232, p1234, r1239

p1234[0...n] Speed at the start of DC braking / DCBRK n_start

G120XA_USS (DC braking)

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7017
Min:	**Max:**	**Factory setting:**
0.00 [rpm]	210000.00 [rpm]	210000.00 [rpm]

Description: Sets the starting speed for DC braking.

If the actual speed falls below this threshold, then DC braking is activated.

Dependency: See also: p1230, p1231, p1232, p1233, r1239

r1239.8...13 CO/BO: DC braking status word / DCBRK ZSW

G120XA_USS (DC braking)

Access level: 2	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Status word of the DC braking.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
08	DC braking active	Yes	No	7017
10	DC braking ready	Yes	No	7017
11	DC braking selected	Yes	No	-
12	DC braking selection internally inhibited	Yes	No	-
13	DC braking for OFF1/OFF3	Yes	No	-

Dependency: See also: p1231, p1232, p1233, p1234

Note

For bit 12, 13:

Only effective for p1231 = 14.

p1240[0...n] Vdc controller configuration (vector control) / Vdc ctr config vec

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 6220, 6827
Min:	**Max:**	**Factory setting:**
0	3	1

Description: Sets the controller configuration of the DC link voltage (Vdc controller) in the closed-loop control mode. For U/f control: see p1280.

Value:
0: Inhibit Vdc ctrl
1: Enable Vdc_max controller
2: Enable Vdc_min controller (kinetic buffering)
3: Enable Vdc_min controller and Vdc_max controller

Dependency: See also: p1245
See also: A07400, A07401, A07402, F07405, F07406

NOTICE
An excessively high value in p1245 can possibly negatively influence the normal operation of the drive.

Note
If a braking resistor is connected to the DC link (p0219 > 0), then the Vdc_max control is automatically deactivated.
p1240 = 1, 3:
When the DC link voltage limit specified for the power unit is reached the following applies:
- the Vdc_max controller limits the regenerative energy in order that the DC link voltage is kept below the maximum DC link voltage when braking.
- the ramp-down times are automatically increased.
p1240 = 2, 3:
When the switch-in threshold of the Vdc_min controller is reached (p1245), the following applies:
- the Vdc_min controller limits the energy taken from the DC link in order to keep the DC link voltage above the minimum DC link voltage when accelerating.
- the motor is braked in order to use its kinetic energy to buffer the DC link.

r1242 Vdc_max controller switch-in level / Vdc_max on_level

G120XA_USS (Vdc_max)

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p2001	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 6220
Min:	**Max:**	**Factory setting:**
- [V]	- [V]	- [V]

Description: Displays the switch-in level for the Vdc_max controller.
If p1254 = 0 (automatic sensing of the switch-in level = off), then the following applies:
r1242 = 1.15 * sqrt(2) * p0210 (supply voltage)
PM230: r1242 is limited to Vdc_max - 50.0 V.
If p1254 = 1 (automatic sensing of the switch-in level = on), then the following applies:
r1242 = Vdc_max - 50.0 V (Vdc_max: Overvoltage threshold of the power unit)
r1242 = Vdc_max - 25.0 V (for 230 V power units)

NOTICE
If the activation level of the Vdc_max controller is already exceeded in the deactivated state (pulse inhibit) by the DC link voltage, then the controller can be automatically deactivated (see F07401), so that the drive is not accelerated the next time that it is activated.

Note
The Vdc_max controller is not switched back off until the DC link voltage falls below the threshold 0.95 * r1242 and the controller output is zero.

p1243[0...n] Vdc_max controller dynamic factor / Vdc_max dyn_factor

G120XA_USS (Vdc_max)

Access level: 3	**Calculated:** CALC_MOD_CON	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 6220
Min:	**Max:**	**Factory setting:**
1 [%]	10000 [%]	100 [%]

Description: Sets the dynamic factor for the DC link voltage controller (Vdc_max controller).

100% means that p1250, p1251, and p1252 (gain, integral time, and rate time) are used corresponding to their basic settings and based on a theoretical controller optimization.

If subsequent optimization is required, this can be carried out using the dynamic factor. In this case p1250, p1251, p1252 are weighted with the dynamic factor p1243.

p1245[0...n] Vdc_min controller switch-in level (kinetic buffering) / Vdc_min on_level

G120XA_USS (Vdc_min)

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
65 [%]	150 [%]	76 [%]

Description: Sets the switch-in level for the Vdc-min controller (kinetic buffering).

The value is obtained as follows:

r1246[V] = p1245[%] * sqrt(2) * p0210

Dependency: See also: p0210

⚠ WARNING

An excessively high value possibly negatively influences normal drive operation, and can mean that after the line supply returns, the Vdc minimum control can no longer be exited.

r1246 Vdc_min controller switch-in level (kinetic buffering) / Vdc_min on_level

G120XA_USS (Vdc_min)

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p2001	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 6220
Min:	**Max:**	**Factory setting:**
- [V]	- [V]	- [V]

Description: Displays the switch-in level for the Vdc_min controller (kinetic buffering).

Note

The Vdc_min controller is not switched back off until the DC link voltage rises above the threshold 1.05 * p1246 and the controller output is zero.

p1247[0...n] Vdc_min controller dynamic factor (kinetic buffering) / Vdc_min dyn_factor

G120XA_USS (PM330, Vdc_min, Vdc_min)

Access level: 3	**Calculated:** CALC_MOD_CON	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 6220
Min:	**Max:**	**Factory setting:**
1 [%]	10000 [%]	300 [%]

Description: Sets the dynamic factor for the Vdc_min controller (kinetic buffering).

100% means that p1250, p1251, and p1252 (gain, integral time, and rate time) are used corresponding to their basic settings and based on a theoretical controller optimization.

If subsequent optimization is required, this can be carried out using the dynamic factor. In this case p1250, p1251, p1252 are weighted with the dynamic factor p1247.

p1249[0...n] Vdc_max controller speed threshold / Vdc_max n_thresh

Access level: 4	**Calculated:** CALC_MOD_ALL	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.00 [rpm]	210000.00 [rpm]	10.00 [rpm]

Description: Sets the lower speed threshold for the Vdc_max controller.

When this speed threshold is undershot, the Vdc_max control is switched out and the speed is controlled using the ramp-function generator.

Note

For fast braking where the ramp-function generator tracking was active, it is possible to prevent the drive rotating in the opposite direction by increasing the speed threshold and setting a final rounding-off time in the ramp-function generator (p1131). This is supported using a dynamic setting of the speed controller.

p1249[0...n] Vdc_max controller speed threshold / Vdc_max n_thresh

G120XA_USS (Vdc_max)

Access level: 3	**Calculated:** CALC_MOD_ALL	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.00 [rpm]	210000.00 [rpm]	10.00 [rpm]

Description: Sets the lower speed threshold for the Vdc_max controller.

When this speed threshold is undershot, the Vdc_max control is switched out and the speed is controlled using the ramp-function generator.

Note

For fast braking where the ramp-function generator tracking was active, it is possible to prevent the drive rotating in the opposite direction by increasing the speed threshold and setting a final rounding-off time in the ramp-function generator (p1131). This is supported using a dynamic setting of the speed controller.

p1250[0...n] Vdc controller proportional gain / Vdc_ctrl Kp

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.00	100.00	1.00

Description: Sets the proportional gain for the DC link voltage controller (Vdc_min controller, Vdc_max controller).

Dependency: The effective proportional gain is obtained taking into account p1243 (Vdc_max controller dynamic factor) and the DC link capacitance of the power unit.

p1251[0...n] Vdc controller integral time / Vdc_ctrl Tn

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 6220
Min:	**Max:**	**Factory setting:**
0 [ms]	10000 [ms]	0 [ms]

Description: Sets the integral time for the DC link voltage controller (Vdc_min controller, Vdc_max controller).

Dependency: The effective integral time is obtained taking into account p1243 (Vdc_max controller dynamic factor).

Note

p1251 = 0: The integral component is deactivated.

p1252[0...n] Vdc controller rate time / Vdc_ctrl t_rate

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 6220
Min:	**Max:**	**Factory setting:**
0 [ms]	1000 [ms]	0 [ms]

Description: Sets the rate time constant for the DC link voltage controller (Vdc_min controller, Vdc_max controller).

Dependency: The effective rate time is obtained taking into account p1243 (Vdc_max controller dynamic factor).

p1254 Vdc_max controller automatic ON level detection / Vdc_max SenseOnLev

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	1	1

Description: Activates/deactivates the automatic sensing of the switch-in level for the Vdc_max controller.

Value:
0: Automatic detection inhibited
1: Automatic detection enabled

p1255[0...n] Vdc_min controller time threshold / Vdc_min t_thresh

G120XA_USS (Vdc_min)

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.000 [s]	1800.000 [s]	0.000 [s]

Description: Sets the time threshold for the Vdc_min controller (kinetic buffering).
If this value is exceeded a fault is output; the required response can be parameterized.
Prerequisite: p1256 = 1

Dependency: See also: F07406

NOTICE

If a time threshold has been parameterized, the Vdc_max controller should also be activated (p1240 = 3) so that the drive does not shut down with overvoltage when Vdc_min control is exited (due to the time violation) and in the event of fault response OFF3. It is also possible to increase the OFF3 ramp-down time p1135.

p1256[0...n] Vdc_min controller response (kinetic buffering) / Vdc_min response

G120XA_USS (Vdc_min)

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	1	0

Description: Sets the response for the Vdc_min controller (kinetic buffering).

Value:
0: Buffer Vdc until undervoltage, n<p1257 -> F07405
1: Buff. Vdc until undervolt., n<p1257 -> F07405, t>p1255 -> F07406

Dependency: See also: F07405, F07406

p1257[0...n] Vdc_min controller speed threshold / Vdc_min n_thresh

G120XA_USS
(Vdc_min)

Access level: 3	**Calculated:** CALC_MOD_ALL	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.00 [rpm]	210000.00 [rpm]	50.00 [rpm]

Description: Sets the speed threshold for the Vdc-min controller (kinetic buffering).

If this value is exceeded a fault is output; the required response can be parameterized .

Kinetic buffering is not started below the speed threshold.

Note

Exiting the Vdc_min control before reaching motor standstill prevents the regenerative braking current from increasing significantly at low speeds, and after a pulse inhibit, means that the motor coasts down.

However, the maximum braking torque can be set via the appropriate torque limiting.

r1258 CO: Vdc controller output / Vdc_ctrl output

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p2002	**Dynamic index:** -
Unit group: 6_2	**Unit selection:** p0505	**Function diagram:** 6220
Min:	**Max:**	**Factory setting:**
- [Arms]	- [Arms]	- [Arms]

Description: Displays the actual output of the Vdc controller (DC link voltage controller)

Note

The regenerative power limit p1531 is used for vector control to precontrol the Vdc_max controller. The lower the power limit is set, the lower the correction signals of the controller when the voltage limit is reached.

p1260 Bypass configuration / Bypass config

Access level: 2	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	3	0

Description: Sets the configuration for the bypass function.

Value:
0: Bypass deactivated
3: Bypass without synchronization

Dependency: The "Bypass" function is only available for induction motors.

Note

When the converter is switched on, the state of the bridging contactor is evaluated.

If the automatic restart is active (p1210 = 4) and both an ON command (r0054.0 = 1) and the bypass signal (p1266 = 1, configuration p1267.0 = 1) are still present during power up, the converter goes into "ready for operation and bypass" state (r0899.0 = 1 and r0046.25 = 1) after power up, and the motor continues to run directly on the line.

The "bypass" function can only be switched off again (p1260 = 0) if the bypass is not active or the bypass function has a fault.

The "flying restart" function must be activated (p1200).

r1261.0...11 CO/BO: Bypass control/status word / Bypass STW / ZSW

Access level: 2	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Control and feedback signals of the bypass switch.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Command switch motor - power unit	Close	Open	-
01	Command switch motor - line supply	Close	Open	-
05	Feedback signal switch motor - power unit	Closed	Opened	-
06	Feedback signal switch motor - line supply	Closed	Opened	-
07	Bypass command (from p1266)	Yes	No	-
10	Bypass in process sequence	Yes	No	-
11	Bypass enabled	Yes	No	-

Dependency: The "Bypass" function is only available for induction motors.

Note

Control bits 0 and 1 should be interconnected to the signal outputs via which the switches in the motor feeder cables should be controlled. These should be selected/dimensioned for switching under load.

p1262[0...n] Bypass dead time / Bypass t_dead

Access level: 2	**Calculated:** CALC_MOD_REG	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.000 [s]	20.000 [s]	1.000 [s]

Description: Sets the dead time for non-synchronized bypass.

Dependency: The "Bypass" function is only available for induction motors.

Note

This parameter is used to define the changeover time of the contactors. It should not be shorter than the de-magnetizing time of the motor (p0347).

The total changeover time for the bypass is based on the total of p1262 plus the OFF time for the relevant switch (p1274[x]).

p1263 Debypass delay time / Debypass t_del

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.000 [s]	300.000 [s]	0.100 [s]

Description: Sets the delay time to switch back to converter operation for a non-synchronized bypass.

Dependency: The "Bypass" function is only available for induction motors.

p1264 Bypass delay time / Bypass t_del

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.000 [s]	300.000 [s]	1.000 [s]

Description: Sets the delay time for switching to line operation for a non-synchronized bypass.

Dependency: The "Bypass" function is only available for induction motors.

p1265 Bypass speed threshold / Bypass n_thresh

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** p2000	**Dynamic index:** -
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.00 [rpm]	210000.00 [rpm]	1480.00 [rpm]

Description: Sets the speed threshold to activate the bypass.

Dependency: The "Bypass" function is only available for induction motors.

If the drive setpoint speed is entered via a motorized potentiometer, then the configuration bit p1030.4 should be set in order to ensure the bypass via speed threshold function.

Note

When selecting p1260 = 3 and p1267.1 = 1, the bypass is automatically activated when this speed is reached.

The bypass speed threshold is only effective for positive directions of rotation. If the drive connected to the line supply requires negative speeds, then this can be achieved using p1820 (direction of rotation reversal).

p1266 BI: Bypass control command / Bypass command

Access level: 2	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source for the control command to the bypass.

Dependency: The "Bypass" function is only available for induction motors.

p1267 Bypass changeover source configuration / Chngov_src config

Access level: 2	**Calculated:** -	**Data type:** Unsigned8
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	0000 bin

Description: Sets the cause that should initiate the bypass.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Bypass via signal (BI: p1266)	Yes	No	-
01	Bypass via reaching the speed threshold	Yes	No	-

Dependency: The "Bypass" function is only available for induction motors.

Note

The parameter only has an effect for a non-synchronized bypass.

p1267.0 = 1:

The bypass is initiated by setting a binary signal. When the command is reset, after the debypass delay time (p1263) has expired, operation at the power unit is re-selected.

p1267.1 = 1:

When the speed threshold entered in p1265 is reached, the bypass is switched in. The system only switches back when the speed setpoint again falls below the threshold value.

p1269[0...1] BI: Bypass switch feedback signal / Bypass FS

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	[0] 1261.0 [1] 1261.1

Description: Sets the signal source for the feedback signal of the bypass switch.

Index:
[0] = Switch motor/drive
[1] = Switch motor/line supply

Dependency: The "Bypass" function is only available for induction motors.

Note
In the case of switches without a feedback signal, interconnect the corresponding control bit as the signal source:
BI: p1269[0] = r1261.0
BI: p1269[1] = r1261.1
Entering p1269 = 0 sets this interconnection automatically for switches without a feedback signal.

p1270[0...n] Flying restart configuration / Fly restart config

G120XA_USS (PM330)

Access level: 4	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	0000 0000 0000 0011 bin

Description: Sets the configuration for the "flying restart function" function.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Fast flying restart with voltage model for induction motor	Yes	No	-
01	PLL expansion for fast flying restart w/ voltage model for ASM	Yes	No	-
12	Use peak current values	Yes	No	-
13	Number of current controller cycles (test pulse) bit 0	1	0	-
14	Number of current controller cycles (test pulse) bit 1	1	0	-
15	Number of current controller cycles (test pulse) bit 2	1	0	-

Note
ASM: Induction motor
For bit 00:
This bit is equivalent to p1780 bit 11.
For bit 01:
This bit should only be set when required for large drives.

p1271[0...n] Flying restart maximum frequency for the inhibited direction / FlyRes f_max dir

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0 [Hz]	650 [Hz]	0 [Hz]

Description: Sets the maximum search frequency for a flying restart in an inhibited setpoint direction (p1110, p1111).

Note
The parameter has no effect for an operating mode, which only searches in the setpoint direction (p1200 > 3).

p1271[0...n] Flying restart maximum frequency for the inhibited direction / FlyRes f_max dir

G120XA_USS (PM330)

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0 [Hz]	650 [Hz]	5 [Hz]

Description: Sets the maximum search frequency for a flying restart in an inhibited setpoint direction (p1110, p1111).

Note
The parameter has no effect for an operating mode, which only searches in the setpoint direction (p1200 > 3).

p1274[0...1] Bypass switch monitoring time / Switch t_monit

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0 [ms]	5000 [ms]	1000 [ms]

Description: Sets the monitoring time for the bypass switch.
Sets the delay time to ensure reliable opening/closing of contactor if p29520 = 1(multi-pump control is enabled).

Index: [0] = Switch motor/drive
[1] = Switch motor/line supply

Dependency: The "Bypass" function is only available for induction motors.

Note
The monitoring is deactivated with p1274 = 0 ms.
The changeover time for the bypass (p1262) is extended by the value in this parameter.
If p29520=1(multi-pump control is enabled), the minimum value and defalt value of p1274 wil be set to 40ms and 50ms.

p1280[0...n] Vdc controller configuration (U/f) / Vdc_ctr config U/f

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 6300, 6320, 6854
Min:	**Max:**	**Factory setting:**
0	3	1

Description: Sets the configuration of the controller for the DC link voltage (Vdc controller) in the U/f operating mode.

Value:
0: Inhibit Vdc ctrl
1: Enable Vdc_max controller
2: Enable Vdc_min controller (kinetic buffering)
3: Enable Vdc_min controller and Vdc_max controller

Note
For high input voltages (p0210), the following settings can improve the degree of ruggedness of the Vdc_max controller:
- set the input voltage as low as possible, and in so doing, avoid A07401 (p0210).
- set the rounding times (p1130, p1136).
- increase the ramp-down times (p1121).
- reduce the integral time of the controller (p1291), factor 0.5.
- activate the Vdc correction in the current controller (p1810.1 = 1) or reduce the derivative action time of the controller (p1292, factor 0.5).
In this case, we generally recommend to use vector control (p1300 = 20) (Vdc controller, see p1240).
The following measures are suitable to improve the Vdc_min controller:
- Optimize the Vdc_min controller (see p1287).
- Activate the Vdc correction in the current controller (p1810.1 = 1).
If a braking resistor is connected to the DC link (p0219 > 0), then the Vdc_max control is automatically deactivated.

p1281[0...n] Vdc controller configuration / Vdc ctrl config

Access level: 3	**Calculated:** CALC_MOD_ALL	**Data type:** Unsigned16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	0000 bin

Description: Sets the configuration for the DC link voltage controller.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Vdc min control (U/f) without up ramp	Yes	No	-
02	Vdc min shorter wait time when the line returns	Yes	No	-

Note
For bit 00:
Deactivate the ramp-up for Vdc_min control.
For drives with a mechanical system that can oscillate and high moment of inertia, the speed can be more quickly tracked.
For bit 02:
When the line supply returns, normal operation is resumed earlier, and the system does not wait until the Vdc min controller reaches the setpoint speed.

r1282 Vdc_max controller switch-in level (U/f) / Vdc_max on_level

G120XA_USS (Vdc_max)

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p2001	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 6320, 6854
Min:	**Max:**	**Factory setting:**
- [V]	- [V]	- [V]

Description: Displays the switch-in level for the Vdc_max controller.
If p1294 = 0 (automatic sensing of the switch-in level = off), then the following applies:
r1282 = 1.15 * sqrt(2) * p0210 (supply voltage)
If p1294 = 1 (automatic sensing of the switch-in level = on), then the following applies:
r1282 = Vdc_max - 50.0 V (Vdc_max: Overvoltage threshold of the power unit)
r1282 = Vdc_max - 25.0 V (for 230 V power units)

NOTICE
If the activation level of the Vdc_max controller is already exceeded in the deactivated state (pulse inhibit) by the DC link voltage, then the controller can be automatically deactivated (see F07401), so that the drive is not accelerated the next time that it is activated.

Note
The Vdc_max controller is not switched back off until the DC link voltage falls below the threshold 0.95 * r1282 and the controller output is zero.

p1283[0...n] Vdc_max controller dynamic factor (U/f) / Vdc_max dyn_factor

G120XA_USS (Vdc_max)

Access level: 3	**Calculated:** CALC_MOD_CON	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 6320, 6854
Min:	**Max:**	**Factory setting:**
1 [%]	10000 [%]	100 [%]

Description: Sets the dynamic factor for the DC link voltage controller (Vdc_max controller).

100% means that p1290, p1291, and p1292 (gain, integral time, and rate time) are used in accordance with their basic settings and on the basis of a theoretical controller optimization.

If subsequent optimization is required, this can be carried out using the dynamic factor. In this case, p1290, p1291, and p1292 are weighted with the dynamic factor p1283.

p1284[0...n] Vdc_max controller time threshold (U/f) / Vdc_max t_thresh

Access level: 3	**Calculated:** CALC_MOD_ALL	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.000 [s]	300.000 [s]	4.000 [s]

Description: Sets the monitoring time for the Vdc_max controller.

If the down ramp of the speed setpoint is held for longer than the time set in p1284, then fault F07404 is output.

p1285[0...n] Vdc_min controller switch-in level (kinetic buffering) (U/f) / Vdc_min on_level

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 6320, 6854
Min:	**Max:**	**Factory setting:**
65 [%]	150 [%]	76 [%]

Description: Sets the switch-in level for the Vdc-min controller (kinetic buffering).

The value is obtained as follows:

r1286[V] = p1285[%] * sqrt(2) * p0210

⚠ WARNING
An excessively high value may adversely affect normal drive operation.

r1286 Vdc_min controller switch-in level (kinetic buffering) (U/f) / Vdc_min on_level

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p2001	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 6320, 6854
Min:	**Max:**	**Factory setting:**
- [V]	- [V]	- [V]

Description: Displays the switch-in level for the Vdc_min controller (kinetic buffering).

Note
The Vdc_min controller is not switched back off until the DC link voltage rises above the threshold 1.05 * r1286 and the controller output is zero.

p1287[0...n] Vdc_min controller dynamic factor (kinetic buffering) (U/f) / Vdc_min dyn_factor

Access level: 3	**Calculated:** CALC_MOD_CON	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 6320, 6854
Min:	**Max:**	**Factory setting:**
1 [%]	10000 [%]	100 [%]

Description: Sets the dynamic factor for the Vdc_min controller (kinetic buffering).

100% means that p1290, p1291, and p1292 (gain, integral time, and rate time) are used corresponding to their basic settings and based on a theoretical controller optimization.

If subsequent optimization is required, this can be carried out using the dynamic factor. In this case, p1290, p1291, and p1292 are weighted with the dynamic factor p1287.

p1290[0...n] Vdc controller proportional gain (U/f) / Vdc_ctrl Kp

Access level: 3	**Calculated:** CALC_MOD_CON	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 6320, 6854
Min:	**Max:**	**Factory setting:**
0.00	100.00	1.00

Description: Sets the proportional gain for the Vdc controller (DC link voltage controller).

Note

The gain factor is proportional to the capacitance of the DC link.
The parameter is pre-set to a value that is optimally adapted to the capacitance of the power unit.

p1291[0...n] Vdc controller integral time (U/f) / Vdc_ctrl Tn

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 6320, 6854
Min:	**Max:**	**Factory setting:**
0 [ms]	10000 [ms]	40 [ms]

Description: Sets the integral time for the Vdc controller (DC link voltage controller).

p1292[0...n] Vdc controller rate time (U/f) / Vdc_ctrl t_rate

Access level: 3	**Calculated:** CALC_MOD_CON	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 6320, 6854
Min:	**Max:**	**Factory setting:**
0 [ms]	1000 [ms]	10 [ms]

Description: Sets the rate time constant for the Vdc controller (DC link voltage controller).

p1294 Vdc_max controller automatic detection ON signal level (U/f) / Vdc_max SenseOnLev

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 6320, 6854
Min:	**Max:**	**Factory setting:**
0	1	0

Description: Activates/deactivates the automatic sensing of the switch-in level for the Vdc_max controller. When the sensing function is deactivated, the activation threshold r1282 for the Vdc_max controller is determined from the parameterized connection voltage p0210.

Value: 0: Automatic detection inhibited

1: Automatic detection enabled

p1295[0...n] Vdc_min controller time threshold (U/f) / Vdc_min t_thresh

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.000 [s]	10000.000 [s]	0.000 [s]

Description: Sets the time threshold for the Vdc_min controller (kinetic buffering).

If this value is exceeded a fault is output; the required response can be parameterized.

Prerequisite: p1296 = 1

NOTICE

If a time threshold has been parameterized, the Vdc_max controller should also be activated (p1280 = 3) so that the drive does not shut down with overvoltage when Vdc_min control is exited (due to the time violation) and in the event of fault response OFF3. It is also possible to increase the OFF3 ramp-down time p1135.

p1296[0...n] Vdc_min controller response (kinetic buffering) (U/f) / Vdc_min response

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	1	0

Description: Sets the response for the Vdc_min controller (kinetic buffering).

Value:
0: Buffer Vdc until undervoltage, n<p1297 -> F07405
1: Buff. Vdc until undervolt., n<p1297 -> F07405, t>p1295 -> F07406

Note

For p1296 = 1:
The quick stop ramp entered in p1135 must not be equal to zero, to prevent overcurrent shutdown if F07406 is triggered.

p1297[0...n] Vdc_min controller speed threshold (U/f) / Vdc_min n_thresh

Access level: 3	**Calculated:** CALC_MOD_ALL	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.00 [rpm]	210000.00 [rpm]	50.00 [rpm]

Description: Sets the speed threshold for the Vdc-min controller (kinetic buffering).

If this value is exceeded a fault is output; the required response can be parameterized .

Note

Exiting the Vdc_min control before reaching motor standstill prevents the regenerative braking current from increasing significantly at low speeds, and after a pulse inhibit, means that the motor coasts down.

r1298 CO: Vdc controller output (U/f) / Vdc_ctrl output

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p2000	**Dynamic index:** -
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 6320, 6854
Min:	**Max:**	**Factory setting:**
- [rpm]	- [rpm]	- [rpm]

Description: Displays the actual output of the Vdc controller (DC link voltage controller)

p1300[0...n] Open-loop/closed-loop control operating mode / Op/cl-lp ctrl_mode

Access level: 2	**Calculated:** -	**Data type:** Integer16
Can be changed: C2(1), T	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 6300, 6301, 6851, 8012
Min:	**Max:**	**Factory setting:**
0	20	0

Description: Sets the open and closed-loop control mode of a drive.

Value:
0: U/f control with linear characteristic
1: U/f control with linear characteristic and FCC
2: U/f control with parabolic characteristic
4: U/f control with linear characteristic and ECO
7: U/f control for a parabolic characteristic and ECO
20: Speed control (encoderless)

Dependency: For Standard Drive Control (p0096 = 1), settings p1300 = 0, 2 are possible, for Dynamic Drive Control (p0096 = 2) only p1300 = 20 can be set.

Only operation with U/f characteristic is possible if the rated motor speed is not entered (p0311).

See also: p0300, p0311, p0500

NOTICE

Active slip compensation is required in the U/f control types with Eco mode (p1300 = 4, 7). The scaling of the slip compensation (p1335) should be set so that the slip is completely compensated (generally 100%).

The Eco mode is only effective in steady-state operation and when the ramp-function generator is not bypassed. In the case of analog setpoints, if required the tolerance for ramp-up and ramp-down should be actively increased for the ramp-function generator using p1148 in order to reliably signal a steady-state condition.

Note

For motors, type p0300 = 6 and 6xx, operation with U/f control is only recommended for diagnostic purposes.

p1300[0...n] Open-loop/closed-loop control operating mode / Op/cl-lp ctrl_mode

G120XA_USS (PM330)

Access level: 2	**Calculated:** -	**Data type:** Integer16
Can be changed: C2(1), T	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 6300, 6301, 6851, 8012
Min:	**Max:**	**Factory setting:**
0	20	20

Description: Sets the open and closed-loop control mode of a drive.

Value:
0: U/f control with linear characteristic
1: U/f control with linear characteristic and FCC
2: U/f control with parabolic characteristic
4: U/f control with linear characteristic and ECO
7: U/f control for a parabolic characteristic and ECO
20: Speed control (encoderless)

Dependency: For Dynamic Drive Control (p0096 = 2), only p1300 = 20 can be set.

Only operation with U/f characteristic is possible if the rated motor speed is not entered (p0311).

See also: p0300, p0311, p0500

NOTICE

Active slip compensation is required in the U/f control types with Eco mode (p1300 = 4, 7). The scaling of the slip compensation (p1335) should be set so that the slip is completely compensated (generally 100%).

The Eco mode is only effective in steady-state operation and when the ramp-function generator is not bypassed. In the case of analog setpoints, if required the tolerance for ramp-up and ramp-down should be actively increased for the ramp-function generator using p1148 in order to reliably signal a steady-state condition.

Note
For motors, type p0300 = 14, operation with U/f control is only recommended for diagnostic purposes.

p1302[0...n] U/f control configuration / U/f config

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	0000 0000 0000 0000 bin

Description: Sets the configuration for the U/f control.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
04	Field orientation	Yes	No	-
05	Starting current when accelerating without flux boost	Yes	No	-
07	Inhibit Iq,max controller I component	Yes	No	-
08	Saturation characteristic for the starting current	Yes	No	-
09	Current boost for fast magnetization	Yes	No	-

NOTICE
p1302 bit 5 = 1: (only for field orientation p1302 bit 4 = 1)
This setting is only selected for very fast acceleration.

Note
For bit 04:
Field orientation for the closed-loop control of application class Standard Drive Control (p0096 = 1). The field orientation is activated with the automatic calculation if p0096 is set = 1.
For bit 05 (only effective for p1302.4 = 1):
The starting current when accelerating (p1311) generally results in an increase in the absolute current and flux. With p1302.5 = 1 the current is only increased in the direction of the load. p1302.5 - in conjunction with p1310 and p1311 - are decisive when it comes to defining the quality of the starting response.
For bit 07:
For field orientation (bit04 = 1), an Iq,max controller supports the current limiting controller (see p1341). Inhibiting the integral component can prevent the drive from stalling under overload conditions.
For bit 08:
Taking into account the saturation characteristic can be activated to improve faster starting operations for high-rating motors.
For bit 09:
For field orientation (bit04 = 1), while the induction motor is being magnetized, the current is automatically increased if the magnetization time p0346 is shortened.

p1310[0...n] Starting current (voltage boost) permanent / I_start (Ua) perm

Access level: 2	**Calculated:** CALC_MOD_ALL	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 6300, 6301, 6851
Min:	**Max:**	**Factory setting:**
0.0 [%]	250.0 [%]	50.0 [%]

Description: Defines the voltage boost as a [%] referred to the rated motor current (p0305).

The magnitude of the permanent voltage boost is reduced with increasing frequency so that at the rated motor frequency, the rated motor voltage is present.

The magnitude of the boost in Volt at a frequency of zero is defined as follows:

Voltage boost [V] = 1.732 x p0305 (rated motor current [A]) x r0395 (stator/primary section resistance [ohm]) x p1310 (permanent voltage boost [%]) / 100 %

At low output frequencies, there is only a low output voltage in order to maintain the motor flux. However, the output voltage can be too low in order to achieve the following:

- magnetize the induction motor.
- hold the load.
- compensate for losses in the system.

This is the reason that the output voltage can be increased using p1310.

The voltage boost can be used for both linear as well as square-law U/f characteristics.

For field orientation (p1302.4 = 1, default setting for Standard Drive Control p0096 = 1), in the vicinity of low output frequencies, a minimum current is impressed with the magnitude of the rated magnetizing current. In this case, for p1310 = 0%, a current setpoint is calculated that corresponds to the no-load case. For p1610 = 100 %, a current setpoint is calculated that corresponds to the rated motor current.

Dependency: The starting current (voltage boost) is limited by the current limit p0640.

Only for p1302.4 = 0 (no field orientation):

The accuracy of the starting current depends on the setting of the stator and feeder cable resistance (p0350, p0352).

For vector control, the starting current is realized using p1610.

See also: p1300, p1311, p1312, r1315

NOTICE
The starting current (voltage boost) increases the motor temperature (particularly at zero speed).

Note

The starting current as a result of the voltage boost is only effective for U/f control (p1300).

The boost values are combined with one another if the permanent voltage boost (p1310) is used in conjunction with other boost parameters (acceleration boost (p1311), voltage boost for starting (p1312)).

However, these parameters are assigned the following priorities: p1310 > p1311, p1312

For field orientation (p1302 bit 4 = 1, not PM230, PM250, PM260), then p1310 together with p1311 and p1302.5 are mainly responsible for the quality of the drive response.

p1311[0...n] Starting current (voltage boost) when accelerating / I_start accel

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 6300, 6301, 6851
Min:	**Max:**	**Factory setting:**
0.0 [%]	250.0 [%]	0.0 [%]

Description: p1311 only results in a voltage boost when accelerating and generates a supplementary torque to accelerate the load.

The voltage boost becomes effective for a positive setpoint increase and disappears as soon as the setpoint has been reached. The build-up and withdrawal of the voltage boost are smoothed.

The magnitude of the boost in Volt at a frequency of zero is defined as follows (not for field orientation):

Voltage boost [V] = 1.732 * p0305 (rated motor current [A]) x r0395 (stator/primary section resistance [ohm]) x p1311 (voltage boost when accelerating [%]) / 100 %

Dependency: The current limit p0640 limits the boost.

For field orientation (p1302 bit 4 = 1, not PM230, PM250, PM260), p1311 is pre-assigned by the automatic calculation.

For vector control, the starting current is realized using p1611.

Refer to:p0500, p0096

See also: p1300, p1310, p1312, r1315

NOTICE
The voltage boost results in a higher motor temperature increase.

Note

The voltage boost when accelerating can improve the response to small, positive setpoint changes.
Assigning priorities for the voltage boosts: refer to p1310
For field orientation (p1302 bit 4 = 1, not PM230, PM250, PM260), then p1311 together with p1310 and p1302.5 are mainly responsible for the quality of the drive response.

p1312[0...n] Starting current (voltage boost) when starting / I_start start

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 6300, 6301, 6851
Min:	**Max:**	**Factory setting:**
0.0 [%]	250.0 [%]	0.0 [%]

Description: Setting for an additional voltage boost when powering-up, however, only for the first acceleration phase.

The voltage boost becomes effective for a positive setpoint increase and disappears as soon as the setpoint has been reached. The build-up and withdrawal of the voltage boost are smoothed.

Dependency: The current limit p0640 limits the boost.

See also: p1300, p1310, p1311, r1315

NOTICE
The voltage boost results in a higher motor temperature increase.

Note

The voltage boost when accelerating can improve the response to small, positive setpoint changes.
Assigning priorities for the voltage boosts: refer to p1310
For field orientation (p1302.4 = 1, not PM230, PM250, PM260), p1312 of the voltage boost is also added in the direction of the load current (non-linear).

r1315 Voltage boost total / U_boost total

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p2001	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 6301, 6851
Min:	**Max:**	**Factory setting:**
- [Vrms]	- [Vrms]	- [Vrms]

Description: Displays the total resulting voltage boost in volt.

For field orientation (p1302.4 = 1, not for PM230, PM250, PM260), at low speeds, as a minimum the magnetizing current is set, so that the voltage depends on r0331.

Dependency: See also: p1310, p1311, p1312

p1331[0...n] Voltage limiting / U_lim

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: 5_1	**Unit selection:** p0505	**Function diagram:** 6300
Min:	**Max:**	**Factory setting:**
50.00 [Vrms]	2000.00 [Vrms]	1000.00 [Vrms]

Description: Limiting the voltage setpoint.

This means that the output voltage can be reduced with respect to the calculated maximum voltage r0071 and the start of field weakening.

Note

The output voltage is only limited if, as a result of p1331, the maximum output voltage (r0071) is fallen below.

p1333[0...n] U/f control FCC starting frequency / U/f FCC f_start

Access level: 3	**Calculated:** CALC_MOD_ALL	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 6301
Min:	**Max:**	**Factory setting:**
0.00 [Hz]	3000.00 [Hz]	0.00 [Hz]

Description: Sets the starting frequency at which FCC (Flux Current Control) is activated.

Dependency: The correct operating mode must be set (p1300 = 1, 6).

⚠ WARNING

An excessively low value can result in instability.

Note

For p1333 = 0 Hz, the FCC starting frequency is automatically set to 6 % of the rated motor frequency.

p1334[0...n] U/f control slip compensation starting frequency / Slip comp start

Access level: 3	**Calculated:** CALC_MOD_ALL	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 6310, 6853
Min:	**Max:**	**Factory setting:**
0.00 [Hz]	3000.00 [Hz]	0.00 [Hz]

Description: Sets the starting frequency of the slip compensation.

Note

For p1334 = 0, the starting frequency of the slip compensation is automatically set to 6 % of the rated motor frequency.

p1335[0...n] Slip compensation scaling / Slip comp scal

Access level: 3	**Calculated:** CALC_MOD_ALL	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 6300, 6310, 6853
Min:	**Max:**	**Factory setting:**
0.0 [%]	600.0 [%]	0.0 [%]

Description: Sets the setpoint for slip compensation in [%] referred to r0330 (motor rated slip).

p1335 = 0.0 %: Slip compensation deactivated.

p1335 = 100.0 %: The slip is completely compensated.

Dependency: Prerequisite for a precise slip compensation for p1335 = 100 % are the precise motor parameters (p0350 ... p0360).

If the parameters are not precisely known, a precise compensation can be achieved by varying p1335.

For U/f control types with Eco optimization (4 and 7), the slip compensation must be activated in order to guarantee correct operation.

For p0096 = 1 (Standard Drive Control), the scaling of the slip compensation is set as default to 100%.

Note

The purpose of slip compensation is to maintain a constant motor speed regardless of the applied load. The fact that the motor speed decreases with increasing load is a typical characteristic of induction motors.

For synchronous motors, this effect does not occur and the parameter has no effect in this case.

For the open-loop control modes p1300 = 5 and 6 (textile sector), the slip compensation is internally disabled in order to be able to precisely set the output frequency.

If p1335 is changed during commissioning (p0010 > 0), then it is possible that the old value will no longer be able to be set. The reason for this is that the dynamic limits of p1335 have been changed by a parameter that was set when the drive was commissioned (e.g. p0300).

p1335[0...n] Slip compensation scaling / Slip comp scal

G120XA_USS (PM330)

Access level: 3	**Calculated:** CALC_MOD_ALL	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 6300, 6310
Min:	**Max:**	**Factory setting:**
0.0 [%]	600.0 [%]	100.0 [%]

Description: Sets the setpoint for slip compensation in [%] referred to r0330 (motor rated slip).

p1335 = 0.0 %: Slip compensation deactivated.

p1335 = 100.0 %: The slip is completely compensated.

Dependency: Prerequisite for a precise slip compensation for p1335 = 100 % are the precise motor parameters (p0350 ... p0360).

If the parameters are not precisely known, a precise compensation can be achieved by varying p1335.

For U/f control types with Eco optimization (4 and 7), the slip compensation must be activated in order to guarantee correct operation.

Note

The purpose of slip compensation is to maintain a constant motor speed regardless of the applied load. The fact that the motor speed decreases with increasing load is a typical characteristic of induction motors.

For synchronous motors, this effect does not occur and the parameter has no effect in this case.

For the open-loop control modes p1300 = 5 and 6 (textile sector), the slip compensation is internally disabled in order to be able to precisely set the output frequency.

If p1335 is changed during commissioning (p0010 > 0), then it is possible that the old value will no longer be able to be set. The reason for this is that the dynamic limits of p1335 have been changed by a parameter that was set when the drive was commissioned (e.g. p0300).

p1336[0...n] Slip compensation limit value / Slip comp lim val

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 6310, 6853
Min:	**Max:**	**Factory setting:**
0.00 [%]	600.00 [%]	250.00 [%]

Description: Sets the limit value for slip compensation in [%] referred to r0330 (motor rated slip).

r1337 CO: Actual slip compensation / Slip comp act val

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 6310, 6853
Min:	**Max:**	**Factory setting:**
- [%]	- [%]	- [%]

Description: Displays the actual compensated slip [%] referred to r0330 (rated motor slip).

Dependency: p1335 > 0 %: Slip compensation active.

See also: p1335

p1338[0...n] U/f mode resonance damping gain / Uf Res_damp gain

Access level: 3	**Calculated:** CALC_MOD_CON	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 6300, 6310, 6853
Min:	**Max:**	**Factory setting:**
0.00	100.00	0.00

Description: Sets the gain for resonance damping for U/f control.

Dependency: See also: p1300, p1339, p1349

Note

The resonance damping function dampens active current oscillations that frequency occur under no-load conditions.

The resonance damping is active in a range from approximately 6 % of the rated motor frequency (p0310). The shutoff frequency is determined by p1349.

For the open-loop control modes p1300 = 5 and 6 (textile sectors), the resonance damping is internally disabled in order that the output frequency can be precisely set.

p1339[0...n] U/f mode resonance damping filter time constant / Uf Res_damp T

Access level: 4	**Calculated:** CALC_MOD_CON	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 6310, 6853
Min:	**Max:**	**Factory setting:**
1.00 [ms]	1000.00 [ms]	20.00 [ms]

Description: Sets the filter time constant for resonance damping for U/f control.

Dependency: See also: p1300, p1338, p1349

p1340[0...n] I_max frequency controller proportional gain / I_max_ctrl Kp

Access level: 3	**Calculated:** CALC_MOD_CON	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 6300
Min:	**Max:**	**Factory setting:**
0.000	0.500	0.000

Description: Sets the proportional gain of the I_max frequency controller.

The I_max controller reduces the drive converter output current if the maximum current (r0067) is exceeded.

In the U/f operating modes (p1300) for the I_max control, one controller is used that acts on the output frequency and one controller that acts on the output voltage. The frequency controller reduces the current by decreasing the converter output frequency. The frequency is reduced down to a minimum value (equaling twice rated slip). If the overcurrent condition cannot be successfully resolved using this measure, then the drive converter output voltage is reduced using the I_max voltage controller. Once the overcurrent condition has been resolved, the drive is accelerated along the ramp set in p1120 (ramp-up time).

Dependency: In the U/f modes (p1300) for textile applications and for external voltage setpoints, only the I_max voltage controller is used.

NOTICE
When deactivating the I_max controller, the following must be carefully observed: When the maximum current (r0067) is exceeded, the output current is no longer reduced. The drive is switched off when the overcurrent limits are exceeded.

Note

The I_max limiting controller becomes ineffective if the ramp-function generator is deactivated with p1122 = 1.

p1341 = 0:

I_max frequency controller deactivated and I_max voltage controller activated over the complete speed range.

p1341[0...n] I_max frequency controller integral time / I_max_ctrl Tn

Access level: 3	**Calculated:** CALC_MOD_CON	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 6300, 6850
Min:	**Max:**	**Factory setting:**
0.000 [s]	50.000 [s]	0.300 [s]

Description: Sets the integral time for the I_max frequency controller.

Dependency: See also: p1340

Note
When p1341 = 0, the current limiting controller influencing the frequency is deactivated and only the current limiting controller influencing the output voltage remains active (p1345, p1346).
In the case of power units with regenerative feedback (PM250, PM260), current limitation control for a regenerative load is always implemented by influencing the frequency. This current limiting function is deactivated with p1340 = p1341 = 0.

r1343 CO: I_max controller frequency output / I_max_ctrl f_outp

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p2000	**Dynamic index:** -
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 6300, 6850
Min:	**Max:**	**Factory setting:**
- [rpm]	- [rpm]	- [rpm]

Description: Displays the effective frequency limit.

Dependency: See also: p1340

r1344 I_max controller voltage output / I_max_ctrl U_outp

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p2001	**Dynamic index:** -
Unit group: 5_1	**Unit selection:** p0505	**Function diagram:** 6300
Min:	**Max:**	**Factory setting:**
- [Vrms]	- [Vrms]	- [Vrms]

Description: Displays the amount by which the converter output voltage is reduced.

Dependency: See also: p1340

p1345[0...n] I_max voltage controller proportional gain / I_max_U_ctrl Kp

Access level: 3	**Calculated:** CALC_MOD_CON	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 6300, 7017
Min:	**Max:**	**Factory setting:**
0.000	100000.000	0.000

Description: Sets the proportional gain for the I_max voltage controller.

Dependency: See also: p1340

Note
The controller settings are also used in the current controller of the DC braking (refer to p1232).

p1346[0...n] I_max voltage controller integral time / I_max_U_ctrl Tn

Access level: 3	**Calculated:** CALC_MOD_CON	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 6300, 7017
Min:	**Max:**	**Factory setting:**
0.000 [s]	50.000 [s]	0.030 [s]

Description: Sets the integral time for the I_max voltage controller.

Dependency: See also: p1340

Note
The controller settings are also used in the current controller of the DC braking (refer to p1232).
For p1346 = 0, the following applies:
The integral time of the I_max voltage controller is deactivated.

r1348 CO: U/f control Eco factor actual value / U/f Eco fac act v

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 6300, 6301
Min:	**Max:**	**Factory setting:**
- [%]	- [%]	- [%]

Description: Displays the economic factor determined for optimizing motor consumption.

Dependency: See also: p1335

Note

The value is only determined for operating modes with Economic (p1300 = 4, 7).

p1349[0...n] U/f mode resonance damping maximum frequency / Uf res_damp f_max

Access level: 3	**Calculated:** CALC_MOD_ALL	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 6310
Min:	**Max:**	**Factory setting:**
0.00 [Hz]	3000.00 [Hz]	0.00 [Hz]

Description: Sets the maximum output frequency for resonance damping for U/f control.
Resonance damping is inactive above this output frequency.

Dependency: See also: p1338, p1339

Note

For p1349 = 0, the changeover limit is automatically set to 95 % of the rated motor frequency - however, to a max. of 45 Hz.

p1382[0...n] Saturation limit for flux setpoint / Max FluxSaturation

Access level: 4	**Calculated:** CALC_MOD_ALL	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
100 [%]	130 [%]	100 [%]

Description: Maximum flux setpoint (saturation limit) for calculating the EMF in the range of the impressed starting current.

p1400[0...n] Speed control configuration / n_ctrl config

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 6490
Min:	**Max:**	**Factory setting:**
-	-	0000 0000 0000 0000 1000 0000 0010 0001 bin

Description: Sets the configuration for the closed-loop speed control.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Automatic Kp/Tn adaptation active	Yes	No	6040
05	Kp/Tn adaptation active	Yes	No	6040
15	Sensorless vector control speed precontrol	Yes	No	6030
16	I component for limiting	Enable	Hold	6030
18	Reserved	-	-	-
19	Anti-windup for integral component	Yes	No	6030
20	Acceleration model	ON	OFF	6031
22	Reserved	-	-	-

25	Acceleration torque instantaneous in the I/f mode	Yes	No	-

Note
For bit 16:
When the bit is set, the integral component of the speed controller is only held if it reaches the torque limit.
For bit 19, 20:
When this bit is set, speed overshoots when accelerating along the torque limit and for load surges are reduced.
For bit 20:
The acceleration model for the speed setpoint is only active if p1496 is not zero.
For bit 25:
When the bit is set, for high dynamic starting in the I/f mode, the acceleration precontrol torque smoothing only has a short minimum time (4 ms).

p1400[0...n] Speed control configuration / n_ctrl config

G120XA_USS (PM330)

Access level: 3
Calculated: -
Data type: Unsigned32
Can be changed: T, U
Scaling: -
Dynamic index: DDS, p0180
Unit group: -
Unit selection: -
Function diagram: 6490
Min: -
Max: -
Factory setting: 0000 0000 0011 1000 1000 0000 0010 0001 bin

Description: Sets the configuration for the closed-loop speed control.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Automatic Kp/Tn adaptation active	Yes	No	6040
05	Kp/Tn adaptation active	Yes	No	6040
15	Sensorless vector control speed precontrol	Yes	No	6030
16	I component for limiting	Enable	Hold	6030
18	Reserved	-	-	-
19	Anti-windup for integral component	Yes	No	6030
20	Acceleration model	ON	OFF	6031
21	Free Tn reduction active	Yes	No	6030
22	Reserved	-	-	-
25	Acceleration torque instantaneous in the I/f mode	Yes	No	-

Note
For bit 16:
When the bit is set, the integral component of the speed controller is only held if it reaches the torque limit.
For bit 19, 20:
When this bit is set, speed overshoots when accelerating along the torque limit and for load surges are reduced.
For bit 20:
The acceleration model for the speed setpoint is only active if p1496 is not zero.
For bit 25:
When the bit is set, for high dynamic starting in the I/f mode, the acceleration precontrol torque smoothing only has a short minimum time (4 ms).

p1401[0...n] Flux control configuration / Flux ctrl config

Access level: 3
Calculated: -
Data type: Unsigned16
Can be changed: T, U
Scaling: -
Dynamic index: DDS, p0180
Unit group: -
Unit selection: -
Function diagram: 6491
Min: -
Max: -
Factory setting: 0000 0000 0000 1110 bin

Description: Sets the configuration for flux setpoint control

Bit field:

Bit	Signal name	1 signal	0 signal	FP
01	Flux setpoint differentiation active	Yes	No	6723

02	Flux build-up control active	Yes	No	6722, 6723
03	Flux characteristic load-dependent	Yes	No	6725
06	Quick magnetizing	Yes	No	6722
09	Dynamic load-dependent flux boost	Yes	No	6790, 6823
10	Flux boost low speed	Yes	No	-
14	Efficiency optimization 2 active	Yes	No	6722, 6837

Note
RESM: reluctance synchronous motor (synchronous reluctance motor)
For bit 01:
Initially, the flux is only established with a low rate of rise when magnetizing the induction motor. The flux setpoint p1570 is reached again at the end of the magnetizing time p0346.
The flux differentiation can be switched out if a significant ripple occurs in the field-generating current setpoint (r0075) when entering the field weakening range. However, this is not suitable for fast acceleration operations because then, the flux decays more slowly and the voltage limiting responds.
For bit 02:
The flux build-up control operates during the magnetizing phase p0346 of the induction motor. If it is switched out, a constant current setpoint is injected and the flux is built up corresponding to the rotor time constant.
For bit 03:
Synchronous-reluctance motor:
Activation of the load-dependent optimum flux characteristic.
For bit 06:
Magnetizing is performed with maximum current (0.9 * r0067). With active identification of the stator resistance (see p0621) quick magnetizing is internally deactivated and alarm A07416 is displayed. During a flying restart of a rotating motor (see p1200) no quick magnetizing takes place.
For bit 09:
Synchronous reluctance motor (RESM):
Dynamic increase in the flux setpoint when torque is quickly established.
For bit 10:
Synchronous reluctance motor (RESM):
For load-dependent optimum flux characteristic (p1401.3 = 1) the flux setpoint is increased at low speeds.
For bit 14:
When the function is activated, the following applies:
- the optimum flux is calculated and the power loss is entered for optimization purposes
- the efficiency optimization (p1580) is not active.
It only makes sense to activate this function if the dynamic response requirements of the speed controller are low.
In order to avoid oscillations, if required, the speed controller parameters should be adapted (increase Tn, reduce Kp). Further, the smoothing time of the flux setpoint filter (p1582) should be increased.

p1402[0...n] Closed-loop current control and motor model configuration / I_ctrl config

Access level: 4	**Calculated:** CALC_MOD_REG	**Data type:** Unsigned16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	0000 0000 0000 0000 bin

Description: Sets the configuration for the closed-loop control and the motor model.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
02	Current controller adaptation active	Yes	No	-
10	d-current controller adaptation model-based	Yes	No	-
12	q-current controller adaptation model-based	Yes	No	-
13	Current controller decoupling filter	Yes	No	-

Note
For bit 02:
The current controller adaptation (p0391 ... p0393) is only calculated when the bit is set.
For bits 10, 12:
Only for closed-loop controlled reluctance motor: The gain of the d, q current controller is realized adaptively at the saturation model depending on the operating point.
Parameters p1720, p1715 act as scaling factor.
For bit 13: only permanent magnet synchronous motors
For stabilization in the field weakening range.

p1402[0...n] Closed-loop current control and motor model configuration / I_ctrl config

G120XA_USS (PM330)

Access level: 4	**Calculated:** CALC_MOD_REG	**Data type:** Unsigned16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	0000 bin

Description: Sets the configuration for the closed-loop control and the motor model.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
02	Current controller adaptation active	Yes	No	-

Note
For bit 02:
The current controller adaptation (p0391 ... p0393) is only calculated when the bit is set.

r1407.0...23 CO/BO: Status word speed controller / ZSW n_ctrl

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 2522
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display and BICO output for the status word of the speed controller.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	U/f control active	Yes	No	-
01	Encoderless operation active	Yes	No	-
02	Reserved	-	-	-
03	Speed control active	Yes	No	6040
05	Speed controller I component frozen	Yes	No	6040
06	Speed controller I component set	Yes	No	6040
07	Torque limit reached	Yes	No	6060
08	Upper torque limit active	Yes	No	6060
09	Lower torque limit active	Yes	No	6060
10	Reserved	-	-	-
11	Speed setpoint limited	Yes	No	6030
12	Ramp-function generator set	Yes	No	-
13	Encoderless operation due to a fault	Yes	No	-
14	I/f control active	Yes	No	-
15	Torque limit reached (without precontrol)	Yes	No	6060
17	Speed limiting control active	Yes	No	6640
23	Acceleration model activated	Yes	No	-

r1408.0...14 CO/BO: Status word current controller / ZSW I_ctrl

Access level: 4	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 2530
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display and BICO output for the status word of the current controller.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Current controller active	Active	Not active	-
01	Id control I component limiting	Active	Not active	6714
03	Voltage limiting	Active	Not active	6714
10	Speed adaptation limiting	Active	Not active	-
12	Motor stalled	Yes	No	-
13	Separately excited synchronous motor is excited	Yes	No	-
14	Current model SESM magnetizing excit. current limited to zero	Yes	No	-

p1416[0...n] Speed setpoint filter 1 time constant / n_set_filt 1 T

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 6020, 6030
Min:	**Max:**	**Factory setting:**
0.00 [ms]	5000.00 [ms]	0.00 [ms]

Description: Sets the time constant for the speed setpoint filter 1 (PT1).

r1438 CO: Speed controller speed setpoint / n_ctrl n_set

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p2000	**Dynamic index:** -
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 3001, 6020, 6031
Min:	**Max:**	**Factory setting:**
- [rpm]	- [rpm]	- [rpm]

Description: Display and connector output of the speed setpoint after setpoint limiting for the P component of the speed controller.
For U/f operation, the value that is displayed is of no relevance.

Note
In the standard state (the reference model is deactivated), r1438 = r1439.

r1445 CO: Actual speed smoothed / n_act smooth

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p2000	**Dynamic index:** -
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 6040
Min:	**Max:**	**Factory setting:**
- [rpm]	- [rpm]	- [rpm]

Description: Display and connector output for the actual smoothed speed actual value of the speed control.

p1452[0...n] Speed controller speed actual value smoothing time (sensorless) / n_C n_act T_s SL

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 6020, 6040
Min:	**Max:**	**Factory setting:**
0.00 [ms]	32000.00 [ms]	10.00 [ms]

Description: Sets the smoothing time for the actual speed of the speed controller for encoderless closed-loop speed control.

Note

The smoothing must be increased if there is gear backlash. For longer smoothing times, the integral time of the speed controller must also be increased (e.g. using p0340 = 4).

p1461[0...n] Speed controller Kp adaptation speed upper scaling / n_ctr Kp n up scal

Access level: 3	**Calculated:** CALC_MOD_CON	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 6050
Min:	**Max:**	**Factory setting:**
0.0 [%]	200000.0 [%]	100.0 [%]

Description: Sets the P gain of the speed controller for the upper adaptation speed range (> p1465).

The entry is made referred to the P gain for the lower adaptation speed range of the speed controller (% referred to p1470).

Dependency: See also: p1464, p1465

Note

If the upper transition point p1465 of the speed controller adaptation is set to lower values than the lower transition p1464, then the controller gain below p1465 is adapted with p1461. This means that an adaptation can be implemented for low speeds without having to change the controller parameters.

p1463[0...n] Speed controller Tn adaptation speed upper scaling / n_ctr Tn n up scal

Access level: 3	**Calculated:** CALC_MOD_CON	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 6050
Min:	**Max:**	**Factory setting:**
0.0 [%]	200000.0 [%]	100.0 [%]

Description: Sets the integral time of the speed controller after the adaptation speed range (> p1465).

The entry is made referred to the integral time for the lower adaptation speed range of the speed controller (% referred to p1472).

Dependency: See also: p1464, p1465

Note

If the upper transition point p1465 of the speed controller adaptation is set to lower values than the lower transition point p1464, then the controller integral time below p1465 is adapted with p1463. This means that an adaptation can be implemented for low speeds without having to change the controller parameters.

p1464[0...n] Speed controller adaptation speed lower / n_ctrl n lower

Access level: 3	**Calculated:** CALC_MOD_CON	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 6050
Min:	**Max:**	**Factory setting:**
0.00 [rpm]	210000.00 [rpm]	0.00 [rpm]

Description: Sets the lower adaptation speed of the speed controller.

No adaptation is effective below this speed.

Dependency: See also: p1461, p1463, p1465

Note
If the upper transition point p1465 of the speed controller adaptation is set to lower values than the lower transition point p1464, then the controller below p1465 is adapted with p1461 or p1463. This means that an adaptation can be implemented for low speeds without having to change the controller parameters.

p1465[0...n] Speed controller adaptation speed upper / n_ctrl n upper

Access level: 3	**Calculated:** CALC_MOD_CON	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 6050
Min:	**Max:**	**Factory setting:**
0.00 [rpm]	210000.00 [rpm]	210000.00 [rpm]

Description: Sets the upper adaptation speed of the speed controller.
No adaptation is effective above this speed.
For the proportional gain, p1470 x p1461 is effective.
For the integral time, p1472 x p1463 is effective.

Dependency: See also: p1461, p1463, p1464

Note
If the upper transition point p1465 of the speed controller adaptation is set to lower values than the lower transition point p1464, then the controller below p1465 is adapted with p1461 or p1463. This means that an adaptation can be implemented for low speeds without having to change the controller parameters.

r1468 CO: Speed controller P-gain effective / n_ctr Kp eff

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 6040
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the effective P gain of the speed controller.

Dependency: The connector output signal r1468 is increased by a factor of 100 in order to improve the resolution.

r1469 Speed controller integral time effective / n_ctr Tn eff

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 5040, 5042, 6040
Min:	**Max:**	**Factory setting:**
- [ms]	- [ms]	- [ms]

Description: Displays the effective integral time of the speed controller.

p1470[0...n] Speed controller encoderless operation P-gain / n_ctrl SL Kp

Access level: 2	**Calculated:** CALC_MOD_CON	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 6040, 6050
Min:	**Max:**	**Factory setting:**
0.000	999999.000	0.300

Description: Sets the P gain for encoderless operation for the speed controller.

Note
The product p0341 x p0342 is taken into account when automatically calculating the speed controller (p0340 = 1, 3, 4).

p1472[0...n] Speed controller encoderless operation integral time / n_ctrl SL Tn

Access level: 2	**Calculated:** CALC_MOD_CON	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 6040, 6050
Min:	**Max:**	**Factory setting:**
0.0 [ms]	100000.0 [ms]	20.0 [ms]

Description: Set the integral time for encoderless operation for the speed controller.

Note

The integral component is stopped if the complete controller output or the sum of controller output and torque precontrol reach the torque limit.

r1482 CO: Speed controller I torque output / n_ctrl I-M_outp

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p2003	**Dynamic index:** -
Unit group: 7_1	**Unit selection:** p0505	**Function diagram:** 5040, 5042, 5210, 6030, 6040
Min:	**Max:**	**Factory setting:**
- [Nm]	- [Nm]	- [Nm]

Description: Display and connector output for the torque setpoint at the output of the I speed controller.

r1493 CO: Moment of inertia total, scaled / M_inert tot scal

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: 25_1	**Unit selection:** p0100	**Function diagram:** 6031
Min:	**Max:**	**Factory setting:**
- [kgm²]	- [kgm²]	- [kgm²]

Description: Display and connector output for the parameterized total moment of inertia.

The value is calculated as follows: (p0341 * p0342) + p1496

p1496[0...n] Acceleration precontrol scaling / a_prectrl scal

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 6020, 6031
Min:	**Max:**	**Factory setting:**
0.0 [%]	10000.0 [%]	0.0 [%]

Description: Sets the scaling for the acceleration precontrol of the speed/velocity controller.

Dependency: See also: p0341, p0342

⚠ WARNING

The acceleration precontrol r1518 is kept at the old value if the ramp-function generator tracking (r1199.5) is active or the ramp-function generator output is set (r1199.3). This is used to avoid torque peaks. Depending on the application, it may therefore be necessary to disable the ramp-function generator tracking (p1145 = 0) or the acceleration precontrol (p1496 = 0).

The acceleration precontrol is set to zero, if the Vdc control is active (r0056.14/15).

Note

The parameter is set to 100% by the rotating measurement (refer to p1960).

The acceleration precontrol may not be used if the speed setpoint manifests significant ripple (e.g. analog setpoint) and the rounding-off in the speed ramp-function generator is disabled.

We also recommend that the precontrol mode is not used if there is gearbox backlash.

p1496[0...n] Acceleration precontrol scaling / a_prectrl scal

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Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 6020, 6031
Min:	**Max:**	**Factory setting:**
0.0 [%]	10000.0 [%]	100.0 [%]

Description: Sets the scaling for the acceleration precontrol of the speed/velocity controller.

Dependency: See also: p0341, p0342

> ⚠ **WARNING**
>
> The acceleration precontrol r1518 is kept at the old value if the ramp-function generator tracking (r1199.5) is active or the ramp-function generator output is set (r1199.3). This is used to avoid torque peaks. Depending on the application, it may therefore be necessary to disable the ramp-function generator tracking (p1145 = 0) or the acceleration precontrol (p1496 = 0).
> The acceleration precontrol is set to zero, if the Vdc control is active (r0056.14/15).

Note

The parameter is set to 100% by the rotating measurement (refer to p1960).

The acceleration precontrol may not be used if the speed setpoint manifests significant ripple (e.g. analog setpoint) and the rounding-off in the speed ramp-function generator is disabled.

We also recommend that the precontrol mode is not used if there is gearbox backlash.

r1508 CO: Torque setpoint before supplementary torque / M_set bef. M_suppl

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p2003	**Dynamic index:** -
Unit group: 7_1	**Unit selection:** p0505	**Function diagram:** 6030, 6060, 6722
Min:	**Max:**	**Factory setting:**
- [Nm]	- [Nm]	- [Nm]

Description: Displays the torque setpoint before entering the supplementary torque.

For closed-loop speed control, r1508 corresponds to the speed controller output.

p1517[0...n] Accelerating torque smoothing time constant / M_accel T_smooth

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 6060
Min:	**Max:**	**Factory setting:**
0.00 [ms]	100.00 [ms]	4.00 [ms]

Description: Sets the smoothing time constant of the accelerating torque.

Note

The acceleration precontrol is inhibited if the smoothing is set to the maximum value.

r1518[0...1] CO: Accelerating torque / M_accel

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p2003	**Dynamic index:** -
Unit group: 7_1	**Unit selection:** p0505	**Function diagram:** 6060
Min:	**Max:**	**Factory setting:**
- [Nm]	- [Nm]	- [Nm]

Description: Displays the accelerating torque for precontrol of the speed controller.

Index:
[0] = Unsmoothed
[1] = Smoothed

Dependency: See also: p0341, p0342, p1496

p1520[0...n] CO: Torque limit upper / M_max upper

Access level: 2	**Calculated:** CALC_MOD_LIM_REF	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** p2003	**Dynamic index:** DDS, p0180
Unit group: 7_1	**Unit selection:** p0505	**Function diagram:** 6020, 6630
Min:	**Max:**	**Factory setting:**
-1000000.00 [Nm]	20000000.00 [Nm]	0.00 [Nm]

Description: Sets the fixed, upper torque limit.

Dependency: See also: p1521, p1522, p1523, r1538, r1539

⚠ DANGER

Negative values when setting the upper torque limit (p1520 < 0) can result in the motor accelerating in an uncontrollable fashion.

NOTICE

A BICO interconnection to a parameter that belongs to a drive data set always acts on the effective data set.

Note

The torque limit is limited to 400% of the rated motor torque. When automatically calculating the motor/closed-loop control parameters (p0340), the torque limit is set to match the current limit (p0640).

p1521[0...n] CO: Torque limit lower / M_max lower

Access level: 2	**Calculated:** CALC_MOD_LIM_REF	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** p2003	**Dynamic index:** DDS, p0180
Unit group: 7_1	**Unit selection:** p0505	**Function diagram:** 6020, 6630
Min:	**Max:**	**Factory setting:**
-20000000.00 [Nm]	1000000.00 [Nm]	0.00 [Nm]

Description: Sets the fixed, lower torque limit.

Dependency: See also: p1520, p1522, p1523

⚠ DANGER

Positive values when setting the lower torque limit (p1521 > 0) can result in the motor accelerating in an uncontrollable fashion.

NOTICE

A BICO interconnection to a parameter that belongs to a drive data set always acts on the effective data set.

Note

The torque limit is limited to 400% of the rated motor torque. When automatically calculating the motor/closed-loop control parameters (p0340), the torque limit is set to match the current limit (p0640).

p1522[0...n] CI: Torque limit upper / M_max upper

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / FloatingPoint32
Can be changed: T	**Scaling:** p2003	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 6630
Min:	**Max:**	**Factory setting:**
-	-	1520[0]

Description: Sets the signal source for the upper torque limit.

Dependency: See also: p1520, p1521, p1523

⚠ DANGER
Negative values resulting from the signal source and scaling can cause the motor to accelerate in an uncontrolled manner.

p1523[0...n] CI: Torque limit lower / M_max lower

Access level: 3 | **Calculated:** - | **Data type:** Unsigned32 / FloatingPoint32

Can be changed: T | **Scaling:** p2003 | **Dynamic index:** CDS, p0170

Unit group: - | **Unit selection:** - | **Function diagram:** 6020, 6630

Min: - | **Max:** - | **Factory setting:** 1521[0]

Description: Sets the signal source for the lower torque limit.

Dependency: See also: p1520, p1521, p1522

⚠ DANGER
Positive values resulting from the signal source and scaling can cause the motor to accelerate in an uncontrolled manner.

p1524[0...n] CO: Torque limit upper/motoring scaling / M_max up/mot scal

Access level: 3 | **Calculated:** - | **Data type:** FloatingPoint32

Can be changed: T, U | **Scaling:** PERCENT | **Dynamic index:** DDS, p0180

Unit group: - | **Unit selection:** - | **Function diagram:** 5620, 5630

Min: -2000.0 [%] | **Max:** 2000.0 [%] | **Factory setting:** 100.0 [%]

Description: Sets the scaling for the upper torque limit or the torque limit when motoring.

Dependency: p1400.4 = 0: upper/lower

p1400.4 = 1: motoring / regenerating

NOTICE
A BICO interconnection to a parameter that belongs to a drive data set always acts on the effective data set.

Note

This parameter can be freely interconnected.

The value has the meaning stated above if it is interconnected from connector input p1528.

p1525[0...n] CO: Torque limit lower scaling / M_max lower scal

Access level: 3 | **Calculated:** - | **Data type:** FloatingPoint32

Can be changed: T, U | **Scaling:** PERCENT | **Dynamic index:** DDS, p0180

Unit group: - | **Unit selection:** - | **Function diagram:** 6630

Min: -2000.0 [%] | **Max:** 2000.0 [%] | **Factory setting:** 100.0 [%]

Description: Sets the scaling for the lower torque limit.

NOTICE
A BICO interconnection to a parameter that belongs to a drive data set always acts on the effective data set.

Note

This parameter can be freely interconnected.

The value has the meaning stated above if it is interconnected from connector input p1528.

r1526 CO: Torque limit upper without offset / M_max up w/o offs

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p2003	**Dynamic index:** -
Unit group: 7_1	**Unit selection:** p0505	**Function diagram:** 6060, 6630, 6640
Min:	**Max:**	**Factory setting:**
- [Nm]	- [Nm]	- [Nm]

Description: Display and connector output for the upper torque limit of all torque limits without offset.

Dependency: See also: p1520, p1521, p1522, p1523, p1528, p1529

r1527 CO: Torque limit lower without offset / M_max low w/o offs

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p2003	**Dynamic index:** -
Unit group: 7_1	**Unit selection:** p0505	**Function diagram:** 6060, 6630, 6640
Min:	**Max:**	**Factory setting:**
- [Nm]	- [Nm]	- [Nm]

Description: Display and connector output for the lower torque limit of all torque limits without offset.

Dependency: See also: p1520, p1521, p1522, p1523, p1528, p1529

p1528[0...n] CI: Torque limit upper scaling / M_max upper scal

Access level: 4	**Calculated:** -	**Data type:** Unsigned32 / FloatingPoint32
Can be changed: T	**Scaling:** PERCENT	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 6630
Min:	**Max:**	**Factory setting:**
-	-	1524[0]

Description: Sets the signal source for the scaling of the upper torque limit in p1522.

⚠ DANGER

For p1400.4 = 0 (torque limiting, upper/lower) the following applies:
Negative values resulting from the signal source and scaling can cause the motor to accelerate in an uncontrolled manner.

NOTICE

The parameter may be protected as a result of p0922 or p2079 and cannot be changed.

p1529[0...n] CI: Torque limit lower scaling / M_max lower scal

Access level: 4	**Calculated:** -	**Data type:** Unsigned32 / FloatingPoint32
Can be changed: T	**Scaling:** PERCENT	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 6630
Min:	**Max:**	**Factory setting:**
-	-	1525[0]

Description: Sets the signal source for the scaling of the lower torque limit in p1523.

⚠ DANGER

For p1400.4 = 0 (torque limiting, upper/lower) the following applies:
Positive values resulting from the signal source and scaling can cause the motor to accelerate in an uncontrolled manner.

NOTICE

The parameter may be protected as a result of p0922 or p2079 and cannot be changed.

p1530[0...n] Power limit motoring / P_max mot

Access level: 2 | **Calculated:** CALC_MOD_LIM_REF | **Data type:** FloatingPoint32
Can be changed: T, U | **Scaling:** - | **Dynamic index:** DDS, p0180
Unit group: 14_5 | **Unit selection:** p0505 | **Function diagram:** 6640
Min: 0.00 [kW] | **Max:** 100000.00 [kW] | **Factory setting:** 0.00 [kW]

Description: Sets the power limit when motoring.

Dependency: See also: p0500, p1531

Note
The power limit is limited to 300% of the rated motor power.

p1531[0...n] Power limit regenerative / P_max gen

Access level: 2 | **Calculated:** CALC_MOD_LIM_REF | **Data type:** FloatingPoint32
Can be changed: T, U | **Scaling:** - | **Dynamic index:** DDS, p0180
Unit group: 14_5 | **Unit selection:** p0505 | **Function diagram:** 6640
Min: -100000.00 [kW] | **Max:** -0.01 [kW] | **Factory setting:** -0.01 [kW]

Description: Sets the regenerative power limit.

Dependency: See also: r0206, p0500, p1530

Note
The power limit is limited to 300% of the rated motor power.
For power units without energy recovery capability, the regenerative power limit is preset to 30 % of the power r0206[0].
For a braking resistor connected to the DC link (p0219 > 0), the power limit when generating is automatically adapted.
For power units with energy recovery, the parameter is limited to the negative value of r0206[2].

r1533 Current limit torque-generating total / Iq_max total

Access level: 3 | **Calculated:** - | **Data type:** FloatingPoint32
Can be changed: - | **Scaling:** p2002 | **Dynamic index:** -
Unit group: 6_2 | **Unit selection:** p0505 | **Function diagram:** 6640
Min: - [Arms] | **Max:** - [Arms] | **Factory setting:** - [Arms]

Description: Displays the maximum torque/force generating current as a result if all current limits.

r1536[0...1] Current limit maximum torque-generating current / Isq_max

Access level: 4 | **Calculated:** - | **Data type:** FloatingPoint32
Can be changed: - | **Scaling:** p2002 | **Dynamic index:** -
Unit group: 6_2 | **Unit selection:** p0505 | **Function diagram:** 6640, 6710
Min: - [Arms] | **Max:** - [Arms] | **Factory setting:** - [Arms]

Description: Displays the maximum limit for the torque-generating current component.
Index 0 indicates the signal limited by the Vdc controller.

Index: [0] = Limited
[1] = Unlimited

r1537[0...1] Current limit minimum torque-generating current / Isq_min

Access level: 4 | **Calculated:** - | **Data type:** FloatingPoint32
Can be changed: - | **Scaling:** p2002 | **Dynamic index:** -
Unit group: 6_2 | **Unit selection:** p0505 | **Function diagram:** 6640, 6710
Min: - [Arms] | **Max:** - [Arms] | **Factory setting:** - [Arms]

Description: Displays the minimum limit for the torque-generating current component.
Index 0 indicates the signal limited by the Vdc controller.

Index: [0] = Limited
[1] = Unlimited

r1538 CO: Upper effective torque limit / M_max upper eff

Access level: 2 | **Calculated:** - | **Data type:** FloatingPoint32
Can be changed: - | **Scaling:** p2003 | **Dynamic index:** -
Unit group: 7_1 | **Unit selection:** p0505 | **Function diagram:** 6020, 6640
Min: - [Nm] | **Max:** - [Nm] | **Factory setting:** - [Nm]

Description: Display and connector output for the actual effective upper torque limit.

Note
The effective upper torque limit is reduced with respect to the selected upper torque limit p1520, if the current limit p0640 is reduced or the rated magnetizing current of the induction motor p0320 is increased.
This may be the case for rotating measurements (see p1960).
The torque limit p1520 can be re-calculated using p0340 = 1, 3 or 5.

r1539 CO: Lower effective torque limit / M_max lower eff

Access level: 2 | **Calculated:** - | **Data type:** FloatingPoint32
Can be changed: - | **Scaling:** p2003 | **Dynamic index:** -
Unit group: 7_1 | **Unit selection:** p0505 | **Function diagram:** 6020, 6640
Min: - [Nm] | **Max:** - [Nm] | **Factory setting:** - [Nm]

Description: Display and connector output for the actual effective lower torque limit.

Note
The effective lower torque limit is reduced with respect to the selected lower torque limit p1521, if the current limit p0640 is reduced or the rated magnetizing current of the induction motor p0320 is increased.
This may be the case for rotating measurements (see p1960).
The torque limit p1520 can be re-calculated using p0340 = 1, 3 or 5.

r1547[0...1] CO: Torque limit for speed controller output / M_max outp n_ctrl

Access level: 3 | **Calculated:** - | **Data type:** FloatingPoint32
Can be changed: - | **Scaling:** p2003 | **Dynamic index:** -
Unit group: 7_1 | **Unit selection:** p0505 | **Function diagram:** 6060
Min: - [Nm] | **Max:** - [Nm] | **Factory setting:** - [Nm]

Description: Displays the torque limit to limit the speed controller output.

Index: [0] = Upper limit
[1] = Lower limit

r1548[0...1] CO: Stall current limit torque-generating maximum / Isq_max stall

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p2002	**Dynamic index:** -
Unit group: 6_2	**Unit selection:** p0505	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
- [Arms]	- [Arms]	- [Arms]

Description: Displays the limit for the torque-generating current component using the stall calculation, the current limit of the power unit as well as the parameterization in p0640.

Index: [0] = Upper limit
[1] = Lower limit

p1552[0...n] CI: Torque limit upper scaling without offset / M_max up w/o offs

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / FloatingPoint32
Can be changed: T	**Scaling:** PERCENT	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 6060
Min:	**Max:**	**Factory setting:**
-	-	1

Description: Sets the signal source for the scaling of the upper torque limiting to limit the speed controller output without taking into account the current and power limits.

p1553[0...n] Stall limit scaling / Stall limit scal

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
80.0 [%]	130.0 [%]	100.0 [%]

Description: Sets the scaling of the stall limit for the start of field weakening.

> ⚠ **DANGER**
> If the stall current limit is increased, then the q current setpoint can exceed the stall limit; as a consequence, a hysteresis effect can occur when loading and unloading.

p1554[0...n] CI: Torque limit lower scaling without offset / M_max low w/o offs

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / FloatingPoint32
Can be changed: T	**Scaling:** PERCENT	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 6060
Min:	**Max:**	**Factory setting:**
-	-	1

Description: Sets the signal source for the scaling of the lower torque limiting to limit the speed controller output without taking into account the current and power limits.

r1566[0...n] Flux reduction torque factor transition value / Flux red M trans

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** PERCENT	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 6790
Min:	**Max:**	**Factory setting:**
- [%]	- [%]	- [%]

Description: The following applies for a synchronous reluctance motor:
Displays the transition value for the start of the evaluation of the optimum flux characteristic.
The value is referred to the rated motor torque.

Note
The transition value corresponds with the lower limit of the flux setpoint (p1581).
For a lower absolute torque setpoint, the flux setpoint remains at the lower limit (p1581).

p1567[0...n] Magnetization rate time scaling / Mag Tv scale

Access level: 4	**Calculated:** CALC_MOD_CON	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 6790
Min:	**Max:**	**Factory setting:**
0 [%]	1000 [%]	100 [%]

Description: The following applies for a synchronous reluctance motor:
Sets the scaling of the rate time Tv for dynamic flux increase when the torque is quickly established.
The value is referred to the inverse value of the rated motor frequency.
Tv = p1567 / 100 % / p0310

Dependency: See also: p1401

Note
The "Dynamic load-dependent flux boost" function can be deactivated using p1401.9 = 0.

r1568[0...5] CO: Synchronous reluctance motor flux channel / RESM flux channel

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
- [%]	- [%]	- [%]

Description: Display and connector output for signals of the flux channel for a synchronous reluctance motor (RESM).
The values are referred to the rated motor flux of the in-line axis (p0357 * r0331).

Index:
[0] = Setpoint before filter
[1] = Optimum flux characteristic output
[2] = Minimum value at low speed
[3] = Dynamic load-dependent boost
[4] = Field weakening value total
[5] = Field weakening value precontrol

Note
RESM: reluctance synchronous motor (synchronous reluctance motor)

p1570[0...n] CO: Flux setpoint / Flex setp

Access level: 3	**Calculated:** CALC_MOD_LIM_REF	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** PERCENT	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 6722
Min:	**Max:**	**Factory setting:**
50.0 [%]	200.0 [%]	100.0 [%]

Description: Sets the flux setpoint referred to rated motor flux.
The following applies for a synchronous reluctance motor:
Scaling the flux setpoint.

NOTICE
A BICO interconnection to a parameter that belongs to a drive data set always acts on the effective data set.

Note

For p1570 > 100%, the flux setpoint increases as a function of the load from 100% (no-load operation) to the setting in p1570 (above rated motor torque), if p1580 > 0% has been set.

The following applies for a synchronous reluctance motor:

The scaling allows the flux setpoint to be adapted when operating with load-dependent optimum flux characteristic or with constant flux setpoint.

p1570[0...n] CO: Flux setpoint / Flex setp

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Access level: 3	**Calculated:** CALC_MOD_LIM_REF	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** PERCENT	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 6722
Min:	**Max:**	**Factory setting:**
50.0 [%]	200.0 [%]	103.0 [%]

Description: Sets the flux setpoint referred to rated motor flux.

The following applies for a synchronous reluctance motor:

Scaling the flux setpoint.

Dependency: See also: p0500

NOTICE
A BICO interconnection to a parameter that belongs to a drive data set always acts on the effective data set.

Note

For p1570 > 100%, the flux setpoint increases as a function of the load from 100% (no-load operation) to the setting in p1570 (above rated motor torque), if p1580 > 0% has been set.

The following applies for a synchronous reluctance motor:

The scaling allows the flux setpoint to be adapted when operating with load-dependent optimum flux characteristic or with constant flux setpoint.

p1574[0...n] Voltage reserve dynamic / U_reserve dyn

Access level: 3	**Calculated:** CALC_MOD_LIM_REF	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: 5_1	**Unit selection:** p0505	**Function diagram:** 6723, 6724
Min:	**Max:**	**Factory setting:**
0.0 [Vrms]	150.0 [Vrms]	10.0 [Vrms]

Description: Sets a dynamic voltage reserve.

Dependency: See also: p0500

Note

In the field weakening range, it must be expected that the control dynamic performance is somewhat restricted due to the limited possibilities of controlling/adjusting the voltage. This can be improved by increasing the voltage reserve. Increasing the reserve reduces the steady-state maximum output voltage (r0071).

p1574[0...n] Voltage reserve dynamic / U_reserve dyn

G120XA_USS (PM330)

Access level: 3	**Calculated:** CALC_MOD_LIM_REF	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: 5_1	**Unit selection:** p0505	**Function diagram:** 6723, 6724
Min:	**Max:**	**Factory setting:**
0.0 [Vrms]	150.0 [Vrms]	2.0 [Vrms]

Description: Sets a dynamic voltage reserve.

Dependency: See also: p0500

Note
In the field weakening range, it must be expected that the control dynamic performance is somewhat restricted due to the limited possibilities of controlling/adjusting the voltage. This can be improved by increasing the voltage reserve. Increasing the reserve reduces the steady-state maximum output voltage (r0071).

p1575[0...n] Voltage target value limit / U_tgt val lim

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 6725
Min:	**Max:**	**Factory setting:**
50.00 [%]	300.00 [%]	200.00 [%]

Description: Sets the limit of the voltage target value.
In steady-state field weakening operation this corresponds to the required output voltage.
The value of 100% refers to p0304.

Note
The output voltage is only limited if the maximum output voltage (r0071) minus the voltage reserve (p1574) corresponds to a value higher than p1575.
Limiting via p1575 allows the influence of the voltage ripple of the line supply voltage to be eliminated at the operating point.

p1578[0...n] Flux reduction flux decrease time constant / Flux red dec T

Access level: 3	**Calculated:** CALC_MOD_CON	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 6791
Min:	**Max:**	**Factory setting:**
20 [ms]	5000 [ms]	200 [ms]

Description: The following applies for a synchronous reluctance motor:
Sets the time constant for reducing the flux setpoint for a load-dependent optimum flux characteristic.

Dependency: See also: p1579

Note
To avoid remagnetization processes for load-dependent flux characteristics and for fast load changes, the time constant to reduce the flux setpoint must be set to an appropriately high value.
As a consequence, it is preset with a multiple of the time constant used for the flux build up.

p1579[0...n] Flux reduction flux build-up time constant / Flux red incr T

Access level: 3	**Calculated:** CALC_MOD_CON	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 6791
Min:	**Max:**	**Factory setting:**
0 [ms]	5000 [ms]	4 [ms]

Description: The following applies for a synchronous reluctance motor:
Sets the time constant for establishing the flux setpoint for a load-dependent optimum flux characteristic.

Dependency: See also: p1578

Note
To quickly establish the flux for torque changes, an appropriately short time constant for the flux build-up must be selected.
It is preset with the inverse value of the rated motor frequency (p0310).

p1580[0...n] Efficiency optimization / Efficiency opt.

Access level: 3	**Calculated:** CALC_MOD_LIM_REF	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 6722
Min:	**Max:**	**Factory setting:**
0 [%]	100 [%]	0 [%]

Description: Sets the efficiency optimization.

When optimizing the efficiency, the flux setpoint of the closed-loop control is adapted as a function of the load.

For p1580 = 100 %, under no-load operating conditions, the flux setpoint is reduced to 50 % of the rated motor flux.

Note

It only makes sense to activate this function if the dynamic response requirements of the speed controller are low.

In order to avoid oscillations, if required, the speed controller parameters should be adapted (increase Tn, reduce Kp).

Further, the smoothing time of the flux setpoint filter (p1582) should be increased.

p1580[0...n] Efficiency optimization / Efficiency opt.

G120XA_USS (PM330)

Access level: 3	**Calculated:** CALC_MOD_LIM_REF	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 6722
Min:	**Max:**	**Factory setting:**
0 [%]	100 [%]	100 [%]

Description: Sets the efficiency optimization.

When optimizing the efficiency, the flux setpoint of the closed-loop control is adapted as a function of the load.

For p1580 = 100 %, under no-load operating conditions, the flux setpoint is reduced to 50 % of the rated motor flux.

Dependency: See also: p0500

Note

It only makes sense to activate this function if the dynamic response requirements of the speed controller are low.

In order to avoid oscillations, if required, the speed controller parameters should be adapted (increase Tn, reduce Kp).

Further, the smoothing time of the flux setpoint filter (p1582) should be increased.

p1581[0...n] Flux reduction factor / Flux red factor

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0 [%]	100 [%]	100 [%]

Description: The following applies for a synchronous reluctance motor:

Sets the lower limit of the flux setpoint to evaluate the optimum flux characteristic.

The value is referred to the rated motor flux (p0357 * r0331).

p1582[0...n] Flux setpoint smoothing time / Flux setp T_smth

Access level: 3	**Calculated:** CALC_MOD_REG	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 6722, 6724
Min:	**Max:**	**Factory setting:**
4 [ms]	5000 [ms]	15 [ms]

Description: Sets the smoothing time for the flux setpoint.

p1584[0...n] Field weakening operation flux setpoint smoothing time / Field weak T_smth

Access level: 4	**Calculated:** CALC_MOD_REG	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 6722
Min:	**Max:**	**Factory setting:**
0 [ms]	20000 [ms]	0 [ms]

Description: Sets the smoothing time for the flux setpoint in the field-weakening range

Recommendation: Smoothing should be especially used if there is no regenerative feedback into the line supply. This means that the DC link voltage can quickly increase in regenerative operation

Note

Only the flux setpoint rise is smoothed

p1586[0...n] Field weakening characteristic scaling / Field weak scal

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
80.0 [%]	120.0 [%]	100.0 [%]

Description: Sets the scaling of the precontrol characteristic for the start of field weakening.

For values above 100 % and for partial load situations, the field weakening starts at higher speeds.

Note

If the start of field weakening is shifted to lower speeds, then the voltage reserve is increased for partial load situations.

If the start of field weakening is shifted to higher speeds, the voltage reserve is appropriately reduced so that for fast load changes, it can be expected that this will have a negative impact on the dynamic performance.

p1590[0...n] Flux controller P gain / Flux controller Kp

Access level: 4	**Calculated:** CALC_MOD_CON	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 6723
Min:	**Max:**	**Factory setting:**
0.0	999999.0	10.0

Description: Sets the proportional gain for the flux controller.

Note

The value is automatically pre-assigned dependent on the motor when the drive system is first commissioned.

When calculating controller parameters (p0340 = 4), this value is re-calculated.

p1592[0...n] Flux controller integral time / Flux controller Tn

Access level: 4	**Calculated:** CALC_MOD_CON	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 6723
Min:	**Max:**	**Factory setting:**
0 [ms]	10000 [ms]	30 [ms]

Description: Sets the integral time for the flux controller.

Note

The value is automatically pre-assigned dependent on the motor when the drive system is first commissioned.

When calculating controller parameters (p0340 = 4), this value is re-calculated.

r1593[0...1] CO: Field weakening controller / flux controller output / Field/Fl_ctrl outp

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p2002	**Dynamic index:** -
Unit group: 6_2	**Unit selection:** p0505	**Function diagram:** 6724
Min:	**Max:**	**Factory setting:**
- [Arms]	- [Arms]	- [Arms]

Description: Display and connector output for the output of the field weakening controller (synchronous motor).

Index: [0] = PI output
[1] = I output

p1595[0...n] Field weakening controller additional setpoint / Field_ctr add_setp

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 6726
Min:	**Max:**	**Factory setting:**
-80.00 [%]	50.00 [%]	0.00 [%]

Description: Sets an additional setpoint for the field weakening controller.
The value refers to the dynamic voltage reserve (p1574).

Note

For a value equal to zero, the field weakening controller is activated when the maximum voltage, calculated with the average value of the DC link voltage, is reached.
Negative values cause the field weakening controller to intervene earlier, so that the voltage can move away from the modulation depth limit.

p1596[0...n] Field weakening controller integral-action time / Field_ctrl Tn

Access level: 3	**Calculated:** CALC_MOD_CON	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 6723, 6724
Min:	**Max:**	**Factory setting:**
10 [ms]	10000 [ms]	300 [ms]

Description: Sets the integral-action time of the field-weakening controller.

r1597 CO: Field weakening controller output / Field_ctrl outp

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 6723
Min:	**Max:**	**Factory setting:**
- [%]	- [%]	- [%]

Description: Displays the output of the field weakening controller.
The value is referred to the rated motor flux.

r1598 CO: Total flux setpoint / Flux setp total

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 6714, 6723, 6724, 6725, 6726
Min:	**Max:**	**Factory setting:**
- [%]	- [%]	- [%]

Description: Displays the effective flux setpoint.
The value is referred to the rated motor flux.

p1601[0...n] Current injection ramp time / I_inject t_ramp

Access level: 3	**Calculated:** CALC_MOD_REG	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 6790
Min:	**Max:**	**Factory setting:**
1 [ms]	10000 [ms]	20 [ms]

Description: Synchronous-reluctance motor:
Sets the ramp-up time of the current setpoint (p1610, p1611) when switching over from closed-loop controlled to open-loop controlled operation.

p1610[0...n] Torque setpoint static (sensorless) / M_set static

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 6700, 6721, 6722, 6726
Min:	**Max:**	**Factory setting:**
-200.0 [%]	200.0 [%]	50.0 [%]

Description: Sets the static torque setpoint for sensorless vector control in the low speed range.
This parameter is entered as a percentage referred to the rated motor torque (r0333).
For sensorless vector control, when the motor model is shut down, an absolute current is impressed. p1610 represents the maximum load that occurs at a constant setpoint speed.

NOTICE
p1610 should always be set to at least 10 % higher than the maximum steady-state load that can occur.

Note
For p1610 = 0%, a current setpoint is calculated that corresponds to the no-load case (ASM: rated magnetizing current, RESM: no-load magnetizing current).
For p1610 = 100 %, a current setpoint is calculated that corresponds to the rated motor torque.
Negative values are converted into positive setpoints in the case of induction and permanent-magnet synchronous motors as well as closed-loop controlled reluctance motors.

p1611[0...n] Additional acceleration torque (sensorless) / M_suppl_accel

Access level: 2	**Calculated:** CALC_MOD_ALL	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 6700, 6721, 6722, 6726
Min:	**Max:**	**Factory setting:**
0.0 [%]	200.0 [%]	30.0 [%]

Description: Enters the dynamic torque setpoint for the low-speed range for sensorless vector control.
This parameter is entered as a percentage referred to the rated motor torque (r0333).

Note
When accelerating and braking p1611 is added to p1610 and the resulting total torque is converted into an appropriate current setpoint and controlled.
For pure accelerating torques, it is always favorable to use the torque precontrol of the speed controller (p1496).

r1614 EMF maximum / EMF max

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p2001	**Dynamic index:** -
Unit group: 5_1	**Unit selection:** p0505	**Function diagram:** 6725
Min:	**Max:**	**Factory setting:**
- [Vrms]	- [Vrms]	- [Vrms]

Description: Displays the actual maximum possible electromotive force (EMF) of the separately excited synchronous motor.

Dependency: The value is the basis for the flux setpoint.

The maximum possible EMF depends on the following factors:

- Actual DC link voltage (r0070).
- Maximum modulation depth (p1803).
- Field-generating and torque-generating current setpoint.

p1616[0...n] Current setpoint smoothing time / I_set T_smooth

Access level: 3	**Calculated:** CALC_MOD_REG	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 6721, 6722
Min:	**Max:**	**Factory setting:**
4 [ms]	10000 [ms]	40 [ms]

Description: Sets the smoothing time for the current setpoint.

The current setpoint is generated from p1610 and p1611.

Note

This parameter is only effective in the range where current is injected for sensorless vector control.

r1623[0...1] Field-generating current setpoint (steady-state) / Id_set stationary

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p2002	**Dynamic index:** -
Unit group: 6_2	**Unit selection:** p0505	**Function diagram:** 6723
Min:	**Max:**	**Factory setting:**
- [Arms]	- [Arms]	- [Arms]

Description: Displays the steady-state field generating current setpoint (Id_set).

Note

For index 1:

Reserved.

r1624 Field-generating current setpoint total / Id_setp total

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p2002	**Dynamic index:** -
Unit group: 6_2	**Unit selection:** p0505	**Function diagram:** 6640, 6721, 6723, 6727
Min:	**Max:**	**Factory setting:**
- [Arms]	- [Arms]	- [Arms]

Description: Displays the limited field-generating current setpoint (Id_set).

This value comprises the steady-state field-generating current setpoint r1623 and a dynamic component that is only set when changes are made to the flux setpoint.

p1654[0...n] Curr. setpoint torque-gen. smoothing time field weakening range / Isq_s T_smth FW

Access level: 4	**Calculated:** CALC_MOD_ALL	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 6710
Min:	**Max:**	**Factory setting:**
0.1 [ms]	50.0 [ms]	4.8 [ms]

Description: Sets the smoothing time constant for the setpoint of the torque-generating current components.

Note

The smoothing time does not become effective until the field-weakening range is reached.

p1703[0...n] Isq current controller precontrol scaling / Isq_ctr_prectrScal

Access level: 4	**Calculated:** CALC_MOD_CON	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 6714
Min:	**Max:**	**Factory setting:**
0.0 [%]	200.0 [%]	60.0 [%]

Description: Sets the scaling of the dynamic current controller precontrol for the torque/force-generating current component Isq.

p1715[0...n] Current controller P gain / I_ctrl Kp

Access level: 4	**Calculated:** CALC_MOD_CON	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 6714
Min:	**Max:**	**Factory setting:**
0.000	100000.000	0.000

Description: Sets the proportional gain of the current controller.
This value is automatically pre-set using p3900 or p0340 when commissioning has been completed.

p1717[0...n] Current controller integral-action time / I_ctrl Tn

Access level: 4	**Calculated:** CALC_MOD_CON	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 5714, 6700, 6714, 7017
Min:	**Max:**	**Factory setting:**
0.00 [ms]	1000.00 [ms]	2.00 [ms]

Description: Sets the integral-action time of the current controller.

Dependency: See also: p1715

p1720[0...n] Current controller d axis p gain / Id_ctrl Kp

Access level: 4	**Calculated:** CALC_MOD_CON	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.000	100000.000	0.000

Description: Sets the proportional gain of the d-current controller for the lower adaptation current range.
This value is automatically pre-set using p3900 or p0340 when commissioning has been completed.

p1722[0...n] Current controller d axis integral time / I_ctrl d-axis Tn

Access level: 4
Calculated: CALC_MOD_CON
Data type: FloatingPoint32
Can be changed: T, U
Scaling: -
Dynamic index: DDS, p0180
Unit group: -
Unit selection: -
Function diagram: -

Min:	Max:	Factory setting:
0.00 [ms]	1000.00 [ms]	2.00 [ms]

Description: Sets the integral time of the d-current controller.

p1730[0...n] Isd controller integral component shutdown threshold / Isd ctrl Tn shutd

Access level: 4
Calculated: CALC_MOD_CON
Data type: FloatingPoint32
Can be changed: T, U
Scaling: -
Dynamic index: DDS, p0180
Unit group: -
Unit selection: -
Function diagram: -

Min:	Max:	Factory setting:
30 [%]	150 [%]	30 [%]

Description: Sets the speed threshold for deactivating the integral component of the Isd controller.

The d current controller is only effective as P controller for speeds greater than the threshold value. Instead of the integral component, the quadrature arm decoupling is effective.

⚠ WARNING

For settings above 80%, the d current controller is active up to the field weakening limit. When operated at the voltage limit, this can result in an unstable behavior. In order to avoid this, the dynamic voltage reserve p1574 should be increased.

Note

The parameter value is referred to the synchronous rated motor speed.

p1731[0...n] Isd controller combination current time component / Isd ctr I_combi T1

Access level: 4
Calculated: CALC_MOD_CON
Data type: FloatingPoint32
Can be changed: T, U
Scaling: -
Dynamic index: DDS, p0180
Unit group: -
Unit selection: -
Function diagram: -

Min:	Max:	Factory setting:
0.00 [ms]	10000.00 [ms]	0.00 [ms]

Description: Sets the time constant to calculate the d current DC component difference (combination current) to add to the d current controller actual value.

Note

It is not added for p1731 = 0.

r1732[0...1] CO: Direct-axis voltage setpoint / Direct U set

Access level: 4
Calculated: -
Data type: FloatingPoint32
Can be changed: -
Scaling: p2001
Dynamic index: -
Unit group: 5_1
Unit selection: p0505
Function diagram: 5700, 5714, 6714, 5718

Min:	Max:	Factory setting:
- [Vrms]	- [Vrms]	- [Vrms]

Description: Display and connector output for the direct axis voltage setpoint Ud.

Index:
[0] = Unsmoothed
[1] = Smoothed with p0045

r1733[0...1] CO: Quadrature-axis voltage setpoint / Quad U set

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p2001	**Dynamic index:** -
Unit group: 5_1	**Unit selection:** p0505	**Function diagram:** 6714, 6731
Min:	**Max:**	**Factory setting:**
- [Vrms]	- [Vrms]	- [Vrms]

Description: Display and connector output for the quadrature axis voltage setpoint Uq.

Index:
[0] = Unsmoothed
[1] = Smoothed with p0045

p1740[0...n] Gain resonance damping for encoderless closed-loop control / Gain res_damp

Access level: 3	**Calculated:** CALC_MOD_CON	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.000	10.000	0.025

Description: Defines the gain of the controller for resonance damping for operation with sensorless vector control in the range that current is injected.

p1745[0...n] Motor model error threshold stall detection / MotMod ThreshStall

Access level: 3	**Calculated:** CALC_MOD_REG	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.0 [%]	1000.0 [%]	5.0 [%]

Description: Sets the fault threshold in order to detect a motor that has stalled.
If the error signal (r1746) exceeds the parameterized error threshold, then status signal r1408.12 is set to 1.

Dependency: If a stalled drive is detected (r1408.12 = 1), fault F07902 is output after the delay time set in p2178.
See also: p2178

Note
Monitoring is only effective in the low-speed range (below p1755 * (100% - p1756)).

r1746 Motor model error signal stall detection / MotMod sig stall

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
- [%]	- [%]	- [%]

Description: Signal to initiate stall detection

Note
The signal is not calculated while magnetizing and only in the low speed range (below p1755 * (100 % - p1756)).

p1749[0...n] Motor model increase changeover speed encoderless operation / Incr n_chng no enc

Access level: 4	**Calculated:** CALC_MOD_REG	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.0 [%]	99.0 [%]	50.0 [%]

Description: Minimum operating frequency for rugged operation.

If the minimum value is greater than the lower changeover limit parameterized with p1755 * (1 - 2 * p1756), then the difference is displayed using p1749 * p1755. The parameter value cannot be changed.

Dependency: See also: p1755, p1756

p1750[0...n] Motor model configuration / MotMod config

Access level: 3	**Calculated:** CALC_MOD_LIM_REF	**Data type:** Unsigned16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	0000 0000 0000 0000 bin

Description: Sets the configuration for the motor model.

Bit 0 = 1: Forces open-loop speed-controlled starting (ASM).

Bit 1 = 1: Forces the system to pass through frequency zero, open-loop-controlled (ASM).

Bit 2 = 1: Drive remains in full closed-loop control mode, even at zero frequency (ASM).

Bit 3 = 1: Motor model evaluates the saturation characteristic (ASM).

Bit 6 = 1: If the motor is blocked, sensorless vector control remains speed-controlled (ASM).

Bit 7 = 1: Use rugged switchover limits to switchover the model (open-loop/closed-loop controlled) for regenerative operation (ASM).

Bit 8 = 1: Open-loop speed controlled operation independent of the speed setpoint (except for OFF3) (ASM).

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Controlled start	Yes	No	-
01	Controlled through 0 Hz	Yes	No	-
02	Closed-loop ctrl oper. down to zero freq. for passive loads	Yes	No	-
03	Motor model Lh_pre = f(PsiEst)	Yes	No	-
06	Closed-loop/open-loop controlled (PMSM) for a blocked motor	Yes	No	-
07	Use rugged changeover limits	Yes	No	-
08	Closed-loop controlled until wait time p1758 has expired	Yes	No	-

Dependency: See also: p0500

> ⚠ **CAUTION**
>
> Do not use bit 6 = 1 if the motor can be slowly reversed by the load at the torque limit. Long delay times due to blocking (p2177 > p1758) can cause the motor to stall. In this case you should deactivate the function or use closed-loop control throughout the speed range (note the information re bit 2 = 1).

Note

Bits 0 ... 2 only have an influence for sensorless vector control, bit 2 is pre-assigned depending on p0500.
For bit 2 = 1:
The sensorless vector control is effective down to zero frequency. A change is not made into the open-loop speed controlled mode.
This operating mode is possible for passive loads. These include applications where the load itself does not generate any active torque and therefore only acts reactively to the drive torque of the induction motor.
If bit 2 = 1, then bit 3 is automatically set to 1. Manual de-selection is possible and may be sensible if the saturation characteristic (p1960) was not measured for third-party motors. Generally, for standard SIEMENS motors, the already pre-assigned (default value) saturation characteristic is adequate.
When the bit is set, the selection of bits 0 and 1 is ignored.
For bit 2 = 0:
Bit 3 is also automatically deactivated.
For bit 6 = 1:
The following applies for sensorless vector control of induction motors:
For a blocked motor (see p2175, p2177) the time condition in p1758 is bypassed and a change is not made into open-loop controlled operation.
For bit 7 = 1:
The following applies for sensorless vector control of induction motors:
If the changeover limits are parameterized too low (p1755, p1756), then they are automatically increased to rugged values by the absolute amount p1749 * p1755.
The effective time condition for changing over into open-controlled operation is obtained from the minimum value of p1758 and 0.5 * r0384.
Is recommended that bit 7 is activated for applications that demand a high torque at low frequencies, and at the same time require low speed gradients..
Adequate parameterization of the current setpoint must be ensured (p1610, p1611).
For bit 8 = 1: no influence on the functionality of bits 0, 1, 2
The following applies for sensorless vector control of induction motors:
Changeover into open-loop speed controlled operation is no longer dependent on the speed setpoint (except for OFF3), but instead is essentially dependent on time condition p1758. As a consequence, a drive can be started or reversed in closed-loop speed controlled operation with setpoints from an external control system, if these briefly lie in the open-loop speed control range.

p1750[0...n] Motor model configuration / MotMod config

G120XA_USS (PM330)

Access level: 4	**Calculated:** CALC_MOD_LIM_REF	**Data type:** Unsigned16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	0000 0000 0100 1100 bin

Description: Sets the configuration for the motor model.
Bit 0 = 1: Forces open-loop speed-controlled starting (ASM).
Bit 1 = 1: Forces the system to pass through frequency zero, open-loop-controlled (ASM).
Bit 2 = 1: Drive remains in full closed-loop control mode, even at zero frequency (ASM).
Bit 3 = 1: Motor model evaluates the saturation characteristic (ASM).
Bit 6 = 1: If the motor is blocked, sensorless vector control remains speed-controlled (ASM).
Bit 7 = 1: Use rugged switchover limits to switchover the model (open-loop/closed-loop controlled) for regenerative operation (ASM).
Bit 8 = 1: Open-loop speed controlled operation independent of the speed setpoint (except for OFF3) (ASM).

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Controlled start	Yes	No	-
01	Controlled through 0 Hz	Yes	No	-
02	Closed-loop ctrl oper. down to zero freq. for passive loads	Yes	No	-
03	Motor model Lh_pre = f(PsiEst)	Yes	No	-

06	Closed-loop/open-loop controlled (PMSM) for a blocked motor	Yes	No	-
07	Use rugged changeover limits	Yes	No	-
08	Closed-loop controlled until wait time p1758 has expired	Yes	No	-

Dependency: See also: p0500

⚠ **CAUTION**

Do not use bit 6 = 1 if the motor can be slowly reversed by the load at the torque limit. Long delay times due to blocking (p2177 > p1758) can cause the motor to stall. In this case you should deactivate the function or use closed-loop control throughout the speed range (note the information re bit 2 = 1).

Note

Bits 0 ... 2 only have an influence for sensorless vector control, bit 2 is pre-assigned depending on p0500.
For bit 2 = 1:
The sensorless vector control is effective down to zero frequency. A change is not made into the open-loop speed controlled mode.
This operating mode is possible for passive loads. These include applications where the load itself does not generate any active torque and therefore only acts reactively to the drive torque of the induction motor.
If bit 2 = 1, then bit 3 is automatically set to 1. Manual de-selection is possible and may be sensible if the saturation characteristic (p1960) was not measured for third-party motors. Generally, for standard SIEMENS motors, the already pre-assigned (default value) saturation characteristic is adequate.
When the bit is set, the selection of bits 0 and 1 is ignored.
For bit 2 = 0:
Bit 3 is also automatically deactivated.
For bit 6 = 1:
The following applies for sensorless vector control of induction motors:
For a blocked motor (see p2175, p2177) the time condition in p1758 is bypassed and a change is not made into open-loop controlled operation.
For bit 7 = 1:
The following applies for sensorless vector control of induction motors:
If the changeover limits are parameterized too low (p1755, p1756), then they are automatically increased to rugged values by the absolute amount p1749 * p1755.
The effective time condition for changing over into open-controlled operation is obtained from the minimum value of p1758 and 0.5 * r0384.
Is recommended that bit 7 is activated for applications that demand a high torque at low frequencies, and at the same time require low speed gradients..
Adequate parameterization of the current setpoint must be ensured (p1610, p1611).
For bit 8 = 1: no influence on the functionality of bits 0, 1, 2
The following applies for sensorless vector control of induction motors:
Changeover into open-loop speed controlled operation is no longer dependent on the speed setpoint (except for OFF3), but instead is essentially dependent on time condition p1758. As a consequence, a drive can be started or reversed in closed-loop speed controlled operation with setpoints from an external control system, if these briefly lie in the open-loop speed control range.

r1751 Motor model status / MotMod status

Access level: 4	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the status of the motor model.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Controlled operation	Active	Inactive	6721
01	Set ramp-function generator	Active	Inactive	-
02	Stop RsLh adaptation	Yes	No	-
03	Feedback	Active	Inactive	-

05	Holding angle	Yes	No	-
06	Acceleration criterion	Active	Inactive	-
11	Speed controller output cannot be set to zero	Yes	No	-
12	Rs adapt waits	Yes	No	-
13	Motor operation	Yes	No	-
14	Stator frequency sign	Positive	Negative	-
15	Torque sign	Motor mode	Regenerative mode	-
17	Operation with rugged model feedback	Enabled	Inhibited	-
18	Operation of the current model with current feedback	Enabled	Inhibited	-
19	Current feedback in the current model	Active	Inactive	-
20	Rugged increase of the changeover limits	Active	Inactive	-

Note
For bit 17:
Displays the enabled status of the rugged model feedback (p1784).
The feedback is used to increase the parameter ruggedness of the motor model and is effective in the operating range of the two-component closed loop current control.
For bit 18:
Displays the status when enabling the differential current feedback in the current model for operation with encoder.
The function is automatically enabled with p1784 > 0 or p1731 > 0. The feedback is used for a rugged change between the current model and complete machine model with active rugged model feedback and combination current.
For bit 19:
Displays the currently active stator circuit feedback in current model operation.
For bit 20:
Displays the currently effective increase of the changeover limits by the value p1749 * p1755.
For bit 21:
For a blocked synchronous motor, the speed ramp-function generator is held in the open-loop speed controlled operating range if the torque setpoint reaches the torque limit and the speed is less than the threshold value in p2175.

p1755[0...n] Motor model changeover speed encoderless operation / MotMod n_chgSnsorl

Access level: 3	**Calculated:** CALC_MOD_REG	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.00 [rpm]	210000.00 [rpm]	210000.00 [rpm]

Description: Sets the speed to change over the motor model to encoderless operation.

Dependency: See also: p1749, p1756

NOTICE
The changeover speed represents the steady-state minimum speed up to which the motor model can be used in sensorless steady-state operation.
If the stability is not adequate close to the changeover speed, it may make sense to increase the parameter value. On the other hand, very low changeover speeds can negatively impact the stability.

Note
The changeover speed applies for the changeover between open-loop and closed-loop control mode.

p1756 Motor model changeover speed hysteresis encoderless operation / MotMod n_chgov hys

Access level: 3	**Calculated:** CALC_MOD_REG	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 6730, 6731
Min:	**Max:**	**Factory setting:**
0.0 [%]	95.0 [%]	50.0 [%]

Description: Sets the hysteresis for the changeover speed of the motor model for encoderless operation.

Dependency: See also: p1755

Note
The parameter value refers to p1755.
Extremely small hystereses can have a negative impact on the stability in the changeover speed range, and very high hystereses in the standstill range.

p1758[0...n] Motor model changeover delay time closed/open-loop control / MotMod t cl_op

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
100 [ms]	10000 [ms]	500 [ms]

Description: Sets the minimum time for falling below the changeover speed when changing from closed-loop controlled operation to open-loop controlled operation.

Dependency: The wait time has no significance if the setpoint speed before the ramp-function generator lies in the open-loop speed controlled operating range. In this case, the change is made without any delay.
See also: p1755, p1756

Note
If p1758 is changed, commissioning must be selected in order to validate the value for the blocking monitoring.

p1759[0...n] Motor model changeover delay time open/closed-loop control / MotMod t op_cl

Access level: 4	**Calculated:** CALC_MOD_LIM_REF	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0 [ms]	2000 [ms]	0 [ms]

Description: Sets the minimum time for a transition from open-loop controlled to closed-loop controlled operation after the lower changeover speed p1755 * (1 - p1756 / 100 %) has been exceeded.

Dependency: See also: p1755, p1756

Note
With p1759 = 2000 ms, the delay time becomes ineffective and the model changeover is determined by the output frequency only (changeover for p1755).

p1764[0...n] Motor model without encoder speed adaptation Kp / MotMod woE n_adaKp

Access level: 4	**Calculated:** CALC_MOD_CON	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 6730
Min:	**Max:**	**Factory setting:**
0.000	100000.000	1000.000

Description: Sets the proportional gain of the controller for speed adaptation without encoder.

p1767[0...n] Motor model without encoder speed adaptation Tn / MotMod woE n_adaTn

Access level: 4	**Calculated:** CALC_MOD_CON	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 6730
Min:	**Max:**	**Factory setting:**
1 [ms]	200 [ms]	4 [ms]

Description: Sets the integral time of the controller for speed adaptation without encoder

p1769[0...n] Motor model changeover delay time closed-loop control / MotMod t cl_ctrl

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0 [ms]	10000 [ms]	0 [ms]

Description: Sets the wait time for a transition from open-loop controlled to closed-loop controlled operation after twice the lower changeover speed p1755 * (1 - p1756 / 100 %) has been exceeded - and below the upper switchover speed p1755.

Dependency: See also: p1755, p1756

Note
With p1759 = 0 ms and above p1755, the delay time becomes ineffective and the model changeover is determined by the output frequency only (changeover for p1755).

r1770 CO: Motor model speed adaptation proportional component / MotMod n_adapt Kp

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p2000	**Dynamic index:** -
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 6730
Min:	**Max:**	**Factory setting:**
- [rpm]	- [rpm]	- [rpm]

Description: Displays the P component of the controller for speed adaptation.

r1771 CO: Motor model speed adaptation I comp. / MotMod n_adapt Tn

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p2000	**Dynamic index:** -
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 6730
Min:	**Max:**	**Factory setting:**
- [rpm]	- [rpm]	- [rpm]

Description: Displays the I component of the controller for speed adaptation.

p1774[0...n] Motor model offset voltage compensation alpha / MotMod offs comp A

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-5.000 [V]	5.000 [V]	0.000 [V]

Description: Sets the offset voltage in the alpha direction; this compensates the offset voltages of the drive converter/inverter at low speeds. The value is valid for the rated (nominal) pulse frequency of the power unit.

Note
The value is pre-set during the rotating measurement.

p1775[0...n] Motor model offset voltage compensation beta / MotMod offs comp B

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-5.000 [V]	5.000 [V]	0.000 [V]

Description: Sets the offset voltage in the beta direction; this compensates the offset voltages of the drive converter/inverter at low speeds. The value is valid for the rated (nominal) pulse frequency of the power unit.

Note
The value is pre-set during the rotating measurement.

r1776[0...6] Motor model status signals / MotMod status sig

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the internal status signals of the motor model.
Index 0: Changeover ramp between current and voltage models
Index 1: Changeover ramp for model feedback (only for induction motors without encoder)
Index 2: Changeover ramp for zero frequency range (only for induction motors without encoder)

Index:
[0] = Changeover ramp motor model
[1] = Changeover ramp model tracking
[2] = Changeover ramp zero frequency induction motor without encoder
[3...6] = Reserved

p1780[0...n] Motor model adaptation configuration / MotMod adapt conf

Access level: 4	**Calculated:** CALC_MOD_CON	**Data type:** Unsigned16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	0000 0000 0001 0100 bin

Description: Sets the configuration for the adaptation circuit of the motor model.
Induction motor (ASM):
Rs, Lh and offset compensation.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
01	Select motor model ASM Rs adaptation	Yes	No	-
02	Select motor model ASM Lh adaptation	Yes	No	-
04	Select motor model offset adaptation	Yes	No	-
07	Select T(valve) with Rs adaptation	Yes	No	-
10	Filter time combination current like current ctrl integral time	Yes	No	-
14	Delay of the precontrol speed to the motor model	Yes	No	-
15	RESM Q flux model linear active	Yes	No	-

Dependency: In U/f characteristic operating mode only bit 7 is relevant.
For active motor model feedback (see p1784), the Lh adaptation is internally deactivated automatically.

Note
When selecting the compensation of the valve interlocking via Rs (bit 7), the compensation in the gating unit is deactivated and is instead taken into account in the motor model.
In order that the correction values of the Rs and Lh adaptation (selected using bit 0 ... bit 1) are correctly accepted when changing over the drive data set, a dedicated motor number must be entered into p0826 for each different motor.
ASM: Induction motor
RESM: synchronous reluctance motor

p1780[0...n] Motor model adaptation configuration / MotMod adapt conf

G120XA_USS (PM330)

Access level: 3	**Calculated:** CALC_MOD_CON	**Data type:** Unsigned16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	0000 1000 0001 0100 bin

Description: Sets the configuration for the adaptation circuit of the motor model.
Induction motor (ASM):
Rs, Lh and offset compensation.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
01	Select motor model ASM Rs adaptation	Yes	No	-
02	Select motor model ASM Lh adaptation	Yes	No	-
04	Select motor model offset adaptation	Yes	No	-
07	Select T(valve) with Rs adaptation	Yes	No	-
10	Filter time combination current like current ctrl integral time	Yes	No	-
11	Fast flying restart with voltage model for induction motor	Yes	No	-

Dependency: In the U/f characteristic operating mode, only bit 7 and bit 11 are relevant.
For active motor model feedback (see p1784), the Lh adaptation is internally deactivated automatically.

Note

When selecting the compensation of the valve interlocking via Rs (bit 7), the compensation in the gating unit is deactivated and is instead taken into account in the motor model.
In order that the correction values of the Rs and Lh adaptation (selected using bit 0 ... bit 1) are correctly accepted when changing over the drive data set, a dedicated motor number must be entered into p0826 for each different motor.
ASM: Induction motor
RESM: synchronous reluctance motor

p1784[0...n] Motor model feedback scaling / MotMod fdbk scal

Access level: 4	**Calculated:** CALC_MOD_CON	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.0 [%]	1000.0 [%]	0.0 [%]

Description: Sets the scaling for model fault feedback.

Note

Feeding back the measured model fault to the model states increases the control stability and makes the motor model rugged against parameter errors.
When feedback is selected (p1784 > 0), Lh adaptation is not effective.

p1785[0...n] Motor model Lh adaptation Kp / MotMod Lh Kp

Access level: 4	**Calculated:** CALC_MOD_CON	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.000	10.000	0.100

Description: Sets the proportional gain for the Lh adaptation of the motor model for an induction motor (ASM).

p1786[0...n] Motor model Lh adaptation integral time / MotMod Lh Tn

Access level: 4	**Calculated:** CALC_MOD_CON	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
10 [ms]	10000 [ms]	100 [ms]

Description: Sets the integral time for the Lh adaptation of the motor model for an induction motor (ASM).

r1787[0...n] Motor model Lh adaptation corrective value / MotMod Lh corr

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
- [mH]	- [mH]	- [mH]

Description: Displays the corrective value for the Lh adaptation of the motor model for an induction motor (ASM).

Dependency: See also: p0826, p1780

Note

The adaptation result is reset if the magnetizing inductance of the induction motor is changed (p0360, r0382). This also happens when changing over the data set if a different motor is not being used (p0826).

The display of the inactive data sets is only updated when changing over the data set.

p1800[0...n] Pulse frequency setpoint / Pulse freq setp

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 8021
Min:	**Max:**	**Factory setting:**
0.500 [kHz]	16.000 [kHz]	4.000 [kHz]

Description: Sets the pulse frequency for the converter.

This parameter is pre-set to the rated converter value when the drive is first commissioned.

Dependency: Minimum pulse frequency: p1800 >= 12 * p1082 * r0313 / 60

See also: p0230

Note

The maximum and minimum possible pulse frequency is also determined by the power unit being used (minimum pulse frequency: 2 kHz or 4 kHz).

When the pulse frequency is increased, depending on the particular power unit, the maximum output current can be reduced (derating, refer to r0067).

If a sine-wave filter is parameterized as output filter (p0230 = 3), then the pulse frequency cannot be set below the minimum value required for the filter.

For operation with output reactors, the pulse frequency is limited to 4 kHz (see p0230).

If p1800 is changed during commissioning (p0010 > 0), then it is possible that the old value will no longer be able to be set. The reason for this is that the dynamic limits of p1800 have been changed by a parameter that was set when the drive was commissioned (e.g. p1082).

The pulse frequency cannot be changed when the motor data identification is activated.

p1800[0...n] Pulse frequency setpoint / Pulse freq setp

G120XA_USS (PM330)

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 8021
Min:	**Max:**	**Factory setting:**
0.500 [kHz]	4.000 [kHz]	4.000 [kHz]

Description: Sets the drive converter switching frequency.

This parameter is pre-set to twice the rated converter value when the drive is first commissioned.

Dependency: Minimum pulse frequency: p1800 >= 12 * p1082 * r0313 / 60

See also: p0230

Note

The maximum and minimum possible pulse frequency is also determined by the power unit being used (minimum pulse frequency: 2 kHz or 4 kHz).

When the pulse frequency is increased, depending on the particular power unit, the maximum output current can be reduced (derating, refer to r0067).

If a sine-wave filter is parameterized as output filter (p0230 = 3), then the pulse frequency cannot be set below the minimum value required for the filter.

For operation with output reactors, the pulse frequency is limited to 4 kHz (see p0230).

If p1800 is changed during commissioning (p0010 > 0), then it is possible that the old value will no longer be able to be set. The reason for this is that the dynamic limits of p1800 have been changed by a parameter that was set when the drive was commissioned (e.g. p1082).

The pulse frequency cannot be changed when the motor data identification is activated.

r1801[0...1] CO: Pulse frequency / Pulse frequency

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p2000	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
- [kHz]	- [kHz]	- [kHz]

Description: Display and connector output for the actual converter switching frequency.

Index:
[0] = Actual
[1] = Modulator minimum value

Note

The selected pulse frequency (p1800) may be reduced if the drive converter has an overload condition (p0290).

p1802[0...n] Modulator mode / Modulator mode

Access level: 3	**Calculated:** CALC_MOD_LIM_REF	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	10	0

Description: Sets the modulator mode.

Value:
0: Automatic changeover SVM/FLB
2: Space vector modulation (SVM)
3: SVM without overcontrol
4: SVM/FLB without overcontrol
10: SVM/FLB with modulation depth reduction

Dependency: If a sine-wave filter is parameterized as output filter (p0230 = 3, 4), then only space vector modulation without overcontrol can be selected as modulation type (p1802 = 3). This does not apply to power units PM260.

p1802 = 10 can only be set for power units PM230 and PM240 and for r0204.15 = 0.

See also: p0230, p0500

Note

When modulation modes are enabled that could lead to overmodulation (p1802 = 0, 2, 10), the modulation depth must be limited using p1803 (default, p1803 < 100 %). The higher the overmodulation, the greater the current ripple and torque ripple.

When changing p1802[x], the values for all of the other existing indices are also changed.

p1802[0...n] Modulator mode / Modulator mode

G120XA_USS (PM330)

Access level: 4	**Calculated:** CALC_MOD_LIM_REF	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	19	9

Description: Sets the modulator mode.

Value:
- 0: Automatic changeover SVM/FLB
- 2: Space vector modulation (SVM)
- 9: Edge modulation
- 19: Optimized pulse pattern

Dependency: Setting p1802 = 19 (optimized pulse pattern) is only released for chassis/built-in power units and SIMOTICS FD motors up to a maximum speed of p1082 <= 60 x 100 Hz / r0313.

See also: p0500

NOTICE

When modulation modes are enabled that could lead to overmodulation (p1802 = 0, 2), the modulation depth must be limited using p1803 (default p1803 < 100 %). The higher the overmodulation, the greater the current ripple and torque ripple.
When changing p1802[x], the values for all of the other existing indices are also changed.

Note

When modulation modes are enabled that could lead to overmodulation (p1802 = 0, 2, 10), the modulation depth must be limited using p1803 (default, p1803 < 100 %). The higher the overmodulation, the greater the current ripple and torque ripple.
When changing p1802[x], the values for all of the other existing indices are also changed.

p1803[0...n] Maximum modulation depth / Modulat depth max

Access level: 3	**Calculated:** CALC_MOD_LIM_REF	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 6723
Min:	**Max:**	**Factory setting:**
20.0 [%]	150.0 [%]	106.0 [%]

Description: Defines the maximum modulation depth.

Dependency: See also: p0500

Note

p1803 = 100% is the overcontrol limit for space vector modulation (for an ideal drive converter without any switching delay).

p1803[0...n] Maximum modulation depth / Modulat depth max

G120XA_USS (PM330)

Access level: 4	**Calculated:** CALC_MOD_LIM_REF	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 6723
Min:	**Max:**	**Factory setting:**
20.0 [%]	150.0 [%]	106.0 [%]

Description: Defines the maximum modulation depth.

Dependency: See also: p0500

Note

p1803 = 100% is the overcontrol limit for space vector modulation (for an ideal drive converter without any switching delay).

p1806[0...n] Filter time constant Vdc correction / T_filt Vdc_corr

Access level: 3	**Calculated:** CALC_MOD_REG	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.0 [ms]	10000.0 [ms]	0.0 [ms]

Description: Sets the filter time constant for the DC link voltage.

This time constant is used to calculate the modulation depth.

r1809 CO: Modulator mode actual / Modulator mode act

Access level: 4	**Calculated:** -	**Data type:** Integer16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
1	9	-

Description: Displays the effective modulator mode.

Value:

1: Flat top modulation (FLB)

2: Space vector modulation (SVM)

9: Optimized pulse pattern

r1809 CO: Modulator mode actual / Modulator mode act

G120XA_USS (PM330)

Access level: 4	**Calculated:** -	**Data type:** Integer16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
1	9	-

Description: Displays the effective modulator mode.

Value:

1: Flat top modulation (FLB)

2: Space vector modulation (SVM)

3: Edge modulation from 28 Hz; 23:3

4: Edge modulation from 28 Hz; 19:1

5: Edge modulation from 60 Hz; 17:3

6: Edge modulation from 60 Hz; 17:1

7: Edge modulation from 100 Hz; 9:2

8: Edge modulation from 100 Hz; 9:1

9: Optimized pulse pattern

p1810 Modulator configuration / Modulator config

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	0000 bin

Description: Sets the configuration for the modulator.

Bit field:

Bit	Signal name	1 signal	0 signal	FP

00	Avg value filter for V_lim (only for Vdc_comp in modulator)	Yes	No	-
01	DC link voltage compensation in the current control	Yes	No	-

NOTICE
Bit 1 = 1 can only be set under a pulse inhibit and for r0192.14 = 1.

Note
For bit 00 = 0:
Voltage limitation from the minimum of the DC link voltage (lower ripple in the output current, reduced output voltage).
For bit 00 = 1:
Voltage limitation from averaged DC link voltage (higher output voltage with increased ripple in the output current). The selection is only valid if the DC link compensation is not performed in the Control Unit (bit 1 = 0).
For bit 01 = 0:
DC link voltage compensation in the modulator.
For bit 01 = 1:
DC link voltage compensation in the current control.

p1811[0...n] Pulse frequency wobbulation amplitude / Puls wobb ampl

G120XA_USS (PM330)

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0 [%]	20 [%]	10 [%]

Description: Sets the amplitude of the statistical wobbulation signal.
This signal is used to vary the pulse frequency to create a more pleasant sound.

Note
p1811 > 0 is possible, if the following applies:
- configuration: p1810.2 = 1 (wobbulation activated)
- pulse frequency: p1800 <= 2000 / p115[0]
- output filter, filter type: p0230 < 3 (no sine-wave filter)

p1820[0...n] Reverse the output phase sequence / Outp_ph_seq rev

Access level: 2	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	1	0

Description: Sets the phase sequence reversal for the motor without setpoint change.
If the motor does not rotate in the required direction, then the output phase sequence can be reversed using this parameter. This means that the direction of the motor is reversed without the setpoint being changed.

Value:
0: OFF
1: ON

Note
This setting can only be changed when the pulses are inhibited.

p1822 Power unit line phases monitoring tolerance time / PU ph monit t_tol

Access level: 4	**Calculated:** -	**Data type:** Unsigned32
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
500 [ms]	540000 [ms]	1000 [ms]

Description: Sets the tolerance time for line phase monitoring for blocksize power units.

If a line phase fault is present for longer than this tolerance time, then a corresponding fault is output.

Dependency: See also: F30011

NOTICE

When operating with a failed line phase, depending on the active power, values higher than the default value can either immediately damage the power unit or damage it over the long term.

Note

For the setting p1822 = maximum value, line phase monitoring is deactivated.

p1825 Converter valve threshold voltage / Threshold voltage

Access level: 4	**Calculated:** CALC_MOD_ALL	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.0 [Vrms]	100.0 [Vrms]	0.6 [Vrms]

Description: Sets the threshold voltage drop of the valves (power semiconductor devices) to be compensated.

Note

The value is automatically calculated in the motor data identification routine.

p1828 Compensation valve lockout time phase U / Comp t_lock ph U

Access level: 4	**Calculated:** CALC_MOD_ALL	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.00 [µs]	3.99 [µs]	0.00 [µs]

Description: Sets the valve lockout time to compensate for phase U.

Note

The value is automatically calculated in the motor data identification routine.

p1828 Compensation valve lockout time phase U / Comp t_lock ph U

G120XA_USS (PM330)

Access level: 4	**Calculated:** CALC_MOD_ALL	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.00 [µs]	7.80 [µs]	0.00 [µs]

Description: Sets the valve lockout time to compensate for phase U.

Note

The value is automatically calculated in the motor data identification routine.

p1829 Compensation valve lockout time phase V / Comp t_lock ph V

Access level: 4	**Calculated:** CALC_MOD_ALL	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.00 [µs]	3.99 [µs]	0.00 [µs]

Description: Sets the valve lockout time to compensate for phase V.

p1829 Compensation valve lockout time phase V / Comp t_lock ph V

G120XA_USS (PM330)

Access level: 4	**Calculated:** CALC_MOD_ALL	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.00 [µs]	7.80 [µs]	0.00 [µs]

Description: Sets the valve lockout time to compensate for phase V.

p1830 Compensation valve lockout time phase W / Comp t_lock ph W

Access level: 4	**Calculated:** CALC_MOD_ALL	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.00 [µs]	3.99 [µs]	0.00 [µs]

Description: Sets the valve lockout time to compensate for phase W.

p1830 Compensation valve lockout time phase W / Comp t_lock ph W

G120XA_USS (PM330)

Access level: 4	**Calculated:** CALC_MOD_ALL	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.00 [µs]	7.80 [µs]	0.00 [µs]

Description: Sets the valve lockout time to compensate for phase W.

p1832 Dead time compensation current level / t_dead_comp I_lev

Access level: 4	**Calculated:** CALC_MOD_ALL	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.0 [Arms]	10000.0 [Arms]	0.0 [Arms]

Description: Sets the current level for the dead time compensation.

Above the current level, the dead time - resulting from the converter switching delays - is compensated by a previously calculated constant value. If the relevant phase current setpoint falls below the absolute value defined by p1832, the corrective value for this phase is continuously reduced.

Dependency: The factory setting of p1832 is automatically set to 0.02 * rated drive converter current (r0207).

r1838.0...15 CO/BO: Gating unit status word 1 / Gating unit ZSW1

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display and BICO output for status word 1 of the power unit.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Fault time-critical	ON	OFF	-
01	Gating unit mode bit 0	ON	OFF	-
02	Pulse enable	ON	OFF	-
03	Switch-off signal path STO_B	Inactive	Active	-
04	Switch-off signal path STO_A	Inactive	Active	-

05	Gating unit mode bit 1	ON	OFF	-
06	Gating unit mode bit 2	ON	OFF	-
07	Brake state	ON	OFF	-
08	Brake diagnostics	ON	OFF	-
09	Armature short-circuit braking	Active	Not active	-
10	Gating unit state bit 0	ON	OFF	-
11	Gating unit state bit 1	ON	OFF	-
12	Gating unit state bit 2	ON	OFF	-
13	Alarm status bit 0	ON	OFF	-
14	Alarm status bit 1	ON	OFF	-
15	Diagnostics 24 V	ON	OFF	-

p1900 Motor data identification and rotating measurement / MotID and rot meas

Access level: 2	**Calculated:** -	**Data type:** Integer16
Can be changed: C2(1), T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	12	0

Description: Sets the motor data identification and speed controller optimization.

The motor identification should first be performed with the motor stationary (p1900 = 1, 2; also refer to p1910). Based on this, additional motor and control parameters can be determined using the motor data identification with the motor rotating (p1900 = 1, 3; also refer to p1960; not for p1300 < 20).

p1900 = 0:

Function inhibited.

p1900 = 1:

Sets p1910 = 1 and p1960 = 0, 1 depending on p1300

When the drive enable signals are present, a motor data identification routine is carried out at standstill with the next switch-on command. Current flows through the motor which means that it can align itself by up to a quarter of a revolution.

With the following switch-on command, a rotating motor data identification routine is carried out - and in addition, a speed controller optimization by making measurements at different motor speeds.

p1900 = 2:

Sets p1910 = 1 and p1960 = 0

When the drive enable signals are present, a motor data identification routine is carried out at standstill with the next switch-on command. Current flows through the motor which means that it can align itself by up to a quarter of a revolution.

p1900 = 3:

Sets p1960 = 0, 1 depending on p1300

This setting should only be selected if the motor data identification was already carried out at standstill.

When the drive enable signals are present, with the next switch-on command, a rotating motor data identification routine is carried out - and in addition, speed controller optimization by taking measurements at different motor speeds.

p1900 = 11, 12:

The same as p1900 = 1, 2 with the difference, that after the measurement, the system immediately goes into operation. For this purpose, p1909.18 is set = p1959.13 is set = 1 .

Value:

0:	Inhibited
1:	Identifying motor data and optimizing the speed controller
2:	Identifying motor data (at standstill)
3:	Optimizing the speed controller (in rotating operation)
11:	Motor data ident. and speed controller opt., switch to operation
12:	Motor data identification (at standstill), switch to operation

Dependency: See also: p1300, p1910, p1960

See also: A07980, A07981, F07983, F07984, F07985, F07986, F07988, F07990, A07991

NOTICE
p1900 = 3: This setting should only be selected if the motor data identification was already carried out at standstill. To permanently accept the determined settings they must be saved in a non-volatile fashion (p0971). During the rotating measurement it is not possible to save the parameter (p0971).

Note

The motor and control parameters of the vector control are only optimally set when both measurements are carried out (initially at standstill, and then with the motor rotating). The measurement with rotating motor is not performed for p1300 < 20 (U/f controls).

An appropriate alarm is output when the parameter is set.

The switch-on command must remain set during a measurement and after the measurement has been completed, the drive automatically resets it.

The duration of the measurements can lie between 0.3 s and several minutes. This time is, for example, influenced by the motor size and the mechanical conditions.

p1900 is automatically set to 0 after the motor data identification routine has been completed.

If a reluctance motor has been parameterized, a pole position identification is carried out during the stationary measurement. As a consequence, faults that occur can also be assigned to the pole position identification.

For U/f control (p1300), identification with speed controller optimization does not make sense (e.g. p1900 = 1).

p1900 Motor data identification and rotating measurement / MotID and rot meas

G120XA_USS (PM330)			
	Access level: 2	**Calculated:** -	**Data type:** Integer16
	Can be changed: C2(1), T	**Scaling:** -	**Dynamic index:** -
	Unit group: -	**Unit selection:** -	**Function diagram:** -
	Min:	**Max:**	**Factory setting:**
	0	12	2

Description:

Sets the motor data identification and speed controller optimization.

The motor identification should first be performed with the motor stationary (p1900 = 1, 2; also refer to p1910). Based on this, additional motor and control parameters can be determined using the motor data identification with the motor rotating (p1900 = 1, 3; also refer to p1960).

p1900 = 0:

Function inhibited.

p1900 = 1:

Sets p1910 = 1 and p1960 = 0, 1 depending on p1300

When the drive enable signals are present, a motor data identification routine is carried out at standstill with the next switch-on command. Current flows through the motor which means that it can align itself by up to a quarter of a revolution.

With the following switch-on command, a rotating motor data identification routine is carried out - and in addition, a speed controller optimization by making measurements at different motor speeds.

p1900 = 2:

Sets p1910 = 1 and p1960 = 0

When the drive enable signals are present, a motor data identification routine is carried out at standstill with the next switch-on command. Current flows through the motor which means that it can align itself by up to a quarter of a revolution.

p1900 = 3:

Sets p1960 = 0, 1 depending on p1300

This setting should only be selected if the motor data identification was already carried out at standstill.

When the drive enable signals are present, with the next switch-on command, a rotating motor data identification routine is carried out - and in addition, speed controller optimization by taking measurements at different motor speeds.

p1900 = 11, 12:

The same as p1900 = 1, 2 with the difference, that after the measurement, the system immediately goes into operation. For this purpose, p1909.18 is set = p1959.13 is set = 1 .

Value:

0:	Inhibited
1:	Identifying motor data and optimizing the speed controller
2:	Identifying motor data (at standstill)

3:	Optimizing the speed controller (in rotating operation)
11:	Motor data ident. and speed controller opt., switch to operation
12:	Motor data identification (at standstill), switch to operation

Dependency: See also: p1300, p1910, p1960

See also: A07980, A07981, F07983, F07984, F07985, F07986, F07988, F07990, A07991

NOTICE
p1900 = 3: This setting should only be selected if the motor data identification was already carried out at standstill. To permanently accept the determined settings they must be saved in a non-volatile fashion (p0971). During the rotating measurement it is not possible to save the parameter (p0971).

Note

The motor and control parameters of the vector control are only optimally set when both measurements are carried out (initially at standstill, and then with the motor rotating). The measurement with rotating motor is not performed for p1300 < 20 (U/f controls).

An appropriate alarm is output when the parameter is set.

The switch-on command must remain set during a measurement and after the measurement has been completed, the drive automatically resets it.

The duration of the measurements can lie between 0.3 s and several minutes. This time is, for example, influenced by the motor size and the mechanical conditions.

p1900 is automatically set to 0 after the motor data identification routine has been completed.

If a reluctance motor has been parameterized, a pole position identification is carried out during the stationary measurement. As a consequence, faults that occur can also be assigned to the pole position identification.

For U/f control (p1300), identification with speed controller optimization does not make sense (e.g. p1900 = 1).

p1901 Test pulse evaluation configuration / Test puls config

Access level: 3	**Calculated:** CALC_MOD_ALL	**Data type:** Unsigned32
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	0000 bin

Description: Sets the configuration for the test pulse evaluation.

Bit 00: Check for conductor-to-conductor short circuit once/always when the pulses are enabled.

Bit 01: Check for ground fault once/always when the pulses are enabled.

Bit 02: Activation of the tests selected using bit 00 and/or bit 01 each time the pulses are enabled

Recommendation: If the ground fault test is incorrectly initiated because the motor is not at a complete standstill, then the pulse cancellation delay time (p1228) should be increased.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Phase short-circuit test pulse active	Yes	No	-
01	Ground fault detection test pulse active	Yes	No	-
02	Test pulse at each pulse enable	Yes	No	-

Dependency: The ground fault test is only possible when the motor is stationary, and is therefore only realized when flying restart is deactivated (p1200 = 0).

See also: p0287

Note

If a conductor-to-conductor short-circuit is detected during the test, this is displayed in r1902.1.

If a ground fault is detected during the test, this is displayed in r1902.2.

For bit 02 = 0:

If the test was successful once after POWER ON (see r1902.0), then it is not repeated.

For bit 02 = 1:

The test is not only performed after POWER ON, but also each time the pulses are enabled.

p1901 Test pulse evaluation configuration / Test puls config

G120XA_USS (PM330)

Access level: 3	**Calculated:** CALC_MOD_ALL	**Data type:** Unsigned32
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	0000 bin

Description: Sets the configuration for the test pulse evaluation.

Bit 00: Check for conductor-to-conductor short circuit once/always when the pulses are enabled.

Bit 01: Check for ground fault once/always when the pulses are enabled.

Bit 02: Activation of the tests selected using bit 00 and/or bit 01 each time the pulses are enabled

Recommendation: If the ground fault test is incorrectly initiated because the motor is not at a complete standstill, then the pulse cancellation delay time (p1228) should be increased.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Phase short-circuit test pulse active	Yes	No	-
01	Ground fault detection test pulse active	Yes	No	-
02	Test pulse at each pulse enable	Yes	No	-

Dependency: The ground fault test is only possible when the motor is stationary, and is therefore only realized when flying restart is deactivated (p1200 = 0).

See also: p0287

Note

If a conductor-to-conductor short-circuit is detected during the test, this is displayed in r1902.1.

If a ground fault is detected during the test, this is displayed in r1902.2.

For bit 02 = 0:

If the test was successful once after POWER ON (see r1902.0), then it is not repeated.

For bit 02 = 1:

The test is not only performed after POWER ON, but also each time the pulses are enabled.

For chassis power units, the ground fault is also determined using the summed output current (see p0287).

r1902 Test pulse evaluation status / Test puls ev stat

Access level: 4	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the status of the test pulse evaluation.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Short-circuit test successfully performed	Yes	No	-
01	Phase short-circuit detected	Yes	No	-
02	Ground fault test successfully performed	Yes	No	-
03	Ground fault detected	Yes	No	-
04	Identification pulse width greater than the minimum pulse width	Yes	No	-
05	Pulse frequency for short-circuit test requested	Yes	No	-
06	Short-circuit test in power stack driver activated	Yes	No	-
07	Short-circuit test pulse suppression active	Yes	No	-
08	Motor phase interrupted	Yes	No	-

Note

If the ground fault test was selected, but not successfully performed, then sufficient current was not be able to be established during the test pulses.

For bit 04:

A test pulse longer than one sampling time has occurred

p1909[0...n] Motor data identification control word / MotID STW

Access level: 3 | **Calculated:** CALC_MOD_ALL | **Data type:** Unsigned32
Can be changed: T | **Scaling:** - | **Dynamic index:** -
Unit group: - | **Unit selection:** - | **Function diagram:** -
Min: - | **Max:** - | **Factory setting:** 0000 0000 0000 0000 0000 0000 0000 0000 bin

Description: Sets the configuration for the motor data identification.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Stator inductance estimate no measurement	Yes	No	-
02	Rotor time constant estimate no measurement	Yes	No	-
03	Leakage inductance estimate no measurement	Yes	No	-
05	Determine Tr and Lsig evaluation in the time range	Yes	No	-
06	Activate vibration damping	Yes	No	-
07	Deactivate vibration detection	Yes	No	-
11	Deactivate pulse measurement Lq Ld	Yes	No	-
12	Deactivate rotor resistance Rr measurement	Yes	No	-
14	Deactivate valve interlocking time measurement	Yes	No	-
15	Determine only stator resistance, valve voltage fault, dead time	Yes	No	-
16	Short motor identification (lower quality)	Yes	No	-
17	Measurement without control parameter calculation	Yes	No	-
18	After motID direct transition into operation	Yes	No	-
19	After MotID automatically save results	Yes	No	-
20	Estimate cable resistance	Yes	No	-
22	Only identify circle	Yes	No	-
23	Deactivate circle identification	Yes	No	-
24	Circle identification with 0 and 90 degrees	Yes	No	-
26	Measure with long cable	Yes	No	-

Note

The following applies to permanent-magnet synchronous motors:
Without de-selection in bit 11, in the closed-loop control mode, the direct inductance LD and the quadrature inductance Lq are measured at a low current.
When de-selecting with bit 11 or in the U/f mode, the stator inductance is measured at half the rated motor current.
If the stator is inductance is not measured but is to be estimated, then bit 0 should be set and bit 11 should be de-selected.
Bit 19 = 1:
All parameters are automatically saved after a successful motor data identification.
If a speed controller optimization run is then selected, the parameters are only saved after this measurement has been completed.
Bit 22 ... 24: only for reluctance motors
Bit 22 = 1:
Only that measurement is carried out that is required for the flying restart of a reluctance motor. The bit is reset after a successful measurement

p1909[0...n] Motor data identification control word / MotID STW

G120XA_USS (PM330)

Access level: 3 | **Calculated:** CALC_MOD_ALL | **Data type:** Unsigned32
Can be changed: T | **Scaling:** - | **Dynamic index:** -
Unit group: - | **Unit selection:** - | **Function diagram:** -
Min: - | **Max:** - | **Factory setting:** 0000 0000 0000 0000 0000 0000 0000 0000 bin

Description: Sets the configuration for the motor data identification.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Stator inductance estimate no measurement	Yes	No	-
02	Rotor time constant estimate no measurement	Yes	No	-
03	Leakage inductance estimate no measurement	Yes	No	-
05	Determine Tr and Lsig evaluation in the time range	Yes	No	-
06	Activate vibration damping	Yes	No	-
07	Deactivate vibration detection	Yes	No	-
11	Deactivate pulse measurement Lq Ld	Yes	No	-
12	Deactivate rotor resistance Rr measurement	Yes	No	-
14	Deactivate valve interlocking time measurement	Yes	No	-
15	Determine only stator resistance, valve voltage fault, dead time	Yes	No	-
16	Short motor identification (lower quality)	Yes	No	-
17	Measurement without control parameter calculation	Yes	No	-
18	After motID direct transition into operation	Yes	No	-
19	After MotID automatically save results	Yes	No	-
20	Estimate cable resistance	Yes	No	-
21	Calibrating the output voltage measurement	Yes	No	-
26	Measure with long cable	Yes	No	-

Note

The following applies to permanent-magnet synchronous motors:

Without de-selection in bit 11, in the closed-loop control mode, the direct inductance LD and the quadrature inductance Lq are measured at a low current.

When de-selecting with bit 11 or in the U/f mode, the stator inductance is measured at half the rated motor current.

If the stator is inductance is not measured but is to be estimated, then bit 0 should be set and bit 11 should be de-selected.

For bit 19 = 1:

All parameters are automatically saved after a successful motor data identification.

If a speed controller optimization run is then selected, the parameters are only saved after this measurement has been completed.

For bit 21 = 1:

The converter output voltage measurement is calibrated at the start of the motor data identification.

p1910 Motor data identification selection / MotID selection

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	28	0

Description: Sets the motor data identification routine.

The motor data identification routine is carried out after the next switch-on command.

p1910 = 1:

All motor data and the drive converter characteristics are identified and then transferred to the following parameters:

p0350, p0354, p0356, p0357, p0358, p0360, p1825, p1828, p1829, p1830

After this, the control parameter p0340 = 3 is automatically calculated.

p1910 = 20:

Only for internal SIEMENS use.

Value:

0: Inhibited

1: Complete identification (ID) and acceptance of motor data

2: Complete identification (ID) of motor data without acceptance

20: Voltage vector input

21: Voltage vector input without filter
22: Rectangular voltage vector input without filter
23: Triangular voltage vector input without filter
24: Rectangular voltage vector input with filter
25: Triangular voltage vector input with filter
26: Enter voltage vector with DTC correction
27: Enter voltage vector with AVC
28: Enter voltage vector with DTC + AVC correction

Dependency: "Quick commissioning" must be carried out (p0010 = 1, p3900 > 0) before executing the motor data identification routine!

When selecting the motor data identification routine, the drive data set changeover is suppressed.

See also: p1900

See also: F07990, A07991

NOTICE
After the motor data identification (p1910 > 0) has been selected, alarm A07991 is output and a motor data identification routine is carried out as follows at the next switch-on command: - current flows through the motor and a voltage is present at the drive converter output terminals. - during the identification routine, the motor shaft can rotate through a maximum of half a revolution. - however, no torque torque is generated.

Note

To permanently accept the determined settings they must be saved in a non-volatile fashion (p0971).

When setting p1910, the following should be observed:

1. "With acceptance" means:

The parameters specified in the description are overwritten with the identified values and therefore have an influence on the controller setting.

2. "Without acceptance" means:

The identified parameters are only displayed in the range r1912 ... r1926 (service parameters). The controller settings remain unchanged.

3. For settings 27 and 28, the AVC configuration set using p1840 is active.

The switch-on command must remain set during a measurement and after the measurement has been completed, the drive automatically resets it. The duration of the measurements can lie between 0.3 s and several minutes. This time is mainly influenced by the motor size. At the end of the motor data identification, p1910 is automatically set to 0, if only the stationary measurement is selected, then p1900 is also reset to 0, otherwise, the rotating measurement is activated.

p1910 Motor data identification selection / MotID selection

G120XA_USS (PM330)

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	28	1

Description: Sets the motor data identification routine.

The motor data identification routine is carried out after the next switch-on command.

p1910 = 1:

All motor data and the drive converter characteristics are identified and then transferred to the following parameters:

p0350, p0354, p0356, p0357, p0358, p0360, p1825, p1828, p1829, p1830

After this, the control parameter p0340 = 3 is automatically calculated.

p1910 = 20:

Only for internal SIEMENS use.

Value:

0: Inhibited
1: Complete identification (ID) and acceptance of motor data
2: Complete identification (ID) of motor data without acceptance
20: Voltage vector input

21: Voltage vector input without filter
22: Rectangular voltage vector input without filter
23: Triangular voltage vector input without filter
24: Rectangular voltage vector input with filter
25: Triangular voltage vector input with filter
26: Enter voltage vector with DTC correction
27: Enter voltage vector with AVC
28: Enter voltage vector with DTC + AVC correction

Dependency: "Quick commissioning" must be carried out (p0010 = 1, p3900 > 0) before executing the motor data identification routine!

When selecting the motor data identification routine, the drive data set changeover is suppressed.

See also: p1900

See also: F07990, A07991

NOTICE
After the motor data identification (p1910 > 0) has been selected, alarm A07991 is output and a motor data identification routine is carried out as follows at the next switch-on command: - current flows through the motor and a voltage is present at the drive converter output terminals. - during the identification routine, the motor shaft can rotate through a maximum of half a revolution. - however, no torque torque is generated.

Note

To permanently accept the determined settings they must be saved in a non-volatile fashion (p0971).

When setting p1910, the following should be observed:

1. "With acceptance" means:

The parameters specified in the description are overwritten with the identified values and therefore have an influence on the controller setting.

2. "Without acceptance" means:

The identified parameters are only displayed in the range r1912 ... r1926 (service parameters). The controller settings remain unchanged.

3. For settings 27 and 28, the AVC configuration set using p1840 is active.

The switch-on command must remain set during a measurement and after the measurement has been completed, the drive automatically resets it. The duration of the measurements can lie between 0.3 s and several minutes. This time is mainly influenced by the motor size. At the end of the motor data identification, p1910 is automatically set to 0, if only the stationary measurement is selected, then p1900 is also reset to 0, otherwise, the rotating measurement is activated.

r1912[0...2] Identified stator resistance / R_stator ident

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
- [ohm]	- [ohm]	- [ohm]

Description: Displays the identified stator resistance.

Index:
[0] = Phase U
[1] = Phase V
[2] = Phase W

r1913[0...2] Identified rotor time constant / T_rotor ident

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
- [ms]	- [ms]	- [ms]

Description: Displays the identified rotor time constant.
Index: [0] = Phase U
[1] = Phase V
[2] = Phase W

r1914[0...2] Identified total leakage inductance / L_total_leak ident

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
- [mH]	- [mH]	- [mH]

Description: Displays the identified total leakage inductance.
Index: [0] = Phase U
[1] = Phase V
[2] = Phase W

r1915[0...2] Identified nominal stator inductance / L_stator ident

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
- [mH]	- [mH]	- [mH]

Description: Displays the nominal stator inductance identified.
Index: [0] = Phase U
[1] = Phase V
[2] = Phase W

r1925[0...2] Identified threshold voltage / U_threshold ident

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
- [Vrms]	- [Vrms]	- [Vrms]

Description: Displays the identified IGBT threshold voltage.
Index: [0] = Phase U
[1] = Phase V
[2] = Phase W

r1926[0...2] Identified effective valve lockout time / t_lock_valve id

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
- [µs]	- [µs]	- [µs]

Description: Displays the identified effective valve lockout time.
Index: [0] = Phase U
[1] = Phase V
[2] = Phase W

r1927[0...2] Identified rotor resistance / R_rotor ident

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
- [ohm]	- [ohm]	- [ohm]

Description: Displays identified rotor resistance (on separately excited synchronous motors: damping resistance).

Index:
[0] = Phase U
[1] = Phase V
[2] = Phase W

p1959[0...n] Rotating measurement configuration / Rot meas config

Access level: 3	**Calculated:** CALC_MOD_ALL	**Data type:** Unsigned16
Can be changed: T	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	0000 0000 0001 1110 bin

Description: Sets the configuration of the rotating measurement.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
01	Saturation characteristic identification	Yes	No	-
02	Moment of inertia identification	Yes	No	-
03	Re-calculates the speed controller parameters	Yes	No	-
04	Speed controller optimization (vibration test)	Yes	No	-
11	Do not change the controller parameters during the measurement	Yes	No	-
12	Measurement shortened	Yes	No	-
13	After measurement direct transition into operation	Yes	No	-
14	Calculate speed actual value smoothing time	Yes	No	-

Dependency: See also: F07988

Note
The following parameters are influenced for the individual optimization steps:
Bit 01: p0320, p0360, p0362 ... p0369
Bit 02: p0341, p0342
Bit 03: p1400.0, p1458, p1459, p1463, p1470, p1472, p1496
Bit 04: Dependent on p1960
p1960 = 1, 3: p1400.0, p1458, p1459, p1470, p1472, p1496

p1959[0...n] Rotating measurement configuration / Rot meas config

G120XA_USS (PM330)

Access level: 3	**Calculated:** CALC_MOD_ALL	**Data type:** Unsigned16
Can be changed: T	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	0001 0000 0001 1110 bin

Description: Sets the configuration of the rotating measurement.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
01	Saturation characteristic identification	Yes	No	-
02	Moment of inertia identification	Yes	No	-
03	Re-calculates the speed controller parameters	Yes	No	-
04	Speed controller optimization (vibration test)	Yes	No	-

11	Do not change the controller parameters during the measurement	Yes	No	-
12	Measurement shortened	Yes	No	-
13	After measurement direct transition into operation	Yes	No	-
14	Calculate speed actual value smoothing time	Yes	No	-

Dependency: See also: F07988

Note

The following parameters are influenced for the individual optimization steps:

Bit 01: p0320, p0360, p0362 ... p0369

Bit 02: p0341, p0342

Bit 03: p1400.0, p1458, p1459, p1463, p1470, p1472, p1496

Bit 04: Dependent on p1960

p1960 = 1, 3: p1400.0, p1458, p1459, p1470, p1472, p1496

For bit 12 = 1:

The selection only has an effect on the measurement p1960 = 1. For the shortened measurement, the magnetizing current and moment of inertia are determined with a somewhat lower accuracy.

p1960 Rotating measurement selection / Rot meas sel

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	3	0

Description: Sets the rotating measurement.

The rotating measurement is carried out after the next switch-on command.

The setting possibilities of the parameter depend on the open-loop/closed-loop control mode (p1300).

p1300 < 20 (U/f open-loop control):

It is not possible to select rotating measurement or speed controller optimization.

p1300 = 20, 22 (encoderless operation):

Only rotating measurement or speed controller optimization can be selected in the encoderless mode.

Value:

0:	Inhibited
1:	Rotating measurement in encoderless operation
3:	Speed controller optimization in encoderless operation

Dependency: Before the rotating measurement is carried out, the motor data identification routine (p1900, p1910, r3925) should have already been done.

When selecting the rotating measurement, the drive data set changeover is suppressed.

See also: p1300, p1900, p1959, p1967, r1968

⚠ DANGER

For drives with a mechanical system that limits the distance moved, it must be ensured that this is not reached during the rotating measurement. If this is not the case, then it is not permissible that the measurement is carried out.

NOTICE

To permanently accept the determined settings they must be saved in a non-volatile fashion (p0971).

During the rotating measurement it is not possible to save the parameter (p0971).

Note

When the rotating measurement is activated, it is not possible to save the parameters (p0971).

Parameter changes are automatically made for the rotating measurement (e.g. p1120); this is the reason that up to the end of the measurement, and if no faults are present, no manual changes should be made.

The ramp-up and ramp-down times (p1120, p1121) are limited, for the rotating measurement, to 900 s.

p1961 Saturation characteristic speed to determine / Sat_char n determ

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
26 [%]	75 [%]	40 [%]

Description: Sets the speed to determine the saturation characteristic.

The percentage value is referred to p0310 (rated motor frequency).

Dependency: See also: p0310, p1959

See also: F07983

Note

The saturation characteristics should be determined at an operating point with the lowest possible load.

p1961 Saturation characteristic speed to determine / Sat_char n determ

G120XA_USS (PM330)

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
26 [%]	75 [%]	30 [%]

Description: Sets the speed to determine the saturation characteristic.

The percentage value is referred to p0310 (rated motor frequency).

Dependency: See also: p0310, p1959

See also: F07983

Note

The saturation characteristics should be determined at an operating point with the lowest possible load.

p1965 Speed_ctrl_opt speed / n_opt speed

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
10 [%]	75 [%]	40 [%]

Description: Sets the speed for the identification of the moment of inertia and the vibration test.

Induction motor:

The percentage value is referred to p0310 (rated motor frequency).

Synchronous motor:

The percentage value is referred to the minimum from p0310 (rated motor frequency) and p1082 (maximum speed).

Dependency: See also: p0310, p1959

See also: F07984, F07985

Note

In order to calculate the inertia, sudden speed changes are carried out - the specified value corresponds to the lower speed setpoint. This value is increased by 20 % for the upper speed value.

The q leakage inductance (refer to p1959.5) is determined at zero speed and at 50 % of p1965 - however, with a maximum output frequency of 15 Hz and at a minimum of 10% of the rated motor speed.

p1967 Speed_ctrl_opt dynamic factor / n_opt dyn_factor

Access level: 3	**Calculated:** CALC_MOD_ALL	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
1 [%]	400 [%]	100 [%]

Description: Sets the dynamic response factor for speed controller optimization.
After optimization, the dynamic response achieved is displayed in r1968.

Dependency: See also: p1959, r1968
See also: F07985

Note
For a rotating measurement, this parameter can be used to optimize the speed controller.
p1967 = 100 % --> speed controller optimization according to a symmetric optimum.
p1967 > 100 % --> optimization with a higher dynamic response (Kp higher, Tn lower).
If the actual dynamic response (see r1968) is significantly reduced with respect to the required dynamic response (p1967), then this can be as a result of mechanical load oscillations. If, in spite of this load behavior, a higher dynamic response is required, then the oscillation test (p1959.4 = 0) should be deactivated and the measurement repeated.

r1968 Speed_ctrl_opt dynamic factor actual / n_opt dyn_fact act

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
- [%]	- [%]	- [%]

Description: Displays the dynamic factor which is actually achieved for the vibration test

Dependency: See also: p1959, p1967
See also: F07985

Note
This dynamic factor only refers to the control mode of the speed controller set in p1960.

r1969 Speed_ctrl_opt moment of inertia determined / n_opt M_inert det

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: 25_1	**Unit selection:** p0100	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
- [kgm^2]	- [kgm^2]	- [kgm^2]

Description: Displays the determined moment of inertia of the drive.
After it has been determined, the value is transferred to p0341, p0342.

Dependency: IEC drives (p0100 = 0): unit kg m^2
NEMA drives (p0100 = 1): unit lb ft^2
See also: p0341, p0342, p1959
See also: F07984

r1970[0...1] Speed_ctrl_opt vibration test vibration frequency determined / n_opt f_vib det

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
- [Hz]	- [Hz]	- [Hz]

Description:	Displays the vibration frequencies determined by the vibration test.
Index:	[0] = Frequency low [1] = Frequency high
Dependency:	See also: p1959 See also: F07985

p1974 Speed_ctrl_opt saturation characteristic rotor flux maximum / n_opt rot_fl max

Access level: 4	**Calculated:** CALC_MOD_ALL	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
104 [%]	120 [%]	120 [%]

Description: Sets the maximum flux setpoint to measure the saturation characteristic.

p1980[0...n] PolID technique / PolID technique

Access level: 3	**Calculated:** CALC_MOD_REG	**Data type:** Integer16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
1	10	4

Description: Sets the pole position identification technique.
p1980 = 1, 8: The current magnitude is set using p0329.
p1980 = 4, 6: The current magnitude of the first measurement section is set using p0325, the second using p0329.
p1980 = 10: The rated motor current is impressed to align.
The current magnitudes are limited to the rated power unit values.

Value:

1:	Voltage pulsing 1st harmonics
4:	Voltage pulsing 2-stage
6:	Voltage pulsing 2-stage inverse
8:	Voltage pulsing 2nd harmonic, inverse
10:	DC current injection

Dependency: See also: p1780
See also: F07969

Note
Voltage pulse technique (p1980 = 1, 4, 8) cannot be applied for operation with sine-wave output filters (p0230).

r1992.0...15 CO/BO: PolID diagnostics / PolID diag

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display and BICO output for the diagnostics information of the pole position identification (polID)

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Critical encoder fault occurred	Yes	No	-
02	Encoder parking active	Yes	No	-
05	Encoder fault Class 1	Yes	No	-
06	Encoder fault Class 2	Yes	No	-
07	Pole position identification for encoder carried out	Yes	No	-
08	Fine synchronization carried out	Yes	No	-

09	Coarse synchronization carried out	Yes	No	-
10	Commutation information available	Yes	No	-
11	Speed information available	Yes	No	-
12	Position information available	Yes	No	-
15	Zero mark passed	Yes	No	-

Dependency: See also: p0325, p0329, p1980

Note

The data of p1992 are updated in a 4 ms cycle.

Fast changes of the encoder status word bits can be better investigated using p7830 and following.

PolID: Pole position identification

p1998[0...n] PolID circle center point / PolID circ center

Access level: 3 | **Calculated:** CALC_MOD_CON | **Data type:** FloatingPoint32

Can be changed: T, U | **Scaling:** - | **Dynamic index:** DDS, p0180

Unit group: - | **Unit selection:** - | **Function diagram:** -

Min: 0.0000 [A] | **Max:** 10000.0000 [A] | **Factory setting:** 0.0000 [A]

Description: Current offset determined to measure the speed (RESM)

Dependency: See also: p1980, r1992

p2000 Reference speed reference frequency / n_ref f_ref

Access level: 2 | **Calculated:** CALC_MOD_ALL | **Data type:** FloatingPoint32

Can be changed: T | **Scaling:** - | **Dynamic index:** -

Unit group: - | **Unit selection:** - | **Function diagram:** -

Min: 6.00 [rpm] | **Max:** 210000.00 [rpm] | **Factory setting:** 1500.00 [rpm]

Description: Sets the reference quantity for speed and frequency.

All speeds or frequencies specified as relative value are referred to this reference quantity.

The reference quantity corresponds to 100% or 4000 hex (word) or 4000 0000 hex (double word).

The following applies: Reference frequency (in Hz) = reference speed (in ((rpm) / 60) x pole pair number)

Dependency: This parameter is only updated during the automatic calculation (p0340 = 1, p3900 > 0) if motor commissioning was carried out beforehand for drive data set zero. This means that the parameter is not locked against overwriting using p0573 = 1.

See also: p2001, p2002, p2003, r2004, r3996

NOTICE
When the reference speed / reference frequency is changed, short-term communication interruptions may occur.

Note

If a BICO interconnection is established between different physical quantities, then the particular reference quantities are used as internal conversion factor.

Example 1:

The signal of an analog input (e.g. r0755[0]) is connected to a speed setpoint (e.g. p1070[0]). The actual percentage input value is cyclically converted into the absolute speed setpoint using the reference speed (p2000).

Example 2:

The setpoint from PROFIBUS (r2050[1]) is connected to a speed setpoint (e.g. p1070[0]). The actual input value is cyclically converted into a percentage value via the pre-specified scaling 4000 hex. This percentage value is converted to the absolute speed setpoint via reference speed (p2000).

p2001 Reference voltage / Reference voltage

Access level: 3	**Calculated:** CALC_MOD_ALL	**Data type:** FloatingPoint32
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
10 [Vrms]	100000 [Vrms]	1000 [Vrms]

Description: Sets the reference quantity for voltages.

All voltages specified as relative value are referred to this reference quantity. This also applies for direct voltage values (= rms value) like the DC link voltage.

The reference quantity corresponds to 100% or 4000 hex (word) or 4000 0000 hex (double word).

Note:

This reference quantity also applies to direct voltage values. It is not interpreted as rms value, but as DC voltage value.

Dependency: p2001 is only updated during automatic calculation (p0340 = 1, p3900 > 0) if motor commissioning has been carried out first for drive data set zero and as a result overwriting of the parameter has not been blocked by setting p0573 = 1.

See also: r3996

p2002 Reference current / I_ref

Access level: 3	**Calculated:** CALC_MOD_ALL	**Data type:** FloatingPoint32
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.10 [Arms]	100000.00 [Arms]	100.00 [Arms]

Description: Sets the reference quantity for currents.

All currents specified as relative value are referred to this reference quantity.

The reference quantity corresponds to 100% or 4000 hex (word) or 4000 0000 hex (double word).

Dependency: This parameter is only updated during the automatic calculation (p0340 = 1, p3900 > 0) if motor commissioning was carried out beforehand for drive data set zero. This means that the parameter is not locked against overwriting using p0573 = 1.

See also: r3996

NOTICE

If various DDS are used with different motor data, then the reference quantities remain the same as these are not changed over with the DDS. The resulting conversion factor must be taken into account.

Example:

p2002 = 100 A

Reference quantity 100 A corresponds to 100 %

p0305[0] = 100 A

Rated motor current 100 A for MDS0 in DDS0 --> 100 % corresponds to 100 % of the rated motor current

p0305[1] = 50 A

Rated motor current 50 A for MDS1 in DDS1 --> 100 % corresponds to 200 % of the rated motor current

When the reference current is changed, short-term communication interruptions may occur.

Note

Pre-assigned value is p0640.

If a BICO interconnection is established between different physical quantities, then the particular reference quantities are used as internal conversion factor.

For infeed units, the rated line current, which is obtained from the rated power and parameterized rated line supply voltage (p2002 = r0206 / p0210 / 1.73) is pre-assigned as the reference quantity.

Example:

The actual value of a phase current (r0069[0]) is connected to a test socket (e.g. p0771[0]). The actual current value is cyclically converted into a percentage of the reference current (p2002) and output according to the parameterized scaling.

p2003 Reference torque / M_ref

Access level: 3	**Calculated:** CALC_MOD_ALL	**Data type:** FloatingPoint32
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: 7_2	**Unit selection:** p0505	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.01 [Nm]	20000000.00 [Nm]	1.00 [Nm]

Description: Sets the reference quantity for torque.

All torques specified as relative value are referred to this reference quantity.

The reference quantity corresponds to 100% or 4000 hex (word) or 4000 0000 hex (double word).

Dependency: This parameter is only updated during the automatic calculation (p0340 = 1, p3900 > 0) if motor commissioning was carried out beforehand for drive data set zero. This means that the parameter is not locked against overwriting using p0573 = 1.

See also: r3996

NOTICE
When the reference torque is changed, short-term communication interruptions may occur.

Note

Preassigned value is 2 * p0333.

If a BICO interconnection is established between different physical quantities, then the particular reference quantities are used as internal conversion factor.

Example:

The actual value of the total torque (r0079) is connected to a test socket (e.g. p0771[0]). The actual torque is cyclically converted into a percentage of the reference torque (p2003) and output according to the parameterized scaling.

r2004 Reference power / P_ref

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: 14_10	**Unit selection:** p0505	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
- [kW]	- [kW]	- [kW]

Description: Displays the reference quantity for power.

All power ratings specified as relative value are referred to this reference quantity.

The reference quantity corresponds to 100% or 4000 hex (word) or 4000 0000 hex (double word).

Dependency: This value is calculated as follows:

Infeed: Calculated from voltage times current.

Closed-loop control: Calculated from torque times speed.

See also: p2000, p2001, p2002, p2003

Note

If a BICO interconnection is established between different physical quantities, then the particular reference quantities are used as internal conversion factor.

The reference power is calculated as follows:

- 2 * Pi * reference speed / 60 * reference torque (motor)
- reference voltage * reference current * root(3) (infeed)

p2006 Reference temperature / Ref temp

Access level: 3	**Calculated:** CALC_MOD_ALL	**Data type:** FloatingPoint32
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: 21_1	**Unit selection:** p0505	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
50.00 [°C]	300.00 [°C]	100.00 [°C]

Description: Sets the reference quantity for temperature.
All temperatures specified as relative value are referred to this reference quantity.
The reference quantity corresponds to 100% or 4000 hex (word) or 4000 0000 hex (double word).

p2010 Comm IF baud rate / Comm baud

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
6	12	12

Description: Sets the baud rate for the commissioning interface (USS, RS232).

Value:

6:	9600 baud
7:	19200 baud
8:	38400 baud
9:	57600 baud
10:	76800 baud
11:	93750 baud
12:	115200 baud

Note
COMM-IF: Commissioning interface
The parameter is not influenced by setting the factory setting.

p2011 Comm IF address / Comm add

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	31	2

Description: Sets the address for the commissioning interface (USS, RS232).

Note
The parameter is not influenced by setting the factory setting.

p2016[0...3] CI: Comm IF USS PZD send word / Comm USS send word

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Integer16
Can be changed: T, U	**Scaling:** 4000H	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Selects the PZD (actual values) to be sent via the commissioning interface USS.
The actual values are displayed on an intelligent operator panel (IOP).

Index:
[0] = PZD 1
[1] = PZD 2
[2] = PZD 3
[3] = PZD 4

r2019[0...7] Comm IF error statistics / Comm err

Access level: 4	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the receive errors at the commissioning interface (USS, RS232).

Index:
[0] = Number of error-free telegrams
[1] = Number of rejected telegrams
[2] = Number of framing errors
[3] = Number of overrun errors
[4] = Number of parity errors
[5] = Number of starting character errors
[6] = Number of checksum errors
[7] = Number of length errors

p2020 Field bus interface baud rate / Field bus baud

Access level: 2	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 9310
Min:	**Max:**	**Factory setting:**
4	13	8

Description: Sets the baud rate for the field bus interface (RS485).

Value:

4:	2400 baud
5:	4800 baud
6:	9600 baud
7:	19200 baud
8:	38400 baud
9:	57600 baud
10:	76800 baud
11:	93750 baud
12:	115200 baud
13:	187500 baud

Note

Fieldbus IF: Fieldbus interface
Changes only become effective after POWER ON.
The parameter is not influenced by setting the factory setting.
The parameter is set to the factory setting when the protocol is reselected.
When p2030 = 1 (USS), the following applies:
Min./max./factory setting: 4/13/8
For p2030 = 2 (Modbus RTU), the following applies:
Min./max./factory setting: 5/13/7
For p2030 = 5 (BACnet MS/TP) the following applies:
Possible values/factory setting: (6, 7, 8, 10) / 8
If p2030 = 8 (P1), the following applies:
Min./max./factory setting: 5/7/5

p2021 Field bus interface address / Field bus address

Access level: 2	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 9310
Min:	**Max:**	**Factory setting:**
0	255	0

Description: Displays or sets the address for the fieldbus interface (RS485).

The address can be set as follows:

1) Using the address switch on the Control Unit.

--> p2021 displays the address setting.

--> A change only becomes effective after a POWER ON.

2) Using p2021

--> Only if an address of 0 or an address that is invalid for the fieldbus selected in p2030 has been set using the address switch.

--> The address is saved in a non-volatile fashion using the function "copy from RAM to ROM".

--> A change only becomes effective after a POWER ON.

Dependency: See also: p2030

Note

Changes only become effective after POWER ON.
The parameter is not influenced by setting the factory setting.
The parameter is set to the factory setting when the protocol is reselected.
When p2030 = 1 (USS), the following applies:
Min./max./factory setting: 0/31/0
When p2030 = 2 (Modbus), the following applies:
Min./max./factory setting: 1/247/1
If p2030 = 5 (BACnet), the following applies:
Min./max./factory setting: 0/127/1
If p2030 = 8 (P1), the following applies:
Min./max./factory setting: 1/99/99

p2022 Field bus int USS PZD no. / Field bus USS PZD

Access level: 2	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 9310
Min:	**Max:**	**Factory setting:**
0	8	2

Description: Sets the number of 16-bit words in the PZD part of the USS telegram for the field bus interface.

Dependency: See also: p2030

Note

The parameter is not influenced by setting the factory setting.

p2023 Field bus interface USS PKW count / Field bus USS PKW

Access level: 2	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 9310
Min:	**Max:**	**Factory setting:**
0	127	127

Description: Sets the number of 16-bit words in the PKW part of the USS telegram for the field bus interface.

Value:

0: PKW 0 words
3: PKW 3 words

4: PKW 4 words
127: PKW variable

Dependency: See also: p2030

Note
The parameter is not influenced by setting the factory setting.

p2024[0...2] Fieldbus interface times / Fieldbus times

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 9310
Min:	**Max:**	**Factory setting:**
0 [ms]	10000 [ms]	[0] 6000 [ms] [1] 0 [ms] [2] 0 [ms]

Description: Sets the time values for the fieldbus interface.
For Modbus the following applies:
p2024[0, 1]: Not relevant.
p2024[2]: Telegram pause time (pause time between two telegrams).
The following applies for BACnet:
p2024[0]: APDU timeout.
p2024[1, 2]: Not relevant.

Index: [0] = Max. processing time
[1] = Character delay time
[2] = Telegram pause time

Dependency: See also: p2020, p2030

Note
For p2024[2] (Modbus):
If the field bus baud rate is changed (p2020), the default time setting is restored.
The default setting corresponds to a time of 3.5 characters (dependent on the baud rate that has been set).

p2025[0...4] Fieldbus interface BACnet settings / BACnet setting

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 9310
Min:	**Max:**	**Factory setting:**
0	4194303	[0] 1 [1] 5 [2] 3 [3] 32 [4] 0

Description: Sets the parameter for communication via BACnet.
p2025[0]:
Device object instance number (0 ... 4194303).
p2025[1]:
Maximum number of info frames (1 ... 10).
p2025[2]:
Number of APDU retries (0 ... 39).
p2025[3]:
Maximum master address (1 ... 127).

Index: [0] = Device object instance number
[1] = Maximum number of info frames
[2] = Number of APDU retries
[3] = Maximum master address
[4] = Reserved

Dependency: See also: p2030

p2026[0...75] Fieldbus interface BACnet COV increment / BACnet COV incr

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 9310
Min:	**Max:**	**Factory setting:**
0	4194303	1

Description: Sets BACnet COV (change of value) increment values.

Index:
[0] = Analog input 0
[1] = Analog input 1
[2] = Analog input 2
[3] = Analog input 3
[4] = Analog input 4
[5] = Analog input 5
[6] = Analog input 6
[7] = Analog input 7
[8] = Analog Output 0
[9] = Analog Output 1
[10] = Analog Value 0
[11] = Analog Value 1
[12] = Analog Value 2
[13] = Analog Value 3
[14] = Analog Value 4
[15] = Analog Value 5
[16] = Analog Value 6
[17] = Analog Value 7
[18] = Analog Value 8
[19] = Analog Value 9
[20] = Analog Value 10
[21] = Analog Value 12
[22] = Analog Value 13
[23] = Analog Value 14
[24] = Analog Value 15
[25] = Analog Value 16
[26] = Analog Value 17
[27] = Analog Value 18
[28] = Analog Value 19
[29] = Analog Value 20
[30] = Analog Value 21
[31] = Analog Value 22
[32] = Analog Value 25
[33] = Analog Value 28
[34] = Analog Value 29
[35] = Analog Value 30
[36] = Analog Value 31
[37] = Analog Value 32
[38] = Analog Value 33
[39] = Analog Value 34
[40] = Analog Value 39
[41] = Analog Value 40
[42] = Analog Value 41
[43] = Analog Value 5000
[44] = Analog Value 5001
[45] = Analog Value 5002
[46] = Analog Value 5003
[47] = Analog Value 5004
[48] = Analog Value 5005
[49] = Analog Value 5006
[50] = Analog Value 5007
[51] = Analog Value 5100

[52] = Analog Value 5101
[53] = Analog Value 5102
[54] = Analog Value 5103
[55] = Analog Value 5104
[56] = Analog Value 5105
[57] = Analog Value 5106
[58] = Analog Value 5107
[59] = Analog Value 5200
[60] = Analog Value 5201
[61] = Analog Value 5202
[62] = Analog Value 5203
[63] = Analog Value 5204
[64] = Analog Value 5205
[65] = Analog Value 5206
[66] = Analog Value 5207
[67] = Analog Value 5300
[68] = Analog Value 5301
[69] = Analog Value 5302
[70] = Analog Value 5303
[71] = Analog Value 5304
[72] = Analog Value 5305
[73] = Analog Value 5306
[74] = Analog Value 5307
[75] = Analog Output 2

Dependency: See also: p2030

p2027 Fieldbus interface BACnet language selection / BACnet language

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 9310
Min:	**Max:**	**Factory setting:**
0	1	0

Description: Sets the language for the BACnet object properties.

Value:
0: German
1: English

Note
Changes only become effective after POWER ON.

r2029[0...7] Field bus interface error statistics / Field bus error

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 9310
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the receive errors on the field bus interface (RS485).

Index:
[0] = Number of error-free telegrams
[1] = Number of rejected telegrams
[2] = Number of framing errors
[3] = Number of overrun errors
[4] = Number of parity errors
[5] = Number of starting character errors
[6] = Number of checksum errors
[7] = Number of length errors

p2030 Field bus interface protocol selection / Field bus protocol

Access level: 1	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 9310
Min:	**Max:**	**Factory setting:**
0	5	0

Description: Sets the communication protocol for the field bus interface.

Value:
0: No protocol
1: USS
2: Modbus RTU
5: BACnet MS/TP

Note
Changes only become effective after POWER ON.
The parameter is not influenced by setting the factory setting.

p2031 Fieldbus interface MODBUS parity / Modbus parity

Access level: 2	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 9310
Min:	**Max:**	**Factory setting:**
0	3	2

Description: Sets the parity for the Modbus protocol (p2030 = 2).

Value:
0: No parity
1: Odd parity
2: Even parity
3: No Parity 1 Stop

Note
Fieldbus IF: Fieldbus interface
Changes only become effective after POWER ON.
The parameter is not influenced by setting the factory setting.
The parameter is set to the factory setting when the protocol is reselected (p2030 = 2).

r2032 Master control control word effective / PcCtrl STW eff

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the effective control word 1 (STW1) of the drive for the master control.

Bit field:

Bit	Signal name	1 signal	0 signal	FP

00	ON/OFF1	Yes	No	-
01	OC / OFF2	Yes	No	-
02	OC / OFF3	Yes	No	-
03	Enable operation	Yes	No	-
04	Enable ramp-function generator	Yes	No	-
05	Start ramp-function generator	Yes	No	-
06	Enable speed setpoint	Yes	No	-
07	Acknowledge fault	Yes	No	-
08	Jog bit 0	Yes	No	3030
09	Jog bit 1	Yes	No	3030
10	Master control by PLC	Yes	No	-

NOTICE

The master control only influences control word 1 and speed setpoint 1. Other control word/setpoints can be transferred from another automation device.

Note

OC: Operating condition

p2039 Select debug monitor interface / Debug monit select

Access level: 4	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	3	0

Description: The serial interface for the debug monitor is COM1 (commissioning interface, RS232) or COM2 (fieldbus interface, RS485).

Value = 0: Deactivated

Value = 1: COM1, commissioning protocol is deactivated

Value = 2: COM2, field bus is deactivated

Value = 3: Reserved

Note

Value = 2 is only possible for Control Units with RS485 as a field bus interface.

p2040 Fieldbus interface monitoring time / Fieldbus t_monit

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 9310
Min:	**Max:**	**Factory setting:**
0 [ms]	1999999 [ms]	1000 [ms]

Description: Sets the monitoring time to monitor the process data received via the fieldbus interface.

If no process data is received within this time, then an appropriate message is output.

Dependency: See also: F01910

Note

p2040 = 0:
Monitoring is deactivated.
For p2030 = 2 (Modbus RTU) or p2030 = 5 (BACnet MS/TP) the following deviation applies:
Factory setting: 10000

r2050[0...11] CO: PROFIdrive PZD receive word / PZD recv word

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: -	**Scaling:** 4000H	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 2440, 2468, 9360
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Connector output to interconnect PZD (setpoints) with word format received from the fieldbus controller.

Index:
[0] = PZD 1
[1] = PZD 2
[2] = PZD 3
[3] = PZD 4
[4] = PZD 5
[5] = PZD 6
[6] = PZD 7
[7] = PZD 8
[8] = PZD 9
[9] = PZD 10
[10] = PZD 11
[11] = PZD 12

NOTICE

Where there is a multiple interconnection of a connector output, all the connector inputs must either have Integer or FloatingPoint data types. A BICO interconnection for a single PZD can only take place either on r2050 or r2060.

p2051[0...16] CI: PROFIdrive PZD send word / PZD send word

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Integer16
Can be changed: T, U	**Scaling:** 4000H	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 2450, 2470, 9370
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Selects the PZD (actual values) with word format to be sent to the fieldbus controller.

Index:
[0] = PZD 1
[1] = PZD 2
[2] = PZD 3
[3] = PZD 4
[4] = PZD 5
[5] = PZD 6
[6] = PZD 7
[7] = PZD 8
[8] = PZD 9
[9] = PZD 10
[10] = PZD 11
[11] = PZD 12
[12] = PZD 13
[13] = PZD 14
[14] = PZD 15
[15] = PZD 16
[16] = PZD 17

r2053[0...16] PROFIdrive diagnostics send PZD word / Diag send word

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 2450, 2470, 9370
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the PZD (actual values) with word format sent to the fieldbus controller.

Index:
[0] = PZD 1
[1] = PZD 2
[2] = PZD 3
[3] = PZD 4
[4] = PZD 5
[5] = PZD 6
[6] = PZD 7
[7] = PZD 8
[8] = PZD 9
[9] = PZD 10
[10] = PZD 11
[11] = PZD 12
[12] = PZD 13
[13] = PZD 14
[14] = PZD 15
[15] = PZD 16
[16] = PZD 17

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Bit 0	ON	OFF	-
01	Bit 1	ON	OFF	-
02	Bit 2	ON	OFF	-
03	Bit 3	ON	OFF	-
04	Bit 4	ON	OFF	-
05	Bit 5	ON	OFF	-
06	Bit 6	ON	OFF	-
07	Bit 7	ON	OFF	-
08	Bit 8	ON	OFF	-
09	Bit 9	ON	OFF	-
10	Bit 10	ON	OFF	-
11	Bit 11	ON	OFF	-
12	Bit 12	ON	OFF	-
13	Bit 13	ON	OFF	-
14	Bit 14	ON	OFF	-
15	Bit 15	ON	OFF	-

r2057 Fieldbus address switch diagnostics / Addr_switch diag

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 2410
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the setting of the "BUS ADDRESS" address switch on the Control Unit.

Dependency: See also: p2021

NOTICE
The display is updated after switching on, and not cyclically.

r2060[0...10] CO: PROFIdrive PZD receive double word / PZD recv DW

Access level: 3	**Calculated:** -	**Data type:** Integer32
Can be changed: -	**Scaling:** 4000H	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 2440, 2468
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Connector output to interconnect PZD (setpoints) with double word format received from the fieldbus controller.

Index:
[0] = PZD 1 + 2
[1] = PZD 2 + 3
[2] = PZD 3 + 4
[3] = PZD 4 + 5
[4] = PZD 5 + 6
[5] = PZD 6 + 7
[6] = PZD 7 + 8
[7] = PZD 8 + 9
[8] = PZD 9 + 10
[9] = PZD 10 + 11
[10] = PZD 11 + 12

Dependency: See also: r2050

NOTICE
Where there is a multiple interconnection of a connector output, all the connector inputs must either have Integer or FloatingPoint data types. A BICO interconnection for a single PZD can only take place either on r2050 or r2060.

p2061[0...15] CI: PROFIdrive PZD send double word / PZD send DW

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Integer32
Can be changed: T, U	**Scaling:** 4000H	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 2470
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Selects the PZD (actual values) with double word format to be sent to the fieldbus controller.

Index: [0] = PZD 1 + 2
[1] = PZD 2 + 3
[2] = PZD 3 + 4
[3] = PZD 4 + 5
[4] = PZD 5 + 6
[5] = PZD 6 + 7
[6] = PZD 7 + 8
[7] = PZD 8 + 9
[8] = PZD 9 + 10
[9] = PZD 10 + 11
[10] = PZD 11 + 12
[11] = PZD 12 + 13
[12] = PZD 13 + 14
[13] = PZD 14 + 15
[14] = PZD 15 + 16
[15] = PZD 16 + 17

Dependency: See also: p2051

NOTICE
A BICO interconnection for a single PZD can only take place either on p2051 or p2061.

r2063[0...15] PROFIdrive diagnostics PZD send double word / Diag send DW

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 2470
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the PZD (actual values) with double word format sent to the fieldbus controller.

Index: [0] = PZD 1 + 2
[1] = PZD 2 + 3
[2] = PZD 3 + 4
[3] = PZD 4 + 5
[4] = PZD 5 + 6
[5] = PZD 6 + 7
[6] = PZD 7 + 8
[7] = PZD 8 + 9
[8] = PZD 9 + 10
[9] = PZD 10 + 11
[10] = PZD 11 + 12
[11] = PZD 12 + 13
[12] = PZD 13 + 14
[13] = PZD 14 + 15
[14] = PZD 15 + 16
[15] = PZD 16 + 17

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Bit 0	ON	OFF	-
01	Bit 1	ON	OFF	-
02	Bit 2	ON	OFF	-
03	Bit 3	ON	OFF	-
04	Bit 4	ON	OFF	-
05	Bit 5	ON	OFF	-

06	Bit 6	ON	OFF	-
07	Bit 7	ON	OFF	-
08	Bit 8	ON	OFF	-
09	Bit 9	ON	OFF	-
10	Bit 10	ON	OFF	-
11	Bit 11	ON	OFF	-
12	Bit 12	ON	OFF	-
13	Bit 13	ON	OFF	-
14	Bit 14	ON	OFF	-
15	Bit 15	ON	OFF	-
16	Bit 16	ON	OFF	-
17	Bit 17	ON	OFF	-
18	Bit 18	ON	OFF	-
19	Bit 19	ON	OFF	-
20	Bit 20	ON	OFF	-
21	Bit 21	ON	OFF	-
22	Bit 22	ON	OFF	-
23	Bit 23	ON	OFF	-
24	Bit 24	ON	OFF	-
25	Bit 25	ON	OFF	-
26	Bit 26	ON	OFF	-
27	Bit 27	ON	OFF	-
28	Bit 28	ON	OFF	-
29	Bit 29	ON	OFF	-
30	Bit 30	ON	OFF	-
31	Bit 31	ON	OFF	-

NOTICE
A maximum of 4 indices of the "trace" function can be used.

r2067[0...1] PZD maximum interconnected / PZDmaxIntercon

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display for the maximum interconnected PZD in the receive/send direction
Index 0: receive (r2050, r2060)
Index 1: send (p2051, p2061)

p2080[0...15] BI: Binector-connector converter status word 1 / Bin/con ZSW1

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 2472
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Selects bits to be sent to the PROFIdrive controller.
The individual bits are combined to form status word 1.

Index: [0] = Bit 0
[1] = Bit 1
[2] = Bit 2
[3] = Bit 3
[4] = Bit 4
[5] = Bit 5
[6] = Bit 6
[7] = Bit 7
[8] = Bit 8
[9] = Bit 9
[10] = Bit 10
[11] = Bit 11
[12] = Bit 12
[13] = Bit 13
[14] = Bit 14
[15] = Bit 15

Dependency: See also: p2088, r2089

p2081[0...15] BI: Binector-connector converter status word 2 / Bin/con ZSW2

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 2472
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Selects bits to be sent to the PROFIdrive controller.
The individual bits are combined to form status word 2.

Index: [0] = Bit 0
[1] = Bit 1
[2] = Bit 2
[3] = Bit 3
[4] = Bit 4
[5] = Bit 5
[6] = Bit 6
[7] = Bit 7
[8] = Bit 8
[9] = Bit 9
[10] = Bit 10
[11] = Bit 11
[12] = Bit 12
[13] = Bit 13
[14] = Bit 14
[15] = Bit 15

Dependency: See also: p2088, r2089

p2082[0...15] BI: Binector-connector converter status word 3 / Bin/con ZSW3

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 2472
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Selects bits to be sent to the PROFIdrive controller.
The individual bits are combined to form free status word 3.

Index:
[0] = Bit 0
[1] = Bit 1
[2] = Bit 2
[3] = Bit 3
[4] = Bit 4
[5] = Bit 5
[6] = Bit 6
[7] = Bit 7
[8] = Bit 8
[9] = Bit 9
[10] = Bit 10
[11] = Bit 11
[12] = Bit 12
[13] = Bit 13
[14] = Bit 14
[15] = Bit 15

Dependency: See also: p2088, r2089

p2083[0...15] BI: Binector-connector converter status word 4 / Bin/con ZSW4

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 2472
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Selects bits to be sent to the PROFIdrive controller.
The individual bits are combined to form free status word 4.

Index:
[0] = Bit 0
[1] = Bit 1
[2] = Bit 2
[3] = Bit 3
[4] = Bit 4
[5] = Bit 5
[6] = Bit 6
[7] = Bit 7
[8] = Bit 8
[9] = Bit 9
[10] = Bit 10
[11] = Bit 11
[12] = Bit 12
[13] = Bit 13
[14] = Bit 14
[15] = Bit 15

Dependency: See also: p2088, r2089

p2084[0...15] BI: Binector-connector converter status word 5 / Bin/con ZSW5

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 2472
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Selects bits to be sent to the PROFIdrive controller.
The individual bits are combined to form free status word 5.

Index:
[0] = Bit 0
[1] = Bit 1
[2] = Bit 2
[3] = Bit 3
[4] = Bit 4
[5] = Bit 5
[6] = Bit 6
[7] = Bit 7
[8] = Bit 8
[9] = Bit 9
[10] = Bit 10
[11] = Bit 11
[12] = Bit 12
[13] = Bit 13
[14] = Bit 14
[15] = Bit 15

Dependency: See also: p2088, r2089

p2088[0...4] Invert binector-connector converter status word / Bin/con ZSW inv

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 2472
Min:	**Max:**	**Factory setting:**
-	-	0000 0000 0000 0000 bin

Description: Setting to invert the individual binector inputs of the binector-connector converter.

Index:
[0] = Status word 1
[1] = Status word 2
[2] = Free status word 3
[3] = Free status word 4
[4] = Free status word 5

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Bit 0	Inverted	Not inverted	-
01	Bit 1	Inverted	Not inverted	-
02	Bit 2	Inverted	Not inverted	-
03	Bit 3	Inverted	Not inverted	-
04	Bit 4	Inverted	Not inverted	-
05	Bit 5	Inverted	Not inverted	-
06	Bit 6	Inverted	Not inverted	-
07	Bit 7	Inverted	Not inverted	-
08	Bit 8	Inverted	Not inverted	-
09	Bit 9	Inverted	Not inverted	-
10	Bit 10	Inverted	Not inverted	-

	11	Bit 11	Inverted	Not inverted	-
	12	Bit 12	Inverted	Not inverted	-
	13	Bit 13	Inverted	Not inverted	-
	14	Bit 14	Inverted	Not inverted	-
	15	Bit 15	Inverted	Not inverted	-

Dependency: See also: p2080, p2081, p2082, p2083, r2089

r2089[0...4] CO: Send binector-connector converter status word / Bin/con ZSW send

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 2472
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Connector output to interconnect the status words to a PZD send word.

Index:
[0] = Status word 1
[1] = Status word 2
[2] = Free status word 3
[3] = Free status word 4
[4] = Free status word 5

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Bit 0	ON	OFF	-
01	Bit 1	ON	OFF	-
02	Bit 2	ON	OFF	-
03	Bit 3	ON	OFF	-
04	Bit 4	ON	OFF	-
05	Bit 5	ON	OFF	-
06	Bit 6	ON	OFF	-
07	Bit 7	ON	OFF	-
08	Bit 8	ON	OFF	-
09	Bit 9	ON	OFF	-
10	Bit 10	ON	OFF	-
11	Bit 11	ON	OFF	-
12	Bit 12	ON	OFF	-
13	Bit 13	ON	OFF	-
14	Bit 14	ON	OFF	-
15	Bit 15	ON	OFF	-

Dependency: See also: p2051, p2080, p2081, p2082, p2083

Note
r2089 together with p2080 to p2084 forms five binector-connector converters.

r2090.0...15 BO: PROFIdrive PZD1 receive bit-serial / PZD1 recv bitw

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 2468, 9204, 9206, 9360
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Binector output for bit-serial interconnection of PZD1 (normally control word 1) received from the PROFIdrive controller.

Bit field:

Bit	Signal name	1 signal	0 signal	FP

00	Bit 0	ON	OFF	-
01	Bit 1	ON	OFF	-
02	Bit 2	ON	OFF	-
03	Bit 3	ON	OFF	-
04	Bit 4	ON	OFF	-
05	Bit 5	ON	OFF	-
06	Bit 6	ON	OFF	-
07	Bit 7	ON	OFF	-
08	Bit 8	ON	OFF	-
09	Bit 9	ON	OFF	-
10	Bit 10	ON	OFF	-
11	Bit 11	ON	OFF	-
12	Bit 12	ON	OFF	-
13	Bit 13	ON	OFF	-
14	Bit 14	ON	OFF	-
15	Bit 15	ON	OFF	-

r2091.0...15 BO: PROFIdrive PZD2 receive bit-serial / PZD2 recv bitw

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 2468, 9204, 9206
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Binector output for bit-serial interconnection of PZD2 received from the PROFIdrive controller.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Bit 0	ON	OFF	-
01	Bit 1	ON	OFF	-
02	Bit 2	ON	OFF	-
03	Bit 3	ON	OFF	-
04	Bit 4	ON	OFF	-
05	Bit 5	ON	OFF	-
06	Bit 6	ON	OFF	-
07	Bit 7	ON	OFF	-
08	Bit 8	ON	OFF	-
09	Bit 9	ON	OFF	-
10	Bit 10	ON	OFF	-
11	Bit 11	ON	OFF	-
12	Bit 12	ON	OFF	-
13	Bit 13	ON	OFF	-
14	Bit 14	ON	OFF	-
15	Bit 15	ON	OFF	-

r2092.0...15 BO: PROFIdrive PZD3 receive bit-serial / PZD3 recv bitw

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 2468, 9204, 9206
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Binector output for bit-serial interconnection of PZD3 received from the PROFIdrive controller.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Bit 0	ON	OFF	-
01	Bit 1	ON	OFF	-
02	Bit 2	ON	OFF	-
03	Bit 3	ON	OFF	-
04	Bit 4	ON	OFF	-
05	Bit 5	ON	OFF	-
06	Bit 6	ON	OFF	-
07	Bit 7	ON	OFF	-
08	Bit 8	ON	OFF	-
09	Bit 9	ON	OFF	-
10	Bit 10	ON	OFF	-
11	Bit 11	ON	OFF	-
12	Bit 12	ON	OFF	-
13	Bit 13	ON	OFF	-
14	Bit 14	ON	OFF	-
15	Bit 15	ON	OFF	-

r2093.0...15 BO: PROFIdrive PZD4 receive bit-serial / PZD4 recv bitw

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 2468, 9204, 9206
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Binector output for bit-serial interconnection of PZD4 (normally control word 2) received from the PROFIdrive controller.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Bit 0	ON	OFF	-
01	Bit 1	ON	OFF	-
02	Bit 2	ON	OFF	-
03	Bit 3	ON	OFF	-
04	Bit 4	ON	OFF	-
05	Bit 5	ON	OFF	-
06	Bit 6	ON	OFF	-
07	Bit 7	ON	OFF	-
08	Bit 8	ON	OFF	-
09	Bit 9	ON	OFF	-
10	Bit 10	ON	OFF	-
11	Bit 11	ON	OFF	-
12	Bit 12	ON	OFF	-
13	Bit 13	ON	OFF	-

14	Bit 14	ON	OFF	-
15	Bit 15	ON	OFF	-

r2094.0...15 BO: Connector-binector converter binector output / Con/bin outp

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 2468, 9360
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Binector output for bit-serial onward interconnection of a PZD word received from the PROFIdrive controller.
The PZD is selected via p2099[0].

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Bit 0	ON	OFF	-
01	Bit 1	ON	OFF	-
02	Bit 2	ON	OFF	-
03	Bit 3	ON	OFF	-
04	Bit 4	ON	OFF	-
05	Bit 5	ON	OFF	-
06	Bit 6	ON	OFF	-
07	Bit 7	ON	OFF	-
08	Bit 8	ON	OFF	-
09	Bit 9	ON	OFF	-
10	Bit 10	ON	OFF	-
11	Bit 11	ON	OFF	-
12	Bit 12	ON	OFF	-
13	Bit 13	ON	OFF	-
14	Bit 14	ON	OFF	-
15	Bit 15	ON	OFF	-

Dependency: See also: p2099

r2095.0...15 BO: Connector-binector converter binector output / Con/bin outp

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 2468, 9360
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Binector output for bit-serial interconnection of a PZD word received from the PROFIdrive controller.
The PZD is selected via p2099[1].

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Bit 0	ON	OFF	-
01	Bit 1	ON	OFF	-
02	Bit 2	ON	OFF	-
03	Bit 3	ON	OFF	-
04	Bit 4	ON	OFF	-
05	Bit 5	ON	OFF	-
06	Bit 6	ON	OFF	-
07	Bit 7	ON	OFF	-
08	Bit 8	ON	OFF	-
09	Bit 9	ON	OFF	-

10	Bit 10	ON	OFF	-
11	Bit 11	ON	OFF	-
12	Bit 12	ON	OFF	-
13	Bit 13	ON	OFF	-
14	Bit 14	ON	OFF	-
15	Bit 15	ON	OFF	-

Dependency: See also: p2099

p2098[0...1] Inverter connector-binector converter binector output / Con/bin outp inv

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 2468, 9360
Min:	**Max:**	**Factory setting:**
-	-	0000 0000 0000 0000 bin

Description: Setting to invert the individual binector outputs of the connector-binector converter.
Using p2098[0], the signals of connector input p2099[0] are influenced.
Using p2098[1], the signals of connector input p2099[1] are influenced.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Bit 0	Inverted	Not inverted	-
01	Bit 1	Inverted	Not inverted	-
02	Bit 2	Inverted	Not inverted	-
03	Bit 3	Inverted	Not inverted	-
04	Bit 4	Inverted	Not inverted	-
05	Bit 5	Inverted	Not inverted	-
06	Bit 6	Inverted	Not inverted	-
07	Bit 7	Inverted	Not inverted	-
08	Bit 8	Inverted	Not inverted	-
09	Bit 9	Inverted	Not inverted	-
10	Bit 10	Inverted	Not inverted	-
11	Bit 11	Inverted	Not inverted	-
12	Bit 12	Inverted	Not inverted	-
13	Bit 13	Inverted	Not inverted	-
14	Bit 14	Inverted	Not inverted	-
15	Bit 15	Inverted	Not inverted	-

Dependency: See also: r2094, r2095, p2099

p2099[0...1] CI: Connector-binector converter signal source / Con/bin s_s

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Integer16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 2468, 9360
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source for the connector-binector converter.
A PZD receive word can be selected as signal source. The signals are available to be serially passed-on (interconnection).

Dependency: See also: r2094, r2095

Note
From the signal source set via the connector input, the corresponding lower 16 bits are converted.
p2099[0...1] together with r2094.0...15 and r2095.0...15 forms two connector-binector converters:
Connector input p2099[0] to binector output in r2094.0...15
Connector input p2099[1] to binector output in r2095.0...15

p2100[0...19] Change fault response fault number / Chng resp F_no

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 8050, 8075
Min:	**Max:**	**Factory setting:**
0	65535	0

Description: Selects the faults for which the fault response should be changed

Dependency: The fault is selected and the required response is set under the same index.
See also: p2101

Note
Re-parameterization is also possible if a fault is present. The change only becomes effective after the fault has been resolved.

p2101[0...19] Change fault response response / Chng resp resp

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 8050, 8075
Min:	**Max:**	**Factory setting:**
0	6	0

Description: Sets the fault response for the selected fault.

Value:
0: NONE
1: OFF1
2: OFF2
3: OFF3
5: STOP2
6: Internal armature short-circuit / DC braking

Dependency: The fault is selected and the required response is set under the same index.
See also: p2100

NOTICE
For the following cases, it is not possible to re-parameterize the fault response to a fault: - fault number does not exist (exception value = 0). - Message type is not "fault" (F). - fault response is not permissible for the set fault number.

Note
Re-parameterization is also possible if a fault is present. The change only becomes effective after the fault has been resolved.
The fault response can only be changed for faults with the appropriate identification.
Example:
F12345 and fault response = NONE (OFF1, OFF2)
--> The fault response NONE can be changed to OFF1 or OFF2.
For value = 1 (OFF1):
Braking along the ramp-function generator down ramp followed by a pulse inhibit.
For value = 2 (OFF2):
Internal/external pulse inhibit.
For value = 3 (OFF3):
Braking along the OFF3 down ramp followed by a pulse inhibit.
For value = 5 (STOP2):
n_set = 0
For value = 6 (armature short-circuit, internal/DC braking):
This value can only be set for all drive data sets when p1231 = 4.
a) DC braking is not possible for synchronous motors.
b) DC braking is possible for induction motors.

p2103[0...n] BI: 1st acknowledge faults / 1st acknowledge

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T, U	**Scaling:** -	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 2441, 2442, 2443, 2447, 2475, 2546, 9220, 9677, 9678
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the first signal source to acknowledge faults.

Note
A fault acknowledgment is triggered with a 0/1 signal.

p2104[0...n] BI: 2nd acknowledge faults / 2nd acknowledge

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T, U	**Scaling:** -	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 2546, 8060
Min:	**Max:**	**Factory setting:**
-	-	[0] 722.5 [1] 0 [2] 0 [3] 0

Description: Sets the second signal source to acknowledge faults.

Note
A fault acknowledgment is triggered with a 0/1 signal.

p2105[0...n] BI: 3rd acknowledge faults / 3rd acknowledge

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T, U	**Scaling:** -	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 2546, 8060
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the third signal source to acknowledge faults.

Note
A fault acknowledgment is triggered with a 0/1 signal.

p2106[0...n] BI: External fault 1 / External fault 1

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T, U	**Scaling:** -	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 2546
Min:	**Max:**	**Factory setting:**
-	-	1

Description: Sets the signal source for external fault 1.

Dependency: See also: F07860

Note
An external fault is triggered with a 1/0 signal.

p2107[0...n] BI: External fault 2 / External fault 2

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T, U	**Scaling:** -	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 2546
Min:	**Max:**	**Factory setting:**
-	-	1

Description: Sets the signal source for external fault 2.

Dependency: See also: F07861

Note
An external fault is triggered with a 1/0 signal.

p2108[0...n] BI: External fault 3 / External fault 3

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T, U	**Scaling:** -	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 2546
Min:	**Max:**	**Factory setting:**
-	-	1

Description: Sets the signal source for external fault 3.
External fault 3 is initiated by the following AND logic operation:
- BI: p2108 negated
- BI: p3111
- BI: p3112 negated

Dependency: See also: p3110, p3111, p3112
See also: F07862

Note
An external fault is triggered with a 1/0 signal.

p2108[0...n] BI: External fault 3 / External fault 3

G120XA_USS (PM330)

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T, U	**Scaling:** -	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 2546
Min:	**Max:**	**Factory setting:**
-	-	4022.1

Description: Sets the signal source for external fault 3.
External fault 3 is initiated by the following AND logic operation:
- BI: p2108 negated
- BI: p3111
- BI: p3112 negated

Dependency: See also: p3110, p3111, p3112
See also: F07862

Note
An external fault is triggered with a 1/0 signal.

r2109[0...63] Fault time removed in milliseconds / t_flt resolved ms

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 8050, 8060
Min:	**Max:**	**Factory setting:**
- [ms]	- [ms]	- [ms]

Description: Displays the system runtime in milliseconds when the fault was removed.

Dependency: See also: r0945, r0947, r0948, r0949, r2130, r2133, r2136, p8400

NOTICE
The time comprises r2136 (days) and r2109 (milliseconds).

Note
The buffer parameters are cyclically updated in the background (refer to status signal in r2139).
The structure of the fault buffer and the assignment of the indices is shown in r0945.

r2110[0...63] Alarm number / Alarm number

Access level: 2	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 8065
Min:	**Max:**	**Factory setting:**
-	-	-

Description: This parameter is identical to r2122.

p2111 Alarm counter / Alarm counter

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 8050, 8065
Min:	**Max:**	**Factory setting:**
0	65535	0

Description: Number of alarms that have occurred after the last reset.

Dependency: When p2111 is set to 0, the following is initiated:
- all of the alarms of the alarm buffer that have gone [0...7] are transferred into the alarm history [8...63].
- the alarm buffer [0...7] is deleted.
See also: r2110, r2122, r2123, r2124, r2125

Note
The parameter is reset to 0 at POWER ON.

p2112[0...n] BI: External alarm 1 / External alarm 1

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T, U	**Scaling:** -	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 2546
Min:	**Max:**	**Factory setting:**
-	-	1

Description: Sets the signal source for external alarm 1.

Dependency: See also: A07850

Note
An external alarm is triggered with a 1/0 signal.

r2114[0...1] System runtime total / Sys runtime tot

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the total system runtime for the drive unit.
The time comprises r2114[0] (milliseconds) and r2114[1] (days).
After r2114[0] has reached a value of 86.400.000 ms (24 hours) this value is reset and r2114[1] is incremented.

Index: [0] = Milliseconds
[1] = Days

Dependency: See also: r0948, r2109, r2123, r2125, r2130, r2136, r2145, r2146

Note
When the electronic power supply is switched out, the counter values are saved.
After the drive unit is switched on, the counter continues to run with the last value that was saved.

p2116[0...n] BI: External alarm 2 / External alarm 2

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T, U	**Scaling:** -	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 2546
Min:	**Max:**	**Factory setting:**
-	-	1

Description: Sets the signal source for external alarm 2.

Dependency: See also: A07851

Note
An external alarm is triggered with a 1/0 signal.

p2117[0...n] BI: External alarm 3 / External alarm 3

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T, U	**Scaling:** -	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 2546
Min:	**Max:**	**Factory setting:**
-	-	1

Description: Sets the signal source for external alarm 3.

Dependency: See also: A07852

Note
An external alarm is triggered with a 1/0 signal.

p2117[0...n] BI: External alarm 3 / External alarm 3

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Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T, U	**Scaling:** -	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 2546
Min:	**Max:**	**Factory setting:**
-	-	4022.0

Description: Sets the signal source for external alarm 3.

Dependency: See also: A07852

Note

An external alarm is triggered with a 1/0 signal.

p2118[0...19] Change message type message number / Chng type msg_no

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 8050, 8075
Min:	**Max:**	**Factory setting:**
0	65535	0

Description: Selects faults or alarms for which the message type should be changed.

Dependency: Selects the fault or alarm selection and sets the required type of message realized under the same index.

See also: p2119

Note

Re-parameterization is also possible if a message is present. The change only becomes effective after the message has gone.

p2119[0...19] Change message type type / Change type type

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 8050, 8075
Min:	**Max:**	**Factory setting:**
1	3	1

Description: Sets the message type for the selected fault or alarm.

Value:

1: Fault (F)
2: Alarm (A)
3: No message (N)

Dependency: Selects the fault or alarm selection and sets the required type of message realized under the same index.

See also: p2118

Note

Re-parameterization is also possible if a message is present. The change only becomes effective after the message has gone.

The message type can only be changed for messages with the appropriate identification (exception, value = 0).

Example:

F12345(A) --> Fault F12345 can be changed to alarm A12345.

In this case, the message number that may be possibly entered in p2100[0...19] and p2126[0...19] is automatically removed.

r2120 CO: Sum of fault and alarm buffer changes / Sum buffer changed

Access level: 4	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 8065
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the sum of all of the fault and alarm buffer changes in the drive unit.

Dependency: See also: r0944, r2121

r2121 CO: Counter alarm buffer changes / Alrm buff changed

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 8065
Min:	**Max:**	**Factory setting:**
-	-	-

Description: This counter is incremented every time the alarm buffer changes.

Dependency: See also: r2110, r2122, r2123, r2124, r2125

r2122[0...63] Alarm code / Alarm code

Access level: 2	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 8050, 8065
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the number of alarms that have occurred.

Dependency: See also: r2110, r2123, r2124, r2125, r2134, r2145, r2146, r3121, r3123

NOTICE
The properties of the alarm buffer should be taken from the corresponding product documentation.

Note

The buffer parameters are cyclically updated in the background (refer to status signal in r2139).
Alarm buffer structure (general principle):
r2122[0], r2124[0], r2123[0], r2125[0] --> alarm 1 (the oldest)
. . .
r2122[7], r2124[7], r2123[7], r2125[7] --> Alarm 8 (the latest)
When the alarm buffer is full, the alarms that have gone are entered into the alarm history:
r2122[8], r2124[8], r2123[8], r2125[8] --> Alarm 1 (the latest)
. . .
r2122[63], r2124[63], r2123[63], r2125[63] --> alarm 56 (the oldest)

r2123[0...63] Alarm time received in milliseconds / t_alarm recv ms

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 8050, 8065
Min:	**Max:**	**Factory setting:**
- [ms]	- [ms]	- [ms]

Description: Displays the system runtime in milliseconds when the alarm occurred.

Dependency: See also: r2110, r2122, r2124, r2125, r2134, r2145, r2146, p8400

NOTICE
The time comprises r2145 (days) and r2123 (milliseconds).

Note
The buffer parameters are cyclically updated in the background (refer to status signal in r2139).
The structure of the alarm buffer and the assignment of the indices is shown in r2122.

r2124[0...63] Alarm value / Alarm value

Access level: 3	**Calculated:** -	**Data type:** Integer32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 8050, 8065
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays additional information about the active alarm (as integer number).

Dependency: See also: r2110, r2122, r2123, r2125, r2134, r2145, r2146, r3121, r3123

Note
The buffer parameters are cyclically updated in the background (refer to status signal in r2139).
The structure of the alarm buffer and the assignment of the indices is shown in r2122.

r2125[0...63] Alarm time removed in milliseconds / t_alarm res ms

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 8050, 8065
Min:	**Max:**	**Factory setting:**
- [ms]	- [ms]	- [ms]

Description: Displays the system runtime in milliseconds when the alarm was cleared.

Dependency: See also: r2110, r2122, r2123, r2124, r2134, r2145, r2146, p8400

NOTICE
The time comprises r2146 (days) and r2125 (milliseconds).

Note
The buffer parameters are cyclically updated in the background (refer to status signal in r2139).
The structure of the alarm buffer and the assignment of the indices is shown in r2122.

p2126[0...19] Change acknowledge mode fault number / Chng ackn F_no

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 8050, 8075
Min:	**Max:**	**Factory setting:**
0	65535	0

Description: Selects the faults for which the acknowledge mode is to be changed

Dependency: Selects the faults and sets the required acknowledge mode realized under the same index
See also: p2127

Note
Re-parameterization is also possible if a fault is present. The change only becomes effective after the fault has been resolved.

p2127[0...19] Change acknowledge mode mode / Chng ackn mode

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 8050, 8075
Min:	**Max:**	**Factory setting:**
1	2	1

Description: Sets the acknowledge mode for selected fault.

Value:
1: Acknowledgment only using POWER ON
2: Ack IMMEDIATELY after the fault cause has been removed

Dependency: Selects the faults and sets the required acknowledge mode realized under the same index

See also: p2126

NOTICE

It is not possible to re-parameterize the acknowledge mode for a fault in the following cases:
- fault number does not exist (exception value = 0).
- Message type is not "fault" (F).
- Acknowledge mode is not permissible for the set fault number.

Note

Re-parameterization is also possible if a fault is present. The change only becomes effective after the fault has been resolved.

The acknowledge mode can only be changed for faults with the appropriate identification.

Example:

F12345 and acknowledge mode = IMMEDIATELY (POWER ON)

--> The acknowledge mode can be changed from IMMEDIATELY to POWER ON.

p2128[0...15] Faults/alarms trigger selection / F/A trigger sel

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 8050, 8070
Min:	**Max:**	**Factory setting:**
0	65535	0

Description: Sets the faults/alarms for which a trigger signal should be generated in r2129.0...15.

Dependency: If the fault/alarm set in p2128[0...15] occurs, then the particular binector output r2129.0...15 is set.

See also: r2129

r2129.0...15 CO/BO: Faults/alarms trigger word / F/A trigger word

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 8070
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display and BICO output for the trigger signals of the faults/alarms set in p2128[0...15].

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Trigger signal p2128[0]	ON	OFF	-
01	Trigger signal p2128[1]	ON	OFF	-
02	Trigger signal p2128[2]	ON	OFF	-
03	Trigger signal p2128[3]	ON	OFF	-
04	Trigger signal p2128[4]	ON	OFF	-
05	Trigger signal p2128[5]	ON	OFF	-
06	Trigger signal p2128[6]	ON	OFF	-

07	Trigger signal p2128[7]	ON	OFF	-
08	Trigger signal p2128[8]	ON	OFF	-
09	Trigger signal p2128[9]	ON	OFF	-
10	Trigger signal p2128[10]	ON	OFF	-
11	Trigger signal p2128[11]	ON	OFF	-
12	Trigger signal p2128[12]	ON	OFF	-
13	Trigger signal p2128[13]	ON	OFF	-
14	Trigger signal p2128[14]	ON	OFF	-
15	Trigger signal p2128[15]	ON	OFF	-

Dependency: If the fault/alarm set in p2128[0...15] occurs, then the particular binector output r2129.0...15 is set.
See also: p2128

Note
CO: r2129 = 0 --> None of the selected messages has occurred.
CO: r2129 > 0 --> At least one of the selected messages has occurred.

r2130[0...63] Fault time received in days / t_fault recv days

Access level: 3 | **Calculated:** - | **Data type:** Unsigned16
Can be changed: - | **Scaling:** - | **Dynamic index:** -
Unit group: - | **Unit selection:** - | **Function diagram:** 8060
Min: - | **Max:** - | **Factory setting:** -

Description: Displays the system runtime in days when the fault occurred.
Dependency: See also: r0945, r0947, r0948, r0949, r2109, r2133, r2136, p8401

NOTICE
The time comprises r2130 (days) and r0948 (milliseconds).
The value displayed in r2130 refers to January 1, 1970

Note
The buffer parameters are cyclically updated in the background (refer to status signal in r2139).

r2131 CO: Actual fault code / Act fault code

Access level: 2 | **Calculated:** - | **Data type:** Unsigned16
Can be changed: - | **Scaling:** - | **Dynamic index:** -
Unit group: - | **Unit selection:** - | **Function diagram:** 8060
Min: - | **Max:** - | **Factory setting:** -

Description: Displays the code of the oldest active fault.
Dependency: See also: r3131, r3132

Note
0: No fault present.

r2132 CO: Actual alarm code / Actual alarm code

Access level: 2 | **Calculated:** - | **Data type:** Unsigned16
Can be changed: - | **Scaling:** - | **Dynamic index:** -
Unit group: - | **Unit selection:** - | **Function diagram:** 8065
Min: - | **Max:** - | **Factory setting:** -

Description: Displays the code of the last alarm that occurred.

Note
0: No alarm present.

r2133[0...63] Fault value for float values / Fault val float

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 8060
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays additional information about the fault that occurred for float values.

Dependency: See also: r0945, r0947, r0948, r0949, r2109, r2130, r2136

Note
The buffer parameters are cyclically updated in the background (refer to status signal in r2139).

r2134[0...63] Alarm value for float values / Alarm value float

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 8065
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays additional information about the active alarm for float values.

Dependency: See also: r2110, r2122, r2123, r2124, r2125, r2145, r2146, r3121, r3123

Note
The buffer parameters are cyclically updated in the background (refer to status signal in r2139).

r2135.12...15 CO/BO: Status word faults/alarms 2 / ZSW fault/alarm 2

Access level: 2	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 2548
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display and BICO output for the second status word of faults and alarms.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
12	Fault motor overtemperature	Yes	No	8016
13	Fault power unit thermal overload	Yes	No	8021
14	Alarm motor overtemperature	Yes	No	8016
15	Alarm power unit thermal overload	Yes	No	8021

r2136[0...63] Fault time removed in days / t_flt resolv days

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 8060
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the system runtime in days when the fault was removed.

Dependency: See also: r0945, r0947, r0948, r0949, r2109, r2130, r2133, p8401

NOTICE
The time comprises r2136 (days) and r2109 (milliseconds).

Note
The buffer parameters are cyclically updated in the background (refer to status signal in r2139).

r2138.7...15 CO/BO: Control word faults/alarms / STW fault/alarm

Access level: 2	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 2546
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display and BICO output for the control word of faults and alarms.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
07	Acknowledge fault	Yes	No	8060
10	External alarm 1 (A07850) effective	Yes	No	8065
11	External alarm 2 (A07851) effective	Yes	No	8065
12	External alarm 3 (A07852) effective	Yes	No	8065
13	External fault 1 (F07860) effective	Yes	No	8060
14	External fault 2 (F07861) effective	Yes	No	8060
15	External fault 3 (F07862) effective	Yes	No	8060

Dependency: See also: p2103, p2104, p2105, p2106, p2107, p2108, p2112, p2116, p2117, p3110, p3111, p3112

r2139.0...15 CO/BO: Status word faults/alarms 1 / ZSW fault/alarm 1

Access level: 2	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 2548
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display and BICO output for status word 1 of faults and alarms.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Being acknowledged	Yes	No	-
01	Acknowledgment required	Yes	No	-
03	Fault present	Yes	No	8060
06	Internal message 1 present	Yes	No	-
07	Alarm present	Yes	No	8065
08	Internal message 2 present	Yes	No	-
11	Alarm class bit 0	High	Low	-
12	Alarm class bit 1	High	Low	-
13	Maintenance required	Yes	No	-
14	Maintenance urgently required	Yes	No	-
15	Fault gone/can be acknowledged	Yes	No	-

Note
For bit 03, 07:
These bits are set if at least one fault/alarm occurs. Data is entered into the fault/alarm buffer with delay. This is the reason that the fault/alarm buffer should only be read if, after "fault present" or "alarm present" has occurred, a change in the buffer was also detected (r0944, r9744, r2121).
For bit 06, 08:
These status bits are used for internal diagnostic purposes only.
For bits 11, 12:
These status bits are used for the classification of internal alarm classes and are intended for diagnostic purposes only on certain automation systems with integrated SINAMICS functionality.

p2140[0...n] Hysteresis speed 2 / n_hysteresis 2

Access level: 3	**Calculated:** CALC_MOD_LIM_REF	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 8010
Min:	**Max:**	**Factory setting:**
0.00 [rpm]	300.00 [rpm]	90.00 [rpm]

Description: Sets the hysteresis speed (bandwidth) for the following signals:
"|n_act| < = speed threshold value 2" (BO: r2197.1)
"|n_act| > speed threshold value 2" (BO: r2197.2)

Dependency: See also: p2155, r2197

p2141[0...n] Speed threshold 1 / n_thresh val 1

Access level: 3	**Calculated:** CALC_MOD_LIM_REF	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 8010
Min:	**Max:**	**Factory setting:**
0.00 [rpm]	210000.00 [rpm]	5.00 [rpm]

Description: Sets the speed threshold value for the signal "f or n comparison value reached or exceeded" (BO: r2199.1).

Dependency: See also: p2142, r2199

p2142[0...n] Hysteresis speed 1 / n_hysteresis 1

Access level: 3	**Calculated:** CALC_MOD_LIM_REF	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 8010
Min:	**Max:**	**Factory setting:**
0.00 [rpm]	300.00 [rpm]	2.00 [rpm]

Description: Sets the hysteresis speed (bandwidth) for the signal "f or n / v comparison value reached or exceeded" (BO: r2199.1).

Dependency: See also: p2141, r2199

p2144[0...n] BI: Motor stall monitoring enable (negated) / Mot stall enab neg

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T, U	**Scaling:** -	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 8012
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source for the negated enable (0 = enable) of the motor stall monitoring.

Dependency: See also: p2163, p2164, p2166, r2197, r2198
See also: F07900

Note
When interconnecting the enable signal with r2197.7 then the stall signal is suppressed if there is no speed setpoint - actual value deviation.

r2145[0...63] Alarm time received in days / t_alarm recv days

Access level: 3 | **Calculated:** - | **Data type:** Unsigned16
Can be changed: - | **Scaling:** - | **Dynamic index:** -
Unit group: - | **Unit selection:** - | **Function diagram:** 8065
Min: - | **Max:** - | **Factory setting:** -

Description: Displays the system runtime in days when the alarm occurred.

Dependency: See also: r2110, r2122, r2123, r2124, r2125, r2134, r2146, p8401

NOTICE
The time comprises r2145 (days) and r2123 (milliseconds).

Note
The buffer parameters are cyclically updated in the background (refer to status signal in r2139).

r2146[0...63] Alarm time removed in days / t_alarm res days

Access level: 3 | **Calculated:** - | **Data type:** Unsigned16
Can be changed: - | **Scaling:** - | **Dynamic index:** -
Unit group: - | **Unit selection:** - | **Function diagram:** 8065
Min: - | **Max:** - | **Factory setting:** -

Description: Displays the system runtime in days when the alarm was cleared.

Dependency: See also: r2110, r2122, r2123, r2124, r2125, r2134, r2145, p8401

NOTICE
The time comprises r2146 (days) and r2125 (milliseconds).

Note
The buffer parameters are cyclically updated in the background (refer to status signal in r2139).

p2148[0...n] BI: RFG active / RFG active

Access level: 3 | **Calculated:** CALC_MOD_LIM_REF | **Data type:** Unsigned32 / Binary
Can be changed: T, U | **Scaling:** - | **Dynamic index:** CDS, p0170
Unit group: - | **Unit selection:** - | **Function diagram:** 8011
Min: - | **Max:** - | **Factory setting:** 0

Description: Sets the signal source for the signal "ramp-function generator active" for the following signals/messages:
"Speed setpoint - actual value deviation within tolerance t_on" (BO: r2199.4)
"Ramp-up/ramp-down completed" (BO: r2199.5)

Note
The binector input is automatically interconnected to r1199.2 as a default setting.

p2149[0...n] Monitoring configuration / Monit config

Access level: 3 | **Calculated:** - | **Data type:** Unsigned16
Can be changed: T, U | **Scaling:** - | **Dynamic index:** DDS, p0180
Unit group: - | **Unit selection:** - | **Function diagram:** -
Min: - | **Max:** - | **Factory setting:** 0000 1001 bin

Description: Sets the configuration for messages and monitoring functions.

Bit field:

Bit	Signal name	1 signal	0 signal	FP

00	Enable alarm A07903	Yes	No	8011
01	Load monitoring only in the 1st quadrant	Yes	No	8013
03	n_act > p2155 own hysteresis	Yes	No	8010
05	Stall monitoring for encoderless speed control	Yes	No	-

Dependency: See also: r2197
See also: A07903

Note
For bit 00:
Alarm A07903 is output when the bit is set with r2197.7 = 0 (n_set <> n_act).
For bit 01:
When the bit is set, the load monitoring is only executed in the 1st quadrant as a result of the positive characteristic parameters (p2182 ... p2190).
For bit 03:
When the bit is set, r2197.1 and r2197.2 are determined using separate hysteresis functions.
For bit 05:
When this bit is set, a change to open-loop speed controlled operation is only possible when the motor is stationary.

p2150[0...n] Hysteresis speed 3 / n_hysteresis 3

Access level: 3	**Calculated:** CALC_MOD_LIM_REF	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 8010, 8011, 8022
Min:	**Max:**	**Factory setting:**
0.00 [rpm]	300.00 [rpm]	2.00 [rpm]

Description: Sets the hysteresis speed (bandwidth) for the following signals:
"|n_act| < speed threshold value 3" (BO: r2199.0)
"n_set >= 0" (BO: r2198.5)
"n_act >= 0" (BO: r2197.3)

Dependency: See also: p2161, r2197, r2199

p2151[0...n] CI: Speed setpoint for messages/signals / n_set for msg

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / FloatingPoint32
Can be changed: T	**Scaling:** p2000	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 8011
Min:	**Max:**	**Factory setting:**
-	-	1170[0]

Description: Sets the signal source for the speed setpoint for the following messages:
"Speed setpoint - actual value deviation within tolerance t_off" (BO: r2197.7)
"Ramp-up/ramp-down completed" (BO: r2199.5)
"|n_set| < p2161" (BO: r2198.4)
"n_set > 0" (BO: r2198.5)

Dependency: See also: r2197, r2198, r2199

p2153[0...n] Speed actual value filter time constant / n_act_filt T

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 8010
Min:	**Max:**	**Factory setting:**
0 [ms]	1000000 [ms]	0 [ms]

Description: Sets the time constant of the PT1 element to smooth the speed / velocity actual value.
The smoothed actual speed/velocity is compared with the threshold values and is only used for messages and signals.

Dependency: See also: r2169

p2155[0...n] Speed threshold 2 / n_thresh val 2

Access level: 3	**Calculated:** CALC_MOD_LIM_REF	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 8010
Min:	**Max:**	**Factory setting:**
0.00 [rpm]	210000.00 [rpm]	900.00 [rpm]

Description: Sets the speed threshold value for the following messages:
"|n_act| < = speed threshold value 2" (BO: r2197.1)
"|n_act| > speed threshold value 2" (BO: r2197.2)

Dependency: See also: p2140, r2197

p2156[0...n] On delay comparison value reached / t_on cmpr val rchd

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 8010
Min:	**Max:**	**Factory setting:**
0.0 [ms]	10000.0 [ms]	0.0 [ms]

Description: Sets the switch-in delay time for the signal "comparison value reached" (BO: r2199.1).

Dependency: See also: p2141, p2142, r2199

p2161[0...n] Speed threshold 3 / n_thresh val 3

Access level: 3	**Calculated:** CALC_MOD_LIM_REF	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 8010, 8011
Min:	**Max:**	**Factory setting:**
0.00 [rpm]	210000.00 [rpm]	5.00 [rpm]

Description: Sets the speed threshold value for the signal "|n_act| < speed threshold value 3" (BO: r2199.0).

Dependency: See also: p2150, r2199

p2162[0...n] Hysteresis speed n_act > n_max / Hyst n_act>n_max

Access level: 3	**Calculated:** CALC_MOD_LIM_REF	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 8010
Min:	**Max:**	**Factory setting:**
0.00 [rpm]	60000.00 [rpm]	0.00 [rpm]

Description: Sets the hysteresis speed (bandwidth) for the signal "n_act > n_max" (BO: r2197.6).

Dependency: See also: r1084, r1087, r2197

NOTICE
For p0322 = 0, the following applies: p2162 <= 0.1 * p0311 For p0322 > 0, the following applies: p2162 <= 1.02 * p0322 - p1082 If one of the conditions is violated, p2162 is appropriately and automatically reduced when exiting the commissioning mode.

Note
For a negative speed limit (r1087) the hysteresis is effective below the limit value and for a positive speed limit (r1084) above the limit value.
If significant overshoot occurs in the maximum speed range (e.g. due to load shedding), you are advised to increase the dynamic response of the speed controller (if possible). If this is insufficient, the hysteresis p2162 can only be increased by more than 10% of the rated speed when the maximum speed (p0322) of the motor is sufficiently greater than the speed limit p1082.

p2163[0...n] Speed threshold 4 / n_thresh val 4

Access level: 3	**Calculated:** CALC_MOD_LIM_REF	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 8011
Min:	**Max:**	**Factory setting:**
0.00 [rpm]	210000.00 [rpm]	90.00 [rpm]

Description: Sets the speed threshold value for the "speed setpoint - actual value deviation in tolerance t_off" signal/message (BO: r2197.7).

Dependency: See also: p2164, p2166, r2197

p2164[0...n] Hysteresis speed 4 / n_hysteresis 4

Access level: 3	**Calculated:** CALC_MOD_LIM_REF	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 8011
Min:	**Max:**	**Factory setting:**
0.00 [rpm]	200.00 [rpm]	2.00 [rpm]

Description: Sets the hysteresis speed (bandwidth) for the "speed setpoint - actual value deviation in tolerance t_off" signal/message (BO: r2197.7).

Dependency: See also: p2163, p2166, r2197

p2165[0...n] Load monitoring stall monitoring upper threshold / Stall_mon up thr

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 8013
Min:	**Max:**	**Factory setting:**
0.00 [rpm]	210000.00 [rpm]	0.00 [rpm]

Description: Sets the upper speed threshold of the stall monitoring of the pump or fan.
The lower limit is formed by the speed threshold 1 of the load monitoring (p2182).
The stall monitoring is active between p2182 and p2165.

Dependency: The following applies: p2182 < p2165
See also: p2181, p2182, p2193
See also: A07891, F07894, A07926

Note
For p2165 = 0 or p2165 < p2182, the following applies:
There is no special stall monitoring for the pump/fan, but only the remaining load monitoring functions (e.g. leakage monitoring for a pump) for the pump or fan are active.

p2166[0...n] Off delay n_act = n_set / t_del_off n_i=n_so

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 8011
Min:	**Max:**	**Factory setting:**
0.0 [ms]	10000.0 [ms]	200.0 [ms]

Description: Sets the switch-off delay time for the "speed setpoint - actual value deviation in tolerance t_off" signal/message (BO: r2197.7).

Dependency: See also: p2163, p2164, r2197

p2167[0...n] Switch-on delay n_act = n_set / t_on n_act=n_set

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 8011
Min:	**Max:**	**Factory setting:**
0.0 [ms]	10000.0 [ms]	200.0 [ms]

Description: Sets the switch-on delay for the "speed setpoint - actual value deviation in tolerance t_on" signal/message (BO: r2199.4).

p2168[0...n] Load monitoring stall monitoring torque threshold / Stall_mon M_thresh

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: 7_1	**Unit selection:** p0505	**Function diagram:** 8013
Min:	**Max:**	**Factory setting:**
0.00 [Nm]	20000000.00 [Nm]	10000000.00 [Nm]

Description: Sets the torque threshold of the stall monitoring of the pump or fan.

If, in the monitored speed range from p2182 to p2165, the torque exceeds this threshold, then this is evaluated as either the motor having stalled or heavy-duty starting.

Dependency: For pumps, the following applies (p2193 = 4):

- the leakage characteristic must lie below the torque threshold for the stall monitoring
- the torque threshold for dry running operation must lie below the torque threshold for stall monitoring

For fans, the following applies (p2193 = 5):

- the torque threshold for the stall monitoring must lie above the torque threshold to identify belt breakage (p2191).

See also: p2165, p2181, p2191, p2193

See also: A07891, F07894, A07926

Note

The following applies for p2168 = 0:
The special stall monitoring for pump/fan is deactivated.
Then, only the remaining load monitoring functions (e.g. the leakage monitoring for a pump) for pump or fan are realized.

r2169 CO: Actual speed smoothed signals / n_act smth message

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p2000	**Dynamic index:** -
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 8010
Min:	**Max:**	**Factory setting:**
- [rpm]	- [rpm]	- [rpm]

Description: Display and connector output of the smoothed speed actual value for messages.

Dependency: See also: p2153

p2170[0...n] Current threshold value / I_thres

Access level: 3	**Calculated:** CALC_MOD_LIM_REF	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** p2002	**Dynamic index:** DDS, p0180
Unit group: 6_2	**Unit selection:** p0505	**Function diagram:** 8022
Min:	**Max:**	**Factory setting:**
0.00 [Arms]	10000.00 [Arms]	0.00 [Arms]

Description: Sets the absolute current threshold for the messages.
"I_act >= I_threshold p2170" (BO: r2197.8)
"I_act < I_threshold p2170" (BO: r2198.8)

Dependency: See also: p2171

p2171[0...n] Current threshold value reached delay time / I_thresh rch t_del

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 8022
Min:	**Max:**	**Factory setting:**
0 [ms]	10000 [ms]	10 [ms]

Description: Sets the delay time for the comparison of the current actual value (r0068) with the current threshold value (p2170).

Dependency: See also: p2170

p2172[0...n] DC link voltage threshold value / Vdc thresh val

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** p2001	**Dynamic index:** DDS, p0180
Unit group: 5_2	**Unit selection:** p0505	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0 [V]	2000 [V]	800 [V]

Description: Sets the DC link voltage threshold value for the following messages:
"Vdc_act <= Vdc_threshold p2172" (BO: r2197.9)
"Vdc_act > Vdc_threshold p2172" (BO: r2197.10)

Dependency: See also: p2173

p2173[0...n] DC link voltage comparison delay time / t_del Vdc

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0 [ms]	10000 [ms]	10 [ms]

Description: Sets the delay time for the comparison of the DC link voltage r0070 with the threshold value p2172.

Dependency: See also: p2172

p2175[0...n] Motor blocked speed threshold / Mot lock n_thresh

Access level: 3	**Calculated:** CALC_MOD_LIM_REF	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 8012
Min:	**Max:**	**Factory setting:**
0.00 [rpm]	210000.00 [rpm]	120.00 [rpm]

Description: Sets the speed threshold for the message "Motor blocked" (BO: r2198.6).

Dependency: See also: p0500, p2177, r2198
See also: F07900

Note
The following applies for sensorless vector control for induction motors:
At low speeds in open-loop speed controlled operation (see p1755, p1756), a blocked motor cannot be detected.

p2177[0...n] Motor blocked delay time / Mot lock t_del

Access level: 3	**Calculated:** CALC_MOD_LIM_REF	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 8012
Min:	**Max:**	**Factory setting:**
0.000 [s]	65.000 [s]	3.000 [s]

Description: Sets the delay time for the message "Motor blocked" (BO: r2198.6).

Dependency: See also: p0500, p2175, r2198
See also: F07900

Note
The following applies for sensorless vector control:
At low speeds a locked motor can only be detected if no change is made to open-loop speed controlled operation. If this is the case, the value in p2177 must be reduced accordingly (p2177 < p1758) before time p2177 has elapsed in order to detect the locked state reliably.
As countermeasure, it is generally also possible to set p1750.6. This is only not permitted if the drive is slowly reversed by the load at the torque limit (speed below p1755 for longer than p1758).

p2178[0...n] Motor stalled delay time / Mot stall t_del

Access level: 3	**Calculated:** CALC_MOD_REG	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 8012
Min:	**Max:**	**Factory setting:**
0.000 [s]	10.000 [s]	0.010 [s]

Description: Sets the delay time for the message "Motor stalled" (BO: r2198.7).

Dependency: See also: r2198

Note
In the open-loop speed controlled operating range (see p1755, p1756), vector control stall monitoring depends on threshold p1745.
At higher speeds, the difference between flux setpoint r0083 and flux actual value r0084 is monitored.

p2179[0...n] Output load identification current limit / Outp_ld iden I_lim

Access level: 3	**Calculated:** CALC_MOD_LIM_REF	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** p2002	**Dynamic index:** DDS, p0180
Unit group: 6_2	**Unit selection:** p0505	**Function diagram:** 8022
Min:	**Max:**	**Factory setting:**
0.00 [Arms]	1000.00 [Arms]	0.00 [Arms]

Description: Sets the current limit for output load identification.
A missing output load is displayed using the "Output load not available" message (r2197.11 = 1).
This message is output with a delay time (p2180).

Dependency: See also: p2180

NOTICE
For synchronous motors the output current can be almost zero under no load conditions.

Note
Missing output load is signaled in the following cases:
- the motor is not connected.
- a phase failure has occurred.

p2180[0...n] Output load detection delay time / Out_load det t_del

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 8022
Min:	**Max:**	**Factory setting:**
0 [ms]	10000 [ms]	2000 [ms]

Description: Sets the delay time for the message "output load not available" (r2197.11 = 1).

Dependency: See also: p2179

p2181[0...n] Load monitoring response / Load monit resp

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 8013
Min:	**Max:**	**Factory setting:**
0	8	0

Description: Sets the response when evaluating the load monitoring.

Value:
0: Load monitoring disabled
1: A07920 for torque/speed too low
2: A07921 for torque/speed too high
3: A07922 for torque/speed out of tolerance
4: F07923 for torque/speed too low
5: F07924 for torque/speed too high
6: F07925 for torque/speed out of tolerance
7: Pump/fan load monitoring as alarm
8: Pump/fan load monitoring as fault

Dependency: See also: p2182, p2183, p2184, p2185, p2186, p2187, p2188, p2189, p2190, p2192, p2193, r2198, p3230, p3231
See also: A07891, A07892, A07893, F07894, F07895, F07896, F07898, A07920, A07921, A07922, F07923, F07924, F07925

Note
The response to the faults F07923 ... F07925 can be set.
This parameter setting has no effect on the generation of fault F07936.
p2181 = 7, 8 can only be combined with p2193 = 4, 5.

p2182[0...n] Load monitoring speed threshold value 1 / n_thresh 1

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 8013
Min:	**Max:**	**Factory setting:**
0.00 [rpm]	210000.00 [rpm]	150.00 [rpm]

Description: Sets the speed/torque envelope curve for load monitoring.

The envelope curve (upper and lower envelope curve) is defined as follows based on 3 speed thresholds:

p2182 (n_threshold 1) --> p2185 (M_threshold 1, upper), p2186 (M_threshold 1, lower)

p2183 (n_threshold 2) --> p2187 (M_threshold 2, upper), p2188 (M_threshold 2, lower)

p2184 (n_threshold 3) --> p2189 (M_threshold 3, upper), p2190 (M_threshold 3, lower)

Dependency: The following applies: p2182 < p2183 < p2184
See also: p2183, p2184, p2185, p2186
See also: A07926

Note
In order that the load monitoring can reliably respond, the speed threshold p2182 should always be set lower than the minimum motor speed to be monitored.

p2183[0...n] Load monitoring speed threshold value 2 / n_thresh 2

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 8013
Min:	**Max:**	**Factory setting:**
0.00 [rpm]	210000.00 [rpm]	900.00 [rpm]

Description: Sets the speed/torque envelope curve for load monitoring.
The envelope curve (upper and lower envelope curve) is defined as follows based on 3 speed thresholds:
p2182 (n_threshold 1) --> p2185 (M_threshold 1, upper), p2186 (M_threshold 1, lower)
p2183 (n_threshold 2) --> p2187 (M_threshold 2, upper), p2188 (M_threshold 2, lower)
p2184 (n_threshold 3) --> p2189 (M_threshold 3, upper), p2190 (M_threshold 3, lower)

Dependency: The following applies: p2182 < p2183 < p2184
See also: p2182, p2184, p2187, p2188
See also: A07926

p2184[0...n] Load monitoring speed threshold value 3 / n_thresh 3

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 8013
Min:	**Max:**	**Factory setting:**
0.00 [rpm]	210000.00 [rpm]	1500.00 [rpm]

Description: Sets the speed/torque envelope curve for load monitoring.
The envelope curve (upper and lower envelope curve) is defined as follows based on 3 speed thresholds:
p2182 (n_threshold 1) --> p2185 (M_threshold 1, upper), p2186 (M_threshold 1, lower)
p2183 (n_threshold 2) --> p2187 (M_threshold 2, upper), p2188 (M_threshold 2, lower)
p2184 (n_threshold 3) --> p2189 (M_threshold 3, upper), p2190 (M_threshold 3, lower)

Dependency: The following applies: p2182 < p2183 < p2184
See also: p2182, p2183, p2189, p2190
See also: A07926

Note
In order that the load monitoring can reliably respond, the speed threshold p2184 should always be set higher than the maximum motor speed to be monitored.

p2185[0...n] Load monitoring torque threshold 1 upper / M_thresh 1 upper

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: 7_1	**Unit selection:** p0505	**Function diagram:** 8013
Min:	**Max:**	**Factory setting:**
0.00 [Nm]	20000000.00 [Nm]	10000000.00 [Nm]

Description: Sets the speed/torque envelope curve for load monitoring.

Dependency: The following applies: p2185 > p2186
See also: p2182, p2186
See also: A07926

Note
The upper envelope curve is defined by p2185, p2187 and p2189.

p2186[0...n] Load monitoring torque threshold 1 lower / M_thresh 1 lower

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: 7_1	**Unit selection:** p0505	**Function diagram:** 8013
Min:	**Max:**	**Factory setting:**
0.00 [Nm]	20000000.00 [Nm]	0.00 [Nm]

Description: Sets the speed/torque envelope curve for load monitoring.

Dependency: The following applies: p2186 < p2185
See also: p2182, p2185
See also: A07926

Note
The lower envelope curve is defined by p2186, p2188 and p2190.

p2187[0...n] Load monitoring torque threshold 2 upper / M_thresh 2 upper

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: 7_1	**Unit selection:** p0505	**Function diagram:** 8013
Min:	**Max:**	**Factory setting:**
0.00 [Nm]	20000000.00 [Nm]	10000000.00 [Nm]

Description: Sets the speed/torque envelope curve for load monitoring.

Dependency: The following applies: p2187 > p2188
See also: p2183, p2188
See also: A07926

Note
The upper envelope curve is defined by p2185, p2187 and p2189.

p2188[0...n] Load monitoring torque threshold 2 lower / M_thresh 2 lower

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: 7_1	**Unit selection:** p0505	**Function diagram:** 8013
Min:	**Max:**	**Factory setting:**
0.00 [Nm]	20000000.00 [Nm]	0.00 [Nm]

Description: Sets the speed/torque envelope curve for load monitoring.

Dependency: The following applies: p2188 < p2187
See also: p2183, p2187
See also: A07926

Note
The lower envelope curve is defined by p2186, p2188 and p2190.

p2189[0...n] Load monitoring torque threshold 3 upper / M_thresh 3 upper

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: 7_1	**Unit selection:** p0505	**Function diagram:** 8013
Min:	**Max:**	**Factory setting:**
0.00 [Nm]	20000000.00 [Nm]	10000000.00 [Nm]

Description: Sets the speed/torque envelope curve for load monitoring.

Dependency: The following applies: p2189 > p2190
See also: p2184, p2190
See also: A07926

Note
The upper envelope curve is defined by p2185, p2187 and p2189.

p2190[0...n] Load monitoring torque threshold 3 lower / M_thresh 3 lower

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: 7_1	**Unit selection:** p0505	**Function diagram:** 8013
Min:	**Max:**	**Factory setting:**
0.00 [Nm]	20000000.00 [Nm]	0.00 [Nm]

Description: Sets the speed/torque envelope curve for load monitoring.

Dependency: The following applies: p2190 < p2189
See also: p2184, p2189
See also: A07926

Note
The lower envelope curve is defined by p2186, p2188 and p2190.

p2191[0...n] Load monitoring torque threshold no load / M_thresh no load

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: 7_1	**Unit selection:** p0505	**Function diagram:** 8013
Min:	**Max:**	**Factory setting:**
0.00 [Nm]	20000000.00 [Nm]	0.00 [Nm]

Description: Setting of the torque threshold to identify dry running operation for pumps or belt breakage for fans.

Dependency: The following applies: p2191< p2168 if p2168 <> 0
See also: p2181, p2182, p2184, p2193
See also: A07892, F07895, A07926

Note
For the setting p2191 = 0, the monitoring for dry running operation or belt breakage is deactivated.
Pre-assignment: p2191 = 5 % of the rated motor torque (p0333).

p2192[0...n] Load monitoring delay time / Load monit t_del

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 8013
Min:	**Max:**	**Factory setting:**
0.00 [s]	65.00 [s]	10.00 [s]

Description: Sets the delay time to evaluate the load monitoring.

p2193[0...n] Load monitoring configuration / Load monit config

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 8013
Min:	**Max:**	**Factory setting:**
0	5	1

Description: Sets the load monitoring configuration.

Value:	0:	Monitoring switched out
	1:	Monitoring torque and load drop
	2:	Monitoring speed and load drop
	3:	Monitoring load drop
	4:	Monitoring pump and load failure
	5:	Monitoring fan and load failure

Dependency: See also: p2182, p2183, p2184, p2185, p2186, p2187, p2188, p2189, p2190, p2192, r2198, p3230, p3231, p3232

See also: A07891, A07892, A07893, F07894, F07895, F07896, F07898, A07920, A07921, A07922, F07923, F07924, F07925, F07936

Note

p2193 = 4, 5 can only be combined with p2181 = 7, 8.

r2197.0...13 CO/BO: Status word monitoring 1 / ZSW monitor 1

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 2534
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display and BICO output for the first status word of the monitoring functions.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	|n_act| <= n_min p1080	Yes	No	8022
01	|n_act| <= speed threshold value 2 p2155	Yes	No	8010
02	|n_act| > speed threshold value 2 p2155	Yes	No	8010
03	n_act >= 0	Yes	No	8011
04	|n_act| >= n_set	Yes	No	8022
05	|n_act| <= n_standstill p1226	Yes	No	8022
06	|n_act| > n_max	Yes	No	8010
07	Speed setpoint - actual value deviation in tolerance t_off	Yes	No	8011
08	I_act >= I_threshold value p2170	Yes	No	8022
09	Vdc_act <= Vdc_threshold value p2172	Yes	No	8022
10	Vdc_act > Vdc_threshold value p2172	Yes	No	8022
11	Output load is not present	Yes	No	8022
13	|n_act| > n_max (F07901)	Yes	No	-

NOTICE

For bit 06:
When the overspeed is reached, this bit is set and F07901 output immediately following this. The bit is canceled again as soon as the next pulse inhibit is present.

Note
For bit 00:
The threshold value is set in p1080 and the hysteresis in p2150.
For bit 01, 02:
The threshold value is set in p2155 and the hysteresis in p2140.
For bit 03:
1 signal direction of rotation positive.
0 signal: direction of rotation negative.
The hysteresis is set in p2150.
For bit 04:
The threshold value is set in r1119 and the hysteresis in p2150.
For bit 05:
The threshold value is set in p1226 and the delay time in p1228.
For bit 06:
The hysteresis is set in p2162.
For bit 07:
The threshold value is set in p2163 and the hysteresis is set in p2164.
For bit 08:
The threshold value is set in p2170 and the delay time in p2171.
For bit 09, 10:
The threshold value is set in p2172 and the delay time in p2173.
For bit 11:
The threshold value is set in p2179 and the delay time in p2180.
For bit 13:
Only for internal Siemens use.

r2198.4...12 CO/BO: Status word monitoring 2 / ZSW monitor 2

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 2536
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display and BICO output for the second status word of the monitoring functions.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
04	|n_set| < p2161	Yes	No	8011
05	n_set > 0	Yes	No	8011
06	Motor blocked	Yes	No	8012
07	Motor stalled	Yes	No	8012
08	|I_act| < I_threshold value p2170	Yes	No	8022
11	Load in the alarm range	Yes	No	8013
12	Load in the fault range	Yes	No	8013

Note
For bit 12:
This bit is reset after the fault cause disappears, even if the fault itself is still present.

r2199.0...5 CO/BO: Status word monitoring 3 / ZSW monitor 3

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 2537
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display and BICO output for the third status word of the monitoring functions.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	|n_act| < speed threshold value 3	Yes	No	8010
01	f or n comparison value reached or exceeded	Yes	No	8010
04	Speed setpoint - actual value deviation in tolerance t_on	Yes	No	8011
05	Ramp-up/ramp-down completed	Yes	No	8011

Note
For bit 00:
The speed threshold value 3 is set in p2161.
For bit 01:
The comparison value is set in p2141. We recommend setting the hysteresis (p2142) for canceling the bit to a value lower than that in p2141. Otherwise, the bit is not reset.

p2200[0...n] BI: Technology controller enable / Tec_ctrl enable

Access level: 2 | **Calculated:** - | **Data type:** Unsigned32 / Binary
Can be changed: T | **Scaling:** - | **Dynamic index:** CDS, p0170
Unit group: - | **Unit selection:** - | **Function diagram:** 7958
Min: - | **Max:** - | **Factory setting:** 0

Description: Sets the signal source to switch in/switch out the technology controller.
The technology controller is switched in with a 1 signal.

p2201[0...n] CO: Technology controller fixed value 1 / Tec_ctrl fix val1

Access level: 2 | **Calculated:** - | **Data type:** FloatingPoint32
Can be changed: T, U | **Scaling:** PERCENT | **Dynamic index:** DDS, p0180
Unit group: 9_1 | **Unit selection:** p0595 | **Function diagram:** 7950, 7951
Min: -200.00 [%] | **Max:** 200.00 [%] | **Factory setting:** 10.00 [%]

Description: Sets the value for fixed value 1 of the technology controller.
Dependency: See also: p2220, p2221, p2222, p2223, r2224, r2229

NOTICE
A BICO interconnection to a parameter that belongs to a drive data set always acts on the effective data set.

p2202[0...n] CO: Technology controller fixed value 2 / Tec_ctr fix val 2

Access level: 2 | **Calculated:** - | **Data type:** FloatingPoint32
Can be changed: T, U | **Scaling:** PERCENT | **Dynamic index:** DDS, p0180
Unit group: 9_1 | **Unit selection:** p0595 | **Function diagram:** 7950, 7951
Min: -200.00 [%] | **Max:** 200.00 [%] | **Factory setting:** 20.00 [%]

Description: Sets the value for fixed value 2 of the technology controller.
Dependency: See also: p2220, p2221, p2222, p2223, r2224, r2229

NOTICE
A BICO interconnection to a parameter that belongs to a drive data set always acts on the effective data set.

p2203[0...n] CO: Technology controller fixed value 3 / Tec_ctr fix val 3

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** PERCENT	**Dynamic index:** DDS, p0180
Unit group: 9_1	**Unit selection:** p0595	**Function diagram:** 7950, 7951
Min:	**Max:**	**Factory setting:**
-200.00 [%]	200.00 [%]	30.00 [%]

Description: Sets the value for fixed value 3 of the technology controller.

Dependency: See also: p2220, p2221, p2222, p2223, r2224, r2229

NOTICE
A BICO interconnection to a parameter that belongs to a drive data set always acts on the effective data set.

p2204[0...n] CO: Technology controller fixed value 4 / Tec_ctr fix val 4

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** PERCENT	**Dynamic index:** DDS, p0180
Unit group: 9_1	**Unit selection:** p0595	**Function diagram:** 7950, 7951
Min:	**Max:**	**Factory setting:**
-200.00 [%]	200.00 [%]	40.00 [%]

Description: Sets the value for fixed value 4 of the technology controller.

Dependency: See also: p2220, p2221, p2222, p2223, r2224, r2229

NOTICE
A BICO interconnection to a parameter that belongs to a drive data set always acts on the effective data set.

p2205[0...n] CO: Technology controller fixed value 5 / Tec_ctr fix val 5

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** PERCENT	**Dynamic index:** DDS, p0180
Unit group: 9_1	**Unit selection:** p0595	**Function diagram:** 7950
Min:	**Max:**	**Factory setting:**
-200.00 [%]	200.00 [%]	50.00 [%]

Description: Sets the value for fixed value 5 of the technology controller.

Dependency: See also: p2220, p2221, p2222, p2223, r2224, r2229

NOTICE
A BICO interconnection to a parameter that belongs to a drive data set always acts on the effective data set.

p2206[0...n] CO: Technology controller fixed value 6 / Tec_ctr fix val 6

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** PERCENT	**Dynamic index:** DDS, p0180
Unit group: 9_1	**Unit selection:** p0595	**Function diagram:** 7950
Min:	**Max:**	**Factory setting:**
-200.00 [%]	200.00 [%]	60.00 [%]

Description: Sets the value for fixed value 6 of the technology controller.

Dependency: See also: p2220, p2221, p2222, p2223, r2224, r2229

NOTICE
A BICO interconnection to a parameter that belongs to a drive data set always acts on the effective data set.

p2207[0...n] CO: Technology controller fixed value 7 / Tec_ctr fix val 7

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** PERCENT	**Dynamic index:** DDS, p0180
Unit group: 9_1	**Unit selection:** p0595	**Function diagram:** 7950
Min:	**Max:**	**Factory setting:**
-200.00 [%]	200.00 [%]	70.00 [%]

Description: Sets the value for fixed value 7 of the technology controller.

Dependency: See also: p2220, p2221, p2222, p2223, r2224, r2229

NOTICE
A BICO interconnection to a parameter that belongs to a drive data set always acts on the effective data set.

p2208[0...n] CO: Technology controller fixed value 8 / Tec_ctr fix val 8

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** PERCENT	**Dynamic index:** DDS, p0180
Unit group: 9_1	**Unit selection:** p0595	**Function diagram:** 7950
Min:	**Max:**	**Factory setting:**
-200.00 [%]	200.00 [%]	80.00 [%]

Description: Sets the value for fixed value 8 of the technology controller.

Dependency: See also: p2220, p2221, p2222, p2223, r2224, r2229

NOTICE
A BICO interconnection to a parameter that belongs to a drive data set always acts on the effective data set.

p2209[0...n] CO: Technology controller fixed value 9 / Tec_ctr fix val 9

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** PERCENT	**Dynamic index:** DDS, p0180
Unit group: 9_1	**Unit selection:** p0595	**Function diagram:** 7950
Min:	**Max:**	**Factory setting:**
-200.00 [%]	200.00 [%]	90.00 [%]

Description: Sets the value for fixed value 9 of the technology controller.

Dependency: See also: p2220, p2221, p2222, p2223, r2224, r2229

NOTICE
A BICO interconnection to a parameter that belongs to a drive data set always acts on the effective data set.

p2210[0...n] CO: Technology controller fixed value 10 / Tec_ctr fix val 10

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** PERCENT	**Dynamic index:** DDS, p0180
Unit group: 9_1	**Unit selection:** p0595	**Function diagram:** 7950
Min:	**Max:**	**Factory setting:**
-200.00 [%]	200.00 [%]	100.00 [%]

Description: Sets the value for fixed value 10 of the technology controller.

Dependency: See also: p2220, p2221, p2222, p2223, r2224, r2229

NOTICE
A BICO interconnection to a parameter that belongs to a drive data set always acts on the effective data set.

p2211[0...n] CO: Technology controller fixed value 11 / Tec_ctr fix val 11

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** PERCENT	**Dynamic index:** DDS, p0180
Unit group: 9_1	**Unit selection:** p0595	**Function diagram:** 7950
Min:	**Max:**	**Factory setting:**
-200.00 [%]	200.00 [%]	110.00 [%]

Description: Sets the value for fixed value 11 of the technology controller.

Dependency: See also: p2220, p2221, p2222, p2223, r2224, r2229

NOTICE
A BICO interconnection to a parameter that belongs to a drive data set always acts on the effective data set.

p2212[0...n] CO: Technology controller fixed value 12 / Tec_ctr fix val 12

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** PERCENT	**Dynamic index:** DDS, p0180
Unit group: 9_1	**Unit selection:** p0595	**Function diagram:** 7950
Min:	**Max:**	**Factory setting:**
-200.00 [%]	200.00 [%]	120.00 [%]

Description: Sets the value for fixed value 12 of the technology controller.

Dependency: See also: p2220, p2221, p2222, p2223, r2224, r2229

NOTICE
A BICO interconnection to a parameter that belongs to a drive data set always acts on the effective data set.

p2213[0...n] CO: Technology controller fixed value 13 / Tec_ctr fix val 13

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** PERCENT	**Dynamic index:** DDS, p0180
Unit group: 9_1	**Unit selection:** p0595	**Function diagram:** 7950
Min:	**Max:**	**Factory setting:**
-200.00 [%]	200.00 [%]	130.00 [%]

Description: Sets the value for fixed value 13 of the technology controller.

Dependency: See also: p2220, p2221, p2222, p2223, r2224, r2229

NOTICE
A BICO interconnection to a parameter that belongs to a drive data set always acts on the effective data set.

p2214[0...n] CO: Technology controller fixed value 14 / Tec_ctr fix val 14

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** PERCENT	**Dynamic index:** DDS, p0180
Unit group: 9_1	**Unit selection:** p0595	**Function diagram:** 7950
Min:	**Max:**	**Factory setting:**
-200.00 [%]	200.00 [%]	140.00 [%]

Description: Sets the value for fixed value 14 of the technology controller.

Dependency: See also: p2220, p2221, p2222, p2223, r2224, r2229

NOTICE
A BICO interconnection to a parameter that belongs to a drive data set always acts on the effective data set.

p2215[0...n] CO: Technology controller fixed value 15 / Tec_ctr fix val 15

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** PERCENT	**Dynamic index:** DDS, p0180
Unit group: 9_1	**Unit selection:** p0595	**Function diagram:** 7950
Min:	**Max:**	**Factory setting:**
-200.00 [%]	200.00 [%]	150.00 [%]

Description: Sets the value for fixed value 15 of the technology controller.

Dependency: See also: p2220, p2221, p2222, p2223, r2224, r2229

NOTICE
A BICO interconnection to a parameter that belongs to a drive data set always acts on the effective data set.

p2216[0...n] Technology controller fixed value selection method / Tec_ctr FixVal sel

Access level: 2	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 7950, 7951
Min:	**Max:**	**Factory setting:**
1	2	1

Description: Sets the method to select the fixed setpoints.

Value:
1: Direct selection
2: Binary selection

p2220[0...n] BI: Technology controller fixed value selection bit 0 / Tec_ctrl sel bit 0

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 7950, 7951
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source to select a fixed value of the technology controller.

Dependency: See also: p2221, p2222, p2223

p2221[0...n] BI: Technology controller fixed value selection bit 1 / Tec_ctrl sel bit 1

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 7950, 7951
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source to select a fixed value of the technology controller.

Dependency: See also: p2220, p2222, p2223

p2222[0...n] BI: Technology controller fixed value selection bit 2 / Tec_ctrl sel bit 2

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 7950, 7951
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source to select a fixed value of the technology controller.

Dependency: See also: p2220, p2221, p2223

p2223[0...n] BI: Technology controller fixed value selection bit 3 / Tec_ctrl sel bit 3

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 7950, 7951
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source to select a fixed value of the technology controller.

Dependency: See also: p2220, p2221, p2222

r2224 CO: Technology controller fixed value effective / Tec_ctr FixVal eff

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: 9_1	**Unit selection:** p0595	**Function diagram:** 7950, 7951
Min:	**Max:**	**Factory setting:**
- [%]	- [%]	- [%]

Description: Display and connector output for the selected and active fixed value of the technology controller.

Dependency: See also: r2229

r2225.0 CO/BO: Technology controller fixed value selection status word / Tec_ctr FixVal ZSW

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display and BICO output for the status word of the fixed value selection of the technology controller.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Technology controller fixed value selected	Yes	No	7950, 7951

r2229 Technology controller number actual / Tec_ctrl No. act

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7950
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the number of the selected fixed setpoint of the technology controller.

Dependency: See also: r2224

p2230[0...n] Technology controller motorized potentiometer configuration / Tec_ctr mop config

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 7954
Min:	**Max:**	**Factory setting:**
-	-	0000 0100 bin

Description: Sets the configuration for the motorized potentiometer of the technology controller.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Data save active	Yes	No	-
02	Initial rounding-off active	Yes	No	-
03	Non-volatile data save active for p2230.0 = 1	Yes	No	-

04	Ramp-function generator always active	Yes	No	-

Dependency: See also: r2231, p2240

Note

For bit 00:

0: The setpoint for the motorized potentiometer is not saved and after ON is entered using p2240.

1: The setpoint for the motorized potentiometer is saved and after ON is entered using r2231. In order to save in a non-volatile fashion, bit 03 should be set to 1.

For bit 02:

0: Without initial rounding-off

1: With initial rounding-off.

The selected ramp-up/down time is correspondingly exceeded. The initial rounding-off is a sensitive way of specifying small changes (progressive reaction when keys are pressed). The jerk for initial rounding is independent of the ramp-up time and only depends on the selected maximum value (p2237).

It is calculated as follows:

r = 0.0001 x max(p2237, |p2238|) [%] / 0.13^2 [s^2]

The jerk is effective until the maximum acceleration is reached (a_max = p2237 [%] / p2247 [s] or a_max = p2238 [%] / p2248 [s]), after which the drive continues to run linearly with constant acceleration.

The higher the maximum acceleration (the lower that p2247 is), the longer the ramp-up time increases with respect to the set ramp-up time.

For bit 03:

0: Non-volatile data save deactivated.

1. The setpoint for the motorized potentiometer is saved in a non-volatile fashion (for p2230.0 = 1).

For bit 04:

When the bit is set, the ramp-function generator is computed independent of the pulse enable. The actual output value of the motorized potentiometer is always in r2250.

r2231 Technology controller motorized potentiometer setpoint memory / Tec_ctrl mop mem

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: 9_1	**Unit selection:** p0595	**Function diagram:** 7954
Min:	**Max:**	**Factory setting:**
- [%]	- [%]	- [%]

Description: Displays the setpoint memory for the motorized potentiometer of the technology controller.

For p2230.0 = 1, the last setpoint that was saved is entered after ON.

Dependency: See also: p2230

p2235[0...n] BI: Technology controller motorized potentiometer raise setpoint / Tec_ctrl mop raise

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 7954
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source to continually increase the setpoint for the motorized potentiometer of the technology controller.

The setpoint change (CO: r2250) depends on the set ramp-up time (p2247) and the duration of the signal that is present (BI: p2235).

Dependency: See also: p2236

p2236[0...n] BI: Technology controller motorized potentiometer lower setpoint / Tec_ctrl mop lower

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 7954
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source to continually reduce the setpoint for the motorized potentiometer of the technology controller.

The setpoint change (CO: r2250) depends on the set ramp-down time (p2248) and the duration of the signal that is present (BI: p2236).

Dependency: See also: p2235

p2237[0...n] Technology controller motorized potentiometer maximum value / Tec_ctrl mop max

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: 9_1	**Unit selection:** p0595	**Function diagram:** 7954
Min:	**Max:**	**Factory setting:**
-200.00 [%]	200.00 [%]	100.00 [%]

Description: Sets the maximum value for the motorized potentiometer of the technology controller.

Dependency: See also: p2238

p2238[0...n] Technology controller motorized potentiometer minimum value / Tec_ctrl mop min

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: 9_1	**Unit selection:** p0595	**Function diagram:** 7954
Min:	**Max:**	**Factory setting:**
-200.00 [%]	200.00 [%]	-100.00 [%]

Description: Sets the minimum value for the motorized potentiometer of the technology controller.

Dependency: See also: p2237

p2240[0...n] Technology controller motorized potentiometer starting value / Tec_ctrl mop start

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: 9_1	**Unit selection:** p0595	**Function diagram:** 7954
Min:	**Max:**	**Factory setting:**
-200.00 [%]	200.00 [%]	0.00 [%]

Description: Sets the starting value for the motorized potentiometer of the technology controller.

For p2230.0 = 0, this setpoint is entered after ON.

Dependency: See also: p2230

r2245 CO: Technology controller mot. potentiometer setpoint before RFG / Tec_ctr mop befRFG

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: 9_1	**Unit selection:** p0595	**Function diagram:** 7954
Min:	**Max:**	**Factory setting:**
- [%]	- [%]	- [%]

Description: Sets the effective setpoint in front of the internal motorized potentiometer ramp-function generator of the technology controller.

Dependency: See also: r2250

p2247[0...n] Technology controller motorized potentiometer ramp-up time / Tec_ctr mop t_r-up

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 7954
Min:	**Max:**	**Factory setting:**
0.0 [s]	1000.0 [s]	10.0 [s]

Description: Sets the ramp-up time for the internal ramp-function generator for the motorized potentiometer of the technology controller.

Dependency: See also: p2248

Note

The time is referred to 100 %.

When the initial rounding-off is activated (p2230.2 = 1) the ramp-up is correspondingly extended.

p2248[0...n] Technology controller motorized potentiometer ramp-down time / Tec_ctrMop t_rdown

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 7954
Min:	**Max:**	**Factory setting:**
0.0 [s]	1000.0 [s]	10.0 [s]

Description: Sets the ramp-down time for the internal ramp-function generator for the motorized potentiometer of the technology controller.

Dependency: See also: p2247

Note

The time is referred to 100 %.

When the initial rounding-off is activated (p2230.2 = 1) the ramp-down is correspondingly extended.

r2250 CO: Technology controller motorized potentiometer setpoint after RFG / Tec_ctr mop aftRFG

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: 9_1	**Unit selection:** p0595	**Function diagram:** 7954
Min:	**Max:**	**Factory setting:**
- [%]	- [%]	- [%]

Description: Displays the effective setpoint after the internal ramp-function generator for the motorized potentiometer of the technology controller.

Dependency: See also: r2245

p2251 Technology controller mode / Tec_ctrl mode

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7958
Min:	**Max:**	**Factory setting:**
0	0	0

Description: Sets the mode for using the technology controller output.

Value: 0: Technology controller as main speed setpoint

Dependency: p2251 = 0 is only effective if the enable signal of the technology controller is interconnected (p2200 > 0).

p2252 Technology controller configuration / Tec_ctrl config

Access level: 3	**Calculated:** CALC_MOD_ALL	**Data type:** Unsigned16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	0000 0000 0000 0000 bin

Description: Sets the configuration of the technology controller.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
04	Ramp-up/ramp-down function generator bypass	Deactivated	Activated	-
05	Integrator active for skip speeds	Yes	No	-
06	Internal controller limit not displayed	Yes	No	-
07	Activate Kp adaptation	Yes	No	7958
08	Activate Tn adaptation	Yes	No	7958

Dependency: For bit 04 = 0:
The setting is only effective when the PID controller is deactivated.

⚠ CAUTION
For bit 04 = 1:
The PID controller can oscillate if the ramp-up and ramp-down times of the speed setpoint channel are not taken into account when setting controller parameters p2280 and p2285.

Note
For bit 04 = 0:
The ramp-function generator in the speed setpoint channel is bypassed when the technology controller is operational.
As a consequence, ramp times p1120, p1121 are not taken into consideration when configuring the controller.
For bit 04 = 1:
The ramp-function generator in the speed setpoint channel is not bypassed when the technology controller is operational.
As a consequence, the ramp-up and ramp-down times (p1120, p1121) remain effective, and must be taken into account as controlled system variables when setting the PID controller parameters (p2280, p2285).
The enable ramps of the PID controller are ensured in this setting by p1120, p1121 as well as rounding functions p1130 and p1131. The ramp-up/ramp-down time of the PID controller limiting p2293 must be set appropriately shorter, as otherwise this has an impact on the speed setpoint channel.
For bit 05 = 0:
The integral component of the PID controller is held if a skip band or the minimum speed range is passed through in the speed set point channel.
This prevents the speed from oscillating between the edges of the skip band.
For bit 05 = 1:
The setting is only effective if a skip band is no longer active.
The integral component of the PID controller is not held in the range of the skip speeds.
The skip band is passed through even for small system deviations and low controller gain factors. In so doing, the controller integral time must be selected large enough so that no undesirable speed oscillations occur between the skip band edges.
The influence of a minimum speed p1080 on the integration behavior can be reduced by raising the lower PID controller limit to p1080 / p2000 * 100%.
For bit 06 = 1:
In r2349, bit 10 and bit 11 are not displayed when reaching internal limits (e.g. for OFF1/3).

p2253[0...n] CI: Technology controller setpoint 1 / Tec_ctrl setp 1

Access level: 2	**Calculated:** -	**Data type:** Unsigned32 / FloatingPoint32
Can be changed: T, U	**Scaling:** PERCENT	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 7958
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source for the setpoint 1 of the technology controller.
Dependency: See also: p2254, p2255

p2254[0...n] CI: Technology controller setpoint 2 / Tec_ctrl setp 2

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / FloatingPoint32
Can be changed: T, U	**Scaling:** PERCENT	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 7958
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source for the setpoint 2 of the technology controller.
Dependency: See also: p2253, p2256

p2255 Technology controller setpoint 1 scaling / Tec_ctrl set1 scal

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7958
Min:	**Max:**	**Factory setting:**
0.00 [%]	100.00 [%]	100.00 [%]

Description: Sets the scaling for the setpoint 1 of the technology controller.
Dependency: See also: p2253

p2256 Technology controller setpoint 2 scaling / Tec_ctrl set2 scal

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7958
Min:	**Max:**	**Factory setting:**
0.00 [%]	100.00 [%]	100.00 [%]

Description: Sets the scaling for the setpoint 2 of the technology controller.
Dependency: See also: p2254

p2257 Technology controller ramp-up time / Tec_ctrl t_ramp-up

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7958
Min:	**Max:**	**Factory setting:**
0.00 [s]	650.00 [s]	1.00 [s]

Description: Sets the ramp-up time of the technology controller.
Dependency: See also: p2258

Note
The ramp-up time is referred to 100 %.

p2258 Technology controller ramp-down time / Tec_ctrl t_ramp-dn

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7958
Min:	**Max:**	**Factory setting:**
0.00 [s]	650.00 [s]	1.00 [s]

Description: Sets the ramp-down time of the technology controller.

Dependency: See also: p2257

Note
The ramp-down time is referred to 100 %.

r2260 CO: Technology controller setpoint after ramp-function generator / Tec_ctr set aftRFG

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: 9_1	**Unit selection:** p0595	**Function diagram:** 7958
Min:	**Max:**	**Factory setting:**
- [%]	- [%]	- [%]

Description: Sets the setpoint after the ramp-function generator of the technology controller.

p2261 Technology controller setpoint filter time constant / Tec_ctrl set T

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7958
Min:	**Max:**	**Factory setting:**
0.000 [s]	60.000 [s]	0.000 [s]

Description: Sets the time constant for the setpoint filter (PT1) of the technology controller.

r2262 CO: Technology controller setpoint after filter / Tec_ctr set aftFlt

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: 9_1	**Unit selection:** p0595	**Function diagram:** 7958
Min:	**Max:**	**Factory setting:**
- [%]	- [%]	- [%]

Description: Display and connector output for the smoothed setpoint after the setpoint filter (PT1) of the technology controller.

p2263 Technology controller type / Tec_ctrl type

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7958
Min:	**Max:**	**Factory setting:**
0	1	0

Description: Sets the type of technology controller.

Value:
0: D component in the actual value signal
1: D component in system deviation

p2264[0...n] CI: Technology controller actual value / Tec_ctrl act val

Access level: 2	**Calculated:** -	**Data type:** Unsigned32 / FloatingPoint32
Can be changed: T, U	**Scaling:** PERCENT	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 7958
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source for the actual value of the technology controller.

p2265	**Technology controller actual value filter time constant / Tec_ctrl act T**		
	Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
	Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
	Unit group: -	**Unit selection:** -	**Function diagram:** 7958
	Min:	**Max:**	**Factory setting:**
	0.000 [s]	60.000 [s]	0.000 [s]
Description:	Sets the time constant for the actual value filter (PT1) of the technology controller.		

r2266	**CO: Technology controller actual value after filter / Tec_ctr act aftFlt**		
	Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
	Can be changed: -	**Scaling:** PERCENT	**Dynamic index:** -
	Unit group: 9_1	**Unit selection:** p0595	**Function diagram:** 7958
	Min:	**Max:**	**Factory setting:**
	- [%]	- [%]	- [%]
Description:	Display and connector output for the smoothed actual value after the filter (PT1) of the technology controller.		

p2267	**Technology controller upper limit actual value / Tec_ctrl u_lim act**		
	Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
	Can be changed: T, U	**Scaling:** PERCENT	**Dynamic index:** -
	Unit group: 9_1	**Unit selection:** p0595	**Function diagram:** 7958
	Min:	**Max:**	**Factory setting:**
	-200.00 [%]	200.00 [%]	100.00 [%]
Description:	Sets the upper limit for the actual value signal of the technology controller.		
Dependency:	See also: p2264, p2265, p2271 See also: F07426		

NOTICE
If the actual value exceeds this upper limit, this results in fault F07426.

p2268	**Technology controller lower limit actual value / Tec_ctrl l_lim act**		
	Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
	Can be changed: T, U	**Scaling:** PERCENT	**Dynamic index:** -
	Unit group: 9_1	**Unit selection:** p0595	**Function diagram:** 7958
	Min:	**Max:**	**Factory setting:**
	-200.00 [%]	200.00 [%]	-100.00 [%]
Description:	Sets the lower limit for the actual value signal of the technology controller.		
Dependency:	See also: p2264, p2265, p2271 See also: F07426		

NOTICE
If the actual value falls below this lower limit, this results in fault F07426.

p2269	**Technology controller gain actual value / Tech_ctrl gain act**		
	Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
	Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
	Unit group: -	**Unit selection:** -	**Function diagram:** 7958
	Min:	**Max:**	**Factory setting:**
	0.00 [%]	500.00 [%]	100.00 [%]
Description:	Sets the scaling factor for the actual value of the technology controller.		
Dependency:	See also: p2264, p2265, p2267, p2268, p2271		

Note
For 100%, the actual value is not changed.

p2270 Technology controller actual value function / Tec_ctr ActVal fct

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7958
Min:	**Max:**	**Factory setting:**
0	3	0

Description: Setting to use an arithmetic function for the actual value signal of the technology controller.

Value:
0: Output (y) = input (x)
1: Root function (root from x)
2: Square function (x * x)
3: Cube function (x * x * x)

Dependency: See also: p2264, p2265, p2267, p2268, p2269, p2271

p2271 Technology controller actual value inversion (sensor type) / Tech_ctrl act inv

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7958
Min:	**Max:**	**Factory setting:**
0	1	0

Description: Setting to invert the actual value signal of the technology controller.
The inversion depends on the sensor type for the actual value signal.

Value:
0: No inversion
1: Inversion actual value signal

⚠ CAUTION
If the actual value inversion is incorrectly selected, then the closed-loop control with the technology controller can become unstable and can oscillate!

Note
The correct setting can be determined as follows:
- inhibit the technology controller (p2200 = 0).
- increase the motor speed and in so doing, measure the actual value signal of the technology controller.
--> If the actual value increases as the motor speed increases, then p2271 should be set to 0 (no inversion).
--> If the actual value decreases as the motor speed increases, then p2271 should be set to 1 (the actual value signal is inverted).

r2272 CO: Technology controller actual value scaled / Tech_ctrl act scal

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: 9_1	**Unit selection:** p0595	**Function diagram:** 7958
Min:	**Max:**	**Factory setting:**
- [%]	- [%]	- [%]

Description: Display and connector output for the scaled actual value signal of the technology controller.

Dependency: See also: p2264, p2265, r2266, p2267, p2268, p2269, p2270, p2271

r2273 CO: Technology controller system deviation / Tec_ctrl sys_dev

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: 9_1	**Unit selection:** p0595	**Function diagram:** 7958
Min:	**Max:**	**Factory setting:**
- [%]	- [%]	- [%]

Description: Displays the system deviation between the setpoint and actual value of the technology controller.

Dependency: See also: p2263

p2274 Technology controller differentiation time constant / Tec_ctrl D comp T

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7958
Min:	**Max:**	**Factory setting:**
0.000 [s]	60.000 [s]	0.000 [s]

Description: Sets the time constant for the differentiation (D component) of the technology controller.

Note
p2274 = 0: Differentiation is disabled.

p2280 Technology controller proportional gain / Tec_ctrl Kp

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7958
Min:	**Max:**	**Factory setting:**
0.000	1000.000	0.500

Description: Sets the proportional gain (P component) of the technology controller.

Note
p2280 = 0: The proportional gain is disabled.

p2285 Technology controller integral time / Tec_ctrl Tn

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7958
Min:	**Max:**	**Factory setting:**
0.000 [s]	10000.000 [s]	10.000 [s]

Description: Sets the integral time (I component, integrating time constant) of the technology controller.

NOTICE
The following applies for p2251 = 0:
If the output of the technology controller lies within the range of a suppression (skip) bandwidth (p1091 ... p1094, p1101) or below the minimum speed (p1080), the integral component of the controller is held so that the controller temporarily works as a P controller. This is necessary in order to prevent the controller from behaving in an unstable manner, as the ramp-function generator switches to the parameterized up and down ramps (p1120, p1121) at the same time in order to avoid setpoint steps. This state can be exited or avoided by changing the controller setpoint or by using the start speed (= minimum speed).

Note
When the controller output reaches the limit, the I component of the controller is held.
p2285 = 0:
The integral time is disabled and the I component of the controller is reset.

p2286[0...n]	**BI: Hold technology controller integrator / Tec_ctr integ hold**		
	Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
	Can be changed: T	**Scaling:** -	**Dynamic index:** CDS, p0170
	Unit group: -	**Unit selection:** -	**Function diagram:** 7958
	Min:	**Max:**	**Factory setting:**
	-	-	56.13
Description:	Sets the signal source to hold the integrator for the technology controller.		

p2289[0...n]	**CI: Technology controller precontrol signal / Tec_ctr prectr_sig**		
	Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / FloatingPoint32
	Can be changed: T, U	**Scaling:** PERCENT	**Dynamic index:** CDS, p0170
	Unit group: -	**Unit selection:** -	**Function diagram:** 7958
	Min:	**Max:**	**Factory setting:**
	-	-	0
Description:	Sets the signal source for the precontrol signal of the technology controller.		

p2290[0...n]	**BI: Technology controller limiting enable / Tec_ctrl lim enab**		
	Access level: 2	**Calculated:** -	**Data type:** Unsigned32 / Binary
	Can be changed: T	**Scaling:** -	**Dynamic index:** CDS, p0170
	Unit group: -	**Unit selection:** -	**Function diagram:** 7958
	Min:	**Max:**	**Factory setting:**
	-	-	1
Description:	Sets the signal source to enable the technology controller output. The technology controller output is enabled with a 1 signal. The technology controller output is held with a 0 signal.		

p2291	**CO: Technology controller maximum limiting / Tec_ctrl max_lim**		
	Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
	Can be changed: T, U	**Scaling:** PERCENT	**Dynamic index:** -
	Unit group: -	**Unit selection:** -	**Function diagram:** 7958
	Min:	**Max:**	**Factory setting:**
	-200.00 [%]	200.00 [%]	100.00 [%]
Description:	Sets the maximum limit of the technology controller.		
Dependency:	See also: p2292		

> ⚠ **CAUTION**
>
> The maximum limit must always be greater than the minimum limit (p2291 > p2292).

p2292	**CO: Technology controller minimum limiting / Tec_ctrl min_lim**		
	Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
	Can be changed: T, U	**Scaling:** PERCENT	**Dynamic index:** -
	Unit group: -	**Unit selection:** -	**Function diagram:** 7958
	Min:	**Max:**	**Factory setting:**
	-200.00 [%]	200.00 [%]	0.00 [%]
Description:	Sets the minimum limit of the technology controller.		
Dependency:	See also: p2291		

> ⚠ **CAUTION**
>
> The maximum limit must always be greater than the minimum limit (p2291 > p2292).

p2293 Technology controller ramp-up/ramp-down time / Tec_ctr t_RU/RD

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7958
Min:	**Max:**	**Factory setting:**
0.00 [s]	100.00 [s]	1.00 [s]

Description: Sets the ramping time for the output signal of the technology controller.

Dependency: See also: p2291, p2292

Note

The time refers to the set maximum and minimum limits (p2291, p2292).

r2294 CO: Technology controller output signal / Tec_ctrl outp_sig

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7958
Min:	**Max:**	**Factory setting:**
- [%]	- [%]	- [%]

Description: Display and connector output for the output signal of the technology controller.

Dependency: See also: p2295

p2295 CO: Technology controller output scaling / Tec_ctrl outp scal

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7958
Min:	**Max:**	**Factory setting:**
-100.00 [%]	100.00 [%]	100.00 [%]

Description: Sets the scaling for the output signal of the technology controller.

p2296[0...n] CI: Technology controller output scaling / Tec_ctrl outp scal

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / FloatingPoint32
Can be changed: T, U	**Scaling:** PERCENT	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 7958
Min:	**Max:**	**Factory setting:**
-	-	2295[0]

Description: Sets the signal source for the scaling value of the technology controller.

Dependency: See also: p2295

p2297[0...n] CI: Technology controller maximum limit signal source / Tec_ctrMaxLim s_s

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / FloatingPoint32
Can be changed: T, U	**Scaling:** PERCENT	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 7958
Min:	**Max:**	**Factory setting:**
-	-	1084[0]

Description: Sets the signal source for the maximum limiting of the technology controller.

Dependency: See also: p2291

Note
In order that the output of the technology controller does not exceed the maximum speed limit, its upper limit p2297 should be connected to the actual maximum speed r1084.

p2298[0...n] CI: Technology controller minimum limit signal source / Tec_ctrl min_l s_s

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / FloatingPoint32
Can be changed: T, U	**Scaling:** PERCENT	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 7958
Min:	**Max:**	**Factory setting:**
-	-	2292[0]

Description: Sets the signal source for the minimum limiting of the technology controller.

Dependency: See also: p2292

Note
If the technology controller is rotated in a negative direction in mode p2251 = 0, its lower limit p2298 should be connected to the actual minimum speed r1087.

p2299[0...n] CI: Technology controller limit offset / Tech_ctrl lim offs

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / FloatingPoint32
Can be changed: T, U	**Scaling:** PERCENT	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 7958
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source for the offset of the output limiting of the technology controller.

p2302 Technology controller output signal starting value / Tec_ctr start val

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7958
Min:	**Max:**	**Factory setting:**
0.00 [%]	200.00 [%]	0.00 [%]

Description: Sets the start value for the output of the technology controller.

If the drive is switched on and the technology controller is already enabled (see p2200, r0056.3), then its output signal r2294 first goes to the start value p2302, before the controller starts to operate.

Dependency: The starting value is only effective in the mode "technology controller as main speed setpoint" (p2251 = 0).

If the technology controller is first enabled when the drive is switched on, a start speed remains ineffective, and the controller output starts with the actual setpoint speed of the ramp-function generator.

Note
If the technology controller operates on the speed/setpoint channel (p2251 = 0), then the starting value is interpreted as the starting speed and when operation is enabled, is connected to the output of the technology controller (r2294).

If fault F07426 "technology controller actual value limited" occurs while ramping up to the starting value and if the associated reaction has been set to "NONE" (see p2100, p2101), the starting value is kept as the speed setpoint instead of a switch to closed-loop control operation.

p2306 Technology controller system deviation inversion / Tec_ctr SysDev inv

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7958
Min:	**Max:**	**Factory setting:**
0	1	0

Description: Setting to invert the system deviation of the technology controller.
The setting depends on the type of control loop.

Value:
0: No inversion
1: Inversion

⚠ CAUTION
If the actual value inversion is incorrectly selected, then the closed-loop control with the technology controller can become unstable and can oscillate!

Note
The correct setting can be determined as follows:
- inhibit the technology controller (p2200 = 0).
- increase the motor speed and in so doing, measure the actual value signal (of the technology controller).
- if the actual value increases with increasing motor speed, then the inversion should be switched out.
- if the actual value decreases with increasing motor speed, then the inversion should be set.
If value = 0:
The drive reduces the output speed when the actual value rises (e.g. for heating fans, intake pump, compressor).
If value = 1:
The drive increases the output speed when the actual value increases (e.g. for cooling fans, discharge pumps).

p2310 CI: Technology controller Kp adaptation input value signal source / Kp adapt inp s_s

Access level: 2	**Calculated:** -	**Data type:** Unsigned32 / FloatingPoint32
Can be changed: T	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7959
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source for the input value of the adaptation of proportional gain Kp for the technology controller.

Dependency: See also: p2252, p2311, p2312, p2313, p2314, p2315, r2316

p2311 Technology controller Kp adaptation lower value / Kp adapt lower val

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7959
Min:	**Max:**	**Factory setting:**
0.000	1000.000	1.000

Description: Sets the lower value for the adaptation of proportional gain Kp for the technology controller.

Dependency: See also: p2310, p2312, p2313, p2314, p2315, r2316

⚠ CAUTION
The upper value must be set higher than the lower value (p2312 > p2311).

Note
Kp adaptation is activated with p2252.7 = 1.

p2312 Technology controller Kp adaptation upper value / Kp adapt upper val

Access level: 2 | **Calculated:** - | **Data type:** FloatingPoint32
Can be changed: T, U | **Scaling:** - | **Dynamic index:** -
Unit group: - | **Unit selection:** - | **Function diagram:** 7959
Min: 0.000 | **Max:** 1000.000 | **Factory setting:** 10.000

Description: Sets the upper value for the adaptation of proportional gain Kp for the technology controller.

Dependency: See also: p2310, p2311, p2313, p2314, p2315, r2316

⚠ CAUTION
The upper value must be set higher than the lower value (p2312 > p2311).

Note
Kp adaptation is activated with p2252.7 = 1.

p2313 Technology controller Kp adaptation lower starting point / Kp adapt lower pt

Access level: 2 | **Calculated:** - | **Data type:** FloatingPoint32
Can be changed: T, U | **Scaling:** PERCENT | **Dynamic index:** -
Unit group: - | **Unit selection:** - | **Function diagram:** 7959
Min: 0.00 [%] | **Max:** 400.00 [%] | **Factory setting:** 0.00 [%]

Description: Sets the lower starting point for the adaptation of proportional gain Kp for the technology controller.

Dependency: See also: p2310, p2311, p2312, p2314, p2315, r2316

⚠ CAUTION
The upper starting point must be set higher than the lower starting point (p2314 > p2313).

Note
Kp adaptation is activated with p2252.7 = 1.

p2314 Technology controller Kp adaptation upper starting point / Kp adapt upper pt

Access level: 2 | **Calculated:** - | **Data type:** FloatingPoint32
Can be changed: T, U | **Scaling:** PERCENT | **Dynamic index:** -
Unit group: - | **Unit selection:** - | **Function diagram:** 7959
Min: 0.00 [%] | **Max:** 400.00 [%] | **Factory setting:** 100.00 [%]

Description: Sets the upper activation point for the adaptation of proportional gain Kp for the technology controller.

Dependency: See also: p2310, p2311, p2312, p2313, p2315, r2316

⚠ CAUTION
The upper starting point must be set higher than the lower starting point (p2314 > p2313).

Note
Kp adaptation is activated with p2252.7 = 1.

p2315 CI: Technology controller Kp adaptation scaling signal source / Kp adapt scal s_s

Access level: 3 | **Calculated:** - | **Data type:** Unsigned32 / FloatingPoint32
Can be changed: T | **Scaling:** PERCENT | **Dynamic index:** -
Unit group: - | **Unit selection:** - | **Function diagram:** 7959
Min: - | **Max:** - | **Factory setting:** 1

Description: Sets the signal source to scale the results of the adaptation of the proportional gain Kp for the technology controller.

Dependency: See also: p2310, p2311, p2312, p2313, p2314, r2316

Note
Kp adaptation is activated with p2252.7 = 1.

r2316 CO: Technology controller, Kp adaptation output / Kp adapt outp

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7959
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display and connector output for the output signal of the adaption of proportional gain Kp for the technology controller.

Dependency: See also: p2252, p2310, p2311, p2312, p2313, p2314, p2315

p2317 CI: Technology controller Tn adaptation input value signal source / Tn adapt inp s_s

Access level: 2	**Calculated:** -	**Data type:** Unsigned32 / FloatingPoint32
Can be changed: T	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7959
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source for the input value of the adaptation of integral time Tn for the technology controller.

Dependency: See also: p2252, p2318, p2319, p2320, p2321, r2322

Note
Tn adaptation is activated with p2252.8 = 1.

p2318 Technology controller Tn adaptation upper value / Tn adapt upper val

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7959
Min:	**Max:**	**Factory setting:**
0.000 [s]	60.000 [s]	3.000 [s]

Description: Sets the upper value for the adaptation of integral time Tn for the technology controller.

Dependency: See also: p2317, p2319, p2320, p2321, r2322

Note
Tn adaptation is activated with p2252.8 = 1.

p2319 Technology controller Tn adaptation lower value / Tn adapt lower val

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7959
Min:	**Max:**	**Factory setting:**
0.000 [s]	60.000 [s]	10.000 [s]

Description: Sets the lower value for the adaptation of integral time Tn for the technology controller.

Dependency: See also: p2317, p2318, p2320, p2321, r2322

Note
Tn adaptation is activated with p2252.8 = 1.

p2320 Technology controller Tn adaptation lower starting point / Tn adapt lower pt

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7959
Min:	**Max:**	**Factory setting:**
0.00 [%]	400.00 [%]	0.00 [%]

Description: Sets the lower activation point for the adaptation of integral time Tn for the technology controller.

Dependency: See also: p2317, p2318, p2319, p2321, r2322

⚠ CAUTION

The upper starting point must be set higher than the lower starting point (p2321 > p2320).

Note

Tn adaptation is activated with p2252.8 = 1.

p2321 Technology controller Tn adaptation upper starting point / Tn adapt upper pt

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7959
Min:	**Max:**	**Factory setting:**
0.00 [%]	400.00 [%]	100.00 [%]

Description: Sets the upper activation point for the adaptation of integral time Tn for the technology controller.

Dependency: See also: p2317, p2318, p2319, p2320, r2322

⚠ CAUTION

The upper starting point must be set higher than the lower starting point (p2321 > p2320).

Note

Tn adaptation is activated with p2252.8 = 1.

r2322 CO: Technology controller Tn adaptation output / Tn adapt output

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7959
Min:	**Max:**	**Factory setting:**
- [s]	- [s]	- [s]

Description: Display and connector output for the output signal of the adaption of integral time Tn for the technology controller.

Dependency: See also: p2252, p2317, p2318, p2319, p2320, p2321

Note

Tn adaptation is activated with p2252.8 = 1.

p2339 Techn. controller threshold value f. I comp. hold for skip speed / Tec_ctrl thr_skip

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: 9_1	**Unit selection:** p0595	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.00 [%]	200.00 [%]	2.00 [%]

Description: Sets the threshold value for the system deviation of the technology controller, which controls holding the controller integral component in the range of the skip speeds of the ramp-function generator.

Recommendation: To avoid speed setpoint steps in the range of the skip speeds, we recommend setting p2252 bit 4 = 1 (ramp-function generator bypass deactivated).

Dependency: The parameter has no effect for p2252 bit 5 = 1 (integrator hold deactivated).

See also: r2273

Note

Only p2251 = 0:

If the output signal of the technology controller reaches a skip band in the speed setpoint channel, then the integral component of the controller is held, if at the same time, the system deviation is lower than the threshold value set here. By holding the integral component, it can be avoided that the controller oscillates in the range of the skip bands.

r2344 CO: Technology controller last speed setpoint (smoothed) / Tec_ctrl n_setp_sm

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7958
Min:	**Max:**	**Factory setting:**
- [%]	- [%]	- [%]

Description: Displays the smoothed speed setpoint of the technology controller prior to switching to operation with fault response (see p2345).

Dependency: See also: p2345

Note

Smoothing time = 10 s

p2345 Technology controller fault response / Tech_ctrl flt resp

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7958
Min:	**Max:**	**Factory setting:**
0	2	0

Description: Sets the response of the technology controller to the occurrence of fault F07426 (technology controller actual value limited).

The fault response is executed if status bit 8 or 9 in the technology controller status word r2349 is set. If both status bits are zero, a switch back to technology controller operation will follow.

Value:

0: Function inhibited

1: On fault: Changeover to r2344 (or p2302)

2: On fault: Changeover to p2215

Dependency: The parameterized fault response is only effective if the technology controller mode is set to p2251 = 0 (technology controller as main setpoint).

See also: p2267, p2268, r2344

See also: F07426

NOTICE
Dependent upon the application, the changing over of the setpoint when fault F07426 occurs can lead to the fault condition disappearing and the re-activation of the technology controller. This can repeat itself and cause limit oscillations. In this case, a different fault response or a different fixed setpoint 15 for the fault response p2345 = 2 should be selected.

Note

The parameterized fault response can only be achieved if the default fault response of the technology controller fault F07426 is set to "NONE" (see p2100, p2101). If a fault response other than "NONE" is entered in p2101 for F07426, p2345 must be set to zero.

If the fault occurs during ramping up to the starting setpoint p2302, this starting setpoint is retained as the final value (there is no changeover to the fault response setpoint).

r2349.0...13 CO/BO: Technology controller status word / Tec_ctrl status

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7958
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display and BICO output for the status word of the technology controller.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Technology controller deactivated	Yes	No	-
01	Technology controller limited	Yes	No	-
02	Technology controller motorized potentiometer limited max	Yes	No	-
03	Technology controller motorized potentiometer limited min	Yes	No	-
04	Technology controller speed setpoint total in setpoint channel	Yes	No	-
05	Technology controller RFG bypassed in the setpoint channel	Yes	No	-
06	Technology controller starting value at the current limit	No	Yes	-
07	Technology controller output negative	Yes	No	-
08	Technology controller actual value at the minimum	Yes	No	-
09	Technology controller actual value at the maximum	Yes	No	-
10	Technology controller output at the minimum	Yes	No	-
11	Technology controller output at the maximum	Yes	No	-
12	Fault response active	Yes	No	-
13	Technology controller limiting enable	Yes	No	-

Note

While the technology controller is enabled, the following applies:
When switching off with OFF1, OFF3 and for pulse inhibit, bits 10 and 11 are simultaneously set to 1 as the controller output is defined by the internal limiting.

p2350 Enable PID autotuning / PID autotuning

Access level: 2	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	4	0

Description: Activates the function to automatically tune the PID controller.

Value:

0: PID autotuning deactivated
1: PID autotuning with ZN technique
2: As 1 with low overshoot
3: As 2 + low or no overshoot
4: PID autotuning, only PI

Dependency: Active if the PID controller is enabled (see p2200).

Note

p2350 = 1
This is the Ziegler-Nichols standard tuning (ZN tuning). In this case, it should involve a response to a step.

p2350 = 2
For this tuning, a low overshoot is obtained (O/S). However, it should be faster than option 1.

p2350 = 3
For this tuning, a low or no overshoot is obtained. However, it is not as fast as option 2.

p2350 = 4
For this tuning, only values P and I are changed, and it should involve a dampened response.

Which option should be selected depends on the particular application. It can be generally stated that option 1 manifests a good response. However, if a faster response is required, then option 2 should be selected.
If no overshoot is desirable, then option 3 should be the preferred choice.
Option 4 should be selected for cases in which no D component is required.
The tuning technique is identical for all options.
Only the P, I and D values are calculated differently.

This parameter is set to zero after automatic tuning has been completed.

p2354 PID autotuning monitoring time / PID tuning t_monit

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
60 [s]	65000 [s]	240 [s]

Description: Sets the monitoring time for the PID autotuning
This time is started after activating PID autotuning (p2350). If, within this time, the control loop is not excited, then the automatic setting is canceled and an appropriate fault is output.

Dependency: See also: p2350
See also: F07445

p2355 PID autotuning offset / PID autotun.offset

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0 [%]	20 [%]	5 [%]

Description: This parameter is used to set the excitation type of the PID control loop to be used.

p2370[0...n] Closed-loop cascade control enable / Csc_ctrl enab

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	1	0

Description: Sets the signal source to switch in/switch out the closed-loop cascade control function.
1 signal: The function is switched in.

Value:
0: Closed-loop cascade control inhibited
1: Closed-loop cascade control enabled

Note
The technology controller must be activated (p2200) and configured (p2251 = 0) in order to use the function.
Negative speed setpoints should be excluded.

p2371 Closed-loop cascade control configuration / Csc_ctrl config

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	8	0

Description: Parameter for configuring the connection and disconnection of external motors to and from the line voltage.

Connecting external motors to the line voltage enables up to three additional drives to be controlled by the technology controller in addition to the main drive. The complete system, therefore, comprises one closed-loop-controlled main drive and up to three other drives, which can be controlled via contactors or motor starters. The contactors or motor starters are switched by the converter's digital outputs (see also r2379).

Switching-in motor:

If the main drive is operated at maximum speed and the deviation at the technology controller input increases further, the control will in addition connect external motors M1 through M3 to the line voltage. At the same time, the main drive is ramped down to the closed-loop cascade control switch-in/switch-out speed (p2378) via the down ramp, so that the total output power can be kept as constant as possible. During this time the technology controller is switched off.

Switching-off the motor:

If the main drive is operated at minimum speed and the deviation at the technology controller input decreases further, the control will disconnect external motors M1 through M3 from the line voltage. At the same time, the main drive is ramped up to the closed-loop cascade control switch-in/switch-out speed (p2378) via the up ramp, so that the total output power can be kept as constant as possible.

Value:

0:	Closed-loop cascade control inhibited
1:	M1 = 1X
2:	M1 = 1X, M2 = 1X
3:	M1 = 1X, M2 = 2X
4:	M1 = 1X, M2 = 1X, M3 = 1X
5:	M1 = 1X, M2 = 1X, M3 = 2X
6:	M1 = 1X, M2 = 2X, M3 = 2X
7:	M1 = 1X, M2 = 1X, M3 = 3X
8:	M1 = 1X, M2 = 2X, M3 = 3X

Dependency: See also: p2372

Note
Selecting 2X means that a motor is switched in with twice the power (as opposed to 1X, which equates to the motor power at the converter).

p2372 Closed-loop cascade control mode motor selection / Csc_ctrl mode

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	3	0

Description: Parameter for selecting the control mode for switching-in and switching-out external motors.

Selection 2 and 3 support selection options for automatically interchanging the motors, which are connected to the line supply.

Value:

0:	Fixed sequence
1:	Closed-loop cascade control after absolute operating hours
2:	Automatic replacement after continuous operating hours

3: Automatic replacement after absolute operating hours

Note

For p2372 = 0:
Motor selection for switching-in/switching-out follows a fixed sequence and is dependent on the closed-loop cascade control configuration (p2371).
For p2372 = 1:
Motor selection for switching-in/switching-out is derived from the operating hours counter p2380. When switching-in, the motor with the least operating hours is connected. When switching-out, the motor with the most operating hours is disconnected.
For p2372 = 2:
Motor selection for switching-in/switching-out is derived from the operating hours counter p2380. When switching-in, the motor with the least operating hours is connected. When switching-out, the motor with the most operating hours is disconnected.
In addition, those motors which have been in operation continuously for longer than the time set in p2381 are interchanged automatically.
If p2371 = 4 (selection of three identical motors), the switch is only performed between two motors, if the required input power of one single external motor is sufficient for the actual operating point.
For p2372 = 3:
Motor selection for switching-in/switching-out is derived from the operating hours counter p2380. When switching-in, the motor with the least operating hours is connected. When switching-out, the motor with the most operating hours is disconnected.
In addition, those motors which have been in operation for a total time longer than that set in p2382 are interchanged automatically.
For p2372 = 2, 3:
This automatic interchange (autochange) is only possible if the designated motor is not in operation. If all motors are in operation, the interchange will not be possible and alarm A07427 appears.
Autochange mode is only possible if p2371 = 2, 4 (motors of the same size).

p2373 Closed-loop cascade control switch-in threshold / Csc_ctrl sw-in thr

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: 9_1	**Unit selection:** p0595	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.0 [%]	200.0 [%]	20.0 [%]

Description: Threshold value for the delayed switching-in or non-delayed switching-out of external motors connected to the line. Motor switching-in is activated if the maximum speed is reached and the wait time in p2374 has expired.

Dependency: See also: p2374

p2374 Closed-loop cascade control switch-in delay / Csc_ctrl t_in_del

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0 [s]	650 [s]	30 [s]

Description: Additional delay time for connecting external motors to the line voltage after the system deviation of the technology controller has exceeded the threshold value p2373 and the motor has reached the maximum speed.

Dependency: See also: p2373

Note

If the deviation at the technology controller input exceeds the overcontrol threshold p2376, the delay time is bypassed.

p2375 Closed-loop cascade control switch-out delay / Csc_ctrl t_out_del

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0 [s]	650 [s]	30 [s]

Description: Additional delay time for the disconnection of external motors from the line after the system deviation of the technology controller has exceeded the threshold p2373 and the motor has reached the minimum speed p1080.

Dependency: See also: p2373, p2376

Note
If the deviation at the technology controller input exceeds the overcontrol threshold -p2376, the delay time is bypassed.

p2376 Closed-loop cascade control overcontrol threshold / Csc_ctr ovctr_thr

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: 9_1	**Unit selection:** p0595	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.0 [%]	200.0 [%]	25.0 [%]

Description: Threshold value for instantaneous switching-in or switching-out external motors.

Note
If the maximum speed is reached and the deviation at the technology controller input exceeds the overcontrol threshold p2376 at the same time, the delay time p2374 is bypassed and the motor is immediately switched-in (connected).
If the minimum speed is reached and the deviation at the technology controller input exceeds the overcontrol threshold -p2376 at the same time, the delay time p2375 is bypassed and the motor is immediately switched-out (disconnected).

p2377 Closed-loop cascade control interlocking time / Csc_ctrl t_interl

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0 [s]	650 [s]	0 [s]

Description: Interlocking time during which, following the connection or disconnection of an external motor, no further motors are connected or disconnected using the closed-loop cascade control. This avoids duplicate switching operations.

p2378 Closed-loop cascade control switch-in/switch-out speed / Csc_ctrl n_in/out

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.0 [%]	100.0 [%]	50.0 [%]

Description: Sets the speed for the main drive, which is approached directly after an external motor has been connected or disconnected.
The parameter value refers to the maximum speed (p1082).

r2379.0...7 CO/BO: Closed-loop cascade control status word / Csc_ctrl ZSW

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the status word of the closed-loop cascade control

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Start external motor 1	Yes	No	-
01	Start external motor 2	Yes	No	-
02	Start external motor 3	Yes	No	-
03	Switch-in motor	Yes	No	-
04	Switch-in/switch-out active	Yes	No	-
05	All motors active	Yes	No	-
06	Automatic replacement not possible	Yes	No	-
07	Alarm active	Yes	No	-

p2380[0...2] Closed-loop cascade control operating hours / Csc_ctrl op_hrs

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.0 [h]	340.28235E36 [h]	0.0 [h]

Description: Displays the operating hours for the external motors.
The display can only be reset to zero.

Index:
[0] = Motor 1
[1] = Motor 2
[2] = Motor 3

p2381 Closed-loop cascade control max time for continuous operation / Csc_ctrl t_max

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.1 [h]	100000.0 [h]	24.0 [h]

Description: Time limit for the continuous operation of external motors.
Continuous operation is measured starting from when a motor is connected to the line voltage. It ends when a motor is disconnected from the line.

p2382 Closed-loop cascade control operating time limit / Csc_ctrl t_max op

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.1 [h]	100000.0 [h]	24.0 [h]

Description: Limit for the total operating time of external motors.
The total operating time of an external motor increases every time it is switched in.

p2383 Closed-loop cascade control switch-out sequence / Csc_ctr sw-out seq

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	1	0

Description: Selection of the response used to stop the motors when the OFF command is sent.

For p2383 = 1:

OFF1 disconnects the external motors from the line in the order 3 - 2 - 1. The time set in p2387 is applied as a delay time between the disconnection of each motor. The main motor is only switched off if all the external motors have already been switched off.

In the case of OFF2 and OFF3, the external motors and the main motor are switched off immediately with the OFF command (same behavior as with p2383 = 0).

Value:

0: Normal stop

1: Sequential stop

> ⚠ **CAUTION**
>
> If p2383 = 1 and the OFF1 command is pending, the main motor will not be stopped until all external motors have been disconnected and time p2387 has elapsed. By switching off the external motors the main motor can be accelerated again.

p2384 Closed-loop cascade control motor switch-on delay / Csc_ctr t_del_on

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.000 [s]	999.000 [s]	0.000 [s]

Description: Delay time once the switch-in conditions have been met until the external motor is switched on.

The activation of the corresponding status bit (r2379) for controlling the contactors or the motor starter is delayed by this time, while the main motor speed already decreases down to the switch-in speed (p2378).

p2385 Closed-loop cascade control holding time switch-in speed / Csc_ctr t_hld n_in

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.000 [s]	999.000 [s]	0.000 [s]

Description: Time during which the switch-in speed (see p2378) of the main motor is maintained after an external motor has been switched-in and the main motor has been decelerated to the switch-in speed.

p2386 Closed-loop cascade control motor switch-off delay / Csc_ctrl t_del_off

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.000 [s]	999.000 [s]	0.000 [s]

Description: Delay time once the switch-out conditions have been met until the external motor is switched off.

The resetting of the corresponding status bit (r2379) for controlling the contactors or the motor starter is delayed by this time, while the main motor ramps up to the switch-out speed (p2378).

p2387 Closed-loop cascade control holding time switch-out speed / CscCtr t_hld n_out

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.000 [s]	999.000 [s]	0.000 [s]

Description: Time during which the switch-out speed (see p2378) of the main motor is maintained after an external motor has been switched-out and the main motor has been accelerated to the switch-out speed.

p2390[0...n] Speed start of hibernation mode / Hib mode n_start

Access level: 3	**Calculated:** CALC_MOD_LIM_REF	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** p2000	**Dynamic index:** DDS, p0180
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 7038
Min:	**Max:**	**Factory setting:**
0.000 [rpm]	21000.000 [rpm]	0.000 [rpm]

Description: Sets the speed for the start of the "hibernation mode" function.

The total speed of this activation threshold is the sum of the minimum speed p1080 and p2390.

If the speed setpoint undershoots this start speed, the delay time in p2391 is started. If the restart threshold is no longer reached before the delay time expires, the hibernation mode boost speed p2395 is impressed for the time period p2394 and then the motor is brought to a standstill via the down ramp of the setpoint channel. The drive is switched off (hibernation mode active). The drive is automatically switched on again as soon as the speed setpoint exceeds the restart threshold.

Note

The speed at which the hibernation mode is started is set to 4 % of the nominal speed when commissioning is completed.

p2391[0...n] Hibernation mode delay time / Hib mode t_delay

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 7038
Min:	**Max:**	**Factory setting:**
0 [s]	3599 [s]	120 [s]

Description: Sets the delay time for the "hibernation mode" function.

To ensure that the drive can be shut down (pulse inhibit), a restart condition must not occur during this time.

Dependency: See also: p2390, p2392, p2393

p2392 Hibernation mode restart value with technology controller / Hib start w/ tec

Access level: 3	**Calculated:** CALC_MOD_LIM_REF	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: 9_1	**Unit selection:** p0595	**Function diagram:** 7038
Min:	**Max:**	**Factory setting:**
0.000 [%]	200.000 [%]	0.000 [%]

Description: Sets the motor restart time with the "Hibernation mode" function.

If the hibernation mode function is active, the technology controller continues to operate and supplies a speed setpoint to the setpoint channel. Since the drive is deactivated, there is no system deviation at the input of the technology controller. As soon as this exceeds the restart value p2392, the drive is automatically switched on and the speed is controlled to 1.05 * (p1080 + p2390) via the up ramp of the setpoint channel.

Note

The restart value is set to 5 % when commissioning is completed.

p2393[0...n] Hibernation mode restart speed relative w/o techn controller / Hib start w/o tec

Access level: 3	**Calculated:** CALC_MOD_LIM_REF	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 7038
Min:	**Max:**	**Factory setting:**
0.000 [rpm]	21000.000 [rpm]	0.000 [rpm]

Description: Sets the starting speed to restart the motor for the "hibernation mode" function.

When the hibernation mode is active, a speed setpoint is still supplied to the setpoint channel. If the setpoint increases again and in so doing exceeds the restart speed, the drive is automatically switched on and the speed setpoint is controlled to p1080 + p2390 + p2393 via the up ramp of the setpoint channel.

The restart speed is the sum of the minimum speed p1080, the hibernation start speed p2390 and the relative restart speed p2393.

Dependency: See also: p1080

Note

The parameter is set to 6 % of the nominal speed when commissioning is exited.

p2394[0...n] Hibernation mode boost time period / Hib mode t_boost

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 7038
Min:	**Max:**	**Factory setting:**
0 [s]	3599 [s]	0 [s]

Description: Sets the boost time period for the "hibernation mode" function.

Before the drive is finally switched off (hibernation mode), the setpoint speed is moved to the boost speed p2395 for the time set in p2394. Depending on the application, this allows the hibernation intervals to be extended (in time).

⚠ CAUTION

The controller is not operational while the boost speed is being impressed. As a result, for example, for pump applications, it must be ensured that the tank does not overflow as a result of the additional boost. For compressors, it must be ensured that the boost speed does not result in an overpressure condition.

Note

For p2394 = 0 s, the following applies:

The boost speed is not used.

p2395[0...n] Hibernation mode boost speed / Hib mode n_boost

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** p2000	**Dynamic index:** DDS, p0180
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 7038
Min:	**Max:**	**Factory setting:**
0.000 [rpm]	21000.000 [rpm]	0.000 [rpm]

Description: Sets the boost speed for the "hibernation mode" function.

The motor is accelerated to the hibernation mode boost speed p2395 for the hibernation mode boost time period p2394 before it is brought to a standstill via the down ramp of the setpoint channel (p1121) and subsequently switched off (pulse inhibit).

Dependency: See also: p2394

⚠ CAUTION

The controller is not operational while the boost speed is being impressed. As a result, for example, for pump applications, it must be ensured that the tank does not overflow as a result of the additional boost. For compressors, it must be ensured that the boost speed does not result in an overpressure condition.

p2396[0...n] Hibernation mode max. shutdown time / Hib t_off max

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 7038
Min:	**Max:**	**Factory setting:**
0 [s]	863999 [s]	0 [s]

Description: Sets the maximum shutdown time for the "Hibernation mode" function.

If the drive is in the hibernation mode (pulse inhibit) then it is switched on again at the latest after the maximum switch-off time has expired. If the restart conditions are fulfilled earlier, then the drive is correspondingly switched on earlier.

⚠ DANGER

The drive automatically powers itself up at the latest after the maximum switch-off time has expired.

⚠ CAUTION

Once the maximum shutdown time has expired, the drive switches itself on automatically and accelerates to the start speed. The technology controller only becomes effective again when this speed is reached (for p2398 = 1).

Depending on the application, for instance for pumps, it should be ensured that as a result of cyclic starts the tank does not overflow or for compressors, an overpressure condition does not occur.

Note

Automatic restart once the maximum OFF time has elapsed is deactivated by setting p2396 = 0 s.

r2397[0...1] CO: Hibernation mode output speed actual / Hib n_outp act

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p2000	**Dynamic index:** -
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 7038
Min:	**Max:**	**Factory setting:**
- [rpm]	- [rpm]	- [rpm]

Description: Display and connector output for the actual output speed for the "hibernation mode" function.

Note

Zero is displayed if the boost or starting speed is not active.

p2398 Hibernation mode operating type / Hib mode op_type

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7038
Min:	**Max:**	**Factory setting:**
0	1	0

Description: Sets the operating mode for the "Hibernation mode" function.

Value:
0: Hibernation mode inhibited
1: Hibernation mode activated

Dependency: See also: p2200, p2251
See also: A07325

⚠ CAUTION

When the "hibernation mode" function is active, the motor can start again automatically.

Note
When the "hibernation mode" function (p2398 = 1) is activated, its behavior is defined as to whether the technology controller is additionally switched in (closed-loop) or switched out (open-loop).
The technology controller is enabled via binector input p2200 and its mode is set in p2251.
p2200 = 0, p2251 = 0:
Hibernation mode operates without technology controller (open-loop)
p2200 = 1, p2251 = 0:
Hibernation mode operates with technology controller (closed-loop)

r2399.0...8 CO/BO: Hibernation mode status words / Hib ZSW

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7038
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display and BICO output for the status word of the "hibernation mode" function.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Hibernation mode enabled (p2398 <> 0)	Yes	No	-
01	Hibernation mode active	Yes	No	-
02	Hibernation mode delay active	Yes	No	-
03	Hibernation boost active	Yes	No	-
04	Hibernation mode motor switched off	Yes	No	-
05	Hibernation mode switched off cyclic restart active	Yes	No	-
06	Hibernation motor motor restarts	Yes	No	-
07	Hibernation mode supplies total setpoint for ramp-fct generator	Yes	No	-
08	Hibernation mode bypasses ramp-fct generator in setpoint channel	Yes	No	-

Dependency: See also: p2398
See also: A07325

p2900[0...n] CO: Fixed value 1 [%] / Fixed value 1 [%]

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** PERCENT	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 1021
Min:	**Max:**	**Factory setting:**
-10000.00 [%]	10000.00 [%]	0.00 [%]

Description: Setting and connector output for a fixed percentage value.

Dependency: See also: p2901, r2902, p2930

NOTICE
A BICO interconnection to a parameter that belongs to a drive data set always acts on the effective data set.

Note
The value can be used to interconnect a scaling function (e.g. scaling the main setpoint).

p2901[0...n] CO: Fixed value 2 [%] / Fixed value 2 [%]

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** PERCENT	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 1021
Min:	**Max:**	**Factory setting:**
-10000.00 [%]	10000.00 [%]	0.00 [%]

Description: Setting and connector output for a fixed percentage value.

Dependency: See also: p2900, p2930

NOTICE
A BICO interconnection to a parameter that belongs to a drive data set always acts on the effective data set.

Note

The value can be used to interconnect a scaling function (e.g. scaling of the supplementary setpoint)

r2902[0...14] CO: Fixed values [%] / Fixed values [%]

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 1021
Min:	**Max:**	**Factory setting:**
- [%]	- [%]	- [%]

Description: Display and connector output for frequently used percentage values.

Index:
[0] = Fixed value +0 %
[1] = Fixed value +5 %
[2] = Fixed value +10 %
[3] = Fixed value +20 %
[4] = Fixed value +50 %
[5] = Fixed value +100 %
[6] = Fixed value +150 %
[7] = Fixed value +200 %
[8] = Fixed value -5 %
[9] = Fixed value -10 %
[10] = Fixed value -20 %
[11] = Fixed value -50 %
[12] = Fixed value -100 %
[13] = Fixed value -150 %
[14] = Fixed value -200 %

Dependency: See also: p2900, p2901, p2930

Note

The signal sources can, for example, be used to interconnect scalings.

p2930[0...n] CO: Fixed value M [Nm] / Fixed value M [Nm]

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** p2003	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 1021
Min:	**Max:**	**Factory setting:**
-100000.00 [Nm]	100000.00 [Nm]	0.00 [Nm]

Description: Setting and connector output for a fixed torque value.

Dependency: See also: p2900, p2901, r2902

NOTICE
A BICO interconnection to a parameter that belongs to a drive data set always acts on the effective data set.

Note
The value can, for example, be used to interconnect a supplementary torque.

r2969[0...6] Flux model value display / Psi_mod val displ

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the values of the direct access flux model for the synchronous reluctance motor (RESM) for diagnostic purposes.
Valid values are only displayed when the pulses are inhibited.
For index 0:
Displays the entered direct axis current id in Arms:
For index 1, 2, 3:
Displays the saturation curves of the direct axis flux psid(id, iq):
- r2969[1]: flux in Vsrms with respect to the direct axis current for iq = 0
- r2969[2]: flux in Vsrms with respect to the direct axis current for iq = 0.5* p2950
- r2969[3]: flux in Vsrms with respect to the direct axis current for iq = p2950
For index 4, 5, 6:
Displays the relative error of the current inversion (id(psid, iq) - id) / p2950:
- r2969[4]: error with respect to direct axis current for iq = 0
- r2969[5]: error with respect to direct axis current for iq = 0.5 * p2950
- r2969[6]: error with respect to direct axis current for iq = p2950

Index: [0] = d-current
[1] = d-flux iq0
[2] = d-flux iq1
[3] = d-flux iq2
[4] = d-current error iq0
[5] = d-current error iq1
[6] = d-current error iq2

Note
RESM: reluctance synchronous motor (synchronous reluctance motor)

p3110 External fault 3 switch-on delay / Ext fault 3 t_on

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 2546
Min:	**Max:**	**Factory setting:**
0 [ms]	1000 [ms]	0 [ms]

Description: Sets the delay time for external fault 3.

Dependency: See also: p2108, p3111, p3112
See also: F07862

p3111[0...n] BI: External fault 3 enable / Ext fault 3 enab

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T, U	**Scaling:** -	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	1

Description: Sets the signal source for the enable signal of external fault 3.
External fault 3 is initiated by the following AND logic operation:
- BI: p2108 negated
- BI: p3111
- BI: p3112 negated

Dependency: See also: p2108, p3110, p3112
See also: F07862

p3112[0...n] BI: External fault 3 enable negated / Ext flt 3 enab neg

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T, U	**Scaling:** -	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source for the negated enable signal of external fault 3.
External fault 3 is initiated by the following AND logic operation:
- BI: p2108 negated
- BI: p3111
- BI: p3112 negated

Dependency: See also: p2108, p3110, p3111
See also: F07862

p3117 Change safety message type / Ch. SI mess type

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	1	0

Description: Sets the re-parameterization of all safety messages for faults and alarms.
The relevant message type during changeover is selected by the firmware.
0: Safety messages are not re-parameterized
1: Safety messages are re-parameterized

Note
A change only becomes effective after a POWER ON.

r3120[0...63] Component fault / Comp fault

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 8060
Min:	**Max:**	**Factory setting:**
0	3	-

Description: Displays the component of the fault which has occurred.

Value: 0: No assignment

1: Control Unit
2: Power Module
3: Motor

Dependency: See also: r0945, r0947, r0948, r0949, r2109, r2130, r2133, r2136, r3122

Note
The buffer parameters are cyclically updated in the background (refer to status signal in r2139).
The structure of the fault buffer and the assignment of the indices is shown in r0945.

r3121[0...63] Component alarm / Comp alarm

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 8065
Min:	**Max:**	**Factory setting:**
0	3	-

Description: Displays the component of the alarm which has occurred.

Value:
0: No assignment
1: Control Unit
2: Power Module
3: Motor

Dependency: See also: r2110, r2122, r2123, r2124, r2125, r2134, r2145, r2146, r3123

Note
The buffer parameters are cyclically updated in the background (refer to status signal in r2139).
The structure of the alarm buffer and the assignment of the indices is shown in r2122.

r3122[0...63] Diagnostic attribute fault / Diag_attr fault

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 8060
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the diagnostic attribute of the fault which has occurred.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Hardware replacement recommended	Yes	No	-
15	Message has gone	Yes	No	-
16	PROFIdrive fault class bit 0	High	Low	-
17	PROFIdrive fault class bit 1	High	Low	-
18	PROFIdrive fault class bit 2	High	Low	-
19	PROFIdrive fault class bit 3	High	Low	-
20	PROFIdrive fault class bit 4	High	Low	-

Dependency: See also: r0945, r0947, r0948, r0949, r2109, r2130, r2133, r2136, r3120

Note

The buffer parameters are cyclically updated in the background (refer to status signal in r2139).
The structure of the fault buffer and the assignment of the indices is shown in r0945.
For bits 20 ... 16:
Bits 20, 19, 18, 17, 16 = 0, 0, 0, 0, 0 --> PROFIdrive message class 0: not assigned
Bits 20, 19, 18, 17, 16 = 0, 0, 0, 0, 1 --> PROFIdrive message class 1: hardware fault/software error
Bits 20, 19, 18, 17, 16 = 0, 0, 0, 1, 0 --> PROFIdrive message class 2: line fault
Bits 20, 19, 18, 17, 16 = 0, 0, 0, 1, 1 --> PROFIdrive message class 3: supply voltage fault
Bits 20, 19, 18, 17, 16 = 0, 0, 1, 0, 0 --> PROFIdrive message class 4: DC link fault
Bits 20, 19, 18, 17, 16 = 0, 0, 1, 0, 1 --> PROFIdrive message class 5: power electronics faulted
Bits 20, 19, 18, 17, 16 = 0, 0, 1, 1, 0 --> PROFIdrive message class 6: overtemperature electronic components
Bits 20, 19, 18, 17, 16 = 0, 0, 1, 1, 1 --> PROFIdrive message class 7: ground fault/phase fault detected
Bits 20, 19, 18, 17, 16 = 0, 1, 0, 0, 0 --> PROFIdrive message class 8: motor overload
Bits 20, 19, 18, 17, 16 = 0, 1, 0, 0, 1 --> PROFIdrive message class 9: communication error to the higher-level control
Bits 20, 19, 18, 17, 16 = 0, 1, 0, 1, 0 --> PROFIdrive message class 10: safe monitoring channel has identified an error
Bits 20, 19, 18, 17, 16 = 0, 1, 0, 1, 1 --> PROFIdrive message class 11: incorrect position actual value/speed actual value or not available
Bits 20, 19, 18, 17, 16 = 0, 1, 1, 0, 0 --> PROFIdrive message class 12: internal (DRIVE-CLiQ) communication error
Bits 20, 19, 18, 17, 16 = 0, 1, 1, 0, 1 --> PROFIdrive message class 13: infeed unit faulted
Bits 20, 19, 18, 17, 16 = 0, 1, 1, 1, 0 --> PROFIdrive message class 14: braking controller/Braking Module faulted
Bits 20, 19, 18, 17, 16 = 0, 1, 1, 1, 1 --> PROFIdrive message class 15: line filter faulted
Bits 20, 19, 18, 17, 16 = 1, 0, 0, 0, 0 --> PROFIdrive message class 16: external measured value/signal state outside the permissible range
Bits 20, 19, 18, 17, 16 = 1, 0, 0, 0, 1 --> PROFIdrive message class 17: application/technology function faulted
Bits 20, 19, 18, 17, 16 = 1, 0, 0, 1, 0 --> PROFIdrive message class 18: error in the parameterization/configuration/commissioning sequence
Bits 20, 19, 18, 17, 16 = 1, 0, 0, 1, 1 --> PROFIdrive message class 19: general drive fault
Bits 20, 19, 18, 17, 16 = 0, 1, 1, 0, 0 --> PROFIdrive message class 20: auxiliary unit faulted

r3123[0...63] Diagnostic attribute alarm / Diag_attr alarm

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 8065
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the diagnostic attribute of the alarm which has occurred.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Hardware replacement recommended	Yes	No	-
11	Alarm class bit 0	High	Low	-
12	Alarm class bit 1	High	Low	-
13	Maintenance required	Yes	No	-
14	Maintenance urgently required	Yes	No	-
15	Message has gone	Yes	No	-
16	PROFIdrive fault class bit 0	High	Low	-
17	PROFIdrive fault class bit 1	High	Low	-
18	PROFIdrive fault class bit 2	High	Low	-
19	PROFIdrive fault class bit 3	High	Low	-
20	PROFIdrive fault class bit 4	High	Low	-

Dependency: See also: r2110, r2122, r2123, r2124, r2125, r2134, r2145, r2146, r3121

Note

The buffer parameters are cyclically updated in the background (refer to status signal in r2139).
The structure of the alarm buffer and the assignment of the indices is shown in r2122.
For bit 12, 11:
These status bits are used for the classification of internal alarm classes and are intended for diagnostic purposes only on certain automation systems with integrated SINAMICS functionality.
For bits 20 ... 16:
Bits 20, 19, 18, 17, 16 = 0, 0, 0, 0, 0 --> PROFIdrive message class 0: not assigned
Bits 20, 19, 18, 17, 16 = 0, 0, 0, 0, 1 --> PROFIdrive message class 1: hardware fault/software error
Bits 20, 19, 18, 17, 16 = 0, 0, 0, 1, 0 --> PROFIdrive message class 2: line fault
Bits 20, 19, 18, 17, 16 = 0, 0, 0, 1, 1 --> PROFIdrive message class 3: supply voltage fault
Bits 20, 19, 18, 17, 16 = 0, 0, 1, 0, 0 --> PROFIdrive message class 4: DC link fault
Bits 20, 19, 18, 17, 16 = 0, 0, 1, 0, 1 --> PROFIdrive message class 5: power electronics faulted
Bits 20, 19, 18, 17, 16 = 0, 0, 1, 1, 0 --> PROFIdrive message class 6: overtemperature electronic components
Bits 20, 19, 18, 17, 16 = 0, 0, 1, 1, 1 --> PROFIdrive message class 7: ground fault/phase fault detected
Bits 20, 19, 18, 17, 16 = 0, 1, 0, 0, 0 --> PROFIdrive message class 8: motor overload
Bits 20, 19, 18, 17, 16 = 0, 1, 0, 0, 1 --> PROFIdrive message class 9: communication error to the higher-level control
Bits 20, 19, 18, 17, 16 = 0, 1, 0, 1, 0 --> PROFIdrive message class 10: safe monitoring channel has identified an error
Bits 20, 19, 18, 17, 16 = 0, 1, 0, 1, 1 --> PROFIdrive message class 11: incorrect position actual value/speed actual value or not available
Bits 20, 19, 18, 17, 16 = 0, 1, 1, 0, 0 --> PROFIdrive message class 12: internal (DRIVE-CLiQ) communication error
Bits 20, 19, 18, 17, 16 = 0, 1, 1, 0, 1 --> PROFIdrive message class 13: infeed unit faulted
Bits 20, 19, 18, 17, 16 = 0, 1, 1, 1, 0 --> PROFIdrive message class 14: braking controller/Braking Module faulted
Bits 20, 19, 18, 17, 16 = 0, 1, 1, 1, 1 --> PROFIdrive message class 15: line filter faulted
Bits 20, 19, 18, 17, 16 = 1, 0, 0, 0, 0 --> PROFIdrive message class 16: external measured value/signal state outside the permissible range
Bits 20, 19, 18, 17, 16 = 1, 0, 0, 0, 1 --> PROFIdrive message class 17: application/technology function faulted
Bits 20, 19, 18, 17, 16 = 1, 0, 0, 1, 0 --> PROFIdrive message class 18: error in the parameterization/configuration/commissioning sequence
Bits 20, 19, 18, 17, 16 = 1, 0, 0, 1, 1 --> PROFIdrive message class 19: general drive fault
Bits 20, 19, 18, 17, 16 = 0, 1, 1, 0, 0 --> PROFIdrive message class 20: auxiliary unit faulted

r3131 CO: Actual fault value / Act fault val

Access level: 3	**Calculated:** -	**Data type:** Integer32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 8060
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the fault value of the oldest active fault.

Dependency: See also: r2131, r3132

r3132 CO: Actual component number / Comp_no act

Access level: 3	**Calculated:** -	**Data type:** Integer32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 8060
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the component number of the oldest fault that is still active.

Dependency: See also: r2131, r3131

p3230[0...n] CI: Load monitoring speed actual value / Load monit n_act

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / FloatingPoint32
Can be changed: T	**Scaling:** p2000	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 8012, 8013
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source for the speed actual value of the load monitoring.

Dependency: See also: r2169, p2181, p2192, p2193, p3231

See also: A07920, A07921, A07922, F07923, F07924, F07925

Note

The parameter is only effective for p2193 = 2.

p3231[0...n] Load monitoring speed deviation / Load monit n_dev

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** 8013
Min:	**Max:**	**Factory setting:**
0.00 [rpm]	210000.00 [rpm]	150.00 [rpm]

Description: Sets the permissible speed deviation during load monitoring (for p2193 = 2).

Dependency: See also: r2169, p2181, p2193, p3230

See also: A07920, A07921, A07922, F07923, F07924, F07925

p3232[0...n] BI: Load monitoring failure detection / Load_moni fail_det

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T, U	**Scaling:** -	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 8013
Min:	**Max:**	**Factory setting:**
-	-	1

Description: Sets the signal source for detecting a failure.

Dependency: See also: p2192, p2193

See also: F07936

Note

Monitoring is triggered with a 0 signal, as soon as the time in p2192 has expired.

p3233[0...n] Torque actual value filter time constant / M_act_filt T

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 8013
Min:	**Max:**	**Factory setting:**
0 [ms]	1000000 [ms]	100 [ms]

Description: Sets the time constant for the PT1 element to smooth the torque actual value.

The smoothed torque actual value is compared with the threshold values and is only used for messages and signals.

p3235 Phase failure signal motor monitoring time / Ph_fail t_monit

Access level: 4 | **Calculated:** - | **Data type:** FloatingPoint32
Can be changed: T, U | **Scaling:** - | **Dynamic index:** -
Unit group: - | **Unit selection:** - | **Function diagram:** -
Min: 0 [ms] | **Max:** 2000 [ms] | **Factory setting:** 320 [ms]

Description: Sets the monitoring time for phase failure detection of the motor.

NOTICE

After the value has been modified, no further parameter modifications can be made and the status is shown in r3996. Modifications can be made again when r3996 = 0.

Note

For p3235 = 0 the function is deactivated.
The monitoring is automatically deactivated during a flying restart for a motor that is still rotating.
3-phase phase failures cannot be detected and are indicated by other messages (e.g. F07902).

r3313 Efficiency optimization 2 optimum flux / Optimum flux

Access level: 3 | **Calculated:** - | **Data type:** FloatingPoint32
Can be changed: - | **Scaling:** r2004 | **Dynamic index:** -
Unit group: - | **Unit selection:** - | **Function diagram:** 6722, 6837
Min: - [%] | **Max:** - [%] | **Factory setting:** - [%]

Description: Displays the calculated, optimum flux.

Dependency: See also: p1401, p3315, p3316

Note

The function is activated via p1401.14 = 1.

p3315[0...n] Efficiency optimization 2 minimum flux limit value / Min flux lim val

Access level: 3 | **Calculated:** - | **Data type:** FloatingPoint32
Can be changed: T, U | **Scaling:** - | **Dynamic index:** DDS, p0180
Unit group: - | **Unit selection:** - | **Function diagram:** 6722, 6837
Min: 10.0 [%] | **Max:** 200.0 [%] | **Factory setting:** 50.0 [%]

Description: Sets the minimal limit value for the calculated optimum flux.

Dependency: See also: p1401, r3313, p3316

Note

The function is activated via p1401.14 = 1.

p3316[0...n] Efficiency optimization 2 maximum flux limit value / Max flux lim val

Access level: 3 | **Calculated:** - | **Data type:** FloatingPoint32
Can be changed: T, U | **Scaling:** - | **Dynamic index:** DDS, p0180
Unit group: - | **Unit selection:** - | **Function diagram:** 6722, 6837
Min: 10.0 [%] | **Max:** 200.0 [%] | **Factory setting:** 110.0 [%]

Description: Sets the maximum limit value for the calculated optimum flux.

Dependency: See also: p1401, r3313, p3315

Note

The function is activated via p1401.14 = 1.

p3320[0...n] Fluid flow machine power point 1 / Fluid_mach P1

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.00	100.00	25.00

Description: For the energy-saving display of a fluid-flow machine, a typical flow characteristic P = f(n) with 5 points along the characteristic is required.

This parameter specifies the power (P) of point 1 as a [%].

The characteristic comprises the following value pairs:

Power (P) / speed (n)

p3320 / p3321 --> point 1 (P1 / n1)

p3322 / p3323 --> point 2 (P2 / n2)

p3324 / p3325 --> point 3 (P3 / n3)

p3326 / p3327 --> point 4 (P4 / n4)

p3328 / p3329 --> point 5 (P5 / n5)

Dependency: See also: r0041, p3321, p3322, p3323, p3324, p3325, p3326, p3327, p3328, p3329

Note

The reference value for power and speed is the rated power/rated speed.

The energy saved is displayed in r0041.

p3321[0...n] Fluid flow machine speed point 1 / Fluid_mach n1

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.00	100.00	0.00

Description: For the energy-saving display of a fluid-flow machine, a typical flow characteristic P = f(n) with 5 points along the characteristic is required.

This parameter specifies the speed (n) of point 1 as a [%].

The characteristic comprises the following value pairs:

Power (P) / speed (n)

p3320 / p3321 --> point 1 (P1 / n1)

p3322 / p3323 --> point 2 (P2 / n2)

p3324 / p3325 --> point 3 (P3 / n3)

p3326 / p3327 --> point 4 (P4 / n4)

p3328 / p3329 --> point 5 (P5 / n5)

Dependency: See also: r0041, p3320, p3322, p3323, p3324, p3325, p3326, p3327, p3328, p3329

Note

The reference value for power and speed is the rated power/rated speed.

The energy saved is displayed in r0041.

p3322[0...n] Fluid flow machine power point 2 / Fluid_mach P2

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.00	100.00	50.00

Description: For the energy-saving display of a fluid-flow machine, a typical flow characteristic P = f(n) with 5 points along the characteristic is required.

This parameter specifies the power (P) of point 2 as a [%].

Dependency: See also: r0041, p3320, p3321, p3323, p3324, p3325, p3326, p3327, p3328, p3329

Note

The reference value for power and speed is the rated power/rated speed.

The energy saved is displayed in r0041.

p3323[0...n] Fluid flow machine speed point 2 / Fluid_mach n2

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.00	100.00	25.00

Description: For the energy-saving display of a fluid-flow machine, a typical flow characteristic P = f(n) with 5 points along the characteristic is required.

This parameter specifies the speed (n) of point 2 as a [%].

Dependency: See also: r0041, p3320, p3321, p3322, p3324, p3325, p3326, p3327, p3328, p3329

Note

The reference value for power and speed is the rated power/rated speed.

The energy saved is displayed in r0041.

p3324[0...n] Fluid flow machine power point 3 / Fluid_mach P3

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.00	100.00	77.00

Description: For the energy-saving display of a fluid-flow machine, a typical flow characteristic P = f(n) with 5 points along the characteristic is required.

This parameter specifies the power (P) of point 3 as a [%].

Dependency: See also: r0041, p3320, p3321, p3322, p3323, p3325, p3326, p3327, p3328, p3329

Note

The reference value for power and speed is the rated power/rated speed.

The energy saved is displayed in r0041.

p3325[0...n] Fluid flow machine speed point 3 / Fluid_mach n3

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.00	100.00	50.00

Description: For the energy-saving display of a fluid-flow machine, a typical flow characteristic P = f(n) with 5 points along the characteristic is required.

This parameter specifies the speed (n) of point 3 as a [%].

Dependency: See also: r0041, p3320, p3321, p3322, p3323, p3324, p3326, p3327, p3328, p3329

Note

The reference value for power and speed is the rated power/rated speed.

The energy saved is displayed in r0041.

p3326[0...n] Fluid flow machine power point 4 / Fluid_mach P4

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.00	100.00	92.00

Description: For the energy-saving display of a fluid-flow machine, a typical flow characteristic P = f(n) with 5 points along the characteristic is required.

This parameter specifies the power (P) of point 4 as a [%].

Dependency: See also: r0041, p3320, p3321, p3322, p3323, p3324, p3325, p3327, p3328, p3329

Note

The reference value for power and speed is the rated power/rated speed.

The energy saved is displayed in r0041.

p3327[0...n] Fluid flow machine speed point 4 / Fluid_mach n4

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.00	100.00	75.00

Description: For the energy-saving display of a fluid-flow machine, a typical flow characteristic P = f(n) with 5 points along the characteristic is required.

This parameter specifies the speed (n) of point 4 as a [%].

Dependency: See also: r0041, p3320, p3321, p3322, p3323, p3324, p3325, p3326, p3328, p3329

Note

The reference value for power and speed is the rated power/rated speed.

The energy saved is displayed in r0041.

p3328[0...n] Fluid flow machine power point 5 / Fluid_mach P5

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.00	100.00	100.00

Description: For the energy-saving display of a fluid-flow machine, a typical flow characteristic P = f(n) with 5 points along the characteristic is required.

This parameter specifies the power (P) of point 5 as a [%].

Dependency: See also: r0041, p3320, p3321, p3322, p3323, p3324, p3325, p3326, p3327, p3329

Note

The reference value for power and speed is the rated power/rated speed.

The energy saved is displayed in r0041.

p3329[0...n] Fluid flow machine speed point 5 / Fluid_mach n5

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.00	100.00	100.00

Description: For the energy-saving display of a fluid-flow machine, a typical flow characteristic P = f(n) with 5 points along the characteristic is required.
This parameter specifies the speed (n) of point 5 as a [%].

Dependency: See also: r0041, p3320, p3321, p3322, p3323, p3324, p3325, p3326, p3327, p3328

Note
The reference value for power and speed is the rated power/rated speed.
The energy saved is displayed in r0041.

p3330[0...n] BI: 2/3 wire control command 1 / 2/3 wire cmd 1

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T, U	**Scaling:** -	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 2272, 2273
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source for command 1 for the two-wire control/three-wire control.

Dependency: See also: p3331, p3332, r3333, p3334

p3331[0...n] BI: 2/3 wire control command 2 / 2/3 wire cmd 2

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T, U	**Scaling:** -	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 2272, 2273
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source for command 2 for the two-wire control/three-wire control.

Dependency: See also: p3330, p3332, r3333, p3334

p3332[0...n] BI: 2/3 wire control command 3 / 2/3 wire cmd 3

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T, U	**Scaling:** -	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** 2273
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source for command 3 for the two-wire control/three-wire control.

Dependency: See also: p3330, p3331, r3333, p3334

r3333.0...3 CO/BO: 2/3 wire control control word / 2/3 wire STW

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 2272, 2273
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the control word for the two wire control/three wire control.
The control signals are dependent on the signal states at the digital inputs.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	ON	Yes	No	-
01	Reversing	Yes	No	-
02	ON inverted	Yes	No	-
03	Reversing inverted	Yes	No	-

Dependency: See also: p3330, p3331, p3332, p3334

p3334 2/3 wire control selection / 2/3 wire select

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 2272, 2273
Min:	**Max:**	**Factory setting:**
0	4	0

Description: Sets the two wire control/three wire control.

Value:
- 0: No wire control
- 1: Two wire control clockwise/counterclockwise 1
- 2: Two wire control clockwise/counterclockwise 2
- 3: Three wire control enable clockwise/counterclockwise
- 4: Three wire control enable ON/reversing

Dependency: See also: p3330, p3331, p3332, r3333

p3340[0...n] BI: Limit switch start / Lim switch start

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source for the start of motion dependent on the sign of the setpoint.

Dependency: See also: p3342, p3343, r3344

See also: A07352

p3342[0...n] BI: Limit switch plus / Lim switch plus

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	1

Description: Sets the signal source for the limit switch plus.

BI: p3342 = 1-signal:

Limit switch is inactive.

BI: p3342 = 0 signal:

Limit switch is active.

Dependency: See also: p3340, p3343, r3344

Note

For p1113 = 0, the drive traverses with a positive speed setpoint towards the positive limit switch – or for p1113 = 1 with a negative speed setpoint.

p3343[0...n] BI: Limit switch minus / Lim switch minus

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	1

Description: Sets the signal source for the limit switch minus.
BI: p3343 = 1-signal:
Limit switch is inactive.
BI: p3343 = 0 signal:
Limit switch is active.

Dependency: See also: p3340, p3342, r3344

Note
For p1113 = 0, the drive traverses with a negative speed setpoint towards the minus limit switch – or for p1113 = 1 with a positive speed setpoint.

r3344.0...5 CO/BO: Limit switch status word / Lim sw ZSW

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display and BICO output for the status word of the limit switch.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Limit switch ON/OFF1	Yes	No	-
01	Limit switch OFF3	No	Yes	-
02	Limit switch axis stationary (standstill)	Yes	No	-
04	Plus limit switch reached	Yes	No	-
05	Minus limit switch reached	Yes	No	-

Dependency: See also: p3340, p3342, p3343

Note
For bit 00 = 1:
The limit switch enables motion.
For example, this bit can be used for interconnection with binector input p0840 (ON/OFF1).
For bit 01 = 0:
The drive cannot be moved as a result of the limit switch function (e.g. as a result of the switching on inhibited).
For example, this bit can be used for interconnection with binector input p0848 (OFF3).
For bit 02 = 1:
The axis is at zero speed.
For bit 04 = 1:
The plus limit switch reached.
For bit 05 = 1:
The minus limit switch reached.

p3380 Forming activation/duration / Form act/duration

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.0 [h]	10.0 [h]	0.0 [h]

Description: Setting to activate the "DC link capacitor forming" function.
This value also defines the forming duration.
The function is deactivated with p3380 = 0.

Recommendation: Recommended forming duration depending on the storage time:
1 - 2 years: p3380 = 1 hour
2 - 3 years: p3380 = 2 hours
>3 years: p3380 = 8 hours

Dependency: The "DC link capacitor forming" function can only be executed when commissioning the power unit (p0010 = 2). The function is automatically deactivated (p3380 = 0) once commissioning has been exited (p0010 = 0).

Procedure when forming:

1. Activate power unit commissioning (p0010 = 2).
2. Activate forming (p3380 > 0, value, see recommendation).
3. Switch on the drive unit (p0840 = 0/1 signal).
4. Wait for forming to be completed (r3381 = 0).
5. Exit power unit commissioning (p0010 = 0).

See also: r3381, r3382

See also: F07390, A07391

NOTICE
If drive units are not commissioned within 2 years after their original manufacture, then the DC link capacitors must be reformed before use. If this is not done, then the units could be damaged in operation.

Note

The "DC link capacitor forming" function can only be activated online in the drive unit.

If switched off while forming is active, the remaining time (r3381) is lost, and forming must be repeated for the full forming time. If the forming duration is changed, then forming starts again from the beginning.

r3381 Forming remaining time / Forming t_remain

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
- [h]	- [h]	- [h]

Description: Displays the remaining time after activating the "DC link capacitor forming" function.

Dependency: See also: p3380, r3382

r3382 Forming status word / Forming ZSW

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the status word of the "DC link capacitor forming" function.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Forming activated	Yes	No	-
01	Forming active	Yes	No	-
02	Forming completed	Yes	No	-
03	Forming fault	Yes	No	-

Dependency: See also: p3380, r3381

See also: F07390, A07391

Note
For bit 00 = 1:
The parameter for activation/duration has been set (p3380 > 0) - however, forming has still not been started (p0840 = 0 signal).
For bit 01 = 1:
The parameter for activation/duration has been set (p3380 > 0) - however, forming has still not been started (p0840 = 0/1 signal).
This status is displayed through alarm A07391.
The procedure can be interrupted via binector input p0840, p0844, p0848 (r3382.1 = 0) - and reactivated again using p0840.
For bit 03 = 1:
Forming was not able to be successfully performed within the set duration.
This status is displayed using fault F07390.

p3855[0...n] DC quantity controller configuration / Rect_ctrl config

Access level: 3 | **Calculated:** CALC_MOD_LIM_REF | **Data type:** Unsigned32

Can be changed: T, U | **Scaling:** - | **Dynamic index:** DDS, p0180

Unit group: - | **Unit selection:** - | **Function diagram:** 6797, 6844, 6855

Min: - | **Max:** - | **Factory setting:** 0111 bin

Description: Sets the configuration for the DC quantity controller in the overmodulation range.

There is no DC quantity control for power units that can also be connected through 1 phase to the line supply (r0204.15 = 1).

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	DC quantity controller on	Yes	No	-
01	Bandwidth increased	Yes	No	-
02	7th harmonic reduced	Yes	No	-
03	Filter active	Yes	No	-

Dependency: The modulator mode p1802 must enable operation in the overmodulation range. In addition, the overmodulation limit p1803 must be greater than 103 %.

Set the modulator mode p1802 = 10, if the DC quantity control is deactivated and overmodulation is to be prevented.

NOTICE
Motor identification must be carried out before activating the DC quantity control in the overmodulation range.

p3856[0...n] Compound braking current / Compound I_brake

G120XA_USS (Compound brake)

Access level: 3 | **Calculated:** - | **Data type:** FloatingPoint32

Can be changed: T, U | **Scaling:** PERCENT | **Dynamic index:** DDS, p0180

Unit group: - | **Unit selection:** - | **Function diagram:** -

Min: 0.00 [%] | **Max:** 250.00 [%] | **Factory setting:** 0.00 [%]

Description: Compound braking current is used to define the amount of DC current that is produced on stopping the motor during U/f operation to further increase the DC braking function.

Compound braking is a superimposition of the DC braking function with regenerative braking (net braking along the ramp) after OFF1 or OFF3. This permits braking with controlled motor frequency and minimum power input into the motor.

Effective braking without using additional hardware components is obtained by optimizing the ramp down time and compound braking.

Dependency: The compound braking current is only activated if the DC link voltage exceeds the threshold value in r1282.
Compound braking does not operate in the following cases:
- DC braking activated (p1230, r1239).
- motor is still not magnetized (e.g. for flying restart).
- vector control parameterized (p1300 >= 20).
- synchronous motor used (p0300 = 2xx).

NOTICE
Generally, increasing the braking current improves the braking effect when stopping the motor. However, if the value is set too high, then the drive can be tripped (shut down) as a result of overcurrent or ground fault. Recommendation: p3856 < 100 % x (r0209 - r0331) / p0305 / 2 Compound braking generates a current in the motor with a ripple manifesting the rotational frequency. The higher the braking current is set, the higher the resulting ripple, especially when the Vdc_max control is simultaneously active (refer to p1280).

Note
The parameter value is entered relative to the rated motor current (p0305).
Compound braking is deactivated with p3856 = 0%.

p3857[0...n] DC quantity controller P gain / DC_ctrl Kp

Access level: 3	**Calculated:** CALC_MOD_CON	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 6797
Min:	**Max:**	**Factory setting:**
0.000	100000.000	0.000

Description: Sets the proportional gain of the DC quantity controller for the overmodulation range.

p3858[0...n] DC quantity controller integral time / DC_ctrl Tn

Access level: 3	**Calculated:** CALC_MOD_CON	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** 6797
Min:	**Max:**	**Factory setting:**
0.00 [ms]	1000.00 [ms]	2.00 [ms]

Description: Sets the integral time for the DC quantity controller.

r3859.0...1 CO/BO: Compound braking/DC quantity control status word / Comp-br/DC_ctr ZSW

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 6797
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display and connector output for the status word of the compound braking and DC quantity control.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Compound braking active	Yes	No	-
01	DC quantity control active in the overmodulation range	Yes	No	-

Dependency: See also: p3856

p3880 BI: ESM activation signal source / ESM act s_s

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7033
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source to activate the essential service mode (ESM) via digital input.

Using this function, when required the motor can be operated for as long as possible (e.g. to extract smoke).

BI: p3880 = 1 signal:

The essential service mode is activated.

BI: p3880 = 0 signal:

The essential service mode is deactivated.

Dependency: See also: p3881, p3882, p3883, p3884, r3887, p3888, r3889

⚠ WARNING

When activating the essential service mode (BI: p3880 = 1 signal), the motor immediately runs according to the selected setpoint source. When the essential service mode is activated, the motor cannot be stopped using the OFF commands.

Note

ESM: Essential Service Mode

Permissible signal sources:

- BO: r0722.x (high active)
- BO: r0723.x (low active), x = 0 ... 5, 11, 12

p3881 ESM setpoint source / ESM setp_src

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7033
Min:	**Max:**	**Factory setting:**
0	7	0

Description: Sets the setpoint source for essential service mode (ESM).

Value:

0: Last known setpoint (r1078 smoothed)
1: Fixed speed setpoint 15 (p1015)
2: Control Unit analog input 0 (AI 0, r0755[0])
3: Fieldbus
4: Technology controller
6: Enable the response OFF1
7: Enable the response OFF2

⚠ WARNING

For p3881 = 4:

If the technology controller is used as setpoint source, then this must first be configured. p2251 must be set to 0.

Note
ESM: Essential Service Mode
When the essential service mode is activated, the effective speed setpoint is displayed in r1114.
For p3881 = 0:
The last known setpoint value will be transmitted immediately when the essential service mode is activated.
For p3881 = 6:
n_act = 0: pulse suppression and switching on inhibited.
n_active > 0: braking along the ramp-function generator down ramp (p1121), pulse cancellation and switching on inhibited.
For p3881 = 7:
n_act = 0: pulse suppression and switching on inhibited.
n_act > 0: immediate pulse cancellation and switching on inhibited.

p3882 ESM setpoint source alternative / ESM setp_src alt

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7033
Min:	**Max:**	**Factory setting:**
0	2	0

Description: Sets the alternative setpoint source for essential service mode (ESM).
This setpoint is used when the setpoint source set in p3881 is lost.

Value:
0: Last known setpoint (r1078 smoothed)
1: Fixed speed setpoint 15 (p1015)
2: Maximum speed (p1082)

Dependency: See also: p3881

Note
ESM: Essential Service Mode
The alternative setpoint source is only active for p3881 = 2, 3, 4.

p3883 BI: ESM direction of rotation signal source / ESM rot dir s_s

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7033
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source for the direction of rotation during essential service mode (ESM).
p3883 = 1 signal:
Direction of rotation of the setpoint, parameterized for essential service mode, is reversed.
p3883 = 0 signal:
Direction of rotation of the setpoint parameterized for essential service mode is kept.

⚠ WARNING
The direction reversal is not taken into account if p3881 = 4 is set (technology controller) and the technology controller is also active as the setpoint source.

Note
ESM: Essential Service Mode

p3884 CI: ESM setpoint technology controller / ESM setp tech_ctrl

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / FloatingPoint32
Can be changed: T, U	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7033
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source for the setpoint for p3881 = 4 (technology controller) in the essential service mode (ESM).

Dependency: See also: p3881

Note
ESM: Essential Service Mode
For p3884 = 0:
The technology controller uses the setpoint from p2253.

r3887[0...1] ESM number of activations/faults / ESM act/fault qty

Access level: 4	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7033
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the number of activations and faults that have occurred for the essential service mode (ESM).

Index:
[0] = Activation of the essential service mode
[1] = Faults during the essential service mode

Dependency: See also: p3888

Note
ESM: Essential Service Mode

p3888 ESM reset number of activations/faults / ESM act/F qty r

Access level: 4	**Calculated:** -	**Data type:** Unsigned8
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7033
Min:	**Max:**	**Factory setting:**
0	1	0

Description: Setting to reset the number of activations and faults that have occurred for the essential service mode (ESM).
1: counter reset active (r3887[0, 1])
0: inactive

Dependency: See also: r3887

Note
ESM: Essential Service Mode
The parameter is automatically reset to zero after the counter has been reset.

r3889.0...10 CO/BO: ESM status word / ESM ZSW

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7033
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display and BICO output for the status word of the essential service mode (ESM).

Bit field:

Bit	Signal name	1 signal	0 signal	FP

00	Essential service mode (ESM) activated	Yes	No	-
01	Direction of rotation inverted	Yes	No	-
02	Setpoint signal lost	Yes	No	-
03	Technology controller actual value (p2264) lost	Yes	No	-
04	Bypass active	Yes	No	-
05	Setpoint technology controller parameterized (p3884)	Yes	No	-
06	Technology controller during essential service mode active	Yes	No	-
09	Response OFF1/OFF2 activated	Yes	No	-
10	Automatic restart interrupted (F07320)	Yes	No	-

Note
ESM: Essential Service Mode

p3900 Completion of quick commissioning / Compl quick_comm

Access level: 1	**Calculated:** -	**Data type:** Integer16
Can be changed: C2(1)	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	3	0

Description: Exits quick commissioning (p0010 = 1) with automatic calculation of all parameters of all existing drive data sets that depend on the entries made during quick commissioning.

p3900 = 1 initially includes a parameter reset (factory setting, the same as p0970 = 1) for all parameters of the drive object; however, without overwriting the entries made during the quick commissioning.

The interconnections via p15 and p1500 are re-established and all of the dependent motor, open-loop and control-loop control parameters are calculated (corresponding to p0340 = 1).

p3900 = 2 includes the restoration of the interconnections via p15 and p1500 and the calculations corresponding to p0340 = 1.

p3900 = 3 only includes the calculations associated with the motor, open-loop and closed-loop control parameters corresponding to p0340 = 1.

Value:
0: No quick parameterization
1: Quick parameterization after parameter reset
2: Quick parameterization (only) for BICO and motor parameters
3: Quick parameterization for motor parameters (only)

NOTICE
After the value has been modified, no further parameter modifications can be made and the status is shown in r3996. Modifications can be made again when r3996 = 0.

Note
When the calculations have been completed, p3900 and p0010 are automatically reset to a value of zero.
When calculating motor, open-loop and closed-loop control parameters (such as for p0340 = 1) parameters associated with a selected Siemens catalog motor are not overwritten.
If a catalog motor has not been selected (p0300), then the following parameters are reset with p3900 > 0 in order to restore the situation that applied when commissioning the drive for the first time:
induction motor: p0320, p0352, p0362 ... p0369, p0604, p0605, p0626 ... p0628
synchronous motor: p0326, p0327, p0352, p0604, p0605

r3925[0...n] Identification final display / Ident final_disp

Access level: 3	**Calculated:** CALC_MOD_ALL	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the commissioning steps that have been carried out.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Motor/control parameters calculated (p0340 = 1, p3900 > 0)	Yes	No	-
02	Motor data identification carried out at standstill (p1910 = 1)	Yes	No	-
03	Rotating measurement carried out (p1960 = 1, 2)	Yes	No	-
08	Identified motor data are automatically backed up	Yes	No	-
11	Automatic parameterization as Standard Drive Control	Yes	No	-
12	Automatic parameterization as Dynamic Drive Control	Yes	No	-
14	First motor commissioning	Yes	No	-
15	Equivalent circuit diagram parameters changed	Yes	No	-
18	Circle identification executed	Yes	No	-

Note

The individual bits are only set if the appropriate action has been initiated and successfully completed.

The identification final display is reset when changing the type plate parameters.

r3926[0...n] Voltage generation alternating base voltage amplitude / U_gen altern base

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
- [V]	- [V]	- [V]

Description: Displays the base voltage for the alternating voltage in the context of motor data identification.

0:

No alternating voltages. The function is deactivated.

<0:

Automatic determination of the base voltage and wobbulation / self-setting based on the converter and the connected motor.

Otherwise:

Base voltage for alternating current generation in volts (wobbulation active).

r3927[0...n] Motor data identification control word / MotID STW

Access level: 3	**Calculated:** CALC_MOD_ALL	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Successfully completed component of the last motor data identification carried out.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Stator inductance estimate no measurement	Yes	No	-
02	Rotor time constant estimate no measurement	Yes	No	-
03	Leakage inductance estimate no measurement	Yes	No	-
05	Determine Tr and Lsig evaluation in the time range	Yes	No	-
06	Activate vibration damping	Yes	No	-
07	Deactivate vibration detection	Yes	No	-
11	Deactivate pulse measurement Lq Ld	Yes	No	-
12	Deactivate rotor resistance Rr measurement	Yes	No	-
14	Deactivate valve interlocking time measurement	Yes	No	-
15	Determine only stator resistance, valve voltage fault, dead time	Yes	No	-
16	Short motor identification (lower quality)	Yes	No	-

17	Measurement without control parameter calculation	Yes	No	-
18	After motID direct transition into operation	Yes	No	-
19	After MotID automatically save results	Yes	No	-
20	Estimate cable resistance	Yes	No	-
21	Calibrating the output voltage measurement	Yes	No	-
22	Only identify circle	Yes	No	-
23	Deactivate circle identification	Yes	No	-
24	Circle identification with 0 and 90 degrees	Yes	No	-
26	Measure with long cable	Yes	No	-

Dependency: See also: r3925

Note
The parameter is a copy of p1909.

r3928[0...n] Rotating measurement configuration / Rot meas config

Access level: 3	**Calculated:** CALC_MOD_ALL	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Successfully completed component of the last rotating measurement carried out.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
01	Saturation characteristic identification	Yes	No	-
02	Moment of inertia identification	Yes	No	-
03	Re-calculates the speed controller parameters	Yes	No	-
04	Speed controller optimization (vibration test)	Yes	No	-
05	q leakage inductance ident. (for current controller adaptation)	Yes	No	-
11	Do not change the controller parameters during the measurement	Yes	No	-
12	Measurement shortened	Yes	No	-
13	After measurement direct transition into operation	Yes	No	-
14	Calculate speed actual value smoothing time	Yes	No	-

Dependency: See also: r3925

Note
The parameter is a copy of p1959.

r3929[0...n] Motor data identification modulated voltage generation / MotID U_gen mod

Access level: 4	**Calculated:** CALC_MOD_ALL	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Configuration of voltage generation for the various MotID sections in the case of the most recent successful MotID.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Wobble U_generate to determine dead-time correction	Yes	No	-
01	Wobble U_generate to determine stator resistance	Yes	No	-
02	Wobble U_generation to determine rotor time constant	Yes	No	-
03	Wobble U_generation to determine leakage inductance	Yes	No	-

04	Wobble U_generation to determine dynamic leakage inductance	Yes	No	-
05	Wobble U_generation to determine magnetizing inductance	Yes	No	-
08	Alternating U_generate to determine dead-time correction	Yes	No	-
09	Alternating U_generate to determine stator resistance	Yes	No	-
10	Alternating U_generate to determine rotor time constant	Yes	No	-
11	Alternating U_generate to determine leakage inductance	Yes	No	-
12	Alternating U_generate to determine dyn. leakage inductance	Yes	No	-
13	Alternating U_generate to determine magnetizing inductance	Yes	No	-

r3930[0...4] Power unit EEPROM characteristics / PU characteristics

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the characteristics (A5E number and versions) of the power unit.

[0]: A5E number xxxx (A5Exxxxyyyy)

[1]: A5E number yyyy (A5Exxxxyyyy)

[2]: File version (logistic)

[3]: File version (fixed data)

[4]: File version (calib data)

p3931 Options for electrical cabinets / Opt elec cabinet

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	0000 0000 0000 0000 bin

Description: Sets the options for the Power Module 330 (PM330).

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Line filter	Yes	No	-
01	Line Harmonics Filter	Yes	No	-
02	du/dt filter compact Voltage Peak Limiter	Yes	No	-
03	Motor reactor	Yes	No	-
04	du/dt filter plus Voltage Peak Limiter	Yes	No	-
05	w/o line reactor	Yes	No	-
07	EmergOff button	Yes	No	-
08	Emergency Stop category 0	Yes	No	-
09	Emergency Stop category 1	Yes	No	-
10	Emergency Stop category 1 24 V	Yes	No	-
11	Braking Module (25 kW)	Yes	No	-
12	Braking Module (50 kW)	Yes	No	-

p3950 Service parameter / Serv par

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: C1, T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: For service personnel only.

r3974 Drive unit status word / Drv_unit ZSW

Access level: 1	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the status word for the drive unit.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Software reset active	Yes	No	-
01	Writing of parameters disabled as parameter save in progress	Yes	No	-
02	Writing of parameters disabled as macro is running	Yes	No	-

r3978 BICO CounterDevice / BICO CounterDevice

Access level: 4	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the counter reading for modified BICO interconnections on this device.
The counter is incremented by one for each modified BICO interconnection.

p3981 Acknowledge drive object faults / Ackn DO faults

Access level: 3	**Calculated:** -	**Data type:** Unsigned8
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 8060
Min:	**Max:**	**Factory setting:**
0	1	0

Description: Setting to acknowledge all active faults of a drive object.

NOTICE
Safety messages cannot be acknowledged using this parameter.

Note
Parameter should be set from 0 to 1 to acknowledge.
After acknowledgment, the parameter is automatically reset to 0.

p3985 Master control mode selection / PcCtrl mode select

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	1	0

Description: Sets the mode to change over the master control / LOCAL mode.

Value:
0: Change master control for STW1.0 = 0
1: Change master control in operation

⚠ DANGER
When changing the master control in operation, the drive can manifest undesirable behavior - e.g. it can accelerate up to another setpoint.

r3986 Number of parameters / Param count

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the number of parameters for this drive unit.
The number comprises the device-specific and the drive-specific parameters.

Dependency: See also: r0980, r0981, r0989

r3988[0...1] Boot state / Boot_state

Access level: 4	**Calculated:** -	**Data type:** Integer16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	800	-

Description: Index 0:
Displays the boot state.
Index 1:
Displays the partial boot state

Value:
0: Not active
1: Fatal fault
10: Fault
20: Reset all parameters
30: Drive object modified
40: Download using commissioning software
50: Parameter download using commissioning software
90: Reset Control Unit
100: Start initialization
101: Only for internal Siemens use
110: Instantiate Control Unit basis
111: Only for internal Siemens use
112: Only for internal Siemens use
113: Only for internal Siemens use
114: Only for internal Siemens use
115: Parameter download using commissioning software
117: Only for internal Siemens use
150: Wait until Power Module is determined
160: Evaluate Power Module
170: Instantiate Control Unit reset
180: Only for internal Siemens use
200: First commissioning

210:	Create drive packages
250:	Wait for fault acknowledge
325:	Wait for input of drive type
350:	Determine drive type
360:	Only for internal Siemens use
370:	Wait until p0010 is set to 0
380:	Only for internal Siemens use
550:	Call conversion functions for parameter
625:	Wait for non-cyclic start
650:	Start cyclic operation
660:	Evaluate drive commissioning status
670:	Only for internal Siemens use
680:	Only for internal Siemens use
690:	Wait for non-cyclic start
700:	Save parameters
725:	Wait for cyclic
740:	Check the ability to operate
745:	Start cyclic calculations
750:	Interrupt enable
800:	Initialization finished

Index: [0] = System
[1] = Partial boot

r3996[0...1] Parameter write inhibit status / Par_write inhib st

Access level: 3	**Calculated:** -	**Data type:** Unsigned8
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays whether writing to parameters is inhibited.
r3996[0] = 0:
Parameter write not inhibited.
0 < r3996[0] < 100:
Parameter write inhibited. The value shows how the calculations are progressing.

Index: [0] = Progress calculations
[1] = Cause

Note
For index 1:
Only for internal Siemens troubleshooting.

r4022.0...3 CO/BO: PM330 digital inputs status / PM330 DI status

G120XA_USS (PM330)

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the status of the digital inputs of the PM330 power unit.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	DI 0 (X9.3, external alarm)	High	Low	-

01	DI 1 (X9.4, external fault)	High	Low	-
02	DI 2 (X9.5, Emergency Off category 0)	High	Low	-
03	DI 3 (X9.6, Emergency Off category 1)	High	Low	-

Dependency: See also: r4023

Note
DI: Digital Input

r4023.0...3 CO/BO: PM330 digital inputs status inverted / PM330 DI stat inv

G120XA_USS (PM330)

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the inverted status of the digital inputs of Power Module 330 (PM330).

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	DI 0 (X9.3, external alarm)	High	Low	-
01	DI 1 (X9.4, external fault)	High	Low	-
02	DI 2 (X9.5, Emergency Off category 0)	High	Low	-
03	DI 3 (X9.6, Emergency Off category 1)	High	Low	-

Dependency: See also: r4022

Note
DI: Digital Input

r4047 PM330 digital outputs status / PM330 DO status

G120XA_USS (PM330)

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the status of the digital outputs of Power Module 330 (PM330).

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	DO 0 (X9.8: enable signal UDC link charged)	High	Low	-
01	DO 1 (X9.11/X9.12: main contactor control)	High	Low	-

Note
DO: Digital Output

p4095 PM330 digital inputs simulation mode / PM330 DI sim_mode

G120XA_USS (PM330)

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	0000 bin

Description: Sets the simulation mode for digital inputs of the PM330 power unit.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	DI 0 (X9.3, external alarm)	Simulation	Terminal eval	-
01	DI 1 (X9.4, external fault)	Simulation	Terminal eval	-
02	DI 2 (X9.5, Emergency Off category 0)	Simulation	Terminal eval	-
03	DI 3 (X9.6, Emergency Off category 1)	Simulation	Terminal eval	-

Dependency: The setpoint for the input signals is specified using p4096.
See also: p4096

Note
This parameter is not saved when data is backed-up (p0971, p0977).
DI: Digital Input

p4096 PM330 digital inputs simulation mode setpoint / PM330 DI sim setp

G120XA_USS (PM330)

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 2275
Min:	**Max:**	**Factory setting:**
-	-	0000 bin

Description: Sets the setpoint for the input signals in the digital input simulation mode of the PM330 power unit.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	DI 0 (X9.3, external alarm)	High	Low	-
01	DI 1 (X9.4, external fault)	High	Low	-
02	DI 2 (X9.5, Emergency Off category 0)	High	Low	-
03	DI 3 (X9.6, Emergency Off category 1)	High	Low	-

Dependency: The simulation of a digital input is selected using p4095.
See also: p4095

Note
This parameter is not saved when data is backed-up (p0971, p0977).
DI: Digital Input

p5350[0...n] Mot_temp_mod 1/3 boost factor at standstill / Standst boost_fact

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 8017
Min:	**Max:**	**Factory setting:**
1.0000	2.0000	2.0000

Description: Sets the boost factor for the copper losses at standstill for motor temperature models 1 and 3.
The entered factor is active for speed n = 0 [rpm].
This factor is linearly reduced down to 1 between speeds n = 0 ... 1 [rpm].
The following values are required to calculate the boost factor:
- stall current (I_0, p0318, catalog value)
- thermal stall current (I_th0, catalog value)
The boost factor is calculated as follows:
- p5350 = (I_0 / I_th0)^2

Dependency: See also: p0318, p0612, p5390, p5391
See also: F07011, A07012, F07013, A07014

NOTICE
When selecting a catalog motor (p0301), this parameter is automatically pre-assigned and is write protected. Information in p0300 should be carefully observed when removing write protection.

Note
Temperature model 1 (I2t):
The following applies for firmware version < 4.7 SP6 or p0612.8 = 0:
- parameter p5350 is not active. Internally, a fixed boost factor of 1.333 is used as basis for the calculation.
The following applies from firmware version 4.7 SP6 and p0612.8 = 1:
- parameter p5350 becomes active as described above.

r5389.0...8 CO/BO: Mot_temp status word faults/alarms / Mot_temp ZSW F/A

Access level: 2	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 8016
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display and BICO output for faults and alarms of the motor temperature monitoring.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Motor temperature measurement fault active	Yes	No	-
01	Motor temperature model fault active	Yes	No	-
02	Encoder temperature measurement fault active	Yes	No	-
04	Motor temperature measurement alarm active	Yes	No	-
05	Motor temperature measurement alarm active	Yes	No	-
08	Current reduction active	Yes	No	-

Dependency: See also: r0034, p0612, r0632

See also: F07011, A07012, A07910

Note

For bit 00, 04:

The motor temperature is measured using a temperature sensor (p0600, p0601). When the bit is set, a high temperature is identified, and a corresponding signal is additionally output.

For bit 01, 05:

The motor temperature is monitored based on a temperature model (p0612). When the bit is set, a high temperature is identified, and a corresponding signal is additionally output.

For bit 02:

The encoder temperature is measured using a temperature sensor. When the bit is set, a high temperature is identified, and a corresponding signal is additionally output.

For bit 08:

When reaching the motor temperature alarm threshold, reduction of the maximum current is set as response (p0610 = 1). When the bit is set, reduction of the maximum current is active.

p5390[0...n] Mot_temp_mod 1/3 alarm threshold / A thresh

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: 21_1	**Unit selection:** p0505	**Function diagram:** 8017
Min:	**Max:**	**Factory setting:**
0.0 [°C]	200.0 [°C]	110.0 [°C]

Description: Sets the alarm threshold for monitoring the motor temperature for motor temperature models 1 and 3.

The stator winding temperature (r0632) is used to initiate the signal.

The following applies for temperature model 1 (I2t):

- only effective from firmware version 4.7 SP6 and p0612.8 = 1.
- Alarm A07012 is output after the alarm threshold is exceeded.
- when commissioning a catalog motor for the first time, the threshold value is copied from p0605 to p5390.

The following applies for temperature model 3:

- after the alarm threshold is exceeded, alarm A07012 is output and a calculated delay time (t = p5371/p5381) is started.
- if the delay time has expired and the alarm threshold has, in the meantime, not been fallen below, then fault F07011 is output.

Dependency: See also: r0034, p0605, p0612, r0632, p5391

See also: F07011, A07012, F07013, A07014

NOTICE

When selecting a catalog motor (p0301), this parameter is automatically pre-assigned and is write protected. Information in p0300 should be carefully observed when removing write protection.

Note
The hysteresis is 2 K.

p5391[0...n] Mot_temp_mod 1/3 fault threshold / F thresh

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: 21_1	**Unit selection:** p0505	**Function diagram:** 8017
Min:	**Max:**	**Factory setting:**
0.0 [°C]	200.0 [°C]	120.0 [°C]

Description: Sets the fault threshold for monitoring the motor temperature for motor temperature models 1 and 3.
Fault F07011 is output after the fault threshold is exceeded.
The stator winding temperature (r0632) is used to initiate the signal.
The following applies for temperature model 1 (I2t):
- only effective from firmware version 4.7 SP6 and p0612.8 = 1.
- when commissioning a catalog motor for the first time, the threshold value is copied from p0615 to p5391.

Dependency: See also: r0034, p0612, p0615, r0632, p5390
See also: F07011, F07013, A07014

NOTICE
When selecting a catalog motor (p0301), this parameter is automatically pre-assigned and is write protected. Information in p0300 should be carefully observed when removing write protection.

Note
The hysteresis is 2 K.

p7610[0...78] Fieldbus interface BACnet device name / BACnet device name

Access level: 3	**Calculated:** -	**Data type:** Unsigned8
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 9310
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Sets the object name for the BACnet device object.
This name must be unique within the complete BACnet network.
The object name is only preassigned with device name and serial number the first time that the system runs up, e.g. "SINAMICS G120 CU230P-2 HVAC - XAB812-005806"

Note
An ASCII table (excerpt) can be found, for example, in the appendix to the List Manual.

r7758[0...19] KHP Control Unit serial number / KHP CU ser_no

Access level: 3	**Calculated:** -	**Data type:** Unsigned8
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the actual serial number of the Control Unit.
The individual characters of the serial number are displayed in the ASCII code in the indices.
For the commissioning software, the ASCII characters are displayed uncoded.

Dependency: See also: p7765, p7766, p7767, p7768

NOTICE
An ASCII table (excerpt) can be found, for example, in the appendix to the List Manual.

Note
KHP: Know-How Protection

p7759[0...19] KHP Control Unit reference serial number / KHP CU ref ser_no

Access level: 3	**Calculated:** -	**Data type:** Unsigned8
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Sets the reference serial number for the Control Unit.

Using this parameter, if a Control Unit and/or a memory card is replaced at the end customer, the OEM can again adapt the project to the modified hardware.

Dependency: See also: p7765, p7766, p7767, p7768

Note
KHP: Know-How Protection
- the OEM may only change this parameter for the use case "Sending encrypted SINAMICS data".
- SINAMICS only evaluates this parameter when powering up from the encrypted "Load into file system..." output or when powering up from the encrypted PS files. The evaluation is only made when know-how protection and memory card copy protection have been activated.

r7760.0...12 CO/BO: Write protection/know-how protection status / Wr_prot/KHP stat

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the status for the write protection and know-how protection.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Write protection active	Yes	No	-
01	Know-how protection active	Yes	No	-
02	Know-how protection temporarily withdrawn	Yes	No	-
03	Know-how protection cannot be deactivated	Yes	No	-
04	Extended copy protection is active	Yes	No	-
05	Basic copy protection is active	Yes	No	-
06	Trace and measuring functions for diagnostic purposes active	Yes	No	-
12	Reserved Siemens	Yes	No	-

Dependency: See also: p7761, p7765, p7766, p7767, p7768

Note
KHP: Know-How Protection
For bit 00:
Write protection can be activated/deactivated via p7761 on the Control Unit.
For bit 01:
The know-how protection can be activated by entering a password (p7766 ... p7768).
For bit 02:
If it has already been activated, know-how protection can be temporarily deactivated by entering the valid password in p7766. In this case, bit 1 = 0 and bit 2 = 1 offset.
For bit 03:
Know-how protection cannot be deactivated, as p7766 is not entered in the OEM exception list (only the factory setting is possible). This bit is only set if know-how protection is active (bit 1 = 1) and p7766 has not been entered in the OEM exception list.
For bit 04:
When know-how protection has been activated, the contents of the memory card (parameter and DCC data) can be additionally protected against being used with other memory cards/Control Units. This bit is only set if know-how protection is active and p7765 bit 00 is set.
For bit 05:
When know-how protection has been activated, the contents of the memory card (parameter and DCC data) can be additionally protected against being used with other memory cards. This bit is only set if know-how protection is active and in p7765 bit 01 is set and not bit 00.
For bit 06:
When know-how protection is activated, the drive data can be traced using the device trace function. This bit is only set if know-how protection is active and in p7765.2 is set.

p7761 Write protection / Write protection

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	1	0

Description: Setting for activating/deactivating the write protection for adjustable parameters.

Value:
0: Deactivate write protection
1: Activate write protection

Dependency: See also: r7760

Note
Parameters with the "WRITE_NO_LOCK" attributes are excluded from the write protection.
A product-specific list of these parameters is also available in the corresponding List Manual.

p7762 Write protection multi-master fieldbus system access behavior / Fieldbus acc_behav

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	1	0

Description: Sets the behavior for write protection when accessing via multi-master fieldbus systems (e.g. CAN, BACnet).

Value:
0: Write access independent of p7761
1: Write access dependent on p7761

Dependency: See also: r7760, p7761

p7763 KHP OEM exception list number of indices for p7764 / KHP OEM qty p7764

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
1	500	1

Description: Sets the number of parameters for the OEM exception list (p7764[0...n]).
p7764[0...n], with n = p7763 - 1

Dependency: See also: p7764

Note
KHP: Know-How Protection
Even if know-how protection is set, parameters in this list can be read and written to.

p7764[0...n] KHP OEM exception list / KHP OEM excep list

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** p7763
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	65535	[0] 7766 [1...499] 0

Description: OEM exception list (p7764[0...n] for setting parameters that should be excluded from know-how protection.
p7764[0...n], with n = p7763 - 1

Dependency: The number of indices depends on p7763.
See also: p7763

Note
KHP: Know-How Protection
Even if know-how protection is set, parameters in this list can be read and written to.

p7765 KHP configuration / KHP config

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	0000 bin

Description: Configuration settings for know-how protection.
For bit 00, 01:
When KHP is activated, this means that the OEM can define whether the parameters and DCC data encrypted on the memory card should be protected before using on other memory cards/Control Units.
For bit 02:
This means that the OEM can define whether it is possible or not to trace the drive data using the device trace function although KHP is activated.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Extended copy protection - linked to the memory card and CU	Yes	No	-
01	Basic copy protection - linked to the memory card	Yes	No	-
02	Permit trace and measuring functions for diagnostic purposes	Yes	No	-

Dependency: See also: p7766, p7767, p7768

Note
KHP: Know-How Protection
For copy protection, the serial numbers of the memory card and/or Control Unit are checked.
The memory card copy protection and preventing data to be traced are only effective when the know-how protection has been activated.
For bit 00, 01:
If both bits are inadvertently set to 1 (e.g. at the BOP), then the setting of bit 0 applies.
There is no copy protection if both bits are set to 0.

p7766[0...29] KHP password input / KHP passw input

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Sets the password for know-how protection.
Example of a password:
123aBc = 49 50 51 97 66 99 dec (ASCII characters)
[0] = character 1 (e.g. 49 dec)
[1] = character 2 (e.g. 50 dec)
...
[5] = character 6 (e.g. 99 dec)
[29] = 0 dec (completes the entry)

Dependency: See also: p7767, p7768

NOTICE
An ASCII table (excerpt) can be found, for example, in the Appendix of the List Manual.
When using the STARTER commissioning tool, the password should be entered via the associated dialogs.
The following rules apply when entering the password:
- password entry must start with p7766[0].
- no gaps are permissible in the password.
- entering a password is completed when writing to p7766[29] (p7766[29] = 0 for passwords less than 30 characters).

Note
KHP: Know-How Protection
When reading, p7766[0...29] = 42 dec (ASCII character = "*") is displayed.
Parameters with the "KHP_WRITE_NO_LOCK" attribute are not involved in the know-how protection.
Parameters with the "KHP_ACTIVE_READ" attribute can be read even when know-how protection is activated.
A product-specific list of these parameters is also available in the corresponding List Manual.

p7767[0...29] KHP password new / KHP passw new

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Sets the new password for know-how protection.

Dependency: See also: p7766, p7768

Note
KHP: Know-How Protection
When reading, p7767[0...29] = 42 dec (ASCII character = "*") is displayed.

p7768[0...29] KHP password confirmation / KHP passw confirm

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Confirms the new password for know-how protection.

Dependency: See also: p7766, p7767

Note
KHP: Know-How Protection
When reading, p7768[0...29] = 42 dec (ASCII character = "*") is displayed.

p7769[0...20] KHP memory card reference serial number / KHP mem ref ser_no

Access level: 3	**Calculated:** -	**Data type:** Unsigned8
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Sets the reference serial number for the memory card.

Using this parameter, if a Control Unit and/or a memory card is replaced at the end customer, the OEM can again adapt the project to the modified hardware.

Dependency: See also: p7765, p7766, p7767, p7768

Note
KHP: Know-How Protection
- the OEM may only change this parameter for the use case "Sending encrypted SINAMICS data".
- SINAMICS only evaluates this parameter when powering up from the encrypted "Load into file system..." output or when powering up from the encrypted PS files. The evaluation is only made when know-how protection and memory card copy protection have been activated.

p7775 NVRAM data backup/import/delete / NVRAM backup

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: C1, T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	17	0

Description: Setting to backup/import/delete NVRAM data.

NVRAM data are non-volatile data in the device (e.g. fault buffer).

For NVRAM data actions, the following data are excluded:

- crash diagnostics
- CU operating hours counter
- CU temperature
- safety logbook

Value:

0:	Inactive
1:	NVRAM data backup to memory card
2:	Import NVRAM data from the memory card
3:	Delete NVRAM data in the device
10:	Error when clearing
11:	Error when backing up, memory card not available
12:	Error when backing up, insufficient memory space
13:	Error when backing up

14: Error when importing, memory card not available
15: Error when importing, checksum error
16: Error when importing, no NVRAM data available
17: Error when importing

NOTICE
For value = 2, 3: These actions are only possible when pulses are inhibited.

Note
After the action has been successfully completed, the parameter is automatically set to zero.
The actions importing and deleting NVRAM data immediately initiate a warm restart.
If the procedure was not successfully completed, then an appropriate fault value is displayed (p7775 >= 10).

r7841[0...15] Power Module serial number / PM serial no.

Access level: 4	**Calculated:** -	**Data type:** Unsigned8
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the actual serial number of the Power Module.
The individual characters of the serial number are displayed in the ASCII code in the indices.

NOTICE
An ASCII table (excerpt) can be found, for example, in the appendix to the List Manual.

r7843[0...20] Memory card serial number / Mem_card ser.no

Access level: 1	**Calculated:** -	**Data type:** Unsigned8
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the actual serial number of the memory card.
The individual characters of the serial number are displayed in the ASCII code in the indices.

NOTICE
An ASCII table (excerpt) can be found, for example, in the appendix to the List Manual.

Note
Example: displaying the serial number for a memory card:
r7843[0] = 49 dec --> ASCII characters = "1" --> serial number, character 1
r7843[1] = 49 dec --> ASCII characters = "1" --> serial number, character 2
r7843[2] = 49 dec --> ASCII characters = "1" --> serial number, character 3
r7843[3] = 57 dec --> ASCII characters = "9" --> serial number, character 4
r7843[4] = 50 dec --> ASCII characters = "2" --> serial number, character 5
r7843[5] = 51 dec --> ASCII characters = "3" --> serial number, character 6
r7843[6] = 69 dec --> ASCII characters = "E" --> serial number, character 7
r7843[7] = 0 dec --> ASCII characters = " " --> serial number, character 8
...
r7843[19] = 0 dec --> ASCII characters = " " --> serial number, character 20
r7843[20] = 0 dec
Serial number = 111923E

r7844[0...2] Memory card/device memory firmware version / Mem_crd/dev_mem FW

Access level: 2	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the version of the firmware stored on the memory medium of the drive device.

Depending on the drive device being used, the memory medium is a memory card, or an internal non-volatile device memory.

Index:
[0] = Internal
[1] = External
[2] = Parameter backup

Note
For index 0:
Displays the internal firmware version (e.g. 04402315).
This firmware version is the version of the memory card/device memory and not the CU firmware (r0018), however, normally they have the same versions.
For index 1:
Displays the external firmware version (e.g. 04040000 -> 4.4).
For automation systems with SINAMICS Integrated this is the runtime version of the automation system.
For index 2:
Displays the internal firmware version of the parameter backup.
With this CU firmware version, the parameter backup was saved, which was used when powering up.

r7901[0...81] Sampling times / t_sample

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
- [µs]	- [µs]	- [µs]

Description: Displays the sampling times currently present on the drive unit.

r7901[0...63]: sampling times of hardware time slices.

r7901[64...82]: sampling times of software time slices.

r7901[x] = 0, means the following:

No methods have been registered in the time slice involved.

Note
The basis for the software time slices is T_NRK = p7901[13].

r7903 Hardware sampling times still assignable / HW t_samp free

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the number of hardware sampling times that can still be assigned.

These free sampling times can be used by OA applications such as DCC or FBLOCKS.

Note
OA: Open Architecture

p8400[0...2] RTC time / RTC time

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	59	0

Description: Sets and displays the time on the real-time clock in hours, minutes, and seconds.

The time is stored in the internal clock block in the drive and continues to run even if the supply voltage for the Control Unit is interrupted (for approx. 5 days).

Index:
[0] = Hour (0 ... 23)
[1] = Minute (0 ... 59)
[2] = Second (0 ... 59)

Note

The time from p8400 and p8401 is used to display the fault and alarm times.
When displaying the fault time and alarm time, the switchover to daylight saving time is not taken into account.
The parameter is not reset when the factory setting is restored (p0010 = 30, p0970).
The time is entered and displayed in 24-hour format.
RTC: Real-time clock

p8401[0...2] RTC date / RTC date

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	9999	[0] 1 [1] 1 [2] 1970

Description: Sets and displays the date on the real-time clock in year, month, and day.

The date is stored in the internal clock block in the drive and continues to run even if the supply voltage for the Control Unit is interrupted (for approx. 5 days).

Recommendation: When the date is set as an index, the day should always be written last because, if a date is invalid, the day is always corrected to the last valid day in that particular month of the year.

Index:
[0] = Day (1 ... 31)
[1] = Month (1 ... 12)
[2] = Year (YYYY)

Note

The time from p8400 and p8401 is used to display the fault and alarm times.
When displaying the fault time and alarm time, the switchover to daylight saving time is not taken into account.
The parameter is not reset when the factory setting is restored (p0010 = 30, p0970).
RTC: Real-time clock

p8402[0...8] RTC daylight saving time setting / RTC DST

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	23	[0] 0 [1] 3 [2] 6 [3] 7 [4] 2 [5] 10 [6] 6 [7] 7 [8] 3

Description: Setting the daylight saving time.

The factory setting corresponds to the time change for central european summer time (CEST). You only have to set p8402[0] = 1 to activate CEST.

Index:
[0] = Difference (0 ... 3 hours)
[1] = Start of month (1 ... 12)
[2] = Start of the week of the month (1 ... 4, 6)
[3] = Start of weekday (1 ... 7)
[4] = Start of hour (0 ... 23)
[5] = End of month (1 ... 12)
[6] = End of the week of the month (1 ... 4, 6)
[7] = End of weekday (1 ... 7)
[8] = End of hour (0 ... 23)

Note

The switchover to daylight saving time only effects the RTC and DTC parameters (p8400 ... p8433).
When displaying the fault time and alarm time, the switchover to daylight saving time is not taken into account.
There must be at least two months between the start and end of daylight saving time.
For index 0:
0: daylight saving time switchover deactivated
1 ... 3: time difference
For indices 1 and 5:
1 = January, ... , 12 = December
For indices 2 and 6:
1 = from the 1st to the 7th of the month
2 = from the 8th to the 14th of the month
3 = from the 15th to the 21st of the month
4 = from the 22nd to the 28th of the month
6 = the last 7 days of the month
For indices 3 and 7:
1 = Monday, ... , 7 = Sunday

r8403 RTC actual daylight saving time difference / RTC act DST

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the actual time difference in hours for the daylight saving time

Note
The value is 0, if daylight saving time has not been defined using p8402.
If it is presently daylight saving time according to what is defined in p8402, then the parameter indicates the time difference between daylight saving time and normal time (p8402[0]).

r8404 RTC weekday / RTC weekday

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
1	7	-

Description: Displays the weekday on the real-time clock.

Value:
1: Monday
2: Tuesday
3: Wednesday
4: Thursday
5: Friday
6: Saturday
7: Sunday

Note
RTC: Real-time clock

p8405 Activate/deactivate RTC alarm A01098 / RTC A01098 act

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	1	1

Description: Sets whether the real-time clock outputs an alarm if the time is not synchronized (e.g. if the power supply was switched off for an extended period).

Value:
0: Alarm A01098 deactivated
1: Alarm A01098 activated

Dependency: See also: A01098

Note
RTC: Real-time clock

p8409 RTC DTC activation / RTC DTC act

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	1	1

Description: Sets the activation/deactivation of the parameters for timers DTC1, DTC2, DTC3.
For p8409 = 0, the following applies:
DTC1 parameters p8410, p8411, p8412 are inactive and can be set. Binector output r8413.0 = 0.
DTC2 parameters p8420, p8421, p8422 are inactive and can be set. Binector output r8423.0 = 0.
DTC3 parameters p8430, p8431, p8432 are inactive and can be set. Binector output r8433.0 = 0.
For p8409 = 1, the following applies:
DTC1 parameters p8410, p8411, p8412 are active and cannot be set. Binector outputs r8413 are active.
DTC2 parameters p8420, p8421, p8422 are active and cannot be set. Binector outputs r8423 are active.
DTC3 parameters p8430, p8431, p8432 are active and cannot be set. Binector outputs r8433 are active.

Value:
0: DTC inactive and can be set
1: DTC active and cannot be set

Dependency: See also: p8410, p8411, p8412, r8413, p8420, p8421, p8422, r8423, p8430, p8431, p8432, r8433

Note
DTC: Digital Time Clock (timer)
RTC: Real-time clock

p8410[0...6] RTC DTC1 weekday of activation / RTC DTC1 day act

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	1	0

Description: Sets the weekday on which timer 1 is activated (DTC1).
The switch-on/off time is set in p8411/p8412 and the result displayed via binector output r8413.

Value:
0: Weekday deactivated
1: Weekday activated

Index:
[0] = Monday
[1] = Tuesday
[2] = Wednesday
[3] = Thursday
[4] = Friday
[5] = Saturday
[6] = Sunday

Dependency: See also: p8409, p8411, p8412, r8413

NOTICE
This parameter can only be changed when p8409 = 0.

Note
DTC: Digital Time Clock (timer)
RTC: Real-time clock

p8411[0...1] RTC DTC1 switch-on time / RTC DTC1 t_ON

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	59	0

Description: Sets the switch-on time in hours and minutes for time switch 1 (DTC1).
BO: r8413 = 1 signal:
The condition for the set weekday (p8410) and switch-on time has been fulfilled.

Index: [0] = Hour (0 ... 23)
[1] = Minute (0 ... 59)

Dependency: See also: p8409, p8410, r8413

NOTICE
This parameter can only be changed when p8409 = 0.

Note
DTC: Digital Time Clock (timer)
RTC: Real-time clock

p8412[0...1] RTC DTC1 off time / RTC DTC1 t_OFF

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	59	0

Description: Sets the switch-off time in hours and minutes for time switch 1 (DTC1).
BO: r8413 = 0 signal:
The condition for the set weekday (p8410) and switch-off time has been fulfilled.

Index: [0] = Hour (0 ... 23)
[1] = Minute (0 ... 59)

Dependency: See also: p8409, p8410, r8413

NOTICE
This parameter can only be changed when p8409 = 0.

Note
DTC: Digital Time Clock (timer)
RTC: Real-time clock

r8413.0...1 BO: RTC DTC1 output / RTC DTC1 output

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display and binector output for the output of time switch 1 (DTC1).
Where a weekday is deactivated, the following applies (p8410):
- the binector output for this timer is inactive (r8413.0 = 0).
Where a weekday is activated, the following applies (p8410):
- the ON/OFF time setting (p8411, p8412) for this timer has an instant effect on the binector output (r8413).

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Timer on	Yes	No	-
01	Timer ON negated	No	Yes	-

Dependency: See also: p8409, p8410, p8411, p8412

NOTICE
The value of this parameter is only likely to change when p8409 = 0.

Note
DTC: Digital Time Clock (timer)
RTC: Real-time clock

p8420[0...6] RTC DTC2 weekday of activation / RTC DTC2 day act

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	1	0

Description: Sets the weekday on which timer 2 is activated (DTC2).
The switch-on/off time is set in p8421/p8422 and the result displayed via binector output r8423.

Value:
0: Weekday deactivated
1: Weekday activated

Index:
[0] = Monday
[1] = Tuesday
[2] = Wednesday
[3] = Thursday
[4] = Friday
[5] = Saturday
[6] = Sunday

Dependency: See also: p8409, p8421, p8422, r8423

NOTICE
This parameter can only be changed when p8409 = 0.

Note
DTC: Digital Time Clock (timer)
RTC: Real-time clock

p8421[0...1] RTC DTC2 switch-on time / RTC DTC2 t_ON

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	59	0

Description: Sets the switch on time in hours and minutes for time switch 2 (DTC2).
BO: r8423 = 1 signal:
The condition for the set weekday (p8420) and switch-on time has been fulfilled.

Index:
[0] = Hour (0 ... 23)
[1] = Minute (0 ... 59)

Dependency: See also: p8409, p8420, r8423

NOTICE
This parameter can only be changed when p8409 = 0.

Note
DTC: Digital Time Clock (timer)
RTC: Real-time clock

p8422[0...1] RTC DTC2 off time / RTC DTC2 t_OFF

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	59	0

Description: Sets the switch off time in hours and minutes for time switch 2 (DTC2).
BO: r8423 = 0 signal:
The condition for the set weekday (p8420) and switch-off time has been fulfilled.

Index: [0] = Hour (0 ... 23)
[1] = Minute (0 ... 59)

Dependency: See also: p8409, p8420, r8423

NOTICE
This parameter can only be changed when p8409 = 0.

Note
DTC: Digital Time Clock (timer)
RTC: Real-time clock

r8423.0...1 BO: RTC DTC2 output / RTC DTC2 output

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display and binector output for the output of timer 2 (DTC2).
Where a weekday is deactivated, the following applies (p8420):
- the binector output for this timer is inactive (r8423.0 = 0).
Where a weekday is activated, the following applies (p8420):
- the ON/OFF time setting (p8421, p8422) for this timer has an instant effect on the binector output (r8423).

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Timer on	Yes	No	-
01	Timer ON negated	No	Yes	-

Dependency: See also: p8409, p8420, p8421, p8422

NOTICE
The value of this parameter is only likely to change when p8409 = 0.

Note
DTC: Digital Time Clock (timer)
RTC: Real-time clock

p8430[0...6] RTC DTC3 weekday of activation / RTC DTC3 day act

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	1	0

Description: Sets the weekday on which timer 3 is activated (DTC3).
The switch-on/off time is set in p8431/p8432 and the result displayed via binector output r8433.

Value:
0: Weekday deactivated
1: Weekday activated

Index: [0] = Monday
[1] = Tuesday
[2] = Wednesday
[3] = Thursday
[4] = Friday
[5] = Saturday
[6] = Sunday

Dependency: See also: p8409, p8431, p8432, r8433

NOTICE
This parameter can only be changed when p8409 = 0.

Note
DTC: Digital Time Clock (timer)
RTC: Real-time clock

p8431[0...1] RTC DTC3 switch-on time / RTC DTC3 t_ON

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	59	0

Description: Sets the switch on time in hours and minutes for timer 3 (DTC3).
BO: r8433 = 1 signal:
The condition for the set weekday (p8430) and switch-on time has been fulfilled.

Index: [0] = Hour (0 ... 23)
[1] = Minute (0 ... 59)

Dependency: See also: p8409, p8430, r8433

NOTICE
This parameter can only be changed when p8409 = 0.

Note
DTC: Digital Time Clock (timer)
RTC: Real-time clock

p8432[0...1] RTC DTC3 off time / RTC DTC3 t_OFF

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	59	0

Description: Sets the switch off time in hours and minutes for timer 3 (DTC3).
BO: r8433 = 0 signal:
The condition for the set weekday (p8430) and switch-off time has been fulfilled.

Index: [0] = Hour (0 ... 23)
[1] = Minute (0 ... 59)

Dependency: See also: p8409, p8430, r8433

NOTICE
This parameter can only be changed when p8409 = 0.

Note
DTC: Digital Time Clock (timer)
RTC: Real-time clock

r8433.0...1 BO: RTC DTC3 output / RTC DTC3 output

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display and binector output for the output of timer 3 (DTC3).
Where a weekday is deactivated, the following applies (p8430):
- the binector output for this timer is inactive (r8433.0 = 0).
Where a weekday is activated, the following applies (p8430):
- the ON/OFF time setting (p8431, p8432) for this timer has an instant effect on the binector output (r8433).

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Timer on	Yes	No	-
01	Timer ON negated	No	Yes	-

Dependency: See also: p8409, p8430, p8431, p8432

NOTICE
The value of this parameter is only likely to change when p8409 = 0.

Note
DTC: Digital Time Clock (timer)
RTC: Real-time clock

r8540.0...15 BO: STW1 from IOP in the manual mode / STW1 IOP

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: For the manual mode: the STW1 (control word 1) entered from the IOP is displayed.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	ON/OFF1	Yes	No	-
01	OC / OFF2	Yes	No	-
02	OC / OFF3	Yes	No	-
03	Reserved	Yes	No	-
04	Reserved	Yes	No	-
05	Reserved	Yes	No	-
06	Reserved	Yes	No	-
07	Acknowledge fault	Yes	No	-
08	Jog bit 0	Yes	No	3030
09	Jog bit 1	Yes	No	3030
10	Reserved	Yes	No	-
11	Direction reversal (setpoint)	Yes	No	-
12	Reserved	Yes	No	-
13	Reserved	Yes	No	-
14	Reserved	Yes	No	-

15	Reserved	Yes	No	-

r8541 CO: Speed setpoint from the IOP in the manual mode / n_set IOP

Access level: 3 | **Calculated:** - | **Data type:** FloatingPoint32
Can be changed: - | **Scaling:** p2000 | **Dynamic index:** -
Unit group: 3_1 | **Unit selection:** p0505 | **Function diagram:** -
Min: - [rpm] | **Max:** - [rpm] | **Factory setting:** - [rpm]

Description: For the manual mode: the speed setpoint entered from the IOP is displayed.

p8542[0...15] BI: Active STW1 in the BOP/IOP manual mode / STW1 act OP

Access level: 3 | **Calculated:** - | **Data type:** Unsigned32 / Binary
Can be changed: T | **Scaling:** - | **Dynamic index:** -
Unit group: - | **Unit selection:** - | **Function diagram:** -
Min: - | **Max:** - | **Factory setting:**

[0] 8540.0
[1] 8540.1
[2] 8540.2
[3] 8540.3
[4] 8540.4
[5] 8540.5
[6] 8540.6
[7] 8540.7
[8] 8540.8
[9] 8540.9
[10] 8540.10
[11] 8540.11
[12] 8540.12
[13] 8540.13
[14] 8540.14
[15] 8540.15

Description: For the manual mode: Setting of the signal sources for STW1 (control word 1).

Index:
[0] = ON/OFF1
[1] = OC / OFF2
[2] = OC / OFF3
[3] = Enable operation
[4] = Enable ramp-function generator
[5] = Continue ramp-function generator
[6] = Enable speed setpoint
[7] = Acknowledge fault
[8] = Jog bit 0
[9] = Jog bit 1
[10] = Master control by PLC
[11] = Direction reversal (setpoint)
[12] = Enable speed controller
[13] = Motorized potentiometer raise
[14] = Motorized potentiometer lower
[15] = CDS bit 0

p8543 CI: Active speed setpoint in the BOP/IOP manual mode / N_act act OP

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / FloatingPoint32
Can be changed: T	**Scaling:** p2000	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	8541[0]

Description: For the manual mode: Sets the signal source for the speed setpoint.

p8552 IOP speed unit / IOP speed unit

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
1	2	1

Description: Sets the unit for displaying and entering speeds.

Value:
1: Hz
2: rpm

p8558 BI: Select IOP manual mode / Sel IOP man mode

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	0

r8570[0...39] Macro drive object / Macro DO

Access level: 1	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the macro file saved in the appropriate directory on the memory card/device memory.

Dependency: See also: p0015

Note
For a value = 9999999, the following applies: The read operation is still running.

r8571[0...39] Macro Binector Input (BI) / Macro BI

Access level: 4	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the ACX file saved in the appropriate directory in the non-volatile memory.

Note
For a value = 9999999, the following applies: The read operation is still running.

r8572[0...39] Macro Connector Inputs (CI) for speed setpoints / Macro CI n_set

Access level: 4	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the ACX file saved in the appropriate directory in the non-volatile memory.

Dependency: See also: p1000

Note
For a value = 9999999, the following applies: The read operation is still running.

r8573[0...39] Macro Connector Inputs (CI) for torque setpoints / Macro CI M_set

Access level: 4	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the ACX file saved in the appropriate directory in the non-volatile memory.

Note
For a value = 9999999, the following applies: The read operation is still running.

r8585 Macro execution actual / Macro executed

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the macro currently being executed on the drive object.

Dependency: See also: p0015, p1000, r8570, r8571, r8572, r8573

p8991 USB memory access / USB mem acc

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
1	2	1

Description: Selects the storage medium for access via the USB mass storage.

Value:
1: Memory card
2: Flash r/w internal

Note
A change only becomes effective after a POWER ON.
The parameter is not influenced by setting the factory setting.

p8999 USB functionality / USB Fct

Access level: 4	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
1	3	3

Description: Setting the USB functionality.

Value:
1: USS commissioning via the virtual COM port
2: Only memory access
3: USB commissioning and memory access

Note
COMM: Commissioning.
A change only becomes effective after a POWER ON.
The parameter is not influenced by setting the factory setting.

p9400 Safely remove memory card / Mem_card rem

Access level: 2	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	100	0

Description: Setting and display when memory card is "removed safely".
Procedure:
Setting p9400 = 2 results in a value of 3
--> The memory card can be removed safely. After removal the value sets itself to 0 automatically.
Setting p9400 = 2 results in a value of 100
--> The memory card cannot be removed safely. Removal may destroy the file system on the memory card. It may be necessary to set p9400 = 2 again.

Value:
0: No memory card inserted
1: Memory card inserted
2: Request "safe removal" of the memory card
3: "Safe removal" possible
100: "Safe removal" not possible due to access

Dependency: See also: r9401

NOTICE
Removing the memory card without a request (p9400 = 2) and confirmation (p9400 = 3) may destroy the file system on the memory card. The memory card will then no longer work properly and must be replaced.

Note
The status when the memory card is being "removed safely" is shown in r9401.
For value = 0, 1, 3, 100:
These values can only be displayed, not set.

r9401.0...3 CO/BO: Safely remove memory card status / Mem_card rem stat

Access level: 2	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the status of the memory card.

Bit field:	Bit	Signal name	1 signal	0 signal	FP
	00	Memory card inserted	Yes	No	-
	01	Memory card activated	Yes	No	-
	02	SIEMENS memory card	Yes	No	-
	03	Memory card as USB data storage medium from the PC used	Yes	No	-

Dependency: See also: p9400

Note
For bit 01, 00:
Bit 1/0 = 0/0: No memory card inserted (corresponds to p9400 = 0).
Bit 1/0 = 0/1: "Safe removal" possible (corresponds to p9400 = 3).
Bit 1/0 = 1/0: Status not possible.
Bit 1/0 = 1/1: Memory card inserted (corresponds to p9400 = 1, 2, 100).
For bit 02, 00:
Bit 2/0 = 0/0: No memory card inserted.
Bit 2/0 = 0/1: Memory card inserted, but not a SIEMENS memory card.
Bit 2/0 = 1/0: Status not possible.
Bit 2/0 = 1/1: SIEMENS memory card inserted.

r9406[0...19] PS file parameter number parameter not transferred / PS par_no n transf

Access level: 4	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the parameters that were not able to be transferred when reading the parameter back-up files (PS files) from the non-volatile memory (e.g. memory card).

r9406[0] = 0

--> All of the parameter values were able to be transferred error-free.

r9406[0...x] > 0

--> indicates the parameter number in the following cases:

- parameter, whose value was not able to be completely accepted.

- indexed parameter, where at least 1 index was not able to be accepted. The first index that is not transferred is displayed in r9407.

Dependency: See also: r9407, r9408

Note
All indices from r9406 to r9408 designate the same parameter.
r9406[x] parameter number, parameter not accepted
r9407[x] parameter index, parameter not accepted
r9408[x] fault code, parameter not accepted

r9407[0...19] PS file parameter index parameter not transferred / PS parameter index

Access level: 4	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the first index of the parameters that could not be transferred when the parameter backup files (PS files) were read from the non-volatile memory (e.g. memory card).

If, from an indexed parameter, at least one index was not able to be transferred, then the parameter number is displayed in r9406[n] and the first index that was not transferred is displayed in r9407[n].

r9406[0] = 0

--> All of the parameter values were able to be transferred error-free.

r9406[n] > 0

--> Displays r9407[n] the first index of the parameter number r9406[n] that was not transferred.

Dependency: See also: r9406, r9408

Note

All indices from r9406 to r9408 designate the same parameter.
r9406[x] parameter number, parameter not accepted
r9407[x] parameter index, parameter not accepted
r9408[x] fault code, parameter not accepted

r9408[0...19] PS file fault code parameter not transferred / PS fault code

Access level: 4	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Only for internal Siemens service purposes.

Dependency: See also: r9406, r9407

Note

All indices from r9406 to r9408 designate the same parameter.
r9406[x] parameter number, parameter not accepted
r9407[x] parameter index, parameter not accepted
r9408[x] fault code, parameter not accepted

r9409 Number of parameters to be saved / Qty par to save

Access level: 4	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the number of modified parameters and those that have still not be saved for this drive object.

Dependency: See also: p0971

NOTICE

Inherent to the system, the list of the parameters to be backed up is empty after the following actions:
- Download
- Warm restart
- Factory setting

In these cases, a new parameter backup must be initiated, which is then the starting point for the list of modified parameters.

Note

The modified parameters that still need to be saved are internally listed in r9410 ... r9419.

r9451[0...29] Units changeover adapted parameters / Unit_chngov par

Access level: 4	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the parameters whose parameter would have to be changed during a units changeover.

Dependency: See also: F07088

r9463 Actual macro / Actual macro

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	999999	-

Description: Displays the set valid macro.

Note
A value of 0 is displayed if a parameter set by a macro is changed.

p9484 BICO interconnections search signal source / BICO s_s srch

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	4294967295	0

Description: Sets the signal source (BO/CO parameter, BICO coded) to search in the signal sinks.

The signal source to be searched for is set in p9484 (BICO-coded) and the search result is specified using the number (r9485) and the first index (r9486).

Dependency: See also: r9485, r9486

r9485 BICO interconnections signal source search count / BICO s_s srch qty

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the number of BICO interconnections to the signal sink being searched for.

Dependency: See also: p9484, r9486

Note
The signal source to be searched is set in p9484 (BICO-coded).
The search result is contained in r9482 and r9483 and is specified by the count (r9485) and the first index (r9486).

r9486 BICO interconnections signal source search first index / BICO s_s srch Idx

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the first index of the signal source being searched for.

The signal source to be searched for is set in p9484 (BICO-coded) and the search result is specified using the number (r9485) and the first index (r9486).

Dependency: See also: p9484, r9485

Note

The signal source to be searched is set in p9484 (BICO-coded).

The search result is contained in r9482 and r9483 and is specified by the count (r9485) and the first index (r9486).

r9925[0...99] Firmware file incorrect / FW file incorr

Access level: 3	**Calculated:** -	**Data type:** Unsigned8
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the directory and name of the file whose status as shipped from the factory was identified as impermissible.

Dependency: See also: r9926

See also: A01016

Note

The directory and name of the file is displayed in the ASCII code.

r9926 Firmware check status / FW check status

Access level: 3	**Calculated:** -	**Data type:** Unsigned8
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the status when the firmware is checked when the system is booted.

0: Firmware not yet checked.

1: Check running.

2: Check successfully completed.

3: Check indicates an error.

Dependency: See also: r9925

See also: A01016

p9930[0...8] System logbook activation / SYSLOG activation

Access level: 4	**Calculated:** -	**Data type:** Unsigned8
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	255	0

Description: Only for service purposes.

Index:

[0] = System logbook stage (0: Not active)

[1] = COM2/COM1 (0: COM2, 1: COM1)

[2] = Activate file write (0: Not active)

[3] = Display time stamp (0: Not displayed)

[4...7] = Reserved

[8] = System logbook file size (stages, each 10 kB)

NOTICE
Before switching off the Control Unit, ensure that the system logbook is switched out (p9930[0] = 0). If writing to the file is activated (p9930[2] = 1), writing to the file must be deactivated again before switching off the Control Unit (p9930[2] = 0) in order to ensure that the system logbook has been completely written to the file.

p9931[0...180] System logbook module selection / SYSLOG mod select.

Access level: 4	**Calculated:** -	**Data type:** Unsigned32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0000 hex	FFFF FFFF hex	0000 hex

Description: Only for service purposes.

p9932 Save system logbook EEPROM / SYSLOG EEPROM save

Access level: 4	**Calculated:** -	**Data type:** Unsigned8
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	255	0

Description: Only for service purposes.

r9935.0 BO: POWER ON delay signal / POWER ON t_delay

Access level: 4	**Calculated:** -	**Data type:** Unsigned8
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display and binector output for a delay after POWER ON.

After switch-on, binector output r9935.0 is set with the start of the first sampling time and is again reset after approx. 100 ms.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	POWER ON delay signal	High	Low	-

r9975[0...7] System utilization measured / Sys util meas

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
- [%]	- [%]	- [%]

Description: Displays the measured system utilization.

The higher the value displayed, the higher the system utilization.

Index:
[0] = Computing time utilization (min)
[1] = Computing time utilization (averaged)
[2] = Computing time utilization (max)
[3] = Largest total utilization (min)
[4] = Largest total utilization (averaged)
[5] = Largest total utilization (max)
[6] = Reserved
[7] = Reserved

Dependency: See also: A01053, F01054, F01205

Note
For index 3 ... 5:
The total utilizations are determined using all sampling times used. The largest total utilizations are mapped here. The sampling time with the largest total utilization is displayed in r9979.
Total utilization:
Computing time load of sampling time involved including load from higher-priority sampling times (interrupts).

r9999[0...99] Software error internal supplementary diagnostics / SW_err int diag

Access level: 4	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Diagnostics parameter to display additional information for internal software errors.

Note
Only for internal Siemens troubleshooting.

p11000 BI: Free tec_ctrl 0 enable / Ftec0 enab

Access level: 2	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source to switch in/switch out the free technology controller 0.
1 signal: The technology controller is switched in.
0 signal: The technology controller is switched out.

p11026 Free tec_ctrl 0 unit selection / Ftec0 unit sel

Access level: 1	**Calculated:** -	**Data type:** Integer16
Can be changed: C2(5)	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
1	48	1

Description: Sets the unit for the parameters of the free technology controller 0.

Value:

1:	%
2:	1 referred no dimensions
3:	bar
4:	°C
5:	Pa
6:	ltr/s
7:	m^3/s
8:	ltr/min
9:	m^3/min
10:	ltr/h
11:	m^3/h
12:	kg/s
13:	kg/min
14:	kg/h

15:	t/min
16:	t/h
17:	N
18:	kN
19:	Nm
20:	psi
21:	°F
22:	gallon/s
23:	inch³/s
24:	gallon/min
25:	inch³/min
26:	gallon/h
27:	inch³/h
28:	lb/s
29:	lb/min
30:	lb/h
31:	lbf
32:	lbf ft
33:	K
34:	rpm
35:	parts/min
36:	m/s
37:	ft³/s
38:	ft³/min
39:	BTU/min
40:	BTU/h
41:	mbar
42:	inch wg
43:	ft wg
44:	m wg
45:	% r.h.
46:	g/kg
47:	ppm
48:	kg/cm²

Dependency: Only units of parameters with unit group 9_2 can be changed over using this parameter.
See also: p11027

p11027 Free tec_ctrl 0 unit reference quantity / Ftec0 unit ref

Access level: 1	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.01	340.28235E36	1.00

Description: Sets the reference quantity for the unit of the parameters of the free technology controller 0.
When changing over using changeover parameter p11026 to absolute units, all of the parameters involved refer to the reference quantity.

Dependency: See also: p11026

p11028 Free tec_ctrl 0 sampling time / Ftec0 t_samp

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
0	4	2

Description: Sets the sampling time for the free technology controller 0.

Value:

0:	Reserved
1:	128 ms
2:	256 ms
3:	512 ms
4:	1024 ms

r11049.0...11 CO/BO: Free tec_ctrl 0 status word / Ftec0 stat_word

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the status word of the free technology controller 0.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Deactivated	Yes	No	-
01	Limited	Yes	No	-
08	Actual value at the minimum	Yes	No	-
09	Actual value at the maximum	Yes	No	-
10	Output at the minimum	Yes	No	-
11	Output at the maximum	Yes	No	-

p11053 CI: Free tec_ctrl 0 setpoint signal source / Ftec0 setp s_s

Access level: 2	**Calculated:** -	**Data type:** Unsigned32 / FloatingPoint32
Can be changed: T, U	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source for the setpoint of the free technology controller 0.

p11057 Free tec_ctrl 0 setpoint ramp-up time / Ftec0 setp t_r-up

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
0.00 [s]	650.00 [s]	1.00 [s]

Description: Sets the ramp-up time for the free technology controller 0.

Dependency: See also: p11058

Note

The ramp-up time is referred to 100 %.

p11058 Free tec_ctrl 0 setpoint ramp-down time / Ftec0 setp t_r-dn

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
0.00 [s]	650.00 [s]	1.00 [s]

Description: Sets the ramp-down time for the free technology controller 0.

Dependency: See also: p11057

Note

The ramp-down time is referred to 100 %.

r11060 CO: Free tec_ctrl 0 setpoint after ramp-function generator / Ftec0 setp aft RFG

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: 9_2	**Unit selection:** p11026	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
- [%]	- [%]	- [%]

Description: Display and connector output for the setpoint after the ramp-function generator of the free technology controller 0.

p11063 Free tec_ctrl 0 system deviation inversion / Ftec0 sys_dev inv

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
0	1	0

Description: Sets the inversion of the system deviation of the free technology controller 0.
The setting depends on the type of control loop.

Value:
0: No inversion
1: Inversion

⚠ CAUTION

If the actual value inversion is incorrectly selected, then the closed-loop control with the technology controller can become unstable and can oscillate!

Note

The correct setting can be determined as follows:
- inhibit free technology controller (p11200 = 0).
- increase the motor speed and in so doing, measure the actual value signal (of the free technology controller).
- if the actual value increases with increasing motor speed, then deactivate inversion.
- if the actual value decreases with increasing motor speed, then activate inversion.

If value = 0:
The drive reduces the output speed when the actual value rises (e.g. for heating fans, intake pump, compressor).
If value = 1:
The drive increases the output speed when the actual value increases (e.g. for cooling fans, discharge pumps).

p11064 CI: Free tec_ctrl 0 actual value signal source / Ftec0 act v s_s

Access level: 2	**Calculated:** -	**Data type:** Unsigned32 / FloatingPoint32
Can be changed: T, U	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source for the actual value of the free technology controller 0.

p11065 Free tec_ctrl 0 actual value smoothing time constant / Ftec0 act v T

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
0.00 [s]	60.00 [s]	0.00 [s]

Description: Sets the smoothing time constant (PT1) for the actual value of the free technology controller 0.

p11067 Free tec_ctrl 0 actual value upper limit / Ftec0 act v up lim

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: 9_2	**Unit selection:** p11026	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
-200.00 [%]	200.00 [%]	100.00 [%]

Description: Sets the upper limit for the actual value signal of the free technology controller 0.

Dependency: See also: p11064

p11068 Free tec_ctrl 0 actual value lower limit / Ftec0 act v lo lim

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: 9_2	**Unit selection:** p11026	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
-200.00 [%]	200.00 [%]	-100.00 [%]

Description: Sets the lower limit for the actual value signal of the free technology controller 0.

Dependency: See also: p11064

p11071 Free tec_ctrl 0 actual value inversion / Ftec0 act v inv

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
0	1	0

Description: Sets the inversion of the actual value signal of the free technology controller 0.

Value:
0: No inversion
1: Inversion

r11072 CO: Free tec_ctrl 0 actual value after limiter / Ftec0 act v af lim

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: 9_2	**Unit selection:** p11026	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
- [%]	- [%]	- [%]

Description: Display and connector output for the actual value after the limiter of the free technology controller 0.

r11073 CO: Free tec_ctrl 0 system deviation / Ftec0 sys dev

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: 9_2	**Unit selection:** p11026	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
- [%]	- [%]	- [%]

Description: Display and connector output for the system deviation of the free technology controller 0.

p11074 Free tec_ctrl 0 differentiation time constant / Ftec0 D comp T

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
0.000 [s]	60.000 [s]	0.000 [s]

Description: Sets the time constant for the differentiation (D component) of the free technology controller 0.

Note
Value = 0: Differentiation is deactivated.

p11080 Free tec_ctrl 0 proportional gain / Ftec0 Kp

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
0.000	1000.000	1.000

Description: Sets the proportional gain (P component) of the free technology controller 0.

Note
Value = 0: The proportional gain is deactivated.

p11085 Free tec_ctrl 0 integral time / Ftec0 Tn

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
0.000 [s]	10000.000 [s]	30.000 [s]

Description: Sets the integral time (I component, integrating time constant) of the free technology controller 0.

Note
Value = 0: The integral time is disabled.
If the parameter is set to zero during operation, the I component retains its most recent value.

p11091 CO: Free tec_ctrl 0 limit maximum / Ftec0 lim max

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
-200.00 [%]	200.00 [%]	100.00 [%]

Description: Sets the maximum limit of the free technology controller 0.

Dependency: See also: p11092

Note

The maximum limit must always be greater than the minimum limit (p11091 > p11092).

p11092 CO: Free tec_ctrl 0 limit minimum / Ftec0 lim min

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
-200.00 [%]	200.00 [%]	0.00 [%]

Description: Sets the minimum limit of the free technology controller 0.

Dependency: See also: p11091

Note

The maximum limit must always be greater than the minimum limit (p11091 > p11092).

p11093 Free tec_ctrl 0 limit ramp-up/ramp-down time / Ftec0 lim r-u/r-dn

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
0.00 [s]	100.00 [s]	1.00 [s]

Description: Sets the ramp-up and ramp-down time for the maximum and minimum limit (p11091, p11092) of the free technology controller 0.

Dependency: See also: p11091, p11092

Note

The ramp-up/ramp-down times are referred to 100%.

r11094 CO: Free tec_ctrl 0 output signal / Ftec0 out_sig

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
- [%]	- [%]	- [%]

Description: Display and connector output for the output signal of the free technology controller 0.

p11097 CI: Free tec_ctrl 0 limit maximum signal source / Ftec0 lim max s_s

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / FloatingPoint32
Can be changed: T, U	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
-	-	11091[0]

Description: Sets the signal source for the maximum limit of the free technology controller 0.

Dependency: See also: p11091

p11098 CI: Free tec_ctrl 0 limit minimum signal source / Ftec0 lim min s_s

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / FloatingPoint32
Can be changed: T, U	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
-	-	11092[0]

Description: Sets the signal source for the minimum limit of the free technology controller 0.

Dependency: See also: p11092

p11099 CI: Free tec_ctrl 0 limit offset signal source / Ftec0 lim offs

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / FloatingPoint32
Can be changed: T, U	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source for the limit offset of the free technology controller 0.

p11100 BI: Free tec_ctrl 1 enable / Ftec1 enab

Access level: 2	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source to switch in/switch out the free technology controller 1.
1 signal: The technology controller is switched in.
0 signal: The technology controller is switched out.

p11126 Free tec_ctrl 1 unit selection / Ftec1 unit sel

Access level: 1	**Calculated:** -	**Data type:** Integer16
Can be changed: C2(5)	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
1	48	1

Description: Sets the unit for the parameters of the free technology controller 1.

Value:
1: %
2: 1 referred no dimensions
3: bar

4:	°C
5:	Pa
6:	ltr/s
7:	m^3/s
8:	ltr/min
9:	m^3/min
10:	ltr/h
11:	m^3/h
12:	kg/s
13:	kg/min
14:	kg/h
15:	t/min
16:	t/h
17:	N
18:	kN
19:	Nm
20:	psi
21:	°F
22:	gallon/s
23:	$inch^3$/s
24:	gallon/min
25:	$inch^3$/min
26:	gallon/h
27:	$inch^3$/h
28:	lb/s
29:	lb/min
30:	lb/h
31:	lbf
32:	lbf ft
33:	K
34:	rpm
35:	parts/min
36:	m/s
37:	ft^3/s
38:	ft^3/min
39:	BTU/min
40:	BTU/h
41:	mbar
42:	inch wg
43:	ft wg
44:	m wg
45:	% r.h.
46:	g/kg
47:	ppm
48:	kg/cm^2

Dependency: Only units of parameters with unit group 9_3 can be changed over using this parameter.

See also: p11127

p11127 Free tec_ctrl 1 unit reference quantity / Ftec1 unit ref

Access level: 1	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
0.01	340.28235E36	1.00

Description: Sets the reference quantity for the unit of the parameters of the free technology controller 1.

When changing over using changeover parameter p11126 to absolute units, all of the parameters involved refer to the reference quantity.

Dependency: See also: p11126

p11128 Free tec_ctrl 1 sampling time / Ftec1 t_samp

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
0	4	2

Description: Sets the sampling time for the free technology controller 1.

Value:

0:	Reserved
1:	128 ms
2:	256 ms
3:	512 ms
4:	1024 ms

r11149.0...11 CO/BO: Free tec_ctrl 1 status word / Ftec1 stat_word

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the status word of the free technology controller 1.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Deactivated	Yes	No	-
01	Limited	Yes	No	-
08	Actual value at the minimum	Yes	No	-
09	Actual value at the maximum	Yes	No	-
10	Output at the minimum	Yes	No	-
11	Output at the maximum	Yes	No	-

p11153 CI: Free tec_ctrl 1 setpoint signal source / Ftec1 setp s_s

Access level: 2	**Calculated:** -	**Data type:** Unsigned32 / FloatingPoint32
Can be changed: T, U	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source for the setpoint of the free technology controller 1.

p11157 Free tec_ctrl 1 setpoint ramp-up time / Ftec1 setp t_r-up

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
0.00 [s]	650.00 [s]	1.00 [s]

Description: Sets the ramp-up time for the free technology controller 1.

Dependency: See also: p11158

Note
The ramp-up time is referred to 100 %.

p11158 Free tec_ctrl 1 setpoint ramp-down time / Ftec1 setp t_r-dn

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
0.00 [s]	650.00 [s]	1.00 [s]

Description: Sets the ramp-down time of the free technology controller 1.

Dependency: See also: p11157

Note
The ramp-down time is referred to 100 %.

r11160 CO: Free tec_ctrl 1 setpoint after ramp-function generator / Ftec1 setp aft RFG

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: 9_3	**Unit selection:** p11126	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
- [%]	- [%]	- [%]

Description: Display and connector output for the setpoint after the ramp-function generator of the free technology controller 1.

p11163 Free tec_ctrl 1 system deviation inversion / Ftec1 sys_dev inv

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
0	1	0

Description: Sets the inversion of the system deviation of the free technology controller 1.
The setting depends on the type of control loop.

Value:
0: No inversion
1: Inversion

⚠ CAUTION
If the actual value inversion is incorrectly selected, then the closed-loop control with the technology controller can become unstable and can oscillate!

Note

The correct setting can be determined as follows:
- inhibit free technology controller (p11200 = 0).
- increase the motor speed and in so doing, measure the actual value signal (of the free technology controller).
- if the actual value increases with increasing motor speed, then deactivate inversion.
- if the actual value decreases with increasing motor speed, then activate inversion.

If value = 0:
The drive reduces the output speed when the actual value rises (e.g. for heating fans, intake pump, compressor).
If value = 1:
The drive increases the output speed when the actual value increases (e.g. for cooling fans, discharge pumps).

p11164 CI: Free tec_ctrl 1 actual value signal source / Ftec1 act v s_s

Access level: 2	**Calculated:** -	**Data type:** Unsigned32 / FloatingPoint32
Can be changed: T, U	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source for the actual value of the free technology controller 1.

p11165 Free tec_ctrl 1 actual value smoothing time constant / Ftec1 act v T

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
0.00 [s]	60.00 [s]	0.00 [s]

Description: Sets the smoothing time constant (PT1) for the actual value of the free technology controller 1.

p11167 Free tec_ctrl 1 actual value upper limit / Ftec1 act v up lim

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: 9_3	**Unit selection:** p11126	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
-200.00 [%]	200.00 [%]	100.00 [%]

Description: Sets the upper limit for the actual value signal of the free technology controller 1.

Dependency: See also: p11164

p11168 Free tec_ctrl 1 actual value lower limit / Ftec1 act v lo lim

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: 9_3	**Unit selection:** p11126	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
-200.00 [%]	200.00 [%]	-100.00 [%]

Description: Sets the lower limit for the actual value signal of the free technology controller 1.

Dependency: See also: p11164

p11171	Free tec_ctrl 1 actual value inversion / Ftec1 act v inv		
	Access level: 3	**Calculated:** -	**Data type:** Integer16
	Can be changed: T	**Scaling:** -	**Dynamic index:** -
	Unit group: -	**Unit selection:** -	**Function diagram:** 7030
	Min:	**Max:**	**Factory setting:**
	0	1	0

Description: Sets the inversion of the actual value signal of the free technology controller 1.

Value:
0: No inversion
1: Inversion

r11172	CO: Free tec_ctrl 1 actual value after limiter / Ftec1 act v af lim		
	Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
	Can be changed: -	**Scaling:** PERCENT	**Dynamic index:** -
	Unit group: 9_3	**Unit selection:** p11126	**Function diagram:** 7030
	Min:	**Max:**	**Factory setting:**
	- [%]	- [%]	- [%]

Description: Display and connector output for the actual value after the limiter of the free technology controller 1.

r11173	CO: Free tec_ctrl 1 system deviation / Ftec1 sys dev		
	Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
	Can be changed: -	**Scaling:** PERCENT	**Dynamic index:** -
	Unit group: 9_3	**Unit selection:** p11126	**Function diagram:** 7030
	Min:	**Max:**	**Factory setting:**
	- [%]	- [%]	- [%]

Description: Display and connector output for the system deviation of the free technology controller 1.

p11174	Free tec_ctrl 1 differentiation time constant / Ftec1 D comp T		
	Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
	Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
	Unit group: -	**Unit selection:** -	**Function diagram:** 7030
	Min:	**Max:**	**Factory setting:**
	0.000 [s]	60.000 [s]	0.000 [s]

Description: Sets the time constant for the differentiation (D component) of the free technology controller 1.

Note
Value = 0: Differentiation is deactivated.

p11180	Free tec_ctrl 1 proportional gain / Ftec1 Kp		
	Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
	Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
	Unit group: -	**Unit selection:** -	**Function diagram:** 7030
	Min:	**Max:**	**Factory setting:**
	0.000	1000.000	1.000

Description: Sets the proportional gain (P component) of the free technology controller 1.

Note
Value = 0: The proportional gain is deactivated.

p11185 Free tec_ctrl 1 integral time / Ftec1 Tn

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
0.000 [s]	10000.000 [s]	30.000 [s]

Description: Sets the integral time (I component, integrating time constant) of the free technology controller 1.

Note

Value = 0: The integral time is disabled.
If the parameter is set to zero during operation, the I component retains its most recent value.

p11191 CO: Free tec_ctrl 1 limit maximum / Ftec1 lim max

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
-200.00 [%]	200.00 [%]	100.00 [%]

Description: Sets the maximum limit of the free technology controller 1.

Dependency: See also: p11192

Note

The maximum limit must always be greater than the minimum limit (p11191 > p11192).

p11192 CO: Free tec_ctrl 1 limit minimum / Ftec1 lim min

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
-200.00 [%]	200.00 [%]	0.00 [%]

Description: Sets the minimum limit of the free technology controller 1.

Dependency: See also: p11191

Note

The maximum limit must always be greater than the minimum limit (p11191 > p11192).

p11193 Free tec_ctrl 1 limit ramp-up/ramp-down time / Ftec1 lim r-u/r-dn

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
0.00 [s]	100.00 [s]	1.00 [s]

Description: Sets the ramp-up and ramp-down time for the maximum and minimum limit (p11191, p11192) of the free technology controller 1.

Dependency: See also: p11191, p11192

Note

The ramp-up/ramp-down times are referred to 100%.

r11194 CO: Free tec_ctrl 1 output signal / Ftec1 out_sig

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
- [%]	- [%]	- [%]

Description: Display and connector output for the output signal of the free technology controller 1.

p11197 CI: Free tec_ctrl 1 limit maximum signal source / Ftec1 lim max s_s

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / FloatingPoint32
Can be changed: T, U	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
-	-	11191[0]

Description: Sets the signal source for the maximum limit of the free technology controller 1.

Dependency: See also: p11191

p11198 CI: Free tec_ctrl 1 limit minimum signal source / Ftec1 lim min s_s

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / FloatingPoint32
Can be changed: T, U	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
-	-	11192[0]

Description: Sets the signal source for the minimum limit of the free technology controller 1.

Dependency: See also: p11192

p11199 CI: Free tec_ctrl 1 limit offset signal source / Ftec1 lim offs

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / FloatingPoint32
Can be changed: T, U	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source for the limit offset of the free technology controller 1.

p11200 BI: Free tec_ctrl 2 enable / Ftec2 enab

Access level: 2	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source to switch in/switch out the free technology controller 2.
1 signal: The technology controller is switched in.
0 signal: The technology controller is switched out.

p11226 Free tec_ctrl 2 unit selection / Ftec2 unit sel

Access level: 1	**Calculated:** -	**Data type:** Integer16
Can be changed: C2(5)	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
1	48	1

Description: Sets the unit for the parameters of the free technology controller 2.

Value:

1: %
2: 1 referred no dimensions
3: bar
4: °C
5: Pa
6: ltr/s
7: m³/s
8: ltr/min
9: m³/min
10: ltr/h
11: m³/h
12: kg/s
13: kg/min
14: kg/h
15: t/min
16: t/h
17: N
18: kN
19: Nm
20: psi
21: °F
22: gallon/s
23: inch³/s
24: gallon/min
25: inch³/min
26: gallon/h
27: inch³/h
28: lb/s
29: lb/min
30: lb/h
31: lbf
32: lbf ft
33: K
34: rpm
35: parts/min
36: m/s
37: ft³/s
38: ft³/min
39: BTU/min
40: BTU/h
41: mbar
42: inch wg

43:	ft wg
44:	m wg
45:	% r.h.
46:	g/kg
47:	ppm
48:	kg/cm²

Dependency: Only units of parameters with unit group 9_4 can be changed over using this parameter.

See also: p11227

p11227 Free tec_ctrl 2 unit reference quantity / Ftec2 unit ref

Access level: 1	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
0.01	340.28235E36	1.00

Description: Sets the reference quantity for the unit of the parameters of the free technology controller 2.

When changing over using changeover parameter p11226 to absolute units, all of the parameters involved refer to the reference quantity.

Dependency: See also: p11226

p11228 Free tec_ctrl 2 sampling time / Ftec2 t_samp

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
0	4	2

Description: Sets the sampling time for the free technology controller 2.

Value:

0:	Reserved
1:	128 ms
2:	256 ms
3:	512 ms
4:	1024 ms

r11249.0...11 CO/BO: Free tec_ctrl 2 status word / Ftec2 stat_word

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the status word of the free technology controller 2.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Deactivated	Yes	No	-
01	Limited	Yes	No	-
08	Actual value at the minimum	Yes	No	-
09	Actual value at the maximum	Yes	No	-
10	Output at the minimum	Yes	No	-
11	Output at the maximum	Yes	No	-

p11253 CI: Free tec_ctrl 2 setpoint signal source / Ftec2 setp s_s

Access level: 2	**Calculated:** -	**Data type:** Unsigned32 / FloatingPoint32
Can be changed: T, U	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source for the setpoint of the free technology controller 2.

p11257 Free tec_ctrl 2 setpoint ramp-up time / Ftec2 setp t_r-up

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
0.00 [s]	650.00 [s]	1.00 [s]

Description: Sets the ramp-up time for the free technology controller 2.

Dependency: See also: p11258

Note

The ramp-up time is referred to 100 %.

p11258 Free tec_ctrl 2 setpoint ramp-down time / Ftec2 setp t_r-dn

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
0.00 [s]	650.00 [s]	1.00 [s]

Description: Sets the ramp-down time of the free technology controller 2.

Dependency: See also: p11257

Note

The ramp-down time is referred to 100 %.

r11260 CO: Free tec_ctrl 2 setpoint after ramp-function generator / Ftec2 setp aft RFG

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: 9_4	**Unit selection:** p11226	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
- [%]	- [%]	- [%]

Description: Display and connector output for the setpoint after the ramp-function generator of the free technology controller 2.

p11263 Free tec_ctrl 2 system deviation inversion / Ftec2 sys_dev inv

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
0	1	0

Description: Sets the inversion of the system deviation of the free technology controller 2.
The setting depends on the type of control loop.

Value: 0: No inversion

1: Inversion

⚠ CAUTION

If the actual value inversion is incorrectly selected, then the closed-loop control with the technology controller can become unstable and can oscillate!

Note

The correct setting can be determined as follows:
- inhibit free technology controller (p11200 = 0).
- increase the motor speed and in so doing, measure the actual value signal (of the free technology controller).
- if the actual value increases with increasing motor speed, then deactivate inversion.
- if the actual value decreases with increasing motor speed, then activate inversion.

If value = 0:
The drive reduces the output speed when the actual value rises (e.g. for heating fans, intake pump, compressor).
If value = 1:
The drive increases the output speed when the actual value increases (e.g. for cooling fans, discharge pumps).

p11264 CI: Free tec_ctrl 2 actual value signal source / Ftec2 act v s_s

Access level: 2	**Calculated:** -	**Data type:** Unsigned32 / FloatingPoint32
Can be changed: T, U	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source for the actual value of the free technology controller 2.

p11265 Free tec_ctrl 2 actual value smoothing time constant / Ftec2 act v T

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
0.00 [s]	60.00 [s]	0.00 [s]

Description: Sets the smoothing time constant (PT1) for the actual value of the free technology controller 2.

p11267 Free tec_ctrl 2 actual value upper limit / Ftec2 act v up lim

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: 9_4	**Unit selection:** p11226	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
-200.00 [%]	200.00 [%]	100.00 [%]

Description: Sets the upper limit for the actual value signal of the free technology controller 2.

Dependency: See also: p11264

p11268 Free tec_ctrl 2 actual value lower limit / Ftec2 act v lo lim

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: 9_4	**Unit selection:** p11226	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
-200.00 [%]	200.00 [%]	-100.00 [%]

Description: Sets the lower limit for the actual value signal of the free technology controller 2.

Dependency: See also: p11264

p11271 Free tec_ctrl 2 actual value inversion / Ftec2 act v inv

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
0	1	0

Description: Sets the inversion of the actual value signal of the free technology controller 2.

Value:
0: No inversion
1: Inversion

r11272 CO: Free tec_ctrl 2 actual value after limiter / Ftec2 act v af lim

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: 9_4	**Unit selection:** p11226	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
- [%]	- [%]	- [%]

Description: Display and connector output for the actual value after the limiter of the free technology controller 2.

r11273 CO: Free tec_ctrl 2 system deviation / Ftec2 sys dev

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: 9_4	**Unit selection:** p11226	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
- [%]	- [%]	- [%]

Description: Display and connector output for the system deviation of the free technology controller 2.

p11274 Free tec_ctrl 2 differentiation time constant / Ftec2 D comp T

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
0.000 [s]	60.000 [s]	0.000 [s]

Description: Sets the time constant for the differentiation (D component) of the free technology controller 2.

Note
Value = 0: Differentiation is deactivated.

p11280 Free tec_ctrl 2 proportional gain / Ftec2 Kp

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
0.000	1000.000	1.000

Description: Sets the proportional gain (P component) of the free technology controller 2.

Note
Value = 0: The proportional gain is deactivated.

p11285 Free tec_ctrl 2 integral time / Ftec2 Tn

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
0.000 [s]	10000.000 [s]	30.000 [s]

Description: Sets the integral time (I component, integrating time constant) of the free technology controller 2.

Note
Value = 0: The integral time is disabled.
If the parameter is set to zero during operation, the I component retains its most recent value.

p11291 CO: Free tec_ctrl 2 limit maximum / Ftec2 lim max

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
-200.00 [%]	200.00 [%]	100.00 [%]

Description: Sets the maximum limit of the free technology controller 2.

Dependency: See also: p11292

Note
The maximum limit must always be greater than the minimum limit (p11291 > p11292).

p11292 CO: Free tec_ctrl 2 limit minimum / Ftec2 lim min

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
-200.00 [%]	200.00 [%]	0.00 [%]

Description: Sets the minimum limit of the free technology controller 2.

Dependency: See also: p11291

Note
The maximum limit must always be greater than the minimum limit (p11291 > p11292).

p11293 Free tec_ctrl 2 limit ramp-up/ramp-down time / Ftec2 lim r-u/r-dn

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
0.00 [s]	100.00 [s]	1.00 [s]

Description: Sets the ramp-up and ramp-down time for the maximum and minimum limit (p11291, p11292) of the free technology controller 2.

Dependency: See also: p11291, p11292

Note
The ramp-up/ramp-down times are referred to 100%.

r11294 CO: Free tec_ctrl 2 output signal / Ftec2 out_sig

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
- [%]	- [%]	- [%]

Description: Display and connector output for the output signal of the free technology controller 2.

p11297 CI: Free tec_ctrl 2 limit maximum signal source / Ftec2 lim max s_s

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / FloatingPoint32
Can be changed: T, U	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
-	-	11291[0]

Description: Sets the signal source for the maximum limit of the free technology controller 2.

Dependency: See also: p11291

p11298 CI: Free tec_ctrl 2 limit minimum signal source / Ftec2 lim min s_s

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / FloatingPoint32
Can be changed: T, U	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
-	-	11292[0]

Description: Sets the signal source for the minimum limit of the free technology controller 2.

Dependency: See also: p11292

p11299 CI: Free tec_ctrl 2 limit offset signal source / Ftec2 lim offs

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / FloatingPoint32
Can be changed: T, U	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7030
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source for the limit offset of the free technology controller 2.

r20001[0...9] Run-time group sampling time / RTG sampling time

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
- [ms]	- [ms]	- [ms]

Description: Displays the current sampling time of the run-time group 0 to 9.

Index: [0] = Run-time group 0
[1] = Run-time group 1
[2] = Run-time group 2
[3] = Run-time group 3
[4] = Run-time group 4
[5] = Run-time group 5
[6] = Run-time group 6
[7] = Run-time group 7
[8] = Run-time group 8
[9] = Run-time group 9

p20030[0...3] BI: AND 0 inputs / AND 0 inputs

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7210
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source of input quantities I0, I1, I2, I3 of instance AND 0 of the AND function block.

Index: [0] = Input I0
[1] = Input I1
[2] = Input I2
[3] = Input I3

r20031 BO: AND 0 output Q / AND 0 output Q

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7210
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display parameter for binary quantity Q = I0 & I1 & I2 & I3 of instance AND 0 of the AND function block.

p20032 AND 0 run-time group / AND 0 RTG

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7210
Min:	**Max:**	**Factory setting:**
4	9999	9999

Description: Setting parameter for the run-time group in which the instance AND 0 of the AND function block is to be called.

Value:
4: Run-time group 4
5: Run-time group 5
6: Run-time group 6
9999: Do not calculate

p20033 AND 0 run sequence / AND 0 RunSeq

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7210
Min:	**Max:**	**Factory setting:**
0	32000	10

Description: Setting parameter for the run sequence of instance AND 0 within the run-time group set in p20032.

Note
The function blocks with a lower run sequence value are calculated before function blocks with a higher run sequence value.

p20034[0...3] BI: AND 1 inputs / AND 1 inputs

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7210
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source of input quantities I0, I1, I2, I3 of instance AND 1 of the AND function block.

Index:
[0] = Input I0
[1] = Input I1
[2] = Input I2
[3] = Input I3

r20035 BO: AND 1 output Q / AND 1 output Q

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7210
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display parameter for binary quantity Q = I0 & I1 & I2 & I3 of instance AND 1 of the AND function block.

p20036 AND 1 run-time group / AND 1 RTG

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7210
Min:	**Max:**	**Factory setting:**
4	9999	9999

Description: Setting parameter for the run-time group in which the instance AND 1 of the AND function block is to be called.

Value:
4: Run-time group 4
5: Run-time group 5
6: Run-time group 6
9999: Do not calculate

p20037 AND 1 run sequence / AND 1 RunSeq

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7210
Min:	**Max:**	**Factory setting:**
0	32000	20

Description: Setting parameter for the run sequence of instance AND 1 within the run-time group set in p20036.

Note
The function blocks with a lower run sequence value are calculated before function blocks with a higher run sequence value.

p20038[0...3] BI: AND 2 inputs / AND 2 inputs

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7210
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source of input quantities I0, I1, I2, I3 of instance AND 2 of the AND function block.

Index:
[0] = Input I0
[1] = Input I1
[2] = Input I2
[3] = Input I3

r20039 BO: AND 2 output Q / AND 2 output Q

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7210
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display parameter for binary quantity Q = I0 & I1 & I2 & I3 of instance AND 2 of the AND function block.

p20040 AND 2 run-time group / AND 2 RTG

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7210
Min:	**Max:**	**Factory setting:**
4	9999	9999

Description: Setting parameter for the run-time group in which the instance AND 2 of the AND function block is to be called.

Value:
4: Run-time group 4
5: Run-time group 5
6: Run-time group 6
9999: Do not calculate

p20041 AND 2 run sequence / AND 2 RunSeq

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 2710
Min:	**Max:**	**Factory setting:**
0	32000	30

Description: Setting parameter for the run sequence of instance AND 2 within the run-time group set in p20040.

Note
The function blocks with a lower run sequence value are calculated before function blocks with a higher run sequence value.

p20046[0...3] BI: OR 0 inputs / OR 0 inputs

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7212
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source of input quantities I0, I1, I2, I3 of instance OR 0 of the OR function block.

Index:
[0] = Input I0
[1] = Input I1
[2] = Input I2
[3] = Input I3

r20047 BO: OR 0 output Q / OR 0 output Q

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7212
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display parameter for binary quantity Q = I0 | I1 | I2 | I3 of instance OR 0 of the OR function block.

p20048 OR 0 run-time group / OR 0 RTG

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7212
Min:	**Max:**	**Factory setting:**
4	9999	9999

Description: Setting parameter for the run-time group in which the instance OR 0 of the OR function block is to be called.

Value:
4: Run-time group 4
5: Run-time group 5
6: Run-time group 6
9999: Do not calculate

p20049 OR 0 run sequence / OR 0 RunSeq

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7212
Min:	**Max:**	**Factory setting:**
0	32000	60

Description: Setting parameter for the run sequence of instance OR 0 within the run-time group set in p20048.

Note
The function blocks with a lower run sequence value are calculated before function blocks with a higher run sequence value.

p20050[0...3] BI: OR 1 inputs / OR 1 inputs

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7212
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source of input quantities I0, I1, I2, I3 of instance OR 1 of the OR function block.

Index:
[0] = Input I0
[1] = Input I1
[2] = Input I2
[3] = Input I3

r20051 BO: OR 1 output Q / OR 1 output Q

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7212
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display parameter for binary quantity Q = I0 | I1 | I2 | I3 of instance OR 1 of the OR function block.

p20052 OR 1 run-time group / OR 1 RTG

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7212
Min:	**Max:**	**Factory setting:**
4	9999	9999

Description: Setting parameter for the run-time group in which the instance OR 1 of the OR function block is to be called.

Value:
4: Run-time group 4
5: Run-time group 5
6: Run-time group 6
9999: Do not calculate

p20053 OR 1 run sequence / OR 1 RunSeq

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7212
Min:	**Max:**	**Factory setting:**
0	32000	70

Description: Setting parameter for the run sequence of instance OR 1 within the run-time group set in p20052.

Note
The function blocks with a lower run sequence value are calculated before function blocks with a higher run sequence value.

p20054[0...3] BI: OR 2 inputs / OR 2 inputs

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7212
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source of input quantities I0, I1, I2, I3 of instance OR 2 of the OR function block.

Index:
[0] = Input I0
[1] = Input I1
[2] = Input I2
[3] = Input I3

r20055 BO: OR 2 output Q / OR 2 output Q

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7212
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display parameter for binary quantity Q = I0 | I1 | I2 | I3 of instance OR 2 of the OR function block.

p20056 OR 2 run-time group / OR 2 RTG

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7212
Min:	**Max:**	**Factory setting:**
4	9999	9999

Description: Setting parameter for the run-time group in which the instance OR 2 of the OR function block is to be called.

Value:
4: Run-time group 4
5: Run-time group 5
6: Run-time group 6
9999: Do not calculate

p20057 OR 2 run sequence / OR 2 RunSeq

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7212
Min:	**Max:**	**Factory setting:**
0	32000	80

Description: Setting parameter for the run sequence of instance OR 2 within the run-time group set in p20056.

Note
The function blocks with a lower run sequence value are calculated before function blocks with a higher run sequence value.

p20062[0...3] BI: XOR 0 inputs / XOR 0 inputs

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7214
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source of input quantities I0, I1, I2, I3 of instance XOR 0 of the XOR function block.

Index:
[0] = Input I0
[1] = Input I1
[2] = Input I2
[3] = Input I3

r20063 BO: XOR 0 output Q / XOR 0 output Q

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7214
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display parameter for binary quantity Q of instance XOR 0 of the XOR function block.

p20064 XOR 0 run-time group / XOR 0 RTG

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7214
Min:	**Max:**	**Factory setting:**
4	9999	9999

Description: Setting parameter for the run-time group in which the instance XOR 0 of the XOR function block is to be called.

Value:
4: Run-time group 4
5: Run-time group 5
6: Run-time group 6
9999: Do not calculate

p20065 XOR 0 run sequence / XOR 0 RunSeq

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7214
Min:	**Max:**	**Factory setting:**
0	32000	110

Description: Setting parameter for the run sequence of instance XOR 0 within the run-time group set in p20064.

Note
The function blocks with a lower run sequence value are calculated before function blocks with a higher run sequence value.

p20066[0...3] BI: XOR 1 inputs / XOR 1 inputs

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7214
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source of input quantities I0, I1, I2, I3 of instance XOR 1 of the XOR function block.

Index:
[0] = Input I0
[1] = Input I1
[2] = Input I2
[3] = Input I3

r20067 BO: XOR 1 output Q / XOR 1 output Q

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7214
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display parameter for binary quantity Q of instance XOR 1 of the XOR function block.

p20068 XOR 1 run-time group / XOR 1 RTG

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7214
Min:	**Max:**	**Factory setting:**
4	9999	9999

Description: Setting parameter for the run-time group in which the instance XOR 1 of the XOR function block is to be called.

Value:
4: Run-time group 4
5: Run-time group 5
6: Run-time group 6
9999: Do not calculate

p20069 XOR 1 run sequence / XOR 1 RunSeq

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7214
Min:	**Max:**	**Factory setting:**
0	32000	120

Description: Setting parameter for the run sequence of instance XOR 1 within the run-time group set in p20068.

Note
The function blocks with a lower run sequence value are calculated before function blocks with a higher run sequence value.

p20070[0...3] BI: XOR 2 inputs / XOR 2 inputs

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7214
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source of input quantities I0, I1, I2, I3 of instance XOR 2 of the XOR function block.

Index:
[0] = Input I0
[1] = Input I1
[2] = Input I2
[3] = Input I3

r20071 BO: XOR 2 output Q / XOR 2 output Q

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7214
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display parameter for binary quantity Q of instance XOR 2 of the XOR function block.

p20072 XOR 2 run-time group / XOR 2 RTG

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7214
Min:	**Max:**	**Factory setting:**
4	9999	9999

Description: Setting parameter for the run-time group in which the instance XOR 2 of the XOR function block is to be called.

Value:
4: Run-time group 4
5: Run-time group 5
6: Run-time group 6
9999: Do not calculate

p20073 XOR 2 run sequence / XOR 2 RunSeq

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7214
Min:	**Max:**	**Factory setting:**
0	32000	130

Description: Setting parameter for the run sequence of instance XOR 2 within the run-time group set in p20072.

Note
The function blocks with a lower run sequence value are calculated before function blocks with a higher run sequence value.

p20078 BI: NOT 0 input I / NOT 0 input I

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7216
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source of input quantity I of instance NOT 0 of the inverter.

r20079 BO: NOT 0 inverted output / NOT 0 inv output

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7216
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display parameter for the inverted output of instance NOT 0 of the inverter.

p20080 NOT 0 run-time group / NOT 0 RTG

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7216
Min:	**Max:**	**Factory setting:**
4	9999	9999

Description: Setting parameter for the run-time group in which the instance NOT 0 of the inverter is to be called.

Value:

4:	Run-time group 4
5:	Run-time group 5
6:	Run-time group 6
9999:	Do not calculate

p20081 NOT 0 run sequence / NOT 0 RunSeq

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7216
Min:	**Max:**	**Factory setting:**
0	32000	160

Description: Setting parameter for the run sequence of instance NOT 0 within the run-time group set in p20080.

Note
The function blocks with a lower run sequence value are calculated before function blocks with a higher run sequence value.

p20082 BI: NOT 1 input I / NOT 1 input I

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7216
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source of input quantity I of instance NOT 1 of the inverter.

r20083 BO: NOT 1 inverted output / NOT 1 inv output

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7216
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display parameter for the inverted output of instance NOT 1 of the inverter.

p20084 NOT 1 run-time group / NOT 1 RTG

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7216
Min:	**Max:**	**Factory setting:**
4	9999	9999

Description: Setting parameter for the run-time group in which the instance NOT 1 of the inverter is to be called.

Value:
4: Run-time group 4
5: Run-time group 5
6: Run-time group 6
9999: Do not calculate

p20085 NOT 1 run sequence / NOT 1 RunSeq

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7216
Min:	**Max:**	**Factory setting:**
0	32000	170

Description: Setting parameter for the run sequence of instance NOT 1 within the run-time group set in p20084.

Note
The function blocks with a lower run sequence value are calculated before function blocks with a higher run sequence value.

p20086 BI: NOT 2 input I / NOT 2 input I

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7216
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source of input quantity I of instance NOT 2 of the inverter.

r20087	**BO: NOT 2 inverted output / NOT 2 inv output**		
	Access level: 3	**Calculated:** -	**Data type:** Unsigned32
	Can be changed: -	**Scaling:** -	**Dynamic index:** -
	Unit group: -	**Unit selection:** -	**Function diagram:** 7216
	Min:	**Max:**	**Factory setting:**
	-	-	-
Description:	Display parameter for the inverted output of instance NOT 2 of the inverter.		

p20088	**NOT 2 run-time group / NOT 2 RTG**		
	Access level: 3	**Calculated:** -	**Data type:** Integer16
	Can be changed: T	**Scaling:** -	**Dynamic index:** -
	Unit group: -	**Unit selection:** -	**Function diagram:** 7216
	Min:	**Max:**	**Factory setting:**
	4	9999	9999
Description:	Setting parameter for the run-time group in which the instance NOT 2 of the inverter is to be called.		
Value:	4: Run-time group 4		
	5: Run-time group 5		
	6: Run-time group 6		
	9999: Do not calculate		

p20089	**NOT 2 run sequence / NOT 2 RunSeq**		
	Access level: 3	**Calculated:** -	**Data type:** Unsigned16
	Can be changed: T	**Scaling:** -	**Dynamic index:** -
	Unit group: -	**Unit selection:** -	**Function diagram:** 7216
	Min:	**Max:**	**Factory setting:**
	0	32000	180
Description:	Setting parameter for the run sequence of instance NOT 2 within the run-time group set in p20088.		

Note
The function blocks with a lower run sequence value are calculated before function blocks with a higher run sequence value.

p20094[0...3]	**CI: ADD 0 inputs / ADD 0 inputs**		
	Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / FloatingPoint32
	Can be changed: T	**Scaling:** PERCENT	**Dynamic index:** -
	Unit group: -	**Unit selection:** -	**Function diagram:** 7220
	Min:	**Max:**	**Factory setting:**
	-	-	0
Description:	Sets the signal source of input quantities X0, X1, X2, X3 of instance ADD 0 of the adder.		
Index:	[0] = Input X0		
	[1] = Input X1		
	[2] = Input X2		
	[3] = Input X3		

r20095 CO: ADD 0 output Y / ADD 0 output Y

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7220
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display parameter for the output quantity Y = X0 + X1 + X2 + X3 of instance ADD 0 of the adder.

p20096 ADD 0 run-time group / ADD 0 RTG

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7220
Min:	**Max:**	**Factory setting:**
5	9999	9999

Description: Setting parameter for the run-time group in which the instance ADD 0 of the adder is to be called.

Value:
5: Run-time group 5
6: Run-time group 6
9999: Do not calculate

p20097 ADD 0 run sequence / ADD 0 RunSeq

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7220
Min:	**Max:**	**Factory setting:**
0	32000	210

Description: Setting parameter for the run sequence of instance ADD 0 within the run-time group set in p20096.

Note
The function blocks with a lower run sequence value are calculated before function blocks with a higher run sequence value.

p20098[0...3] CI: ADD 1 inputs / ADD 1 inputs

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / FloatingPoint32
Can be changed: T	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7220
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source of input quantities X0, X1, X2, X3 of instance ADD 1 of the adder.

Index:
[0] = Input X0
[1] = Input X1
[2] = Input X2
[3] = Input X3

r20099 CO: ADD 1 output Y / ADD 1 output Y

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7220
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display parameter for the output quantity Y = X0 + X1 + X2 + X3 of instance ADD 1 of the adder.

p20100 ADD 1 run-time group / ADD 1 RTG

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7220
Min:	**Max:**	**Factory setting:**
5	9999	9999

Description: Setting parameter for the run-time group in which the instance ADD 1 of the adder is to be called.

Value:
5: Run-time group 5
6: Run-time group 6
9999: Do not calculate

p20101 ADD 1 run sequence / ADD 1 RunSeq

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7220
Min:	**Max:**	**Factory setting:**
0	32000	220

Description: Setting parameter for the run sequence of instance ADD 1 within the run-time group set in p20100.

Note
The function blocks with a lower run sequence value are calculated before function blocks with a higher run sequence value.

p20102[0...1] CI: SUB 0 inputs / SUB 0 inputs

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / FloatingPoint32
Can be changed: T	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7220
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source of minuend X1 and subtrahend X2 of instance SUB 0 of the subtractor.

Index:
[0] = Minuend X1
[1] = Subtrahend X2

r20103 CO: SUB 0 difference Y / SUB 0 difference Y

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7220
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display parameter for the difference Y = X1 - X2 of instance SUB 0 of the subtractor.

p20104 SUB 0 run-time group / SUB 0 RTG

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7220
Min:	**Max:**	**Factory setting:**
5	9999	9999

Description: Setting parameter for the run-time group in which instance SUB 0 of the subtractor is to be called.

Value:

5:	Run-time group 5
6:	Run-time group 6
9999:	Do not calculate

p20105 SUB 0 run sequence / SUB 0 RunSeq

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7220
Min:	**Max:**	**Factory setting:**
0	32000	240

Description: Setting parameter for the run sequence of instance SUB 0 within the run-time group set in p20104.

Note
The function blocks with a lower run sequence value are calculated before function blocks with a higher run sequence value.

p20106[0...1] CI: SUB 1 inputs / SUB 1 inputs

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / FloatingPoint32
Can be changed: T	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7220
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source of minuend X1 and subtrahend X2 of instance SUB 1 of the subtractor.

Index:
[0] = Minuend X1
[1] = Subtrahend X2

r20107 CO: SUB 1 difference Y / SUB 1 difference Y

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7220
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display parameter for the difference Y = X1 - X2 of instance SUB 1 of the subtractor.

p20108 SUB 1 run-time group / SUB 1 RTG

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7220
Min:	**Max:**	**Factory setting:**
5	9999	9999

Description: Setting parameter for the run-time group in which instance SUB 1 of the subtractor is to be called.

Value:

5:	Run-time group 5
6:	Run-time group 6
9999:	Do not calculate

p20109 SUB 1 run sequence / SUB 1 RunSeq

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7220
Min:	**Max:**	**Factory setting:**
0	32000	250

Description: Setting parameter for the run sequence of instance SUB 1 within the run-time group set in p20108.

Note
The function blocks with a lower run sequence value are calculated before function blocks with a higher run sequence value.

p20110[0...3] CI: MUL 0 inputs / MUL 0 inputs

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / FloatingPoint32
Can be changed: T	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7222
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source of the factors X0, X1, X2, X3 of instance MUL 0 of the multiplier.

Index:
[0] = Factor X0
[1] = Factor X1
[2] = Factor X2
[3] = Factor X3

r20111 CO: MUL 0 product Y / MUL 0 product Y

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7222
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display parameter for the product Y = X0 * X1 * X2 * X3 of instance MUL 0 of the multiplier.

p20112 MUL 0 run-time group / MUL 0 RTG

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7222
Min:	**Max:**	**Factory setting:**
5	9999	9999

Description: Setting parameter for the run-time group in which instance MUL 0 of the multiplier is to be called.

Value:
5: Run-time group 5
6: Run-time group 6
9999: Do not calculate

p20113 MUL 0 run sequence / MUL 0 RunSeq

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7222
Min:	**Max:**	**Factory setting:**
0	32000	270

Description: Setting parameter for the run sequence of instance MUL 0 within the run-time group set in p20112.

Note
The function blocks with a lower run sequence value are calculated before function blocks with a higher run sequence value.

p20114[0...3] CI: MUL 1 inputs / MUL 1 inputs

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / FloatingPoint32
Can be changed: T	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7222
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source of the factors X0, X1, X2, X3 of instance MUL 1 of the multiplier.

Index:
[0] = Factor X0
[1] = Factor X1
[2] = Factor X2
[3] = Factor X3

r20115 CO: MUL 1 product Y / MUL 1 product Y

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7222
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display parameter for the product Y = X0 * X1 * X2 * X3 of instance MUL 1 of the multiplier.

p20116 MUL 1 run-time group / MUL 1 RTG

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7222
Min:	**Max:**	**Factory setting:**
5	9999	9999

Description: Setting parameter for the run-time group in which instance MUL 1 of the multiplier is to be called.

Value:
5: Run-time group 5
6: Run-time group 6
9999: Do not calculate

p20117 MUL 1 run sequence / MUL 1 RunSeq

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7222
Min:	**Max:**	**Factory setting:**
0	32000	280

Description: Setting parameter for the run sequence of instance MUL 1 within the run-time group set in p20116.

Note
The function blocks with a lower run sequence value are calculated before function blocks with a higher run sequence value.

p20118[0...1] CI: DIV 0 inputs / DIV 0 inputs

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / FloatingPoint32
Can be changed: T	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7222
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source of dividend X1 and divisor X2 of instance DIV 0 of the divider.

Index:
[0] = Dividend X0
[1] = Divisor X1

r20119[0...2] CO: DIV 0 quotient / DIV 0 quotient

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7222
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display parameter for quotients Y = X1 / X2, integer number quotients YIN, and division remainder MOD = (Y - YIN) x X2 of instance DIV 0 of the divider.

Index:
[0] = Quotient Y
[1] = Integer number quotient YIN
[2] = Div remainder MOD

r20120 BO: DIV 0 divisor is zero QF / DIV 0 divisor=0 QF

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7222
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display parameter for the signal QF that the divisor X2 of instance DIV 0 of the divider is zero.
X2 = 0.0 => QF = 1

p20121 DIV 0 run-time group / DIV 0 RTG

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7222
Min:	**Max:**	**Factory setting:**
5	9999	9999

Description: Setting parameter for the run-time group in which instance DIV 0 of the divider is to be called.

Value:
5: Run-time group 5
6: Run-time group 6
9999: Do not calculate

p20122 DIV 0 run sequence / DIV 0 RunSeq

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7222
Min:	**Max:**	**Factory setting:**
0	32000	300

Description:	Setting parameter for the run sequence of instance DIV 0 within the run-time group set in p20121.

Note

The function blocks with a lower run sequence value are calculated before function blocks with a higher run sequence value.

p20123[0...1] CI: DIV 1 inputs / DIV 1 inputs

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / FloatingPoint32
Can be changed: T	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7222
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source of dividend X1 and divisor X2 of instance DIV 1 of the divider.

Index:
[0] = Dividend X0
[1] = Divisor X1

r20124[0...2] CO: DIV 1 quotient / DIV 1 quotient

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7222
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display parameter for quotients Y = X1 / X2, the integer number quotients YIN, and division remainder MOD = (Y - YIN) x X2 of instance DIV 1 of the divider.

Index:
[0] = Quotient Y
[1] = Integer number quotient YIN
[2] = Div remainder MOD

r20125 BO: DIV 1 divisor is zero QF / DIV 1 divisor=0 QF

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7222
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display parameter for the signal QF that the divisor X2 of instance DIV 1 of the divider is zero.
X2 = 0.0 => QF = 1

p20126 DIV 1 run-time group / DIV 1 RTG

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7222
Min:	**Max:**	**Factory setting:**
5	9999	9999

Description: Setting parameter for the run-time group in which instance DIV 1 of the divider is to be called.

Value:
5: Run-time group 5
6: Run-time group 6
9999: Do not calculate

p20127 DIV 1 run sequence / DIV 1 RunSeq

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7222
Min:	**Max:**	**Factory setting:**
0	32000	310

Description: Setting parameter for the run sequence of instance DIV 1 within the run-time group set in p20126.

Note

The function blocks with a lower run sequence value are calculated before function blocks with a higher run sequence value.

p20138 BI: MFP 0 input pulse I / MFP 0 inp_pulse I

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7230
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source for the input pulse I of instance MFP 0 of the pulse generator.

p20139 MFP 0 pulse duration in ms / MFP 0 pulse_dur ms

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7230
Min:	**Max:**	**Factory setting:**
0.00	5400000.00	0.00

Description: Setting parameter for pulse duration T in milliseconds of instance MFP 0 of the pulse generator.

r20140 BO: MFP 0 output Q / MFP 0 output Q

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7230
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display parameter for output pulse Q of instance MFP 0 of the pulse generator.

p20141 MFP 0 run-time group / MFP 0 RTG

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7230
Min:	**Max:**	**Factory setting:**
5	9999	9999

Description: Setting parameter for the run-time group in which the instance MFP 0 of the pulse generator is to be called.

Value:

5:	Run-time group 5
6:	Run-time group 6
9999:	Do not calculate

p20142 MFP 0 run sequence / MFP 0 RunSeq

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7230
Min:	**Max:**	**Factory setting:**
0	32000	370

Description: Setting parameter for the run sequence of instance MFP 0 within the run-time group set in p20141.

Note

The function blocks with a lower run sequence value are calculated before function blocks with a higher run sequence value.

p20143 BI: MFP 1 input pulse I / MFP 1 inp_pulse I

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7230
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source for the input pulse I of instance MFP 1 of the pulse generator.

p20144 MFP 1 pulse duration in ms / MFP 1 pulse_dur ms

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7230
Min:	**Max:**	**Factory setting:**
0.00	5400000.00	0.00

Description: Setting parameter for pulse duration T in milliseconds of instance MFP 1 of the pulse generator.

r20145 BO: MFP 1 output Q / MFP 1 output Q

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7230
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display parameter for output pulse Q of instance MFP 1 of the pulse generator.

p20146 MFP 1 run-time group / MFP 1 RTG

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7230
Min:	**Max:**	**Factory setting:**
5	9999	9999

Description: Setting parameter for the run-time group in which the instance MFP 1 of the pulse generator is to be called.

Value:

5:	Run-time group 5
6:	Run-time group 6
9999:	Do not calculate

p20147 MFP 1 run sequence / MFP 1 RunSeq

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7230
Min:	**Max:**	**Factory setting:**
0	32000	380

Description: Setting parameter for the run sequence of instance MFP 1 within the run-time group set in p20146.

Note

The function blocks with a lower run sequence value are calculated before function blocks with a higher run sequence value.

p20158 BI: PDE 0 input pulse I / PDE 0 inp_pulse I

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7232
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source for the input pulse I of instance PDE 0 of the closing delay device.

p20159 PDE 0 pulse delay time in ms / PDE 0 t_del ms

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7232
Min:	**Max:**	**Factory setting:**
0.00	5400000.00	0.00

Description: Setting parameter for pulse delay time T in milliseconds of instance PDE 0 of the closing delay device.

r20160 BO: PDE 0 output Q / PDE 0 output Q

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7232
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display parameter for output pulse Q of instance PDE 0 of the closing delay device.

p20161 PDE 0 run-time group / PDE 0 RTG

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7232
Min:	**Max:**	**Factory setting:**
5	9999	9999

Description: Setting parameter for the run-time group in which instance PDE 0 of the closing delay device is to be called.

Value:

5: Run-time group 5
6: Run-time group 6
9999: Do not calculate

p20162 PDE 0 run sequence / PDE 0 RunSeq

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7232
Min:	**Max:**	**Factory setting:**
0	32000	430

Description: Setting parameter for the run sequence of instance PDE 0 within the run-time group set in p20161.

Note

The function blocks with a lower run sequence value are calculated before function blocks with a higher run sequence value.

p20163 BI: PDE 1 input pulse I / PDE 1 inp_pulse I

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7232
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source for the input pulse I of instance PDE 1 of the closing delay device.

p20164 PDE 1 pulse delay time in ms / PDE 1 t_del ms

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7232
Min:	**Max:**	**Factory setting:**
0.00	5400000.00	0.00

Description: Setting parameter for pulse delay time T in milliseconds of instance PDE 1 of the closing delay device.

r20165 BO: PDE 1 output Q / PDE 1 output Q

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7232
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display parameter for output pulse Q of instance PDE 1 of the closing delay device.

p20166 PDE 1 run-time group / PDE 1 RTG

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7232
Min:	**Max:**	**Factory setting:**
5	9999	9999

Description: Setting parameter for the run-time group in which instance PDE 1 of the closing delay device is to be called.

Value:

5: Run-time group 5

6: Run-time group 6

9999: Do not calculate

p20167 PDE 1 run sequence / PDE 1 RunSeq

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7232
Min:	**Max:**	**Factory setting:**
0	32000	440

Description: Setting parameter for the run sequence of instance PDE 1 within the run-time group set in p20166.

Note

The function blocks with a lower run sequence value are calculated before function blocks with a higher run sequence value.

p20168 BI: PDF 0 input pulse I / PDF 0 inp_pulse I

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7233
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source for the input pulse I of instance PDF 0 of the breaking delay device.

p20169 PDF 0 pulse extension time in ms / PDF 0 t_ext ms

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7233
Min:	**Max:**	**Factory setting:**
0.00	5400000.00	0.00

Description: Setting parameter for pulse extension time T in milliseconds of instance PDF 0 of the breaking delay device.

r20170 BO: PDF 0 output Q / PDF 0 output Q

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7233
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display parameter for output pulse Q of instance PDF 0 of the breaking delay device.

p20171 PDF 0 run-time group / PDF 0 RTG

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7233
Min:	**Max:**	**Factory setting:**
5	9999	9999

Description: Setting parameter for the run-time group in which the instance PDF 0 of the breaking delay device is to be called.

Value:

5:	Run-time group 5
6:	Run-time group 6
9999:	Do not calculate

p20172 PDF 0 run sequence / PDF 0 RunSeq

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7233
Min:	**Max:**	**Factory setting:**
0	32000	460

Description: Setting parameter for the run sequence of instance PDF 0 within the run-time group set in p20171.

Note

The function blocks with a lower run sequence value are calculated before function blocks with a higher run sequence value.

p20173 BI: PDF 1 input pulse I / PDF 1 inp_pulse I

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7233
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source for the input pulse I of instance PDF 1 of the breaking delay device.

p20174 PDF 1 pulse extension time in ms / PDF 1 t_ext ms

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7233
Min:	**Max:**	**Factory setting:**
0.00	5400000.00	0.00

Description: Setting parameter for pulse extension time T in milliseconds of instance PDF 1 of the breaking delay device.

r20175 BO: PDF 1 output Q / PDF 1 output Q

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7233
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display parameter for output pulse Q of instance PDF 1 of the breaking delay device.

p20176 PDF 1 run-time group / PDF 1 RTG

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7233
Min:	**Max:**	**Factory setting:**
5	9999	9999

Description: Setting parameter for the run-time group in which the instance PDF 1 of the breaking delay device is to be called.

Value:

5: Run-time group 5
6: Run-time group 6
9999: Do not calculate

p20177 PDF 1 run sequence / PDF 1 RunSeq

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7233
Min:	**Max:**	**Factory setting:**
0	32000	470

Description: Setting parameter for the run sequence of instance PDF 1 within the run-time group set in p20176.

Note
The function blocks with a lower run sequence value are calculated before function blocks with a higher run sequence value.

p20188[0...1] BI: RSR 0 inputs / RSR 0 inputs

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7240
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source for set input S and reset input R of instance RSR 0 of the RS flipflop.

Index:
[0] = Set S
[1] = Reset R

r20189 BO: RSR 0 output Q / RSR 0 output Q

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7240
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display parameter for output Q of instance RSR 0 of the RS flipflop

r20190 BO: RSR 0 inverted output QN / RSR 0 inv outp QN

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7240
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display parameter for inverted output QN of instance RSR 0 of the RS flipflop.

p20191 RSR 0 run-time group / RSR 0 RTG

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7240
Min:	**Max:**	**Factory setting:**
4	9999	9999

Description: Setting parameter for the run-time group in which instance RSR 0 of the RS flipflop is to be called.

Value:
4: Run-time group 4
5: Run-time group 5
6: Run-time group 6
9999: Do not calculate

p20192 RSR 0 run sequence / RSR 0 RunSeq

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7240
Min:	**Max:**	**Factory setting:**
0	7999	520

Description: Setting parameter for the run sequence of instance RSR 0 within the run-time group set in p20191.

Note
The function blocks with a lower run sequence value are calculated before function blocks with a higher run sequence value.

p20193[0...1] BI: RSR 1 inputs / RSR 1 inputs

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7240
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source for set input S and reset input R of instance RSR 1 of the RS flipflop.

Index:
[0] = Set S
[1] = Reset R

r20194 BO: RSR 1 output Q / RSR 1 output Q

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7240
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display parameter for output Q of instance RSR 1 of the RS flipflop

r20195 BO: RSR 1 inverted output QN / RSR 1 inv outp QN

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7240
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display parameter for inverted output QN of instance RSR 1 of the RS flipflop.

p20196 RSR 1 run-time group / RSR 1 RTG

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7240
Min:	**Max:**	**Factory setting:**
4	9999	9999

Description: Setting parameter for the run-time group in which instance RSR 1 of the RS flipflop is to be called.

Value:
4: Run-time group 4
5: Run-time group 5
6: Run-time group 6
9999: Do not calculate

p20197 RSR 1 run sequence / RSR 1 RunSeq

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7240
Min:	**Max:**	**Factory setting:**
0	7999	530

Description: Setting parameter for the run sequence of instance RSR 1 within the run-time group set in p20196.

Note

The function blocks with a lower run sequence value are calculated before function blocks with a higher run sequence value.

p20218[0...1] CI: NSW 0 inputs / NSW 0 inputs

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / FloatingPoint32
Can be changed: T	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7250
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source of input quantities X0 and X1 of instance NSW 0 of the numeric changeover switch.

Index:
[0] = Input X0
[1] = Input X1

p20219 BI: NSW 0 switch setting I / NSW 0 sw_setting

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7250
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source of the switch setting I of instance NSW 0 of the numeric changeover switch.

r20220 CO: NSW 0 output Y / NSW 0 output Y

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7250
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display parameter for output quantity Y of instance NSW 0 of the numeric changeover switch.

p20221 NSW 0 run-time group / NSW 0 RTG

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7250
Min:	**Max:**	**Factory setting:**
5	9999	9999

Description: Setting parameter for the run-time group in which the instance NSW 0 of the numeric changeover switch is to be called.

Value:
5: Run-time group 5
6: Run-time group 6
9999: Do not calculate

p20222 NSW 0 run sequence / NSW 0 RunSeq

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7250
Min:	**Max:**	**Factory setting:**
0	32000	610

Description: Setting parameter for the run sequence of instance NSW 0 within the run-time group set in p20221.

Note
The function blocks with a lower run sequence value are calculated before function blocks with a higher run sequence value.

p20223[0...1] CI: NSW 1 inputs / NSW 1 inputs

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / FloatingPoint32
Can be changed: T	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7250
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source of input quantities X0 and X1 of instance NSW 1 of the numeric changeover switch.

Index:
[0] = Input X0
[1] = Input X1

p20224 BI: NSW 1 switch setting I / NSW 1 sw_setting

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7250
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source of the switch setting I of instance NSW 1 of the numeric changeover switch.

r20225 CO: NSW 1 output Y / NSW 1 output Y

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7250
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display parameter for output quantity Y of instance NSW 1 of the numeric changeover switch.

p20226 NSW 1 run-time group / NSW 1 RTG

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7250
Min:	**Max:**	**Factory setting:**
5	9999	9999

Description: Setting parameter for the run-time group in which the instance NSW 1 of the numeric changeover switch is to be called.

Value:
5: Run-time group 5
6: Run-time group 6
9999: Do not calculate

p20227 NSW 1 run sequence / NSW 1 RunSeq

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7250
Min:	**Max:**	**Factory setting:**
0	32000	620

Description: Setting parameter for the run sequence of instance NSW 1 within the run-time group set in p20226.

Note

The function blocks with a lower run sequence value are calculated before function blocks with a higher run sequence value.

p20228 CI: LIM 0 input X / LIM 0 input X

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / FloatingPoint32
Can be changed: T	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7260
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source of input quantity X of instance LIM 0 of the limiter.

p20229 LIM 0 upper limit value LU / LIM 0 upper lim LU

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7260
Min:	**Max:**	**Factory setting:**
-340.28235E36	340.28235E36	0.0000

Description: Setting parameter for the upper limit value LU of instance LIM 0 of the limiter.

p20230 LIM 0 lower limit value LL / LIM 0 lower lim LL

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7260
Min:	**Max:**	**Factory setting:**
-340.28235E36	340.28235E36	0.0000

Description: Setting parameter for the lower limit value LL of instance LIM 0 of the limiter.

r20231 CO: LIM 0 output Y / LIM 0 output Y

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7260
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display parameter for the limited output quantity Y of instance LIM 0 of the limiter.

r20232 BO: LIM 0 input quantity at the upper limit QU / LIM 0 QU

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7260
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display parameter of instance LIM 0 of limiter QU (upper limit reached), i.e. QU = 1 for X >= LU.

r20233 BO: LIM 0 input quantity at the lower limit QL / LIM 0 QL

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7260
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display parameter of instance LIM 0 of limiter QL (lower limit reached), i.e. QL = 1 for X <= LL.

p20234 LIM 0 run-time group / LIM 0 RTG

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7260
Min:	**Max:**	**Factory setting:**
5	9999	9999

Description: Setting parameter for the run-time group in which instance LIM 0 of the limiter is to be called.

Value:
5: Run-time group 5
6: Run-time group 6
9999: Do not calculate

p20235 LIM 0 run sequence / LIM 0 RunSeq

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7260
Min:	**Max:**	**Factory setting:**
0	32000	640

Description: Setting parameter for the run sequence of instance LIM 0 within the run-time group set in p20234.

Note
The function blocks with a lower run sequence value are calculated before function blocks with a higher run sequence value.

p20236 CI: LIM 1 input X / LIM 1 input X

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / FloatingPoint32
Can be changed: T	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7260
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source of input quantity X of instance LIM 1 of the limiter.

p20237 LIM 1 upper limit value LU / LIM 1 upper lim LU

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7260
Min:	**Max:**	**Factory setting:**
-340.28235E36	340.28235E36	0.0000

Description: Setting parameter for the upper limit value LU of instance LIM 1 of the limiter.

p20238 LIM 1 lower limit value LL / LIM 1 lower lim LL

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7260
Min:	**Max:**	**Factory setting:**
-340.28235E36	340.28235E36	0.0000

Description: Setting parameter for the lower limit value LL of instance LIM 1 of the limiter.

r20239 CO: LIM 1 output Y / LIM 1 output Y

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7260
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display parameter for the limited output quantity Y of instance LIM 1 of the limiter.

r20240 BO: LIM 1 input quantity at the upper limit QU / LIM 1 QU

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7260
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display parameter of instance LIM 1 of limiter QU (upper limit reached), i.e. QU = 1 for X >= LU.

r20241 BO: LIM 1 input quantity at the lower limit QL / LIM 1 QL

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7260
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display parameter of instance LIM 1 of limiter QL (lower limit reached), i.e. QL = 1 for X <= LL.

p20242 LIM 1 run-time group / LIM 1 RTG

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7260
Min:	**Max:**	**Factory setting:**
5	9999	9999

Description: Setting parameter for the run-time group in which instance LIM 1 of the limiter is to be called.

Value: 5: Run-time group 5

6:	Run-time group 6
9999:	Do not calculate

p20243 LIM 1 run sequence / LIM 1 RunSeq

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7260
Min:	**Max:**	**Factory setting:**
0	32000	650

Description: Setting parameter for the run sequence of instance LIM 1 within the run-time group set in p20242.

Note
The function blocks with a lower run sequence value are calculated before function blocks with a higher run sequence value.

p20266 CI: LVM 0 input X / LVM 0 input X

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / FloatingPoint32
Can be changed: T	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7270
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source of input quantity X of instance LVM 0 of the double-sided limiter.

p20267 LVM 0 interval average value M / LVM 0 avg value M

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7270
Min:	**Max:**	**Factory setting:**
-340.28235E36	340.28235E36	0.0000

Description: Setting parameter for the interval average M of instance LVM 0 of the double-sided limiter.

p20268 LVM 0 interval limit L / LVM 0 limit L

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7270
Min:	**Max:**	**Factory setting:**
-340.28235E36	340.28235E36	0.0000

Description: Setting parameter for the interval limit L of instance LVM 0 of the double-sided limiter.

p20269 LVM 0 hyst HY / LVM 0 hyst HY

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7270
Min:	**Max:**	**Factory setting:**
-340.28235E36	340.28235E36	0.0000

Description: Setting parameter for hysteresis HY of instance LVM 0 of the double-sided limiter.

r20270 BO: LVM 0 input quantity above interval QU / LVM 0 X above QU

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7270
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display parameter of instance LVM 0 of the double-sided limiter that input quantity X was at least once X > M + L and X is >= M + L - HY.

r20271 BO: LVM 0 input quantity within interval QM / LVM 0 X within QM

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7270
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display parameter of instance LVM 0 of the double-sided limiter that the input quantity X lies within the interval.

r20272 BO: LVM 0 input quantity below interval QL / LVM 0 X below QL

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7270
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display parameter of instance LVM 0 of the double-sided limiter that input quantity X was at least once X < M - L and X is <= M - L + HY.

p20273 LVM 0 run-time group / LVM 0 RTG

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7270
Min:	**Max:**	**Factory setting:**
5	9999	9999

Description: Setting parameter for the run-time group in which instance LVM 0 of the double-sided limiter is to be called.

Value:
5: Run-time group 5
6: Run-time group 6
9999: Do not calculate

p20274 LVM 0 run sequence / LVM 0 RunSeq

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7270
Min:	**Max:**	**Factory setting:**
0	7999	720

Description: Setting parameter for the run sequence of instance LVM 0 within the run-time group set in p20273.

Note
The function blocks with a lower run sequence value are calculated before function blocks with a higher run sequence value.

p20275 CI: LVM 1 input X / LVM 1 input X

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / FloatingPoint32
Can be changed: T	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7270
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source of input quantity X of instance LVM 1 of the double-sided limiter.

p20276 LVM 1 interval average value M / LVM 1 avg value M

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7270
Min:	**Max:**	**Factory setting:**
-340.28235E36	340.28235E36	0.0000

Description: Setting parameter for the interval average M of instance LVM 1 of the double-sided limiter.

p20277 LVM 1 interval limit L / LVM 1 limit L

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7270
Min:	**Max:**	**Factory setting:**
-340.28235E36	340.28235E36	0.0000

Description: Setting parameter for the interval limit L of instance LVM 1 of the double-sided limiter.

p20278 LVM 1 hyst HY / LVM 1 hyst HY

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7270
Min:	**Max:**	**Factory setting:**
-340.28235E36	340.28235E36	0.0000

Description: Setting parameter for hysteresis HY of instance LVM 1 of the double-sided limiter.

r20279 BO: LVM 1 input quantity above interval QU / LVM 1 X above QU

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7270
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display parameter of instance LVM 1 of the double-sided limiter that input quantity X was at least once X > M + L and X is >= M + L - HY.

r20280 BO: LVM 1 input quantity within interval QM / LVM 1 X within QM

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7270
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display parameter of instance LVM 1 of the double-sided limiter that the input quantity X lies within the interval.

r20281 BO: LVM 1 input quantity below interval QL / LVM 1 X below QL

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7270
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display parameter of instance LVM 1 of the double-sided limiter that input quantity X was at least once X < M - L and X is <= M - L + HY.

p20282 LVM 1 run-time group / LVM 1 RTG

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7270
Min:	**Max:**	**Factory setting:**
5	9999	9999

Description: Setting parameter for the run-time group in which instance LVM 1 of the double-sided limiter is to be called.

Value:

5: Run-time group 5
6: Run-time group 6
9999: Do not calculate

p20283 LVM 1 run sequence / LVM 1 RunSeq

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7270
Min:	**Max:**	**Factory setting:**
0	7999	730

Description: Setting parameter for the run sequence of instance LVM 1 within the run-time group set in p20282.

Note
The function blocks with a lower run sequence value are calculated before function blocks with a higher run sequence value.

p20312[0...1] CI: NCM 0 inputs / NCM 0 inputs

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / FloatingPoint32
Can be changed: T	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7225
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source of input quantities X0 and X1 of instance NCM 0 of the numeric comparator.

Index:

[0] = Input X0
[1] = Input X1

r20313 BO: NCM 0 output QU / NCM 0 output QU

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7225
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display parameter for binary quantity QU of instance NCM 0 of the numeric comparator.
QU is only set if X0 > X1.

r20314 BO: NCM 0 output QE / NCM 0 output QE

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7225
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display parameter for binary quantity QE of instance NCM 0 of the numeric comparator.
QE is only set if X0 = X1.

r20315 BO: NCM 0 output QL / NCM 0 output QL

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7225
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display parameter for binary quantity QL of instance NCM 0 of the numeric comparator.
QL is only set if X0 < X1.

p20316 NCM 0 run-time group / NCM 0 RTG

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7225
Min:	**Max:**	**Factory setting:**
5	9999	9999

Description: Setting parameter for the run-time group in which the instance NCM 0 of the numeric comparator is to be called.

Value:
5: Run-time group 5
6: Run-time group 6
9999: Do not calculate

p20317 NCM 0 run sequence / NCM 0 RunSeq

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7225
Min:	**Max:**	**Factory setting:**
0	32000	820

Description: Setting parameter for the run sequence of instance NCM 0 within the run-time group set in p20316.

Note
The function blocks with a lower run sequence value are calculated before function blocks with a higher run sequence value.

p20318[0...1] CI: NCM 1 inputs / NCM 1 inputs

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / FloatingPoint32
Can be changed: T	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7225
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source of input quantities X0 and X1 of instance NCM 1 of the numeric comparator.

Index:
[0] = Input X0
[1] = Input X1

r20319 BO: NCM 1 output QU / NCM 1 output QU

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7225
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display parameter for binary quantity QU of instance NCM 1 of the numeric comparator.
QU is only set if X0 > X1.

r20320 BO: NCM 1 output QE / NCM 1 output QE

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7225
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display parameter for binary quantity QE of instance NCM 1 of the numeric comparator.
QE is only set if X0 = X1.

r20321 BO: NCM 1 output QL / NCM 1 output QL

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7225
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display parameter for binary quantity QL of instance NCM 1 of the numeric comparator.
QL is only set if X0 < X1.

p20322 NCM 1 run-time group / NCM 1 RTG

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7225
Min:	**Max:**	**Factory setting:**
5	9999	9999

Description: Setting parameter for the run-time group in which the instance NCM 1 of the numeric comparator is to be called.

Value:
5: Run-time group 5
6: Run-time group 6
9999: Do not calculate

p20323 NCM 1 run sequence / NCM 1 RunSeq

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7225
Min:	**Max:**	**Factory setting:**
0	32000	830

Description: Setting parameter for the run sequence of instance NCM 1 within the run-time group set in p20322.

Note

The function blocks with a lower run sequence value are calculated before function blocks with a higher run sequence value.

p20324[0...1] BI: RSR 2 inputs / RSR 2 inputs

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7240
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source for set input S and reset input R of instance RSR 2 of the RS flipflop.

Index:
[0] = Set S
[1] = Reset R

r20325 BO: RSR 2 output Q / RSR 2 output Q

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7240
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display parameter for output Q of instance RSR 2 of the RS flipflop

r20326 BO: RSR 2 inverted output QN / RSR 2 inv outp QN

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7240
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display parameter for inverted output QN of instance RSR 2 of the RS flipflop.

p20327 RSR 2 run-time group / RSR 2 RTG

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7240
Min:	**Max:**	**Factory setting:**
4	9999	9999

Description: Setting parameter for the run-time group in which instance RSR 2 of the RS flipflop is to be called.

Value:
4: Run-time group 4
5: Run-time group 5
6: Run-time group 6
9999: Do not calculate

p20328 RSR 2 run sequence / RSR 2 RunSeq

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7240
Min:	**Max:**	**Factory setting:**
0	7999	850

Description: Setting parameter for the run sequence of instance RSR 2 within the run-time group set in p20327.

Note

The function blocks with a lower run sequence value are calculated before function blocks with a higher run sequence value.

p20334 BI: PDE 2 input pulse I / PDE 2 inp_pulse I

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7232
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source for the input pulse I of instance PDE 2 of the closing delay device.

p20335 PDE 2 pulse delay time in ms / PDE 2 t_del ms

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7232
Min:	**Max:**	**Factory setting:**
0.00	5400000.00	0.00

Description: Setting parameter for pulse delay time T in milliseconds of instance PDE 2 of the closing delay device.

r20336 BO: PDE 2 output Q / PDE 2 output Q

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7232
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display parameter for output pulse Q of instance PDE 2 of the closing delay device.

p20337 PDE 2 run-time group / PDE 2 RTG

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7232
Min:	**Max:**	**Factory setting:**
5	9999	9999

Description: Setting parameter for the run-time group in which instance PDE 2 of the closing delay device is to be called.

Value:

5:	Run-time group 5
6:	Run-time group 6
9999:	Do not calculate

p20338 PDE 2 run sequence / PDE 2 RunSeq

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7232
Min:	**Max:**	**Factory setting:**
0	32000	890

Description: Setting parameter for the run sequence of instance PDE 2 within the run-time group set in p20337.

Note
The function blocks with a lower run sequence value are calculated before function blocks with a higher run sequence value.

p20344 BI: PDF 2 input pulse I / PDF 2 inp_pulse I

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7233
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source for the input pulse I of instance PDF 2 of the breaking delay device.

p20345 PDF 2 pulse extension time in ms / PDF 2 t_ext ms

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7233
Min:	**Max:**	**Factory setting:**
0.00	5400000.00	0.00

Description: Setting parameter for pulse extension time T in milliseconds of instance PDF 2 of the breaking delay device.

r20346 BO: PDF 2 output Q / PDF 2 output Q

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7233
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display parameter for output pulse Q of instance PDF 2 of the breaking delay device.

p20347 PDF 2 run-time group / PDF 2 RTG

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7233
Min:	**Max:**	**Factory setting:**
5	9999	9999

Description: Setting parameter for the run-time group in which the instance PDF 2 of the breaking delay device is to be called.

Value:
5: Run-time group 5
6: Run-time group 6
9999: Do not calculate

p20348 PDF 2 run sequence / PDF 2 RunSeq

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7233
Min:	**Max:**	**Factory setting:**
0	32000	920

Description: Setting parameter for the run sequence of instance PDE 2 within the run-time group set in p20347.

Note

The function blocks with a lower run sequence value are calculated before function blocks with a higher run sequence value.

p20354 BI: MFP 2 input pulse I / MFP 2 inp_pulse I

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7230
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source for the input pulse I of instance MFP 2 of the pulse generator.

p20355 MFP 2 pulse duration in ms / MFP 2 pulse_dur ms

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7230
Min:	**Max:**	**Factory setting:**
0.00	5400000.00	0.00

Description: Setting parameter for pulse duration T in milliseconds of instance MFP 2 of the pulse generator.

r20356 BO: MFP 2 output Q / MFP 2 output Q

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7230
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Display parameter for output pulse Q of instance MFP 2 of the pulse generator.

p20357 MFP 2 run-time group / MFP 2 RTG

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7230
Min:	**Max:**	**Factory setting:**
5	9999	9999

Description: Setting parameter for the run-time group in which the instance MFP 2 of the pulse generator is to be called.

Value:

5: Run-time group 5
6: Run-time group 6
9999: Do not calculate

p20358 MFP 2 run sequence / MFP 2 RunSeq

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** 7230
Min:	**Max:**	**Factory setting:**
0	32000	950

Description: Setting parameter for the run sequence of instance MFP 2 within the run-time group set in p20357.

Note
The function blocks with a lower run sequence value are calculated before function blocks with a higher run sequence value.

r29018[0...1] Application firmware version / APP FW version

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the application firmware version.

Index:
[0] = Firmware version
[1] = Build increment number

p29520 Multi-pump control enable / Mpc enab

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	1	0

Description: Enables the multi-pump control function.
0: Multi-pump control inhibited
1: Multi-pump control enabled

Value:
0: Disable MPC
1: Enable MPC

Dependency: The "Multi-pump control" function is only available for induction motors.
The "Multi-pump control" function is not supported on G120X converter variants of power rating 30kW or above.

Note
when P29520=0, P29521 can not set to a !0 value.
when P29520 value change from 1 to 0, P29521 value will change to 0 automatically

p29521 Multi-pump control motor configuration / Mpc mtr num config

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	6	0

Description: Selects the number of motors that will be used as multi-pump control.

Value:
0: NONE
1: M1=1X
2: M1=1X,M2=1X
3: M1=1X,M2=1X,M3=1X

4: M1=1X,M2=1X,M3=1X,M4=1X
5: M1=1X,M2=1X,M3=1X,M4=1X,M5=1X
6: M1=1X,M2=1X,M3=1X,M4=1X,M5=1X,M6=1X

Note
1X means motor power that configured in p307.
Currently multi-pump control only support that all motors should have the same power.

p29522 Multi-pump control motor selection mode / Mpc mtr sel mode

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	1	0

Description: Parameter for selecting the control mode for swtiching-in and switching-out motors

Value:
0: Fixed sequence
1: Absolute operating hours

Note
For p29522=0:
Motor selection for switching-in/switching-out follows a fixed sequence and is dependent on the multi-pump control configuratin(p29521).
For p29522=1:
Motor selection for switching-in/switching-out is derived from the operating hours counter p29530.When switching-in, the motor with the least operating hours is connected.When switching-out,the motor with the most operating hours is disconnected.

p29523 Multi-pump control switch-in threshold / Mpc sw_in thr

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: 9_1	**Unit selection:** p0595	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.0 [%]	200.0 [%]	20.0 [%]

Description: Threshold value for the delayed switching-in or switching-out of motors.
Motor switching-in is activated if the maximum speed is reached and the wait time in p29524 has expired.

Dependency: refer to p29524

p29524 Multi-pump control switch-in delay / Mpc_ctrl t_in_del

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0 [s]	650 [s]	30 [s]

Description: Additional delay time for staging motors after the system deviation of the technology controller has exceeded the threshold value p29523 and the motor has reached the maximum speed.

Dependency: refer to p29523

Note
If the technology controller deviation exceeds the overcontrol threshold p29526, the delay time is bypassed.

p29525 Multi-pump control switch-out delay / Mpc sw_out del

Access level: 3
Calculated: -
Data type: Unsigned16
Can be changed: T, U
Scaling: -
Dynamic index: -
Unit group: -
Unit selection: -
Function diagram: -

Min:	Max:	Factory setting:
0 [s]	650 [s]	30 [s]

Description: Additional delay time for switch-out motor after the technology controller deviation has exceeded the threshold p29523 and the motor has reached the speed threshold p1080+p29528.

Dependency: Refer to p29523,p29526

Note

If the technology controller deviation exceeds the overcontrol threshold p29526, the delay time is bypassed.

If the hibernation mode is active, ensure that p2391 is longer than p29525 to avoid false operation of hibernation.

p29526 Multi-pump control overcontrol threshold / Mpc overctrl thr

Access level: 3
Calculated: -
Data type: FloatingPoint32
Can be changed: T, U
Scaling: PERCENT
Dynamic index: -
Unit group: 9_1
Unit selection: p0595
Function diagram: -

Min:	Max:	Factory setting:
0.0 [%]	200.0 [%]	25.0 [%]

Description: Sets the threshold value for instaneous switching-in or switching-out motors.

Note

If the technology controller deviation rises above the multi-pump control overcontrol threshold p29526, the converter skips the switch-in delay time and performs the switch-in operation immediately.

If the technology controller deviation drops below the multi-pump control overcontrol threshold -p29526, the converter skips the switch-out delay and performs the switch-out operation immediately.

p29527 Multi-pump control interlocking time / Mpc t_interl

Access level: 3
Calculated: -
Data type: Unsigned16
Can be changed: T
Scaling: -
Dynamic index: -
Unit group: -
Unit selection: -
Function diagram: -

Min:	Max:	Factory setting:
0 [s]	650 [s]	0 [s]

Description: Interlocking time during which, following the connection or disconnection of a motor, no further motors are connected or disconnected using the multi-control control. This avoids duplicate switching operations.

p29528 Multi-pump control switch-out speed offset / Mpc sw_out offset

Access level: 3
Calculated: -
Data type: FloatingPoint32
Can be changed: T, U
Scaling: -
Dynamic index: -
Unit group: 3_1
Unit selection: p0505
Function diagram: -

Min:	Max:	Factory setting:
0.0 [rpm]	21000.0 [rpm]	100.0 [rpm]

Description: Sets the speed offset which pluses p1080 as the speed threshold.

If the technology controller deviation has exceeded the threshold p29523 for p29525s (or exceeded the threshold p29526) and the motor has reached the speed threshold p1080+p29528, a motor will be switched out.

r29529.0...19 CO/BO: Multi-pump control status word / Mpc ZSW

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the status word of the multi-pump control

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Start motor 1	Yes	No	-
01	Start motor 2	Yes	No	-
02	Start motor 3	Yes	No	-
03	Start motor 4	Yes	No	-
04	Start motor 5	Yes	No	-
05	Start motor 6	Yes	No	-
06	Reserved			-
07	Reserved			-
08	Reserved			-
09	Reserved			-
10	Reserved			-
11	Reserved			-
12	Reserved			-
13	Reserved			-
14	Signal to enable PID	Yes	No	-
15	Reserved			-
16	Switch-in/switch-out active	Yes	No	-
17	All motors active	Yes	No	-
18	Switch Over not possible	Yes	No	-
19	Alarm active	Yes	No	-

p29530[0...5] Multi-pump control absolute operating hours / Mpc op_hrs

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.00 [h]	340.28235E36 [h]	0.00 [h]

Description: Displays the total operating hours for motors.
The display can only be reset to zero.

Index:
[0] = Motor 1 operating hours
[1] = Motor 2 operating hours
[2] = Motor 3 operating hours
[3] = Motor 4 operating hours
[4] = Motor 5 operating hours
[5] = Motor 6 operating hours

Note

Absolute operating hours means the total operating hours since the motor's initial operation.

p29531 Multi-pump control maximum time for continuous operation / Mpc t_max

Access level: 3 | **Calculated:** - | **Data type:** FloatingPoint32
Can be changed: T, U | **Scaling:** - | **Dynamic index:** -
Unit group: - | **Unit selection:** - | **Function diagram:** -
Min: 0.01 [h] | **Max:** 100000.00 [h] | **Factory setting:** 24.00 [h]

Description: Time limit for the continuous operation of motors.

Continuous operation is measured starting from when a motor is ON and It ends when a motor is OFF.

p29532 Multi-pump control switch-over speed threshold / Mpc sw sp thr

Access level: 3 | **Calculated:** - | **Data type:** FloatingPoint32
Can be changed: T, U | **Scaling:** PERCENT | **Dynamic index:** -
Unit group: 9_1 | **Unit selection:** p0595 | **Function diagram:** -
Min: 0.0 [%] | **Max:** 100.0 [%] | **Factory setting:** 90.0 [%]

Description: Threshold value for the delayed switching-in or switching-out of motors.

Motor switching-in is activated if the maximum speed is reached and the wait time in p29524 has expired.

p29533 Multi-pump control switch-off sequence / Mpc sw_off seq

Access level: 3 | **Calculated:** - | **Data type:** Integer16
Can be changed: T | **Scaling:** - | **Dynamic index:** -
Unit group: - | **Unit selection:** - | **Function diagram:** -
Min: 0 | **Max:** 1 | **Factory setting:** 0

Description: Selection of the response used to stop the motors when the OFF command is sent.

For p29533 = 1:

when OFF1:

In this mode the motors connecting with the mains stop one at a time separated by one ramp down delay in the reverse order in which they were switched on. The converter controlled motor stops with a normal ramp down (OFF1) which commences when the first motor connecting with the mains is switched off.

The time set in p29537 is applied as a delay time between the disconnection of each line motor.

Then speed-regulated motor is ramp down following OFF1 behavior.

In the case of OFF2 and OFF3, the motors connecting to the line are switched off immediately with the OFF command(same behavior as with p29533=0).Then the converter controlled motor is ramp down following OFF2 or OFF3 behavior.

Value:
0: Halt normal
1: Halt sequential

p29534 Multi-pump control Switch-over lockout time / Mpc Sw_lock_time

Access level: 3 | **Calculated:** - | **Data type:** FloatingPoint32
Can be changed: T, U | **Scaling:** - | **Dynamic index:** -
Unit group: - | **Unit selection:** - | **Function diagram:** -
Min: 0.0 [h] | **Max:** 100000.0 [h] | **Factory setting:** 0.5 [h]

Description: To prevent another switch-over occurring within this time.

p29537 Multi-pump control disconnection lockout time / Mpc t_disc_lockout

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.0 [s]	999.0 [s]	0.0 [s]

Description: Multi-pump control-holding time switch-out: The time set in p29537 is applied as a delay time between the disconnection of each motor.

r29538 Multi-pump control variable-speed motor / Mpc driven mtr

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the No. of the motor which is driven by drive.

Valid Value :

1 - 6

p29539 Multi-pump control pump switchover enable / Mpc sw-over enab

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	1	0

Description: Enables the multi-pump control pump switchover function.

0: Pump switchover function inhibited

1: Pump switchover function enabled

Value:

0: Disable switchover

1: Enable switchover

Note

With pump switchover enabled, the converter monitors the operation status of all running pumps.

If the continuous operating hours of the pump in converter operation exceed the threshold, the converter switches off the pump and then switches in an idle pump to keep constant output power.

If the continuous operating hours of a pump in mains operation exceed the threshold, the converter switches off the pump, switches the converter-controlled pump to mains operation, and switches in an idle pump to run in converter operation to keep constant output power.

p29540 Multi-pump control service mode enable / Mpc SerMode enab

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	1	0

Description: Enables the multi-pump control service mode.

0: Service mode inhibited

1: Service mode enabled

Value:

0: Disable MPC

1: Enable MPC

Note
When a pump is in service mode, the converter locks the corresponding relay. Then you can perform troubleshooting of this pump without interrupting the operation of other pumps.

p29542.0...5 CO/BO: Multi-pump control service mode interlock manually / Mpc ser_interl

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	0000 0000 bin

Description: Sets the service mode manually.
When a motor fault is activated or a motor is not to run, user can set the corresponding bit to 1 to lock it.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Motor 1 locked	Yes	No	-
01	Motor 2 locked	Yes	No	-
02	Motor 3 locked	Yes	No	-
03	Motor 4 locked	Yes	No	-
04	motor 5 locked	Yes	No	-
05	motor 6 locked	Yes	No	-

p29543[0...5] BI: Multi-pump control motor under repair / Mpc mtr_und_ser

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	[0] 29542.0 [1] 29542.1 [2] 29542.2 [3] 29542.3 [4] 29542.4 [5] 29542.5

Description: Sets the signal source(digital input or p29542) for service mode.
The signal indicates the motor/motors which is/are under repair or locked manually.

Index:
[0] = Motor 1 under repair
[1] = Motor 2 under repair
[2] = Motor 3 under repair
[3] = Motor 4 under repair
[4] = Motor 5 under repair
[5] = Motor 6 under repair

r29544[0...5] Multi-pump control index of motors under repair / Mpc mtr und repair

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the motors which are interlocked/under repair.
Value:
r29544.0 = 1: Motor 1 is interlocked / under repair
r29544.1 = 1: Motor 2 is interlocked / under repair
r29544.2 = 1: Motor 3 is interlocked / under repair
r29544.3 = 1: Motor 4 is interlocked / under repair
r29544.4 = 1: Motor 5 is interlocked / under repair
r29544.5 = 1: Motor 6 is interlocked / under repair

Index: [0] = Motor 1 under repair
[1] = Motor 2 under repair
[2] = Motor 3 under repair
[3] = Motor 4 under repair
[4] = Motor 5 under repair
[5] = Motor 6 under repair

r29545 CO/BO: Multi-pump control bypass command / Mpc bypass cmd

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the signal source for the control command to the bypass.It is BiCo to p1266.

Note
The "Bypass" function switches the motor between converter and line operation.

p29546 Multi-pump control deviation threshold / Mpc devia thres

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.0 [%]	100.0 [%]	20.0 [%]

Description: If the system deviation (p2273) at the PID technology controller exceeds the threshold (p29546) and no more motor is available, alarm A52963 occurs.

p29547[0...5] Multi-pump control continuous operating hours / Mpc Conti_oper_hrs

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.00 [h]	1000000.00 [h]	0.00 [h]

Description: Displays the continuous operating hours for the motors.
The display can only be reset to zero.

Index: [0] = Motor 1 operating hours
[1] = Motor 2 operating hours
[2] = Motor 3 operating hours
[3] = Motor 4 operating hours
[4] = Motor 5 operating hours
[5] = Motor 6 operating hours

Note
Continuous operation is measured starting from when a motor is ON. It ends when a motor is OFF.

p29550 Multi-pump control time for motor stopping / Mpc t_mtr_stop

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.0 [s]	999.0 [s]	3.0 [s]

Description: Waiting time for motor which is connected with lines to stop when flying restart is disable in service mode.

Note

if p1262 < p29550:
The drive will be operation enabled in about (p1262 + p1274[1] + p0346) s;
if p1262 > p29550:
The drive will be operation enabled in about (p0346) s.

p29551 CO: Multi-pump control switch in/out speed / Mpc sw-in/out spd

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.0 [%]	100.0 [%]	90.0 [%]

Description: Additional holding ratio for switching motors during stage in and out.

Dependency: refer to p2000

p29552[0...3] Multi-pump control holding time for boost / Mpc t_hld_boost

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.0 [s]	999.0 [s]	0.0 [s]

Description: Additional holding time for switching motors during stage in and out.

Index:
[0] = stage-in holding time
[1] = stage-out holding time
[2] = switch-over holding time
[3] = service holding time

p29570[0...n] Ramp-up scaling 1 / RmpUpScaling1

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.00 [%]	9999999.00 [%]	100.00 [%]

Description: Sets the ramp-up scaling 1 for the dual ramp function [%].

Note

The linear acceleration time from speed 0 to speed p29571 can be calculated via formula (p29571/p1082)*p1120*p29570.

If p1130 is not equal to 0, the time will be adapted.

p29571[0...n] Threshold speed 2 / Thresh_2_Ramp

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T	**Scaling:** p2000	**Dynamic index:** DDS, p0180
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.00 [rpm]	210000.00 [rpm]	30.00 [rpm]

Description: Defines the threshold 2 for comparing the speed actual value with the speed threshold.

p29572[0...n] Ramp-up scaling 2 / RmpUpScaling2

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.00 [%]	9999999.00 [%]	100.00 [%]

Description: Sets the ramp-up scaling 2 for the dual ramp function [%].

Note

The linear acceleration time from speed p29571 to constant speed V can be calculated via formula ((V-p29571)/p1082)*p1120*p29572.

If p1130 is not equal to 0, the time will be adapted.

p29573[0...n] Ramp-down scaling 1 / RmpDnScaling1

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.00 [%]	9999999.00 [%]	100.00 [%]

Description: Defines the ramp-down scaling 1 for the dual ramp function [%].

Note

The linear deceleration time from constant speed V to speed p29574 can be calculated via formula ((V-p29574)/p1082)*p1121*p29573.

If p1131 is not equal to 0, the time will be adapted.

p29574[0...n] Threshold speed 3 / Thresh_3_Ramp

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T	**Scaling:** p2000	**Dynamic index:** DDS, p0180
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.00 [rpm]	210000.00 [rpm]	30.00 [rpm]

Description: Defines the threshold 3 for comparing the speed actual value to the speed threshold.

p29575[0...n] Ramp-down scaling 2 / RmpDnScaling2

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.00 [%]	9999999.00 [%]	100.00 [%]

Description: Sets the ramp-down scaling 2 for dual ramp function [%].

Note
The linear deceleration time from speed p29574 to speed 0 can be calculated via formula (p29574/p1082)*p1121*p29575.

If p1131 is not equal to 0, the time will be adapted.

r29576 CO: Ramp-up scaling output / RmpUpScale output

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
- [%]	- [%]	- [%]

Description: Displays the actual output of the ramp-up scaling.

r29577 CO: Ramp-down scaling output / RmpDnScale output

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** PERCENT	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
- [%]	- [%]	- [%]

Description: Displays the actual output of the ramp-down scaling.

p29578[0...n] CI: Ramp-up scaling input / RmpUp scale input

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / FloatingPoint32
Can be changed: T	**Scaling:** PERCENT	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	1

Description: Sets the signal source for scaling the ramp-up time of the ramp-function generator when p1138 is BICO to r29576. When the dual ramp functionality is not enabled, p29578 will function.

p29579[0...n] CI: Ramp-down scaling input / RmpDn scale input

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / FloatingPoint32
Can be changed: T	**Scaling:** PERCENT	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	1

Description: Sets the signal source for scaling the ramp-down time of the ramp-function generator when p1139 is BICO to r29577. When the dual ramp functionality is not enabled, p29579 will function.

p29580[0...n] BI: Dual ramp enable / DualRmp En

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source to enable the dual ramp function.

p29590[0...n] Deragging mode / Derag mod

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	4	0

Description: Select the startup mode of deragging, if the condition is met with selected mode, deragging will perform when drive start to run, then switch to user setpoint automatically.

Value:
0: deragging disable
1: enabled on first run after power up
2: enabled on every run
3: enabled by BI on every run
4: enabled by BI while running

Note
If deragging is enabled (p29590 > 0), make sure that reverse direction is not inhibited, i.e. p1110 = 0;
If p29590=3 or 4, enable source is defined by p29591.

p29591[0...n] BI: Deragging enable / Derag en

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	0

Description: The source of deragging enable.

Dependency: Refer to p29590

Note
Effective only if mode set as BI input(p29590=3 or 4).
When p29590=3, command via BI should keep on while deragging in operation, else deragging will be interrupted;
When p29590=4, command via BI will be ignore while deragging in operation, it can be interruped only when drive go to off.

p29592[0...n] Deragging forward speed / Derag fw spd

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-210000.00 [rpm]	210000.00 [rpm]	500.00 [rpm]

Description: Defines forward speed setpoint for deragging.

Note
The actual speed setpoint is limited by minimal(p1080) and maximum(p1082) value.
If both forward speed(p29592) and the time of duration(p29596) are 0, forward rotation will not perform in each cycle.

p29593[0...n] Deragging reverse speed / Derag rev spd

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-210000.00 [rpm]	210000.00 [rpm]	500.00 [rpm]

Description: Defines reverse speed setpoint for deragging.

Note
The actual speed setpoint is limited by minimal(p1080) and maximum(p1082) value.
If both reverse speed(p29593) and the time of duration(p29597) are 0, reverse rotation will not perform in each cycle.

p29594[0...n] Deragging ramp up time / Derag rup

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.00 [s]	1000.00 [s]	5.00 [s]

Description: Defines ramp time from 0 to forward/reverse speed setpoint for deragging.

Note
Too short ramp up time for deragging may trigger F7902, and speed jump may occur.
The minimal time is upon the inertia of motor and power stage.

p29595[0...n] Deragging ramp down time / Derag rdn

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.00 [s]	1000.00 [s]	5.00 [s]

Description: Defines ramp time from forward/reverse speed setpoint to 0 for deragging.

Note
Speed jump may occur if ramp down time is too short, and that may trigger the fault of DC-link overvoltage.
The minimal time is upon the inertia of motor and power stage.

p29596[0...n] Deragging forward time / Derag fw time

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.00 [s]	1000.00 [s]	5.00 [s]

Description: Defines the duration time at each forward speed for deragging.

p29597[0...n] Deragging reverse time / Derag rev tim

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.00 [s]	1000.00 [s]	5.00 [s]

Description: Defines the duration time at reverse speed for deragging.

p29598[0...n] Number of deragging cycles / Derag cycs

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: T	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
1	999	1

Description: The number of the deragging cycle is repeated

r29599.0...13 BO: Deragging status word / Derag zsw

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the actual state of the deragging.

The bit12&13 as the state of deragging too frequency monitoring, if bit12=1/bit13=0, it can be reset manually via p29605=0 or automatically when monitoring period timeout.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Deragging actived	Yes	No	-
04	Motor in forward rotation	Yes	No	-
05	Motor in ramp-down	Yes	No	-
06	Motor in reverse rotation	Yes	No	-
08	Forward rotation is enabled	Yes	No	-
09	Reverse rotation is enabled	Yes	No	-
12	Derag count is too frequency	Yes	No	-
13	Derag count in normal	Yes	No	-

p29605 CO: Deragging counter / Derag count

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	4294967295	0

Description: Display and clear the counter of deragging operation after power up.

It count at each deragging operate, will reset to 0 at the end of count period or clear by manually(set p29605=0).

Dependency: Refer to p29606, p29607

p29606 Deragging count time / T derag count

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0 [s]	4294967295 [s]	3600 [s]

Description: Set the deragging count time.

Deragging counter will reset to 0 at each timeout.

Dependency: Refer to p29605, p29607

p29607[0...n] Deragging maximum count / Derag max. ct.

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	4294967295	5

Description: Set the maximum deragging counter in specified time(p29606).
If deragging counter(r29605) is equal or greater than the set value in p29607, that means deragging is too frequency, the state will a set to 1 in bit12 of r29599, and the invert state display at bit13 of r29599.

Dependency: Refer to p29605, p29606

p29609[0...n] BI: Pipe filling activate / PF act

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T, U	**Scaling:** -	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	29610.0

Description: Sets the signal source to activate the pipe filling function.

Note
Don't assign the same input to this signal with ON/OFF signal, otherwise pipe filling may not be activated successfully.
If this signal is trigged (rising edge) during operation, it can only be activated after next switch on.

p29610 BO: Pipe filling enable / PF en

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	1	0

Description: Enable the pipe filling function.

Value:
- 0: The pipe filling function is disabled
- 1: The pipe filling function is enabled

Note
The pipe filling function allows the converter to fill an empty pipe slowly when the converter works according to the mode selected in p29611.

p29611[0...n] Pipe filling mode / PF mode

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	3	0

Description: Selects the mode for pipe filling.

Value:
- 0: The pipe is filled based on specified time each power on
- 1: The pipe is filled based on the actual pressure each power on
- 2: The pipe is filled based on specified time each servo on
- 3: The pipe is filled based on the actual pressure each servo on

p29612[0...n] Pipe filling speed / PF spd

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T	**Scaling:** p2000	**Dynamic index:** DDS, p0180
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-210000.00 [rpm]	210000.00 [rpm]	900.00 [rpm]

Description: Sets the speed applied to the motor for the pipe filling.

p29613[0...n] Pipe filling time / PF time

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.50 [s]	10000.00 [s]	50.00 [s]

Description: Sets the duration time for the pipe filling.

p29614[0...n] Pipe filling threshold / PF thresh

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: 9_1	**Unit selection:** p0595	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.00 [%]	100.00 [%]	10.00 [%]

Description: Defines the threshold for stopping the pipe filling. The filling stops if the actual PID feedback reaches the threshold. It's used when p29611 equal to 1 or 3.

p29615[0...n] Pipe filling monitoring time / PF mon time

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T	**Scaling:** -	**Dynamic index:** DDS, p0180
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.00 [s]	100.00 [s]	0.00 [s]

Description: Monitors the duration time for actual pressure (r2272) >= the threshold (p29614). The pipe filling stops if the duration time is reached.

Note

It is used when p29611 equal to 1 or 3.

p29622[0...n] BI: Frost protection enable / Fro en

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T, U	**Scaling:** -	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source to enable frost protection. If the binary input is equal to 1, then protection will be initiated. If the converter is stopped and the protection signal becomes active, protection measure is applied as follows:

- If p29623 != 0, frost protection is activated by applying the specified speed to the motor;
- If p29623 = 0, and p29624 != 0, condensation protection is activated by applying the specified current to the motor.

Note

The protection function may be overridden under the following conditions:

- If the converter is running and the protection signal becomes active, the signal is ignored.
- If the converter is turning a motor due to active protection signal and a RUN command is received, RUN command overrides the frost protection signal.
- Issuing an OFF command while protection is active will stop the motor.

p29623[0...n] Frost protection speed / Fro spd

Access level: 3 | **Calculated:** - | **Data type:** FloatingPoint32
Can be changed: T, U | **Scaling:** p2000 | **Dynamic index:** DDS, p0180
Unit group: 3_1 | **Unit selection:** p0505 | **Function diagram:** -
Min: -210000.000 [rpm] | **Max:** 210000.000 [rpm] | **Factory setting:** 0.000 [rpm]

Description: Specifies the speed applied to the motor when frost protection is active.
And this parameter can't be changed when the frost or condensation function is active.

Dependency: See also p29622.

p29624[0...n] Condensation protection current / Cond current

Access level: 3 | **Calculated:** - | **Data type:** FloatingPoint32
Can be changed: T, U | **Scaling:** - | **Dynamic index:** DDS, p0180
Unit group: - | **Unit selection:** - | **Function diagram:** -
Min: 0.000 [%] | **Max:** 100.000 [%] | **Factory setting:** 30.000 [%]

Description: Specifies the DC current (as a percentage of rated current) applied to the motor when condensation protection is active.

Dependency: See also p29622.

Note
The change to the current becomes effective the next time condensation protection is active.

p29625[0...n] Cavitation protection enable / Cavi en

Access level: 3 | **Calculated:** - | **Data type:** Integer16
Can be changed: T, U | **Scaling:** - | **Dynamic index:** DDS, p0180
Unit group: - | **Unit selection:** - | **Function diagram:** -
Min: 0 | **Max:** 2 | **Factory setting:** 0

Description: Enables the cavitation protection function. A fault/alarm is generated when cavitation conditions are deemed to be present.

Value:
0: The cavitation protection function is deactivated
1: The cavitation protection function triggers fault F52960
2: The cavitation protection function triggers warning A52961

p29626[0...n] Cavitation protection threshold / Cavi thresh

Access level: 3 | **Calculated:** - | **Data type:** FloatingPoint32
Can be changed: T, U | **Scaling:** - | **Dynamic index:** DDS, p0180
Unit group: 9_1 | **Unit selection:** p0595 | **Function diagram:** -
Min: 0.00 [%] | **Max:** 200.00 [%] | **Factory setting:** 40.00 [%]

Description: Defines the feedback threshold (as a percentage) for triggering a fault/alarm.

p29627[0...n] Cavitation protection time / Cavi time

Access level: 3 | **Calculated:** - | **Data type:** Unsigned16
Can be changed: T, U | **Scaling:** - | **Dynamic index:** DDS, p0180
Unit group: - | **Unit selection:** - | **Function diagram:** -
Min: 1 [s] | **Max:** 65000 [s] | **Factory setting:** 30 [s]

Description: Sets the time for which cavitation conditions have to be present before a fault/alarm is triggered.

r29629.0...2 CO/BO: Status word: application / App status word

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the status word for application:
bit 0:
= 1, pipe filling is active;
= 0, pipe filling is not active.
bit 2/1:
= 0/1, condesation protection is active;
= 1/1, frost protection is active;
= 0/0, frost and condensation protections are not active;
= 1/0, not used.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Pipe filling	Active	Inactive	-
01	Condensation protection	Active	Inactive	-
02	Frost protection	Active	Inactive	-

p29630 Keep-running operation enable / KeepRun

Access level: 3	**Calculated:** -	**Data type:** Unsigned16
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0	1	0

Description: Sets the signal source to enable converter keep-running operation. This attempts to prevent the converter from tripping by enabling all possible existing de-rating features and the automatic restart function.

Note
p29630 = 1
Sets the following parameter values to minimize likelihood of a trip:
p0290 = 2 (power unit overload reaction: reduce pulse frequency, output current and output frequency)
p1210 = 4 (restart after line supply failure without additional start attempts)
p1211 = 10 (number of times converter will attempt to restart)
p1240 = 2 and p1280 = 2 (configuration of Vdc controller: Vdc_max controller and kinetic buffering (KIB) enabled)
p29630 = 0
Resets the parameters to their default values:
p0290 = 2 (power unit overload reaction: reduce pulse frequency, output current and output frequency)
p1210 = 0 (automatic restart function: trip reset after power on, p1211 disabled)
p1211 = 3 (number of times converter will attempt to restart)
p1240 = 1 and p1280 = 1(configuration of Vdc controller: Vdc_max controller enabled)

p29631[0...4] Flow meter pump power / FlowM_power

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.00 [kW]	340.28235E36 [kW]	0.00 [kW]

Description: Determines the power points for flow estimation.

Five power values are put into the indexes of this parameter. These values should be spread across the full power range of the converter.

User should guarantee values in all indexes is increasing in sequence (p29631[0] <= p29631 [1] <= p29631[2] <= ...). Otherwise the calculated flow value will be 0.

p29632[0...4] Flow meter pump flow / FlowM_flow

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.00 [m³/h]	340.28235E36 [m³/h]	0.00 [m³/h]

Description: Determines the flow for the corresponding pump power point used for flow estimation.

Five correcponding flow values should be entered derived from the manufacturer's pump characteristic curve.

r29633 Flow meter calculated flow / FlowM_calc flow

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
- [m³/h]	- [m³/h]	- [m³/h]

Description: The calculation result of flow meter.

r29640.0...18 CO/BO: Extented setpoint channel selection output / Setp selection

Access level: 3	**Calculated:** -	**Data type:** Unsigned32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	-

Description: Displays the actual output of the extended setpoint channel selection.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	Extend speed setpoint selected	1	0	-
01	Frost or condensation executing	1	0	-
03	Deragging executing	1	0	-
04	Pipe filling executing	1	0	-
05	Total executing	1	0	-
06	Normal executing	1	0	-
16	Ramp up status	1	0	-
17	Ramp down status	1	0	-
18	Target setpoint reached flag	1	0	-

r29641 CO: Extented setpoint channel setpoint output / Setp output

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** p2000	**Dynamic index:** -
Unit group: 3_1	**Unit selection:** p0505	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
- [rpm]	- [rpm]	- [rpm]

Description: Displays the actual output of the extended setpoint channel setpoint.

p29642 BI: Ramp-function generator, accept setpoint / Total setp sel

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source for accepting the setpoint of the ramp-function generator.

p29643 CI: Ramp-function generator setpoint input / Total Setpoint

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / FloatingPoint32
Can be changed: T	**Scaling:** p2000	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source for inputting the setpoint of the ramp-function generator.

p29650[0...n] DI selection for ON/OFF2 / DI sel ON/OFF2

Access level: 3	**Calculated:** -	**Data type:** Integer16
Can be changed: T	**Scaling:** -	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-1	5	0

Description: Defines the DI selection for ON/OFF2. After setting, configuration will be done internally(Except DP/PN variants),

p0840[0...n] = r29659.0

p0844[0...n] = r29659.1

p29652[0...n] = 722.n

You can also configure p29651[0...n] and p29652[0...n] after setting p29650[0...n].

Similar to p0840[0...n] and p0844[0...n], p29651[0...n] and p29652[0...n] are for ON/OFF1 input and OFF2 input respectively.

Value:

-1:	NONE
0:	DI0
1:	DI1
2:	DI2
3:	DI3
4:	DI4
5:	DI5

Note

On variants with PN/DP interface, ON/OFF2 is disabled as default(p29650=-1), when enabled(p29650>=0), the configuration of p840 and p844 will not be updated internally. ON/OFF2 is only effective if both are configured as r29659 bit0 and bit1 respectively.

p29651[0...n] BI: ON/OFF1 (OFF1) / ON/OFF1 (OFF1)

Access level: 3	**Calculated:** -	**Data type:** Unsigned32 / Binary
Can be changed: T	**Scaling:** -	**Dynamic index:** CDS, p0170
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
-	-	0

Description: Sets the signal source for the command "ON/OFF1 (OFF1)".

p29652[0...n] BI: ON/OFF2 (OFF2) / ON/OFF2 (OFF2)

Access level: 3
Calculated: -
Data type: Unsigned32 / Binary
Can be changed: T
Scaling: -
Dynamic index: CDS, p0170
Unit group: -
Unit selection: -
Function diagram: -
Min: -
Max: -
Factory setting: 0

Description: Sets the signal source for the command "ON/OFF2 (OFF2)".

r29659.0...1 CO/BO: Command word / Cmd word

Access level: 3
Calculated: -
Data type: Unsigned32
Can be changed: -
Scaling: -
Dynamic index: -
Unit group: -
Unit selection: -
Function diagram: -
Min: -
Max: -
Factory setting: -

Description: Command status is for ON/OFF1, OFF2 which can connect to p0840, p0844.

Bit field:

Bit	Signal name	1 signal	0 signal	FP
00	ON/OFF1	Active	Inactive	-
01	coast-down(OFF2) signal source	Active	Inactive	-

p29700[0...n] Temperature sensor type / TempSen type

Access level: 2
Calculated: -
Data type: Integer16
Can be changed: T, U
Scaling: -
Dynamic index: DDS, p0180
Unit group: -
Unit selection: -
Function diagram: -
Min: 0
Max: 3
Factory setting: 0

Description: Sets the sensor type for temperature measurement.
This means that the temperature sensor type is selected and the evaluation is switched in.

Value:
0: Evaluation disabled
1: 1 x PT100
2: 2 x PT100
3: 3 x PT100

Dependency: When enabled(p29700>0):

1. One analog input and output should be used to connect the sensor, the connected analog input should be set as 0-10V voltage input(p756[x]=0), and the analog output should be set as 0-20mA current output(p776[x]=0);

2. The measure sensor voltage should connect to the sensor voltage input(p29701=r755.x)and the sensor exciting current value should connect to analog output source(p771[x]=r29706.x).

Note
The temperature sensor is connected at CU AIx and AOx terminals.
When the measurement is enabled(p29700>0), the set value of p601 is not impact on the motor temperature sensor selection.
If p29700=0, the motor temperature sensor can be selected by p601.

p29701 CI: Temperature sensor voltage input source / TempSen V_src

Access level: 2
Calculated: -
Data type: Unsigned32 / FloatingPoint32
Can be changed: T, U
Scaling: PERCENT
Dynamic index: -
Unit group: -
Unit selection: -
Function diagram: -
Min: -
Max: -
Factory setting: 0

Description: Sets the signal source for temperature sensor voltage.

Note
The value may be the measured value of the analog input(e.g. r755[x]), which is the AI channel of the sensor connected.

p29704 Equivalent wire resistance / TempSen R_wire

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.00 [ohm]	3000.00 [ohm]	0.00 [ohm]

Description: Sets the equivalent wire resistance for temperature sensor.

If the wire resistance can't be ignored for the temperature accuracy, that should be measured or calculated and set via p29704.

Note
The value may be measured by short-circuit the sensor conductor close to the sensor, set p29704=0, then that can be read via r29707.
The parameter is not influenced by setting the factory setting.

r29705 CO: Temperature sensor actual value / TempSen T_actual

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
- [°C]	- [°C]	- [°C]

Description: Displays the temperature actual value of the temperature sensor

Note
PT100: Valid temperature range -48 ... 248 degree.
r29705=20 degree is displayed when the sensor type is not selected(p29700 = 0).

r29706 CO: Temperature sensor exciting current output / TempSen I_out

Access level: 2	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
- [%]	- [%]	- [%]

Description: Current output to temperature sensor in percent of 20mA.

Note
This CO parameter may connect to the analog output source set(e.g. p771[x]), which is the AO channel of sensor connected.

r29707 CO: Temperature sensor resistance value / TempSen R

Access level: 3	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: -	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
- [ohm]	- [ohm]	- [ohm]

Description: Display the actual resistance value of the temperature sensor.

p29708 Temperature sensor exiting current set / TempSen I_exit

Access level: 4	**Calculated:** -	**Data type:** FloatingPoint32
Can be changed: T, U	**Scaling:** -	**Dynamic index:** -
Unit group: -	**Unit selection:** -	**Function diagram:** -
Min:	**Max:**	**Factory setting:**
0.00 [%]	100.00 [%]	50.00 [%]

Description: Sets the exciting current of temperature sensor.

9.3 ASCII table

Function description

The following table contains the characters that can be used for certain parameters, e.g. serial number, password or device name on a fieldbus.

Table 9-1 Permissible characters

Character	Decimal	Hexadecimal	Meaning
	32	20	Space
!	33	21	Exclamation mark
"	34	22	Quotation mark
#	35	23	Number sign
$	36	24	Dollar
%	37	25	Percent
&	38	26	Ampersand
’	39	27	Apostrophe, closing single quotation mark
(	40	28	Opening parenthesis
)	41	29	Closing parenthesis
*	42	2A	Asterisk
+	43	2B	Plus
,	44	2C	Comma
-	45	2D	Hyphen, minus
.	46	2E	Period, decimal point
/	47	2F	Slash, slant
0	48	30	Digit 0
...	...	...	...
9	57	39	Digit 9
:	58	3A	Colon
;	59	3B	Semicolon
<	60	3C	Less than
=	61	3D	Equals
>	62	3E	Greater than
?	63	3F	Question mark
@	64	40	Commercial At
A	65	41	Capital Letter A
...	...	...	...
Z	90	5A	Capital letter Z
[	91	5B	Opening bracket
\	92	5C	Backslash
]	93	5D	Closing bracket
^	94	5E	Circumflex
_	95	5F	Underline

Character	Decimal	Hexadecimal	Meaning
ʻ	96	60	Opening single quotation mark
a	97	61	Small letter a
...	...	...	...
z	122	7A	Small Letter z
{	123	7B	Opening brace
|	124	7C	Vertical line
}	125	7D	Closing brace
~	126	7E	Tilde

Warnings, faults and system messages 10

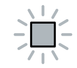
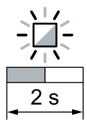
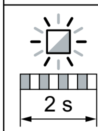
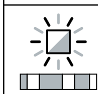
10.1 Overview

The converter has the following diagnostic types:

- LED
  The LEDs at the front of the converter immediately inform you about the most important converter states.
- Alarms and faults
  Every alarm and every fault has a unique number.
  The converter signals alarms and faults via the following interfaces:
  - Fieldbus
  - Terminal strip with the appropriate setting
  - Interface to the BOP-2 or IOP-2 operator panel
  - Interface to SINAMICS G120 Smart Access

10.2 Operating states indicated via LEDs

Table 10-1 Explanation of symbols for the following tables

	LED is ON
	LED is OFF
	LED flashes slowly
	LED flashes quickly
	LED flashes with variable frequency

Please contact Technical Support for LED states that are not described in the following.

Table 10-2 Basic states

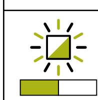
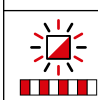
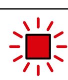
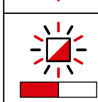
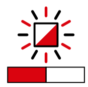
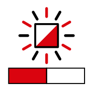
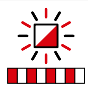
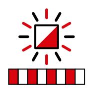
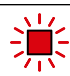
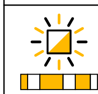
RDY	Explanation
	Temporary state after the supply voltage is switched on.
	The converter is free of faults
	Commissioning or reset to factory settings
	A fault is active
	Firmware update is active
	Converter waits until the power supply is switched off and switched on again after a firmware update

Table 10-3 Fieldbuses via RS 485 interface

<table>
<tr><th>BF</th><th colspan="2">Explanation</th></tr>
<tr><td></td><td colspan="2">Data exchange between the converter and control system is active</td></tr>
<tr><td rowspan="2"></td><td colspan="2">The fieldbus is active, however, the converter is not receiving any process data</td></tr>
<tr><td>RDY
</td><td>When LED RDY flashes simultaneously:
Converter waits until the power supply is switched off and switched on again after a firmware update</td></tr>
<tr><td rowspan="2"></td><td colspan="2">No fieldbus connection available</td></tr>
<tr><td>RDY
</td><td>When LED RDY flashes simultaneously:
Incorrect memory card</td></tr>
<tr><td></td><td colspan="2">Firmware update failed</td></tr>
<tr><td></td><td colspan="2">Firmware update is active</td></tr>
</table>

Communication via Modbus or USS:

If the fieldbus monitoring is deactivated with p2040 = 0, the BF-LED remains dark, independent of the communication state.

10.3 System runtime

Overview

By evaluating the system runtime of the converter, you can decide when you should replace components subject to wear in time before they fail - such as fans, motors and gear units.

Function description

The system runtime is started once the power supply of the converter is switched on. The system runtime stops when the power supply is switched off.

The system runtime comprises r2114[0] (milliseconds) and r2114[1] (days):

System runtime = r2114[1] × days + r2114[0] × milliseconds

If r2114[0] has reached a value of 86,400,000 ms (24 hours), r2114[0] is set to the value 0 and the value of r2114[1] is increased by 1.

Example

Parameter	Description
r2114[0]	System runtime (ms)
r2114[1]	System runtime (days)

You cannot reset the system runtime.

Parameters

Parameter	Description	Factory setting
r2114[0 ... 1]	Total system runtime	-

10.4 Alarms, alarm buffer, and alarm history

Overview

An alarm generally indicates that the converter may no longer be able to maintain the operation of the motor in future.

The extended diagnostics have an alarm buffer and an alarm history, in which the converter stores the most recent alarms.

Function description

Alarms have the following properties:

- Incoming alarms have no direct influence on the converter.
- A warning disappears as soon as its cause is eliminated.
- Alarms do not have to be acknowledged.
- Alarms are displayed as follows:
  - Display via the fieldbus
  - Display on the operator panel with Axxxxx
  - Display via SINAMICS G120 Smart Access

Alarm code or alarm value describe the cause of the alarm.

Alarm buffer

Alarm code	Alarm value		Alarm time received			Alarm time removed	
	I32	float	Days	ms		Days	ms
r2122[0]	r2124[0]	r2134[0]	r2145[0]	r2123[0]	old	r2146[0]	r2125[0]
[1]	[1]	[1]	[1]	[1]	↓	[1]	[1]
[2]	[2]	[2]	[2]	[2]		[2]	[2]
[3]	[3]	[3]	[3]	[3]		[3]	[3]
[4]	[4]	[4]	[4]	[4]		[4]	[4]
[5]	[5]	[5]	[5]	[5]		[5]	[5]
[6]	[6]	[6]	[6]	[6]		[6]	[6]
[7]	[7]	[7]	[7]	[7]	new	[7]	[7]

Figure 10-1 Alarm buffer

The converter saves incoming alarms in the alarm buffer. An alarm includes an alarm code, an alarm value, and two alarm times:

- Alarm code: r2122
- Alarm value: r2124 in fixed-point format "I32", r2134 in floating-point format "Float"
- Alarm time received = r2145 + r2123
- Alarm time removed = r2146 + r2125

The converter takes its internal time calculation to save the alarm times.

System runtime (Page 990)

Up to 8 alarms can be saved in the alarm buffer.

In the alarm buffer, the alarms are sorted according to "Alarm time received". If the alarm buffer is completely filled and an additional alarm occurs, then the converter overwrites the values with Index [7].

Alarm history

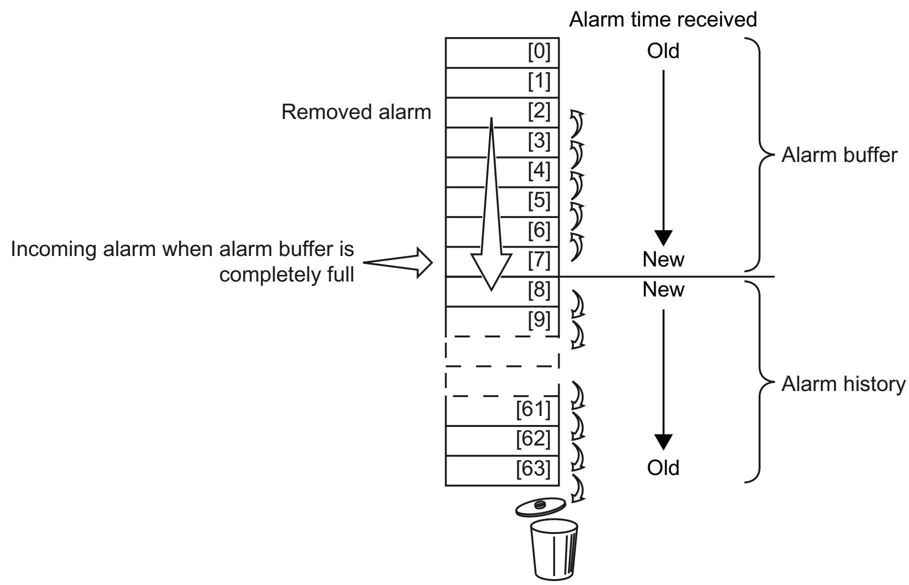


Figure 10-2 Shifting removed alarms into the alarm history

If the alarm buffer is completely filled and an additional alarm occurs, the converter shifts all removed alarms into the alarm history. The following occurs in detail:

1. To create space after position [8] in the alarm history, the converter shifts the alarms already stored in the alarm history "down" by one or more positions.
   If the alarm history is completely full, the converter will delete the oldest alarms.
2. The converter moves the removed alarms from the alarm buffer to the now freed up positions of the alarm history.
   Alarms that have not been removed remain in the alarm buffer.
3. The converter closes gaps in the alarm buffer that occurred when the removed alarms were shifted in the alarm history by shifting the alarms that have not been removed "up".
4. The converter saves the received alarm as the latest alarm in the alarm buffer.

The alarm history saves up to 56 alarms.

In the alarm history, alarms are sorted according to the "alarm time received". The latest alarm has Index [8].

Parameters

Table 10-4 Parameters of the alarm buffer and the alarm history

Parameter	Description	Factory setting
p2111	Alarm counter	0
r2122[0 ... 63]	Alarm code	-

Parameter	Description	Factory setting
r2123[0 ... 63]	Alarm time received in milliseconds	- ms
r2124[0 ... 63]	Alarm value	-
r2125[0 ... 63]	Alarm time removed in milliseconds	- ms
r2132	CO: Actual alarm code	-
r2134[0 ... 63]	Alarm value for float values	-
r2145[0 ... 63]	Alarm time received in days	-
r2146[0 ... 63]	Alarm time removed in days	-

Table 10-5 Extended settings for alarms

Parameter	Description	Factory setting
You can change up to 20 different alarms into a fault or suppress alarms:		
p2118[0 ... 19]	Change message type, message number	0
p2119[0 ... 19]	Change message type, type	1

10.5 Faults, alarm buffer and alarm history

Overview

A fault generally indicates that the converter can no longer maintain the operation of the motor.

The extended diagnostics have a fault buffer and a fault history, in which the converter stores the most recent faults.

Function description

Faults have the following properties:

- In general, a fault leads to the motor being switched off.
- A fault must be acknowledged.
- Faults are displayed as follows:
  - Display via the fieldbus
  - Display on the operator panel with Fxxxxx
  - Display on the converter via the LED RDY
  - Display via SINAMICS G120 Smart Access

Fault buffer

Fault code	Fault value		Fault time received			Fault time removed	
	I32	float	Days	ms		Days	ms
r0945[0]	r0949[0]	r2133[0]	r2130[0]	r0948[0]	Old	r2136[0]	r2109[0]
[1]	[1]	[1]	[1]	[1]		[1]	[1]
[2]	[2]	[2]	[2]	[2]		[2]	[2]
[3]	[3]	[3]	[3]	[3]		[3]	[3]
[4]	[4]	[4]	[4]	[4]		[4]	[4]
[5]	[5]	[5]	[5]	[5]		[5]	[5]
[6]	[6]	[6]	[6]	[6]		[6]	[6]
[7]	[7]	[7]	[7]	[7]	New	[7]	[7]

Figure 10-3 Fault buffer

The converter saves incoming faults in the fault buffer. A fault includes a fault code, a fault value, and two fault times:

- Fault code: r0945
  The fault code and fault value describe the cause of the fault.
- Fault value: r0949 in fixed-point format "I32", r2133 in floating-point format "Float"
- Fault time received = r2130 + r0948
- Fault time removed = r2136 + r2109

The converter takes its internal time calculation to save the fault times.

System runtime (Page 990)

Up to 8 faults can be saved in the fault buffer.

In the fault buffer, the faults are sorted according to "Fault time received". If the fault buffer is completely filled and an additional fault occurs, then the converter overwrites the values with Index [7].

Acknowledging a fault

To acknowledge a fault, you have the following options:

- Acknowledge via the fieldbus
- Acknowledge via a digital input
- Acknowledge via the operator panel
- Switch off the converter power supply and switch on again

Faults detected during the converter-internal monitoring of hardware and firmware can be acknowledged only by switching the supply voltage off and on again. The list of fault codes and alarm codes includes the note on the limitations on the acknowledgment for the corresponding fault codes.

Fault history

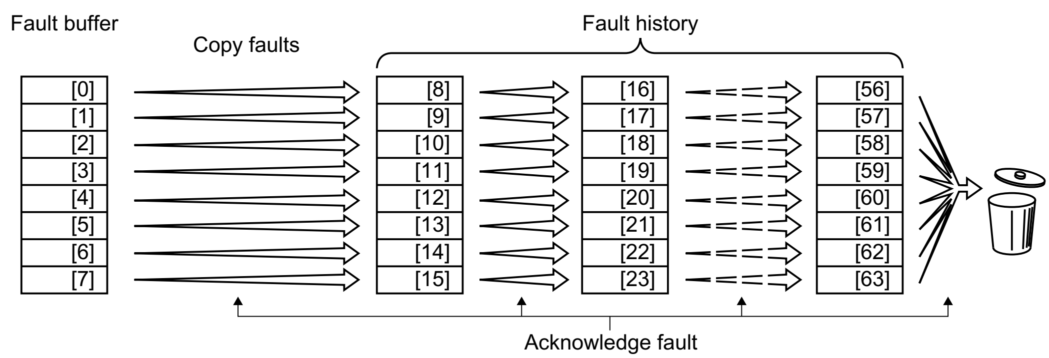


Figure 10-4 Fault history after acknowledging the faults

If at least one of the fault causes in the fault buffer has been removed and you acknowledge the faults, the following takes place:

1. The converter shifts the values previously saved in the fault history by eight indexes.
   The converter deletes the faults that were saved in the indexes [56 ... 63] before the acknowledgement.
2. The converter copies the contents of the fault buffer to the memory locations [8 ... 15] in the fault history.
3. The converter deletes the faults that have been removed from the fault buffer.
   The faults that have not been removed are now saved both in the fault buffer and in the fault history.
4. The converter writes the time of acknowledgement of the removed faults to "Fault time removed".
   The "Fault time removed" of the faults that have not been removed retains the value = 0.

The fault history can contain up to 56 faults.

Deleting the fault history

To delete all faults from the fault history, set parameter p0952 = 0.

Parameters

Table 10-6 Parameters of the fault buffer and the fault history

Parameter	Description	Factory setting
r0945[0 ... 63]	Fault code	-
r0948[0 ... 63]	Fault time received in milliseconds	- ms
r0949[0 ... 63]	Fault value	-
p0952	Fault cases counter	0
r2109[0 ... 63]	Fault time removed in milliseconds	- ms
r2130[0 ... 63]	Fault time received in days	-
r2131	CO: Actual fault code	-
r2133[0 ... 63]	Fault value for float values	-
r2136[0 ... 63]	Fault time removed in days	-

Extended settings for faults

Parameter	Description	Factory setting
p2100[0...19]	Changing the fault reaction, fault number	0
p2101[0...19]	Changing the fault reaction, reaction	0
p2118[0 ... 19]	Change message type, message number	0
p2119[0 ... 19]	Change message type, type	1
p2126[0 ... 19]	Changing the acknowledge mode, fault number	0
p2127[0 ... 19]	Changing the acknowledge mode	1

10.6 List of fault codes and alarm codes

10.6.1 Overview of faults and alarms

Overview

A message comprises a letter followed by the relevant number.

The letters have the following meaning:

A	Alarm code **. . . .**
F	Fault code **. . . .**
N	No report or internal message

10.6.2 Fault codes and alarm codes

All objects: G120XA_USS

F01000 **Internal software error**

Reaction: OFF2

Acknowledge: POWER ON

Cause: An internal software error has occurred.
Fault value (r0949, interpret hexadecimal):
Only for internal Siemens troubleshooting.

Remedy:
- evaluate fault buffer (r0945).
- carry out a POWER ON (switch-off/switch-on) for all components.
- if required, check the data on the non-volatile memory (e.g. memory card).
- upgrade firmware to later version.
- contact Technical Support.
- replace the Control Unit.

F01001 **FloatingPoint exception**

Reaction: OFF2

Acknowledge: POWER ON

Cause: An exception occurred during an operation with the FloatingPoint data type.
The error may be caused by the basic system or an OA application (e.g. FBLOCKS, DCC).
Fault value (r0949, interpret hexadecimal):
Only for internal Siemens troubleshooting.
Note:
Refer to r9999 for further information about this fault.
r9999[0]: Fault number.
r9999[1]: Program counter at the time when the exception occurred.
r9999[2]: Cause of the FloatingPoint exception.
Bit 0 = 1: Operation invalid
Bit 1 = 1: Division by zero
Bit 2 = 1: Overflow
Bit 3 = 1: Underflow
Bit 4 = 1: Inaccurate result

Remedy: - carry out a POWER ON (switch-off/switch-on) for all components.
- check configuration and signals of the blocks in FBLOCKS.
- check configuration and signals of DCC charts.
- upgrade firmware to later version.
- contact Technical Support.

F01002 Internal software error

Reaction: OFF2

Acknowledge: IMMEDIATELY

Cause: An internal software error has occurred.
Fault value (r0949, interpret hexadecimal):
Only for internal Siemens troubleshooting.

Remedy: - carry out a POWER ON (switch-off/switch-on) for all components.
- upgrade firmware to later version.
- contact Technical Support.

F01003 Acknowledgment delay when accessing the memory

Reaction: OFF2

Acknowledge: IMMEDIATELY

Cause: A memory area was accessed that does not return a "READY".
Fault value (r0949, interpret hexadecimal):
Only for internal Siemens troubleshooting.

Remedy: - carry out a POWER ON (switch-off/switch-on) for all components.
- contact Technical Support.

N01004 (F, A) Internal software error

Reaction: NONE

Acknowledge: NONE

Cause: An internal software error has occurred.
Fault value (r0949, hexadecimal):
Only for internal Siemens troubleshooting.

Remedy: - read out diagnostics parameter (r9999).
- contact Technical Support.
See also: r9999 (Software error internal supplementary diagnostics)

F01005 File upload/download error

Reaction: NONE

Acknowledge: IMMEDIATELY

Cause: The upload or download of EEPROM data was unsuccessful.

Fault value (r0949, interpret hexadecimal):

yyxxxx hex: yy = component number, xxxx = fault cause

xxxx = 000B hex = 11 dec:

Power unit component has detected a checksum error.

xxxx = 000F hex = 15 dec:

The selected power unit will not accept the content of the EEPROM file.

xxxx = 0011 hex = 17 dec:

Power unit component has detected an internal access error.

xxxx = 0012 hex = 18 dec:

After several communication attempts, no response from the power unit component.

xxxx = 008B hex = 140 dec:

EEPROM file for the power unit component not available on the memory card.

xxxx = 008D hex = 141 dec:

An inconsistent length of the firmware file was signaled. It is possible that the download/upload has been interrupted.

xxxx = 0090 hex = 144 dec:

When checking the file that was loaded, the component detected a fault (checksum). It is possible that the file on the memory card is defective.

xxxx = 0092 hex = 146 dec:

This SW or HW does not support the selected function.

xxxx = 009C hex = 156 dec:

Component with the specified component number is not available (p7828).

xxxx = Additional values:

Only for internal Siemens troubleshooting.

Remedy: Save a suitable firmware file or EEPROM file for upload or download in folder "/ee_sac/" on the memory card.

A01009 (N) CU: Control module overtemperature

Reaction: NONE

Acknowledge: NONE

Cause: The temperature (r0037[0]) of the control module (Control Unit) has exceeded the specified limit value.

Remedy: - check the air intake for the Control Unit.

- check the Control Unit fan.

Note:

The alarm is automatically withdrawn once the limit value has been fallen below.

F01010 Drive type unknown

Reaction: NONE

Acknowledge: IMMEDIATELY

Cause: An unknown drive type was found.

Remedy: - replace Power Module.

- carry out a POWER ON (switch-off/switch-on).
- upgrade firmware to later version.
- contact Technical Support.

F01015 Internal software error

Reaction: OFF2

Acknowledge: POWER ON

Cause: An internal software error has occurred.
Fault value (r0949, interpret decimal):
Only for internal Siemens troubleshooting.

Remedy: - carry out a POWER ON (switch-off/switch-on) for all components.
- upgrade firmware to later version.
- contact Technical Support.

A01016 (F) Firmware changed

Reaction: NONE

Acknowledge: NONE

Cause: At least one firmware file in the directory was illegally changed on the non-volatile memory (memory card/device memory) with respect to the version when shipped from the factory.
Alarm value (r2124, interpret decimal):
0: Checksum of one file is incorrect.
1: File missing.
2: Too many files.
3: Incorrect firmware version.
4: Incorrect checksum of the back-up file.

Remedy: For the non-volatile memory for the firmware (memory card/device memory), restore the delivery condition.
Note:
The file involved can be read out using parameter r9925.
The status of the firmware check is displayed using r9926.
See also: r9925, r9926

A01017 Component lists changed

Reaction: NONE

Acknowledge: NONE

Cause: On the memory card, one file in the directory /SIEMENS/SINAMICS/DATA or /ADDON/SINAMICS/DATA has been illegally changed with respect to that supplied from the factory. No changes are permitted in this directory.
Alarm value (r2124, interpret decimal):
zyx dec: x = Problem, y = Directory, z = File name
x = 1: File does not exist.
x = 2: Firmware version of the file does not match the software version.
x = 3: File checksum is incorrect.
y = 0: Directory /SIEMENS/SINAMICS/DATA/
y = 1: Directory /ADDON/SINAMICS/DATA/
z = 0: File MOTARM.ACX
z = 1: File MOTSRM.ACX
z = 2: File MOTSLM.ACX
z = 3: File ENCDATA.ACX
z = 4: File FILTDATA.ACX
z = 5: File BRKDATA.ACX
z = 6: File DAT_BEAR.ACX
z = 7: File CFG_BEAR.ACX

Remedy: For the file on the memory card involved, restore the status originally supplied from the factory.

F01018 Booting has been interrupted several times

Reaction: NONE

Acknowledge: POWER ON

Cause: Module booting was interrupted several times. As a consequence, the module boots with the factory setting.
Possible reasons for booting being interrupted:
- power supply interrupted.
- CPU crashed.
- parameterization invalid.

Remedy: - carry out a POWER ON (switch-off/switch-on). After switching on, the module reboots from the valid parameterization (if available).
- restore the valid parameterization.
Examples:
a) Carry out a first commissioning, save, carry out a POWER ON (switch-off/switch-on).
b) Load another valid parameter backup (e.g. from the memory card), save, carry out a POWER ON (switch-off/switch-on).
Note:
If the fault situation is repeated, then this fault is again output after several interrupted boots.

A01019 Writing to the removable data medium unsuccessful

Reaction: NONE
Acknowledge: NONE
Cause: The write access to the removable data medium was unsuccessful.
Remedy: Remove and check the removable data medium. Then run the data backup again.

A01020 Writing to RAM disk unsuccessful

Reaction: NONE
Acknowledge: NONE
Cause: A write access to the internal RAM disk was unsuccessful.
Remedy: Adapt the file size for the system logbook to the internal RAM disk (p9930).
See also: p9930 (System logbook activation)

A01021 Removable data medium as USB data storage medium from the PC used

Reaction: NONE
Acknowledge: NONE
Cause: The removable data medium is used as USB data storage medium from a PC
As a consequence, the drive cannot access the removable data medium. When backing up, the configuration data cannot be saved on the removable data medium.
Alarm value (r2124, interpret decimal):
1: The know-how protection as well as the copy protection for the removable data medium is active. Backup is inhibited.
2: The configuration data are only backed up in the Control Unit.
See also: r7760, r9401

Remedy: Deactivate the USB connection to the PC and back up the configuration data.
Note:
The alarm is automatically canceled when disconnecting the USB connection or when removing the removable data medium.
See also: r9401 (Safely remove memory card status)

F01023 Software timeout (internal)

Reaction: NONE
Acknowledge: IMMEDIATELY
Cause: An internal software timeout has occurred.
Fault value (r0949, interpret decimal):
Only for internal Siemens troubleshooting.

Remedy: - carry out a POWER ON (switch-off/switch-on) for all components.
- upgrade firmware to later version.
- contact Technical Support.

A01028 (F) Configuration error

Reaction: NONE

Acknowledge: NONE

Cause: The parameterization that was downloaded was generated with a different module type (Order No., MLFB).

Remedy: Save parameters in a non-volatile fashion (p0971 = 1).

F01030 Sign-of-life failure for master control

Reaction: OFF3 (IASC/DCBRK, NONE, OFF1, OFF2, STOP2)

Acknowledge: IMMEDIATELY

Cause: For active PC master control, no sign-of-life was received within the monitoring time.

The master control was returned to the active BICO interconnection.

Remedy: Set the monitoring time higher at the PC or, if required, completely disable the monitoring function.

For the commissioning software, the monitoring time is set as follows:

<Drive> -> Commissioning -> Control panel -> Button "Fetch master control" -> A window is displayed to set the monitoring time in milliseconds.

Notice:

The monitoring time should be set as short as possible. A long monitoring time means a late response when the communication fails!

F01033 Units changeover: Reference parameter value invalid

Reaction: NONE

Acknowledge: IMMEDIATELY

Cause: When changing over the units to the referred representation type, it is not permissible for any of the required reference parameters to be equal to 0.0

Fault value (r0949, parameter):

Reference parameter whose value is 0.0.

See also: p0505, p0595

Remedy: Set the value of the reference parameter to a number different than 0.0.

See also: p0304, p0305, p0310, p0596, p2000, p2001, p2002, p2003, r2004

F01034 Units changeover: Calculation parameter values after reference value change unsuccessful

Reaction: NONE

Acknowledge: IMMEDIATELY

Cause: The change of a reference parameter meant that for an involved parameter the selected value was not able to be re-calculated in the per unit representation. The change was rejected and the original parameter value restored.

Fault value (r0949, parameter):

Parameter whose value was not able to be re-calculated.

See also: p0304, p0305, p0310, p0596, p2000, p2001, p2002, p2003, r2004

Remedy: - Select the value of the reference parameter such that the parameter involved can be calculated in the per unit representation.
- Technology unit selection (p0595) before changing the reference parameter p0596, set p0595 = 1.

A01035 (F) ACX: Parameter back-up file corrupted

Reaction: NONE

Acknowledge: NONE

Cause: When the Control Unit is booted, no complete data set was found from the parameter back-up files. The last time that the parameterization was saved, it was not completely carried out.

It is possible that the backup was interrupted by switching off or withdrawing the memory card.

Alarm value (r2124, interpret hexadecimal):

ddccbbaa hex:

aa = 01 hex:

Power up was realized without data backup. The drive is in the factory setting.

aa = 02 hex:

The last available internal backup data record was loaded. The parameterization must be checked. It is recommended that the parameterization is downloaded again.

aa = 03 hex:

The last available data record from the memory card was loaded. The parameterization must be checked.

aa = 04 hex:

An invalid data backup was loaded from the memory card into the drive. The drive is in the factory setting.

dd, cc, bb:

Only for internal Siemens troubleshooting.

See also: p0971 (Save parameters)

Remedy: - Download the project again with the commissioning software.

- save all parameters (p0971 = 1 or "copy RAM to ROM").

See also: p0971 (Save parameters)

F01036 (A) ACX: Parameter back-up file missing

Reaction: NONE (OFF1, OFF2, OFF3)

Acknowledge: IMMEDIATELY

Cause: When downloading the device parameterization, a parameter back-up file PSxxxyyy.ACX associated with a drive object cannot be found.

Fault value (r0949, interpret hexadecimal):

Byte 1: yyy in the file name PSxxxyyy.ACX

yyy = 000 --> consistency back-up file

yyy = 001 ... 062 --> drive object number

yyy = 099 --> PROFIBUS parameter back-up file

Byte 2, 3, 4:

Only for internal Siemens troubleshooting.

Remedy: If you have saved the project data using the commissioning software, carry out a new download for your project.

Save using the function "Copy RAM to ROM" or with p0971 = 1.

This means that the parameter files are again completely written into the non-volatile memory.

Note:

If the project data have not been backed up, then a new first commissioning is required.

F01038 (A) ACX: Loading the parameter back-up file unsuccessful

Reaction: NONE (OFF1, OFF2, OFF3)

Acknowledge: IMMEDIATELY

Cause: An error has occurred when downloading PSxxxyyy.ACX or PTxxxyyy.ACX files from the non-volatile memory.
Fault value (r0949, interpret hexadecimal):
Byte 1: yyy in the file name PSxxxyyy.ACX
yyy = 000 --> consistency back-up file
yyy = 001 ... 062 --> drive object number
yyy = 099 --> PROFIBUS parameter back-up file
Byte 2:
255: Incorrect drive object type.
254: Topology comparison unsuccessful -> drive object type was not able to be identified.
Reasons could be:
- incorrect component type in the actual topology
- Component does not exist in the actual topology.
- Component not active.
Additional values:
Only for internal Siemens troubleshooting.
Byte 4, 3:
Only for internal Siemens troubleshooting.

Remedy: - if you have saved the project data using the commissioning software, download the project again. Save using the function "Copy RAM to ROM" or with p0971 = 1. This means that the parameter files are again completely written to the non-volatile memory.
- replace the memory card or Control Unit.

F01039 (A) ACX: Writing to the parameter back-up file was unsuccessful

Reaction: NONE (OFF1, OFF2, OFF3)

Acknowledge: IMMEDIATELY

Cause: Writing to at least one parameter back-up file PSxxxyyy.*** in the non-volatile memory was unsuccessful.
- in the directory /USER/SINAMICS/DATA/ at least one parameter back-up file PSxxxyyy.*** has the "read only" file attribute and cannot be overwritten.
- there is not sufficient free memory space available.
- the non-volatile memory is defective and cannot be written to.
Fault value (r0949, interpret hexadecimal):
dcba hex
a = yyy in the file names PSxxxyyy.***
a = 000 --> consistency back-up file
a = 001 ... 062 --> drive object number
a = 099 --> PROFIBUS parameter back-up file
b = xxx in the file names PSxxxyyy.***
b = 000 --> data save started with p0971 = 1
b = 010 --> data save started with p0971 = 10
b = 011 --> data save started with p0971 = 11
b = 012 --> data save started with p0971 = 12
d, c:
Only for internal Siemens troubleshooting.

Remedy: - check the file attribute of the files (PSxxxyyy.***, CAxxxyyy.***, CCxxxyyy.***) and, if required, change from "read only" to "writeable".
- check the free memory space in the non-volatile memory. Approx. 80 kbyte of free memory space is required for every drive object in the system.
- replace the memory card or Control Unit.

F01040 Save parameter settings and carry out a POWER ON

Reaction: OFF2

Acknowledge: POWER ON

Cause: A parameter has been changed that requires the parameters to be backed up and the Control Unit to be switched OFF and ON again.

Remedy: - Save parameters (p0971).
- carry out a POWER ON (switch-off/switch-on) for the Control Unit.

F01042 Parameter error during project download

Reaction: OFF2 (NONE, OFF1, OFF3)

Acknowledge: IMMEDIATELY

Cause: An error was detected when downloading a project using the commissioning software (e.g. incorrect parameter value).

For the specified parameter, it was detected that dynamic limits were exceeded that may possibly depend on other parameters.

Fault value (r0949, interpret hexadecimal):

ccbbaaaa hex

aaaa = Parameter

bb = Index

cc = fault cause

0: Parameter number illegal.

1: Parameter value cannot be changed.

2: Lower or upper value limit exceeded.

3: Sub-index incorrect.

4: No array, no sub-index.

5: Data type incorrect.

6: Setting not permitted (only resetting).

7: Descriptive element cannot be changed.

9: Descriptive data not available.

11: No master control.

15: No text array available.

17: Task cannot be executed due to operating state.

20: Illegal value.

21: Response too long.

22: Parameter address illegal.

23: Format illegal.

24: Number of values not consistent.

108: Unit unknown.

Additional values:

Only for internal Siemens troubleshooting.

Remedy: - enter the correct value in the specified parameter.
- identify the parameter that restricts the limits of the specified parameter.

F01043 Fatal error at project download

Reaction: OFF2 (OFF1, OFF3)

Acknowledge: IMMEDIATELY

Cause: A fatal error was detected when downloading a project using the commissioning software.

Fault value (r0949, interpret decimal):

1: Device status cannot be changed to Device Download (drive object ON?).

2: Incorrect drive object number.

8: Maximum number of drive objects that can be generated exceeded.

11: Error while generating a drive object (global component).

12: Error while generating a drive object (drive component).

13: Unknown drive object type.

14: Drive status cannot be changed to "ready for operation" (r0947 and r0949).

15: Drive status cannot be changed to drive download.

16: Device status cannot be changed to "ready for operation".

18: A new download is only possible if the factory settings are restored for the drive unit.

20: The configuration is inconsistent.

21: Error when accepting the download parameters.

22: SW-internal download error.

100: The download was canceled, because no write requests were received from the commissioning client (e.g. for communication error).

Additional values:

Only for internal Siemens troubleshooting.

Remedy: - use the current version of the commissioning software.

- modify the offline project and download again (e.g. compare the motor and Power Module in the offline project and on the drive).

- change the drive state (is a drive rotating or is there a message/signal?).

- carefully note any other messages/signals and remove their cause.

- boot from previously saved files (switch-off/switch-on or p0970).

F01044 CU: Descriptive data error

Reaction: OFF2

Acknowledge: POWER ON

Cause: An error was detected when loading the descriptive data saved in the non-volatile memory.

Remedy: Replace the memory card or Control Unit.

A01045 Configuring data invalid

Reaction: NONE

Acknowledge: NONE

Cause: An error was detected when evaluating the parameter files PSxxxyyy.ACX, PTxxxyyy.ACX, CAxxxyyy.ACX, or CCxxxyyy.ACX saved in the non-volatile memory. Because of this, under certain circumstances, several of the saved parameter values were not able to be accepted. Also see r9406 up to r9408.

Alarm value (r2124, interpret hexadecimal):

Only for internal Siemens troubleshooting.

Remedy: - check the parameters displayed in r9406 up to r9408, and correct these if required.

- Restore the factory setting using (p0970 = 1) and re-load the project into the drive unit.

Then save the parameterization in STARTER using the function "Copy RAM to ROM" or with p0971 = 1. This overwrites the incorrect parameter files in the non-volatile memory – and the alarm is withdrawn.

See also: r9406, r9407, r9408

A01049 It is not possible to write to file

Reaction: NONE

Acknowledge: NONE

Cause: It is not possible to write into a write-protected file (PSxxxxxx.acx). The write request was interrupted.
Alarm value (r2124, interpret decimal):
Drive object number.

Remedy: Check whether the "write protected" attribute has been set for the files in the non-volatile memory under .../USER/SINAMICS/DATA/... When required, remove write protection and save again (e.g. set p0971 to 1).

F01054 CU: System limit exceeded

Reaction: OFF2

Acknowledge: IMMEDIATELY

Cause: At least one system overload has been identified.
Fault value (r0949, interpret decimal):
1: Computing time load too high (r9976[1]).
5: Peak load too high (r9976[5]).
Note:
As long as this fault is present, it is not possible to save the parameters (p0971).
See also: r9976 (System utilization)

Remedy: For fault value = 1, 5:
- reduce the computing time load of the drive unit (r9976[1] and r9976[5]) to under 100 %.
- check the sampling times and adjust if necessary (p0115, p0799, p4099).
- deactivate function modules.
- deactivate drive objects.
- remove drive objects from the target topology.
- note the DRIVE-CLiQ topology rules and if required, change the DRIVE-CLiQ topology.

When using the Drive Control Chart (DCC) or free function blocks (FBLOCKS), the following applies:
- the computing time load of the individual run-time groups on a drive object can be read out in r21005 (DCC) or r20005 (FBLOCKS).
- if necessary, the assignment of the run-time group (p21000, p20000) can be changed in order to increase the sampling time (r21001, r20001).
- if necessary, reduce the number of cyclically calculated blocks (DCC) and/or function blocks (FBLOCKS).

A01066 Buffer memory: 70% fill level reached or exceeded

Reaction: NONE

Acknowledge: NONE

Cause: The non-volatile buffer memory for parameter changes is filled to at least 70%.
This can also occur if the buffer memory is active (p0014 = 1) and parameters are continually changed via a fieldbus system.

Remedy: If required, deactivate and clear the buffer memory (p0014 = 0).
If required, clear the buffer memory (p0014 = 2).
In the following cases, the entries in the buffer memory are transferred into the ROM and then the buffer memory is cleared:
- p0971 = 1
- switch-off/switch-on Control Unit

See also: p0014 (Buffer memory mode)

A01067 Buffer memory: 100 % fill level reached

Reaction: NONE

Acknowledge: NONE

Cause: The non-volatile buffer memory for parameter changes is filled to 100%.
All additional parameter changes will no longer be taken into account in the non-volatile buffer memory. However, parameter changes can still be made in the volatile memory (RAM).
This can also occur if the buffer memory is active (p0014 = 1) and parameters are continually changed via a fieldbus system.

Remedy: If required, deactivate and clear the buffer memory (p0014 = 0).
If required, clear the buffer memory (p0014 = 2).
In the following cases, the entries in the buffer memory are transferred into the ROM and then the buffer memory is cleared:
- p0971 = 1
- switch-off/switch-on Control Unit
See also: p0014 (Buffer memory mode)

F01068 CU: Data memory memory overflow

Reaction: OFF2
Acknowledge: IMMEDIATELY
Cause: The utilization for a data memory area is too large.
Fault value (r0949, interpret binary):
Bit 0 = 1: High-speed data memory 1 overloaded
Bit 1 = 1: High-speed data memory 2 overloaded
Bit 2 = 1: High-speed data memory 3 overloaded
Bit 3 = 1: High-speed data memory 4 overloaded
Remedy: - deactivate the function module.
- deactivate drive object.
- remove the drive object from the target topology.

A01069 Parameter backup and device incompatible

Reaction: NONE
Acknowledge: NONE
Cause: The parameter backup on the memory card and the drive unit do not match.
The module boots with the factory settings.
Example:
Devices A and B. are not compatible and a memory card with the parameter backup for device A is inserted in device B.
Remedy: - insert a memory card with compatible parameter backup and carry out a POWER ON.
- insert a memory card without parameter backup and carry out a POWER ON.
- if required, withdraw the memory card and carry out POWER ON.
- save the parameters (p0971 = 1).

F01072 Memory card restored from the backup copy

Reaction: NONE
Acknowledge: IMMEDIATELY
Cause: The Control Unit was switched-off while writing to the memory card. This is why the visible partition became defective.
After switching on, the data from the non-visible partition (backup copy) were written to the visible partition.
Remedy: Check that the firmware and parameterization is up-to-date.

A01073 (N) POWER ON required for backup copy on memory card

Reaction: NONE
Acknowledge: NONE
Cause: The parameter assignment on the visible partition of the memory card has changed.
In order that the backup copy on the memory card is updated on the non-visible partition, it is necessary to carry out a POWER ON or hardware reset (p0972) of the Control Unit.
Note:
It is possible that a new POWER ON is requested via this alarm (e.g. after saving with p0971 = 1).
Remedy: - carry out a POWER ON (power off/on) for the Control Unit.
- carry out a hardware reset (RESET button, p0972).

A01098 RTC: Date and time setting required

Reaction: NONE

Acknowledge: NONE

Cause: The power supply for the Control Unit was interrupted for an extended period. The date and time displayed on the real-time clock are no longer accurate.

Note:

This alarm is only output when p8405 = 1 (factory setting).

See also: p8405 (Activate/deactivate RTC alarm A01098)

Remedy: Set the date and time on the real-time clock.

Note:

RTC: Real-time clock

See also: p8400, p8401

N01101 (A) CU: memory card not available

Reaction: NONE

Acknowledge: NONE

Cause: The memory card is not available for the drive.

Remedy: Insert a memory card.

If Starter is not active, interrupt the USB connection to the PC

F01105 (A) CU: Insufficient memory

Reaction: OFF1

Acknowledge: POWER ON

Cause: Too many data sets are configured on this Control Unit.

Fault value (r0949, interpret decimal):

Only for internal Siemens troubleshooting.

Remedy: - reduce the number of data sets.

F01107 Save to memory card unsuccessful

Reaction: NONE

Acknowledge: IMMEDIATELY

Cause: A data save to the memory card was not able to be successfully carried out.

- Memory card defective
- insufficient space on memory card.

Fault value (r0949, interpret decimal):

1: The file on the RAM was not able to be opened.

2: The file on the RAM was not able to be read.

3: A new directory could not be created on the memory card.

4: A new file could not be created on the memory card.

5: A new file could not be written on the memory card.

Remedy:
- try to save again.
- replace the memory card or Control Unit.

F01112 CU: Power unit not permissible

Reaction: NONE

Acknowledge: IMMEDIATELY

Cause: The connected power unit cannot be used together with this Control Unit.

Fault value (r0949, interpret decimal):

1: Power unit is not supported (e.g. PM340).

Remedy: Replace the power unit that is not permissible by a component that is permissible.

F01120 (A) Terminal initialization has failed

Reaction: OFF1 (OFF2)
Acknowledge: IMMEDIATELY (POWER ON)
Cause: An internal software error occurred while the terminal functions were being initialized.
Fault value (r0949, interpret hexadecimal):
Only for internal Siemens troubleshooting.
Remedy:
- carry out a POWER ON (switch-off/switch-on) for all components.
- upgrade firmware to later version.
- contact Technical Support.
- replace the Control Unit.

F01152 CU: Invalid constellation of drive object types

Reaction: NONE
Acknowledge: POWER ON
Cause: It is not possible to simultaneously operate drive object types SERVO, VECTOR and HLA.
A maximum of 2 of these drive object types can be operated on a Control Unit.
Remedy:
- switch off the unit.
- restrict the use of drive object types SERVO, VECTOR, HLA to a maximum of 2.
- re-commission the unit.

F01205 CU: Time slice overflow

Reaction: OFF2
Acknowledge: POWER ON
Cause: Insufficient computation time.
Fault value (r0949, interpret hexadecimal):
Only for internal Siemens troubleshooting.
Remedy: Contact Technical Support.

F01250 CU: CU-EEPROM incorrect read-only data

Reaction: NONE (OFF2)
Acknowledge: POWER ON
Cause: Error when reading the read-only data of the EEPROM in the Control Unit.
Fault value (r0949, interpret decimal):
Only for internal Siemens troubleshooting.
Remedy:
- carry out a POWER ON.
- replace the Control Unit.

A01251 CU: CU-EEPROM incorrect read-write data

Reaction: NONE
Acknowledge: NONE
Cause: Error when reading the read-write data of the EEPROM in the Control Unit.
Alarm value (r2124, interpret decimal):
Only for internal Siemens troubleshooting.
Remedy: For alarm value r2124 < 256, the following applies:
- carry out a POWER ON.
- replace the Control Unit.

For alarm value r2124 >= 256, the following applies:
- clear the fault memory (p0952 = 0).
- replace the Control Unit.

F01257 CU: Firmware version out of date

Reaction: OFF2
Acknowledge: POWER ON
Cause: The Control Unit firmware is too old.
Fault value (r0949, interpret hexadecimal):
bbbbbbaa hex: aa = unsupported component
aa = 01 hex = 1 dec:
The firmware being used does not support the Control Unit.
aa = 02 hex = 2 dec:
The firmware being used does not support the Control Unit.
aa = 03 hex = 3 dec:
The firmware being used does not support the Power Module.
aa = 04 hex = 4 dec:
The firmware being used does not support the Control Unit.
Remedy: For fault value = 1, 2, 4:
- Upgrade the firmware of the Control Unit.
For fault value = 3:
- Upgrade the firmware of the Control Unit.
- Replace the Power Module by a component that is supported.

F01340 Topology: Too many components on one line

Reaction: NONE
Acknowledge: IMMEDIATELY
Cause: For the selected communications clock cycle, too many DRIVE-CLiQ components are connected to one line of the Control Unit.
Fault value (r0949, interpret hexadecimal):
xyy hex: x = fault cause, yy = component number or connection number.
1yy:
The communications clock cycle of the DRIVE-CLiQ connection on the Control Unit is not sufficient for all read transfers.
2yy:
The communications clock cycle of the DRIVE-CLiQ connection on the Control Unit is not sufficient for all write transfers.
3yy:
Cyclic communication is fully utilized.
4yy:
The DRIVE-CLiQ cycle starts before the earliest end of the application. An additional dead time must be added to the control. Sign-of-life errors can be expected.
The conditions of operation with a current controller sampling time of 31.25 µs have not been maintained.
5yy:
Internal buffer overflow for net data of a DRIVE-CLiQ connection.
6yy:
Internal buffer overflow for receive data of a DRIVE-CLiQ connection.
7yy:
Internal buffer overflow for send data of a DRIVE-CLiQ connection.
8yy:
The component clock cycles cannot be combined with one another
900:
The lowest common multiple of the clock cycles in the system is too high to be determined.
901:
The lowest common multiple of the clock cycles in the system cannot be generated with the hardware.

Remedy: - check the DRIVE-CLiQ wiring.

- reduce the number of components on the DRIVE-CLiQ line involved and distribute these to other DRIVE-CLiQ sockets of the Control Unit. This means that communication is uniformly distributed over several lines.

For fault value = 1yy - 4yy in addition:

- increase the sampling times (p0112, p0115, p4099). If necessary, for DCC or FBLOCKS, change the assignment of the run-time group (p21000, p20000) so that the sampling time (r21001, r20001) is increased.

- if necessary, reduce the number of cyclically calculated blocks (DCC) and/or function blocks (FBLOCKS).

- reduce the function modules (r0108).

- establish the conditions for operation with a current controller sampling time of 31.25 µs (at the DRIVE-CLiQ line, only operate Motor Modules and Sensor Modules with this sampling time and only use a permitted Sensor Module (e.g. SMC20, this means a 3 at the last position of the order number)).

- For an NX, the corresponding Sensor Module for a possibly existing second measuring system should be connected to a free DRIVE-CLiQ socket of the NX.

For fault value = 8yy in addition:

- check the clock cycles settings (p0112, p0115, p4099). Clock cycles on a DRIVE-CLiQ line must be perfect integer multiples of one another. As clock cycle on a line, all clock cycles of all drive objects in the previously mentioned parameters apply, which have components on the line involved.

For fault value = 9yy in addition:

- check the clock cycles settings (p0112, p0115, p4099). The lower the numerical value difference between two clock cycles, the higher the lowest common multiple. This behavior has a significantly stronger influence, the higher the numerical values of the clock cycles.

F01505 (A) BICO: Interconnection cannot be established

Reaction: NONE

Acknowledge: IMMEDIATELY

Cause: A PROFIdrive telegram has been set (p0922).

An interconnection contained in the telegram was not able to be established.

Fault value (r0949, interpret decimal):

Parameter receiver that should be changed.

Remedy: Establish another interconnection.

F01510 BICO: Signal source is not float type

Reaction: NONE

Acknowledge: IMMEDIATELY

Cause: The requested connector output does not have the correct data type. This interconnection is not established.

Fault value (r0949, interpret decimal):

Parameter number to which an interconnection should be made (connector output).

Remedy: Interconnect this connector input with a connector output having a float data type.

F01511 (A) BICO: Interconnection with different scalings

Reaction: NONE

Acknowledge: IMMEDIATELY

Cause: The requested BICO interconnection was established. However, a conversion is made between the BICO output and BICO input using the reference values.

- the BICO output has different normalized units than the BICO input.

- message only for interconnections within a drive object.

Example:

The BICO output has, as normalized unit, voltage and the BICO input has current.

This means that the factor p2002/p2001 is calculated between the BICO output and the BICO input.

p2002: contains the reference value for current

p2001: contains the reference value for voltage

Fault value (r0949, interpret decimal):

Parameter number of the BICO input (signal sink).

Remedy: Not necessary.

F01512 BICO: No scaling available

Reaction: OFF2

Acknowledge: POWER ON

Cause: An attempt was made to determine a conversion factor for a scaling that does not exist.

Fault value (r0949, interpret decimal):

Unit (e.g. corresponding to SPEED) for which an attempt was made to determine a factor.

Remedy: Apply scaling or check the transfer value.

F01513 (N, A) BICO: Interconnection cross DO with different scalings

Reaction: NONE

Acknowledge: IMMEDIATELY

Cause: The requested BICO interconnection was established. However, a conversion is made between the BICO output and BICO input using the reference values.

An interconnection is made between different drive objects and the BICO output has different normalized units than the BICO input or the normalized units are the same but the reference values are different.

Example 1:

BICO output with voltage normalized unit, BICO input with current normalized unit, BICO output and BICO input lie in different drive objects. This means that the factor p2002/p2001 is calculated between the BICO output and the BICO input.

p2002: contains the reference value for current

p2001: contains the reference value for voltage

Example 2:

BICO output with voltage normalized unit in drive object 1 (DO1), BICO input with voltage normalized unit in drive object 2 (DO2). The reference values for voltage (p2001) of the two drive objects have different values. This means that the factor p2001(DO1)/p2001(DO2) is calculated between the BICO output and the BICO input.

p2001: contains the reference value for voltage, drive objects 1, 2

Fault value (r0949, interpret decimal):

Parameter number of the BICO input (signal sink).

Remedy: Not necessary.

A01514 (F) BICO: Error when writing during a reconnect

Reaction: NONE

Acknowledge: NONE

Cause: During a reconnect operation (e.g. while booting or downloading - but can also occur in normal operation) a parameter was not able to be written to.

Example:

When writing to BICO input with double word format (DWORD), in the second index, the memory areas overlap (e.g. p8861). The parameter is then reset to the factory setting.

Alarm value (r2124, interpret decimal):

Parameter number of the BICO input (signal sink).

Remedy: Not necessary.

F01515 (A) BICO: Writing to parameter not permitted as the master control is active

Reaction: NONE
Acknowledge: IMMEDIATELY
Cause: When changing the number of CDS or when copying from CDS, the master control is active.
Remedy: If required, return the master control and repeat the operation.

A01590 (F) Drive: Motor maintenance interval expired

Reaction: NONE
Acknowledge: NONE
Cause: The selected service/maintenance interval for this motor was reached.
Alarm value (r2124, interpret decimal):
Motor data set number.
See also: p0650, p0651
Remedy: carry out service/maintenance and reset the service/maintenance interval (p0651).

F01662 Error internal communications

Reaction: OFF2
Acknowledge: POWER ON
Cause: A module-internal communication error has occurred.
Fault value (r0949, interpret hexadecimal):
Only for internal Siemens troubleshooting.
Remedy: - carry out a POWER ON (switch-off/switch-on).
- check the electrical cabinet design and cable routing for EMC compliance
- check whether an impermissible voltage is connected at one of the digital outputs.
- check whether a digital output is loaded with an impermissible current.
- upgrade firmware to later version.
- contact Technical Support.

A01900 (F) PROFIBUS: Configuration telegram error

Reaction: NONE
Acknowledge: NONE
Cause: A PROFIBUS master attempts to establish a connection using an incorrect configuring telegram.
Alarm value (r2124, interpret decimal):
2: Too many PZD data words for input or output. The number of possible PZD is specified by the number of indices in r2050/p2051.
3: Uneven number of bytes for input or output.
211: Unknown parameterizing block.
Additional values:
Only for internal Siemens troubleshooting.
Remedy: Check the bus configuration on the master and the slave sides.
For alarm value = 2:
Check the number of data words for input and output.
For alarm value = 211:
Ensure offline version <= online version.

F01910 (N, A) Fieldbus interface setpoint timeout

Reaction: OFF3 (IASC/DCBRK, NONE, OFF1, OFF2, STOP2)
Acknowledge: IMMEDIATELY

Cause: The reception of setpoints from the fieldbus interface has been interrupted.
- bus connection interrupted.
- communication partner switched off.
CU230P-2 DP:
- PROFIBUS master set into the STOP state.
See also: p2040, p2047

Remedy: Ensure bus connection has been established and switch on communication partner.
CU230P-2 BT, CU230P-2 HVAC:
- if required, adapt p2040.
CU230P-2 DP:
- set the PROFIBUS master to the RUN state.
- if the error is repeated, check the set response monitoring in the bus configuration (HW Config).
- slave redundancy: For operation on a Y link, it must be ensured that "DP alarm mode = DPV1" is set in the slave parameterization.

A01920 (F) PROFIBUS: Interruption cyclic connection

Reaction: NONE
Acknowledge: NONE
Cause: The cyclic connection to the PROFIBUS master is interrupted.
Remedy: Establish the PROFIBUS connection and activate the PROFIBUS master in the cyclic mode.
Note:
If there is no communication to a higher-level control system, then p2030 should be set = 0 to suppress this message.
See also: p2030 (Field bus interface protocol selection)

A01945 PROFIBUS: Connection to the Publisher failed

Reaction: NONE
Acknowledge: NONE
Cause: For PROFIBUS peer-to-peer data transfer, the connection to at least one Publisher has failed.
Alarm value (r2124, interpret binary):
Bit 0 = 1: Publisher with address in r2077[0], connection failed.
...
Bit 15 = 1: Publisher with address in r2077[15], connection failed.
Remedy: Check the PROFIBUS cables.
See also: r2077 (PROFIBUS diagnostics peer-to-peer data transfer addresses)

F01946 (A) PROFIBUS: Connection to the Publisher aborted

Reaction: OFF1 (NONE, OFF2, OFF3)
Acknowledge: IMMEDIATELY (POWER ON)
Cause: The connection to at least one Publisher for PROFIBUS peer-to-peer data transfer in cyclic operation has been aborted.
Fault value (r0949, interpret binary):
Bit 0 = 1: Publisher with address in r2077[0], connection aborted.
...
Bit 15 = 1: Publisher with address in r2077[15], connection aborted.
Remedy: - check the PROFIBUS cables.
- check the state of the Publisher that has the aborted connection.
See also: r2077 (PROFIBUS diagnostics peer-to-peer data transfer addresses)

A02150 OA: Application cannot be loaded

Reaction: NONE
Acknowledge: NONE

Cause: The system was not able to load an OA application.
Alarm value (r2124, interpret hexadecimal):
16:
The interface version in the DCB user library is not compatible to the DCC standard library that has been loaded.
Only for internal Siemens troubleshooting.

Remedy: - carry out a POWER ON (switch-off/switch-on) for all components.
- upgrade firmware to later version.
- contact Technical Support.
For alarm value = 16:
Load a compatible DCB user library (compatible to the interface of the DCC standard library).
Note:
OA: Open Architecture
DCB: Drive Control Block
DCC: Drive Control Chart
See also: r4950, r4955, p4956, r4957

F02151 (A) OA: Internal software error

Reaction: OFF2 (NONE, OFF1, OFF3)

Acknowledge: IMMEDIATELY (POWER ON)

Cause: An internal software error has occurred within an OA application.
Fault value (r0949, interpret hexadecimal):
Only for internal Siemens troubleshooting.

Remedy: - carry out a POWER ON (switch-off/switch-on) for all components.
- upgrade firmware to later version.
- contact Technical Support.
- replace the Control Unit.
Note:
OA: Open Architecture
See also: r4950, r4955, p4956, r4957

F02152 (A) OA: Insufficient memory

Reaction: OFF1

Acknowledge: IMMEDIATELY (POWER ON)

Cause: Too many functions have been configured on this Control Unit (e.g. too many drives, function modules, data sets, OA applications, blocks, etc.).
Fault value (r0949, interpret decimal):
Only for internal Siemens troubleshooting.

Remedy: - change the configuration on this Control Unit (e.g. fewer drives, function modules, data sets, OA applications, blocks, etc.).
- use an additional Control Unit.
Note:
OA: Open Architecture

F03000 NVRAM fault on action

Reaction: NONE

Acknowledge: IMMEDIATELY

Cause: A fault occurred during execution of action p7770 = 1 or 2 for the NVRAM data.
Fault value (r0949, interpret hexadecimal):
yyxx hex: yy = fault cause, xx = application ID
yy = 1:
The action p7770 = 1 is not supported by this version if Drive Control Chart (DCC) is activated for the drive object concerned.
yy = 2:
The data length of the specified application is not the same in the NVRAM and the backup.
yy = 3:
The data checksum in p7774 is not correct.
yy = 4:
No data available to load.

Remedy: - Perform the remedy according to the results of the troubleshooting.
- if necessary, start the action again.

F03001 NVRAM checksum incorrect

Reaction: NONE

Acknowledge: IMMEDIATELY

Cause: A checksum error occurred when evaluating the non-volatile data (NVRAM) on the Control Unit.
The NVRAM data affected was deleted.

Remedy: Carry out a POWER ON (switch-off/switch-on) for all components.

F03505 (N, A) Analog input wire breakage

Reaction: OFF1 (NONE, OFF2)

Acknowledge: IMMEDIATELY (POWER ON)

Cause: The wire-break monitoring for an analog input has responded.
The input value of the analog input has undershot the threshold value parameterized in p0761[0...3].
p0756[0]: Analog input 0
p0756[1]: Analog input 1
p0756[2]: Analog input 2
Fault value (r0949, interpret decimal):
yxxx dec
y = analog input (0 = analog input 0 (AI 0), 1 = analog input 1 (AI 1), 2 = analog input 2 (AI 2))
xxx = component number (p0151)
Note:
For the following analog input type, the wire breakage monitoring is active:
p0756[0...1] = 1 (2 ... 10 V with monitoring)
p0756[0...2] = 3 (4 ... 20 mA with monitoring)

Remedy: - Check the connection to the signal source for interruptions.
- check the magnitude of the injected current - it is possible that the infed signal is too low.
Note:
The input current measured by the analog input can be read in r0752[x].

A03510 (F, N) Calibration data not plausible

Reaction: NONE

Acknowledge: NONE

Cause: During booting, the calibration data for the analog inputs is read and checked with respect to plausibility.
At least one calibration data point was determined to be invalid.

Remedy: - switch-off/switch-on the power supply for the Control Unit.
Note:
If it reoccurs, then replace the module.
In principle, operation could continue.
The analog channel involved possibly does not achieve the specified accuracy.

A03520 (F, N) Temperature sensor fault

Reaction: NONE
Acknowledge: NONE
Cause: When evaluating the temperature sensor, an error occurred.
It is expected that one of the following temperature sensors is connected via an analog input:
- LG-Ni1000 (p0756[2...3] = 6)
- PT1000 (p0756[2...3] = 7)
- DIN Ni 1k (p0756[2...3] = 10)
Alarm value (r2124, interpret decimal):
33: Analog input 2 (AI2) wire breakage or sensor not connected.
34: Analog input 2 (AI2) measured resistance too low (short circuit).
49: Analog input 3 (AI3) wire breakage or sensor not connected.
50: Analog input 3 (AI3) measured resistance too low (short circuit).
See also: p0756 (CU analog inputs type)
Remedy: - make sure that the sensor is connected correctly.
- check the sensor for correct function and if required, replace.
- change over the analog input to type "no sensor connected" (p0756 = 8).

A05000 (N) Power unit: Overtemperature heat sink AC inverter

Reaction: NONE
Acknowledge: NONE
Cause: The alarm threshold for overtemperature at the inverter heat sink has been reached. The response is set using p0290.
If the heat sink temperature exceeds the value set in p0292[0], then fault F30004 is output.
Remedy: Check the following:
- is the ambient temperature within the defined limit values?
- have the load conditions and the load duty cycle been appropriately dimensioned?
- has the cooling failed?

A05001 (N) Power unit: Overtemperature depletion layer chip

Reaction: NONE
Acknowledge: NONE
Cause: Alarm threshold for overtemperature of the power semiconductor in the AC converter has been reached.
Note:
- the response is set using p0290.
- if the temperature of the barrier layer increases by the value set in p0292[1], then fault F30025 is initiated.
Remedy: Check the following:
- is the ambient temperature within the defined limit values?
- have the load conditions and the load duty cycle been appropriately dimensioned?
- has the cooling failed?
- pulse frequency too high?
See also: r0037, p0290

A05002 (N) Power unit: Air intake overtemperature

Reaction: NONE

Acknowledge: NONE

Cause: For chassis power units, the following applies:

The alarm threshold for the air intake overtemperature has been reached. For air-cooled power units, the threshold is 42 °C (hysteresis 2 K). The response is set using p0290.

If the air intake temperature increases by an additional 13 K, then fault F30035 is output.

Remedy: Check the following:

- is the ambient temperature within the defined limit values?
- has the fan failed? Check the direction of rotation.

A05003 (N) Power unit: Internal overtemperature

Reaction: NONE

Acknowledge: NONE

Cause: For chassis power units, the following applies:

The alarm threshold for internal overtemperature has been reached.

If the temperature inside the power unit increases by an additional 5 K, then fault F30036 is triggered.

Remedy: Check the following:

- is the ambient temperature within the defined limit values?
- has the fan failed? Check the direction of rotation.

A05004 (N) Power unit: Rectifier overtemperature

Reaction: NONE

Acknowledge: NONE

Cause: The alarm threshold for the overtemperature of the rectifier has been reached. The response is set using p0290.

If the temperature of the rectifier increases by an additional 5 K, then fault F30037 is triggered.

Remedy: Check the following:

- is the ambient temperature within the defined limit values?
- have the load conditions and the load duty cycle been appropriately dimensioned?
- has the fan failed? Check the direction of rotation.
- has a phase of the line supply failed?
- is an arm of the supply (incoming) rectifier defective?

A05006 (N) Power unit: Overtemperature thermal model

Reaction: NONE

Acknowledge: NONE

Cause: The temperature difference between the chip and heat sink has exceeded the permissible limit value (blocksize power units only).

Depending on p0290, an appropriate overload response is initiated.

See also: r0037

Remedy: Not necessary.

The alarm disappears automatically once the limit value is undershot.

Note:

If the alarm does not disappear automatically and the temperature continues to rise, this can result in fault F30024.

See also: p0290

A05065 (F, N) Voltage measured values not plausible

Reaction: NONE

Acknowledge: NONE

Cause: The voltage measurement does not supply any plausible values and is not used.
Alarm value (r2124, interpret bitwise binary):
Bit 1: Phase U
Bit 2: Phase V
Bit 3: Phase W

Remedy: The following parameterization must be made in order to deactivate the alarm:
- Deactivate voltage measurement (p0247.0 = 0).
- Deactivate flying restart with voltage measurement (p0247.5 = 0) and deactivate fast flying restart (p1780.11 = 0).

F06310 (A) Supply voltage (p0210) incorrectly parameterized

Reaction: NONE (OFF1, OFF2)

Acknowledge: IMMEDIATELY (POWER ON)

Cause: The measured DC voltage lies outside the tolerance range after precharging has been completed.
Permissible range:
1.16 * p0210 < r0070 < 1.6 * p0210
Note:
The fault can only be acknowledged when the drive is switched off.
See also: p0210 (Drive unit line supply voltage)

Remedy: - check the parameterized supply voltage and if required change (p0210).
- check the line supply voltage.
See also: p0210 (Drive unit line supply voltage)

F07011 Drive: Motor overtemperature

Reaction: OFF2 (NONE, OFF1, OFF3, STOP2)

Acknowledge: IMMEDIATELY

Cause: KTY84/PT1000:
The motor temperature has exceeded the fault threshold (p0605) or a timer after the alarm threshold was exceeded (p0604) has expired. The response parameterized in p0610 becomes active. The alarm is withdrawn if the response threshold for wire breakage or sensor not connected is exceeded (R > 2120 Ohm).
PTC or bimetallic NC contact:
The response threshold of 1650 Ohm was exceeded or the NC contact opened and a timer has expired. The response parameterized in p0610 becomes active.
Possible causes:
- motor is overloaded.
- motor ambient temperature too high.
- wire breakage or sensor not connected.
Fault value (r0949, interpret decimal):
200:
Motor temperature model 1 (I2t): temperature too high.
See also: p0351, p0604, p0605, p0606, p0612, p0613, p0617, p0618, p0619, p0625, p0626, p0627, p0628

Remedy: - reduce the motor load.
- check the ambient temperature and the motor ventilation.
- check the wiring and the connection of the PTC or bimetallic NC contact.
See also: p0351, p0604, p0605, p0606, p0612, p0617, p0618, p0619, p0625, p0626, p0627, p0628

A07012 (N) Drive: Motor temperature model 1/3 overtemperature

Reaction: NONE

Acknowledge: NONE

Cause: The motor temperature model 1/3 identified that the alarm threshold was exceeded.
Hysteresis:2K.
Alarm value (r2124, interpret decimal):
200:
Motor temperature model 1 (I2t): temperature too high.
300:
Motor temperature model 3: temperature too high.
See also: r0034, p0351, p0605, p0611, p0612, p0613

Remedy: - check the motor load and if required, reduce.
- check the motor ambient temperature.
- check activation of the motor temperature model (p0612).
Motor temperature model 1 (I2t):
- check the thermal time constant (p0611).
- check alarm threshold.
Motor temperature model 3:
- check the motor type.
- check alarm threshold.
- check the model parameters.
See also: r0034, p0351, p0605, p0611, p0612, r5397

A07014 (N) Drive: Motor temperature model configuration alarm

Reaction: NONE
Acknowledge: NONE
Cause: A fault has occurred in the configuration of the motor temperature model.
Alarm value (r2124, interpret decimal):
1:
All motor temperature models: It is not possible to save the model temperature
See also: p0610 (Motor overtemperature response)

Remedy: - set the response for motor overtemperature to "Alarm and fault, no reduction of I_max" (p0610 = 2).
See also: p0610 (Motor overtemperature response)

A07015 Drive: Motor temperature sensor alarm

Reaction: NONE
Acknowledge: NONE
Cause: An error was detected when evaluating the temperature sensor set in p0601.
With the fault, the time in p0607 is started. If the fault is still present after this time has expired, then fault F07016 is output; however, at the earliest, 50 ms after alarm A07015.
Possible causes:
- wire breakage or sensor not connected (KTY: R > 2120 Ohm, PT1000: R > 2120 Ohm).
- measured resistance too low (PTC: R < 20 Ohm, KTY: R < 50 Ohm, PT1000: R < 603 Ohm).

Remedy: - make sure that the sensor is connected correctly.
- check the parameterization (p0601).
See also: r0035, p0601, p0607

F07016 Drive: Motor temperature sensor fault

Reaction: OFF1 (NONE, OFF2, OFF3, STOP2)
Acknowledge: IMMEDIATELY

Cause: An error was detected when evaluating the temperature sensor set in p0601.

Possible causes:

- wire breakage or sensor not connected (KTY: R > 2120 Ohm, PT1000: R > 2120 Ohm).
- measured resistance too low (PTC: R < 20 Ohm, KTY: R < 50 Ohm, PT1000: R < 603 Ohm).

Note:

If alarm A07015 is present, the time in p0607 is started. If the fault is still present after this time has expired, then fault F07016 is output; however, at the earliest, 50 ms after alarm A07015.

See also: p0607 (Temperature sensor fault timer)

Remedy:

- make sure that the sensor is connected correctly.
- check the parameterization (p0601).
- induction motors: Deactivate temperature sensor fault (p0607 = 0).

See also: r0035, p0601, p0607

F07080 Drive: Incorrect control parameter

Reaction: NONE

Acknowledge: IMMEDIATELY (POWER ON)

Cause: The closed-loop control parameters have been parameterized incorrectly (e.g. p0356 = L_spread = 0).

Fault value (r0949, interpret decimal):

The fault value includes the parameter number involved.

See also: p0310, p0311, p0341, p0344, p0350, p0354, p0356, p0357, p0358, p0360, p0400, p0640, p1082, p1300

Remedy: Modify the parameter indicated in the fault value (r0949) (e.g. p0640 = current limit > 0).

See also: p0311, p0341, p0344, p0350, p0354, p0356, p0358, p0360, p0400, p0640, p1082

F07082 Macro: Execution not possible

Reaction: NONE

Acknowledge: IMMEDIATELY

Cause: The macro cannot be executed.
Fault value (r0949, interpret hexadecimal):
ccccbbaa hex:
cccc = preliminary parameter number, bb = supplementary information, aa = fault cause
Fault causes for the trigger parameter itself:
19: Called file is not valid for the trigger parameter.
20: Called file is not valid for parameter 15.
21: Called file is not valid for parameter 700.
22: Called file is not valid for parameter 1000.
23: Called file is not valid for parameter 1500.
24: Data type of a TAG is incorrect (e.g. Index, number or bit is not U16).
Fault causes for the parameters to be set:
25: Error level has an undefined value.
26: Mode has an undefined value.
27: A value was entered as string in the tag value that is not "DEFAULT".
31: Entered drive object type unknown.
32: A device was not able to be found for the determined drive object number.
34: A trigger parameter was recursively called.
35: It is not permissible to write to the parameter via macro.
36: Check, writing to a parameter unsuccessful, parameter can only be read, not available, incorrect data type, value range or assignment incorrect.
37: Source parameter for a BICO interconnection was not able to be determined.
38: An index was set for a non-indexed (or CDS-dependent) parameter.
39: No index was set for an indexed parameter.
41: A bit operation is only permissible for parameters with the parameter format DISPLAY_BIN.
42: A value not equal to 0 or 1 was set for a BitOperation.
43: Reading the parameter to be changed by the BitOperation was unsuccessful.
51: Factory setting for DEVICE may only be executed on the DEVICE.
61: The setting of a value was unsuccessful.

Remedy: - check the parameter involved.
- check the macro file and BICO interconnection.
See also: p0015, p0700, p1000, p1500

F07083 Macro: ACX file not found

Reaction: NONE
Acknowledge: IMMEDIATELY
Cause: The ACX file (macro) to be executed was not able to be found in the appropriate directory.
Fault value (r0949, interpret decimal):
Parameter number with which the execution was started.
See also: p0015, p0700, p1000, p1500
Remedy: - check whether the file is saved in the appropriate directory on the memory card.

F07084 Macro: Condition for WaitUntil not fulfilled

Reaction: NONE
Acknowledge: IMMEDIATELY
Cause: The WaitUntil condition set in the macro was not fulfilled in a certain number of attempts.
Fault value (r0949, interpret decimal):
Parameter number for which the condition was set.
Remedy: Check and correct the conditions for the WaitUntil loop.

F07086 Units changeover: Parameter limit violation due to reference value change

Reaction: NONE

Acknowledge: IMMEDIATELY

Cause: A reference parameter was changed in the system. This resulted in the fact that for the parameters involved, the selected value was not able to be written in the per unit notation.

The values of the parameters were set to the corresponding violated minimum limit/maximum limit or to the factory setting.

Possible causes:

- the steady-state minimum limit/maximum limit or that defined in the application was violated.

Fault value (r0949, parameter):

Diagnostics parameter to display the parameters that were not able to be re-calculated.

See also: p0304, p0305, p0310, p0596, p2000, p2001, p2002, p2003, r2004

Remedy: Check the adapted parameter value and if required correct.

See also: r9450 (Reference value change parameter with unsuccessful calculation)

F07088 Units changeover: Parameter limit violation due to units changeover

Reaction: NONE

Acknowledge: IMMEDIATELY

Cause: A changeover of units was initiated. This resulted in a violation of a parameter limit

Possible causes for the violation of a parameter limit:

- When rounding off a parameter corresponding to its decimal places, the steady-state minimum limit or maximum limit was violated.

- inaccuracies for the data type "FloatingPoint".

In these cases, when the minimum limit is violated then the parameter value is rounded up and when the maximum limited is violated the parameter value is rounded down.

Fault value (r0949, interpret decimal):

Diagnostics parameter r9451 to display all parameters whose value had to be adapted.

See also: p0100, p0505, p0595

Remedy: Check the adapted parameter values and if required correct.

See also: r9451 (Units changeover adapted parameters)

A07089 Changing over units: Function module activation is blocked because the units have been changed over

Reaction: NONE

Acknowledge: NONE

Cause: An attempt was made to activate a function module. This is not permissible if the units have already been changed over.

See also: p0100, p0505

Remedy: Restore units that have been changed over to the factory setting.

A07094 General parameter limit violation

Reaction: NONE

Acknowledge: NONE

Cause: As a result of the violation of a parameter limit, the parameter value was automatically corrected.

Minimum limit violated --> parameter is set to the minimum value.

Maximum limit violated --> parameter is set to the maximum value.

Alarm value (r2124, interpret decimal):

Parameter number, whose value had to be adapted.

Remedy: Check the adapted parameter values and if required correct.

A07200 Drive: Master control ON command present

Reaction: NONE

Acknowledge: NONE

Cause: The ON/OFF1 command is present (no 0 signal).
The command is either influenced via binector input p0840 (current CDS) or control word bit 0 via the master control.

Remedy: Switch the signal via binector input p0840 (current CDS) or control word bit 0 via the master control to 0.

F07220 (N, A) Drive: Master control by PLC missing

Reaction: OFF1 (NONE, OFF2, OFF3, STOP2)

Acknowledge: IMMEDIATELY

Cause: The "master control by PLC" signal was missing in operation.
- interconnection of the binector input for "master control by PLC" is incorrect (p0854).
- the higher-level control has withdrawn the "master control by PLC" signal.
- data transfer via the fieldbus (master/drive) was interrupted.

Remedy: - check the interconnection of the binector input for "master control by PLC" (p0854).
- check the "master control by PLC" signal and, if required, switch in.
- check the data transfer via the fieldbus (master/drive).
Note:
If the drive should continue to operate after withdrawing "master control by PLC" then fault response must be parameterized to NONE or the message type should be parameterized as alarm.

F07300 (A) Drive: Line contactor feedback signal missing

Reaction: OFF2 (NONE)

Acknowledge: IMMEDIATELY

Cause: - the line contactor was not able to be closed within the time in p0861.
- the line contactor was not able to be opened within the time in p0861.
- the line contactor dropped out during operation
- the line contactor has closed although the drive converter is switched off.

Remedy: - check the setting of p0860.
- check the feedback circuit from the line contactor.
- increase the monitoring time in p0861.
See also: p0860, p0861

F07311 Bypass motor switch

Reaction: OFF2

Acknowledge: IMMEDIATELY

Cause: Fault value (r0949, interpret bitwise binary):
Bit 1: Switch "Closed" feedback signal missing.
Bit 2: Switch "Open" feedback signal missing.
Bit 3: Switch feedback signal too slow.
After switching, the system waits for the positive feedback signal. If the feedback signal is received later than the specified time, then a fault trip (shutdown) is issued.
Bit 6: Drive switch feedback signal not consistent with the bypass state.
The drive switch is closed when switching-on or when switching-in the motor.
See also: p1260, r1261, p1266, p1267, p1269, p1274

Remedy: - check the transfer of the feedback signals.
- check the switch.

F07312 Bypass Line Side Switch:

Reaction: OFF2

Acknowledge: IMMEDIATELY

Cause: Fault value (r0949, interpret bitwise binary):

Bit 1: Switch "Closed" feedback signal missing.

Bit 2: Switch "Open" feedback signal missing.

Bit 3: Switch feedback signal too slow.

After switching, the system waits for the positive feedback signal. If the feedback signal is received later than the specified time, then a fault trip (shutdown) is issued.

Bit 6: Line Side Switch feedback signal not consistent with the bypass state.

When switching-on or when switching-in the motor, the line side switch is closed without this having been requested from the bypass.

See also: p1260, r1261, p1266, p1267, p1269, p1274

Remedy: - check the transfer of the feedback signals.

- check the switch.

F07320 Drive: Automatic restart interrupted

Reaction: OFF2

Acknowledge: IMMEDIATELY

Cause: - the specified number of restart attempts (p1211) has been completely used up because within the monitoring time (p1213) the faults were not able to be acknowledged. The number of restart attempts (p1211) is decremented at each new start attempt.

- the monitoring time for the power unit has expired (p0857).

- when exiting commissioning or at the end of the motor identification routine or the speed controller optimization, the drive unit is not automatically switched on again.

Fault value (r0949, interpret hexadecimal):

Only for internal Siemens troubleshooting.

Remedy: - increase the number of restart attempts (p1211). The actual number of starting attempts is displayed in r1214.

- increase the delay time in p1212 and/or the monitoring time in p1213.

- either increase or disable the monitoring time of the power unit (p0857).

- reduce the delay time to reset the start counter (p1213[1]) so that fewer faults are registered in the time interval.

A07321 Drive: Automatic restart active

Reaction: NONE

Acknowledge: NONE

Cause: The automatic restart (AR) is active. When the line supply returns and/or the causes of the existing faults are removed the drive is automatically restarted. The pulses are enabled and the motor starts to rotate.

For p1210 = 26, restarting is realized with the delayed setting of the ON command.

Remedy: - the automatic restart (AR) should, if required, be inhibited (p1210 = 0).

- an automatic restart can be directly interrupted by withdrawing the switch-on command (BI: p0840).

- for p1210 = 26: by withdrawing the OFF2- / OFF3 command.

A07325 Drive: Hibernation mode active - drive automatically switched-on again

Reaction: NONE

Acknowledge: NONE

Cause: The "hibernation" function is active (p2398). The drive automatically powers itself up again as soon as the restart conditions are present.

See also: p2398, r2399

Remedy: Not necessary.

The alarm is automatically withdrawn when the motor is restarted or when the motor is manually switched off.

F07330 Flying restart: Measured search current too low

Reaction: OFF2 (NONE, OFF1)

Acknowledge: IMMEDIATELY

Cause: During a flying restart, it was identified that the search current reached is too low.
It is possible that the motor is not connected.

Remedy: Check the motor feeder cables.

F07331 Flying restart: Function not supported

Reaction: OFF2 (NONE, OFF1)

Acknowledge: IMMEDIATELY

Cause: It is not possible to power up with the motor rotating (no flying restart).
In the following cases, the "flying restart" function is not supported:
PMSM: operation with U/f characteristic and sensorless vector control.
Note:
PMSM: permanent-magnet synchronous motor

Remedy: Deactivate the "flying restart" function (p1200 = 0).

F07332 Flying restart: maximum speed reduced

Reaction: OFF2 (NONE, OFF1)

Acknowledge: IMMEDIATELY

Cause: The maximum speed that can be reached is reduced; at very high speeds problems associated with the flying restart can be encountered.
Possible causes:
- power ratio, power unit/motor too high

Remedy: Parameter changes are not required.
Note:
A flying restart at speeds above 3000 rpm should be avoided.

A07352 Drive: Limit switch signals not plausible

Reaction: NONE

Acknowledge: NONE

Cause: Limit switch signals are not plausible.
Possible causes:
- BICO interconnections are not OK (p3342, p3343).
- sensors are not supplying a valid signal (both supply a 0 signal).

Remedy: - check the BICO interconnections for the limit switch signals.
- check the sensors.
See also: p3342, p3343

A07353 Drive: DC quantity control deactivated

Reaction: NONE

Acknowledge: NONE

Cause: The DC quantity control has deactivated itself.
The manipulated variable of the DC quantity control was at its limit.

Remedy: Optimize the DC quantity controller (Kp, Tn, bandwidth, PT2 filter).
Note:
After changing the corresponding parameters, the DC quantity control is re-enabled and the alarm is automatically withdrawn.
See also: p3857, p3858

F07390 Drive: DC link capacitor forming fault

Reaction: OFF2

Acknowledge: IMMEDIATELY

Cause: The "DC link capacitor forming" function was canceled with fault (r3382.3 = 1). The expected DC link voltage is out of tolerance.
See also: p3380, r3382

Remedy: - check drive device (supply voltage, terminals, ...).
- set activation/duration again (p3380 > 0).
- restart forming (p0840 = 0/1 signal).

A07391 Drive: DC link capacitor forming active

Reaction: NONE
Acknowledge: NONE
Cause: The "DC link capacitor forming" function is active. The remaining time of the operation is displayed in parameter r3381.
See also: p3380 (Forming activation/duration)
Remedy: Not necessary.
The alarm is automatically withdrawn after forming has been completed (r3382.2 = 1).
See also: r3382 (Forming status word)

A07400 (N) Drive: DC link voltage maximum controller active

Reaction: NONE
Acknowledge: NONE
Cause: The DC link voltage controller has been activated because the upper switch-in threshold has been exceeded (r1242, r1282).
The ramp-down times are automatically increased in order to maintain the DC link voltage (r0070) within the permissible limits. There is a system deviation between the setpoint and actual speeds.
When the DC link voltage controller is switched out (disabled), this is the reason that the ramp-function generator output is set to the speed actual value.
See also: r0056, p1240, p1280
Remedy: If the controller is not to intervene:
- increase the ramp-down times.
- switch off the Vdc_max controller (p1240 = 0 for vector control, p1280 = 0 for U/f control).
If the ramp-down times are not to be changed:
- use a chopper or regenerative feedback unit.

A07401 (N) Drive: DC link voltage maximum controller deactivated

Reaction: NONE
Acknowledge: NONE
Cause: The Vdc_max controller can no longer maintain the DC link voltage (r0070) below the limit value (r1242, r1282) and was therefore switched out (disabled).
- the line supply voltage is permanently higher than specified for the power unit.
- the motor is permanently in the regenerative mode as a result of a load that is driving the motor.
Remedy: - check whether the input voltage is within the permissible range (if required, increase the value in p0210).
- check whether the load duty cycle and load limits are within the permissible limits.

A07402 (N) Drive: DC link voltage minimum controller active

Reaction: NONE
Acknowledge: NONE
Cause: The DC link voltage controller has been activated as the lower switch-in threshold has been undershot (r1246, r1286).
The kinetic energy of the motor is used to buffer the DC link. The drive is therefore braked.
See also: r0056, p1240, p1280
Remedy: The alarm disappears when power supply returns.

F07405 (N, A) Drive: Kinetic buffering minimum speed fallen below

Reaction: OFF2 (IASC/DCBRK, NONE, OFF1, OFF3, STOP2)

Acknowledge: IMMEDIATELY

Cause: During kinetic buffering the speed fell below minimum speed (p1257 or p1297 for vector drives with U/f control) and the line supply did not return.

Remedy: Check the speed threshold for the Vdc_min controller (kinetic buffering) (p1257, p1297).

See also: p1257, p1297

F07406 (N, A) Drive: Kinetic buffering maximum time exceeded

Reaction: OFF3 (IASC/DCBRK, NONE, OFF1, OFF2, STOP2)

Acknowledge: IMMEDIATELY

Cause: The maximum buffer time (p1255 and p1295 for vector drives with U/f control) has been exceeded without the line supply having returned.

Remedy: Check the time threshold for Vdc-min controller (kinetic buffering) (p1255, p1295).

See also: p1255, p1295

A07409 (N) Drive: U/f control, current limiting controller active

Reaction: NONE

Acknowledge: NONE

Cause: The current limiting controller of the U/f control was activated because the current limit was exceeded.

Remedy: The alarm is automatically withdrawn after one of the following measures:

- increase current limit (p0640).
- reduce the load.
- slow down the ramp up to the setpoint speed.

F07410 Drive: Current controller output limited

Reaction: OFF2 (NONE, OFF1)

Acknowledge: IMMEDIATELY

Cause: The condition "I_act = 0 and Uq_set_1 longer than 16 ms at its limit" is present and can be caused by the following:

- motor not connected or motor contactor open.
- motor data and motor configuration (star-delta) do not match.
- no DC link voltage present.
- power unit defective.
- the "flying restart" function is not activated.

Remedy:

- connect the motor or check the motor contactor.
- check the motor parameterization and the connection type (star-delta).
- check the DC link voltage (r0070).
- check the power unit.
- activate the "flying restart" function (p1200).

F07411 Drive: Flux setpoint not reached when building up excitation

Reaction: OFF2

Acknowledge: IMMEDIATELY

Cause: When quick magnetizing is configured (p1401.6 = 1) the specified flux setpoint is not reached although 90% of the maximum current is specified.
- incorrect motor data.
- motor data and motor configuration (star-delta) do not match.
- the current limit has been set too low for the motor.
- induction motor (encoderless, open-loop controlled) in I2t limiting.
- power unit is too small.
- the magnetizing time is too short.

Remedy:
- correct the motor data. Perform motor data identification and rotating measurement.
- check the motor configuration.
- correct the current limits (p0640).
- reduce the induction motor load.
- if necessary, use a larger power unit.
- check motor supply cable.
- check power unit.
- increase p0346.

A07416 Drive: Flux controller configuration

Reaction: NONE

Acknowledge: NONE

Cause: The configuration of the flux control (p1401) is contradictory.
Alarm value (r2124, interpret hexadecimal):
ccbbaaaa hex
aaaa = Parameter
bb = Index
cc = fault cause
1: Quick magnetizing (p1401.6) for soft starting (p1401.0).
2: Quick magnetizing for flux build-up control (p1401.2).
3: Quick magnetizing (p1401.6) for Rs identification after restart (p0621 = 2).

Remedy: For fault cause = 1:
- Shut down soft start (p1401.0 = 0).
- Shut down quick magnetizing (p1401.6 = 0).

For fault cause = 2:
- switch-on flux build-up control (p1401.2 = 1).
- Shut down quick magnetizing (p1401.6 = 0).

For fault cause = 3:
- Re-parameterize Rs identification (p0621 = 0, 1)
- Shut down quick magnetizing (p1401.6 = 0).

F07426 (A) Technology controller actual value limited

Reaction: OFF1 (IASC/DCBRK, NONE, OFF2, OFF3)

Acknowledge: IMMEDIATELY

Cause: The actual value for the technology controller, interconnected via connector input p2264, has reached a limit.
Fault value (r0949, interpret decimal):
1: upper limit reached.
2: lower limit reached.

Remedy:
- adapt the limits to the signal level (p2267, p2268).
- check the actual value normalization (p0595, p0596).

See also: p0595, p0596, p2264, p2267, p2268

A07427 Motor switch-in alarm

Reaction: NONE

Acknowledge: NONE

Cause: Alarm value (r2124, interpret decimal):

1:

The technology controller is not active or is not being used to control the main setpoint (see p2251).

2:

The operating time limits have been exceeded in at least one external motor.

Remedy: For alarm value = 1:

- enable technology controller (p2200).
- set technology controller mode p2251 = 0 (main setpoint).

For alarm value = 2:

- increase p2381, p2382 or set p2380 = 0.

A07428 (N) Technology controller parameterizing error

Reaction: NONE

Acknowledge: NONE

Cause: The technology controller has a parameterizing error.

Alarm value (r2124, interpret decimal):

1:

The upper output limit in p2291 is set lower than the lower output limit in p2292.

Remedy: For alarm value = 1:

Set the output limit in p2291 higher than in p2292.

See also: p2291, p2292

F07435 (N) Drive: Setting the ramp-function generator for sensorless vector control

Reaction: OFF2 (IASC/DCBRK, NONE, OFF1, OFF3)

Acknowledge: IMMEDIATELY

Cause: During operation with sensorless vector control (r1407.1) the ramp-function generator was stopped (p1141). An internal setting command of the ramp-function generator output caused the set setpoint speed to be frozen.

Remedy: - deactivate the holding command for the ramp-function generator (p1141).

- suppress the fault (p2101, p2119). This is necessary if the ramp-function generator is held using jogging and the speed setpoint is simultaneously inhibited (r0898.6).

F07436 (A) Free tec_ctrl 0 actual value limited

Reaction: OFF1 (IASC/DCBRK, NONE, OFF2, OFF3)

Acknowledge: IMMEDIATELY

Cause: The actual value for the free technology controller 0 has reached the limit.

The signal source for the actual value is set via connector input p11064.

Fault value (r0949, interpret decimal):

1: The actual value has reached the upper limit.

2: The actual value has reached the lower limit.

Remedy: - adapt the limit settings to the actual value signal (p11067, p11068).

- check the scaling of the actual value signal.
- check the signal source setting for the actual value (p11064).

See also: p11064, p11067, p11068

F07437 (A) Free tec_ctrl 1 actual value limited

Reaction: OFF1 (IASC/DCBRK, NONE, OFF2, OFF3)

Acknowledge: IMMEDIATELY

Cause: The actual value for the free technology controller 1 has reached the limit.
The signal source for the actual value is set via connector input p11164.
Fault value (r0949, interpret decimal):
1: The actual value has reached the upper limit.
2: The actual value has reached the lower limit.

Remedy: - adapt the limit settings to the actual value signal (p11167, p11168).
- check the scaling of the actual value signal.
- check the signal source setting for the actual value (p11164).
See also: p11164, p11167, p11168

F07438 (A) Free tec_ctrl 2 actual value limited

Reaction: OFF1 (IASC/DCBRK, NONE, OFF2, OFF3)

Acknowledge: IMMEDIATELY

Cause: The actual value for the free technology controller 2 has reached the limit.
The signal source for the actual value is set via connector input p11264.
Fault value (r0949, interpret decimal):
1: The actual value has reached the upper limit.
2: The actual value has reached the lower limit.

Remedy: - adapt the limit settings to the actual value signal (p11267, p11268).
- check the scaling of the actual value signal.
- check the signal source setting for the actual value (p11264).
See also: p11264, p11267, p11268

A07444 PID autotuning is activated

Reaction: NONE

Acknowledge: NONE

Cause: Automatic setting of the PID controller parameters (PID autotuning) was activated (p2350).
See also: p2350 (Enable PID autotuning)

Remedy: Not necessary.
This alarm is automatically withdrawn after the PID autotuning has been completed.

F07445 PID autotuning canceled

Reaction: NONE

Acknowledge: IMMEDIATELY

Cause: The PID autotuning was canceled as a result of an error.

Remedy: - increase the offset.
- check system configuration.

A07530 Drive: Drive Data Set DDS not present

Reaction: NONE

Acknowledge: NONE

Cause: The selected drive data set is not available (p0837 > p0180). The drive data set was not changed over.
See also: p0180, p0820, p0821, p0822, p0823, p0824, r0837

Remedy: - select the existing drive data set.
- set up additional drive data sets.

A07531 Drive: Command Data Set CDS not present

Reaction: NONE

Acknowledge: NONE

Cause: The selected command data set is not available (p0836 > p0170). The command data set was not changed over.
See also: p0810, p0811, p0812, p0813, r0836

Remedy: - select the existing command data set.
- set up additional command data sets.

F07800 Drive: No power unit present

Reaction: NONE

Acknowledge: IMMEDIATELY

Cause: The power unit parameters cannot be read or no parameters are stored in the power unit.
Note:
This fault also occurs if an incorrect topology was selected in the commissioning software and this parameterization is then downloaded to the Control Unit.
See also: r0200 (Power unit code number actual)

Remedy: - carry out a POWER ON (switch-off/switch-on) for all components.
- check the power unit and replace if necessary.
- check the Control Unit, and if required replace it.
- after correcting the topology, the parameters must be again downloaded using the commissioning software.

F07801 Drive: Motor overcurrent

Reaction: OFF2 (NONE, OFF1, OFF3)

Acknowledge: IMMEDIATELY

Cause: The permissible motor limit current was exceeded.
- effective current limit set too low.
- current controller not correctly set.
- U/f operation: Up ramp was set too short or the load is too high.
- U/f operation: Short-circuit in the motor cable or ground fault.
- U/f operation: Motor current does not match current of power unit.
- Switch to rotating motor without flying restart function (p1200).
Note:
Limit current = 2 x minimum (p0640, 4 x p0305 x p0306) >= 2 x p0305 x p0306

Remedy: - check the current limits (p0640).
- vector control: Check the current controller (p1715, p1717).
- U/f control: Check the current limiting controller (p1340 ... p1346).
- increase the up ramp (p1120) or reduce the load.
- check the motor and motor cables for short-circuit and ground fault.
- check the motor for the star-delta configuration and rating plate parameterization.
- check the power unit and motor combination.
- Choose "flying restart" function (p1200) if switched to rotating motor.

F07802 Drive: Infeed or power unit not ready

Reaction: OFF2 (NONE)

Acknowledge: IMMEDIATELY

Cause: After an internal switch-on command, the infeed or drive does not signal ready.
- monitoring time is too short.
- DC link voltage is not present.
- associated infeed or drive of the signaling component is defective.
- supply voltage incorrectly set.

Remedy: - increase the monitoring time (p0857).
- ensure that there is a DC link voltage. Check the DC link busbar. Enable the infeed.
- replace the associated infeed or drive of the signaling component.
- check the line supply voltage setting (p0210).
See also: p0857 (Power unit monitoring time)

A07805 (N) Drive: Power unit overload I2t

Reaction: NONE

Acknowledge: NONE

Cause: Alarm threshold for I2t overload (p0294) of the power unit exceeded.
The response parameterized in p0290 becomes active.
See also: p0290

Remedy: - reduce the continuous load.
- adapt the load duty cycle.
- check the assignment of the motor and power unit rated currents.

F07806 Drive: Regenerative power limit exceeded (F3E)

Reaction: OFF2 (IASC/DCBRK)

Acknowledge: IMMEDIATELY

Cause: For blocksize power units, types PM250 and PM260, the regenerative rated power r0206[2] was exceeded for more than 10 s.
See also: r0206, p1531

Remedy: - increase the down ramp.
- reduce the driving load.
- use a power unit with a higher regenerative feedback capability.
- for vector control, the regenerative power limit in p1531 can be reduced so that the fault is no longer triggered.

F07807 Drive: Short-circuit/ground fault detected

Reaction: OFF2 (NONE)

Acknowledge: IMMEDIATELY

Cause: A phase-phase short-circuit or ground fault was detected at the motor-side output terminals of the converter.
Fault value (r0949, interpret decimal):
1: Short-circuit, phase UV.
2: Short-circuit, phase UW.
3: Short-circuit, phase VW.
4: Ground fault with overcurrent.
5: Motor cable phase U interrupted
6: Motor cable phase V interrupted
7: Motor cable phase W interrupted
8: Short-circuit with hardware shutdown
1yxxx: Ground fault with current in phase U detected (y = pulse number, xxxx = component of the current in phase V in per mille).
2yxxx: Ground fault with current in phase V detected (y = pulse number, xxxx = component of the current in phase U in per mille).
Note:
Also when interchanging the line and motor cables is identified as a motor-side short circuit.
The ground fault test only functions when the motor is stationary.
Connecting to a motor that is either not de-energized or partially de-energized is possibly detected as ground fault.

Remedy: - check the motor-side converter connection for a phase-phase short-circuit.
- rule-out interchanged line and motor cables.
- check for a ground fault.
- check the motor cable connections
For a ground fault the following applies:
- do not enable the pulses when connecting to a rotating motor without the "Flying restart" function activated (p1200).
- increase the de-energization time (p0347).
- increase pulse suppression delay time (p1228) to ensure standstill.
- if required, deactivate the monitoring (p1901).

F07810 Drive: Power unit EEPROM without rated data

Reaction: NONE
Acknowledge: IMMEDIATELY
Cause: No rated data are stored in the power unit EEPROM.
See also: p0205, r0206, r0207, r0208, r0209
Remedy: Replace the power unit or inform Siemens Customer Service.

A07850 (F) External alarm 1

Reaction: NONE
Acknowledge: NONE
Cause: The condition for "External alarm 1" is satisfied.
Note:
The "External alarm 1" is initiated by a 1/0 edge via binector input p2112.
See also: p2112 (External alarm 1)
Remedy: Eliminate the causes of this alarm.

A07851 (F) External alarm 2

Reaction: NONE
Acknowledge: NONE
Cause: The condition for "External alarm 2" is satisfied.
Note:
The "External alarm 2" is initiated by a 1/0 edge via binector input p2116.
See also: p2116 (External alarm 2)
Remedy: Eliminate the causes of this alarm.

A07852 (F) External alarm 3

Reaction: NONE
Acknowledge: NONE
Cause: The condition for "External alarm 3" is satisfied.
Note:
The "External alarm 3" is initiated by a 1/0 edge via binector input p2117.
See also: p2117
Remedy: Eliminate the causes of this alarm.

F07860 (A) External fault 1

Reaction: OFF2 (IASC/DCBRK, NONE, OFF1, OFF3, STOP2)
Acknowledge: IMMEDIATELY (POWER ON)

Cause: The condition for "External fault 1" is satisfied.
Note:
The "External fault 1" is initiated by a 1/0 edge via binector input p2106.
See also: p2106 (External fault 1)

Remedy: - eliminate the causes of this fault.
- acknowledge fault.

F07861 (A) External fault 2

Reaction: OFF2 (IASC/DCBRK, NONE, OFF1, OFF3, STOP2)

Acknowledge: IMMEDIATELY (POWER ON)

Cause: The condition for "External fault 2" is satisfied.
Note:
The "External fault 2" is initiated by a 1/0 edge via binector input p2107.
See also: p2107 (External fault 2)

Remedy: - eliminate the causes of this fault.
- acknowledge fault.

F07862 (A) External fault 3

Reaction: OFF2 (IASC/DCBRK, NONE, OFF1, OFF3, STOP2)

Acknowledge: IMMEDIATELY (POWER ON)

Cause: The condition for "External fault 3" is satisfied.
Note:
The "External fault 3" is initiated by a 1/0 edge via the following parameters.
- AND logic operation, binector input p2108, p3111, p3112.
- switch-on delay p3110.
See also: p2108, p3110, p3111, p3112

Remedy: - eliminate the causes of this fault.
- acknowledge fault.

A07891 Drive: Load monitoring pump/fan blocked

Reaction: NONE

Acknowledge: NONE

Cause: The load monitoring is configured for a pump or fan (p2193 = 4, 5).
The monitoring function detects when the pump/fan is blocked.
It is possible that the blocking torque threshold (p2168) is set too low (e.g. heavy duty starting).
See also: p2165, p2168, p2181, p2193

Remedy: - check whether the pump/fan is blocked, and if blocked, then resolve the problem.
- check that the fan can freely move, and if necessary, resolve the problem.
- adapt the parameterization corresponding to the load (p2165, p2168)..

A07892 Drive: Load monitoring pump/fan no load condition

Reaction: NONE

Acknowledge: NONE

Cause: The load monitoring is configured for a pump or fan (p2193 = 4, 5).
The monitoring function detects when the pump/fan is operating under no load conditions.
The pump is running in the dry state (no medium to be pumped) – or the fan has a broken belt.
It is possible that the detection torque threshold is too low (p2191).
See also: p2181, p2191, p2193

Remedy: - for a pump, check the medium being pumped, and if required, provide the medium.
- for a fan, check the belt, and if required, replace.
- if necessary, increase the detection torque threshold (p2191).

A07893 Drive: Load monitoring pump leakage

Reaction: NONE

Acknowledge: NONE

Cause: The load monitoring is configured for a pump (p2193 = 4).
The monitoring function detects a leak in the pump circuit.
In this case, the pump requires a torque that is lower than in normal operation to pump the reduced quantity.
See also: p2181, p2182, p2183, p2184, p2186, p2188, p2190, p2193

Remedy: - remove the leak in the pump circuit.
- for a nuisance trip, reduce the torque thresholds of the leakage characteristic (p2186, p2188, p2190).

F07894 Drive: Load monitoring pump/fan blocked

Reaction: OFF1 (NONE, OFF2, OFF3)

Acknowledge: IMMEDIATELY

Cause: The load monitoring is configured for a pump or fan (p2193 = 4, 5).
The monitoring function detects when the pump/fan is blocked.
It is possible that the blocking torque threshold (p2168) is set too low (e.g. heavy duty starting).
See also: p2165, p2168, p2181, p2193

Remedy: - check whether the pump/fan is blocked, and if blocked, then resolve the problem.
- check that the fan can freely move, and if necessary, resolve the problem.
- adapt the parameterization corresponding to the load (p2165, p2168)..

F07895 Drive: Load monitoring pump/fan no load condition

Reaction: OFF1 (NONE, OFF2, OFF3)

Acknowledge: IMMEDIATELY

Cause: The load monitoring is configured for a pump or fan (p2193 = 4, 5).
The monitoring function detects when the pump/fan is operating under no load conditions.
The pump is running in the dry state (no medium to be pumped) – or the fan has a broken belt.
It is possible that the detection torque threshold is too low (p2191).
See also: p2181, p2191, p2193

Remedy: - for a pump, check the medium being pumped, and if required, provide the medium.
- for a fan, check the belt, and if required, replace.
- if necessary, increase the detection torque threshold (p2191).

F07896 Drive: Load monitoring pump leakage

Reaction: OFF1 (NONE, OFF2, OFF3)

Acknowledge: IMMEDIATELY

Cause: The load monitoring is configured for a pump (p2193 = 4).
The monitoring function detects a leak in the pump circuit.
In this case, the pump requires a torque that is lower than in normal operation to pump the reduced quantity.
See also: p2181, p2182, p2183, p2184, p2186, p2188, p2190, p2193

Remedy: - remove the leak in the pump circuit.
- for a nuisance trip, reduce the torque thresholds of the leakage characteristic (p2186, p2188, p2190).

F07900 (N, A) Drive: Motor blocked

Reaction: OFF2 (NONE, OFF1, OFF3, STOP2)

Acknowledge: IMMEDIATELY

Cause: Motor has been operating at the torque limit longer than the time specified in p2177 and below the speed threshold in p2175.

This signal can also be triggered if the speed is oscillating and the speed controller output repeatedly goes to its limit.

It may also be the case that thermal monitoring of the power unit reduces the current limit (see p0290), thereby causing the motor to decelerate.

See also: p2175, p2177

Remedy: - check that the motor can freely move.

- check the effective torque limit (r1538, r1539).
- check the parameter, message "Motor blocked" and if required, correct (p2175, p2177).
- check the direction of rotation enable signals for a flying restart of the motor (p1110, p1111).
- for U/f control: check the current limits and acceleration times (p0640, p1120).

F07901 Drive: Motor overspeed

Reaction: OFF2 (IASC/DCBRK)

Acknowledge: IMMEDIATELY

Cause: The maximum permissible speed was either positively or negatively exceeded.

The maximum permissible positive speed is formed as follows: Minimum (p1082, CI: p1085) + p2162

The maximum permissible negative speed is formed as follows: Maximum (-p1082, CI: 1088) - p2162

Remedy: The following applies for a positive direction of rotation:

- check r1084 and if required, correct p1082, CI:p1085 and p2162.

The following applies for a negative direction of rotation:

- check r1087 and if required, correct p1082, CI:p1088 and p2162.

Activate precontrol of the speed limiting controller (p1401.7 = 1).

Increase the hysteresis for the overspeed signal p2162. This upper limit is dependent upon the maximum motor speed p0322 and the maximum speed p1082 of the setpoint channel.

F07902 (N, A) Drive: Motor stalled

Reaction: OFF2 (IASC/DCBRK, NONE, OFF1, OFF3, STOP2)

Acknowledge: IMMEDIATELY

Cause: The system has identified that the motor has stalled for a time longer than is set in p2178.

Fault value (r0949, interpret decimal):

1: Reserved.

2: Stall detection using r1408.12 (p1745) or via (r0084 ... r0083).

See also: p2178 (Motor stalled delay time)

Remedy: Steps should always be taken to ensure that both motor data identification and the rotating measurement were carried out (see p1900, r3925).

- check whether the drive stalls solely due to the load in controlled mode or when the speed setpoint is still zero. If yes, then increase the current setpoint using p1610.
- if the motor excitation time (p0346) was significantly reduced and the drive stalls when it is switched on and run immediately, p0346 should be increased again.
- check whether a line phase failure is affecting power unit PM230, PM250, PM260.
- check whether the motor cables are disconnected (see A07929).

If there is no fault, then the fault tolerance (p1745) or the delay time (p2178) can be increased.

- check the current limits (p0640, r0067, r0289). If the current limits are too low, then the drive cannot be magnetized.
- if the fault occurs with fault value 2 when the motor accelerates very quickly to the field weakening range, the deviation between the flux setpoint and flux actual value can be reduced and, in turn, the message prevented, by reducing p1596 or p1553.

A07903 Drive: Motor speed deviation

Reaction: NONE

Acknowledge: NONE

Cause: The absolute value of the speed difference from the setpoint (p2151) and the speed actual value (r2169) exceeds the tolerance threshold (p2163) longer than tolerated (p2164, p2166).

The alarm is only enabled for p2149.0 = 1.

Possible causes:

- the load torque is greater than the torque setpoint.
- when accelerating, the torque/current/power limit is reached. If the limits are not sufficient, then it is possible that the drive has been dimensioned too small.
- for active Vdc controller.

For U/f control, the overload condition is detected as the I_max controller is active.

See also: p2149 (Monitoring configuration)

Remedy:
- increase p2163 and/or p2166.
- increase the torque/current/power limits.
- deactivate alarm with p2149.0 = 0.

A07910 (N) Drive: Motor overtemperature

Reaction: NONE

Acknowledge: NONE

Cause: KTY84/PT1000 or no sensor:

The measured motor temperature or the temperature of the motor temperature model 2 has exceeded the alarm threshold (p0604). The response parameterized in p0610 becomes active.

PTC or bimetallic NC contact:

The response threshold of 1650 Ohm was exceeded or the NC contact opened.

Alarm value (r2124, interpret decimal):

11: No output current reduction.

12: Output current reduction active.

See also: p0604, p0610

Remedy:
- check the motor load.
- check the motor ambient temperature.
- check KTY84/PT1000.
- check overtemperatures of the motor temperature model 2 (p0626 ... p0628).

See also: p0612, p0617, p0618, p0619, p0625, p0626, p0627, p0628

A07920 Drive: Torque/speed too low

Reaction: NONE

Acknowledge: NONE

Cause: For p2193 = 1:

The torque deviates from the torque/speed envelope characteristic (too low).

For p2193 = 2:

The speed signal from the external encoder (refer to p3230) deviates from the speed (r2169) (too low).

See also: p2181 (Load monitoring response)

Remedy:
- check the connection between the motor and load.
- adapt the parameterization corresponding to the load.

A07921 Drive: Torque/speed too high

Reaction: NONE

Acknowledge: NONE

Cause: For p2193 = 1:

The torque deviates from the torque/speed envelope characteristic (too high).

For p2193 = 2:

The speed signal from the external encoder (refer to p3230) deviates from the speed (r2169) (too high).

Remedy: - check the connection between the motor and load.
- adapt the parameterization corresponding to the load.

A07922 Drive: Torque/speed out of tolerance

Reaction: NONE
Acknowledge: NONE
Cause: For p2193 = 1:
The torque deviates from the torque/speed envelope characteristic.
For p2193 = 2:
The speed signal from the external encoder (refer to p3230) deviates from the speed (r2169).
Remedy: - check the connection between the motor and load.
- adapt the parameterization corresponding to the load.

F07923 Drive: Torque/speed too low

Reaction: OFF1 (NONE, OFF2, OFF3)
Acknowledge: IMMEDIATELY
Cause: For p2193 = 1:
The torque deviates from the torque/speed envelope characteristic (too low).
For p2193 = 2:
The speed signal from the external encoder (refer to p3230) deviates from the speed (r2169) (too low).
Remedy: - check the connection between the motor and load.
- adapt the parameterization corresponding to the load.

F07924 Drive: Torque/speed too high

Reaction: OFF1 (NONE, OFF2, OFF3)
Acknowledge: IMMEDIATELY
Cause: For p2193 = 1:
The torque deviates from the torque/speed envelope characteristic (too high).
For p2193 = 2:
The speed signal from the external encoder (refer to p3230) deviates from the speed (r2169) (too high).
Remedy: - check the connection between the motor and load.
- adapt the parameterization corresponding to the load.

F07925 Drive: Torque/speed out of tolerance

Reaction: OFF1 (NONE, OFF2, OFF3)
Acknowledge: IMMEDIATELY
Cause: For p2193 = 1:
The torque deviates from the torque/speed envelope characteristic.
For p2193 = 2:
The speed signal from the external encoder (refer to p3230) deviates from the speed (r2169).
Remedy: - check the connection between the motor and load.
- adapt the parameterization corresponding to the load.

A07926 Drive: Envelope curve parameter invalid

Reaction: NONE
Acknowledge: NONE

Cause: Invalid parameter values were entered for the envelope characteristic of the load monitoring.
The following rules apply for the speed thresholds:
p2182 < p2183 < p2184
The following rules apply for the torque thresholds:
p2185 > p2186
p2187 > p2188
p2189 > p2190
Load monitoring configuration and response must match.
It is not permissible that the individual load torque monitoring areas overlap.
Alarm value (r2124, interpret decimal):
Number of the parameter with the invalid value.
The load torque monitoring has not been activated as long as the alarm is active.

Remedy: - set the parameters for the load monitoring according to the applicable rules.
- if necessary, deactivate the load monitoring (p2181 = 0, p2193 = 0).

A07927 DC braking active

Reaction: NONE

Acknowledge: NONE

Cause: The motor is braked with DC current. DC braking is active.
1)
A message with response DCBRK is active. The motor is braked with the braking current set in p1232 for the duration set in in p1233. If the standstill threshold p1226 is undershot, then braking is prematurely canceled.
2)
DC braking has been activated at binector input p1230 with the DC braking set (p1230 = 4). Braking current p1232 is injected until this binector input becomes inactive.

Remedy: Not necessary.
The alarm automatically disappears once DC braking has been executed.

A07929 (F) Drive: No motor detected

Reaction: NONE

Acknowledge: NONE

Cause: The absolute current value is so small after enabling the inverter pulses that no motor is detected.
Note:
- in the case of vector control and an induction motor, this alarm is followed by fault F07902.
- PM330: Correction currents are calculated and displayed in the optimized pulse pattern range.
See also: p2179 (Output load identification current limit)

Remedy: - check the motor feeder cables.
- reduce the threshold value (p2179), e.g. for synchronous motors.
- increase threshold value (PM330).
- check the voltage boost of the U/f control (p1310).
- carry out a standstill measurement to set the stator resistance (p0350).

F07936 Drive: load failure

Reaction: OFF1 (NONE, OFF2, OFF3)

Acknowledge: IMMEDIATELY

Cause: The load monitoring has detected a load failure.

Remedy: - check the sensor.
- if necessary, deactivate the load monitoring (p2193).
See also: p2193, p3232

F07950 (A) Motor parameter incorrect

Reaction: NONE

Acknowledge: IMMEDIATELY

Cause: The motor parameters were incorrectly entered while commissioning (e.g. p0300 = 0, no motor)
Fault value (r0949, interpret decimal):
Parameter number involved.
See also: p0300, p0301, p0304, p0305, p0307, p0310, p0311, p0314, p0315, p0316, p0320, p0322, p0323

Remedy: Compare the motor data with the rating plate data and if required, correct.

F07967 Drive: Incorrect pole position identification

Reaction: OFF2 (NONE, OFF1)

Acknowledge: IMMEDIATELY

Cause: A fault has occurred during the pole position identification routine.
Only for internal Siemens troubleshooting.

Remedy: Carry out a POWER ON.

F07968 Drive: Lq-Ld measurement incorrect

Reaction: OFF2

Acknowledge: IMMEDIATELY

Cause: A fault has occurred during the Lq-Ld measurement.
Fault value (r0949, interpret decimal):
10: Stage 1: The ratio between the measured current and zero current is too low.
12: Stage 1: The maximum current was exceeded.
15: Second harmonic too low.
16: Drive converter too small for the measuring technique.
17: Abort due to pulse inhibit.

Remedy: For fault value = 10:
Check whether the motor is correctly connected.
Replace the power unit involved.
Deactivate technique (p1909).
For fault value = 12:
Check whether motor data have been correctly entered.
Deactivate technique (p1909).
For fault value = 16:
Deactivate technique (p1909).
For fault value = 17:
Repeat technique.

F07969 Drive: Incorrect pole position identification

Reaction: OFF2

Acknowledge: IMMEDIATELY

Cause: A fault has occurred during the pole position identification routine.
Fault value (r0949, interpret decimal):
1: Current controller limited
2: Motor shaft locked.
10: Stage 1: The ratio between the measured current and zero current is too low.
11: Stage 2: The ratio between the measured current and zero current is too low.
12: Stage 1: The maximum current was exceeded.
13: Stage 2: The maximum current was exceeded.
14: Current difference to determine the +d axis too low.
15: Second harmonic too low.
16: Drive converter too small for the measuring technique.
17: Abort due to pulse inhibit.
18: First harmonic too low.
20: Pole position identification requested with the motor shaft rotating and activated "flying restart" function.

Remedy: For fault value = 1:
Check whether the motor is correctly connected.
Check whether motor data have been correctly entered.
Replace the power unit involved.
For fault value = 2:
Bring the motor into a no-load condition.
For fault value = 10:
When selecting p1980 = 4: Increase the value for p0325.
When selecting p1980 = 1: Increase the value for p0329.
Check whether the motor is correctly connected.
Replace the power unit involved.
For fault value = 11:
Increase the value for p0329.
Check whether the motor is correctly connected.
Replace the power unit involved.
For fault value = 12:
When selecting p1980 = 4: Reduce the value for p0325.
When selecting p1980 = 1: Reduce the value for p0329.
Check whether motor data have been correctly entered.
For fault value = 13:
Reduce the value for p0329.
Check whether motor data have been correctly entered.
For fault value = 14:
Increase the value for p0329.
For fault value = 15:
Increase the value for p0325.
Motor not sufficiently anisotropic, change the technique (p1980 = 1, 10).
For fault value = 16:
Change the technique (p1980).
For fault value = 17:
Repeat technique.
For fault value = 18:
Increase the value for p0329.
Saturation not sufficient, change the technique (p1980 = 10).
For fault value = 20:
Before carrying out a pole position identification routine ensure that the motor shaft is absolutely stationary (zero speed).

A07980 Drive: Rotating measurement activated

Reaction: NONE

Acknowledge: NONE

Cause: The rotating measurement (automatic speed controller optimization) is activated.

The rotating measurement is carried out at the next switch-on command.

Note:

During the rotating measurement it is not possible to save the parameters (p0971).

See also: p1960 (Rotating measurement selection)

Remedy: Not necessary.

The alarm disappears automatically after the speed controller optimization has been successfully completed or for the setting p1900 = 0.

A07981 Drive: Enable signals for the rotating measurement missing

Reaction: NONE

Acknowledge: NONE

Cause: The rotating measurement cannot be started due to missing enable signals.

For p1959.13 = 1, the following applies:

- enable signals for the ramp-function generator missing (see p1140 ... p1142).
- enable signals for the speed controller integrator missing (see p1476, p1477).

Remedy:

- acknowledge faults that are present.
- establish missing enable signals.

See also: r0002, r0046

F07983 Drive: Rotating measurement saturation characteristic

Reaction: OFF1 (NONE, OFF2)

Acknowledge: IMMEDIATELY

Cause: A fault has occurred while determining the saturation characteristic.

Fault value (r0949, interpret decimal):

1: The speed did not reach a steady-state condition.

2: The rotor flux did not reach a steady-state condition.

3: The adaptation circuit did not reach a steady-state condition.

4: The adaptation circuit was not enabled.

5: Field weakening active.

6: The speed setpoint was not able to be approached as the minimum limiting is active.

7: The speed setpoint was not able to be approached as the suppression (skip) bandwidth is active.

8: The speed setpoint was not able to be approached as the maximum limiting is active.

9: Several values of the determined saturation characteristic are not plausible.

10: Saturation characteristic could not be sensibly determined because load torque too high.

Remedy: For fault value = 1:

- the total drive moment of inertia is far higher than that of the motor (p0341, p0342).

De-select rotating measurement (p1960), enter the moment of inertia p0342, re-calculate the speed controller p0340 = 4 and repeat the measurement.

For fault value = 1 ... 2:

- increase the measuring speed (p1961) and repeat the measurement.

For fault value = 1 ... 4:

- check the motor parameters (rating plate data). After the change: Calculate p0340 = 3.
- check the moment of inertia (p0341, p0342). After the change: Calculate p0340 = 3.
- carry out a motor data identification routine (p1910).
- if required, reduce the dynamic factor (p1967 < 25 %).

For fault value = 5:

- the speed setpoint (p1961) is too high. Reduce the speed.

For fault value = 6:

- adapt the speed setpoint (p1961) or minimum limiting (p1080).

For fault value = 7:

- adapt the speed setpoint (p1961) or suppression (skip) bandwidths (p1091 ... p1094, p1101).

For fault value = 8:

- adapt the speed setpoint (p1961) or maximum limit (p1082, p1083 and p1086).

For fault value = 9, 10:

- the measurement was carried out at an operating point where the load torque is too high. Select a more suitable operating point, either by changing the speed setpoint (p1961) or by reducing the load torque. The load torque may not be varied while making measurements.

Note:

The saturation characteristic identification routine can be disabled using p1959.1.

See also: p1959

F07984 Drive: Speed controller optimization, moment of inertia

Reaction: OFF1 (NONE, OFF2)

Acknowledge: IMMEDIATELY

Cause: A fault has occurred while identifying the moment of inertia.

Fault value (r0949, interpret decimal):

1: The speed did not reach a steady-state condition.

2: The speed setpoint was not able to be approached as the minimum limiting is active.

3. The speed setpoint was not able to be approached as the suppression (skip) bandwidth is active.

4. The speed setpoint was not able to be approached as the maximum limiting is active.

5: It is not possible to increase the speed by 10% as the minimum limiting is active.

6: It is not possible to increase the speed by 10% as the suppression (skip) bandwidth is active.

7: It is not possible to increase the speed by 10% as the maximum limiting is active.

8: The torque difference after the speed setpoint step is too low in order to be able to still reliably identify the moment of inertia.

9: Too few data to be able to reliably identify the moment of inertia.

10: After the setpoint step, the speed either changed too little or in the incorrect direction.

11: The identified moment of inertia is not plausible. The measured moment of inertia is less than the 0.1x or greater than 500x the preset moment of inertia of the motor p0341.

Remedy: For fault value = 1:
- check the motor parameters (rating plate data). After the change: Calculate p0340 = 3.
- check the moment of inertia (p0341, p0342). After the change: Calculate p0340 = 3.
- carry out a motor data identification routine (p1910).
- if required, reduce the dynamic factor (p1967 < 25 %).

For fault value = 2, 5:
- adapt the speed setpoint (p1965) or adapt the minimum limit (p1080).

For fault value = 3, 6:
- adapt the speed setpoint (p1965) or suppression (skip) bandwidths (p1091 ... p1094, p1101).

For fault value = 4, 7:
- adapt the speed setpoint (p1965) or maximum limit (p1082, p1083 and p1086).

For fault value = 8:
- the total drive moment of inertia is far higher than that of the motor (refer to p0341, p0342). De-select rotating measurement (p1960), enter the moment of inertia p0342, re-calculate the speed controller p0340 = 4 and repeat the measurement.

For fault value = 9:
- check the moment of inertia (p0341, p0342). After the change, re-calculate (p0340 = 3 or 4).

For fault value = 10:
- check the moment of inertia (p0341, p0342). After the change: Calculate p0340 = 3.

For fault value = 11:
- reduce the moment of inertia of the motor p0341 (e.g. factor of 0.2) or increase (e.g. factor of 5) and repeat the measurement.

Note:

The moment of inertia identification routine can be disabled using p1959.2.

See also: p1959

F07985 Drive: Speed controller optimization (oscillation test)

Reaction: OFF1 (NONE, OFF2)

Acknowledge: IMMEDIATELY

Cause: A fault has occurred during the vibration test.

Fault value (r0949, interpret decimal):

1: The speed did not reach a steady-state condition.

2: The speed setpoint was not able to be approached as the minimum limiting is active.

3: The speed setpoint was not able to be approached as the suppression (skip) bandwidth is active.

4: The speed setpoint was not able to be approached as the maximum limiting is active.

5: Torque limits too low for a torque step.

6: No suitable speed controller setting was found.

Remedy: For fault value = 1:
- check the motor parameters (rating plate data). After the change: Calculate p0340 = 3.
- check the moment of inertia (p0341, p0342). After the change: Calculate p0340 = 3.
- carry out a motor data identification routine (p1910).
- if required, reduce the dynamic factor (p1967 < 25 %).
For fault value = 2:
- adapt the speed setpoint (p1965) or adapt the minimum limit (p1080).
For fault value = 3:
- adapt the speed setpoint (p1965) or suppression (skip) bandwidths (p1091 ... p1094, p1101).
For fault value = 4:
- adapt the speed setpoint (p1965) or maximum limit (p1082, p1083 and p1086).
For fault value = 5:
- increase the torque limits (e.g. p1520, p1521).
For fault value = 6:
- reduce the dynamic factor (p1967).
- disable the vibration test (p1959.4 = 0) and repeat the rotating measurement.
See also: p1959

F07986 Drive: Rotating measurement ramp-function generator

Reaction: OFF1 (NONE, OFF2)

Acknowledge: IMMEDIATELY

Cause: During the rotating measurements, problems with the ramp-function generator occurred.
Fault value (r0949, interpret decimal):
1: The positive and negative directions are inhibited.

Remedy: For fault value = 1:
Enable the direction (p1110 or p1111).

F07988 Drive: Rotating measurement, no configuration selected

Reaction: OFF2 (NONE, OFF1)

Acknowledge: IMMEDIATELY

Cause: When configuring the rotating measurement (p1959), no function was selected.

Remedy: Select at least one function for automatic optimization of the speed controller (p1959).
See also: p1959

F07990 Drive: Incorrect motor data identification

Reaction: OFF2 (NONE, OFF1)

Acknowledge: IMMEDIATELY

Cause: A fault has occurred during the identification routine.
Fault value (r0949, interpret decimal):
1: Current limit value reached.
2: Identified stator resistance lies outside the expected range 0.1 ... 100% of Zn.
3: Identified rotor resistance lies outside the expected range 0.1 ... 100% of Zn.
4: identified stator reactance lies outside the expected range 50 ... 500 % of Zn.
5: identified magnetizing reactance lies outside the expected range 50 ... 500 % of Zn.
6: Identified rotor time constant lies outside the expected range 10 ms ... 5 s.
7: identified total leakage reactance lies outside the expected range 4 ... 50 % of Zn.
8: Identified stator leakage reactance lies outside the expected range 2 ... 50% of Zn.
9: Identified rotor leakage reactance lies outside the expected range 2 ... 50% of Zn.
10: Motor has been incorrectly connected.
11: Motor shaft rotates.
12: Ground fault detected.
15: Pulse inhibit occurred during motor data identification.
20: Identified threshold voltage of the semiconductor devices lies outside the expected range 0 ... 10 V.
30: Current controller in voltage limiting.
40: At least one identification contains errors. The identified parameters are not saved to prevent inconsistencies.
60: Incorrect power stack data for the calibration of the converter output voltage
61: Incorrect measured values for the calibration of the converter output voltage
Note:
Percentage values are referred to the rated motor impedance:
Zn = Vmot.nom / sqrt(3) / Imot,nom

Remedy: For fault value = 1 ... 40:
- check whether motor data have been correctly entered in p0300, p0304 ... p0311.
- is there an appropriate relationship between the motor power rating and that of the power unit? The ratio of the power unit to the rated motor current should not be less than 0.5 and not be greater than 4.
- check connection type (star-delta).
For fault value = 4, 7:
- check whether the inductance in p0233 is correctly set.
- check whether motor has been correctly connected (star-delta).
For fault value = 11 in addition:
- deactivate oscillation monitoring (p1909.7 = 1).
For fault value = 12:
- check the power cable connections.
- check the motor.
- check the CT.

A07991 (N) Drive: Motor data identification activated

Reaction: NONE

Acknowledge: NONE

Cause: The motor data identification routine is activated.
The motor data identification routine is carried out at the next switch-on command.
If rotating measurement is selected (see p1900, p1960), it will not be possible to save the parameter assignment. Once motor data identification has been completed or deactivated, the option to save the parameter assignment will be made available again.
See also: p1910

Remedy: Not necessary.
The alarm automatically disappears after the motor data identification routine has been successfully completed or for the setting p1900 = 0.

A07994 (F, N) Drive: motor data identification not performed

Reaction: NONE

Acknowledge: NONE

Cause: The "Vector control" mode or application class "Standard Drive Control, STC" (p0096 = 1) has been selected, and a motor data identification has still not been performed.

The alarm is initiated when changing the drive data set (see r0051) in the following cases:

- vector control is parameterized in the actual drive data set (p1300 >= 20).

and

- motor data identification has still not been performed in the actual drive data set (see r3925).

Note:

For SINAMICS G120, a check is made and the alarm is output also when exiting commissioning and when the system powers up.

Remedy: - Perform motor data identification (see p1900).

- if required, parameterize "U/f control" (p1300 < 20) or set p0096 = 0 (only G120).
- switch over to a drive data set, in which the conditions do not apply.

F08010 (N, A) CU: Analog-to-digital converter

Reaction: OFF1 (IASC/DCBRK, NONE, OFF2, OFF3, STOP2)

Acknowledge: IMMEDIATELY (POWER ON)

Cause: The analog-to-digital converter on the Control Unit has not supplied any converted data.

Remedy: - check the power supply.

- replace Control Unit.

F08501 (N, A) PROFINET: Setpoint timeout

Reaction: OFF3 (IASC/DCBRK, NONE, OFF1, OFF2, STOP2)

Acknowledge: IMMEDIATELY

Cause: The reception of setpoints from PROFINET has been interrupted.

- bus connection interrupted.
- controller switched off.
- controller set into the STOP state.

Remedy: - Restore the bus connection and set the controller to RUN.

- if the error is repeated, check the update time set in the bus configuration (HW Config).

F08502 (A) PROFINET: Monitoring time sign-of-life expired

Reaction: OFF1 (OFF2, OFF3)

Acknowledge: IMMEDIATELY

Cause: The monitoring time for the sign-of-life counter has expired.

The connection to the PROFINET interface was interrupted.

Remedy: - carry out a POWER ON (switch-off/switch-on).

- contact Technical Support.

A08511 (F) PROFINET: Receive configuration data invalid

Reaction: NONE

Acknowledge: NONE

Cause: The drive unit did not accept the receive configuration data.

Alarm value (r2124, interpret decimal):

Return value of the receive configuration data check.

2: Too many PZD data words for input or output. The number of possible PZD is specified by the number of indices in r2050/p2051.

3: Uneven number of bytes for input or output.

Remedy: Check the receive configuration data.
For alarm value = 2:
- check the number of data words for output and input.

A08526 (F) PROFINET: No cyclic connection

Reaction: NONE
Acknowledge: NONE
Cause: There is no connection to a PROFINET controller.
Remedy: Establish the cyclic connection and activate the controller with cyclic operation.
Check the parameters "Name of Station" and "IP of Station" (r61000, r61001).

A08564 PN/COMM BOARD: syntax error in the configuration file

Reaction: NONE
Acknowledge: NONE
Cause: A syntax error has been detected in the ASCII configuration file for the Communication Board Ethernet. The saved configuration file has not been loaded.
Remedy: - correct the PROFINET interface configuration (p8920 and following) and activate (p8925 = 2).
- reinitialize the station (e.g. using the STARTER commissioning software)
Note:
The configuration is not applied until the next POWER ON!

A08565 PROFINET: Consistency error affecting adjustable parameters

Reaction: NONE
Acknowledge: NONE
Cause: A consistency error was detected when activating the configuration (p8925) for the PROFINET interface. The currently set configuration has not been activated.
Alarm value (r2124, interpret decimal):
0: general consistency error
1: error in the IP configuration (IP address, subnet mask or standard gateway)
2: Error in the station names.
3: DHCP was not able to be activated, as a cyclic PROFINET connection already exists.
4: a cyclic PROFINET connection is not possible as DHCP is activated.
Remedy: - check the required interface configuration (p8920 and following), correct if necessary, and activate (p8925).
or
- reconfigure the station via the "Edit Ethernet node" screen form (e.g. with STARTER commissioning software).

F13009 Licensing OA application not licensed

Reaction: OFF1
Acknowledge: IMMEDIATELY
Cause: At least one OA application which is under license does not have a license.
Note:
Refer to r4955 and p4955 for information about the installed OA applications.
Remedy: - enter and activate the license key for OA applications under license (p9920, p9921).
- if necessary, deactivate unlicensed OA applications (p4956).

F13100 Know-how protection: Copy protection error

Reaction: OFF1
Acknowledge: IMMEDIATELY

Cause: The know-how protection with copy protection for the memory card is active.
An error has occurred when checking the memory card.
Fault value (r0949, interpret decimal):
0: A memory card is not inserted.
1: An invalid memory card is inserted (not SIEMENS).
2: An invalid memory card is inserted.
3: The memory card is being used in another Control Unit.
12: An invalid memory card is inserted (OEM input incorrect, p7769).
13: The memory card is being used in another Control Unit (OEM input incorrect, p7759).
See also: p7765 (KHP configuration)

Remedy: For fault value = 0, 1:
- insert the correct memory card and carry out POWER ON.
For fault value = 2, 3, 12, 13:
- contact the responsible OEM.
- Deactivate copy protection (p7765) and acknowledge the fault (p3981).
- Deactivate know-how protection (p7766 ... p7768) and acknowledge the fault (p3981).
Note:
In general, the copy protection can only be changed when know-how protection is deactivated.
KHP: Know-How Protection
See also: p3981, p7765

F13101 Know-how protection: Copy protection cannot be activated

Reaction: NONE

Acknowledge: IMMEDIATELY

Cause: An error occurred when attempting to activate the copy protection for the memory card.
Fault value (r0949, interpret decimal):
0: A memory card is not inserted.
1: An invalid memory card is inserted (not SIEMENS).
Note:
KHP: Know-How Protection

Remedy: - insert a valid memory card.
- Try to activate copy protection again (p7765).
See also: p7765 (KHP configuration)

F13102 Know-how protection: Consistency error of the protected data

Reaction: OFF1

Acknowledge: IMMEDIATELY

Cause: An error was identified when checking the consistency of the protected files. As a consequence, the project on the memory card cannot be run.
Fault value (r0949, interpret hexadecimal):
yyyyxxxx hex: yyyy = object number, xxxx = fault cause
xxxx = 1:
A file has a checksum error.
xxxx = 2:
The files are not consistent with one another.
xxxx = 3:
The project files, which were loaded into the file system via load (download from the memory card), are inconsistent.
Note:
KHP: Know-How Protection

Remedy: - Replace the project on the memory card or replace project files for download from the memory card.
- Restore the factory setting and download again.

F30001	**Power unit: Overcurrent**
Reaction:	OFF2
Acknowledge:	IMMEDIATELY
Cause:	The power unit has detected an overcurrent condition. - closed-loop control is incorrectly parameterized. - motor has a short-circuit or fault to ground (frame). - U/f operation: Up ramp set too low. - U/f operation: rated current of motor much greater than that of power unit. - High discharge and post-charging current for line supply voltage interruptions. - High post-charging currents for overload when motoring and DC link voltage dip. - short-circuit currents at switch-on due to the missing line reactor. - power cables are not correctly connected. - power cables exceed the maximum permissible length. - power unit defective. - line phase interrupted. Fault value (r0949, interpret bitwise binary): Bit 0: Phase U. Bit 1: Phase V. Bit 2: Phase W. Bit 3: Overcurrent in the DC link. Note: Fault value = 0 means that the phase with overcurrent is not recognized.
Remedy:	- check the motor data - if required, carry out commissioning. - check the motor circuit configuration (star/delta). - U/f operation: Increase up ramp. - U/f operation: Check assignment of rated currents of motor and power unit. - check the line supply quality. - reduce motor load. - correct connection of line reactor. - check the power cable connections. - check the power cables for short-circuit or ground fault. - check the length of the power cables. - replace power unit. - check the line supply phases.

F30002	**Power unit: DC link voltage overvoltage**
Reaction:	OFF2
Acknowledge:	IMMEDIATELY
Cause:	The power unit has detected an overvoltage condition in the DC link. - motor regenerates too much energy. - line supply voltage too high. - line phase interrupted. - DC link voltage control switched off. - dynamic response of DC link voltage controller excessive or insufficient. Fault value (r0949, interpret decimal): DC link voltage at the time of trip [0.1 V].

Remedy: -increase the ramp-down time (p1121).
- set the rounding times (p1130, p1136). This is particularly recommended in U/f operation to relieve the DC link voltage controller with rapid ramp-down times of the ramp-function generator.
- Activate the DC link voltage controller (p1240, p1280).
- adapt the dynamic response of the DC link voltage controller (p1243, p1247, p1283, p1287).
- check the line supply and DC link voltage. set p0210 as low as possible (also see A07401, p1294 = 0).
- check and correct the phase assignment at the power unit.
- check the line supply phases.

See also: p0210, p1240

F30003 Power unit: DC link voltage undervoltage

Reaction: OFF2

Acknowledge: IMMEDIATELY

Cause: The power unit has detected an undervoltage condition in the DC link.
- line supply failure
- line supply voltage below the permissible value.
- line phase interrupted.

Note:
The monitoring threshold for the DC link undervoltage is the minimum of the following values:
- for a calculation, refer to p0210.

Remedy:
- check the line supply voltage
- check the line supply phases.

See also: p0210 (Drive unit line supply voltage)

F30004 Power unit: Overtemperature heat sink AC inverter

Reaction: OFF2

Acknowledge: IMMEDIATELY

Cause: The temperature of the power unit heat sink has exceeded the permissible limit value.
- insufficient cooling, fan failure.
- overload.
- ambient temperature too high.
- pulse frequency too high.

Fault value (r0949, interpret decimal):
Temperature [1 bit = 0.01 °C].

Remedy:
- check whether the fan is running.
- check the fan elements.
- check whether the ambient temperature is in the permissible range.
- check the motor load.
- reduce the pulse frequency if this is higher than the rated pulse frequency.

Notice:
This fault can only be acknowledged after the alarm threshold for alarm A05000 has been undershot.
See also: p1800

F30005 Power unit: Overload I2t

Reaction: OFF2

Acknowledge: IMMEDIATELY

Cause: The power unit was overloaded (r0036 = 100 %).
- the permissible rated power unit current was exceeded for an inadmissibly long time.
- the permissible load duty cycle was not maintained.

Fault value (r0949, interpret decimal):
I2t [100 % = 16384].

Remedy: - reduce the continuous load.
- adapt the load duty cycle.
- check the motor and power unit rated currents.
- reduce the current limit (p0640).
- during operation with U/f characteristic: reduce the integral time of the current limiting controller (p1341).
See also: r0036, r0206, p0307

F30011 Power unit: Line phase failure in main circuit

Reaction: OFF2 (OFF1)

Acknowledge: IMMEDIATELY

Cause: At the power unit, the DC link voltage ripple has exceeded the permissible limit value.
Possible causes:
- a line phase has failed.
- the 3 line phases are inadmissibly asymmetrical.
- the capacitance of the DC link capacitor forms a resonance frequency with the line inductance and the reactor integrated in the power unit.
- the fuse of a phase of a main circuit has ruptured.
- a motor phase has failed.
Fault value (r0949, interpret decimal):
Only for internal Siemens troubleshooting.

Remedy: - check the main circuit fuses.
- check whether a single-phase load is distorting the line voltages.
- Detune the resonant frequency with the line inductance by using an upstream line reactor.
- Dampen the resonant frequency with the line inductance by switching over the DC link voltage compensation in the software (see p1810) – or increase the smoothing (see p1806). However, this can have a negative impact on the torque ripple at the motor output.
- check the motor feeder cables.

F30012 Power unit: Temperature sensor heat sink wire breakage

Reaction: OFF1 (OFF2)

Acknowledge: IMMEDIATELY

Cause: The connection to a heat sink temperature sensor in the power unit is interrupted.
Fault value (r0949, interpret hexadecimal):
Bit 0: Module slot (electronics slot)
Bit 1: Air intake
Bit 2: Inverter 1
Bit 3: Inverter 2
Bit 4: Inverter 3
Bit 5: Inverter 4
Bit 6: Inverter 5
Bit 7: Inverter 6
Bit 8: Rectifier 1
Bit 9: Rectifier 2

Remedy: Contact the manufacturer.

F30013 Power unit: Temperature sensor heat sink short-circuit

Reaction: OFF1 (OFF2)

Acknowledge: IMMEDIATELY

Cause: The heat sink temperature sensor in the power unit is short-circuited.
Fault value (r0949, interpret hexadecimal):
Bit 0: Module slot (electronics slot)
Bit 1: Air intake
Bit 2: Inverter 1
Bit 3: Inverter 2
Bit 4: Inverter 3
Bit 5: Inverter 4
Bit 6: Inverter 5
Bit 7: Inverter 6
Bit 8: Rectifier 1
Bit 9: Rectifier 2

Remedy: Contact the manufacturer.

F30015 (N, A) Power unit: Phase failure motor cable

Reaction: OFF2 (NONE, OFF1, OFF3)

Acknowledge: IMMEDIATELY

Cause: A phase failure in the motor feeder cable was detected.
The signal can also be output in the following cases:
- the motor is correctly connected, but the drive has stalled in U/f control. In this case, a current of 0 A is possibly measured in one phase due to asymmetry of the currents.
- the motor is correctly connected, however the closed-speed control is instable and therefore an oscillating torque is generated.
Note:
Chassis power units do not feature phase failure monitoring.

Remedy: - check the motor feeder cables.
- increase the ramp-up or ramp-down time (p1120) if the drive has stalled in U/f control.
- check the speed controller settings.

A30016 (N) Power unit: Load supply switched off

Reaction: NONE

Acknowledge: NONE

Cause: The DC link voltage is too low.
Alarm value (r2124, interpret decimal):
DC link voltage at the time of trip [0.1 V].

Remedy: Under certain circumstances, the AC line supply is not switched on.

F30017 Power unit: Hardware current limit has responded too often

Reaction: OFF2

Acknowledge: IMMEDIATELY

Cause: The hardware current limitation in the relevant phase (see A30031, A30032, A30033) has responded too often. The number of times the limit has been exceeded depends on the design and type of power unit.
- closed-loop control is incorrectly parameterized.
- fault in the motor or in the power cables.
- the power cables exceed the maximum permissible length.
- motor load too high
- power unit defective.
Fault value (r0949, interpret binary):
Bit 0: Phase U
Bit 1: Phase V
Bit 2: Phase W

Remedy: - check the motor data.
- check the motor circuit configuration (star-delta).
- check the motor load.
- check the power cable connections.
- check the power cables for short-circuit or ground fault.
- check the length of the power cables.
- replace power unit.

F30021 Power unit: Ground fault

Reaction: OFF2

Acknowledge: IMMEDIATELY

Cause: The power has detected a ground fault.
Possible causes:
- ground fault in the power cables.
- ground fault at the motor.
- CT defective.
- when the brake closes, this causes the hardware DC current monitoring to respond.
- short-circuit at the braking resistor.
Fault value (r0949, interpret decimal):
0:
- the hardware DC current monitoring has responded.
- short-circuit at the braking resistor.
> 0:
Absolute value, summation current [32767 = 271 % rated current].

Remedy: - check the power cable connections.
- check the motor.
- check the CT.
- check the cables and contacts of the brake connection (a wire is possibly broken).
- check the braking resistor.
See also: p0287 (Ground fault monitoring thresholds)

F30022 Power unit: Monitoring U_ce

Reaction: OFF2

Acknowledge: POWER ON

Cause: In the power unit, the monitoring of the collector-emitter voltage (U_ce) of the semiconductor has responded.
Possible causes:
- fiber-optic cable interrupted.
- power supply of the IGBT gating module missing.
- short-circuit at the power unit output.
- defective semiconductor in the power unit.
Fault value (r0949, interpret binary):
Bit 0: Short-circuit in phase U
Bit 1: Short circuit in phase V
Bit 2: Short-circuit in phase W
Bit 3: Light transmitter enable defective
Bit 4: U_ce group fault signal interrupted
See also: r0949 (Fault value)

Remedy: - check the fiber-optic cable and if required, replace.
- check the power supply of the IGBT gating module (24 V).
- check the power cable connections.
- select the defective semiconductor and replace.

F30024 Power unit: Overtemperature thermal model

Reaction: OFF2

Acknowledge: IMMEDIATELY

Cause: The temperature difference between the heat sink and chip has exceeded the permissible limit value.
- the permissible load duty cycle was not maintained.
- insufficient cooling, fan failure.
- overload.
- ambient temperature too high.
- pulse frequency too high.

See also: r0037

Remedy:
- adapt the load duty cycle.
- check whether the fan is running.
- check the fan elements.
- check whether the ambient temperature is in the permissible range.
- check the motor load.
- reduce the pulse frequency if this is higher than the rated pulse frequency.
- if DC braking is active: reduce braking current (p1232).

F30025 Power unit: Chip overtemperature

Reaction: OFF2

Acknowledge: IMMEDIATELY

Cause: The chip temperature of the semiconductor has exceeded the permissible limit value.
- the permissible load duty cycle was not maintained.
- insufficient cooling, fan failure.
- overload.
- ambient temperature too high.
- pulse frequency too high.

Fault value (r0949, interpret decimal):
Temperature difference between the heat sink and chip [0.01 °C].

Remedy:
- adapt the load duty cycle.
- check whether the fan is running.
- check the fan elements.
- check whether the ambient temperature is in the permissible range.
- check the motor load.
- reduce the pulse frequency if this is higher than the rated pulse frequency.

Notice:
This fault can only be acknowledged after the alarm threshold for alarm A05001 has been undershot.
See also: r0037

F30027 Power unit: Precharging DC link time monitoring

Reaction: OFF2

Acknowledge: IMMEDIATELY

Cause: The power unit DC link was not able to be precharged within the expected time.
1) There is no line supply voltage connected.
2) The line contactor/line side switch has not been closed.
3) The line supply voltage is too low.
4) Line supply voltage incorrectly set (p0210).
5) The precharging resistors are overheated as there were too many precharging operations per time unit.
6) The precharging resistors are overheated as the DC link capacitance is too high.
7) The DC link has either a ground fault or a short-circuit.
8) Precharging circuit may be defective.
Fault value (r0949, interpret binary):
yyyyxxxx hex:
yyyy = power unit state
0: Fault status (wait for OFF and fault acknowledgment).
1: Restart inhibit (wait for OFF).
2: Overvoltage condition detected -> change into the fault state.
3: Undervoltage condition detected -> change into the fault state.
4: Wait for bridging contactor to open -> change into the fault state.
5: Wait for bridging contactor to open -> change into restart inhibit.
6: Commissioning.
7: Ready for precharging.
8: Precharging started, DC link voltage less than the minimum switch-on voltage.
9: Precharging, DC link voltage end of precharging still not detected.
10: Wait for the end of the de-bounce time of the main contactor after precharging has been completed.
11: Precharging completed, ready for pulse enable.
12: Reserved.
xxxx = Missing internal enable signals, power unit (inverted bit-coded, FFFF hex -> all internal enable signals available)
Bit 0: Power supply of the IGBT gating shut down.
Bit 1: Ground fault detected.
Bit 2: Peak current intervention.
Bit 3: I2t exceeded.
Bit 4. Thermal model overtemperature calculated.
Bit 5: (heat sink, gating module, power unit) overtemperature measured.
Bit 6: Reserved.
Bit 7: Overvoltage detected.
Bit 8: Power unit has completed precharging, ready for pulse enable.
Bit 9: Reserved.
Bit 10: Overcurrent detected.
Bit 11: Reserved.
Bit 12: Reserved.
Bit 13: Vce fault detected, transistor de-saturated due to overcurrent/short-circuit.
Bit 14: Undervoltage detected.
See also: p0210 (Drive unit line supply voltage)

Remedy: In general:
- check the line supply voltage at the input terminals.
- check the line supply voltage setting (p0210).
- wait until the precharging resistors have cooled down. For this purpose, preferably disconnect the infeed unit from the line supply.
For 5):
- carefully observe the permissible precharging frequency (refer to the appropriate Equipment Manual).
For 6):
- check the capacitance of the DC link and, if necessary, reduce it in accordance with the maximum permissible DC link capacitance (see relevant Equipment Manual).
For 7):
- check the DC link for a ground fault or short circuit.
See also: p0210 (Drive unit line supply voltage)

A30030 Power unit: Internal overtemperature alarm

Reaction: NONE
Acknowledge: NONE
Cause: The temperature inside the drive converter has exceeded the permissible temperature limit.
- insufficient cooling, fan failure.
- overload.
- ambient temperature too high.
Alarm value (r2124, interpret decimal):
Only for internal Siemens troubleshooting.
Remedy: - possibly use an additional fan.
- check whether the ambient temperature is in the permissible range.
Notice:
This fault can only be acknowledged once the permissible temperature limit minus 5 K has been fallen below.

A30031 Power unit: Hardware current limiting in phase U

Reaction: NONE
Acknowledge: NONE
Cause: Hardware current limit for phase U responded. The pulsing in this phase is inhibited for one pulse period.
- closed-loop control is incorrectly parameterized.
- fault in the motor or in the power cables.
- the power cables exceed the maximum permissible length.
- motor load too high
- power unit defective.
Note:
Alarm A30031 is always output if, for a Power Module, the hardware current limiting of phase U, V or W responds.
Remedy: - check the motor data and if required, recalculate the control parameters (p0340 = 3). As an alternative, run a motor data identification (p1910 = 1, p1960 = 1).
- check the motor circuit configuration (star/delta).
- check the motor load.
- check the power cable connections.
- check the power cables for short-circuit or ground fault.
- check the length of the power cables.

A30032 Power unit: Hardware current limiting in phase V

Reaction: NONE
Acknowledge: NONE

Cause: Hardware current limit for phase V responded. The pulsing in this phase is inhibited for one pulse period.
- closed-loop control is incorrectly parameterized.
- fault in the motor or in the power cables.
- the power cables exceed the maximum permissible length.
- motor load too high
- power unit defective.

Note:
Alarm A30031 is always output if, for a Power Module, the hardware current limiting of phase U, V or W responds.

Remedy: Check the motor data and if required, recalculate the control parameters (p0340 = 3). As an alternative, run a motor data identification (p1910 = 1, p1960 = 1).
- check the motor circuit configuration (star/delta).
- check the motor load.
- check the power cable connections.
- check the power cables for short-circuit or ground fault.
- check the length of the power cables.

A30033 Power unit: Hardware current limiting in phase W

Reaction: NONE

Acknowledge: NONE

Cause: Hardware current limit for phase W responded. The pulsing in this phase is inhibited for one pulse period.
- closed-loop control is incorrectly parameterized.
- fault in the motor or in the power cables.
- the power cables exceed the maximum permissible length.
- motor load too high
- power unit defective.

Note:
Alarm A30031 is always output if, for a Power Module, the hardware current limiting of phase U, V or W responds.

Remedy:
- check the motor data and if required, recalculate the control parameters (p0340 = 3). As an alternative, run a motor data identification (p1910 = 1, p1960 = 1).
- check the motor circuit configuration (star/delta).
- check the motor load.
- check the power cable connections.
- check the power cables for short-circuit or ground fault.
- check the length of the power cables.

A30034 Power unit: Internal overtemperature

Reaction: NONE

Acknowledge: NONE

Cause: The alarm threshold for internal overtemperature has been reached.
If the temperature inside the unit continues to increase, fault F30036 may be triggered.
- ambient temperature might be too high.
- insufficient cooling, fan failure.

Alarm value (r2124, interpret decimal):
Only for internal Siemens troubleshooting.

Remedy:
- check the ambient temperature.
- check the fan for the inside of the unit.

F30035 Power unit: Air intake overtemperature

Reaction: OFF1 (OFF2)

Acknowledge: IMMEDIATELY

Cause: The air intake in the power unit has exceeded the permissible temperature limit.
For air-cooled power units, the temperature limit is at 55 °C.
- ambient temperature too high.
- insufficient cooling, fan failure.
Fault value (r0949, interpret decimal):
Temperature [0.01 °C].

Remedy: - check whether the fan is running.
- check the fan elements.
- check whether the ambient temperature is in the permissible range.
Notice:
This fault can only be acknowledged after the alarm threshold for alarm A05002 has been undershot.

F30036 Power unit: Internal overtemperature

Reaction: OFF2

Acknowledge: IMMEDIATELY

Cause: The temperature inside the drive converter has exceeded the permissible temperature limit.
- insufficient cooling, fan failure.
- overload.
- ambient temperature too high.
Fault value (r0949, interpret decimal):
Only for internal Siemens troubleshooting.

Remedy: - check whether the fan is running.
- check the fan elements.
- check whether the ambient temperature is in the permissible range.
Notice:
This fault can only be acknowledged once the permissible temperature limit minus 5 K has been fallen below.

F30037 Power unit: Rectifier overtemperature

Reaction: OFF2

Acknowledge: IMMEDIATELY

Cause: The temperature in the rectifier of the power unit has exceeded the permissible temperature limit.
- insufficient cooling, fan failure.
- overload.
- ambient temperature too high.
- line supply phase failure.
Fault value (r0949, interpret decimal):
Temperature [0.01 °C].

Remedy: - check whether the fan is running.
- check the fan elements.
- check whether the ambient temperature is in the permissible range.
- check the motor load.
- check the line supply phases.
Notice:
This fault can only be acknowledged after the alarm threshold for alarm A05004 has been undershot.

A30042 Power unit: Fan has reached the maximum operating hours

Reaction: NONE

Acknowledge: NONE

Cause: The maximum operating time of at least one fan will soon be reached, or has already been exceeded.
Alarm value (r2124, interpret binary):
Bit 0: heat sink fan will reach the maximum operating time in 500 hours.
Bit 1: heat sink fan has exceeded the maximum operating time.
Bit 8: internal device fan will reach the maximum operating time in 500 hours.
Bit 9: internal device fan has exceeded the maximum operating time.
Note:
The maximum operating time of the heat sink fan in the power unit is displayed in p0252.
The maximum operating time of the internal device fan in the power unit is internally specified and is fixed.

Remedy: For the fan involved, carry out the following:
- replace the fan.
- reset the operating hours counter (p0251, p0254).
See also: p0251, p0252, p0254

A30049 Power unit: Internal fan faulty

Reaction: NONE
Acknowledge: NONE
Cause: The internal fan has failed.
Remedy: Check the internal fan and replace if necessary.

F30051 Power unit: Motor holding brake short circuit detected

Reaction: OFF2
Acknowledge: IMMEDIATELY
Cause: A short-circuit at the motor holding brake terminals has been detected.
Fault value (r0949, interpret decimal):
Only for internal Siemens troubleshooting.
Remedy: - check the motor holding brake for a short-circuit.
- check the connection and cable for the motor holding brake.

F30052 EEPROM data error

Reaction: OFF2
Acknowledge: POWER ON
Cause: EEPROM data error of the power unit module.
Fault value (r0949, interpret decimal):
0, 2, 3, 4:
The EEPROM data read in from the power unit module is inconsistent.
1:
EEPROM data is not compatible to the firmware of the Control Unit.
Remedy: Replace power unit module.

A30057 Power unit: Line asymmetry

Reaction: NONE
Acknowledge: NONE
Cause: Frequencies have been detected on the DC link voltage that would suggest line asymmetry or failure of a line phase.
It is also possible that a motor phase has failed.
Fault F30011 is output if the alarm is present and at the latest after 5 minutes.
The precise duration depends on the power unit type and the particular frequencies. For booksize and chassis power units, the duration also depends on how long the alarm has been active.
Alarm value (r2124, interpret decimal):
Only for internal Siemens troubleshooting.

Remedy: - check the line phase connection.
- check the motor feeder cable connections.
If there is no phase failure of the line or motor, then line asymmetry is involved.
- reduce the power in order to avoid fault F30011.

F30059 Power unit: Internal fan faulty

Reaction: OFF2
Acknowledge: IMMEDIATELY
Cause: The internal power unit fan has failed and is possibly defective.
Remedy: Check the internal fan and replace if necessary.

A30065 (F, N) Voltage measured values not plausible

Reaction: NONE
Acknowledge: NONE
Cause: The voltage measurement is not supplying any plausible values
Alarm value (r2124, interpret bitwise binary):
Bit 1: Phase U.
Bit 2: Phase V.
Bit 3: Phase W.
Remedy: - Deactivate voltage measurement (p0247.0 = 0).
- Deactivate flying restart with voltage measurement (p0247.5 = 0) and deactivate fast flying restart (p1780.11 = 0).

F30068 Power unit: undertemperature inverter heat sink

Reaction: OFF2
Acknowledge: IMMEDIATELY
Cause: The actual inverter heat sink temperature is below the permissible minimum value.
Possible causes:
- the power unit is being operated at an ambient temperature that lies below the permissible range.
- the temperature sensor evaluation is defective.
Fault value (r0949, interpret decimal): inverter heat sink temperature [0.1 °C].
Remedy: - ensure that higher ambient temperatures prevail.
- replace the power unit.

F30071 No new actual values received from the Power Module

Reaction: OFF2
Acknowledge: IMMEDIATELY
Cause: More than one actual value telegram from the power unit module has failed.
Remedy: Check the interface (adjustment and locking) to the power unit module.

F30072 Setpoints can no longer be transferred to the Power Module

Reaction: OFF2
Acknowledge: IMMEDIATELY
Cause: More than one setpoint telegram was not able to be transferred to the power unit module.
Remedy: Check the interface (adjustment and locking) to the power unit module.

F30074 (A) Communication error between the Control Unit and Power Module

Reaction: NONE
Acknowledge: IMMEDIATELY

Cause: Communications between the Control Unit (CU) and Power Module (PM) via the interface no longer possible. The CU may have been withdrawn or is incorrectly inserted.

Fault value (r0949, interpret hexadecimal):

0 hex:

- a Control Unit with external 24 V supply was withdrawn from the Power Module during operation.
- with the Power Module switched off, the external 24 V supply for the Control Unit was interrupted for some time.

1 hex:

The Control Unit was withdrawn from the Power Module during operation, although the encoderless safe motion monitoring functions are enabled. This is not supported. After re-inserting the Control Unit in operation, communications to the Power Module no longer possible.

20A hex:

The Control Unit was inserted on a Power Module, which has another code number.

20B hex:

The Control Unit was inserted on a Power Module, which although it has the same code number, has a different serial number. The Control Unit executes an automatic warm restart to accept the new calibration data.

Remedy: For fault value = 0 and 20A hex:

Insert the Control Unit on an appropriate Power Module and continue operation. If required, carry out a POWER ON of the Control Unit.

For fault value = 1 hex:

Carry out a POWER ON of the Control Unit.

F30075 Configuration of the power unit unsuccessful

Reaction: OFF2

Acknowledge: IMMEDIATELY

Cause: A communication error has occurred while configuring the power unit using the Control Unit. The cause is not clear.

Fault value (r0949, interpret decimal):

0:

The output filter initialization was unsuccessful.

1:

Activation/deactivation of the regenerative feedback functionality was unsuccessful.

Remedy: - acknowledge the fault and continue operation.

- if the fault reoccurs, carry out a POWER ON (switch-off/switch-on).
- if required, replace the power unit.

F30080 Power unit: Current increasing too quickly

Reaction: OFF2

Acknowledge: IMMEDIATELY

Cause: The power unit has detected an excessive rate of rise in the overvoltage range.

- closed-loop control is incorrectly parameterized.
- motor has a short-circuit or fault to ground (frame).
- U/f operation: Up ramp set too low.
- U/f operation: rated current of motor much greater than that of power unit.
- power cables are not correctly connected.
- power cables exceed the maximum permissible length.
- power unit defective.

Fault value (r0949, interpret bitwise binary):

Bit 0: Phase U.

Bit 1: Phase V.

Bit 2: Phase W.

Remedy: - check the motor data - if required, carry out commissioning.
- check the motor circuit configuration (star-delta)
- U/f operation: Increase up ramp.
- U/f operation: Check assignment of rated currents of motor and power unit.
- check the power cable connections.
- check the power cables for short-circuit or ground fault.
- check the length of the power cables.
- replace power unit.

F30081 Power unit: Switching operations too frequent

Reaction: OFF2
Acknowledge: IMMEDIATELY
Cause: The power unit has executed too many switching operations for current limitation.
- closed-loop control is incorrectly parameterized.
- motor has a short-circuit or fault to ground (frame).
- U/f operation: Up ramp set too low.
- U/f operation: rated current of motor much greater than that of power unit.
- power cables are not correctly connected.
- power cables exceed the maximum permissible length.
- power unit defective.
Fault value (r0949, interpret bitwise binary):
Bit 0: Phase U.
Bit 1: Phase V.
Bit 2: Phase W.
Remedy: - check the motor data - if required, carry out commissioning.
- check the motor circuit configuration (star-delta)
- U/f operation: Increase up ramp.
- U/f operation: Check assignment of rated currents of motor and power unit.
- check the power cable connections.
- check the power cables for short-circuit or ground fault.
- check the length of the power cables.
- replace power unit.

F30105 PU: Actual value sensing fault

Reaction: OFF2
Acknowledge: IMMEDIATELY
Cause: At least one incorrect actual value channel was detected on the Power Stack Adapter (PSA).
The incorrect actual value channels are displayed in the following diagnostic parameters.
Remedy: Evaluate the diagnostic parameters.
If the actual value channel is incorrect, check the components and if required, replace.

A30502 Power unit: DC link overvoltage

Reaction: NONE
Acknowledge: NONE
Cause: The power unit has detected overvoltage in the DC link on a pulse inhibit.
- device connection voltage too high.
- line reactor incorrectly dimensioned.
Alarm value (r0949, interpret decimal):
DC link voltage [1 bit = 100 mV].
See also: r0070 (Actual DC link voltage)

Remedy: - check the device supply voltage (p0210).
- check the dimensioning of the line reactor.
See also: p0210 (Drive unit line supply voltage)

F30662 Error in internal communications

Reaction: OFF2
Acknowledge: POWER ON
Cause: A module-internal communication error has occurred.
Fault value (r0949, interpret hexadecimal):
Only for internal Siemens troubleshooting.
Remedy: - carry out a POWER ON (switch-off/switch-on).
- upgrade firmware to later version.
- contact Technical Support.

F30664 Error while booting

Reaction: OFF2
Acknowledge: POWER ON
Cause: An error has occurred during booting.
Fault value (r0949, interpret hexadecimal):
Only for internal Siemens troubleshooting.
Remedy: - carry out a POWER ON (switch-off/switch-on).
- upgrade firmware to later version.
- contact Technical Support.

N30800 (F) Power unit: Group signal

Reaction: OFF2
Acknowledge: NONE
Cause: The power unit has detected at least one fault.
Remedy: Evaluate the other messages that are presently available.

F30802 Power unit: Time slice overflow

Reaction: OFF2
Acknowledge: IMMEDIATELY
Cause: A time slice overflow has occurred.
Fault value (r0949, interpret decimal):
xx: Time slice number xx
Remedy: - carry out a POWER ON (switch-off/switch-on) for all components.
- upgrade firmware to later version.
- contact Technical Support.

F30804 (N, A) Power unit: CRC

Reaction: OFF2 (OFF1, OFF3)
Acknowledge: IMMEDIATELY
Cause: A checksum error (CRC error) has occurred for the power unit.
Remedy: - carry out a POWER ON (switch-off/switch-on) for all components.
- upgrade firmware to later version.
- contact Technical Support.

F30805	**Power unit: EEPROM checksum error**
Reaction:	OFF2
Acknowledge:	IMMEDIATELY
Cause:	Internal parameter data is corrupted. Fault value (r0949, interpret hexadecimal): 01: EEPROM access error. 02: Too many blocks in the EEPROM.
Remedy:	Replace the module.

F30809	**Power unit: Switching information not valid**
Reaction:	OFF2
Acknowledge:	IMMEDIATELY
Cause:	For 3P gating unit, the following applies: The last switching status word in the setpoint telegram is identified by the end ID. Such an end ID was not found.
Remedy:	- carry out a POWER ON (switch-off/switch-on) for all components. - upgrade firmware to later version. - contact Technical Support.

A30810 (F)	**Power unit: Watchdog timer**
Reaction:	NONE
Acknowledge:	NONE
Cause:	When booting it was detected that the cause of the previous reset was an SAC watchdog timer overflow.
Remedy:	- carry out a POWER ON (switch-off/switch-on) for all components. - upgrade firmware to later version. - contact Technical Support.

F30850	**Power unit: Internal software error**
Reaction:	OFF1 (NONE, OFF2, OFF3)
Acknowledge:	POWER ON
Cause:	An internal software error has occurred in the power unit. Fault value (r0949, interpret decimal): Only for internal Siemens troubleshooting.
Remedy:	- replace power unit. - if required, upgrade the firmware in the power unit. - contact Technical Support.

F30903	**Power unit: I2C bus error occurred**
Reaction:	OFF2 (IASC/DCBRK, NONE, OFF1, OFF3, STOP2)
Acknowledge:	IMMEDIATELY
Cause:	Communications error with an EEPROM or an analog/digital converter. Fault value (r0949, interpret hexadecimal): 80000000 hex: - internal software error. 00000001 hex ... 0000FFFF hex: - module fault.
Remedy:	For fault value = 80000000 hex: - upgrade firmware to later version. For fault value = 00000001 hex ... 0000FFFF hex: - replace the module.

A30920 (F) Temperature sensor fault

Reaction: NONE

Acknowledge: NONE

Cause: When evaluating the temperature sensor, an error occurred.
Alarm value (r2124, interpret decimal):
1: Wire breakage or sensor not connected.
KTY: R > 2120 Ohm, PT1000: R > 2120 Ohm
2: Measured resistance too low.
PTC: R < 20 Ohm, KTY: R < 50 Ohm, PT1000: R < 603 Ohm

Remedy: - make sure that the sensor is connected correctly.
- replace the sensor.

F30950 Power unit: Internal software error

Reaction: OFF2

Acknowledge: POWER ON

Cause: An internal software error has occurred.
Fault value (r0949, interpret decimal):
Information about the fault source.
Only for internal Siemens troubleshooting.

Remedy: - if necessary, upgrade the firmware in the power unit to a later version.
- contact Technical Support.

A30999 (F, N) Power unit: Unknown alarm

Reaction: NONE

Acknowledge: NONE

Cause: An alarm occurred on the power unit that cannot be interpreted by the Control Unit firmware.
This can occur if the firmware on this component is more recent than the firmware on the Control Unit.
Alarm value (r2124, interpret decimal):
Alarm number.
Note:
If required, the significance of this new alarm can be read about in a more recent description of the Control Unit.

Remedy: - replace the firmware on the power unit by an older firmware version (r0128).
- upgrade the firmware on the Control Unit (r0018).

F35950 TM: Internal software error

Reaction: OFF2 (NONE)

Acknowledge: POWER ON

Cause: An internal software error has occurred.
Fault value (r0949, interpret decimal):
Information about the fault source.
Only for internal Siemens troubleshooting.

Remedy: - if necessary, upgrade the firmware in the Terminal Module to a later version.
- contact Technical Support.

A50010 (F) PROFINET: Consistency error affecting adjustable parameters

Reaction: NONE

Acknowledge: NONE

Cause: A consistency error was detected when activating the configuration (p8925) for the PROFINET interface. The currently set configuration has not been activated.

Alarm value (r2124, interpret decimal):

0: general consistency error

1: error in the IP configuration (IP address, subnet mask or standard gateway).

2: Error in the station names.

3: DHCP was not able to be activated, as a cyclic PROFINET connection already exists.

4: a cyclic PROFINET connection is not possible as DHCP is activated.

Note:

DHCP: Dynamic Host Configuration Protocol

Remedy: - check the required interface configuration (p8920 and following), correct if necessary, and activate (p8925).

or

- reconfigure the station via the "Edit Ethernet node" screen form (e.g. with STARTER commissioning software).

A50011 (F) Ethernet/IP: configuration error

Reaction: NONE

Acknowledge: NONE

Cause: An EtherNet/IP controller attempts to establish a connection using an incorrect configuring telegram.

The telegram length set in the controller does not match the parameterization in the drive device.

Remedy: Check the set telegram length.

For p0922 not equal to 999, then the length of the selected telegram applies.

For p0922 = 999, the maximum interconnected PZD (r2067) applies.

See also: p0922, r2067

F50510 FBLOCKS: Logon of the run-time group rejected

Reaction: OFF2

Acknowledge: IMMEDIATELY

Cause: When the run-time groups of the free function blocks attempted to log on with the sampling time management, the logon of at least one run-time group was rejected.

Too many different hardware sampling times may have been assigned to the free function blocks.

See also: r20008 (Hardware sampling times available)

Remedy: - check number of available hardware sampling times (T_sample < 8 ms) (r7903).

F50511 FBLOCKS: Memory no longer available for free function blocks

Reaction: OFF2

Acknowledge: IMMEDIATELY

Cause: When the free function blocks were activated, more memory was requested than was available on the Control Unit.

Remedy: Not necessary.

A50513 (F) FBLOCKS: Run sequence value already assigned

Reaction: NONE

Acknowledge: NONE

Cause: An attempt was made to assign a run sequence value already assigned to a function block on this drive object to another additional function block on the same drive object. A run sequence value can only be precisely assigned to one function block on one drive object.

Remedy: Set another value that is still available on this drive object for the run sequence.

A50517 FBLOCKS: Int. meas. active

Reaction: NONE

Acknowledge: NONE

Cause: A Siemens internal measurement has been activated.

Remedy: Carry out a POWER ON (switch-off/switch-on) for the Control Unit involved.

F50518 FBLOCKS: Sampling time of free run-time group differs at download

Reaction: NONE

Acknowledge: IMMEDIATELY

Cause: In the STARTER/SCOUT project that was downloaded, the hardware sampling time of a free run-time group (1 <= p20000[i] <= 256) was set to a value that was either too low or too high.

The sampling time must be between 1 ms and the value r20003 - r20002.

If the sampling time of the selected free run-time group is < 1 ms, the equivalent value of 1 ms is used.

If the value >= r20003, then the sampling time is set to the next higher or the same software sampling time >= r21003.

Fault value (r0949, interpret decimal):

Number of the p20000 index of the run-time group where the sampling time is incorrectly set.

Number of the run-time group = fault value + 1

See also: r20008 (Hardware sampling times available)

Remedy: - correctly set the sampling time of the run-time group.

- if required, take all of the blocks from the run-time group.

Note:

Fault F50518 only detects an incorrectly parameterized run-time group. If, after correcting p20000[i] in the project, this error occurs again at download, then the run-time group involved should be identified using the fault value (r0949) and the sampling time correctly set.

F52960 Cavitation protection failure

Reaction: OFF2

Acknowledge: IMMEDIATELY

Cause: Conditions exist for cavitation damage. Cavitation damage is damage caused to a pump in pumping systems when the fluid is not flowing sufficiently. This can lead to heat build up and subsequent damage to the pump.

Remedy: If cavitation is not occurring, reduce the cavitation threshold p29626, or increase the cavitation protection delay. Ensure sensor feedback is working.

A52961 Cavitation protection warning

Reaction: NONE

Acknowledge: NONE

Cause: Conditions for possible cavitation damage are detected.

Remedy: See F52960.

A52962 Mpc operating time limit exceeded

Reaction: NONE

Acknowledge: NONE

Cause: The continuous operating time of at least one motor has exceeded the limit.

Remedy: Increase p29531 or set p29547 = 0.

A52963 Mpc PID deviation exceeded

Reaction: NONE

Acknowledge: NONE

Cause: The technology controller deviation (r2273) has exceeded the threashold (p29546) and all motors are running except the motors under service or locked.

Remedy: - Repair or unlock motors if there are motors under service or locked.

- Add more motors in the system if the number of motors is less than four.

A52964 Mpc one motor available

Reaction: NONE

Acknowledge: NONE

Cause: Only one motor is not under service or locked manually. All the other motors are under service or locked manually.

Remedy: Repair or unlock motors.

F52965 Mpc no motor available

Reaction: OFF2

Acknowledge: IMMEDIATELY

Cause: All motors are under service or locked manually.

Remedy: Repair or unlock (set p29542 = 0) motors.

F52966 Mpc motor quantity not matched

Reaction: OFF2

Acknowledge: IMMEDIATELY

Cause: p29521 and digital output settings do not match.

Remedy: Case 1: without I/O extended module.

Change p29521 or digital output (p0730, p0731, p0732, p0733) settings to ensure that the motor quantity set in p29521 matches with the quantity of digital outputs (mapped in r29529).

Case 2: added I/O extended module.

Change p29521 or digital output (p0730, p0731, p0732, p0733, p0734, p0735) settings to ensure that the motor quantity set in p29521 matches with the quantity of digital outputs (mapped in r29529). If p29521 is greater than four, but the CU without I/O extended module, the fault occurs.

Corrective maintenance 11

> ⚠ **WARNING**
>
> **Fire or electric shock due to defective components**
>
> If an overcurrent protection device is triggered, the converter may be defective. A defective converter can cause a fire or electric shock.
>
> - Have the converter and the overcurrent protection device checked by a specialist.

Repair

> ⚠ **WARNING**
>
> **Fire or electric shock due to improper repair**
>
> Improper repair of the converter may cause malfunctions or result in consequential damage such as fire or electric shock.
>
> - Only commission the following persons to repair the converter:
>   - Siemens customer service
>   - A repair center that has been authorized by Siemens
>   - Specialist personnel who are thoroughly acquainted with all the warnings and operating procedures contained in this manual.
> - Only use original spare parts when carrying out repairs.

> ⚠ **CAUTION**
>
> **Burns due to touching hot surfaces**
>
> Certain components (e.g. the heat sink or line reactor) can become very hot during operation. The components can remain hot for some time after operation. Touching hot surfaces can cause burns to the skin.
>
> - Do not touch hot components during operation or immediately following operation.

11.1 Replacing the converter

11.1.1 Replacing the converter hardware

Overview

You may only replace a converter with a different converter under certain preconditions.

Requirement

The following preconditions apply for making a replacement:

- The new converter has the same or more recent firmware version than that of the converter being replaced.
- The two converters must also satisfy one of the following conditions:
  - The new and replaced converters have the same power rating.
  - The new converter has a different power rating than the converter it replaced, but still has the same frame size.
    In this case, the rated power of the converter and the rated motor power must not differ too much.
    The following values are permissible for the quotients (rated motor power)/(rated converter power): 0.25 ... 1.5

Description

WARNING

Unexpected machine motion caused by incorrect converter type

Replacing converters of different types can result in incomplete or incorrect/inappropriate converter settings. As a consequence, machines can unexpectedly move, e.g. speed oscillation, overspeed or incorrect direction of rotation. Unexpected machine motion can result in death, injury and/or material damage.

- In all cases not permitted according to the above precondition, you must recommission the drive after replacing the converter.

⚠ WARNING

Unexpected machine motion caused by inappropriate/incorrect converter settings

Missing or incorrect converter settings can lead to unexpected operating states or machine movements, e.g. a non-functioning EMERGENCY STOP or an incorrect direction of rotation. As a consequence, machine components or devices can become damaged or death or bodily injury may result.

- Back up the settings of the converter to be replaced by uploading them to an external storage medium, e.g. a memory card.
- Transfer the settings of the converter to be replaced by downloading them to the new converter.
- If you do not have a backup of the converter settings, commission the new converter as completely new converter.
- Check that the new converter works properly.

Procedure

1. Disconnect the line voltage to the converter.

   ⚠ WARNING

   Electric shock as a result of a residual charge in power components

   After the power supply has been switched off, it takes up to 5 min. until the capacitors in the converter have discharged so that the residual charge is at a non-hazardous level.

   - Check the voltage at the converter connections, before removing the connection cables.

2. Remove the connecting cables of the converter.
3. Remove the defective converter.
4. Install the new converter.
5. Connect all of the cables to the converter.

   NOTICE

   Damage caused by interchanging the motor cables

   The direction in which the motor rotates switches if you exchange the two phases of the motor line. An incorrect direction of rotation can lead to damage in the machine or system.

   - Connect the 3 phases of the motor lines in the correct sequence.

6. Switch on the line voltage of the converter.
7. Set the new converter to suit the application:
   - If the settings of the replaced converter are backed up on an external storage medium, transfer the settings via a download.
     Download of the converter settings (Page 1076)
   - If there is no data backup of the replaced converter, commission the converter as new converter.

You successfully replaced the converter.
❒

11.1.2 Download of the converter settings

11.1.2.1 Automatic download from the memory card

Overview

We recommend that you insert the memory card before switching on the converter. The converter automatically imports its settings from the inserted memory card.

Precondition

The following requirements apply:

- The converter power supply has been switched off.
- The converter settings are not protected against copying.
  Download with active know-how protection with copy protection (Page 1082)

Function description

Procedure

1. Insert the memory card into the converter.
2. Switch on the power supply for the converter.
3. The converter loads the settings from the memory card.
4. After loading, check whether the converter outputs Alarm A01028.
   – Alarm A01028:
   The loaded settings are not compatible with the converter.
   Delete the alarm with p0971 = 1.
   Recommission the drive.
   – No alarm A01028:
   The converter accepts the settings that have been loaded.

You have transferred the settings to the converter.
❒

11.1.2.2 Manual downloading from the memory card with the BOP-2

Overview

If you have backed up the settings of several converters on the memory card, the settings download must be started manually.

Precondition

The following requirements apply:

- The converter power supply has been switched on.
- The converter settings are not protected against copying.
  Download with active know-how protection with copy protection (Page 1082)

Function description

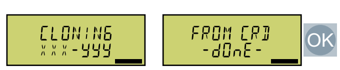
Procedure

1. Insert the memory card into the converter.
2. Select the download.

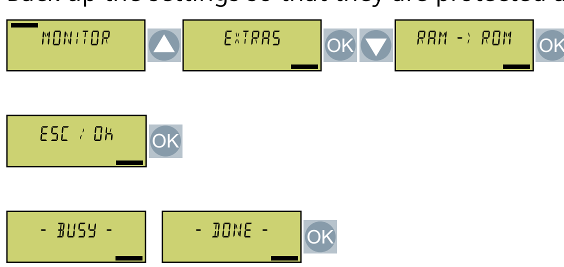
3. Set the number of your data backup. You can back up 99 different settings on the memory card.

4. Start the data transfer.

5. Wait until the converter has transferred the settings from the memory card.



6. Back up the settings so that they are protected against power failure.



You have transferred the settings from the memory card to the converter.
❒

11.1.2.3 Download from BOP-2 operator panel

Overview

You can transfer the converter settings that are backed up on the BOP-2 operator panel back into the converter.

Precondition

The following requirements apply:

- The converter power supply has been switched on.
- The converter settings are not protected against copying.
  Download with active know-how protection with copy protection (Page 1082)

Function description

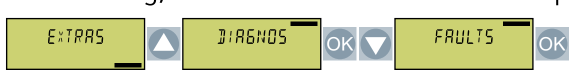
Procedure

1. Attach the Operator Panel to the converter.
2. Select the download from the operator panel to the converter.

3. Start the download.

4. Wait until the download is completed.

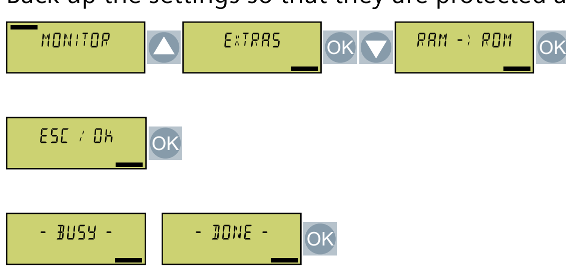
5. After loading, check whether the converter outputs Alarm A01028.



   – Alarm A01028:
     The loaded settings are not compatible with the converter.
     Delete the alarm with p0971 = 1.
     Recommission the drive.

   – No alarm A01028: Proceed with the next step.

6. Back up the settings so that they are protected against power failure.



You have transferred the settings to the converter.
❒

11.1.2.4 Download from IOP-2 operator panel

Overview

You can transfer the converter settings that are backed up on the IOP-2 operator panel back into the converter.

Precondition

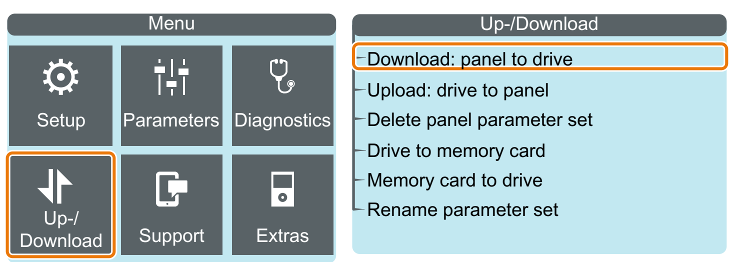
The following requirements apply:

- The converter power supply has been switched on.
- The converter settings are not protected against copying.
  Download with active know-how protection with copy protection (Page 1082)

Function description

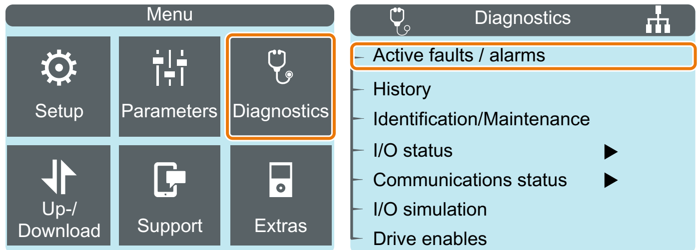
Procedure

1. Connect the operator panel to the converter.
2. Start the download.



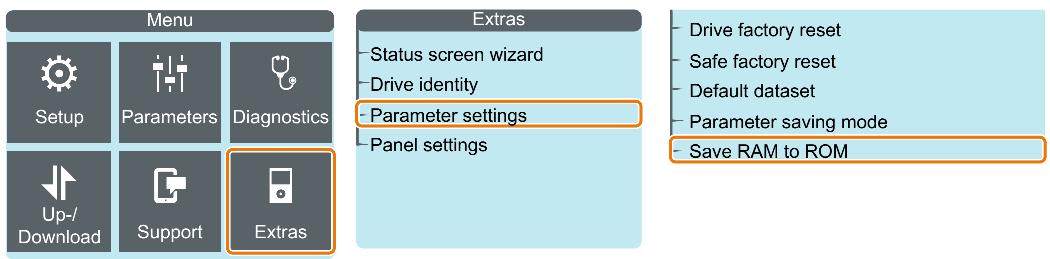
3. Wait until the download is completed.

4. After loading, check whether the converter outputs Alarm A01028.



   – Alarm A01028:
     The loaded settings are not compatible with the converter.
     Delete the alarm with p0971 = 1.
     Recommission the drive.
   – No alarm A01028: Proceed with the next step.

5. Back up the settings so that they are protected against power failure.



You transferred the settings to the converter.
❒

11.1.2.5 Download from Smart Access

Overview

You can transfer the converter settings that are backed up on the digital terminal device back into the converter.

Precondition

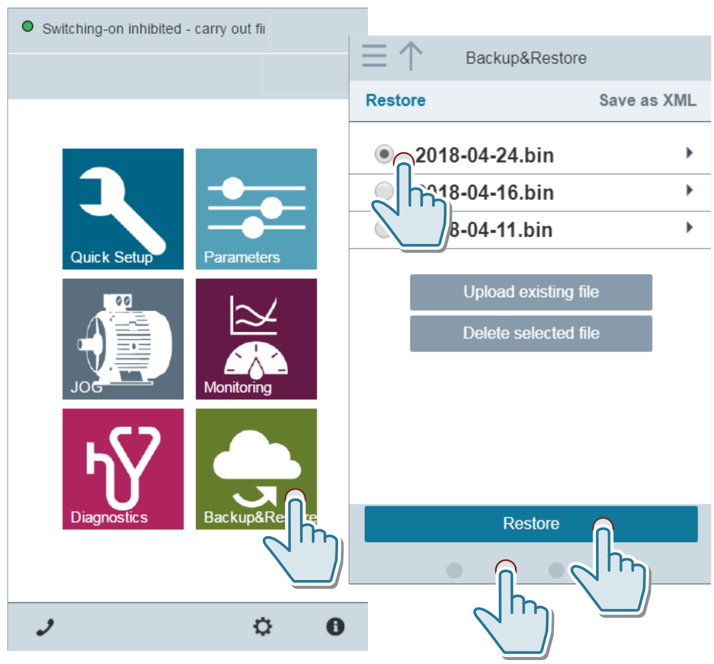
The following requirements apply:

- The converter power supply has been switched on.
- The converter settings are not protected against copying.
  Download with active know-how protection with copy protection (Page 1082)

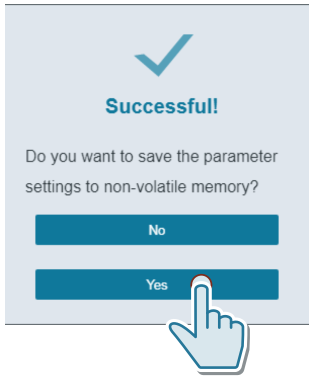
Function description

Procedure

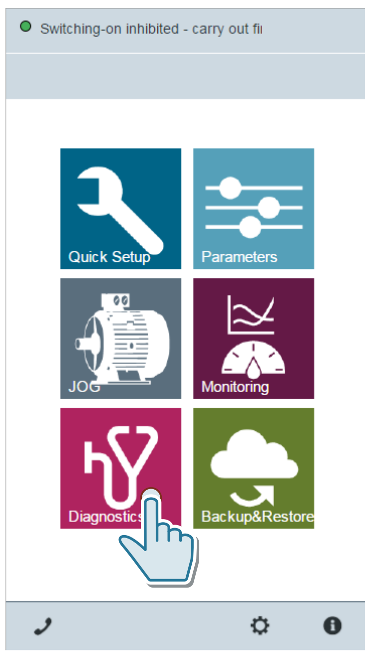
1. Attach the Smart Access to the converter.
2. Connect your terminal device with the Smart Access.
3. Select the file for restoring the converter settings.



4. Back up the settings so that they are protected against power failure.



5. After loading, check whether the converter outputs Alarm A01028.



   – Alarm A01028:
     The loaded settings are not compatible with the converter.
     Delete the alarm with p0971 = 1.
     Recommission the drive.

   – No alarm A01028: Proceed with the next step.

You transferred the settings from the Smart Access to the new converter.
❒

11.1.2.6 Download with active know-how protection with copy protection

Overview

The know-how protection function prevents converter settings from being copied.

There are two options to avoid recommissioning after a converter has been replaced.

Requirement

The following preconditions apply:

- The end user uses a SIEMENS memory card.
- The machine manufacturer (OEM) has an identical machine.

Function description

Procedure 1: The machine manufacturer only knows the serial number of the new converter

1. The end customer provides the machine manufacturer with the following information:
   - For which machine must the converter be replaced?
   - What is the serial number (r7758) of the new converter?
2. The machine manufacturer performs the following steps online on the prototype machine:
   - Deactivating know-how protection
     Activating and deactivating know-how protection (Page 169)
   - Enter the serial number of the new converter in p7759.
   - Enter the serial number of the inserted memory card as reference serial number in p7769.
   - Activate know-how protection with copy protection. "Copy RAM to ROM" must be activated.
   - Write the configuration with p0971 = 1 to the memory card.
   - Send the memory card to the end customer.
3. The end user inserts the memory card.
4. The end user switches on the converter power supply.
5. The converter checks the serial numbers of the card and the converter, and when there is a match the converter goes into the "Ready for switching on" state.
   If the numbers do not match, then the converter signals fault F13100 (no valid memory card).

The settings have been transferred to the converter.
❒

Procedure 2: The machine manufacturer knows the serial number of the new converter and the serial number of the memory card

1. The end customer provides the machine manufacturer with the following information:
   - For which machine must the converter be replaced?
   - What is the serial number (r7758) of the new converter?
   - What is the serial number of the memory card?
2. The machine manufacturer performs the following steps online on the prototype machine:
   - Deactivating know-how protection
     Activating and deactivating know-how protection (Page 169)
   - Enter the serial number of the new converter in p7759.
   - Enter the serial number of the customer's memory card as reference serial number in p7769.
   - Activate know-how protection with copy protection. "Copy RAM to ROM" must be activated.
   - Write the configuration with p0971 = 1 to the memory card.
   - Copy the encrypted project from the card to the associated PC.
   - Send the encrypted project to the end customer, e.g. via e-mail.
3. The end user copies the project to the Siemens memory card that belongs to the machine.
4. The end user inserts the Siemens memory card into the converter.
5. The end user switches on the converter power supply.
6. The converter checks the serial numbers of the card and the converter, and when there is a match the converter goes into the "Ready for switching on" state.
   If the numbers do not match, then the converter signals fault F13100 (no valid memory card).

The settings have been transferred to the converter.
❒

11.2 Replacing spare parts

11.2.1 Replacing the Control Unit

In the event of a long-term function fault, you may replace the Control Unit.

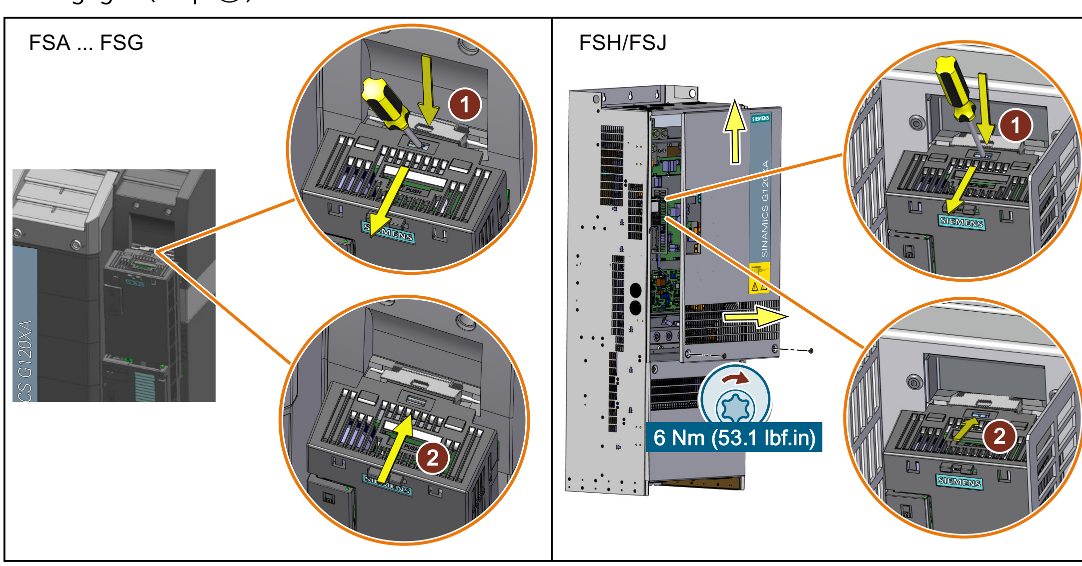
Precondition

The following preconditions apply for making a replacement:

- The new Control Unit has the same or more recent firmware version than that of the Control Unit being replaced.
- The new and replaced Control Unit have the same type of fieldbus interface.

Procedure

1. Disconnect the line voltage to the Power Module and (if installed) the external 24 V supply and the voltage for the digital outputs of the Control Unit.
2. For FSH and FSJ, remove the front cover to gain access to the Control Unit. For FSD to FSG, go to Step 3 directly.
3. Remove the control cables from the Control Unit.
4. Insert a screwdriver (3 mm) in the release slot of the Control Unit, and push down to release and remove the Control Unit (Step 1).
5. Fit the new Control Unit in place and press it on the Power Module until the latch audibly engages (Step 2).



6. Connect all the control cables to the new Control Unit.
7. Set the converter with the new Control Unit to suit the application:
   – If the settings of the replaced Control Unit are backed up on an external storage medium, transfer the settings via a download.
   Download of the converter settings (Page 1076)
   – If there is no data backup of the replaced Control Unit, commission the converter as a new one.

You have successfully replaced the Control Unit.
□

11.2.2 Spare parts compatibility

Continuous development within the scope of product maintenance

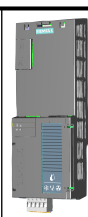
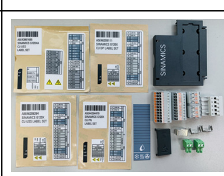
Converter components are being continuously developed within the scope of product maintenance. Product maintenance includes, for example, measures to increase the ruggedness or hardware changes which become necessary as components are discontinued.

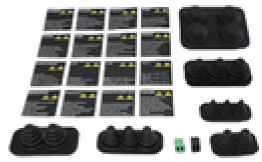
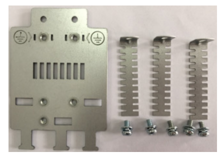
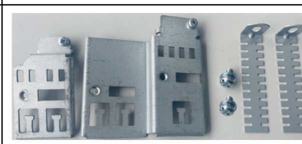
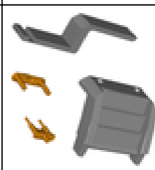
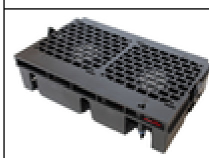
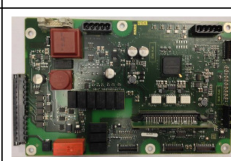
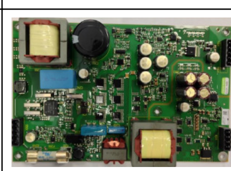
These further developments are "spare parts-compatible" and do not change the article number.

In the scope of such spare parts-compatible ongoing development, plug connector or connection positions are sometimes slightly modified. This does not cause any problems when the components are properly used. Please take this fact into consideration in special installation situations (e.g. allow sufficient reserve regarding the cable length).

11.2.3 Spare parts overview

The look of the spare part can differ from the picture.

Spare parts		Frame size	Article number
Control Unit (USS, Modbus RTU, BACnet MS/TP)		FSA ... FSJ	6SL3200-0SC00-0BA0
Kit for control interfaces: • 4 sets of labels • 1 CU door • 1 ESD cover • 2 U clamps • 1 functional grounding clamp • 1 RS485 connector • 1 set of I/O connectors		FSA ... FSJ	6SL3200-0SK10-0AA0

Spare parts		**Frame size**	**Article number**
1 set of small parts for installation		FSD ... FSG	6SL3200-0SK08-0AA0
Shield connection kit		FSA	6SL3262-1AA01-0DA0
		FSB	6SL3262-1AB01-0DA0
		FSC	6SL3262-1AC01-0DA0
Shield connection kit for the control in-terfaces		FSD ... FSG	6SL3264-1EA00-0YA0
Terminal cover kit		FSD	6SL3200-0SM13-0AA0
		FSE	6SL3200-0SM14-0AA0
		FSF	6SL3200-0SM15-0AA0
		FSG	6SL3200-0SM16-0AA0
External fan unit for the heat sink		FSA	6SL3200-0SF52-0AA0
		FSB	6SL3200-0SF53-0AA0
		FSC	6SL3200-0SF54-0AA0
		FSD	6SL3200-0SF15-0AA0
		FSE	6SL3200-0SF16-0AA0
		FSF	6SL3200-0SF17-0AA0
		FSG	6SL3200-0SF18-0AA0
		FSH	6SL3200-0SF55-0AA0
		FSJ	6SL3200-0SF56-0AA0
Internal fan unit		FSH/FSJ	6SL3200-0SF51-0AA0
Free programmable interface		FSH/FSJ	6SL3200-0SP05-0AA0
Power supply board		FSH/FSJ	6SL3200-0SP06-0AA0
Current transducer		FSH (315...400 kW)/FSJ (450 kW)	6SL3200-0SE01-0AA0
		FSJ (500...560 kW)	6SL3200-0SE02-0AA0

Spare parts		Frame size	Article number
SITOP power supply for the external fan		FSH/FSJ	6EP3446-8SB00-0AY0
Fuse for the external fan		FSH/FSJ	6SY7000-0AC46

11.2.4 Fan units

The average service life of the fan is 40,000 hours. In practice, however, the service life may deviate from this value. Especially a dusty environment can block up the fan. The defective fan must be replaced timely to ensure that the converter is ready for operation.

When must the fan unit be replaced?

A defective fan in operation results in an overtemperature condition of the converter. For example, the following messages indicate that the fan unit is defective:

- A05002 (air intake overtemperature)
- A05004 (rectifier overtemperature)
- F30004 (heat sink overtemperature)
- F30024 (temperature model overtemperature)
- F30025 (chip overtemperature)
- F30035 (air intake overtemperature)
- F30037 (rectifier overtemperature)

Precondition

Switch off the converter power supply before replacing the fan unit.

⚠ WARNING

Electric shock as a result of a residual charge in power components

After the power supply has been switched off, it takes up to 5 minutes until the capacitors in the converter have discharged so that the residual charge is at a non-hazardous level. Therefore, touching the converter immediately after powering off can result in electric shock due to residual charge in the power components.

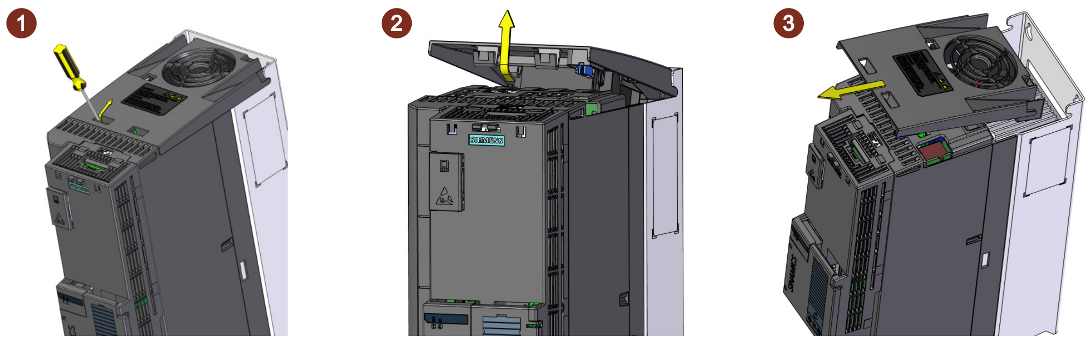
- Check the voltage at the converter connections before you replace the fan unit.

11.2.4.1 Replacing the fan unit, FSA ... FSC

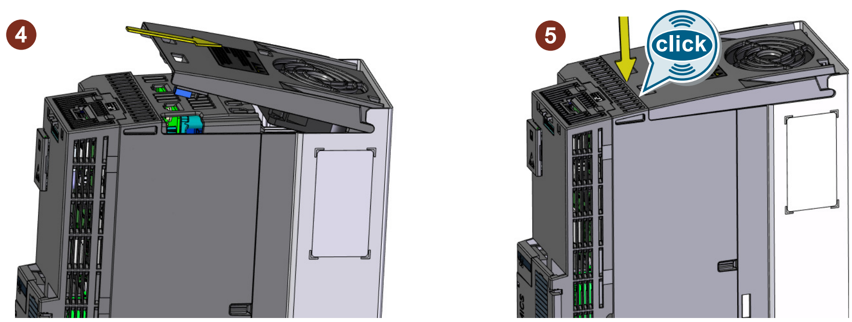
The fan unit is installed at the top.

Procedure

1. Switch off the converter power supply.
2. Use a screwdriver to remove the fan unit from the converter as shown below.



3. Install the new fan unit in the inverse sequence as shown below.



   By inserting the fan unit, you have established the electrical connection between the converter and fan unit.

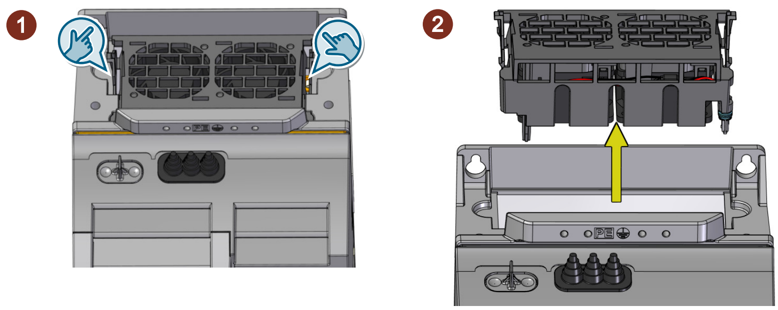
You have replaced the fan unit.
❒

11.2.4.2 Replacing the fan unit, FSD ... FSG

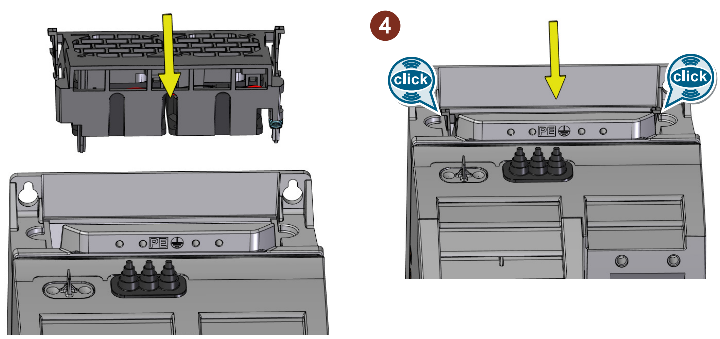
The fan unit is installed at the top.

Procedure

1. Switch off the converter power supply.
2. Press the release clips to remove the fan unit from the converter as shown below. Use a screwdriver if necessary.



3. Install the new fan unit in the inverse sequence as shown below.



By inserting the fan unit, you have established the electrical connection between the converter and fan unit.

You have replaced the fan unit.

❒

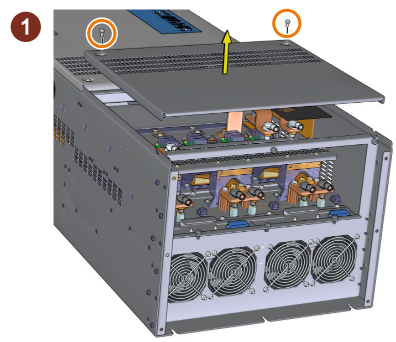
11.2.4.3 Replacing the fan unit, FSH/FSJ

Two external fan units are installed at the bottom of the converter.

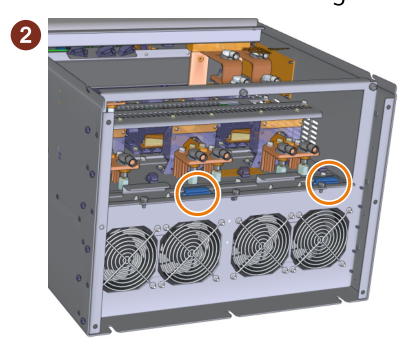
Procedure

Proceed as follows to replace the fan unit(s):

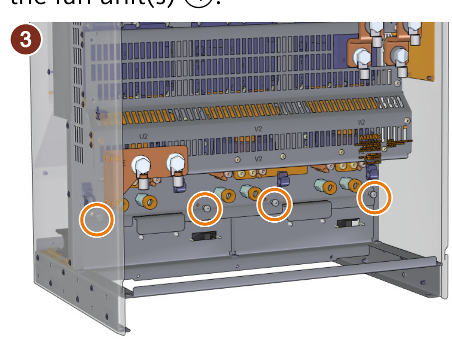
1. Switch off the converter power supply.
2. Release the retaining screws (two screws on FSH, and three screws on FSJ) and remove the lower cover of the converter ①.

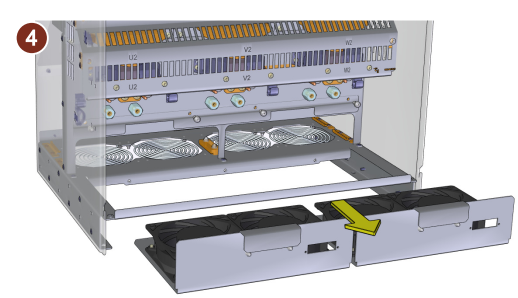


3. Disconnect the two cable lugs of fan power supply ②.



4. Release the retaining screws (four screws on FSH, and eight screws on FSJ) ③ and draw out the fan unit(s) ④.





5. Install the new fan unit(s) in the reverse sequence (tightening torque for the fixing screws: 3 Nm/26.5 lbf.in).

You have replaced the fan unit(s).
❒

11.2.4.4 Replacing the internal fan, FSH/FSJ only

Preconditions

The converter power supply is switched off.

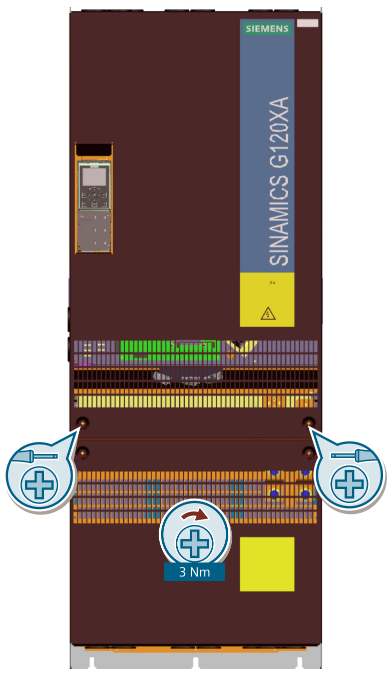
Required tools

Torque wrench for TX-25 screws

Function description

Removing the fan

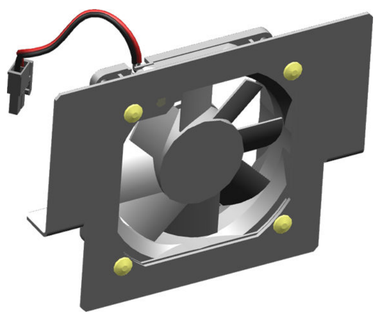
1. Remove 2 screws (TX-25) of the front cover.



2. Remove the front cover.
3. Remove the connector of the fan cable.

4. Remove 2 screws (TX-25).

5. Remove the fan.
6. Remove the fan from the mounting plate by loosening the 4 plastic screws.



The fan is removed.
❒

Installing the fan

1. Install the fan on the mounting plate by tightening the 4 plastic screws.
2. Align the fan to the screw holes.
3. Insert 2 screws (TX-25).
   Tightening torque: 3 Nm
4. Plug the connector.
5. Install the front cover.
6. Insert 2 screws (TX-25) of the front cover.
   Tightneing torque: 3 Nm

The fan is installed.
❒

11.2.5 Assemblies for FSH and FSJ

11.2.5.1 Replacing the power supply board

Precondition

The converter power supply is switched off.

Required tools

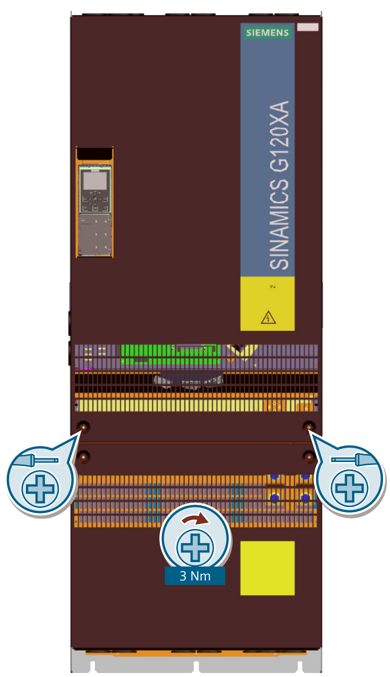
Torque wrench for the following screws:

- TX-20
- TX-25

Function description

Removing the power supply board

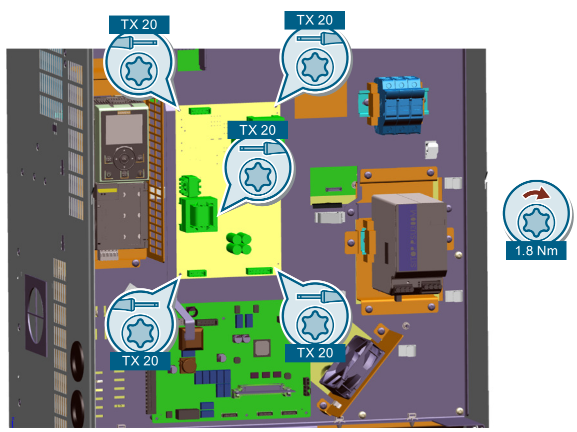
1. Remove 2 screws of the front cover.



2. Remove the front cover.

3. Remove the connectors on the power supply board.

4. Remove 5 screws (TX-20).



5. Remove the power supply board.

The power supply board is removed.
❒

Installing the power supply board

1. Align the power supply board to the screw holes.
2. Insert 5 screws (TX-20)
   Tightening torque: 1.8 Nm.
3. Plug the connectors onto the power supply board.
4. Install the front cover.
5. Insert 2 screws of the front cover.
   Tightneing torque: 3 Nm.

The power supply board is installed.
❒

11.2.5.2 Replacing the free programmable interface (FPI)

Precondition

The converter power supply is switched off.

Required tools

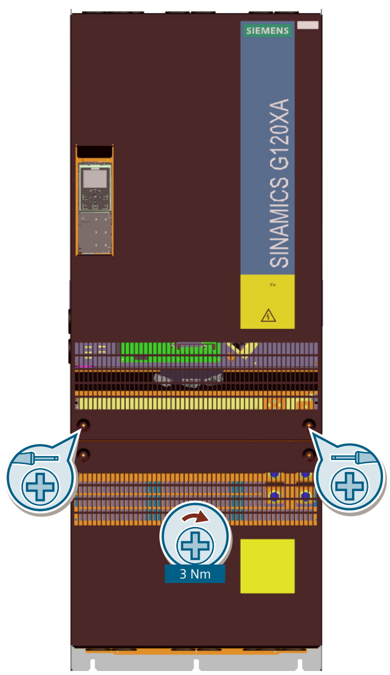
Torque wrench for the following screws:

- TX-20
- TX-25

Function description

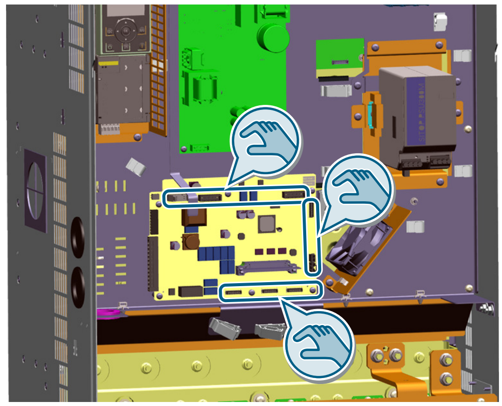
Removing the FPI board

1. Remove the 2 screws of the front cover.

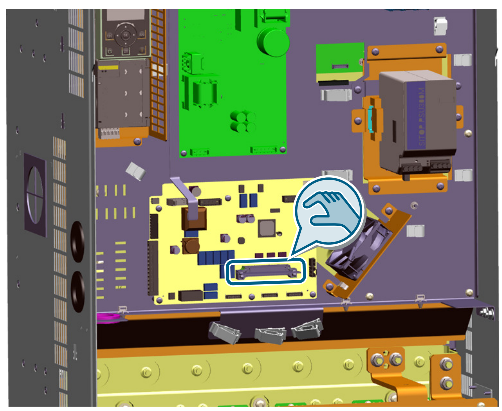


2. Remove the front cover.

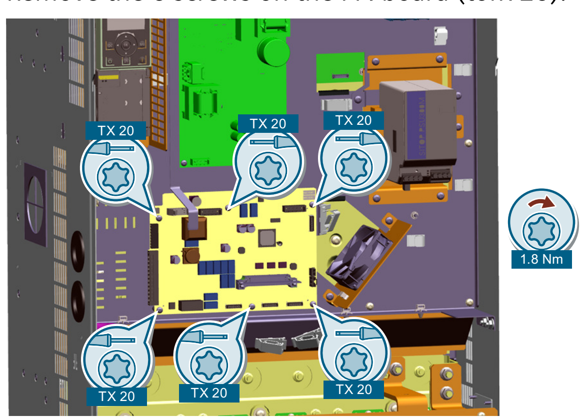
3. Remove the connectors on the FPI board.



4. Remove the IPD.



5. Remove the 6 screws on the FPI board (torx 20).



6. Remove the FPI board.

The FPI board is removed.
❒

Installing the FPI board

1. Align the FPI board to the screw holes.
2. Insert 5 screws (torx 20)
   Tightening torque: 1.8 Nm.
3. Plug the IPD.
4. Plug the connectors onto the FPI board.
5. Install the front cover.
6. Insert 2 screws of the front cover.
   Tightneing torque: 3 Nm.

The FPI board is installed.
❒

11.2.5.3 Replacing the current sensor

Precondition

The converter power supply is switched off.

Required tools

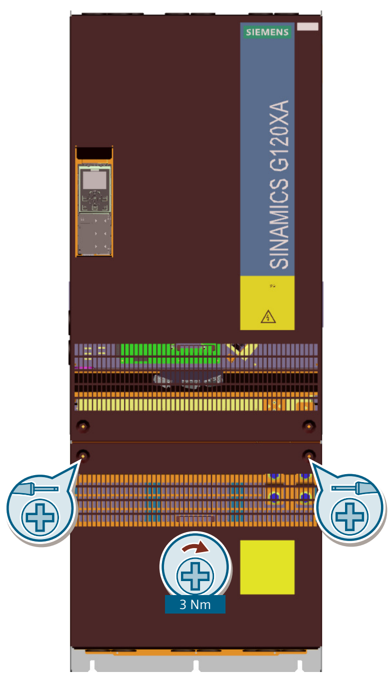
Torque wrench for the following screws:

- Hexagon 10 mm
- Hexagon 19 mm
- TX-20
- TX-25
- TX-30

Function description

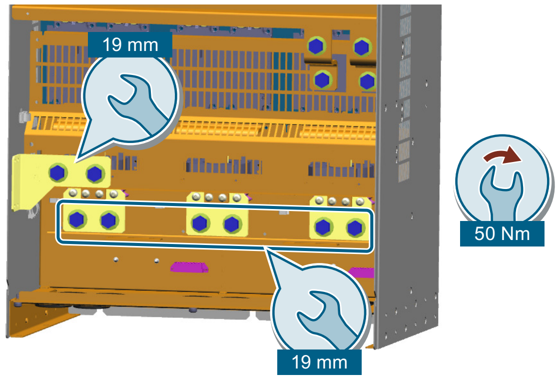
Removing the current sensor

1. Remove 2 screws of the front cover.

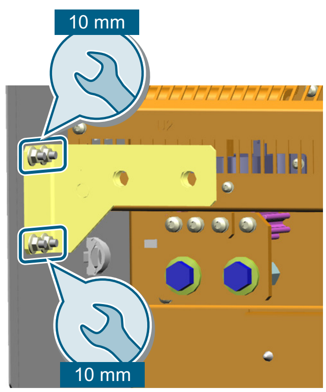


2. Remove the front cover.

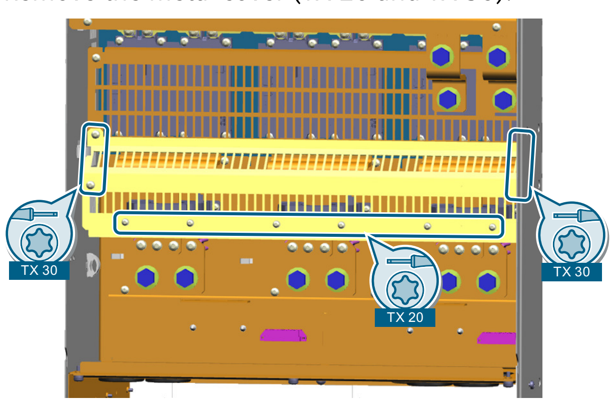
3. Remove the power cables (Hexagon 19 mm).



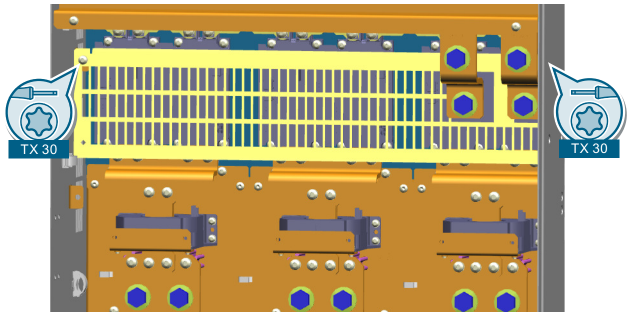
4. Remove the PE connect sheet metal (Hexagon 10 mm).



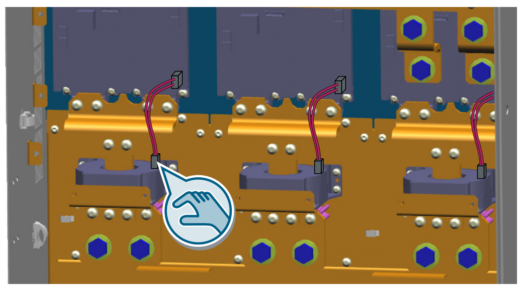
5. Remove the metal cover (TX-20 and TX-30).



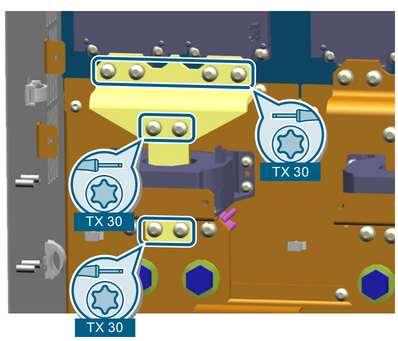
6. Remove the metal cover (TX-30).



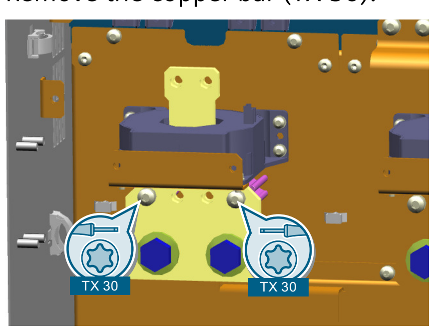
7. Remove the current sensor cables.



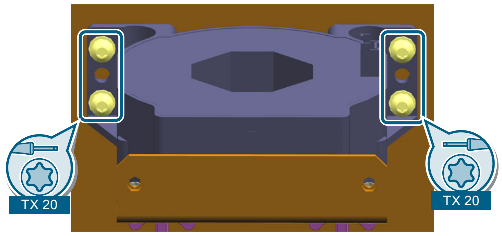
8. Remove the copper bar (TX-30).



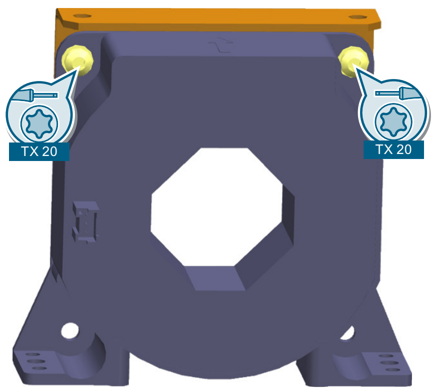
9. Remove the copper bar (TX-30).



10. Remove the current sensor (TX-20).



11. Remove the holding plate (TX-20).



The current sensor is removed.
❒

Installing the current sensor

1. Mount the holding plate (TX-20).
2. Mount the current sensor (TX-20).
3. Mount the copper bar (TX-30).
4. Mount the copper bar (TX-30).
5. Plug the current sensor cables.
6. Mount the metal cover (TX-30).
7. Mount the metal cover (TX-20 and TX-30).
8. Mount the PE connect sheet metal (Hexagon 10 mm).
9. Connect the power cables (Hexagon 19 mm).
10. Mount the front cover.
11. Insert 2 screws of the front cover.

The current sensor is installed.
❒

11.2.5.4 Replacing the SITOP power supply for the external fan

Precondition

The converter power supply is switched off.

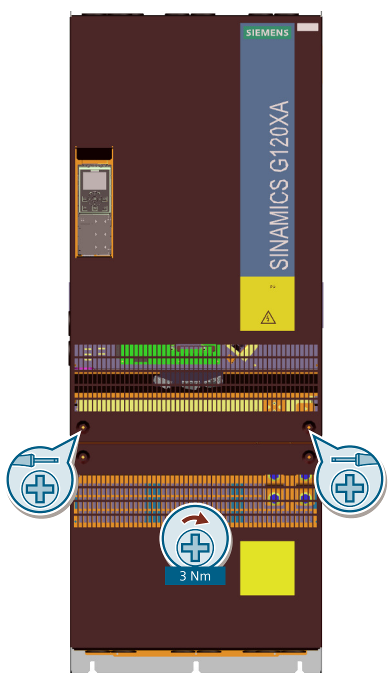
Required tools

- Torque wrench for TX-20 screws
- Torque wrench for TX-25 screws
- Slot screwdriver 0.6 mm × 3.5 mm

Function description

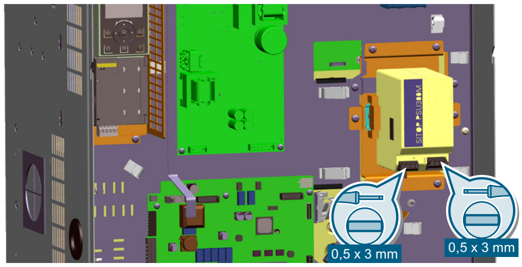
Removing the power supply

1. Remove 2 screws of the front cover.



2. Remove the front cover.

3. Disconnect the wires.



4. Remove the power supply.

The power supply is removed.
❒

Installing the power supply

1. Mount the power supply on the top hat rail.
2. Connect the wires.
3. Install the front cover.
4. Insert 2 screws of the front cover.
   Tightneing torque: 3 Nm.

The power supply board is installed.
❒

11.2.5.5 Replacing the fuse for the external fan

Precondition

The converter power supply is switched off.

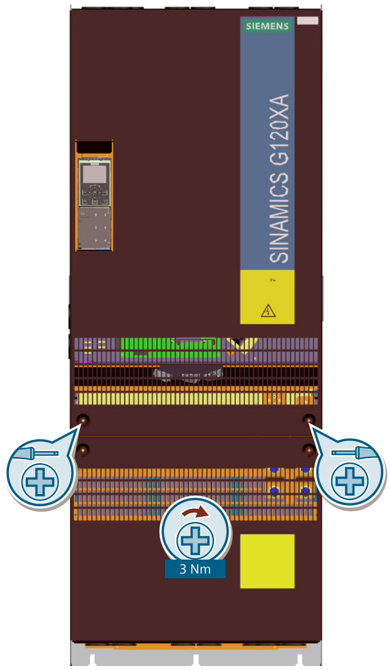
Required tools

- Torque wrench for TX-20 screws
- Torque wrench for TX-25 screws
- Slot screwdriver 0.6 mm × 3.5 mm

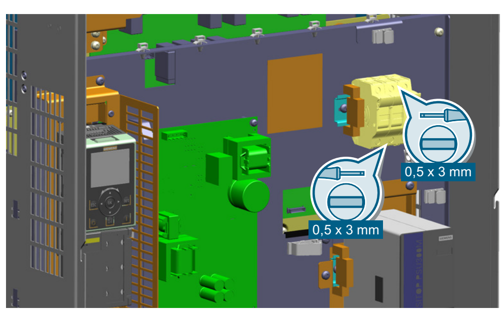
Function description

Removing the fuse

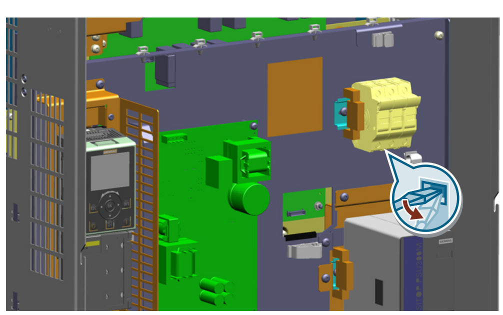
1. Remove 2 screws of the front cover.



2. Remove the front cover.
3. Disconnect the wires.



4. Remove the fuse.



The fuse is removed.
❒

Installing the fuse

1. Mount the fuse on the top hat rail.
2. Connect the wires.
3. Install the front cover.
4. Insert 2 screws of the front cover.
   Tightneing torque: 3 Nm.

The fuse is installed.
❒

11.3 Firmware upgrade and downgrade

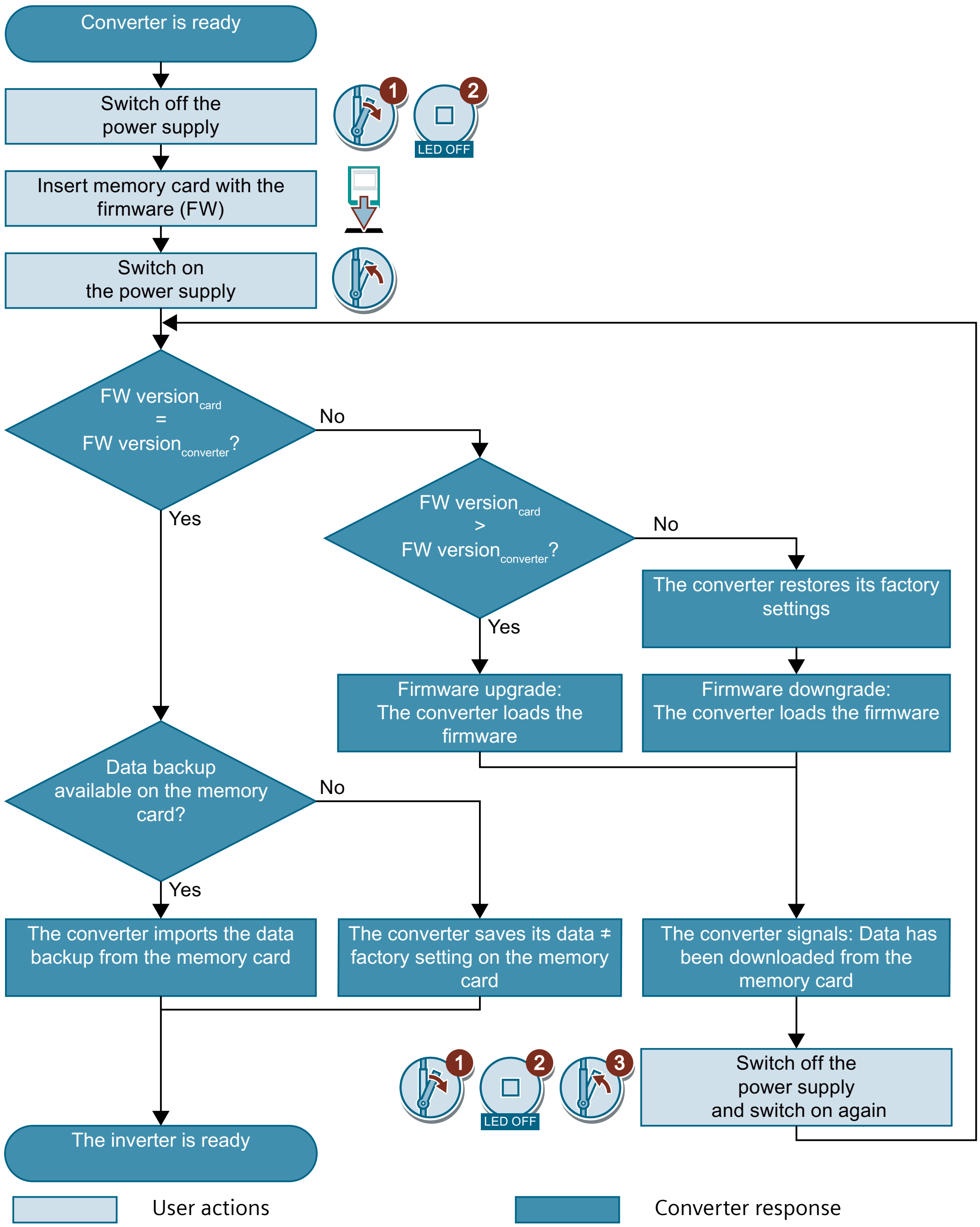


Figure 11-1 Overview of the firmware upgrade and firmware downgrade

11.3.1 Preparing the memory card

Overview

You can load the converter firmware from the Internet to a memory card.

Precondition

You have the appropriate memory card.

Recommended memory cards (Page 156)

Function description

Procedure

1. Download the required firmware to your PC from the Internet.
   Download firmware (https://support.industry.siemens.com/cs/cn/en/view/109769381)
2. Extract the files to a directory of your choice on your PC.
3. Transfer the unzipped files into the root directory of the memory card.

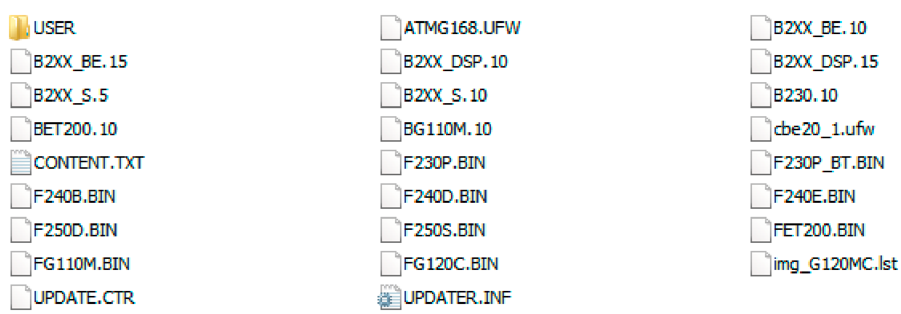
   

   Figure 11-2 Example of memory card contents after the file transfer

   Depending on the firmware, the filenames and the number of files may differ from the display above.
   The "USER" directory does not exist on unused memory cards. After the memory card is plugged in for the first time, the converter creates a new "USER" directory.

You have prepared the memory card for the firmware upgrade or downgrade.

❒

11.3.2 Upgrading the firmware

Overview

When upgrading the firmware, you replace the converter firmware by a later version.

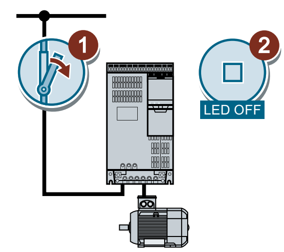
Precondition

Converter and memory card have different firmware versions.

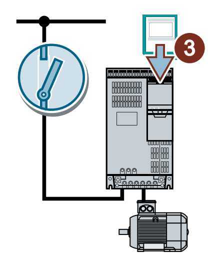
Function description

Procedure

1. Switch off the converter power supply.
2. Wait until all LEDs on the converter are dark.



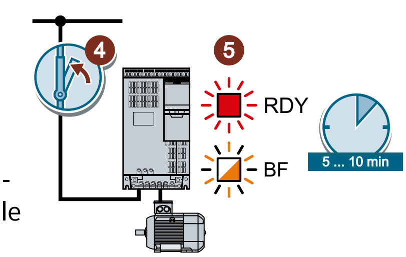
3. Insert the card with the matching firmware into the converter slot until it latches into place.



4. Switch on the converter power supply again.
5. The converter transfers the firmware from the memory card into its memory.

   The transfer takes approximately 5 ... 10 minutes.

   While data is being transferred, the LED RDY on the converter stays red. The LED BF flashes orange with a variable frequency.

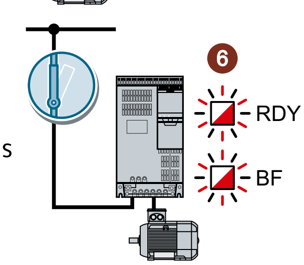


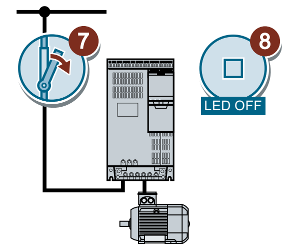
6. At the end of the transfer, the LED RDY and BF slowly flash red (0.5 Hz).

   Power supply failure during transfer

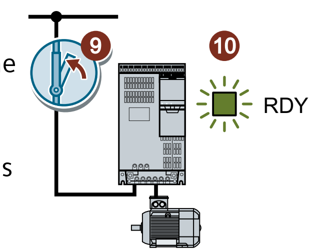
   The converter firmware will be incomplete if the power supply fails during the transfer.

   - Start again with step 1 of the instructions.





7. Switch off the converter power supply.
8. Wait until all LEDs on the converter are dark.
   Decide whether you want to withdraw the memory card from the converter:
   - You remove the memory card:
     ⇒ The converter keeps its settings.
   - You leave the memory card in the converter:
     ⇒ If the memory card still does not have a data backup of the converter settings, in step 9 the converter writes its settings to the memory card.
     ⇒ If the memory card already includes a data backup, the converter imports the settings from the memory card in step 9.



9. Switch on the converter power supply again.
10. If the firmware upgrade was successful, after several seconds the converter LED RDY turns green.
    If the memory card is still inserted, depending on the previous content of the memory card, one of the two following cases has occurred:
    - The memory card contains a data backup:
      ⇒ The converter has taken the settings from the memory card.
    - There was no data backup on the memory card:
      ⇒ The converter has written its settings to the memory card.

You have upgraded the converter firmware.
❒

11.3.3 Firmware downgrade

Overview

When downgrading the firmware, you replace the converter firmware by an older version.

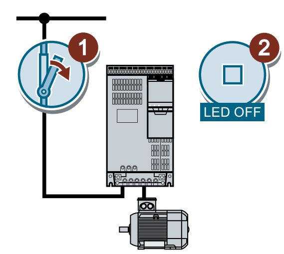
Precondition

- Converter and memory card have different firmware versions.
- The settings have been saved on a memory card or in an operator panel.

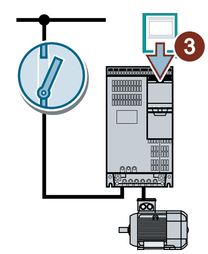
Function description

Procedure

1. Switch off the converter power supply.
2. Wait until all LEDs on the converter are dark.



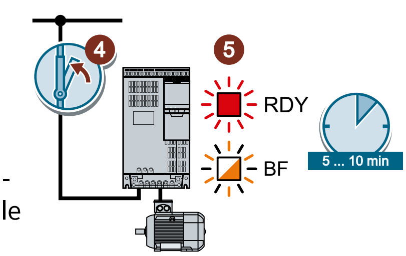
3. Insert the card with the matching firmware into the converter slot until it latches into place.



4. Switch on the converter power supply again.
5. The converter transfers the firmware from the memory card into its memory.

   The transfer takes approximately 5 ... 10 minutes.

   While data is being transferred, the LED RDY on the converter stays red. The LED BF flashes orange with a variable frequency.

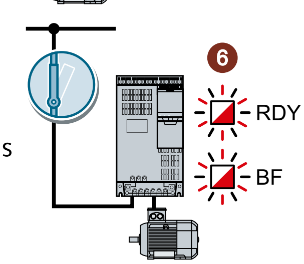


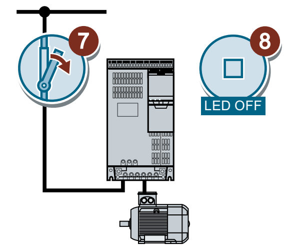
6. At the end of the transfer, the LED RDY and BF slowly flash red (0.5 Hz).

   Power supply failure during transfer

   The converter firmware will be incomplete if the power supply fails during the transfer.

   - Start again with Step 1 of these instructions.

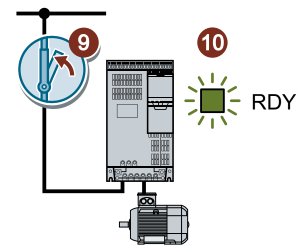




7. Switch off the converter power supply.
8. Wait until all LEDs on the converter are dark.

   Decide whether you want to withdraw the memory card from the converter:

   - The memory card contains a data backup:
     ⇒ The converter has taken the settings from the memory card.
   - There was no data backup on the memory card:
     ⇒ The converter has the factory setting.



9. Switch on the converter power supply again.
10. If the firmware downgrade was successful, after several seconds the converter LED RDY turns green.

    If the memory card is still inserted, depending on the previous content of the memory card, one of the two following cases has occurred:

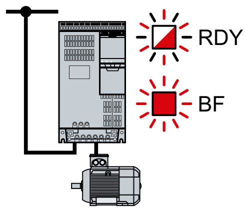
    - The memory card contains a data backup:
      ⇒ The converter has taken the settings from the memory card.
    - There was no data backup on the memory card:
      ⇒ The converter has the factory setting.
11. If the memory card did not contain a data backup of the converter settings, then you must transfer your settings to the converter from another data backup.

    Download of the converter settings (Page 1076)

You have replaced the converter firmware by an older version.
❒

11.3.4 Correcting an unsuccessful firmware upgrade or downgrade

Precondition



The converter signals an unsuccessful firmware upgrade or downgrade by a quickly flashing LED RDY and the lit LED BF.

Function description

You can check the following to correct an unsuccessful firmware upgrade or downgrade:

- Have you correctly inserted the card?
- Does the card contain the correct firmware?

Repeat the firmware upgrade or downgrade

Technical data 12

12.1 Technical data of inputs and outputs

Property	Explanation	
Fieldbus interface	USS	
24 V power supply	The converter generates its 24 V power supply from the line voltage.	
Output voltages	• 24 V (max. 250 mA) • 10 V (max. 10 mA)	
Setpoint resolution	0.01 Hz	
Digital inputs	6 (DI 0 ... DI 5)	• Electrically isolated only when supplied via an external isolated 24V supply • Type 3 in accordance with EN 61131-2 • Voltage for "low" state: < 5 V • Voltage for "high" state: > 11 V • Current for 24 V input voltage: 4 mA • Minimum current for the "high" state: 2.5 mA • 30 V maximum input voltage • PNP/NPN switchable • Compatible to SIMATIC outputs • 10 ms response time for debounce time p0724 = 0
Analog inputs	2 (AI 0 ... AI 1)	• Single-ended input • 12-bit resolution • 13 ms response time • Switchable between voltage and current via parameter setting: – -10/0 V ... 10 V: typical current drain: 0.1 mA, maximum voltage 35 V – 0 mA ... 20 mA : maximum voltage 10 V, maximum current 80 mA • If AI 0 and AI 1 are configured as supplementary digital inputs: Voltage < 35 V, low < 1.6 V, high > 4.0 V, 13 ms ± 1 ms response time for debounce time p0724 = 0.
Digital outputs	4 (DO 0 ... D0 3)	• DO 0 ... DO 3: 250 V AC 1A/30 V DC 1A, for resistive, inductive or capacitive load • 1 type C relay, 3 type A relays • Update time: 2 ms • Max. 1 A (with ambient temperature ≤ 60 °C) • Overvoltage category: II • Switching cycle: 1 Hz

Property	Explanation	
Analog outputs	2 (AO 0 ... AO 1)	• Not isolated • 16-bit resolution • Switchable between voltage and current via parameter setting – 0 ... 10 V – 0/4 ... 20 mA • Update time: 4 ms • <400 mV offset at 0 %
Motor temperature sensor	PTC	• Short-circuit monitoring < 20 Ω • Overtemperature 1650 Ω
	KTY84	• Short-circuit monitoring < 50 Ω • Wire-break: > 2120 Ω
	Pt100	• Connection of sensors: – 2-wire technique – 3-wire technique • Measurement range: -48 °C to 248 °C
	Pt1000	• Short-circuit monitoring < 603 Ω • Wire-break > 2120 Ω
	Bimetalic temperature switch with NC contact	
Memory card	Slot for SD or MMC memory cards Recommended memory cards (Page 156)	

12.2 Load cycles and overload capability

Overload capability is the property of the converter to temporarily supply a current that is higher than the rated current to accelerate a load.

Definitions

Base load

Constant load between the accelerating phases of the converter

LO base load input current

Permissible input current for a "Low Overload" load cycle

LO base load output current

Permissible output current for a "Low Overload" load cycle

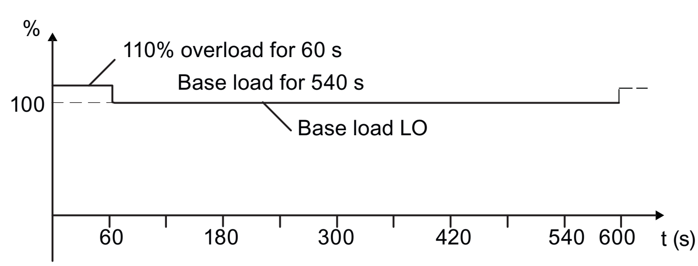
LO base load power

Rated power based on the LO base load overload output current

If not specified otherwise, the power and current data in the technical data always refer to a load cycle according to overload.

Permissible converter overload

Rated overload is based on a duty cycle of 110 % for 60 s.



Note that the rated ambient temperature for the above load cycles is 40°C.

12.3 General converter technical data

Property	Explanation
Line voltage	• FSA ... FSG: 3 AC 380 V (-20%) ... 440 V (+10%) • FSH, FSJ: 3 AC 380 V (-15%) ... 440 V (+10%) The actual permissible line voltage depends on the installation altitude.
Output voltage	0 V 3 AC ... line voltage x 0.97
Input frequency	47 Hz ... 63 Hz
Output frequency	• FSA ... FSG: 0 Hz ... 550 Hz, depending on the control mode • FSH, FSJ: 0 Hz ... 100 Hz, depending on the control mode
Power factor λ	• 0.75 ... 0.93 (FSA ... FSG, FSH, FSJ with line reactor Uk = 2%) • 0.96 (FSH, FSJ)
Line impedance Uk	• FSA ... FSC: 2% • FSD ... FSG: no restriction • FSH, FSJ: a line reactor (2% Uk) must be connected in series if R_{SC} > 33 (315 ... 500 kW) / > 20 (≥ 500 kW)
Inrush current	< 2 × peak input current The converter can withstand 100000 power cycles with an inverval of 120 s.
Overvoltage category	According to IEC 61800-5-1: • OVC III for power connections • OVC II for control connections

Pulse frequency (factory setting)	• FSA ... FSG:
	  – 4 kHz for devices with an LO base load power < 100 kW
	  – 2 kHz for devices with an LO base load power ≥ 100 kW
	• FSH, FSJ: 4 kHz

Degree of protection	• FSA ... FSH: IP20 • FSJ: IP00
Short-circuit current (SCCR) and branch protection	Maximum permissible short-circuit current: 100 kA The length of the connecting cable from the line to the converter may not reduce the minimum short-circuit current Branch protection and short-circuit strength according to IEC (https://support.industry.siemens.com/cs/ww/en/ps/13213/man)
Surrounding air temperature during operation	• FSA ... FSG: -20 °C to +60 °C (For FSA ... FSC, a lateral clearance of 5 cm or greater is required for ambient temperature higher than 55 °C), > 40 °C with derating With operator panel BOP-2 or IOP-2: 0 °C to +50 °C • FSH, FSJ: 0 °C to 50 °C, > 40 °C with derating Current derating as a function of the ambient temperature (Page 1123)
Relative humidity	< 95% (non-condensing)
Installation altitude	Up to 1000 m above sea level without derating Above 1000 m with derating Current derating as a function of the installation altitude (Page 1122)
Surrounding air temperature during storage	• FSA ... FSG: -40 °C to +70 °C • FSH, FSJ: -25 °C to +55 °C

Property	Explanation
Shock and vibration	• FSA ... FSG – Transport in the transport packaging according to Class 2M3 according to EN 61800-5-1 and EN 60068-2-6 – Vibration in operation according to Class 3M1 according to EN 60721-3-3: 1995 • FSH, FSJ – Vibration during operation: Fc test according to EN 60068-2-6 0.075 mm for 10 ... 58 Hz 9.81 m/s² (1 x g) at > 58 ... 200 Hz – Shock during operation: Test according to EN 60068- 2-27 100 m/s² (10 x g)/11 ms – Vibration during product packaging: Fc test according to EN 60068-2-64 30 min/axis, 3 axes 10 ... 200 Hz ASD 1.0 (m^2/s^3) – Shock during product packaging: Fc test according to EN 60068-2-27 10 x g/11 ms
Protection against chemical substances	Protected according to 3C2 to EN 60721-3-3
Pollution	Suitable for environments with degree of pollution 2 according to EN 61800-5-1
Sound pressure level L_{PA} (1 m)	≤ 76 dB (A) [1]
Cooling method	Air forced cooling
Cooling air	Clean and dry air

[1] Maximum sound pressure level, ascertained in the IP20 cabinet

12.4 Technical data dependent on the power

Table 12-1 Electrical data

Frame size	Rated power (kW)	Rated input current (A)	Rated output current (A), @ 380 V *	Rated output current (A), @ 400 V
	Based on Low Overload			
FSA	0.75	2.1	2.2	2.2
	1.1	2.8	3.1	3.1
	1.5	3.6	4.1	4.1
	2.2	5.3	5.6	5.6
	3	6.6	7.3	7.3
FSB	4	8.5	9.3	8.8
	5.5	11.5	12.5	12.5
	7.5	15.8	16.5	16.5
FSC	11	25.8	25	25
	15	28.5	31	31
FSD	18.5	41	37.5	37
	22	46	45	43
	30	56	59	58
	37	73	73.5	68
	45	84	85	82.5
FSE	55	106	108	103
FSF	75	143	144	136
	90	164	174	164
	110	200	205	201
	132	234	245	237
FSG	160	278	292	289
	200	348	370	364
	250	417	468	436
FSH	315	617	605	583
	355	684	670	644
	400	760	750	722
FSJ	450	870	840	803
	500	959	925	882
	560	1060	1035	992

* For converters 4 kW, 18.5 ... 250 kW, the data is valid for FS version 03 or higher.

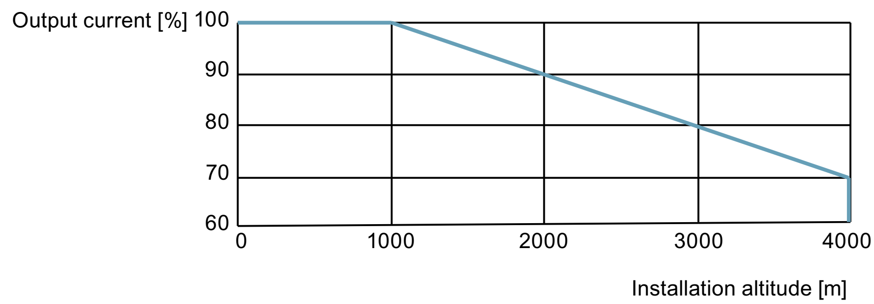
Table 12-2 Further data

Frame size	Rated power (kW) Based on Low Overload	Power loss (kW)		Required cooling air flow (l/s)	Net weight (kg)	
		Without filter	With filter		Without filter	With filter
FSA	0.75	0.043	0.043	5	3.1	3.4
	1.1	0.055	0.055		3.1	3.4
	1.5	0.071	0.072		3.1	3.4
	2.2	0.085	0.086		3.1	3.4
	3	0.116	0.117		3.1	3.4
FSB	4	0.118	0.119	5	5.9	6.2
	5.5	0.172	0.175	9.2	5.9	6.2
	7.5	0.225	0.231		5.9	6.2
FSC	11	0.306	0.31	18.5	7.2	7.7
	15	0.387	0.402		7.2	7.7
FSD	18.5	0.54	0.54	55	16.2	17.9
	22	0.63	0.64		16.2	17.9
	30	0.92	0.93		16.2	17.9
	37	0.97	0.98		18.4	19.1
	45	1.26	1.27	83	16.6	18.3
FSE	55	1.56	1.57		27	27
FSF	75	1.72	1.74	153	60.3	66.8
	90	2.16	2.18		60.3	66.8
	110	2.27	2.29		64	68.3
	132	2.86	2.89		64	68.3
FSG	160	--	3.45	210	--	105
	200	--	4.51		--	113
	250	--	5.44		--	120
FSH	315	--	6.4	345	--	132
	355	--	7.29		--	134
	400	--	7.99		--	137
FSJ	450	--	9	345	--	204
	500	--	10		--	210
	560	--	11.2		--	218

12.5 Derating data

12.5.1 Current derating as a function of the installation altitude

The permissible converter output current is reduced above an installation altitude of 1000 m.

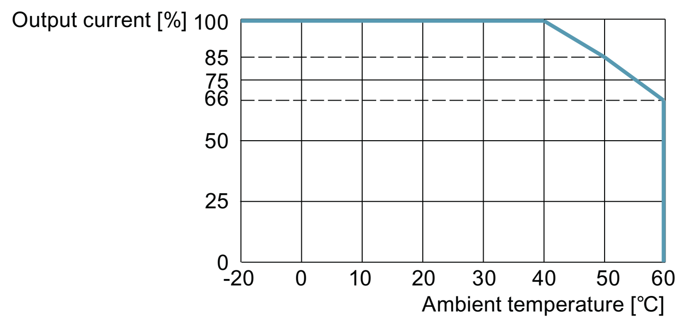


Permissible line supplies dependent on the installation altitude

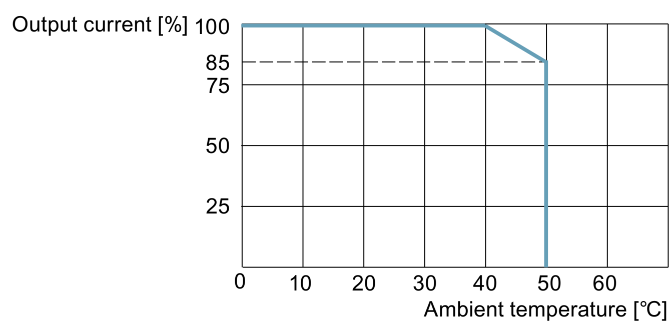
- Installation altitude is up to 4000 m above sea level.
- Output voltage is reduced above an installation altitude of 2000 m.
- For installation altitudes ≤ 2000 m above sea level, it is permissible to connect the converter to any of the line supplies that are specified for it.
- For installation altitudes 2000 m to 4000 m above sea level, the following applies:
  - Connection to a TN line system with grounded neutral point is permissible.
  - TN systems with grounded line conductor are not permitted.
  - The TN line system with grounded neutral point can also be supplied using an isolation transformer.
  - The phase-to-phase voltage does not have to be reduced.

12.5.2 Current derating as a function of the ambient temperature

Permissible output current as a function of the ambient temperature, FSA ... FSG



Permissible output current as a function of the ambient temperature, FSH/FSJ



Note that Operator Panel can restrict the maximum permissible operating ambient temperature of the converter.

12.5.3 Current derating as a function of the line voltage

Converters FSA ... FSG

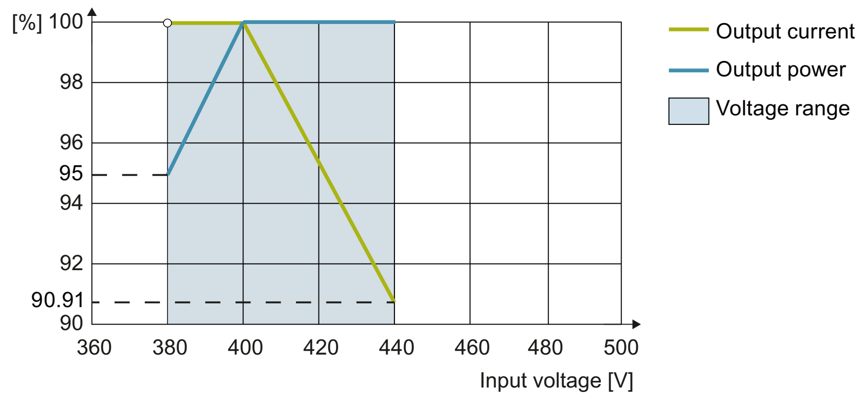


Figure 12-1 Current and voltage derating as a function of the input voltage

The output current for the 380 V is not included in the above illustration. For information about output current when the input voltage is 380 V, refer to Section "Technical data dependent on the power (Page 1120)".

Converters FSH/FSJ

Power (kW)		**Rated output current (A)**	**Base load current (A)**	**380 V**	**400 V**	**415 V**	**440 V**
FSH	315	605	590	100%	96.3%	93.5%	88.8%
	355	670	645	100%	96.1%	93.2%	88.3%
	400	750	725	100%	96.3%	93.6%	89.0%
FSJ	450	840	820	100%	95.6%	92.3%	86.8%
	500	925	895	100%	95.3%	91.7%	85.8%
	560	1035	1015	100%	95.8%	92.7%	87.5%

12.5.4 Current derating as a function of the pulse frequency

Frame size	**Power ratings (kW)**	**Output current (A) (@ 400 V , 40 °C ambient temperature) for a pulse frequency of**							
		2 kHz	**4 kHz**	**6 kHz**	**8 kHz**	**10 kHz**	**12 kHz**	**14 kHz**	**16 kHz**
FSA	0.75	2.2	**2.2**	1.87	1.54	1.32	1.1	0.99	0.88
	1.1	3.1	**3.1**	2.64	2.17	1.86	1.55	1.40	1.24
	1.5	4.1	**4.1**	3.49	2.87	2.46	2.05	1.85	1.64
	2.2	5.6	**5.6**	4.76	3.92	3.36	2.8	2.52	2.24
	3	7.3	**7.3**	6.21	5.11	4.38	3.65	3.29	2.92

Frame size	Power ratings (kW)	Output current (A) (@ 400 V , 40 °C ambient temperature) for a pulse frequency of							
		2 kHz	**4 kHz**	**6 kHz**	**8 kHz**	**10 kHz**	**12 kHz**	**14 kHz**	**16 kHz**
FSB	4	8.8	**8.8**	7.48	6.16	5.28	4.4	3.96	3.52
	5.5	12.5	**12.5**	10.63	8.75	7.5	6.25	5.63	5
	7.5	16.5	**16.5**	14.03	11.48	9.9	8.25	7.43	6.6
FSC	11	25	**25**	21.25	17.5	15	12.5	11.25	10
	15	31	**31**	26.35	21.7	18.6	15.5	13.95	12.4
FSD	18.5	37	**37**	31.4	25.9	22.2	18.5	16.6	14.8
	22	43	**43**	36.5	30.1	25.8	21.5	19.3	17.2
	30	58	**58**	49.3	40.6	34.8	29	26.1	23.2
	37	68	**68**	57.8	47.6	40.8	34	30.6	27.2
	45	82.5	**83**	70.1	57.7	49.4	41.2	37.1	33
FSE	55	103	**103**	87.5	72.1	61.8	51.5	46.3	41.2
FSF	75	136	**136**	115.6	95.2	81.6	68	61.2	54.4
	90	164	**164**	139.4	114.8	98.4	82	73.8	65.6
	110	**201**	141	101	80.4	--	--	--	--
	132	**237**	166	119	94.8	--	--	--	--
FSG	160	**277**	194	139	111	--	--	--	--
	200	**348**	244	174	139	--	--	--	--
	250	**436**	305	218	174	--	--	--	--
FSH	315	**583**	408 [1)]	--	--	--	--	--	--
	355	**644**	450 [1)]	--	--	--	--	--	--
	400	**722**	505 [1)]	--	--	--	--	--	--
FSJ	450	**803**	562 [1)]	--	--	--	--	--	--
	500	**882**	617 [1)]	--	--	--	--	--	--
	560	**992**	694 [1)]	--	--	--	--	--	--

The rated output currents in bold refer to the output currents for the default pulse frequency at 400 V power supply under 40 °C ambient temperature. To calculate the current derating as a function of pulse frequency at 380 V, follow the formula below:

Derated current for certain pulse frequency at 380 V [A] = Rated output current at 380 V [A] * Derated current at certain pulse frequency at 400 V [A] / Output current for default pulse frequency at 400 V [A]

For example, the derated current for a pulse frequency of 6 kHz at 380 V for FSA, 0.75 kW can be calculated as follows:

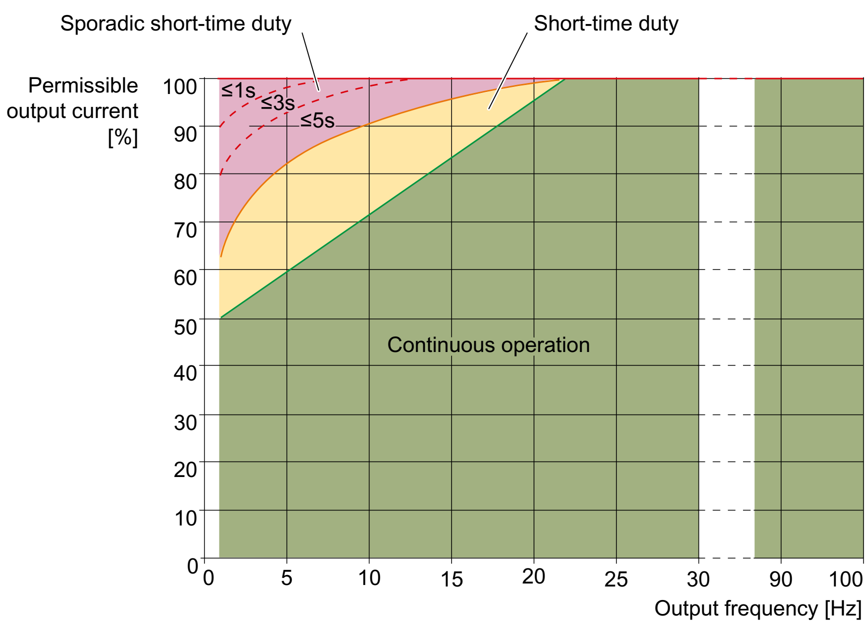
2.2 A * 1.87 A /2.2 A = 1.87 A

[1)] In the factory setting, the converter starts with a pulse frequency of 4 kHz and reduces automatically the pulse frequency to the associated required frequencies when loaded. When the load decreases, the pulse frequency is increased automatically up to 4 kHz.

12.6 Low frequency performance

The converter can only be operated with reduced output current at low output frequencies.

NOTICE
Reduced converter service life as a result of overheating
Loading the converter with a high output current and at the same time with a low output frequency can cause the current-conducting components in the converter to overheat. Excessively high temperatures can damage the converter or reduce the converter service life. • Never operate the converter continuously with an output frequency = 0 Hz. • Only operate the converter in the permissible operating range.



- Continuous operation (green area in the figure)
  Operating state that is permissible for the complete operating time.
- Short-time duty (yellow area in the figure)
  Operating state that is permissible for less than 2% of the total operating time.
- Sporadic short-time duty (red area in the figure)
  Operating state that is permissible for less than 1% of the total operating time.

12.7 Data regarding the power loss in partial load operation

You can find data regarding power loss in partial load operation in the Internet:

Partial load operation (http://support.automation.siemens.com/WW/view/en/94059311)

12.8 Electromagnetic compatibility of the converter

EMC (electromagnetic compatibility) means that the devices function satisfactorily without interfering with other devices and without being disrupted by other devices. EMC applies when the emitted interference (emission level) and the interference immunity are matched with each other.

The product standard IEC/EN 61800-3 describes the EMC requirements placed on "Variable-speed drive systems".

A variable-speed drive system (or Power Drive System PDS) consists of the converter as well as the associated electric motors and encoders including the connecting cables.

The driven machine is not part of the drive system.

Note

PDS as component of machines or systems

When you install PDS into machines or systems, additional measures may be required so that the product standards of these machines or systems is complied with. The machine or system builder is responsible for taking these measures.

Overview of environments and categories

Environments

IEC/EN 61800-3 makes a distinction between the "first environment" and "second environment" - and defines different requirements for these environments.

- **First environment**
  Residential buildings or locations at which the PDS is directly connected to a public low-voltage supply without intermediate transformer.
- **Second environment**
  An environment that includes all other establishments which are not connected directly to a public low-voltage line supply.

Categories

- **Category C1**
  Power Drive System (PDS) of rated voltage less than 1000 V intended for use in the first (residential) environment.
- **Category C2**
  Power Drive System (PDS) of rated voltage less than 1000 V, which is neither a plug-in device nor a movable device, and when used in the first environment, is only intended to be installed and commissioned by a professional.
- **Category C3**
  Power Drive System (PDS) of rated voltage less than 1000 V intended for use in the second (industrial) environment and not intended for use within the first (residential) environment.

Second environment - category C3

Interference immunity

The converters with integrated line filters have been tested in accordance with the immunity requirements of category C3, second environment, and fulfill the requirements according to EN 61800-3.

Emitted interference

The converters comply with the limit values of the second environment, category C3 when the following conditions are satisfied:

- EMC-compliant installation and configuration by qualified technician
- Operation on TN or TT line supply with star-point grounded
- Permissible motor cable length
  Maximum permissible motor cable length (Page 71)
- Shielded motor cable with low capacitance
- Pulse freqency restrictions:
  - FSA ... FSG: Pulse frequency ≤ factotory setting
    General converter technical data (Page 1118)
  - FSH/FSJ: pulse frequency ≤ 2 Hz
- With line filter (external or internal)
  - The converters FSA ... FSJ with integrated line filters are suitable for operation in the second environment, Category C3.
  - The unfiltered converters FSA ... FSG with external line filters are suitble for operation in the second environment, Category C3.

Note

Fault of the wireless services caused by high-frequency faults in residential environments

This product can cause high-frequency interferences in a residential environment that can require radio interference suppression measures.

- Have the installation and commissioning with appropriate radio interference suppression measures preformed by qualified personnel.

Caution

In a residential environment, this product may cause radio interference, in which case supplementary mitigation measures may be required.

Typical harmonic currents, FSD ... FSG

Converter	Typical harmonic current (% of rated input current) at Uk 1%							
	5th	7th	11th	13th	17th	19th	23th	25th
FSD .. FSG	48.2	26.6	7.3	5.5	3.9	2.7	2.5	1.8

Typical harmonic currents, FSH/FSJ

Typical harmonic current (% of rated input current) with line reactor Uk 2%							
Line supply with average, relative short-circuit power (R_{SC} = 50), Uk = 2 %, with line reactor Uk = 2%							
5th	**7th**	**11th**	**13th**	**17th**	**19th**	**23th**	**25th**
37.1	12.4	6.9	3.2	2.8	1.9	1.4	1.3
Line supply with low relative short-circuit power (R_{SC} < 15): "Weak line supply", Uk = 6%, with line reactor Uk = 2%							
5th	**7th**	**11th**	**13th**	**17th**	**19th**	**23th**	**25th**
22.4	7	3.1	2.5	1.3	1	0.8	0.7

12.9 Protecting persons from electromagnetic fields

Overview

Protection of workers from electromagnetic fields is specified in the European EMF Directive 2013/35/EU. This directive is implemented in national law in the European Economic Area (EEA). Employers are obligated to design workplaces in such a way that workers are protected from impermissibly strong electromagnetic fields.

To this end, assessments and/or measurements must be performed for workplaces.

General conditions

The following general conditions apply for the evaluations and measurements:

1. The laws for protection from electromagnetic fields in force in individual EU member states can go beyond the minimum requirements of the EMF Directive 2013/35/EU and always take precedence.
2. The ICNIRP 2010 limits for the workplace are the basis for the assessment.
3. The 26th BImSchV (German Federal Emission Protection Regulation) defines 100 µT (RMS) for the assessment of active implants.
   According to Directive 2013/35/EU, 500 µT (RMS) at 50 Hz is applicable here.
4. The routing of power cables has a significant impact on the electromagnetic fields that occur. Install and operate the components inside metallic cabinets in compliance with the documentation and use shielded motor cables.
   EMC-compliant setup of the machine or plant (Page 59)

Evaluation of the converter

The converters are normally used in machines. The assessment and testing is based on DIN EN 12198.

Compliance with the limit values was assessed for the following frequencies:

- Line frequency 47 ... 63 Hz
- Pulse frequency, for example 4/8/16 kHz and multiples thereof, assessed up to a maximum of 100 kHz

The indicated minimum distances apply to the head and complete torso of the human body. Shorter distances are possible for extremities.

Table 12-3 Minimum distances to the converter

Individuals without active implants		Individuals with active implants	
Control cabinet closed	**Control cabinet open**	**Control cabinet closed**	**Control cabinet open**
0 cm	Forearm length (approx. 35 cm)	Must be separately assessed depending on the active implant.	

Appendix A

A.1 Manuals and technical support

A.1.1 Overview of the manuals

Manuals with additional information that can be downloaded

- Compact hardware installation instructions (https://support.industry.siemens.com/cs/cn/en/view/109762898)
  Installing the converter
- SINAMICS G120XA documentation (https://www.siemens.com/sinamics-g120xa/documentation)
  Installing, commissioning and maintaining the converter. Advanced commissioning (this manual)
- BOP-2 operating instructions (https://support.industry.siemens.com/cs/ww/en/view/109483379)
  Operating the converter with the BOP-2 operator panel
- Operating instructions IOP-2 (https://support.industry.siemens.com/cs/ww/en/view/109752613)
  Operating the converter with the IOP-2 operator panel
- SINAMICS G120 Smart Access Operating Instructions (https://support.industry.siemens.com/cs/ww/en/view/109758122)
  Operating the converter from a PC, tablet or smartphone
- Protective devices (https://support.industry.siemens.com/cs/cn/en/view/109762896)
  Overcurrent protection devices of the converter

A.1.2 Configuring support

Catalog

Ordering data and technical information for the converter.

Catalogs for download or online catalog (Industry Mall):

SINAMICS G120X (www.siemens.com/sinamics-g120xa)

EMC (electromagnetic compatibility) technical overview

Standards and guidelines, EMC-compliant control cabinet design

EMC overview (https://support.industry.siemens.com/cs/ww/en/view/103704610)

EMC Guidelines configuration manual

EMC-compliant control cabinet design, potential equalization and cable routing

EMC installation guideline (http://support.automation.siemens.com/WW/view/en/60612658)

A.1.3 Product Support

Overview

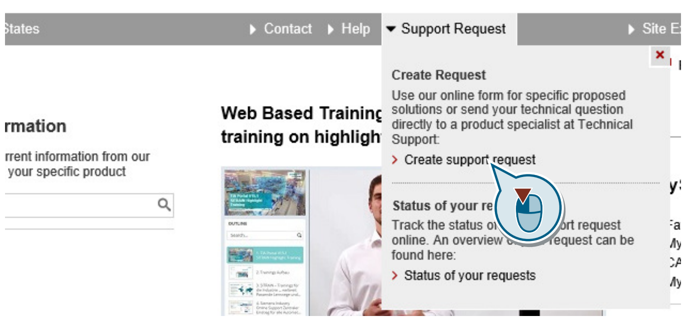
You can find additional information about the product on the Internet:

Product support (https://support.industry.siemens.com/cs/ww/en/)

This URL provides the following:

- Up-to-date product information (product announcements)
- FAQs
- Downloads
- The Newsletter contains the latest information on the products you use.
- The Knowledge Manager (Intelligent Search) helps you find the documents you need.
- Users and specialists from around the world share their experience and knowledge in the Forum.
- You can find your local representative for Automation & Drives via our contact database under "Contact & Partner".
- Information about local service, repair, spare parts and much more can be found under "Services".

If you have any technical questions, use the online form in the "Support Request" menu:



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Further information

SINAMICS converters:
www.siemens.com/sinamics

Siemens AG
Digital Industries
Motion Control
Postfach 3180
91050 ERLANGEN
Germany

Scan the QR code for additional information about SINAMICS G120XA.