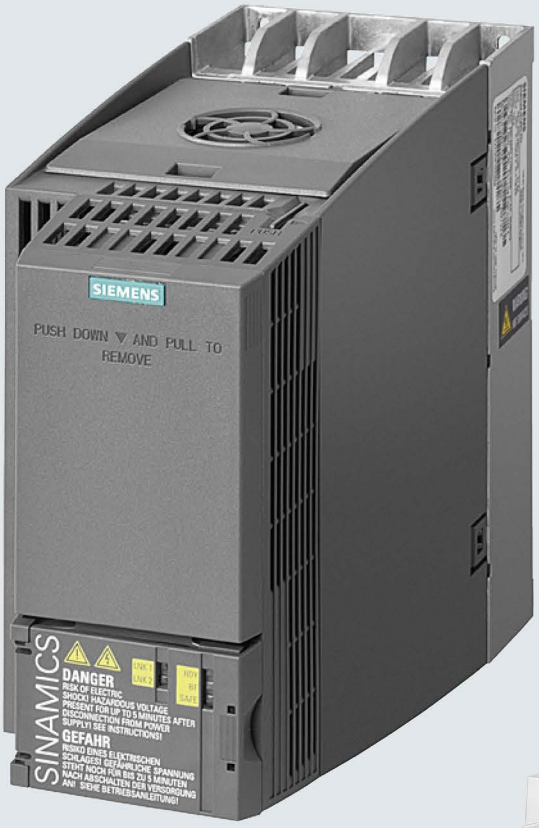
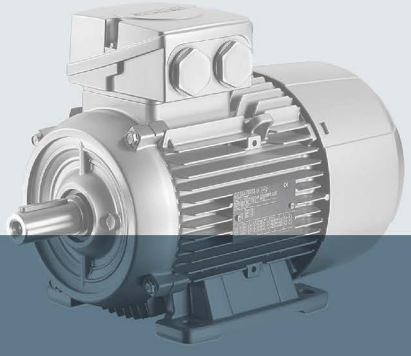
SIEMENS





SINAMICS

Low-voltage SINAMICS G120C converters

Built-in devices, frame sizes AA ... C

Compact Operating Instructions

Edition 04/2016

SIEMENS

SINAMICS

SINAMICS G120C
SINAMICS G120C inverter

Compact Operating Instructions

Edition 04/2016, firmware 4.7 SP6

04/2016, FW V4.7 SP6

A5E37947815B AA

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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A5E37947815B AA
℗ 04/2016 Subject to change

Table of contents

This manual describes how you install and commission the SINAMICS G120C converter.

What is the meaning of the symbols in the manual?

 Reference to further information in the manual

An operating instruction starts here.

 This concludes the operating instruction.

 Download from the Internet

 DVD that can be ordered

Fundamental safety instructions

1

1.1 General safety instructions

⚠ WARNING

Danger to life if the safety instructions and residual risks are not observed

If the safety instructions and residual risks in the associated hardware documentation are not observed, accidents involving severe injuries or death can occur.

- Observe the safety instructions given in the hardware documentation.
- Consider the residual risks for the risk evaluation.

⚠ WARNING

Danger to life or malfunctions of the machine as a result of incorrect or changed parameterization

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

- Protect the parameterization (parameter assignments) against unauthorized access.
- Respond to possible malfunctions by applying suitable measures (e.g. EMERGENCY STOP or EMERGENCY OFF).

1.2 Industrial security

Note

Industrial security

Siemens provides products and solutions with industrial security functions that support the secure operation of plants, solutions, machines, equipment and/or networks. They are important components in a holistic industrial security concept. With this in mind, Siemens' products and solutions undergo continuous development. Siemens recommends strongly that you regularly check for product updates.

For the secure operation of Siemens products and solutions, it is necessary to take suitable preventive action (e.g. cell protection concept) and integrate each component into a holistic, state-of-the-art industrial security concept. Third-party products that may be in use should also be considered. For more information about industrial security, visit this address (http://www.siemens.com/industrialsecurity).

To stay informed about product updates as they occur, sign up for a product-specific newsletter. For more information, visit this address (http://support.automation.siemens.com).

⚠ WARNING

Danger as a result of unsafe operating states resulting from software manipulation

Software manipulation (e.g. by viruses, Trojan horses, malware, worms) can cause unsafe operating states to develop in your installation which can result in death, severe injuries and/or material damage.

- Keep the software up to date.

  You will find relevant information and newsletters at this address (http://support.automation.siemens.com).
- Incorporate the automation and drive components into a holistic, state-of-the-art industrial security concept for the installation or machine.

  You will find further information at this address (http://www.siemens.com/industrialsecurity).
- Make sure that you include all installed products into the holistic industrial security concept.

⚠ WARNING

Danger to life due to software manipulation when using exchangeable storage media

Storing files onto exchangeable storage media amounts to an increased risk of infection, e.g. with viruses and malware. As a result of incorrect parameterization, machines can malfunction, which in turn can lead to injuries or death.

- Protect files stored on exchangeable storage media from malicious software by taking suitable protection measures, e.g. virus scanners.

Scope of delivery and options

2

2.1 Inverter

The delivery comprises at least the following components:

- A ready to run inverter with loaded firmware.

  Options for upgrading and downgrading the firmware can be found on the Internet: Firmware (http://support.automation.siemens.com/WW/news/en/67364620)

  You can find the article number 6SL3210-1KE…, the hardware version (e.g. C02) and the firmware (e.g. V4.7) on the inverter rating plate.
- 1 set of connectors for connecting the inputs and outputs
- 1 set of connectors for connecting the line supply, motor and braking resistor
- Only for inverters with fieldbus via USS or Modbus RTU: 1 connector for connecting the fieldbus
- 1 set of shield plates
- Compact Operating Instructions in German and English
- The inverter contains open-source software (OSS). The OSS license terms are saved in the inverter.

Reading the OSS license terms

The inverter contains open-source software (OSS). OSS comprises open source text and satisfies special license terms. If you wish to read the license terms, you must transfer them from the inverter to a PC.

Procedure

To transfer the OSS license terms from the inverter to a PC, proceed as follows:

1. Switch off the inverter power supply.
2. Insert an empty memory card into the card slot of the inverter.

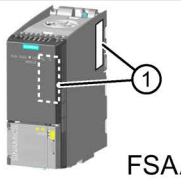
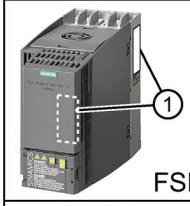
   

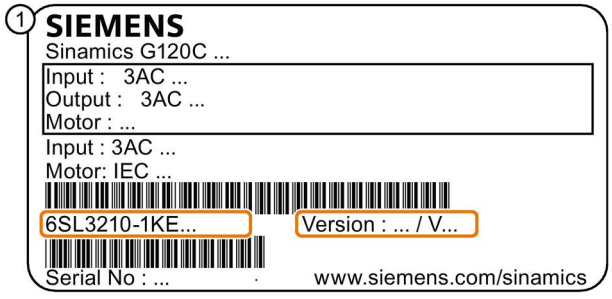
   Overview of the interfaces (Page 23)
3. Switch on the inverter power supply.
4. When you have switched on the power supply, wait 30 seconds.

   During this time, the inverter writes the "Read_OSS.ZIP" file onto the memory card.
5. Switch off the inverter power supply.
6. Withdraw the memory card from the inverter.
7. Use a card reader and load the file to a PC.

You have then transferred the OSS license terms from the inverter to a PC, and you can now read the license terms.

Rating plate and technical data

Frame size	Rated output power	Rated output current	Article No.	
	Based on a low overload		Without filter	With filter
 FSAA	0.55 kW	1.7 A	6SL3210-1KE11-8U□2	6SL3210-1KE11-8A□2
	0.75 kW	2.2 A	6SL3210-1KE12-3U□2	6SL3210-1KE12-3A□2
	1.1 kW	3.1 A	6SL3210-1KE13-2U□2	6SL3210-1KE13-2A□2
	1.5 kW	4.1 A	6SL3210-1KE14-3U□2	6SL3210-1KE14-3A□2
	2.2 kW	5.6 A	6SL3210-1KE15-8U□2	6SL3210-1KE15-8A□2
SINAMICS G120C USS/MB	(USS, Modbus RTU)		B	B
SINAMICS G120C DP	(PROFIBUS)		P	P
SINAMICS G120C PN	(PROFINET, EtherNet/IP)		F	F
 FSA	0.55 kW	1.7 A	6SL3210-1KE11-8U□1	6SL3210-1KE11-8A□1
	0.75 kW	2.2 A	6SL3210-1KE12-3U□1	6SL3210-1KE12-3A□1
	1.1 kW	3.1 A	6SL3210-1KE13-2U□1	6SL3210-1KE13-2A□1
	1.5 kW	4.1 A	6SL3210-1KE14-3U□1	6SL3210-1KE14-3A□1
	2.2 kW	5.6 A	6SL3210-1KE15-8U□1	6SL3210-1KE15-8A□1
	3.0 kW	7.3 A	6SL3210-1KE17-5U□1	6SL3210-1KE17-5A□1
	4.0 kW	8.8 A	6SL3210-1KE18-8U□1	6SL3210-1KE18-8A□1
 FSB	5.5 kW	12.5 A	6SL3210-1KE21-3U□1	6SL3210-1KE21-3A□1
	7.5 kW	16.5 A	6SL3210-1KE21-7U□1	6SL3210-1KE21-7A□1
 FSC	11.0 kW	25.0 A	6SL3210-1KE22-6U□1	6SL3210-1KE22-6A□1
	15.0 kW	31.0 A	6SL3210-1KE23-2U□1	6SL3210-1KE23-2A□1
	18.5 kW	37.0 A	6SL3210-1KE23-8U□1	6SL3210-1KE23-8A□1
SINAMICS G120C USS/MB	(USS, Modbus RTU)		B	B
SINAMICS G120C DP	(PROFIBUS)		P	P
SINAMICS G120C PN	(PROFINET, EtherNet/IP)		F	F
SINAMICS G120C CANopen			C	C



The rating plate contains the Article No. and the hardware and firmware version of the inverter. You will find a rating plate at the following locations on the inverter:

- At the front, after removing the blanking cover for the operator panel.
- At the side on the heat sink

2.2 Optional components

Braking resistor

The braking resistor allows the inverter to actively brake loads with high moments of inertia.

Inverter			Braking resistor	Braking resistor as base component
Frame sizes AA, A	0.55 kW … 1.1 kW	6SL3210-1KE11-8 . . ., 6SL3210-1KE12-3 . . ., 6SL3210-1KE13-2 . . .	6SL3201-0BE14-3AA0	6SE6400-4BD11-0AA0
	1.5 kW	6SL3210-1KE14-3 . . .		
	2.2 kW	6SL3210-1KE15-8 . . .	6SL3201-0BE21-0AA0	---
Frame size A	3.0 kW … 4.0 kW	6SL3210-1KE17-5 . . 1, 6SL3210-1KE18-8 . . 1		---
Frame size B	5.5 kW … 7.5 kW	6SL3210-1KE21-3 . . 1, 6SL3210-1KE21-7 . . 1	6SL3201-0BE21-8AA0	---
Frame size C	11.0 kW … 18.5 kW	6SL3210-1KE22-6 . . 1, 6SL3210-1KE23-2 . . 1, 6SL3210-1KE23-8 . . 1	6SL3201-0BE23-8AA0	---

Line reactor

The line reactor increases the level of protection for the inverter against overvoltages, harmonics and commutation dips.

In order that the inverter service life is not reduced, a line reactor is required for a relative short-circuit voltage u_k of the line transformer < 1 %.

Inverter			Line reactor	Line reactor as base component
Frame sizes AA, A	0.55 kW	6SL3210-1KE11-8 . . .	6SL3203-0CE13-2AA0	6SE6400-3CC00-2AD3
	0.75 kW … 1.1 kW	6SL3210-1KE12-3 . . ., 6SL3210-1KE13-2 . . .		6SE6400-3CC00-4AD3
	1.5 kW	6SL3210-1KE14-3 . . .	6SL3203-0CE21-0AA0	6SE6400-3CC00-6AD3
	2.2 kW	6SL3210-1KE15-8 . . .		---
Frame size A	3.0 kW … 4.0 kW	6SL3210-1KE17-5 . . 1, 6SL3210-1KE18-8 . . 1		---
Frame size B	5.5 kW … 7.5 kW	6SL3210-1KE21-3 . . 1, 6SL3210-1KE21-7 . . 1	6SL3203-0CE21-8AA0	---
Frame size C	11.0 kW … 18.5 kW	6SL3210-1KE22-6 . . 1, 6SL3210-1KE23-2 . . 1, 6SL3210-1KE23-8 . . 1	6SL3203-0CE23-8AA0	---

Line filter

With a line filter, the inverter can achieve a higher radio interference class.

Inverter			Line filter as base component
Frame sizes AA, A	0.55 kW … 1.5 kW	6SL3210-1KE11-8 . . 2, 6SL3210-1KE12-3 . . 2, 6SL3210-1KE13-2 . . 2, 6SL3210-1KE14-3 . . 2	Class A: 6SE6400-2FA00-6AD0 Class B: 6SE6400-2FB00-6AD0

Output choke

The output reactor increases the maximum permissible length of the motor cables.

Inverter			Output reactor	Output reactor as base component
Frame sizes AA, A	0.55 kW … 1.1 kW	6SL3210-1KE11-8 . . ., 6SL3210-1KE12-3 . . ., 6SL3210-1KE13-2 . . .	6SL3202-0AE16-1CA0	6SE6400-3TC00-4AD2
	1.5 kW	6SL3210-1KE14-3 . . .		
	2.2 kW	6SL3210-1KE15-8 . . .		---
Frame size A	3.0 kW … 4.0 kW	6SL3210-1KE17-5 . . 1, 6SL3210-1KE18-8 . . 1	6SL3202-0AE18-8CA0	---
Frame size B	5.5 kW … 7.5 kW	6SL3210-1KE21-3 . . 1, 6SL3210-1KE21-7 . . 1	6SL3202-0AE21-8CA0	---
Frame size C	11.0 kW … 18.5 kW	6SL3210-1KE22-6 . . 1, 6SL3210-1KE23-2 . . 1, 6SL3210-1KE23-8 . . 1	6SL3202-0AE23-8CA0	---

Sine-wave filter

Sine-wave filters limit the the rate of voltage rise (dv/dt) and the peak voltages at the motor winding. The sine-wave filter increases the maximum permissible length of the motor cables.

Inverter			Sine-wave filter as base component
Frame sizes AA, A	0.55 kW … 1.5 kW	6SL3210-1KE11-8 . . ., 6SL3210-1KE12-3 . . ., 6SL3210-1KE13-2 . . ., 6SL3210-1KE14-3 . . .	6SE6400-3TD00-4AD0

Installing

3

3.1 Mounting

Dimensions

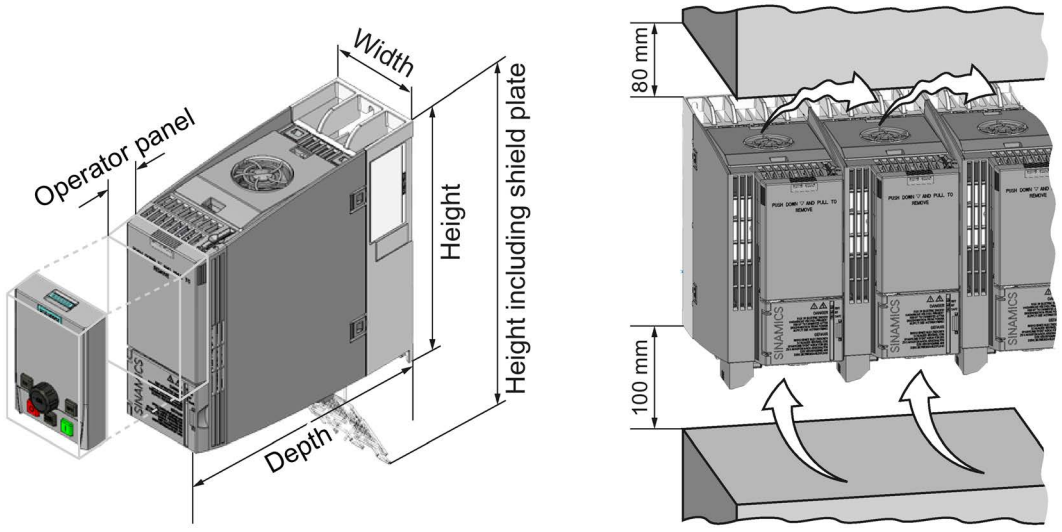


Image 3-1 Dimensions and minimum spacing to other devices

Table 3- 1 Dimensions

	Frame size AA 0.55 kW … 2.2 kW	Frame Size A 0.55 kW … 4.0 kW	Frame size B 5.5 kW … 7.5 kW	Frame size C 11 kW … 18.5 kW
Height including connectors	181 mm	196 mm	196 mm	295 mm
Height including shield plate	268 mm	276 mm	276 mm	375 mm
Width	73 mm	73 mm	100 mm	140 mm
Depth of the inverter with PROFINET interface	178 mm	226 mm	226 mm	226 mm
Depth of the inverter with USS/MB, CANopen, or PROFIBUS interface	155 mm	203 mm	203 mm	203 mm
Additional depth when the Operator Panel is attached	+ 21 mm with IOP (Intelligent Operator Panel) attached			
	+ 11 mm with BOP-2 (Basic Operator Panel) attached			

Mounting the shield plates

We recommend that you mount the shield plates provided. The shield plates make it simpler to install the inverter in compliance with EMC regulations and to provide strength relief for the connected cables.

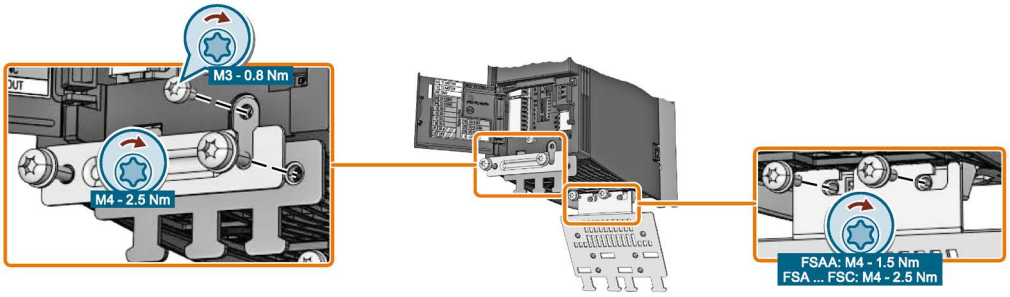
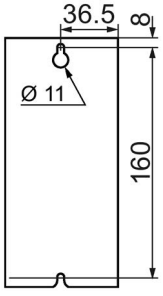
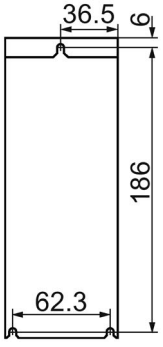
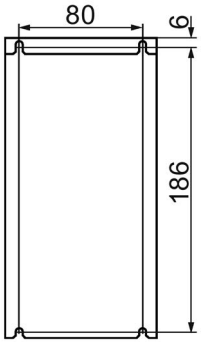
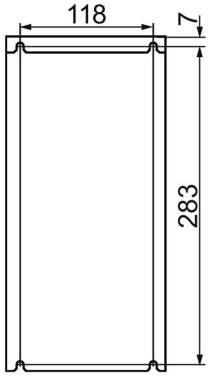


Image 3-2 Mounting the shield plates using as example a frame size A inverter

Mounting on a control cabinet panel

Table 3- 2 Drilling patterns and mounting equipment

	Frame size AA **0.55 kW ... 2.2 kW**	**Frame Size A** **0.55 kW ... 4.0 kW**	**Frame size B** **5.5 kW ... 7.5 kW**	**Frame size C** **11 kW ... 18.5 kW**
Drilling pattern	 Drilling pattern without shield plate When the shield plate is mounted, the drilling pattern is compatible to frame size A			
Mounting parts	2 x M4 bolts 2 x M4 nuts 2 x M4 washers	3 x M4 studs, 3 x M4 nuts, 3 x M4 washers	4 x M4 studs, 4 x M4 nuts, 4 x M4 washers	4 x M5 studs, 4 x M5 nuts, 4 x M5 washers
Locked-rotor (starting) torque	2.5 Nm	2.5 Nm	2.5 Nm	2.5 Nm

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.

3.2 Connecting

3.2.1 Connecting the inverter and inverter components to the line supply

⚠ WARNING

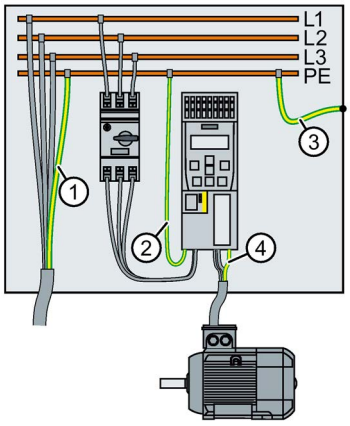
Danger to life caused by high leakage currents for an interrupted protective conductor

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.

- Dimension the protective conductor as stipulated in the appropriate regulations.

Dimensioning the protective conductor

Observe the local regulations for protective conductors subject to an increased leakage current at the site of operation.



① Protective conductor for line feeder cables
② Protective conductor for inverter line feeder cables
③ Protective conductor between PE and the electrical 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:

- 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 electrical 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 mm² Cu.
  - For an individual conductor, the protective conductor has a cross-section ≥ 10 mm² Cu.
  - The protective conductor consists of two 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 mm² Cu.

Overview

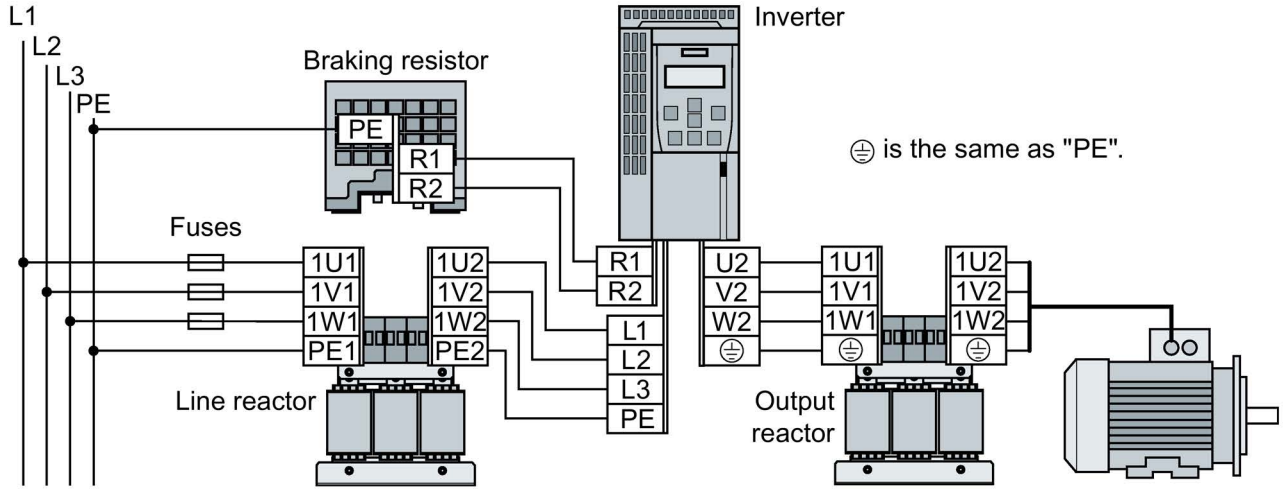
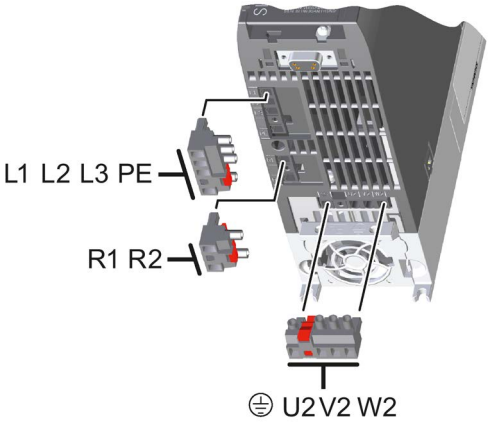


Image 3-3 Connecting the inverter and its optional components

The plugs for connecting the line supply, motor, and braking resistor are located on the lower side of the inverter.

If an EMC-compliant installation is required, you must use shielded cables.

Connecting inverters in compliance with EMC (Page 22)

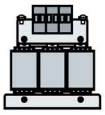


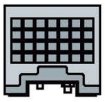
Connection cross-sections and tightening torque

Converter Frame size, rated power		Connection cross-section (tightening torque)	
FSAA, FSA	0.55 kW … 4.0 kW	1.0 ... 2.5 mm² (0.5 Nm)	18 ... 14 AWG (4.5 lbf in)
FSB	5.5 kW … 7.5 kW	4.0 ... 6.0 mm² (0.6 Nm)	12 ... 10 AWG (5.5 lbf in)
FSC	11 kW	6.0 ... 16 mm² (1.5 Nm)	10 ... 5 AWG (13.5 lbf in)
	15 kW … 18.5 kW	10 ... 16 mm² (1.5 Nm)	7 ... 5 AWG (13.5 lbf in)

Converter Frame size, rated power		Reactor, filter or braking resistor as base components Connection cross-section (tightening torque)	
FSAA	0.55 kW … 2.2 kW	1.0 ... 2.5 mm² (1.1 Nm)	17 ... 14 AWG (10 lbf in)

Rated power of the inverter	Line reactor Connection cross-section (tightening torque)		
0.55 kW … 4.0 kW	2.5 mm² (0.8 Nm)	14 AWG (7 lbf in)	PE M4 (3 Nm / 27 lbf in)
5.5 kW … 7.5 kW	6 mm² (1.8 Nm)	10 AWG (16 lbf in)	PE M5 (5 Nm / 44 lbf in)
11 kW … 18.5 kW	16 mm² (4 Nm)	5 AWG (35 lbf in)	

Rated power of the inverter		Output choke Connection cross-section (tightening torque)		
0.55 kW … 4.0 kW		2.5 mm² (0.8 Nm)	14 AWG (7 lbf in)	PE M4 (3 Nm / 27 lbf in)
5.5 kW … 7.5 kW		10 mm² (1.8 Nm)	8 AWG (16 lbf in)	PE M5 (5 Nm / 44 lbf in)
11 kW … 18.5 kW		16 mm² (4 Nm)	5 AWG (35 lbf in)	

Rated power of the inverter		Braking resistor Connection cross-section (tightening torque)			
		R1, R2, PE		Temperature contact	
0.55 kW … 7.5 kW		2.5 mm² (0.5 Nm)	14 AWG (4.5 lbf in)	2.5 mm² (0.5 Nm)	14 AWG (4.5 lbf in)
11 kW … 18.5 kW		6 mm² (0.6 Nm)	10 AWG (5.5 lbf in)		

Branch circuit protection according to the IEC standard

Table 3- 3 Permissible protection devices according to the IEC standard

Frame size	Rated power	Inverter article number	Article number		I_{max} 1)	Control cabinet 2)
			Fuse	Circuit-breaker		
FSAA, FSA	0.55 kW 0.75 kW 1.1 kW 1.5 kW 2.2 kW	6SL3210-1KE11-8… 6SL3210-1KE12-3… 6SL3210-1KE13-2… 6SL3210-1KE14-3… 6SL3210-1KE15-8…	3NA3803	3RV2011-1JA.. or 3RV2021-1JA..	10 A	≥ 0.03 m³
FSA	3 kW 4 kW	6SL3210-1KE17-5… 6SL3210-1KE18-8…	3NA3805	3RV2011-4AA.. or 3RV2021-4AA..	16 A	
FSB	5.5 kW 7.5 kW	6SL3210-1KE21-3… 6SL3210-1KE21-7…	3NA3812	3RV2021-4EA..	32 A	≥ 0.06 m³
FSC	11 kW 15 kW 18.5 kW	6SL3210-1KE22-6… 6SL3210-1KE23-2… 6SL3210-1KE23-8…	3NA3822	3RV1041-4JA..	63 A	≥ 0.2 m³

1) Maximum rated current of the protection device. You may also use protective devices 3NA38.. and 3RV with a lower rated current.

2) Minimum volume of the control cabinet in which the inverter is installed. The restriction applies only for a protection with a circuit-breaker.

Branch circuit protection according to the UL standard

Use in North America requires protection devices that meet UL standards as detailed in the following tables.

Table 3- 4 Permissible safety devices according to the UL standard

Protection device	UL category
Fuses of any manufacturer with faster tripping characteristic than class RK5, e.g. class J, T, CC, G, or CF	JDDZ
SIEMENS circuit breaker	DIVQ
Type E combination motor controller (designation according to the UL standard), is available as SIEMENS circuit breaker	NKJH

In accordance with the following tables, you may operate the inverter on a branch circuit with the specified short-circuit current rating provided the specified branch-circuit protection is installed.

Table 3- 5 Permissible circuit protection with non-semiconductor fuses of Classes J, T, CC, G or CF (JDDZ)

Frame size	Rated power	Inverter article number	I_{max} [1]	SCCR [2]	Control cabinet [3]
FSAA, FSA	0.55 kW 0.75 kW 1.1 kW 1.5 kW 2.2 kW	6SL3210-1KE11-8… 6SL3210-1KE12-3… 6SL3210-1KE13-2… 6SL3210-1KE14-3… 6SL3210-1KE15-8…	10 A	100 kA, 480 V 3 AC	≥ 1830 in³
FSA	3 kW 4 kW	6SL3210-1KE17-5… 6SL3210-1KE18-8…	15 A	100 kA, 480 V 3 AC	≥ 1830 in³
FSB	5.5 kW 7.5 kW	6SL3210-1KE21-3… 6SL3210-1KE21-7…	35 A	100 kA, 480 V 3 AC	≥ 3660 in³
FSC	11 kW 15 kW 18.5 kW	6SL3210-1KE22-6… 6SL3210-1KE23-2… 6SL3210-1KE23-8…	60 A	100 kA, 480 V 3 AC	≥ 12200 in³

1) Maximum rated current of the fuse

2) Short-circuit current rating of the branch circuit

3) Minimum volume of a control cabinet approved according to UL in which the inverter is installed. UL does not specify any minimum value of the control cabinet for inverters FSA … FSC with fuses, Class AJT from Mersen (Ferraz Shawmut).

Table 3- 6 Permissible circuit-breakers (DIVQ)

Frame size	Rated power	Inverter article number	Circuit breaker		SCCR [2]	Control cabinet [3]
			Article number	I_{max} [1]		
FSAA, FSA	0.55 kW 0.75 kW 1.1 kW 1.5 kW 2.2 kW	6SL3210-1KE11-8… 6SL3210-1KE12-3… 6SL3210-1KE13-2… 6SL3210-1KE14-3… 6SL3210-1KE15-8…	3RV1742, LGG or CED6	15 A	5 kA, 480 VAC	≥ 1830 in³
			3RV2711	15 A	5 kA, 480Y / 277 VAC	≥ 1830 in³
FSA	3 kW 4 kW	6SL3210-1KE17-5… 6SL3210-1KE18-8…	3RV1742, LGG or CED6	15 A	65 kA, 480 VAC	≥ 1830 in³
			3RV2711	15 A	65 kA, 480Y / 277 VAC	≥ 1830 in³
FSB	5.5 kW 7.5 kW	6SL3210-1KE21-3… 6SL3210-1KE21-7…	NCGA	35 A	35 kA, 480 VAC	≥ 3660 in³
			3RV2721	35 A	50 kA, 480Y / 277 VAC	≥ 3660 in³
			LGG, CED6 or HCGA	35 A	65 kA, 480 VAC	≥ 3660 in³
			3RV1742	35 A	65 kA, 480Y / 277 VAC [4]	≥ 3660 in³
			3RV2711	35 A	65 kA, 480Y / 277 VAC	≥ 3660 in³

Frame size	Rated power	Inverter article number	Circuit breaker		SCCR [2]	Control cabinet [3]
			Article number	I_{max} [1]		
FSC	11 kW	6SL3210-1KE22-6…	NCGA	60 A	35 kA, 480 VAC	≥ 8780 in³
	15 kW	6SL3210-1KE23-2…	LGG, CED6 or HCGA	60 A	65 kA, 480 VAC	≥ 8780 in³
	18.5 kW	6SL3210-1KE23-8…	3RV1742	60 A	65 kA, 480Y / 277 VAC [4]	≥ 8780 in³

1) Maximum rated current of the circuit-breaker

2) Short-circuit current rating of the branch circuit

3) Minimum volume of a control cabinet approved according to UL in which the inverter is installed. UL does not specify any minimum value of the control cabinet for inverters FSA … FSC with fuses, Class AJT from Mersen (Ferraz Shawmut).

4) 65 kA, 480 VAC with rated current < 35 A

Table 3- 7 Permissible Type E combination motor controller (NKJH)

Frame size	Rated power	Inverter article number	Type E combination motor controller			SCCR [3]	Control cabinet [4]
			Article number	I_{max} [1]	P_N [2]		
FSAA, FSA	0.55 kW 0.75 kW 1.1 kW 1.5 kW 2.2 kW	6SL3210-1KE11-8… 6SL3210-1KE12-3… 6SL3210-1KE13-2… 6SL3210-1KE14-3… 6SL3210-1KE15-8…	3RV2011-1JA.. or 3RV2021-1JA..	10 A	5 HP	65 kA, 480Y / 277 VAC	≥ 1830 in³
FSA	3 kW 4 kW	6SL3210-1KE17-5… 6SL3210-1KE18-8…	3RV2011-4AA.. or 3RV2011-4AA..	16 A	10 HP	65 kA, 480Y / 277 VAC	≥ 1830 in³
			3RV1031-4AA..	16 A	10 HP	65 kA, 480Y / 277 VAC	≥ 1830 in³
FSB	5.5 kW 7.5 kW	6SL3210-1KE21-3… 6SL3210-1KE21-7…	3RV2021-4DA..	25 A	15 HP	65 kA, 480Y / 277 VAC	≥ 3660 in³
			3RV2021-4EA..	32 A	20 HP	50 kA, 480Y / 277 VAC	≥ 3660 in³
			3RV1031-4EA.. or 3RV1031-4EA..	32 A	20 HP	65 kA, 480Y / 277 VAC	≥ 3660 in³
FSC	11 kW 15 kW 18.5 kW	6SL3210-1KE22-6… 6SL3210-1KE23-2… 6SL3210-1KE23-8…	3RV1031-4HA..	50 A	40 HP	65 kA, 480Y / 277 VAC	≥ 12200 in³
			3RV1041-4JA..	63 A	50 HP	65 kA, 480Y / 277 VAC	≥ 12200 in³

1) Maximum rated current of the Type E combination motor controller. You may use NKJH-listed Type E combination motor controller of the same type - with a rated voltage ≥ 480 V AC and with a lower rated current - which match the inverter.

2) Rated power of the Type E combination motor controller at 460 V AC

3) Short-circuit current rating of the branch circuit

4) Minimum volume of a control cabinet approved according to UL in which the inverter is installed. UL does not specify any minimum value of the control cabinet for inverters FSA … FSC with fuses, Class AJT from Mersen (Ferraz Shawmut).

Installation in the United States and Canada (UL or CSA)

To install the inverter in compliance with UL/cUL, perform the following steps:

- Use the specified protection devices.
- A multi-motor drive is not permissible, i.e. simultaneously operating several motors connected to one inverter.
- The integrated semiconductor short-circuit protection in the inverter does not provide branch protection. Install branch protection in compliance with the National Electric Code and possibly relevant local regulations.
- Use copper cables, Class 1, ≥ 60° C for frame size FSAA with rated power ≤ 1.5 kW.
- Use copper cables, Class 1, 75° C for frame sizes FSAA (2.2 KW) and FSA … FSC.
- Leave parameter p0610 in its factory setting.

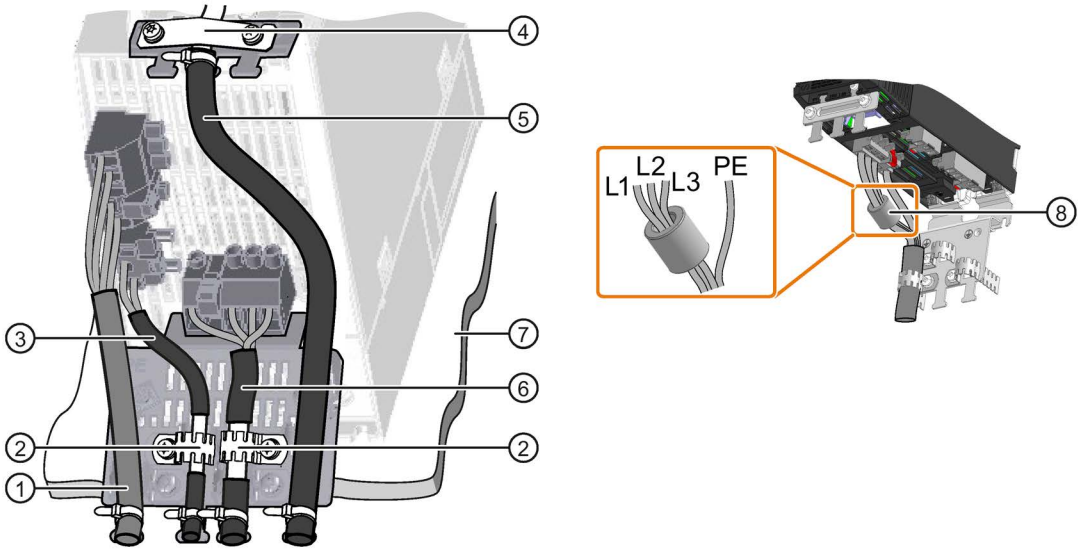
  The factory setting p0610 = 12 means: The inverter responds to motor overtemperature immediately with an alarm and after a certain time with a fault.

Additional requirements for CSA compliance:

- Use the specified protection devices.
- Use a surge protection device with article no. 5SD7424-1.
- Alternative: Install the inverter with an external surge protection device with the following attributes:
  - Surge protection device with ‘listed’ test symbol: category checking numbers VZCA and VZCA7
  - Rated voltage 3-phase 480/277 VAC, 50/60 Hz
  - Terminal voltage V_{PR} = 2000 V, I_N = 3 kA min, MCOV = 508 VAC, SCCR = 40 kA
  - Suitable for SPD applications, type 1 or type 2
- When commissioning the drive system, set the motor overload protection to 115%, 230% or 400% of the rated motor current using parameter p0640. This means that motor overload protection according to CSA C22.2 No. 274 is complied with.

3.2.2 Connecting inverters in compliance with EMC

Overview



① Unshielded line cable
② Toothed tapes on the shield plate of the inverter
③ Shielded cable to the braking resistor
④ Shield clamp for the cable to the terminal strip on the shield plate of the inverter
⑤ Shielded cables to the terminal strip, to the fieldbus and to the motor temperature sensor
⑥ Shielded motor cable
⑦ Unlacquered, good electrically conducting mounting plate
⑧ Supplied ferrite core in the line cable, relevant only for FSAA, 2.2 kW (6SL3210-1KE15-8A . 2)

Image 3-4 EMC-compliant wiring shown using the example of a frame size A and frame size AA inverter

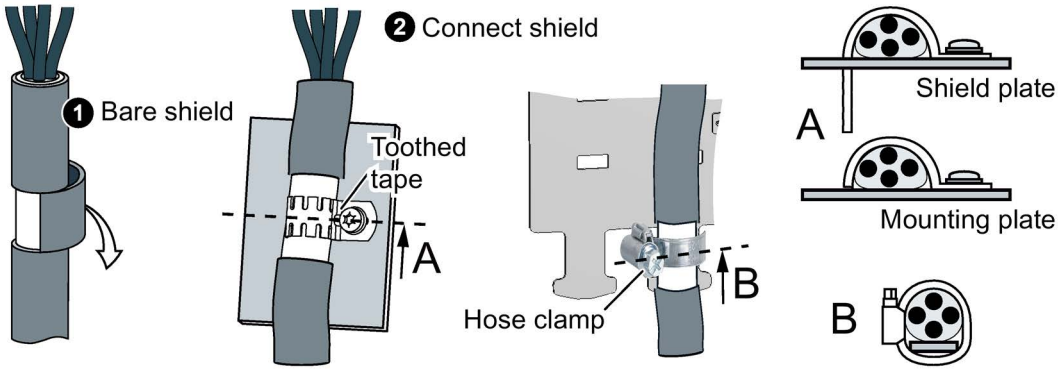
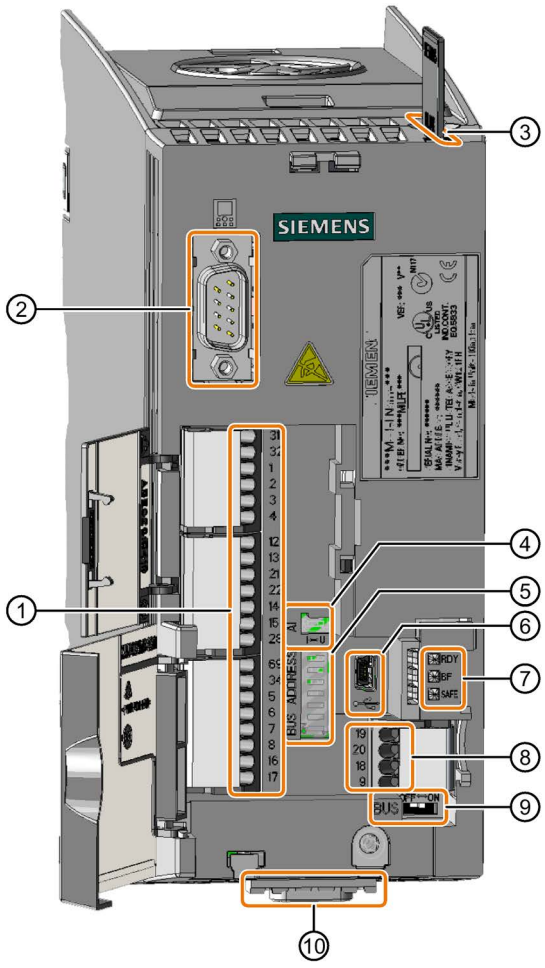


Image 3-5 EMC-compliant shield connection

3.2.3 Overview of the interfaces

The inverter interfaces

To access the interfaces at the front of the inverter, you must unplug the operator panel (if one is being used) and open the front doors.



① Terminal strip

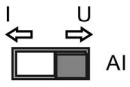
② Connection to the operator panel

③ Memory card slot

④ Switch for analog input:

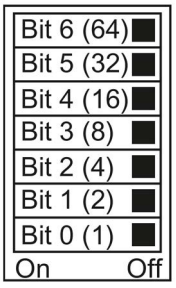
I 0/4 mA … 20 mA

U -10/0 V … 10 V



⑤ Selecting the fieldbus address:

- PROFIBUS
- USS
- Modbus RTU
- CanOpen



⑥ USB interface for connection to a PC

⑦ Status LED:

RDY
BF
SAFE
LNK1, only for PROFINET
LNK2, only for PROFINET

⑧ Terminal strip

⑨ Depending on the fieldbus:

- No function for PROFIBUS and PROFINET
- Bus termination for USS, Modbus and CANopen

⑩ Fieldbus interface

3.2.4 Terminal strips

Wiring variations of the terminal strips

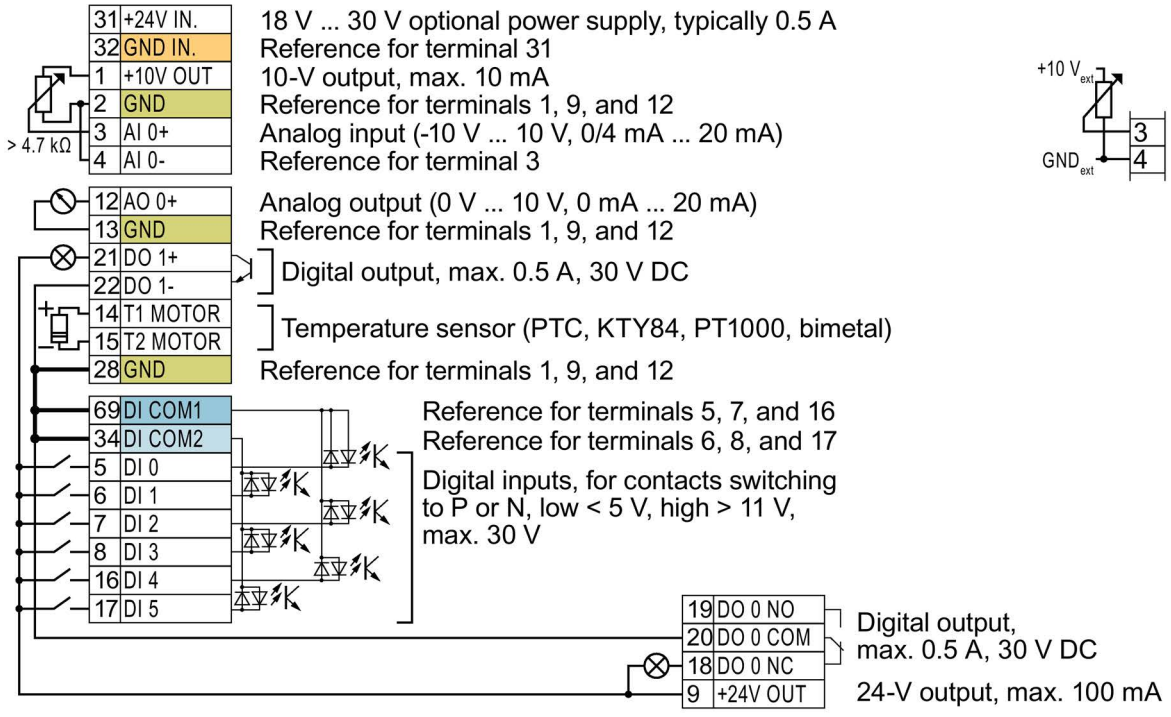
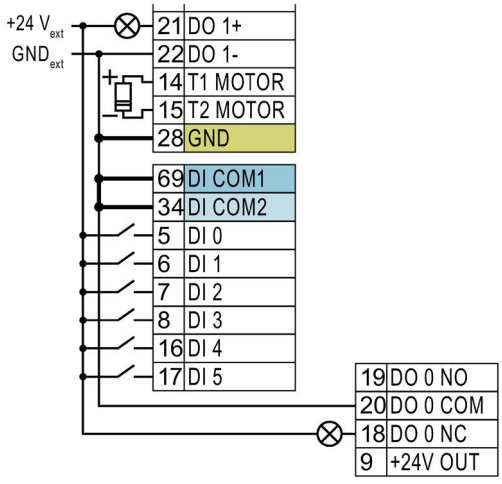


Image 3-6 Wiring example of the digital inputs with the internal inverter 24 V power supply

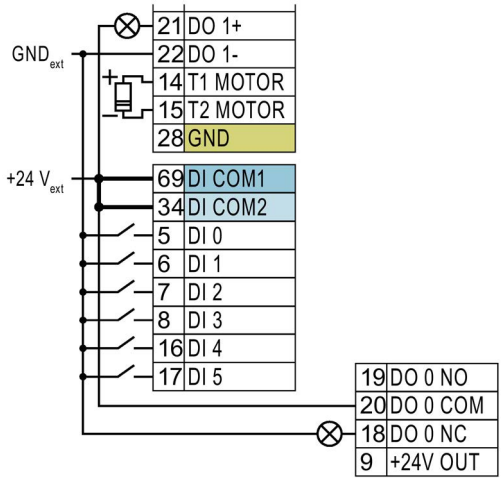
GND	All terminals with the reference potential "GND" are connected to each other inside the inverter.
DI COM1	Reference potentials "DI COM1" and "DI COM2" are electrically isolated from "GND".
DI COM2	→ If you use the 24-V power supply at terminal 9 to power the digital inputs, you must interconnect "GND," "DI COM1," and "DI COM2."
31 +24 V IN 32 GND IN	When an optional 24-V power supply is connected to terminals 31, 32, the Control Unit remains in operation even after the Power Module has been disconnected from the line supply. The Control Unit thus maintains fieldbus communication, for example. → Connect only power supplies that are SELV (Safety Extra Low Voltage) or PELV (Protective Extra Low Voltage) to terminals 31, 32 . → If you also wish to use the power supply at terminals 31, 32 for the digital inputs, then you must connect "DI COM1/2" and "GND IN" with one another.
3 AI 0+ 4 AI 0-	For the analog input, you can use the internal 10-V power supply or an external voltage source. Typical current consumption: 10 mA … 20 mA. → If you use the internal 10-V supply, you must connect AI 0- to GND.

Further wiring options for digital inputs



Connection of contacts switching to P potential with an external power source

If you want to connect the potential of the external power source to the potential of the inverter's internal power supply, you must connect "GND" to terminals 34 and 69.



Connection of contacts switching to N potential with an external power source

Connect terminals 69 and 34 to each other.

3.2.5 Factory setting of the interfaces

The factory setting of the interfaces depends on which fieldbus the inverter supports.

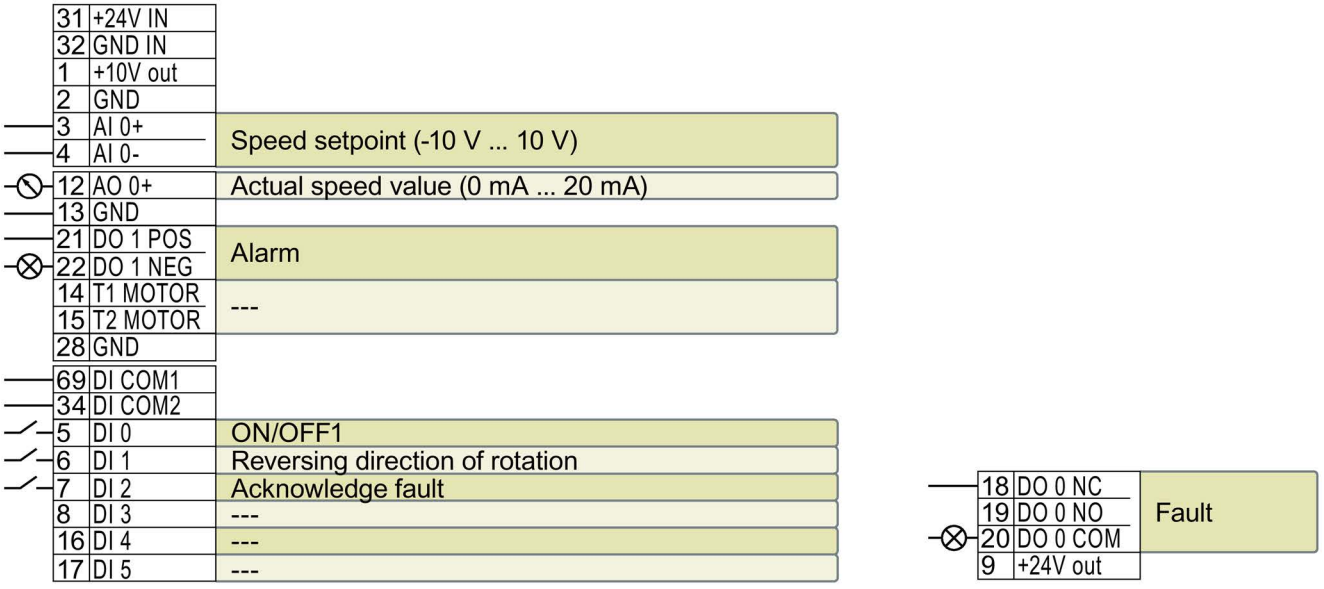


Image 3-7 Factory setting of the terminals for G120C USS and G120C CAN

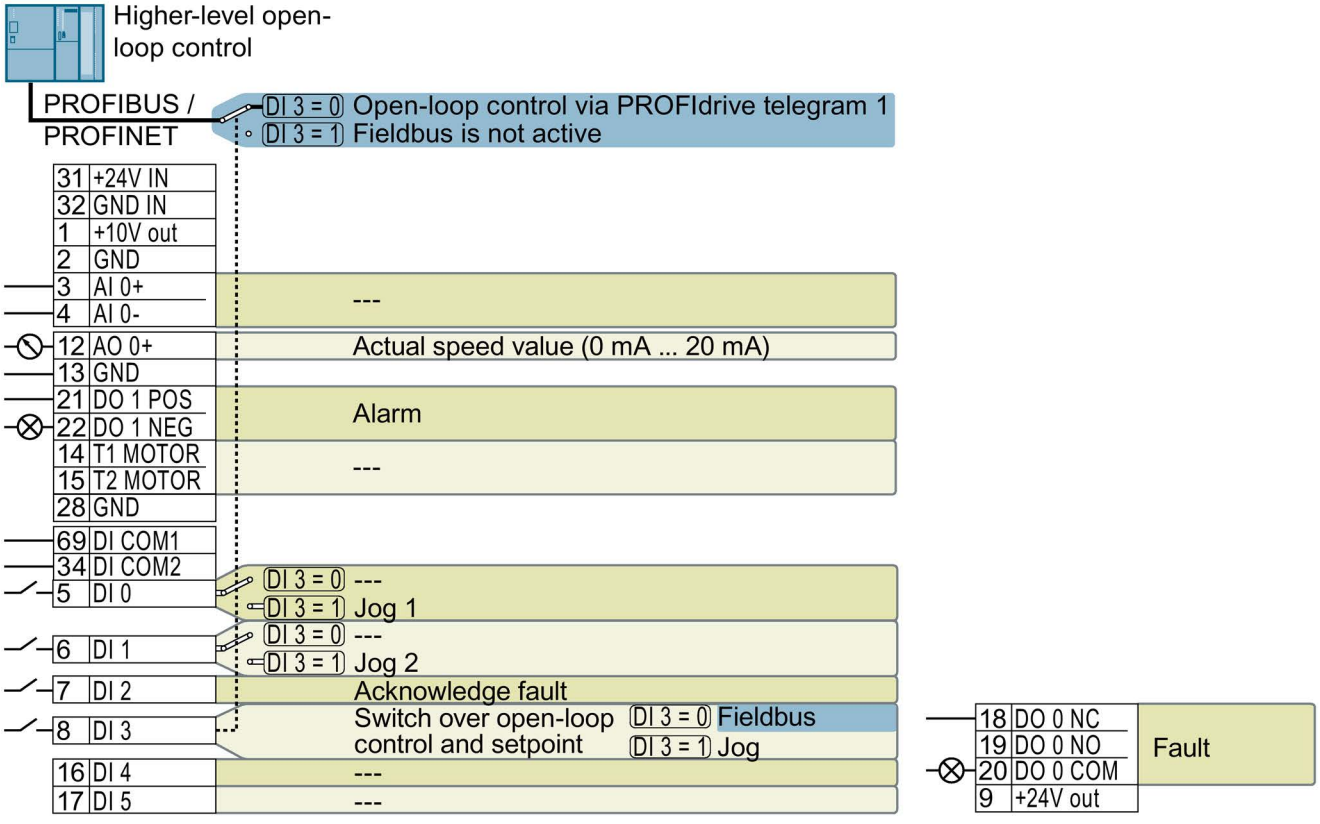


Image 3-8 Factory setting of the terminals for G120C DP and G120C PN

3.2.6 Default setting of the interfaces

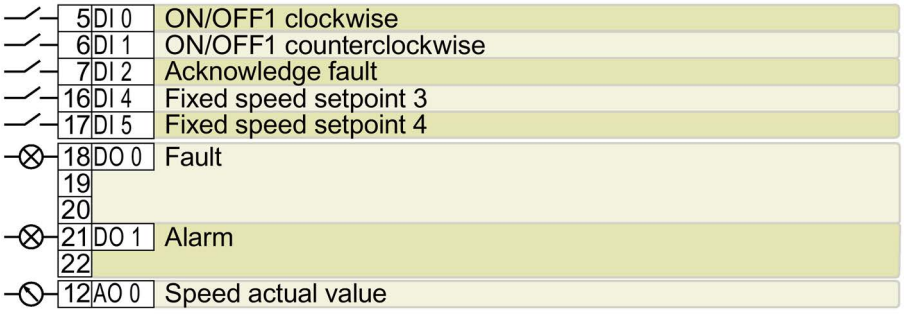
The function of the terminals and fieldbus interface can be adjusted.

In order that you do not have to successively change terminal for terminal, several terminals can be jointly set using default settings ("p0015 Macro drive unit").

The terminal settings made in the factory described above correspond to the following default settings:

- Default setting 12 (p0015 = 12): "Standard I/O with analog setpoint"
- Default setting 7 (p0015 = 7): "Fieldbus with data set switchover"

Default setting 1: "Conveyor technology with 2 fixed frequencies"



DO 0: p0730, DO 1: p0731 AO 0: p0771[0] DI 0: r0722.0, …, DI 5: r0722.5

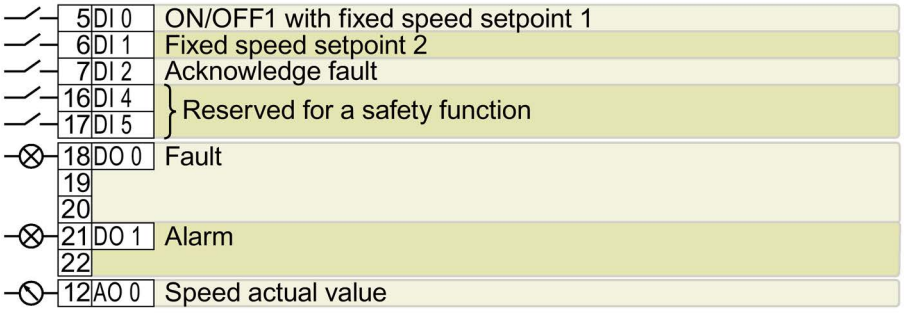
Fixed speed setpoint 3: p1003, fixed speed setpoint 4: p1004, fixed speed setpoint active: r1024

Speed setpoint (main setpoint): p1070[0] = 1024

DI 4 and DI 5 = high: the inverter adds the two fixed speed setpoints

Designation in the BOP-2: coN 2 SP

Default setting 2: "Conveyor system with Basic Safety"



DO 0: p0730, DO 1: p0731 AO 0: p0771[0] DI 0: r0722.0, …, DI 5: r0722.5

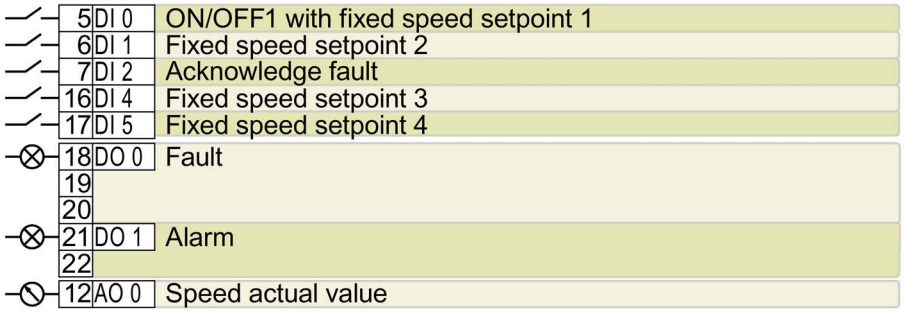
Fixed speed setpoint 1: p1001, fixed speed setpoint 2: p1002, fixed speed setpoint active: r1024

Speed setpoint (main setpoint): p1070[0] = 1024

DI 0 and DI 1 = high: the inverter adds the two fixed speed setpoints.

Designation in the BOP-2: coN SAFE

Default setting 3: "Conveyor system with 4 fixed frequencies"



DO 0: p0730, DO 1: p0731 AO 0: p0771[0] DI 0: r0722.0, …, DI 5: r0722.5

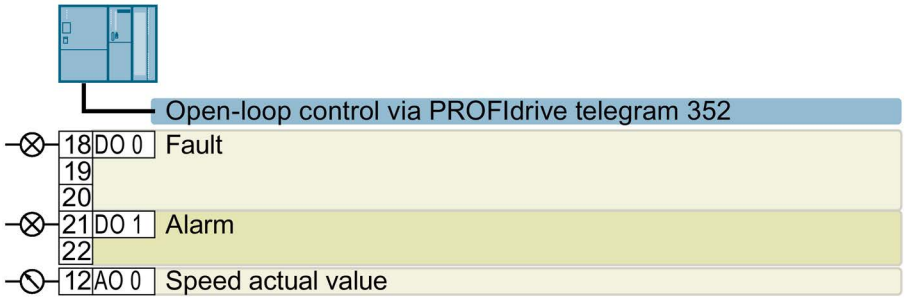
Fixed speed setpoint 1: p1001, … fixed speed setpoint 4: p1004, fixed speed setpoint active: r1024

Speed setpoint (main setpoint): p1070[0] = 1024

Several of the DI 0, DI 1, DI 4, and DI 5 = high: the inverter adds the corresponding fixed speed setpoints.

Designation in the BOP-2: coN 4 SP

Default setting 4: "Conveyor system with fieldbus"

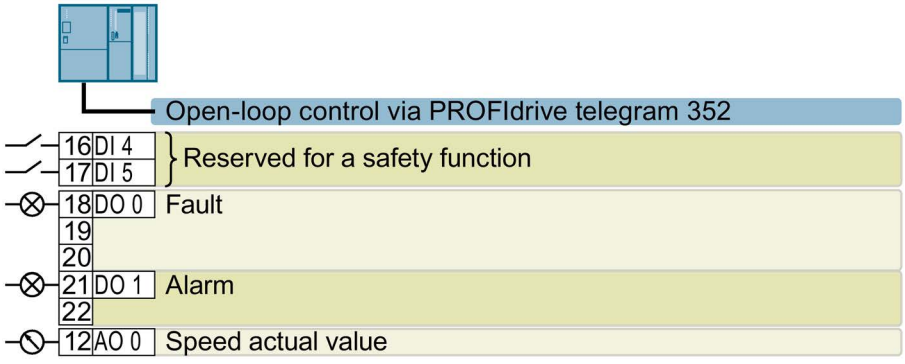


DO 0: p0730, DO 1: p0731 AO 0: p0771[0]

Speed setpoint (main setpoint): p1070[0] = 2050[1]

Designation in the BOP-2: coN Fb

Default setting 5: "Conveyor system with fieldbus and Basic Safety"



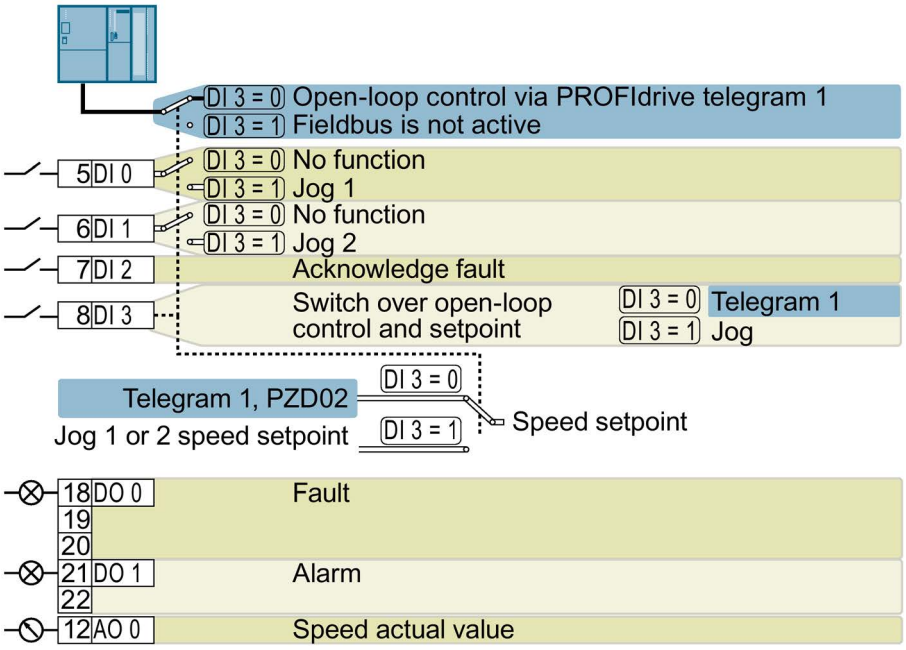
DO 0: p0730, DO 1: p0731 AO 0: p0771[0] DI 4: r0722.4, DI 5: r0722.5

Speed setpoint (main setpoint): p1070[0] = 2050[1]

Designation in the BOP-2: coN Fb S

Default setting 7: "Fieldbus with data set switchover"

Factory setting for inverters with PROFIBUS or PROFINET interface



DO 0: p0730, DO 1: p0731 AO 0: p0771[0] DI 0: r0722.0, …, DI 3: r0722.3

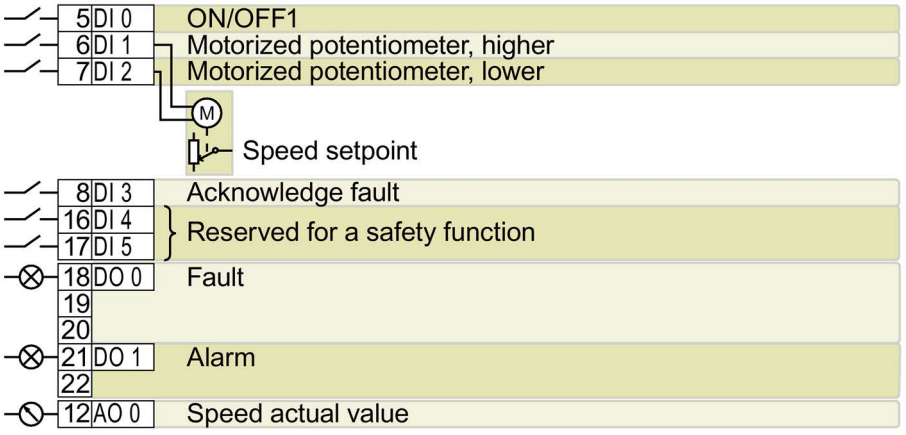
Speed setpoint (main setpoint): p1070[0] = 2050[1]

Jog 1 speed setpoint: p1058, factory setting: 150 rpm

Jog 2 speed setpoint: p1059, factory setting: -150 rpm

Designation in the BOP-2: FB cdS

Default setting 8: "MOP with Basic Safety"



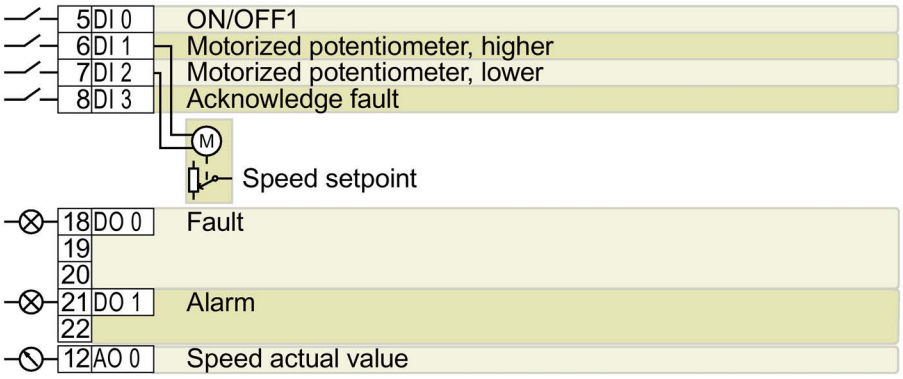
DO 0: p0730, DO 1: p0731 AO 0: p0771[0] DI 0: r0722.0, …, DI 5: r0722.5

Motorized potentiometer, setpoint after the ramp-function generator: r1050

Speed setpoint (main setpoint): p1070[0] = 1050

Designation in the BOP-2: MoP SAFE

Default setting 9: "Standard I/O with MOP"



DO 0: p0730, DO 1: p0731 AO 0: p0771[0] DI 0: r0722.0, …, DI 3: r0722.3

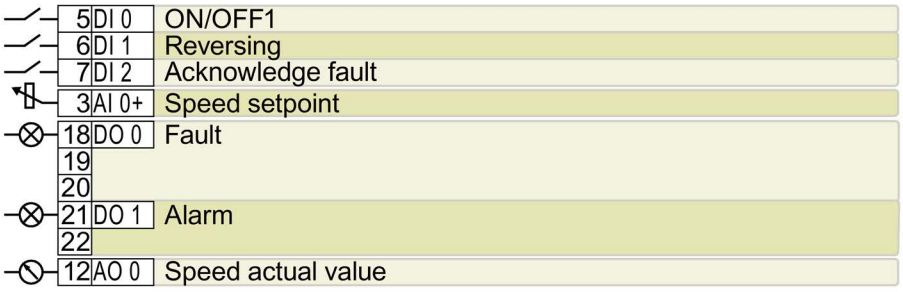
Motorized potentiometer, setpoint after the ramp-function generator: r1050

Speed setpoint (main setpoint): p1070[0] = 1050

Designation in the BOP-2: Std MoP

Default setting 12: "Standard I/O with analog setpoint"

Factory setting for inverters with USS interface

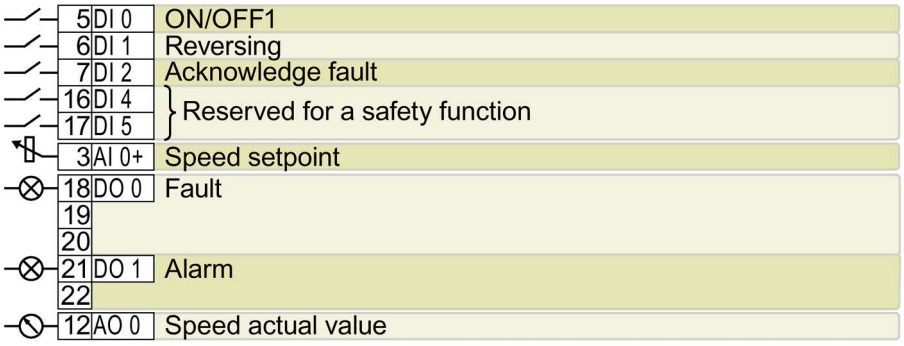


DO 0: p0730, DO 1: p0731 AO 0: p0771[0] DI 0: r0722.0, …, DI 2: r0722.2 AI 0: r0755[0]

Speed setpoint (main setpoint): p1070[0] = 755[0]

Designation in the BOP-2: Std ASP

Default setting 13: "Standard I/O with analog setpoint and safety"

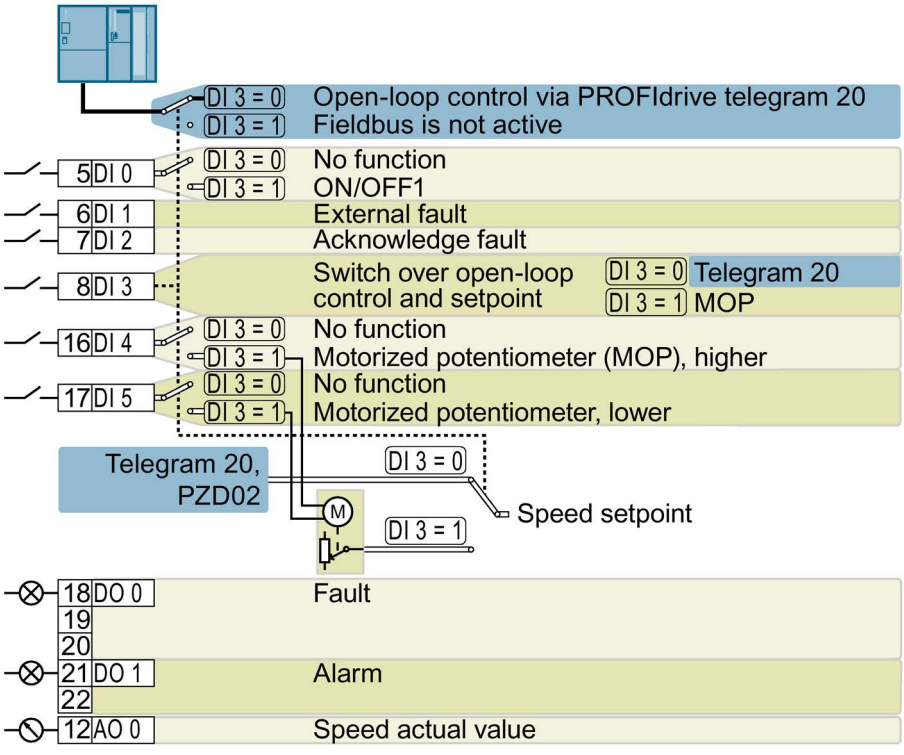


DO 0: p0730, DO 1: p0731 AO 0: p0771[0] DI 0: r0722.0, …, DI 5: r0722.5 AI 0: r0755[0]

Speed setpoint (main setpoint): p1070[0] = 755[0]

Designation in the BOP-2: ASPS

Default setting 14: "Process industry with fieldbus"



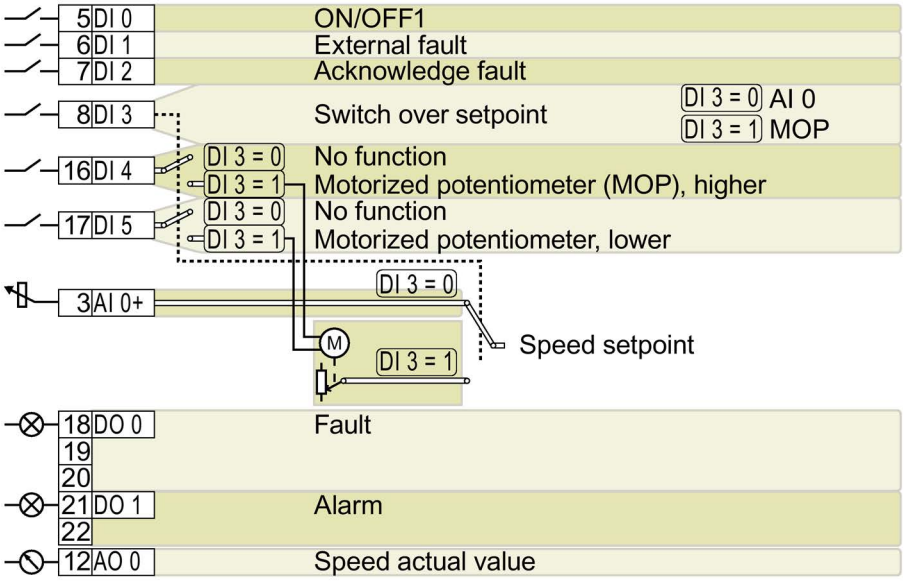
DO 0: p0730, DO 1: p0731 AO 0: p0771[0] DI 0: r0722.0, …, DI 5: r0722.5

Motorized potentiometer, setpoint after the ramp-function generator: r1050

Speed setpoint (main setpoint): p1070[0] = 2050[1], p1070[1] = 1050

Designation in the BOP-2: Proc Fb

Default setting 15: "Process industry"



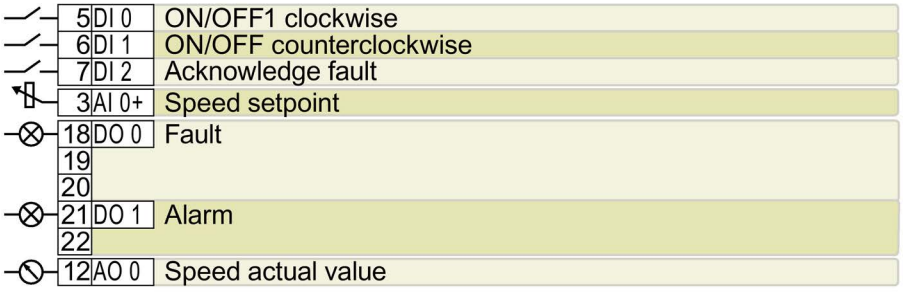
DO 0: p0730, DO 1: p0731 AO 0: p0771[0] DI 0: r0722.0, …, DI 5: r0722.5 AI 0: r0755[0]

Motorized potentiometer, setpoint after the ramp-function generator: r1050

Speed setpoint (main setpoint): p1070[0] = 755[0], p1070[1] = 1050

Designation in the BOP-2: Proc

Default setting 17: "2-wire (forw/backw1)"

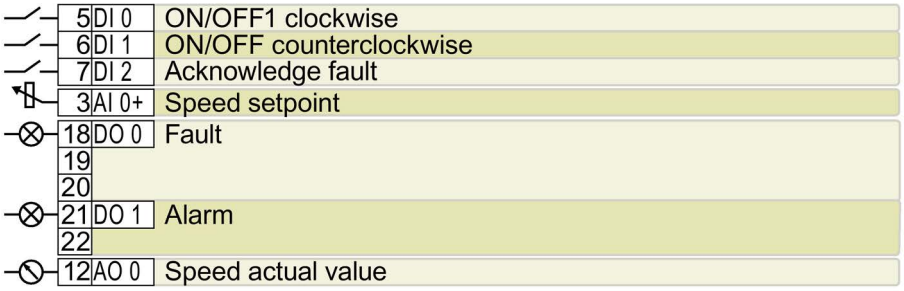


DO 0: p0730, DO 1: p0731 AO 0: p0771[0] DI 0: r0722.0, …, DI 2: r0722.2 AI 0: r0755[0]

Speed setpoint (main setpoint): p1070[0] = 755[0]

Designation in the BOP-2: 2-wIrE 1

Default setting 18: "2-wire (forw/backw2)"

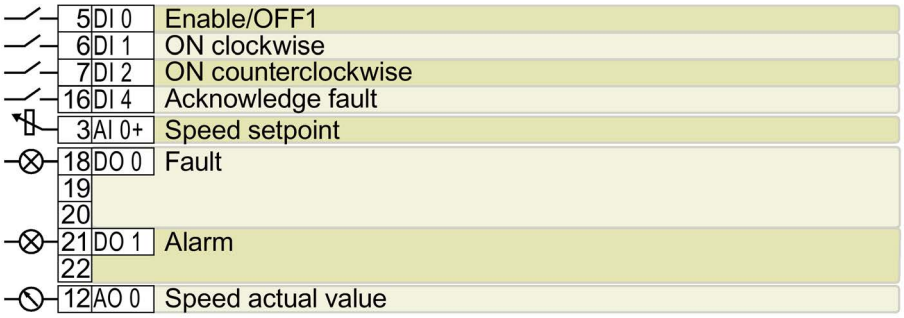


DO 0: p0730, DO 1: p0731 AO 0: p0771[0] DI 0: r0722.0, …, DI 2: r0722.2 AI 0: r0755[0]

Speed setpoint (main setpoint): p1070[0] = 755[0]

Designation in the BOP-2: 2-wIrE 2

Default setting 19: "3-wire (enable/forw/backw)"

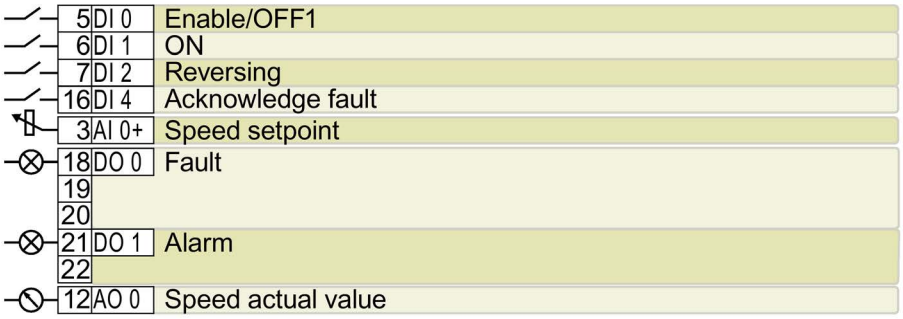


DO 0: p0730, DO 1: p0731 AO 0: p0771[0] DI 0: r0722.0, …, DI 4: r0722.4 AI 0: r0755[0]

Speed setpoint (main setpoint): p1070[0] = 755[0]

Designation in the BOP-2: 3-wIrE 1

Default setting 20: "3-wire (enable/on/reverse)"

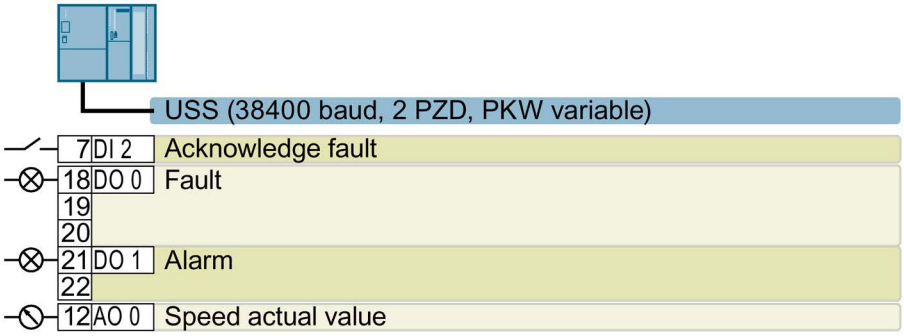


DO 0: p0730, DO 1: p0731 AO 0: p0771[0] DI 0: r0722.0, …, DI 4: r0722.4 AI 0: r0755[0]

Speed setpoint (main setpoint): p1070[0] = 755[0]

Designation in the BOP-2: 3-wIrE 2

Default setting 21: "USS fieldbus"

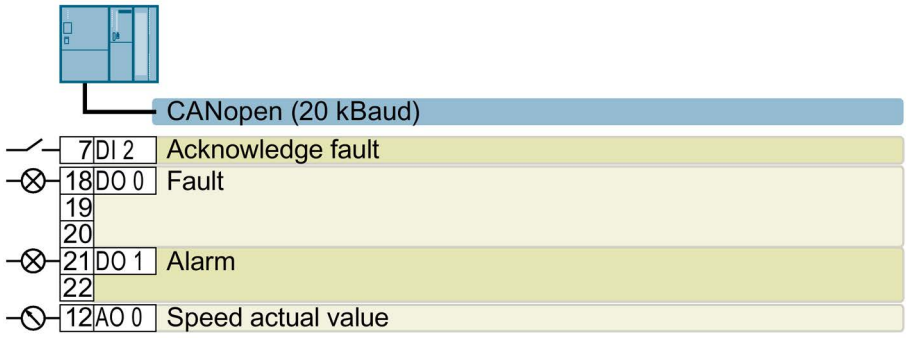


DO 0: p0730, DO 1: p0731 AO 0: p0771[0] DI 2: r0722.2

Speed setpoint (main setpoint): p1070[0] = 2050[1]

Designation in the BOP-2: FB USS

Default setting 22: "CAN fieldbus"



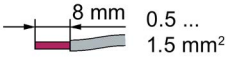
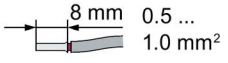
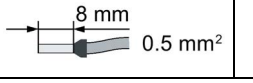
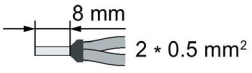
DO 0: p0730, DO 1: p0731 AO 0: p0771[0] DI 2: r0722.2

Speed setpoint (main setpoint): p1070[0] = 2050[1]

Designation in the BOP-2: FB CAN

3.2.7 Wiring the terminal strip

Table 3- 8 Permissible cables and wiring options

Solid or finely stranded cable	Flexible conductor with non-insulated end sleeve	Flexible conductor with non-insulated end sleeve	Two finely stranded cables with the same cross-section with partially insulated twin end sleeves
			

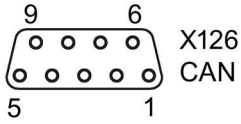
Wiring the terminal strip to ensure EMC

- 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 inverter through a good electrical connection and a large surface area.
- Use the shield connection plate of the inverter as strain relief.

Further information about EMC-compliant wiring is available in the Internet:EMC installation guideline (http://support.automation.siemens.com/WW/view/en/60612658)

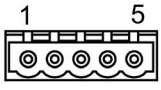
3.2.8 Fieldbus interface assignment

The fieldbus interface is on the underside of the inverter.



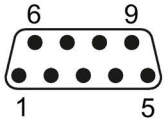
X126
CAN

1 ---
2 CAN_L, CAN signal (dominant low)
3 CAN_GND, ground
4 ---
5 CAN _SHLD, shield
6 GND, optional ground
7 CAN_H, CAN signal (dominant high)
8 ---
9 ---



X128
RS485

1 0 V
2 RS485P, receive and transmit (+)
3 RS485N, receive and transmit (-)
4 Shield
5 ---



X126
PROFIBUS

1 ---
2 ---
3 RxD/TxD-P, receive and transmit (B/B')
4 CNTR-P, control signal
5 GND, reference for data (C/C')
6 + 5 V power supply
7 ---
8 RxD/TxD-N, receive and transmit (A/A')
9 ---

X150 P1
X150 P2
PROFINET

1 RX+ Receive data +
2 RX- Receive data -
3 TX+ Transmit data +
4 ---
5 ---
6 TX- Transmit data -
7 ---
8 ---

Description files for fieldbuses

The description files are electronic device data sheets which contain all the required information of a higher-level controller. You can configure and operate the inverter on a fieldbus with the appropriate description file.

Description file	Download	Alternative to download
Generic Station Description (GSD) for PROFIBUS	Internet: (http://support.automation.siemens.com/WW/view/en/23450835)	GSD and GSDML are saved in the inverter. The inverter writes its GSD or GSDML to the inserted memory card when you set p0804 = 12. For instance, you can transfer the file to a PC from the memory card.
GSD Markup Language (GSDML) for PROFINET	Internet: (http://support.automation.siemens.com/WW/view/en/26641490)	
Electronic Data Sheet (EDS) for CANopen	Internet: (http://support.automation.siemens.com/WW/view/en/48351511)	---
EDS for Ethernet/IP	Internet: (http://support.automation.siemens.com/WW/view/en/78026217)	---

Commissioning

4

4.1 Overview of the commissioning tools

Operator panel

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

The **Intelligent Operator Panel (IOP)** is available for snapping onto the inverter, or as handheld with a connecting cable to the inverter. The graphics-capable plain text display of the IOP enables intuitive operation and diagnostics of the inverter.

The IOP is available in two versions:

- With European languages
- With Chinese, English and German

Additional information about the compatibility of the IOP and inverters is available in the Internet:

Compatibility of the IOP and Control Units
(http://support.automation.siemens.com/WW/view/en/67273266)

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

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

Operator Panels
(http://support.automation.siemens.com/WW/view/en/30563514/133300)

PC tools

STARTER and **Startdrive** are PC tools that are used to commission, troubleshoot and control the inverter, as well as to back up and transfer the inverter settings. You can connect the PC with the inverter via USB or via the PROFIBUS / PROFINET fieldbus.

Connecting cable (3 m) between PC and inverter: Article number 6SL3255-0AA00-2CA0

STARTER DVD: Article number 6SL3072-0AA00-0AG0

Startdrive DVD: Article number 6SL3072-4CA02-1XG0

Startdrive, system requirements and download
(http://support.automation.siemens.com/WW/view/en/68034568)

STARTER, system requirements and download
(http://support.automation.siemens.com/WW/view/en/26233208)

Startdrive tutorial (http://support.automation.siemens.com/WW/view/en/73598459)

STARTER videos (http://www.automation.siemens.com/mcms/mc-drives/en/low-voltage-inverter/sinamics-g120/videos/Pages/videos.aspx)

If you intend to commission the converter with IOP operator panel

The IOP offers commissioning wizards and help texts for an intuitive commissioning. For further information refer to the IOP operating instructions.

If you intend to commission the converter with PC tools STARTER and Startdrive

Overviev of the most important steps with STARTER:

1. Connect the PC to the converter via USB and start the PC tool.
2. Choose the project wizard (menu "Project / New with assistent").
   - In the project wizard choose "Find drive units online".
   - Select USB as interface (Access point of the application: "DEVICE …", interface parameter assignment used: "S7USB").
   - Finish the project wizard.
3. STARTER has now created your project and inserted a new drive.
   - Select the drive in your project and go online .
   - In your drive open the "Configuration" mask (double click).
   - Start commissioning with the "Assistent" button.

For further information refer to converter operating instructions.

Overview of the manuals (Page 84)

4.2 Commissioning with BOP-2 operator panel

Plug Basic Operator Panel BOP-2 into the inverter

Procedure

1
2

To plug Basic Operator Panel BOP-2 onto the inverter, proceed as follows:

1. Remove the blanking cover of the inverter.
2. Locate the lower edge of the BOP-2 housing in the matching recess of the inverter housing.
3. Press the BOP-2 onto the inverter until you hear the latching mechanism on the inverter housing engage.

You have plugged the BOP-2 onto the inverter

When you power up the inverter, the BOP-2 will be ready for operation.

4.2.1 Quick commissioning with the BOP-2

Carrying out quick commissioning

Preconditions

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

Procedure

Proceed as follows to carry out quick commissioning:

Press the ESC key.

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

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

If you wish to restore all of the parameters to the factory setting before the quick commissioning, proceed as follows:

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

When you select an application class, the inverter assigns suitable default settings to the motor control:

- STANDARD

  Standard Drive Control (Page 41)
- DYNAMIC

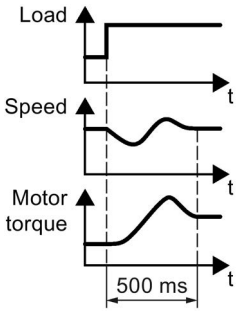
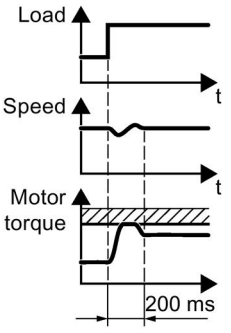
  Dynamic Drive Control (Page 43)
- EXPERT

  This procedure is described in the operating instructions

  Overview of the manuals (Page 84)

Select the suitable application class

When you select an application class, the inverter assigns suitable settings to the motor control:

Application class	Standard Drive Control	Dynamic Drive Control
Motors that can be operated	Induction motors	Induction and synchronous motors
Application examples	• Pumps, fans, and compressors with flow characteristic • Wet or dry blasting technology • Mills, mixers, kneaders, crushers, agitators • Horizontal conveyor technology (conveyor belts, roller conveyors, chain conveyors) • Basic spindles	• Pumps and compressors with displacement machines • Rotary furnaces • Extruder • Centrifuge
Characteristics	• Typical settling time after a speed change: 100 ms … 200 ms • Typical settling time after after a sudden load change: 500 ms • Standard Drive Control is suitable for the following requirements: – All motor power ratings – Ramp-up time 0 → rated speed (depending on the motor power rating): 1 s (0.1 kW) … 10 s (18.5 kW) – Applications with continuous load torque without sudden load changes • Standard Drive Control is insensitive to inaccurate motor data settings 	• Typical settling time after a speed change: < 100 ms • Typical settling time after after a sudden load change: 200ms • Dynamic Drive Control controls and limits the motor torque • Typically achieves a torque accuracy: ± 5 % for 15 % … 100 % of the rated speed • We recommend Dynamic Drive Control for the following applications: – Motor power ratings > 11 kW – On sudden load changes 10% ... >100% of the motor rated torque • Dynamic Drive Control is necessary for a ramp-up time 0 → rated speed (depending on the motor power rating): < 1 s (0.1 kW) … < 10 s (18.5 kW). 
Max. output frequency	550 Hz	240 Hz
Commissioning	• Unlike "Dynamic Drive Control," no speed controller needs to be set • In comparison to setting "EXPERT": – Simplified commissioning using predefined motor data – Reduced number of parameters	• Fewer number of parameters when compared to setting "EXPERT"

4.2.2 Standard Drive Control

EUR/USA P100__

Select the motor standard.

- KW 50HZ: IEC
- HP 60HZ: NEMA
- KW 60HZ: IEC 60 Hz

INV VOLT P210__

Set the inverter supply voltage.

MOT TYPE P300__

Select the motor type. Depending on the particular inverter, it is possible that the BOP-2 does not list all of the following motor types.

- INDUCT: Third-party induction motor
- SYNC: Third-party synchronous motor
- RELUCT: Third-party reluctance motor
- 1L… IND: 1LE1, 1LG6, 1LA7, 1LA9 induction motors
- 1LE1 IND 100: 1LE1 . 9 with motor code on the rating plate
- 1PC1 IND: 1PC1 with motor code on the rating plate
- 1PH8 IND: Induction motor
- 1FP1: Reluctance motor
- 1F… SYN: 1FG1, 1FK7 synchronous motor, without encoder

MOT CODE P301__

If you have selected a motor type > 100, then you must enter the motor code:

With the correct motor code, the inverter assigns the motor data the following values.

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

87 HZ __

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

MOT VOLT P304__

Rated motor voltage

MOT CURR P305__

Rated motor current

MOT POW P307__

Rated motor power

MOT FREQ P310__

Rated motor frequency

MOT RPM P311__

Rated motor speed

MOT COOL P335__

Motor cooling:

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

TEC APPL P501

Select the basic setting for the motor control:

- VEC STD: Constant load; typical applications include conveyor drives
- PUMP FAN: Speed-dependent load; typical applications include pumps and fans

MAc PAr P15

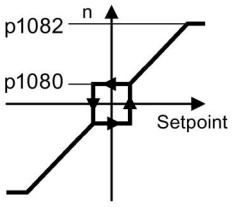
Select the default setting for the interfaces of the inverter that is suitable for your application.

Default setting of the interfaces (Page 27)

MIN RPM P1080

MAX RPM P1082

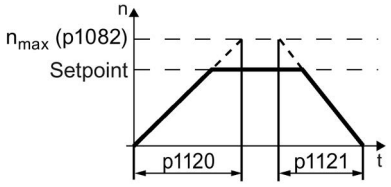
Minimum and maximum motor speed



RAMP UP P1120

RAMP DWN P1121

Ramp-up and ramp-down time of the motor



OFF3 RP P1135

Ramp-down time after an OFF3 command

MOT ID P1900

Motor data identification Select the method which the inverter 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 inverter switches off the motor after the motor data identification has been completed.
- STILL: Measure the motor data at standstill. The inverter switches off the motor after the motor data identification has been completed.

  Select this setting if the motor cannot freely rotate, e.g. for a mechanically limited traversing range.
- ROT: Measure the motor data while it is rotating. The inverter 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 currently set setpoint.
- STILL OP: Setting the same as STILL.

  After the motor data identification, the motor accelerates to the currently set setpoint.

FINISH

Complete quick commissioning as follows:

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

You have completed quick commissioning.

4.2.3 Dynamic Drive Control

EUR/USA P100__

Select the motor standard.

- KW 50HZ: IEC
- HP 60HZ: NEMA
- KW 60HZ: IEC 60 Hz

INV VOLT P210__

Set the inverter supply voltage.

MOT TYPE P300__

Select the motor type. Depending on the particular inverter, it is possible that the BOP-2 does not list all of the following motor types.

- INDUCT: Third-party induction motor
- SYNC: Third-party synchronous motor
- RELUCT: Third-party reluctance motor
- 1L… IND: 1LE1, 1LG6, 1LA7, 1LA9 induction motors
- 1LE1 IND 100: 1LE1 . 9 with motor code on the rating plate
- 1PC1 IND: 1PC1 with motor code on the rating plate
- 1PH8 IND: Induction motor
- 1FP1: Reluctance motor
- 1F… SYN: 1FG1, 1FK7 synchronous motor, without encoder

MOT CODE P301__

If you have selected a motor type > 100, then you must enter the motor code:

With the correct motor code, the inverter assigns the motor data the following values.

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

87 HZ __

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

MOT VOLT P304__

Rated motor voltage

MOT CURR P305__

Rated motor current

MOT POW P307__

Rated motor power

MOT FREQ P310__

Rated motor frequency

MOT RPM P311__

Rated motor speed

MOT COOL P335__

Motor cooling:

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

TEC APPL P502

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. This setting is not suitable for hoisting gear and cranes/lifting gear.
- HVY LOAD: Recommended setting for applications with a high break loose torque.

MAc PAr P15

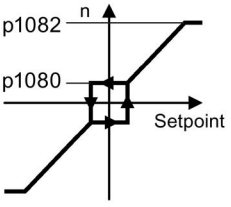
Select the default setting for the interfaces of the inverter that is suitable for your application.

Default setting of the interfaces (Page 27)

MIN RPM P1080

MAX RPM P1082

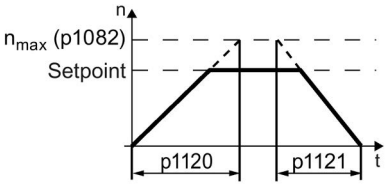
Minimum and maximum motor speed



RAMP UP P1120

RAMP DWN P1121

Ramp-up and ramp-down time of the motor



OFF3 RP P1135

Ramp-down time after an OFF3 command

MOT ID P1900

Motor data identification Select the method which the inverter 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 inverter switches off the motor after the motor data identification has been completed.
- STILL: Measure the motor data at standstill. The inverter switches off the motor after the motor data identification has been completed.

  Select this setting if the motor cannot freely rotate, e.g. for a mechanically limited traversing range.
- ROT: Measure the motor data while it is rotating. The inverter 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 currently set setpoint.
- STILL OP: Setting the same as STILL.

  After the motor data identification, the motor accelerates to the currently set setpoint.

FINISH

Complete quick commissioning as follows:

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

You have completed quick commissioning.

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

The inverter has several techniques to automatically identify the motor data and optimize the speed control.

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

⚠ WARNING

Risk of death due to machine motion while motor data identification is active

For the stationary measurement, the motor can make several rotations. The rotating measurement accelerates the motor up to its 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 hanging/suspended loads to the floor.

Preconditions

- You selected a method of motor data identification during quick commissioning, e.g. measurement of the motor data while the motor is stationary.

  When quick commissioning is complete, the inverter issues alarm A07991.
- The motor has cooled down to the ambient temperature.

  An excessively high motor temperature falsifies the motor data identification results.

Procedure when using the BOP-2 operator panel

1
2

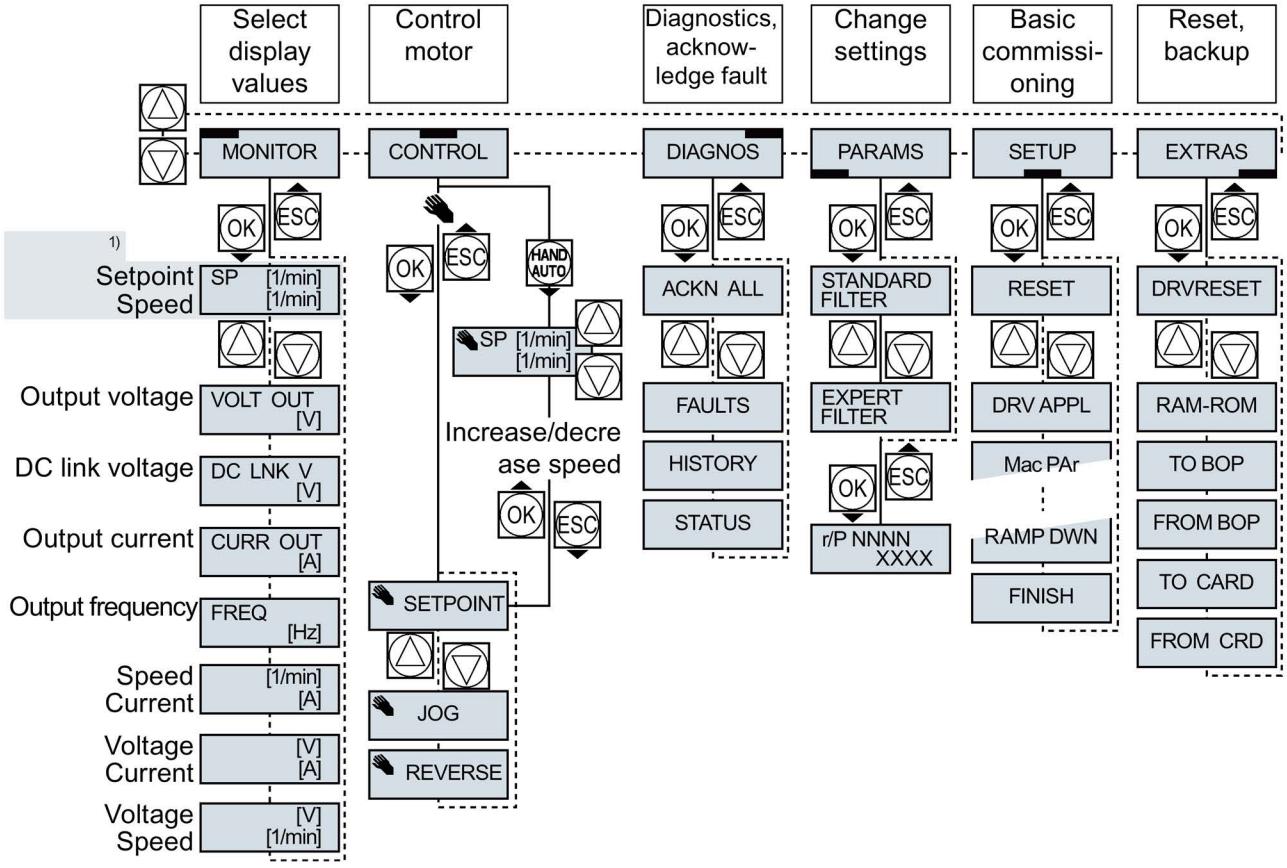
To start the motor data identification, proceed as follows:

1.  ⇒  Press the HAND/AUTO key.
   ⇒ The BOP-2 displays the symbol for manual operation.
2.  Switch on the motor.
3.  During motor data identification, "MOT-ID" flashes on the BOP-2.
4.  If the inverter again outputs alarm A07991, then it waits for a new ON command to start the rotating measurement.
   If the inverter does not output alarm A07991, proceed to step 7.
5.  Switch on the motor to start the rotating measurement.
6.  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.
7.  Depending on the setting, after motor data identification has been completed, the inverter switches off the motor - or it accelerates it to the currently set setpoint.
   If required, switch off the motor.
8.  Switch the inverter control from HAND to AUTO.

You have completed the motor data identification.

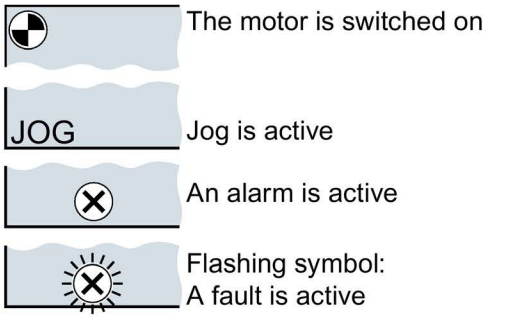
4.2.5 Additional settings

4.2.5.1 Operating the inverter with the BOP-2



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

Image 4-1 Menu of the BOP-2



Procedure for switching the motor on and off via the operator panel:

1. Press MANUAL AUTO

2. Master control of the inverter is released via the BOP-2

3. Switch on motor

4. Switch off the motor

Image 4-2 Other keys and symbols of the BOP-2

Changing settings using BOP-2

You can modify the settings of your inverter by changing the values of the its parameters. The inverter only permits changes to "write" parameters. Write parameters begin with a "P", e.g. P45.

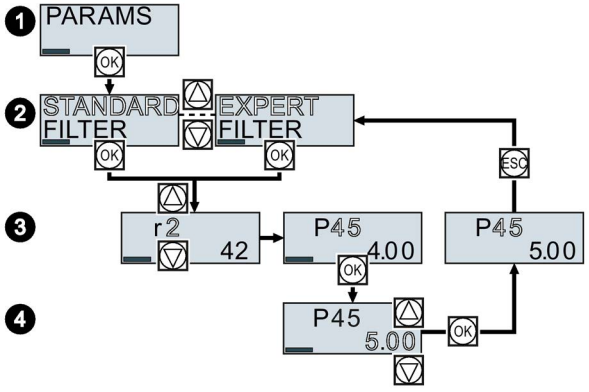
The value of a read-only parameter cannot be changed. Read-only parameters begin with an "r", for example: r2.

Procedure

1
2

To change write parameters using the BOP-2, proceed as follows:

1. Select the menu to display and change parameters.
   Press the OK key.
2. Select the parameter filter using the arrow keys.
   Press the OK key.
   – STANDARD: The inverter only displays the most important parameters.
   – EXPERT: The inverter displays all of the parameters.



3. Select the required number of a write parameter using the arrow keys.
   Press the OK key.
4. Select the value of the write parameter using the arrow keys.
   Accept the value with the OK key.

You have now changed a write parameter using the BOP-2.

The inverter saves all the changes made using the BOP-2 so that they are protected against power failure.

Changing indexed parameters

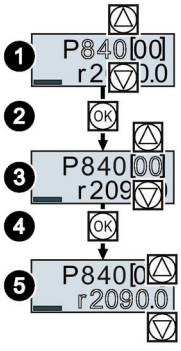
For indexed parameters, several parameter values are assigned to a parameter number. Each of the parameter values has its own index.

Procedure

1
2

To change an indexed parameter, proceed as follows:

1. Select the parameter number.
2. Press the OK key.
3. Set the parameter index.
4. Press the OK key.
5. Set the parameter value for the selected index.



You have now changed an indexed parameter.

Directly select the parameter number

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

Precondition

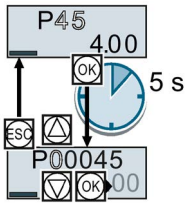
The parameter number is flashing in the BOP-2 display.

Procedure

1
2

To select the parameter number directly, proceed as follows:

1. Press the OK button for longer than five seconds.
2. Change the parameter number digit-by-digit.
   If you press the OK button then the BOP-2 jumps to the next digit.
3. If you have entered all of the digits of the parameter number, press the OK button.



You have now entered the parameter number directly.

Entering the parameter value directly

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

Precondition

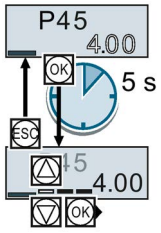
The parameter value flashes in the BOP-2 display.

Procedure

1
2

To select the parameter value directly, proceed as follows:

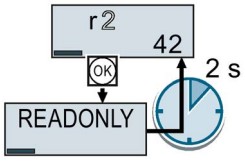
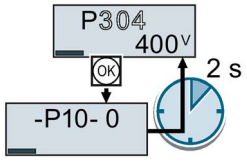
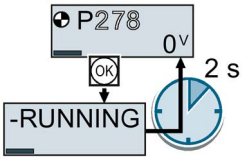
1. Press the OK button for longer than five seconds.
2. Change the parameter value digit-by-digit.
   If you press the OK button then the BOP-2 jumps to the next digit.
3. If you have entered all of the digits of the parameter value, press the OK button.



You have now entered the parameter value directly.

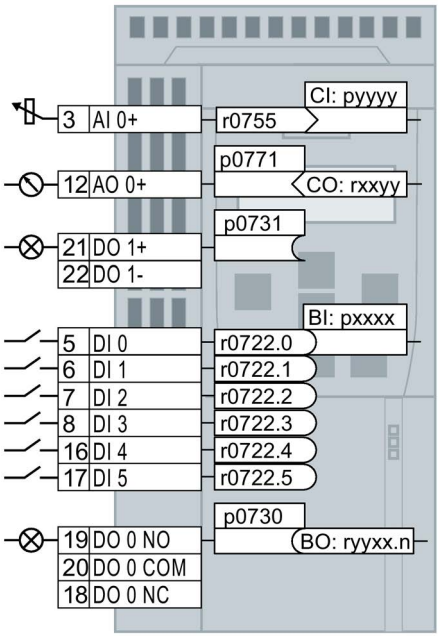
When cannot you change a parameter?

The inverter 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
		

The operating state in which you can change a parameter is provided in the List Manual for each parameter.

4.2.5.2 Changing the function of individual terminals



The function of the terminal is defined through a signal interconnection in the inverter:

- The inverter writes every input signal into a readable parameter. Parameter r0755 makes the signal of the analog input available, for example.

  To define the function of the input, the appropriate parameter (connector CI or BI) must be set to the parameter number of the input.
- Every inverter output is represented by a parameter that can be written to. The value of parameter p0771 defines the analog output signal, for example.

  To define the output function, you must set the parameter number of the output to the parameter number of the matching signal (binector CO or BO).

In the parameter list, the abbreviation CI, CO, BI or BO as prefix indicates as to whether the parameter is available as signal for the function of the terminal.

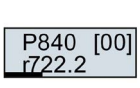
Defining the function of a digital input

Procedure

To define the function of a digital input, proceed as follows:

1. Select the function marked using a BI parameter.
2. Enter the parameter number of the required digital input 722.x into the BI parameter.

You have defined the digital input function.



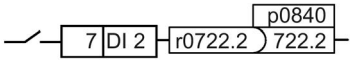


Image 4-3 Example: p0840[00] = 722.2 → switch on the motor using DI 2

Advanced settings

When switching over the master control of the inverter (for example, if you select default setting 7), you must select the correct index of the parameter:

- Index 0 (e.g., P840[00]) applies for the interface assignment on the left side of the macro illustration.
- Index 1 (e.g., P840[01]) applies for the interface assignment on the right side of the macro illustration.

Defining the function of an analog input

Procedure

1
2

To define the function of an analog input, proceed as follows:

1. Select the function marked using a CI parameter.
2. Enter the parameter number of analog input 755[00] into the CI parameter.
3. Determine whether the analog input is a current or a voltage input:
   - Set the I/U switch at the front of the inverter to the correct position.
   - Set the p0756[00] parameter to the corresponding value.

You have now defined the analog input function.

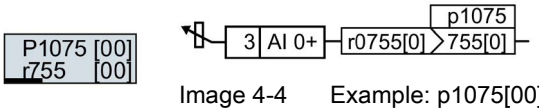


Image 4-4 Example: p1075[00] = 755[00] → enter the supplementary setpoint via AI 0

Advanced settings

When switching over the master control of the inverter (for example, if you select default setting 7), you must select the correct index of the parameter:

- Index 0 (e.g. p1075[00]) applies to the assignment for the interface on the left-hand side of the macro representation.
- Index 1 (e.g. P1075[01]) applies to the assignment for the interface on the right-hand side of the macro representation.

Defining the function of a digital output

Procedure

1
2

To define the function of a digital output, proceed as follows:

1. Select the function marked using a BO parameter.
2. Enter the number of the BO parameter into parameter p073x of the digital output.

You have defined the digital output function.

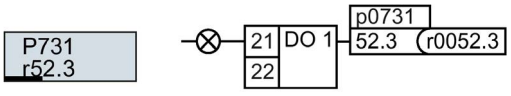


Image 4-5 Example: p0731 = 52.3 → signal "fault" via DO 1

Defining the function of an analog output

Procedure

1
2

To define the function of an analog output, proceed as follows:

1. Select the function marked using a CO parameter.
2. Enter the number of the CO parameter into parameter p0771 of the analog output.
3. Use p0776[0] to determine whether the analog output is a current or voltage input.

You have now defined the analog output function.

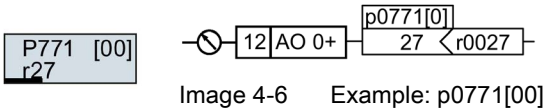
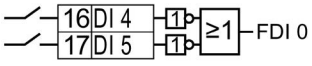


Image 4-6 Example: p0771[00] = 27 → output the signal for the actual current via AO 0

4.2.5.3 Releasing the failsafe function "Safe Torque Off" (STO)

Requirement



You have selected an interface assignment with terminals reserved for a fail-safe function.

Default setting of the interfaces (Page 27)

Procedure

1
2

Proceed as follows to enable the STO function:

1. p0010 = 95 - start to commission the fail-safe functions.
2. p9761 = … - when the safety function settings are password-protected, then you must enter the password.
3. p9762 = … - if you wish to change the password, enter a new password (1 … FFFF FFFF). If you wish to reset the password, then set p9762 = 0.
4. p9763 = … - if you have changed the password, then you must enter the password again to confirm the change.
5. p9601.0 = 1 - select STO via the terminal strip.
6. p9659 = … - set the timer for the forced checking procedure.
7. p9700 = D0 - copy the fail-safe parameters.
8. p9701 = DC - confirm the change of the fail-safe parameters.
9. p0010 = 0 - exit commissioning of the fail-safe functions.
10. p0971 = 1 - save the parameters in a non-volatile fashion (data cannot be lost when the power fails).
11. Wait until p0971 = 0.
12. Bring the inverter into a no voltage condition (400 V and 24 V).
13. Switch on the inverter power supply again.

You have enabled function STO.

4.2.5.4 Parameter list

The following list contains the basic parameter information with access level 1 … 3. The complete parameter list is provided in the list manual.


Overview of the manuals (Page 84)

No.	Description
	Operation and visualization
r0002	Drive operating display
p0003	Access level
p0010	Drive, commissioning parameter filter
p0015	Macro drive unit  Default setting of the interfaces (Page 27)
r0018	Control Unit firmware version
r0020	Speed setpoint smoothed [100 % ≙ p2000]
r0021	CO: Actual speed smoothed [100 % ≙ p2000]
r0022	Speed actual value rpm smoothed [rpm]
r0024	Output frequency smoothed [100 % ≙ p2000]
r0025	CO: Output voltage smoothed [100 % ≙ p2001]
r0026	CO: DC link voltage smoothed [100 % ≙ p2001]
r0027	CO: Absolute actual current smoothed [100 % ≙ p2002]
r0031	Actual torque smoothed [100 % ≙ p2003]
r0032	CO: Active power actual value smoothed [100 % ≙ r2004]
r0034	Motor utilization [100 ≙ 100%]
r0035	CO: Motor temperature [100°C ≙ p2006]
r0036	CO: Power unit overload I^2t [100 ≙ 100%]
r0039	Energy consumption [kWh]
	[0] Energy balance (total) [1] Energy drawn
	[2] Energy fed back
p0040	0 → 1 Reset the energy consumption display
r0041	Energy usage saved/energy saved
r0042	CO: Process energy display
	[0] Energy balance (total) [1] Energy drawn
	[2] Energy fed back
p0043	BI: Release display of energy consumption
	0 → 1: Start energy display r0042
p0045	Smoothing time constant, display values [ms]
r0046	CO/BO: Missing enable signals
r0047	Motor data identification routine and speed controller optimization
r0050	CO/BO: Command Data Set CDS effective

No.	Description	
r0051	CO/BO: Drive Data Set DDS effective	
r0052	CO/BO: Status word 1	
	.00	Ready to start
	.01	Ready
	.02	Operation enabled
	.03	Fault active
	.04	Coast down active (OFF2)
	.05	Quick stop active (OFF3)
	.06	Closing lockout active
	.07	Alarm active
	.08	Deviation, setpoint/actual speed
	.09	Control requested
	.10	Maximum speed reached
	.11	I,M,P limit reached
	.12	Motor holding brake open
	.13	Alarm overtemperature motor
	.14	Motor rotates forwards
	.15	Alarm inverter overload
r0053	CO/BO: Status word 2	
r0054	CO/BO: Control word 1	
	.00	ON/OFF1
	.01	OFF2
	.02	OFF3
	.03	Enable ramp-function generator
	.04	Enable ramp-function generator
	.05	Continue ramp-function generator
	.06	Enable speed setpoint
	.07	Acknowledge fault
	.08	Jog bit 0
	.09	Jog bit 1
	.10	Master control by PLC
	.11	Direction reversal (setpoint)
	.13	Motorized potentiometer, raise
	.14	Motorized potentiometer, lower
	.15	CDS bit 0

No.	Description			
r0055	CO/BO: Supplementary control word			
	.00	Fixed setpoint, bit 0		
	.01	Fixed setpoint, bit 1		
	.02	Fixed setpoint, bit 2		
	.03	Fixed setpoint, bit 3		
	.04	DDS selection, bit 0		
	.05	DDS selection, bit 1		
	.08	Technology controller enable		
	.09	DC braking enable		
	.11	Droop enable		
	.12	Closed-loop torque control active		
	.13	External fault 1 (F07860)		
	.15	CDS bit 1		
r0056	CO/BO: Status word, closed-loop control			
r0060	CO: Speed setpoint before setpoint filter [100 % ≙ p2000]			
r0062	CO: Speed setpoint after filter [100 % ≙ p2000]			
r0063	CO: Speed actual value unsmoothed [100 % ≙ p2000]			
r0064	CO: Speed controller system deviation [100 % ≙ p2000]			
r0065	Slip frequency [100 % ≙ p2000]			
r0066	CO: Output frequency [100 % ≙ p2000]			
r0067	CO: Output current, maximum [100 % ≙ p2002]			
r0068	CO: Absolute current actual value unsmoothed [100 % ≙ p2002]			
r0070	CO: Actual DC link voltage [100 % ≙ p2001]			
r0071	Maximum output voltage [100 % ≙ p2001]			
r0072	CO: Output voltage [100 % ≙ p2001]			
r0075	CO: Current setpoint field-generating [100 % ≙ p2002]			
r0076	CO: Current actual value field-generating [100 % ≙ p2002]			
r0077	CO: Current setpoint torque-generating [100 % ≙ p2002]			
r0078	CO: Current actual value torque-generating [100 % ≙ p2002]			
r0079	CO: Torque setpoint, total [100 % ≙ p2003]			
r0080	CO: Actual torque value			
	[0]	unsmoothed	[1]	smoothed
r0082	CO: Active power actual value			
	[0]	unsmoothed	[1]	smoothed with p0045
	[2]	Electric power		

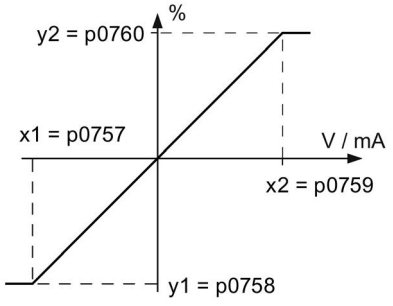
No.	Description					
	Commissioning					
p0096	Application class					
	0	Expert	1	Standard Drive Control		
	2	Dynamic Drive Control				
p0100	IEC/NEMA motor standard					
	0	IEC motor (50 Hz, SI units)	1	NEMA motor (60 Hz, US units)		
	2	NEMA motor (60 Hz, SI units)				
p0124	CU Identification via LED					
p0133	Motor configuration					
	.00	1: Delta 0: Star	.01	1: 87 Hz 0: No 87 Hz		
p0170	Number of Command Data Sets (CDS)					
p0180	Number of Drive Data Sets (DDS)					
	Power Module					
p0201	Power unit code number					
r0204	Power unit, hardware properties					
p0205	Power unit application					
	0	Load cycle with high overload	1	Load cycle with light overload		
r0206	Rated power unit power [kw/hp]					
r0207	Rated power unit current					
r0208	Rated power unit line supply voltage [V]					
r0209	Power unit, maximum current					
p0210	Drive unit line supply voltage [V]					
p0219	Braking resistor braking power [kW]					
p0230	Drive filter type, motor side					
	0	No filter	1	Motor reactor		
	2	dv/dt filter	3	Siemens sine-wave filter		
	4	Sine wave filter, third-party manufacturer				
p0233	Power unit motor reactor [mH]					
p0234	Power unit sine-wave filter capacitance [µF]					
r0238	Internal power unit resistance					
p0287	Ground fault monitoring thresholds [100 % ≙ r0209]					
r0289	CO: Maximum power unit output current [100 % ≙ p2002]					

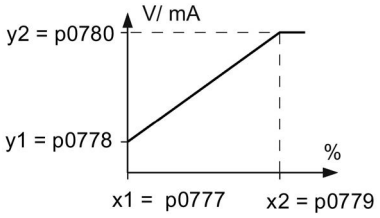
No.	Description					
p0290	Power unit overload response					
	0	Reduce output current or output frequency				
	1	No reduction, shutdown when overload threshold is reached				
	2	Reduce I_output or f_output and f_pulse (not using I2t).				
	3	Reduce the pulse frequency (not using I2t)				
	12	I_output or f_output and automatic pulse frequency reduction				
	13	Automatic pulse frequency reduction				
p0292	Power unit temperature alarm threshold [°C]					
p0295	Fan run-on time [s]					
Motor						
p0300	Motor type selection					
	0	No motor	1	Standard induction motor	2	Synchro-nous motor
	10	1LE1	13	1LG6	17	1LA7
	19	1LA9	100	1LE1	101	1PC1
	108	1PH8	271	1FG1	277	1FK7
p0301	Motor code number selection					
p0304	Rated motor voltage [V]					
p0305	Rated motor current [A]					
p0306	Number of motors connected in parallel					
p0307	Rated motor power [kW]					
p0308	Rated motor power factor					
p0309	Rated motor efficiency [%]					
p0310	Rated motor frequency [Hz]					
p0311	Rated motor speed [rpm]					
p0312	Rated motor torque [Nm]					
r0313	Motor pole pair number, current (or calculated)					
p0320	Motor rated magnetizing current/short-circuit current [A]					
p0322	Maximum motor speed [rpm]					
p0323	Maximum motor current [A]					
p0325	Motor pole position identification current 1. Phase [A]					
p0329	Motor pole position identification current [A]					
r0330	Rated motor slip					
r0331	Actual motor magnetizing current/short-circuit current					
r0333	Rated motor torque [Nm]					
p0335	Motor cooling type					

No.	Description			
p0340	Automatic calculation of motor/control parameters			
p0341	Motor moment of inertia [kgm²]			
p0342	Ratio between the total and motor moment of inertia [kgm²]			
p0344	Motor weight (for thermal motor model) [kg]			
r0345	Motor rated running-up time [s]			
p0346	Motor excitation build-up time [s]			
p0347	Motor de-excitation time [s]			
p0350	Motor stator resistance, cold [Ω]			
p0352	Cable resistance [Ω]			
r0394	Rated motor power [kW]			
r0395	Actual stator resistance			
r0396	Actual rotor resistance			
Technology and units				
p0500	Technology application			
	0	Standard drive	1	Pumps and fans
	2	Encoderless control up to f = 0	2	Pumps and fans, efficiency optimization
p0501	Technological application (Standard Drive Control)			
	0	Constant load (linear characteristic)	1	Speed-dependent load (parabolic characteristic)
p0502	Technology application (Dynamic Drive Control)			
	0	Standard drive (e.g. pump, fan)	1	Dynamic approach or reversing
	5	Heavy starting (e.g. extruders, compressors)		
p0505	Selecting the system of units			
	1	SI	2	Referred/SI
	3	US	4	Referred/US
p0514	Specific scaling, reference values			
p0515	Specific scaling, parameter referred to p0514[0]			
p0516	Specific scaling, parameter referred to p0514[1]			
…	…			
p0524	Specific scaling, parameter referred to p0514[9]			
p0530	Bearing, type selection			
p0531	Bearing, code number selection			
p0532	Bearing, maximum speed			
p0541	Load gear unit code number			
p0542	Load gear unit maximum speed			
p0543	Load gear unit maximum torque			
p0544	Load gear unit gear ratio (absolute value) total, numerator			

No.	Description					
p0545	Load gear unit gear ratio (absolute value) total, nominator					
p0546	Load gear unit output direction of rotation inversion					
p0550	Brake type					
p0551	Brake code number					
p0552	Brake maximum speed					
p0553	Brake holding torque					
p0554	Brake moment of inertia					
p0573	Inhibit automatic reference value calculation					
p0595	Selecting technological units					
	1	%	2	1 referred, dimensionless		
	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
p0596	Reference quantity, technological units					

No.	Description			
	Thermal motor monitoring and motor model, maximum current			
p0601	Motor temperature sensor type			
	0	No sensor		
	1	PTC warning & timer		
	2	KTY84		
	4	Bimetallic NC contact warning & timer		
	6	PT1000		
p0604	Motor temperature alarm threshold [°C]			
p0605	Motor temperature fault threshold [°C]			
p0610	Motor overtemperature response			
	0	No response, alarm only, no reduction of I_{max}		
	1	Alarm with reduction of I_{max} and fault		
	2	Alarm and fault, no reduction of I_{max}		
	12	Messages, no reduction of I_{max}, temperature is saved		
p0611	I^2t motor model thermal time constant [s]			
p0612	Motor temperature model activation			
	.00	Activate motor temperature model 1 (I^2t)	.01	Activate motor temperature model 2
	.02	Activate motor temperature model 3	.08	Activate motor temperature model 1 expansions
	.09	Activate motor temperature model 2 expansions	.12	Motor temperature model 1 ambient temperature can be set
p0613	Motor temperature model 1/3 ambient temperature [°C]			
p0614	Thermal resistor adaptation reduction factor			
p0615	I^2t motor model fault threshold [°C]			
p0625	Motor ambient temperature [°C]			
p0637	Q flux, flux gradient saturated [mH]			
p0640	Current limit [A]			
p0650	Motor operating hours, current [h]			
p0651	Motor operating hours, maintenance interval [h]			

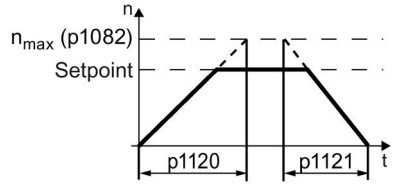
No.	Description
Command sources and terminals on the Control Unit	
r0720	CU number of inputs and outputs
r0722	CO/BO: CU digital inputs, status .00 DI 0 (terminal 5) .01 DI 1 (terminal 6) .02 DI 2 (terminal 7) .03 DI 3 (terminal 8) .04 DI 4 (terminal 16) .05 DI 5 (terminal 17) .11 DI 11 (terminals 3, 4) AI 0
r0723	CO/BO: CU digital inputs, status inverted
p0724	CU digital inputs debounce time [ms]
p0730	BI: CU signal source for terminal DO 0 NO: Terminal 19 / NC: Terminal 18
p0731	BI: CU signal source for terminal DO 1 NO: Terminal 21
r0747	CU, digital outputs status
p0748	CU, invert digital outputs
r0751	BO: CU analog inputs status word
r0752	CO: CU analog inputs input voltage/current actual AI0 (terminals 3/4)
p0753	CU analog inputs smoothing time constant [ms]
r0755	CO: CU analog inputs actual value in percent, AI0 (terminals 3/4) [100 ≙ 100%]
p0756	CU analog input type (terminals 3, 4) 0 0 V ... +10 V 1 +2 V ... +10 V 2 0 mA ... +20 mA 3 +4 mA ... +20 mA 4 -10 V ... +10 V 8 No sensor connected
	
p0757	CU analog input characteristic value x1
p0758	CU analog input characteristic value y1 [%]
p0759	CU analog input characteristic value x2
p0760	CU analog input characteristic value y2 [%]
p0761	CU analog input wire break monitoring response threshold
p0762	CU analog inputs wire-break monitoring deceleration time [ms]

No.	Description
p0764	CU analog inputs deadband [V]
p0771	CI: CU analog output signal source, AO 0 (terminals 12, 13) [100 ≙ 100%]
r0772	CU analog output, output value currently referred
p0773	CU analog outputs smoothing time constant [ms]
r0774	CU analog output, output voltage/current actual [100% ≙ p2001]
p0775	CU analog output activate absolute value generation
p0776	CU analog output type 0 0 mA ... +20 mA 1 0 V ... +10 V 2 +4 mA ... +20 mA
	
p0777	CU analog output characteristic value x1 [%]
p0778	CU analog output characteristic value y1 [V]
p0779	CU analog output characteristic value x2 [%]
p0780	CU analog output characteristic value y2 [V]
p0782	BI: CU analog output invert signal source, AO 0 (terminals 12,13)
r0785	BO: CU analog outputs status word .00 1 = AO 0 negative
p0795	CU digital inputs, simulation mode
p0796	CU digital inputs, simulation mode setpoint
p0797	CU analog inputs, simulation mode
p0798	CU analog inputs, simulation mode setpoint
Change over and copy data sets	
p0802	Data transfer with memory card as source/target
p0803	Data transfer with device memory as source/target
p0804	Data transfer start 12 Transfer GSD / GSDML for PROFIBUS / PROFINET onto the memory card
p0806	BI: Inhibit master control
r0807	BO: Master control active
p0809	Copy Command Data Set CDS
p0810	BI: Command data set selection CDS bit 0

No.	Description
p0819	Copy drive data set DDS
p0820	BI: Drive data set selection DDS, bit 0
p0826	Motor changeover, motor number
r0835	CO/BO: Data set changeover status word
r0836	CO/BO: Command data set CDS selected
r0837	CO/BO: Drive data set DDS selected
Sequential control system (e.g. ON/OFF1)	
p0840	BI: ON/OFF 1
p0844	BI: No coast down/coast down (OFF2) signal source 1
p0845	BI: No coast down/coast down (OFF2) signal source 2
p0848	BI: No quick stop/quick stop (OFF3) signal source 1
p0849	BI: No quick stop/quick stop (OFF3) signal source 1
p0852	BI: Enable operation
p0854	BI: Master control by PLC
p0855	BI: Unconditionally release holding brake
p0856	BI: Enable speed controller
p0857	Power Module monitoring time [ms]
p0858	BI: Unconditionally close holding brake
p0860	BI: Line contactor, feedback signal
p0861	Line contactor, monitoring time [ms]
r0863	CO/BO: Drive coupling status word / control word
	.00 = 1 = closed-loop control, operation; .01 = 1 = operate line contactor
p0867	Power unit main contactor hold time after OFF1 [ms]
p0869	Configuration sequence control
	.00 = 1 = keep main contactor closed for STO
r0898	CO/BO: Control word sequence control
r0899	CO/BO: Status word sequence control

No.	Description
PROFIBUS, PROFIdrive	
p0918	PROFIBUS address
p0922	PROFIdrive telegram selection
	1 = Standard telegram 1, PZD-2/2
	20 = Standard telegram 20, PZD-2/6
	352 = SIEMENS telegram 352, PZD-6/6
	353 = SIEMENS telegram 353, PZD-2/2, PKW-4/4
	354 = SIEMENS telegram 354, PZD-6/6, PKW-4/4
	999 = Free telegram configuration with BICO
Faults (Part 1)	
r0944	CO: Counter for fault buffer changes
r0945	Fault code
r0946	Fault code list
r0947	Fault number
r0948	Fault time received in milliseconds [ms]
r0949	Fault value
p0952	Fault cases, counter
r0963	PROFIBUS baud rate
r0964	Device identification
p0965	PROFIdrive profile number
p0969	System runtime relative [ms]
Restoring the factory setting Saving parameters	
p0970	Reset drive parameters
	0 = Inactive; 1 = Reset parameters except for Safety
	5 = Reset safety parameters; 10 = Load setting 10
	11 = Load setting 11; 12 = Load setting 12
	100 = Reset BICO interconnections
p0971	Save parameters
	0 = Inactive
	1 = Save in nonvolatile storage (RAM → ROM)
	10 = Save in a non-volatile memory as setting 10
	11 = Save in a non-volatile memory as setting 11
	12 = Save in a non-volatile memory as setting 12
p0972	Drive unit reset

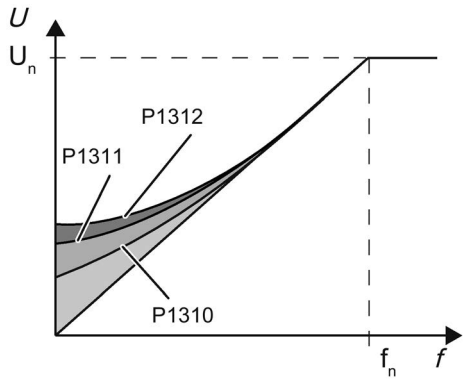
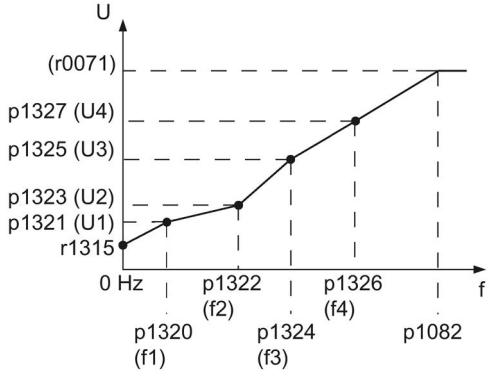
No.	Description
Setpoint channel	
p1000	Speed setpoint selection
p1001	CO: Fixed speed setpoint 1 [rpm]
p1002	CO: Fixed speed setpoint 2 [rpm]
…	…
p1015	CO: Fixed speed setpoint 15 [rpm]
p1016	Fixed speed setpoint mode
	1 Direct selection / 2 Selection, binary coded
p1020	BI: Fixed speed setpoint selection bit 0
p1021	BI: Fixed speed setpoint selection bit 1
p1022	BI: Fixed speed setpoint selection bit 2
p1023	BI: Fixed speed setpoint selection bit 3
r1024	CO: Fixed speed setpoint effective [100 % ≙ p2000]
r1025	BO: Fixed speed setpoint status
	.00 Fixed speed setpoint selected
p1030	Motorized potentiometer configuration
	00 Storage active
	01 Automatic operation, ramp-function generator active
	02 Initial rounding active
	03 Storage in NVRAM active
p1035	BI: Motorized potentiometer setpoint raise
p1036	BI: Motorized potentiometer setpoint lower
p1037	Motorized potentiometer maximum speed [rpm]
p1038	Motorized potentiometer minimum speed [rpm]
p1040	Motorized potentiometer start value [rpm]
p1043	BI: Motorized potentiometer, accept setting value
p1044	CI: Motorized potentiometer setting value [100 % ≙ p2000]
r1045	CO: Motorized potentiometer, setpoint in front of the ramp-function generator [rpm]
p1047	Motorized potentiometer ramp-up time [s]
p1048	Motorized potentiometer ramp-down time [s]
r1050	CO: Motorized potentiometer setpoint after the ramp-function generator [100 % ≙ p2000]
p1055	BI: Jog bit 0
p1056	BI: Jog bit 1
p1058	Jog 1 speed setpoint [rpm]
p1059	Jog 2 speed setpoint [rpm]
p1070	CI: Main setpoint [100 % ≙ p2000]
p1071	CI: Main setpoint scaling [100 ≙ 100%]

No.	Description
r1073	CO: Main setpoint effective [100 % ≙ p2000]
p1075	CI: Supplementary setpoint [100 % ≙ p2000]
p1076	CI: Supplementary setpoint scaling [100 ≙ 100%]
r1077	CO: Supplementary setpoint effective [100 % ≙ p2000]
r1078	CO: Total setpoint effective [100 % ≙ p2000]
p1080	Minimum speed [rpm]
p1081	Maximum speed scaling [%]
p1082	Maximum speed [rpm]
p1083	CO:Speed limit in positive direction of rotation [rpm]
r1084	CO: Speed limit positive effective [100 % ≙ p2000]
p1086	CO: Speed limit in negative direction of rotation [rpm]
r1087	CO: Speed limit negative effective [100 % ≙ p2000]
p1091	Skip speed 1 [rpm]
p1092	Skip speed 2 [rpm]
p1101	Skip speed bandwidth [rpm]
p1106	CI: Minimum speed signal source
p1110	BI: Inhibit negative direction
p1111	BI: Inhibit positive direction
p1113	BI: Setpoint inversion
r1114	CO: Setpoint after the direction limiting [100 % ≙ p2000]
r1119	CO: Ramp-function generator setpoint at the input [100 % ≙ p2000]
	
p1120	Ramp-function generator ramp-up time [s]
p1121	Ramp-function generator ramp-down time [s]
p1130	Ramp-function generator initial rounding-off time [s]
p1131	Ramp-function generator final rounding-off time [s]
p1134	Ramp-function generator rounding-off type
	0 Continuous smoothing / 1 Discontinuous smoothing
p1135	OFF3 ramp-down time [s]
p1136	OFF3 initial rounding-off time [s]

No.	Description		
p1137	OFF3 final rounding-off time [s]		
p1138	CI: Acceleration ramp scaling [100 ≙ 100%]		
p1139	CI: Ramp down scaling [100 ≙ 100%]		
p1140	BI: Enable ramp-function generator		
p1141	BI: Continue ramp-function generator		
p1142	BI: Enable speed setpoint		
r1149	CO: Ramp-function generator acceleration [100 % ≙ p2007]		
r1170	CO: Speed controller setpoint sum [100 % ≙ p2000]		
r1198	CO/BO: Control word, setpoint channel		
Functions (e.g. motor holding brake)			
p1200	Flying restart operating mode		
	0	Flying restart inactive	
	1	Flying restart always active (start in setpoint direction)	
	4	Flying restart always active (start only in setpoint direction)	
p1201	BI: Flying restart enable signal source		
p1202	Flying restart search current [100 % ≙ r0331]		
p1203	Flying restart search rate factor [%]		
	A higher value results in a longer search time.		
p1206	Set fault number without automatic restart		
p1210	Automatic restart mode		
	0	Inhibit automatic restart	
	1	Acknowledge all faults without restarting	
	4	Restart after line supply failure, without additional start attempts	
	6	Restart after fault with additional start attempts	
	14	Restart after line supply failure following manual acknowledgement	
	16	Restart after fault following manual acknowledgement	
	26	Acknowledging all faults and restarting for an ON command	
p1211	Automatic restart, start attempts		
p1212	Automatic restart, delay time start attempts [s]		
p1213	Automatic restart, monitoring time [s]		
	[0]	Restart	[1] Reset start counter

No.	Description	
p1215	Motor holding brake configuration	
	0	No motor holding brake being used
	3	Motor holding brake like sequential control, connection via BICO
p1216	Motor holding brake, opening time [ms]	
p1217	Motor holding brake, closing time [ms]	
p1226	Standstill detection threshold [rpm]	
p1227	Standstill detection monitoring time [s]	
p1230	BI: DC braking activation	
p1231	DC braking configuration	
	0	No function
	4	DC braking
	5	DC braking OFF1/OFF3
	14	DC braking below starting speed
p1232	DC braking, braking current [A]	
p1233	DC braking time [s]	
p1234	Speed at the start of DC braking [rpm]	
r1239	CO/BO: DC braking status word	
p1240	V_{DC} controller or V_{DC} monitoring configuration (vector control)	
	0	Inhibit V_{DC} controller
	1	Enable V_{DC_max} controller
	2	Enable V_{DC_min} controller (kinetic buffering)
	3	Enable V_{DC_min} controller and V_{DC_max} controller
r1242	V_{DC_max} controller switch-in level [100 % ≙ p2001]	
p1243	V_{DC_max} controller dynamic factor [%]	
p1245	V_{DC_min} controller switch-in level (kinetic buffering) [%]	
r1246	V_{DC_min} controller switch-in level (kinetic buffering) [100 % ≙ p2001]	
p1247	V_{DC_min} controller dynamic factor (kinetic buffering) [%]	
p1249	V_{DC_max} controller speed threshold [rpm]	
p1250	V_{DC} controller proportional gain	
p1251	V_{DC} controller integral time [ms]	
p1252	V_{DC} controller rate time [ms]	
p1254	V_{DC_max} controller automatic ON level detection	
	0	Automatic detection inhibited
	1	Automatic detection enabled
p1255	V_{DC_min} controller time threshold [s]	

No.	Description
p1256	V_{DC_min} controller response (kinetic buffering)
	0 Buffer V_{DC} until undervoltage, n<p1257 → F07405
	1 Buffer V_{DC} until undervoltage, n<p1257 → F07405, t>p1255 → F07406
p1257	V_{DC_min} controller speed threshold [rpm]
r1258	CO: V_{DC} controller output
p1271	Flying restart maximum frequency for the inhibited direction [Hz]
p1280	V_{DC} controller or V_{DC} monitoring configuration (V/f)
	0 Inhibit V_{DC} controller
	1 Enable V_{DC_max} controller
p1281	Vdc controller configuration
r1282	V_{DC_max} controller switch-in level (V/f) [100 % ≙ p2001]
p1283	V_{DC_max} controller dynamic factor (V/f) [%]
p1284	V_{DC_max} controller time threshold (U/f) [s]
p1288	V_{DC_max} controller ramp-function generator feedback factor (U/f)
p1290	V_{DC} controller proportional gain (U/f)
p1291	V_{DC} controller integral time (U/f) [ms]
p1292	V_{DC} controller rate time (U/f) [ms]
p1297	V_{DC_min} controller speed threshold (U/f) [rpm]
V/f control	
p1300	Open-loop/closed-loop control operating mode
	0 V/f control with linear characteristic
	1 V/f control with linear characteristic and FCC
	2 V/f control with parabolic characteristic
	3 V/f control with parameterizable characteristic
	4 V/f control with linear characteristic and ECO
	5 V/f control for drive requiring a precise frequency (e.g. textiles)
	6 V/f control for drive requiring a precise frequency and FCC
	7 V/f control for parabolic characteristic and ECO
	19 V/f control with independent voltage setpoint
	20 Speed control (without encoder)

No.	Description
	
p1302	V/f control configuration
p1310	Starting current (voltage boost) permanent [100 % ≙ p0305]
p1311	Starting current (voltage boost) acceleration [%]
p1312	Starting current (voltage boost) when starting [%]
r1315	Voltage boost, total [100 % ≙ p2001]
	
p1320 … p1327	U/f control programmable frequency f [Hz] and voltage U [V] characteristic
p1330	CI: V/f control independent voltage setpoint [100 % ≙ p2001]
p1331	Voltage limiting [V]
p1333	U/f control FCC starting frequency [Hz]
p1334	V/f control slip compensation starting frequency [Hz]
p1335	Slip compensation, scaling [100 % ≙ r0330]
p1336	Slip compensation limit value [100 % ≙ r0330]
r1337	CO: Actual slip compensation [100 ≙ 100%]
p1338	V/f mode resonance damping gain
p1340	I_{max} frequency controller proportional gain

No.	Description
r1343	CO: I_max controller frequency output [100 % ≙ p2000]
p1349	U/f mode resonance damping maximum frequency [Hz]
p1351	CO: Motor holding brake starting frequency [100 ≙ 100%]
p1352	CI: Motor holding brake starting frequency [100 ≙ 100%]
Closed-loop speed control	
p1400	Speed control configuration
.00	1 = automatic Kp/Tn adaptation active
.01	1 = sensorless vector control, freeze I action
.05	1 = Kp/Tn adaptation active
.06	1 = free Tn adaptation active
.14	1= torque precontrol is always active 0 = torque precontrol is active when speed controller enabled
.15	1 = sensorless vector control, speed precontrol active
.16	1 = release I action for limitation 0 = block I action for limitation
.18	1 = moment of inertia estimator active
.20	1 = acceleration model is switched on
.22	1 = obtain moment of inertia estimator value for pulse inhibit
.24	1 = moment of inertia estimator actively accelerates the motor
r1438	CO: Speed controller speed setpoint [100 % ≙ p2000]
p1452	Speed controller speed actual value smoothing time (SLVC) [ms]
p1470	Speed controller encoderless operation P gain
p1472	Speed controller sensorless operation integral time [ms]
p1475	CI: Speed controller torque setting value for motor holding brake [100 % ≙ p2003]
r1482	CO: Speed controller I torque output [100 % ≙ p2003]
r1493	CO: Total moment of inertia [kgm^2]
p1496	Acceleration pre-control scaling [%]
p1498	Load moment of inertia [kgm^2]
p1502	BI: Freezing the moment of inertia estimator
	0 = moment of inertia estimator active 1 = determined moment of inertia is frozen

No.	Description
p1511	CI: Supplementary torque 1 [100 % ≙ p2003]
p1512	CI: Supplementary torque 1 scaling
r1516	CO: Supplementary torque and acceleration torque [100 % ≙ p2003]
p1520	CO: Torque limit upper [Nm]
p1521	CO: Torque limit lower [Nm]
p1522	CI: Torque limit upper [100 % ≙ p2003]
p1523	CI: Torque limit lower [100 % ≙ p2003]
p1524	CO: Torque limit upper/motoring scaling [100 ≙ 100%]
p1525	CO: Torque limit lower scaling [100 ≙ 100%]
r1526	CO: Torque limit upper without offset [100 % ≙ p2003]
r1527	CO: Torque limit lower without offset [100 % ≙ p2003]
p1530	Power limit motoring [kW]
p1531	Power limit regenerative [kW]
r1538	CO: Upper effective torque limit [100 % ≙ p2003]
r1539	CO: Lower effective torque limit [100 % ≙ p2003]
r1547	CO: Torque limit for speed controller output
[0]	Upper limit [100 % ≙ p2003]
[1]	Lower limit [100 % ≙ p2003]
p1552	CI: Torque limit upper scaling without offset [100 ≙ 100%]
p1554	CI: Torque limit lower scaling without offset [100 ≙ 100%]
p1560	Moment of inertia estimator, accelerating torque threshold value [100% ≙ r0333]
p1561	Moment of inertia estimator change time inertia [ms]
p1562	Moment of inertia estimator change time load [ms]
p1563	CO: Moment of inertia estimator load torque positive direction of rotation [Nm]
p1564	CO: Moment of inertia estimator load torque negative direction of rotation [Nm]
p1570	CO: Flux setpoint [100 ≙ 100%]
p1580	Efficiency optimization [%]
r1598	CO: Flux setpoint total [100 ≙ 100%]
p1610	Torque setpoint static (SLVC) [100 % ≙ r0333]
p1611	Supplementary accelerating torque (SLVC) [100 % ≙ r0333]
p1616	Current setpoint smoothing time [ms]
r1732	CO: Direct-axis voltage setpoint [100 % ≙ p2001]
r1733	CO: Quadrature-axis voltage setpoint [100 % ≙ p2001]

No.	Description		
p1740	Gain resonance damping with sensorless control		
p1745	Motor model error threshold stall detection [%]		
p1750	Motor model configuration		
	.00	1 = forces open-loop speed-controlled starting	
	.01	1 = forces open-loop-controlled crossing of frequency zero	
	.02	1 = drive remains completely under closed-loop control even at frequency zero	
	.03	1 = motor model evaluates saturation characteristic	
	.06	1 = when motor is blocked, sensorless vector control remains under closed-loop speed control	
	.07	1 = use of robust switchover limits for model switchover (open/closed-loop) during generating operation	
p1755	Motor model changeover speed encoderless operation [rpm]		
p1780	Motor model adaptation configuration		
Gating unit			
p1800	Pulse frequency setpoint [kHz]		
r1801	CO: Pulse frequency [100 % ≙ p2000]		
p1806	Filter time constant V_{DC} correction [ms]		
p1810	Modulator configuration		
	.00	1 = averaging filter for voltage limiting	
	.01	1 = DC link voltage compensation in current control	
p1820	Reverse the output phase sequence		
	0	Off	1 On
r1838	CO/BO: Gating unit status word 1		

No.	Description	
Motor identification		
p1900	Motor data identification and rotating measurement	
	0	Inhibited
	1	Identify the motor data at standstill and with the motor rotating
	2	Identify motor data at standstill
	3	Identify motor data with the motor rotating
	11	Identify motor data and optimize the speed controller, operation
	12	Identify motor data (at standstill), operation
p1901	Test pulse evaluation configuration	
p1909	Motor data identification control word	
p1910	Motor data identification selection	
p1959	Rotating measurement configuration	
p1960	Rotating measurement selection	
	0	Inhibited
	1	Rotating measurement in encoderless operation
	3	Speed controller optimization in encoderless operation
p1961	Saturation characteristic speed to determine [%]	
p1965	Speed_ctrl_opt speed [100 % ≙ p0310]	
p1967	Speed_ctrl_opt dynamic factor [%]	
p1980	PolID procedure	
	1	Voltage pulsing 1st harmonic
	4	Voltage pulsing, 2-phase
	6	Voltage pulsing, 2-phase inverse
	8	Voltage pulsing 2nd harmonic, inverted
	10	Impressing DC current
Reference values		
p2000	Reference speed reference frequency [rpm]	
p2001	Reference voltage [V]	
p2002	Reference current [A]	
p2003	Reference torque [Nm]	
r2004	Reference power	
p2006	Reference temperature [°C]	
p2010	Commissioning interface baud rate	
p2011	Commissioning interface address	
p2016	CI: Comm IF USS PZD send word	

No.	Description			
USS or Modbus RTU				
p2020	Fieldbus interface baud rate			
	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
p2021	Fieldbus interface address			
p2022	Fieldbus interface USS PZD number			
p2023	Fieldbus interface USS PKW number			
	0	PKW 0 words	3	PKW 3 words
	4	PKW 4 words	127	PKW variable
p2024	Fieldbus interface times [ms]			
	[0]	Maximum processing time		
	[1]	Character delay time		
	[2]	Telegram pause time		
r2029	Fieldbus interface error statistics			
	[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	Fieldbus interface protocol selection			
	0	No protocol	1	USS
	2	MODBUS	3	PROFIBUS
	4	CAN	7	PROFINET
	10	Ethernet/IP		
p2031	Fieldbus interface Modbus parity			
	0	No parity	1	Odd parity
	2	Even parity		

No.	Description			
r2032	Master control, control word effective			
	.00	ON / OFF1		
	.01	OFF2 inactive		
	.02	OFF3 inactive		
	.03	Enable operation		
	.04	Enable ramp-function generator		
	.05	Start ramp-function generator		
	.06	Enable speed setpoint		
	.07	Acknowledge fault		
	.08	Jog bit 0		
	.09	Jog bit 1		
	.10	Master control by PLC		
p2037	PROFIdrive STW1.10 = 0 mode			
	0	Freeze setpoints and further process sign-of-life		
	1	Freeze setpoints and sign-of-life		
	2	Setpoints are not frozen		
p2038	PROFIdrive STW/ZSW interface mode			
	0	SINAMICS		
	2	VIK-NAMUR		
p2040	Fieldbus interface monitoring time [ms]			
PROFIBUS, PROFIdrive				
p2042	PROFIBUS ID Number			
	0	SINAMICS	2	VIK-NAMUR
r2043	BO: PROFIdrive PZD state			
	.00	1 = setpoint failure	.02	1 = fieldbus running
p2044	PROFIdrive fault delay [s]			
p2047	PROFIBUS additional monitoring time [ms]			
r2050	CO: PROFIdrive PZD receive word			
	[0]	PZD 1 …	[7]	PZD 8
p2051	CI: PROFIdrive PZD send word			
	[0]	PZD 1 …	[7]	PZD 8
r2053	PROFIdrive diagnostics send PZD word			
	[0]	PZD 1 …	[7]	PZD 8
r2054	PROFIBUS status			
	0	Off		
	1	No connection (search for baud rate)		
	2	Connection OK (baud rate found)		
	3	Cyclic connection with master (data exchange)		
	4	Cyclic data OK		

No.	Description			
r2055	PROFIBUS diagnosis standard			
	[0]	Master bus address		
	[1]	Master input total length bytes		
	[2]	Master output total length bytes		
r2057	PROFIBUS address switch diagnostics			
r2060	CO: IF1 PROFIdrive PZD receive double word			
	[0]	PZD 1 + 2 …	[10]	PZD 11 + 12
r2061	CI: IF1 PROFIdrive PZD send double word			
	[0]	PZD 1 + 2 …	[10]	PZD 11 + 12
r2063	IF1 PROFIdrive diagnostics PZD send double word			
	[0]	PZD 1 + 2 …	[10]	PZD 11 + 12
r2067	IF1 PZD maximum interconnected			
	[0]	Receiving	[1]	Sending
p2072	Response, receive value after PZD failure			
	.00	Unconditionally open holding brake (p0855)		1 = freeze value
				0 = zero value
r2074	PROFIdrive diagnostics bus address PZD receive			
	[0]	PZD 1 …	[7]	PZD 8
r2075	PROFIdrive diagnostics telegram offset PZD receive			
	[0]	PZD 1 …	[7]	PZD 8
r2076	PROFIdrive diagnostics telegram offset PZD send			
	[0]	PZD 1 …	[7]	PZD 8
r2077	PROFIBUS diagnostics peer-to-peer data transfer addresses			
p2079	PROFIdrive PZD telegram selection extended			
	See p0922			
p2080	BI: Binector-connector converter, status word 1			
	The individual bits are combined to form status word 1.			
p2088	Binector-connector converter, invert status word			
r2089	CO: Send binector-connector converter status word			
	[0]	Status word 1		
	[1]	Status word 2		
	[2]	Free status word 3		
	[3]	Free status word 4		
	[4]	Free status word 5		
r2090	BO: PROFIdrive PZD1 receive bit-serial			
r2091	BO: PROFIdrive PZD2 receive bit-serial			
r2092	BO: PROFIdrive PZD3 receive bit-serial			
r2093	BO: PROFIdrive PZD4 receive bit-serial			

No.	Description			
r2094	BO: Connector-binector converter binector output			
r2095	BO: Connector-binector converter binector output			
p2098	Invert connector-binector converter binector output			
p2099	CI: Connector-binector converter signal source			
	Faults (Part 2) and alarms			
p2100	Setting the fault number for fault response			
p2101	Setting the fault response			
	0	None	1	OFF1
	2	OFF2	3	OFF3
	5	STOP2	6	DC braking
p2103	BI: 1. Acknowledge faults			
p2104	BI: 2. Acknowledge faults			
p2106	BI: External fault 1			
r2110	Alarm number			
p2111	Alarm counter			
p2112	BI: External alarm 1			
p2118	Change message type, message number			
p2119	Change message type, type			
	1	Fault	2	Alarm
	3	No message		
r2122	Alarm code			
r2123	Alarm time received [ms]			
r2124	Alarm value			
r2125	Alarm time removed [ms]			
p2126	Setting fault number for acknowledge mode			
p2127	Sets acknowledgement mode			
p2128	Selecting fault/alarm code for trigger			
r2129	CO/BO: Trigger word for faults and alarms			
r2130	Fault time received in days			
r2131	CO: Actual fault code			
r2132	CO: Actual alarm code			
r2133	Fault value for float values			
r2134	Alarm value for float values			
r2135	CO/BO: Status word faults / alarms 2			
r2136	Fault time removed in days			
r2138	CO/BO: Control word, faults/alarms			
r2139	CO/BO: Status word, faults/alarms 1			
p2141	Speed threshold value 1 [rpm]			
p2153	Speed actual value filter time constant [ms]			
p2155	Speed threshold value 2 [rpm]			

No.	Description
p2156	Switch-on delay comparison value reached [ms]
p2165	Load monitoring blocking monitoring upper threshold [rpm]
p2168	Load monitoring blocking monitoring torque threshold [Nm]
r2169	CO: Speed actual value smoothed signals [rpm]
p2170	Current threshold value [A]
p2171	Current threshold value reached delay time [ms]
p2172	DC-link voltage threshold [V]
p2174	Torque threshold value 1 [Nm]
p2191	Load monitoring torque threshold without load [Nm]
p2194	Torque threshold value 2 [%]
p2195	Torque utilization switch-off delay [ms]
r2197	CO/BO: Status word monitoring functions 1
r2198	CO/BO: Status word monitoring 2
r2199	CO/BO: Status word monitoring 3
Technology controller	
p2200	BI: Technology controller enable
p2201	CO: Techn. controller fixed value 1 [100 ≙ 100%]
p2202	CO: Techn. controller fixed value 2 [100 ≙ 100%]
…	…
p2215	CO: Techn. controller fixed value 15 [100 ≙ 100%]
p2216	Techn. controller fixed value selection method 0 Selection, direct 1 Selection, binary
p2220	BI: Techn. controller fixed value selection bit 0
p2221	BI: Techn. controller fixed value selection bit 1
p2222	BI: Techn. controller fixed value selection bit 2
p2223	BI: Techn. controller fixed value selection bit 3
r2224	CO: Techn. controller fixed value active [100 ≙ 100%]
r2225	CO/BO: Techn. controller fixed value selection status word
r2229	Techn. controller number currently
p2230	Techn. controller motorized potentiometer configuration .00 Storage active .02 Initial rounding active .03 Non-volatile data save active for p2230.0 = 1 .04 Ramp-function generator always active
r2231	Techn. controller motorized potentiometer setpoint memory

No.	Description
p2235	BI: Techn. controller motorized potentiometer setpoint up
p2236	BI: Techn. controller motorized potentiometer setpoint down
p2237	Techn. controller motorized potentiometer maximum value [%]
p2238	Techn. controller motorized potentiometer minimum value [%]
p2240	Techn. controller motorized potentiometer start value [%]
r2245	CO: Techn. controller motorized potentiometer setpoint before RFG [100 ≙ 100%]
p2247	Techn. controller motorized potentiometer ramp-up time [s]
p2248	Techn. controller motorized potentiometer ramp-down time [s]
r2250	CO: Techn. controller motorized potentiometer setpoint after RFG [100 ≙ 100%]
p2251	Techn. controller mode 0 Techn. controller as main speed setpoint 1 Techn. controller as additional speed setpoint
p2252	Technology controller configuration .04 1 = ramp function generator (up/down) bypass deactivated .05 1 = integrator for skip speeds active .06 1 = do not display internal controller limitation
p2253	CI: Techn. controller setpoint 1 [100 ≙ 100%]
p2254	CI: Techn. controller setpoint 2 [100 ≙ 100%]
p2255	Techn. controller setpoint 1 scaling [100 ≙ 100%]
p2256	Techn. controller setpoint 2 scaling [100 ≙ 100%]
p2257	Techn. controller ramp-up time [s]
p2258	Techn. controller ramp-down time [s]
r2260	CO: Techn. controller setpoint after ramp function generator [100 ≙ 100%]
p2261	Techn. controller setpoint filter time constant [s]
p2263	Techn. controller type 0 D component in the actual value signal 1 D component in the fault signal
p2264	CI: Techn. controller actual value [100 ≙ 100%]
p2265	Techn. controller actual value filter time constant [s]
r2266	CO: Techn. controller actual value after filter [100 ≙ 100%]
p2267	Techn. controller upper limit actual value [100 ≙ 100%]

No.	Description
p2268	Techn. controller lower limit actual value [100 ≙ 100%]
p2269	Techn. controller gain actual value [%]
p2270	Techn. controller actual value function selection 0 No function 1 √x 2 x² 3 x³
p2271	Techn. controller actual value inversion (sensor type) 0 No inversion 1 Inversion of the technology controller actual value signal
r2272	CO: Techn. controller actual value scaled [100 ≙ 100%]
r2273	CO: Techn. controller error [100 ≙ 100%]
p2274	Techn. controller actual differentiation time constant [s]
p2280	Techn. controller proportional gain
p2285	Techn. controller integral time [s]
p2286	BI: Hold techn. controller integrator
p2289	CI: Techn. controller pre-control signal [100 ≙ 100%]
p2290	BI: Technology controller limitation enable 1 = enable technology controller output
p2291	CO: Techn. controller maximum limit [100 ≙ 100%]
p2292	CO: Techn. controller minimum limit [100 ≙ 100%]
p2293	Techn. controller ramp-up/ramp-down time [s]
r2294	CO: Techn. controller output signal [100 ≙ 100%]
p2295	CO: Techn. controller output scaling [100 ≙ 100%]
p2296	CI: Techn. controller output scaling [100 ≙ 100%]
p2297	CI: Techn. controller maximum limit signal source [100 ≙ 100%]
p2298	CI: Techn. controller minimum limit signal source [100 ≙ 100%]
p2299	CI: Techn. controller limit offset [100 ≙ 100%]
p2302	Techn. controller output signal start value [%]
p2306	Techn. controller fault signal inversion 0 No inversion 1 Inversion of the fault signal
p2339	Techn. controller threshold value for I action stop at skip speed [%]
r2344	CO: Techn. controller last speed setpoint (smoothed) [100 ≙ 100%]

No.	Description
p2345	Techn. controller fault response 0 Function inhibited 1 For a fault: change over to r2344 (or p2302) 2 For a fault: Change over to p2215
r2349	CO/BO: Techn. controller status word
p2350	PID Autotune Enable 0 No function 1 Ziegler Nichols 2 Slight overshoot 3 No overshoot 4 Optimize P and I action of the technology controller only
p2354	PID tuning timeout length
p2355	PID tuning offset
p2900	CO: Fixed value 1 [100 ≙ 100%]
p2901	CO: Fixed value 2 [100 ≙ 100%]
r2902	CO: Fixed values [100 ≙ 100%]
p2930	CO: Fixed value M [Nm]
r2969	Direct axis flux model display
	Messages
r3113	CO/BO: NAMUR message bit bar
p3117	Change safety message type 0 Safety messages are not reparameterized 1 Safety messages are reparameterized
r3120	Component fault 0 No assignment 1 Control Unit 2 Power Module 3 Motor
r3121	Component alarm 0 No assignment 1 Control Unit 2 Power Module 3 Motor
r3122	Diagnostic attribute fault
r3123	Diagnostic attribute alarm
p3233	Torque actual value filter time constant [ms]
	Energy-saving display
p3320	Fluid flow machine P = f(n), Y coordinate: P flow 1%, point 1
p3321	Fluid flow machine P = f(n), X coordinate: n flow 1%, point 1
p3322	P = f(n), Y coordinate: P flow 2%, point 2
p3323	P = f(n), X coordinate: n flow 2%, point 2
…	…
p3328	P = f(n), Y coordinate: P flow 5%, point 5
p3329	P = f(n), X coordinate: n flow 5%, point 5

No.	Description
Two/three wire control	
p3330	BI: 2-3 wire control 1
p3331	BI: 2-3 wire control 2
p3332	BI: 2-3 wire control 3
r3333	CO/BO: 2-3 wire output
	.00 2-3 wire ON
	.01 2-3 wire reverse
	.02 2-3 wire ON / invert
	.03 2-3 wire reverse/invert
Friction characteristic	
p3820	Friction characteristic, value n0
p3821	Friction characteristic, value n1
…	…
p3829	Friction characteristic, value n9
p3830	Friction characteristic, value M0
p3831	Friction characteristic, value M1
…	…
p3839	Friction characteristic, value M9
r3840	CO/BO: Friction characteristic status word
	.00 1 = Friction characteristic OK / .01 1 = Recording of the friction characteristic activated
	.02 1 = Recording of the friction characteristic ended / .03 1 = Recording of the friction characteristic aborted
	.08 1 = Friction characteristic positive direction
r3841	CO: Friction characteristic, output [Nm]
p3842	Activate friction characteristic
	1 Friction characteristic active
p3845	Activate friction characteristic plot
	0 Recording of friction characteristic plot deactivated
	1 Recording of friction characteristic in all directions
	2 Recording of friction characteristic in positive direction only
	3 Recording of friction characteristic in negative direction only
p3846	Friction characteristic plot ramp-up/ramp-down time [s]
p3847	Friction characteristic plot warm-up period [s]

No.	Description
Compound braking	
p3856	Compound braking current [100 ≙ 100%]
r3859	CO/BO: Compound braking status word
Administration parameters	
p3900	Completion of quick commissioning
r3925	Identification final display
p3950	Service parameters
p3981	Faults, acknowledge drive object
p3985	Master control mode selection
r3996	Parameter write inhibit status
p5271	Online tuning controller configuration
p5310	Moment of inertia precontrol configuration
r5311	Moment of inertia precontrol status word
p5312	Moment of inertia precontrol linear positive [s²]
p5313	Moment of inertia precontrol constant positive [kgms²]
p5314	Moment of inertia precontrol linear negative [s²]
p5315	Moment of inertia precontrol constant negative [kgms²]
p5316	Moment of inertia precontrol change time moment of inertia [ms]
p5350	Mot_temp_mod 1/3 zero speed boost factor
r5389	CO/BO: Mot_temp status word faults/alarms
p5390	Mot_temp_mod 1/3 alarm threshold [°C]
p5391	Mot_temp_mod 1/3 fault threshold [°C]
p5397	Mot_temp_mod 3 ambient air temperature image p0613 [°C]
r5398	Mot_temp_mod 3 alarm threshold image p5390 [°C]
r5399	Mot_temp_mod 3 fault threshold image p5391 [°C]
r5600	Pe hibernation ID
p5602	Pe hibernation pause time, minimum [s]
p5606	Pe hibernation duration, maximum [ms]
p5611	Pe energy-saving properties, general
	.00 Inhibit PROFIenergy / .01 Drive triggers OFF1
	.02 Transition to hibernation from PROFIdrive state 4 possible
p5612	Pe energy-saving properties, mode-dependent
r5613	CO/BO: Pe energy-saving active/inactive
p5614	BI: Set Pe Switching On Inhibited signal source
r7758	Know-how protection Control Unit serial number

No.	Description
r7759	Know-how protection Control Unit reference serial number
p7760	Write protection/know-how protection status
	.00 1 = Write protection active
	.01 1 = Know-how protection active
	.02 1 = Know-how protection temporarily unlocked
	.03 1 = Know-how protection cannot be deactivated
	.04 1 = Memory card copy protection active
	.05 1 = basis copy protection active
	.06 1 = trace and measuring functions for diagnostic purposes active
p7761	Write protection
	0 Not active / 1 Active
p7762	Write access for control using multi-master third-party bus system
	0 Free write access independent of p7761
	1 No free write access (p7761 is active)
p7763	Know-how protection OEM exception list number of parameters
p7764	Know-how protection OEM exception list
p7765	Know-how protection memory card copy protection
	.00 1 = extended copy protection - linked to memory card and CU
	.01 1 = basic copy protection active - linked to memory card
	.02 1 = trace and measuring functions permitted for diagnostic purposes
p7766	Know-how protection password input
p7767	Know-how protection password new
p7768	Know-how protection password confirmation
p7769	Know-how protection memory card setpoint serial number
p7775	NVRAM data action
r7843	Memory card serial number
r8540	BO: STW1 from BOP/IOP in manual mode
r8541	CO: Speed setpoint from BOP/IOP in manual mode
p8542	BI: Active STW1 in BOP/IOP manual mode
p8543	CI: Active speed setpoint in BOP/IOP manual mode
p8552	IOP speed unit
p8558	BI: Selection IOP manual mode

No.	Description
r8570	Macro Drive object Display of the macro files stored in the inverter. See also p0015.
	CANopen
r8600	CAN Device Type
r8601	CAN Error Register
p8602	CAN SYNC-Object
p8603	CAN COB-ID Emergency Message [hex]
p8604	CAN Node Guarding
p8606	CAN Producer Heartbeat Time [ms]
r8607	CAN Identity Object
p8608	CAN Clear Bus Off Error
p8609	CAN Error Behavior
r8610	CAN First Server SDO
p8611	CAN Pre-defined Error Field [hex]
p8620	CAN Node-ID
r8621	CAN Node-ID effective
p8622	CAN bit rate [kBit/s]
	0 1000 / 1 800 / 2 500
	3 250 / 4 125 / 5 50
	6 20 / 7 10
p8623	CAN Bit Timing selection [hex]
p8630	CAN virtual objects
p8641	CAN Abort Connection Option Code
	0 No response / 1 OFF1
	2 OFF2 / 3 OFF3
r8680	CAN Diagnosis Hardware
p8684	CAN NMT state after booting
p8685	CAN NMT state
p8699	CAN RPDO monitoring time [ms]
p8700	CAN Receive PDO 1 [hex]
p8701	CAN Receive PDO 2 [hex]
…	…
p8707	CAN Receive PDO 8 [hex]
p8710	CAN Receive Mapping for RPDO 1 [hex]
p8711	CAN Receive Mapping for RPDO 2 [hex]
…	…
p8717	CAN Receive Mapping for RPDO 8 [hex]

No.	Description			
p8720	CAN Transmit PDO 1 [hex]			
p8721	CAN Transmit PDO 2 [hex]			
…	…			
p8727	CAN Transmit PDO 8 [hex]			
p8730	CAN Transmit Mapping for TPDO 1 [hex]			
p8731	CAN Transmit Mapping for TPDO 2 [hex]			
…	…			
p8737	CAN Transmit Mapping for TPDO 8 [hex]			
p8744	CAN PDO Mapping Configuration			
	1:	Predefined connection set		
	2:	Free PDO mapping		
r8745	CO: CAN free PZD receive objects 16 bit			
p8746	CI: CAN free PZD send objects 16 bit			
r8747	CO: CAN free PZD receive objects 32 bit			
p8748	CI: CAN free PZD send objects 32 bit			
r8750	CAN mapped receive objects 16 bit			
r8751	CAN mapped receive objects 16 bit			
r8760	CAN mapped receive objects 32 bit			
r8761	CAN mapped transmit objects 32 bit			
r8762	CO: CAN operating mode display			
r8784	CO: CAN status word			
p8785	BI: CAN status word bit 8			
p8786	BI: CAN status word bit 14			
p8787	BI: CAN status word bit 15			
p8790	CAN control word - auto interconnection			
p8791	CAN holding option code			
r8792	CO: CAN Velocity Mode I16 setpoint			
r8795	CAN control word			
r8796	CO: CAN Profile Velocity Mode I32 setpoints			
r8797	CAN Target Torque			
p8798	CAN speed conversion factor			
	[0]	Counters	[1]	Denominator
Identification & maintenance data (I&M)				
p8805	Identification and Maintenance 4 configuration			
	0:	Standard value for I&M 4 (p8809)		
	1:	User value for I&M 4 (p8809)		
p8806	Identification and Maintenance 1			
	[0…31]	Plant ID (PID)		
	[32…53]	Location ID (LID)		
p8807	Identification and Maintenance 2			
	[0…15]	YYY-MM-DD hh.mm		

No.	Description			
p8808	Identification and Maintenance 3			
	[0…53]	Arbitrary supplementary information and remarks (ASCII)		
p8809	Identification and Maintenance 4 (signature)			
PROFIdrive				
r8859	PROFINET identification data			
r8909	PN Device ID			
p8920	PN Name of station			
p8921	PN IP Address of Station			
p8922	PN Default Gateway of Station			
p8923	PN Subnet Mask of Station			
p8924	PN DHCP mode			
p8925	PN interfaces configuration			
	0:	No function		
	1:	Activate the configuration		
	2:	Activate the configuration and save		
	3:	Delete configuration		
p8929	PN Remote Controller number			
	0:	Automation or Safety		
	1:	Automation and Safety		
r8930	PN Name of Station active			
r8931	PN IP Address of Station active			
r8932	PN Default Gateway of Station active			
r8933	PN Subnet Mask of Station active			
r8934	PN DHCP mode active			
r8935	PN MAC Address of Station			
r8939	PN DAP ID			
r8960	PN Subslot assignment			
r8961	PN IP Addr Remote Controller 1			
r8962	PN IP Addr Remote Controller 2			
p8980	Ethernet/IP profile			
	0:	SINAMICS	1:	ODVA / AC/DC
p8981	Ethernet/IP ODVA STOP mode			
	0:	OFF1	1:	OFF2
p8982 p8983	Ethernet/IP ODVA speed (p8982) or torque (p8983) scaling			
	123:	32	124:	16
	125:	8	126:	4
	127:	2	128:	1
	129:	0.5	130:	0.25
	131:	0.125	132:	0.0625
	133:	0.03128		

No.	Description			
p8991	USB memory access			
Parameter consistency and storage				
p9400	Safely remove memory card			
	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		
r9401	Safely remove memory card status			
r9463	Set valid macro			
p9484	BICO interconnections, search signal source			
r9485	BICO interconnections, search signal source number			
r9486	BICO interconnections, search signal source first index			
Safety Integrated				
p9601	SI enable, functions integrated in the drive (processor 1)			
p9610	SI PROFIsafe address (processor 1)			
p9650	SI F-DI changeover, tolerance time (processor 1) [ms]			
p9651	SI STO debounce time (processor 1) [ms]			
p9659	SI forced checking procedure timer [h]			
r9660	SI forced checking procedure remaining time [h]			
r9670	SI module identifier, Control Unit			
r9672	SI module identifier, Power Module			
p9700	SI copy function			
p9701	Acknowledge SI data change			
p9761	SI password input [hex]			
p9762	SI password new [hex]			
p9763	SI password acknowledgment [hex]			
r9768	SI PROFIsafe control words received (processor 1)			
	[0]	PZD 1 …	[7]	PZD 8
r9769	SI PROFIsafe status words send (processor 1)			
	[0]	PZD 1 …	[7]	PZD 8
r9770	SI version, safety functions integrated in the drive (processor 1)			
r9771	SI common functions (processor 1)			
r9772	CO/BO: SI status (processor 1)			
r9773	CO/BO: SI status (processor 1 + processor 2)			

No.	Description			
r9776	SI diagnostics			
	.00	1 = safety parameters changed, POWER ON required		
	.01	1 = safety functions enabled		
	.02	1 = safety components exchanged and save necessary		
r9780	SI monitoring clock cycle (processor 1) [ms]			
r9781	SI checksum to check changes (processor 1)			
r9782	SI time stamp to check changes (processor 1) [h]			
r9794	SI crosswise comparison list (processor 1)			
r9795	SI diagnostics, STOP F (processor 1)			
r9798	SI actual checksum SI parameters (processor 1)			
p9799	SI reference checksum SI parameters (processor 1)			
p9801	SI enable, functions integrated in the drive (processor 2)			
p9810	SI PROFIsafe address (processor 2)			
p9850	SI F-DI changeover, tolerance time (processor 2)			
p9851	SI STO debounce time (processor 2) [µs]			
r9871	SI common functions (processor 2)			
r9872	CO/BO: SI status (Power Module)			
r9898	SI actual checksum SI parameters (processor 2)			
p9899	SI reference checksum SI parameters (processor 2)			
Diagnostics (internal)				
r9976	System utilization [%]			
	[1]	Computation time utilization	[5]	Highest gross utilization
Free function blocks				
r20001	Runtime group sampling time [ms]			
	[0]	Runtime group 0 ...	[9]	Runtime group 9
p20030	BI: AND 0 inputs			
	[0]	Input I0 …	[3]	Input I3
r20031	BO: AND 0 output Q			
p20032	AND 0 runtime group			
	1	Runtime group 1 ...	6	Runtime group 6
	9999	Not calculated		
p20033	AND 0 run sequence			
p20034	BI: AND 1 inputs → same as p20030			
r20035	BO: AND 1 output Q			
p20036	AND 1 runtime group → same as p20032			
p20037	AND 1 run sequence			

No.	Description
p20038	BI: AND 2 inputs → same as p20030
r20039	BO: AND 2 output Q
p20040	AND 2 runtime group → same as p20032
p20041	AND 2 run sequence
p20042	BI: AND 3 inputs → same as p20030
r20043	BO: AND 3 output Q
p20044	AND 3 runtime group → same as p20032
p20045	AND 3 run sequence
p20046	BI: OR 0 inputs → same as p20030
r20047	BO: OR 0 output Q
p20048	OR 0 runtime group → same as p20032
p20049	OR 0 run sequence
p20050	BI: OR 1 inputs → same as p20030
r20051	BO: OR 1 output Q
p20052	OR 1 runtime group → same as p20032
p20053	OR 1 run sequence
p20054	BI: OR 2 inputs → same as p20030
r20055	BO: OR 2 output Q
p20056	OR 2 runtime group → same as p20032
p20057	OR 2 run sequence
p20058	BI: OR 3 inputs → same as p20030
r20059	BO: OR 3 output Q
p20060	OR 3 runtime group → same as p20032
p20061	OR 3 run sequence
p20062	BI: XOR 0 inputs → same as p20030
r20063	BO: XOR 0 output Q
p20064	XOR 0 runtime group → same as p20032
p20065	XOR 0 run sequence
p20066	BI: XOR 1 inputs → same as p20030
r20067	BO: XOR 1 output Q
p20068	XOR 1 runtime group → same as p20032
p20069	XOR 1 run sequence
p20070	BI: XOR 2 inputs → same as p20030
r20071	BO: XOR 2 output Q
p20072	XOR 2 runtime group → same as p20032
p20073	XOR 2 run sequence
p20074	BI: XOR 3 inputs → same as p20030
r20075	BO: XOR 3 output Q
p20076	XOR 3 runtime group → same as p20032
p20077	XOR 3 run sequence
p20078	BI: NOT 0 input I
r20079	BO: NOT 0 inverted output

No.	Description			
p20080	NOT 0 runtime group → same as p20032			
p20081	NOT 0 run sequence			
p20082	BI: NOT 1 input I			
r20083	BO: NOT 1 inverted output			
p20084	NOT 1 runtime group → same as p20032			
p20085	NOT 1 run sequence			
p20086	BI: NOT 2 input I			
r20087	BO: NOT 2 inverted output			
p20088	NOT 2 runtime group → same as p20032			
p20089	NOT 2 run sequence			
p20090	BI: NOT 3 input I			
r20091	BO: NOT 3 inverted output			
p20092	NOT 3 runtime group → same as p20032			
p20093	NOT 3 run sequence			
p20094	CI: ADD 0 inputs			
	[0]	Input X0 …	[3]	Input X3
r20095	CO: ADD 0 output Y = X0 + X1 + X2 + X3			
p20096	ADD 0 runtime group			
	5	Runtime group 5	6	Runtime group 6
	9999	Not calculated		
p20097	ADD 0 run sequence			
p20098	CI: ADD 1 inputs → same as p20094			
r20099	CO: ADD 1 output Y			
p20100	ADD 1 runtime group → same as p20096			
p20101	ADD 1 run sequence			
p20102	CI: SUB 0 inputs			
	[0]	X1	[1]	X2
r20103	CO: SUB 0 difference Y = X1 - X2			
p20104	SUB 0 runtime group → same as p20096			
p20105	SUB 0 run sequence			
p20106	CI: SUB 1 inputs → same as p20102			
r20107	CO: SUB 1 difference Y = X1 - X2			
p20108	SUB 1 runtime group → same as p20096			
p20109	SUB 1 run sequence			
p20110	CI: MUL 0 inputs			
	[0]	Factor X0 …	[3]	Factor X3
r20111	CO: MUL 0 product Y = X0 × X1 × X2 × X3			
p20112	MUL 0 runtime group → same as p20096			
p20113	MUL 0 run sequence			
p20114	CI: MUL 1 inputs → same as p20110			
r20115	CO: MUL 1 product Y = X0 × X1 × X2 × X3			
p20116	MUL 1 runtime group → same as p20096			

No.	Description
p20117	MUL 1 run sequence
p20118	CI: DIV 0 inputs
	[0] Dividend X0 [1] Divisor X1
r20119	CO: DIV 0 quotient
	[0] Y = X0 / X1 [1] Integer quotient YIN
	[2] Division remainder MOD = (Y - YIN) × X0
r20120	BO: DIV 0 divisor is zero QF
p20121	DIV 0 runtime group → same as p20096
p20122	DIV 0 run sequence
p20123	CI: DIV 1 inputs → same as p20118
r20124	CO: DIV 1 quotient → same as p20119
r20125	BO: DIV 1 divisor is zero QF
p20126	DIV 1 runtime group → same as p20096
p20127	DIV 1 run sequence
p20128	CI: AVA 0 input X
r20129	CO: AVA 0 output Y = IXI
r20130	BO: AVA 0 input negative SN (X < 0 ⇒ SN = 1)
p20131	AVA 0 runtime group → same as p20096
p20132	AVA 0 run sequence
p20133	CI: AVA 1 input X
r20134	CO: AVA 1 output Y = IXI
r20135	BO: AVA 1 input negative S (X < 0 ⇒ SN = 1)
p20136	AVA 1 runtime group → same as p20096
p20137	AVA 1 run sequence
p20138	BI: MFP 0 input pulse I
p20139	MFP 0 pulse duration [ms]
r20140	BO: MFP 0 output Q
p20141	MFP 0 runtime group → same as p20096
p20142	MFP 0 run sequence
p20143	BI: MFP 1 input pulse
p20144	MFP 1 pulse duration [ms]
r20145	BO: MFP 1 output Q
p20146	MFP 1 runtime group → same as p20096
p20147	MFP 1 run sequence
p20148	BI: PCL 0 input pulse I
p20149	PCL 0 pulse duration [ms]
r20150	BO: PCL 0 output Q
p20151	PCL 0 runtime group → same as p20096
p20152	PCL 0 run sequence
p20153	BI: PCL 1 input pulse I
p20154	PCL 1 pulse duration [ms]
r20155	BO: PCL 1 output Q

No.	Description
p20156	PCL 1 runtime group → same as p20096
p20157	PCL 1 run sequence
p20158	BI: PDE 0 input pulse I
p20159	PDE 0 pulse delay time [ms]
r20160	BO: PDE 0 output Q
p20161	PDE 0 runtime group → same as p20096
p20162	PDE 0 run sequence
p20163	BI: PDE 1 input pulse I
p20164	PDE 1 pulse delay time [ms]
r20165	BO: PDE 1 output Q
p20166	PDE 1 runtime group → same as p20096
p20167	PDE 1 run sequence
p20168	BI: PDF 0 input pulse I
p20169	PDF 0 pulse delay time [ms]
r20170	BO: PDF 0 output Q
p20171	PDF 0 runtime group → same as p20096
p20172	PDF 0 run sequence
p20173	BI: PDF 1 input pulse I
p20174	PDF 1 pulse delay time [ms]
r20175	BO: PDF 1 output Q
p20176	PDF 1 runtime group → same as p20096
p20177	PDF 1 run sequence
p20178	BI: PST 0 inputs
	[0] Input pulse I [1] Reset input R
p20179	PST 0 pulse duration [ms]
r20180	BO: PST 0 output Q
p20181	PST 0 runtime group → same as p20096
p20182	PST 0 run sequence
p20183	BI: PST 1 inputs → same as p20178
p20184	PST 1 pulse duration [ms]
r20185	BO: PST 1 output Q
p20186	PST 1 runtime group → same as p20096
p20187	PST 1 run sequence
p20188	BI: RSR 0 inputs
	[0] Set S [1] Reset R
r20189	BO: RSR 0 output Q
r20190	BO: RSR 0 inverted output QN
p20191	RSR 0 runtime group → same as p20032
p20192	RSR 0 run sequence
p20193	BI: RSR 1 inputs → same as p20188
r20194	BO: RSR 1 output Q
r20195	BO: RSR 1 inverted output QN

No.	Description			
p20196	RSR 1 runtime group → same as p20032			
p20197	RSR 1 run sequence			
p20198	BI: DFR 0 inputs			
	[0]	Trigger input I	[1]	D input D
	[2]	Set S	[3]	Reset R
r20199	BO: DFR 0 output Q			
r20200	BO: DFR 0 inverted output QN			
p20201	DFR 0 runtime group → same as p20032			
p20202	DFR 0 run sequence			
p20203	BI: DFR 1 inputs → same as p20198			
r20204	BO: DFR 1 output Q			
r20205	BO: DFR 1 inverted output QN			
p20206	DFR 1 runtime group → same as p20032			
p20207	DFR 1 run sequence			
p20208	BI: BSW 0 inputs			
	[0]	Input I0	[1]	Input I1
p20209	BI: BSW 0 switch position I			
r20210	BO: BSW 0 output Q			
p20211	BSW 0 runtime group → same as p20032			
p20212	BSW 0 run sequence			
p20213	BI: BSW 1 inputs → same as p20208			
p20214	BI: BSW 1 switch position I			
r20215	BO: BSW 1 output Q			
p20216	BSW 1 runtime group → same as p20032			
p20217	BSW 1 run sequence			
p20218	CI: NSW 0 inputs			
	[0]	Input X0	[1]	Input X1
p20219	BI: NSW 0 switch position I			
r20220	CO: NSW 0 output Y			
p20221	NSW 0 runtime group → same as p20096			
p20222	NSW 0 run sequence			
p20223	CI: NSW 1 inputs → same as p20218			
p20224	BI: NSW 1 switch position I			
r20225	CO: NSW 1 output Y			
p20226	NSW 1 runtime group → same as p20096			
p20227	NSW 1 run sequence			
p20228	CI: LIM 0 input X			
p20229	LIM 0 upper limit value LU			
p20230	LIM 0 lower limit value LL			
r20231	CO: LIM 0 output Y			
r20232	BO: LIM 0 input variable at the upper limit QU			
r20233	BO: LIM 0 input variable at the lower limit QL			

No.	Description			
p20234	LIM 0 runtime group → same as p20096			
p20235	LIM 0 run sequence			
p20236	CI: LIM 1 input X			
p20237	LIM 1 upper limit value LU			
p20238	LIM 1 lower limit value LL			
r20239	CO: LIM 1 output Y			
r20240	BO: LIM 1 input variable at the upper limit QU			
r20241	BO: LIM 1 input variable at the lower limit QL			
p20242	LIM 1 runtime group → same as p20096			
p20243	LIM 1 run sequence			
p20244	CI: PT1 0 inputs			
	[0]	Input x	[1]	Setting value SV
p20245	BI: PT1 0 accept setting value S			
p20246	PT1 0 smoothing time constant [ms]			
r20247	CO: PT1 0 output Y			
p20248	PT1 0 runtime group → same as p20096			
p20249	PT1 0 run sequence			
p20250	CI: PT1 1 inputs → same as p20244			
p20251	BI: PT1 1 accept setting value S			
p20252	PT1 1 smoothing time constant [ms]			
r20253	CO: PT1 1 output Y			
p20254	PT1 1 runtime group → same as p20096			
p20255	PT1 1 run sequence			
p20256	CI: INT 0 inputs → same as p20244			
p20257	INT 0 upper limit value LU			
p20258	INT 0 lower limit value LL			
p20259	INT 0 integrating time constant [ms]			
p20260	BI: INT 0 accept setting value S			
r20261	CO: INT 0 output Y			
r20262	BO: INT 0 integrator at the upper limit QU			
r20263	BO: INT 0 integrator at the lower limit QL			
p20264	INT 0 runtime group → same as p20096			
p20265	INT 0 run sequence			
p20266	CI: LVM 0 input X			
p20267	LVM 0 interval mean value M			
p20268	LVM 0 interval limit L			
p20269	LVM 0 hysteresis HY			
r20270	BO: LVM 0 input variable above interval QU			
r20271	BO: LVM 0 input variable within interval QM			
r20272	BO: LVM 0 input variable below interval QL			
p20273	LVM 0 runtime group → same as p20096			
p20274	LVM 0 run sequence			

No.	Description			
p20275	CI: LVM 1 input X			
p20276	LVM 1 interval mean value M			
p20277	LVM 1 interval limit L			
p20278	LVM 1 hysteresis HY			
r20279	BO: LVM 1 input variable above interval QU			
r20280	BO: LVM 1 input variable within interval QM			
r20281	BO: LVM 1 input variable below interval QL			
p20282	LVM 1 runtime group → same as p20096			
p20283	LVM 1 run sequence			
p20284	CI: DIF 0 input X			
p20285	DIF 0 differential time constant [ms]			
r20286	CO: DIF 0 output Y			
p20287	DIF 0 runtime group → same as p20096			
p20288	DIF 0 run sequence			
p20300	BI: NOT 4 input I			
r20301	BO: NOT 4 inverted output			
p20302	NOT 4 runtime group → same as p20032			
p20303	NOT 4 run sequence			
p20304	BI: NOT 5 input I			
r20305	BO: NOT 5 inverted output			
p20306	NOT 5 runtime group → same as p20032			
p20307	NOT 5 run sequence			
p20308	CI: ADD 2 inputs → same as p20094			
r20309	CO: ADD 2 output Y			
p20310	ADD 2 runtime group → same as p20096			
p20311	ADD 2 run sequence			
p20312	CI: NCM 0 inputs			
	[0]	Input X0	[1]	Input X1
r20313	BO: NCM 0 output QU (QU = 1 if X0 > X1)			
r20314	BO: NCM 0 output QE (QE = 1 if X0 = X1)			
r20315	BO: NCM 0 output QL (QL = 1 if X0 < X1)			
p20316	NCM 0 runtime group → same as p20096			
p20317	NCM 0 run sequence			
p20318	CI: NCM 1 inputs			
	[0]	Input X0	[1]	Input X1
r20319	BO: NCM 1 output QU (QU = 1 if X0 > X1)			
r20320	BO: NCM 1 output QE (QE = 1 if X0 = X1)			
r20321	BO: NCM 1 output QL (QL = 1 if X0 < X1)			
p20322	NCM 1 runtime group → same as p20096			
p20323	NCM 1 run sequence			
p20324	BI: RSR 2 inputs			
	[0]	Set S	[1]	Reset R

No.	Description
r20325	BO: RSR 2 output Q
r20326	BO: RSR 2 inverted output QN
p20327	RSR 2 runtime group → same as p20032
p20328	RSR 2 run sequence
p20329	BI: DFR 2 inputs → same as p20198
r20330	BO: DFR 2 output Q
r20331	BO: DFR 2 inverted output QN
p20332	DFR 2 runtime group → same as p20032
p20333	DFR 2 run sequence
p20334	BI: PDE 2 input pulse I
p20335	PDE 2 pulse delay time [ms]
r20336	BO: PDE 2 output Q
p20337	PDE 2 runtime group → same as p20096
p20338	PDE 2 run sequence
p20339	BI: PDE 3 input pulse I
p20340	PDE 3 pulse delay time [ms]
r20341	BO: PDE 3 output Q
p20342	PDE 3 runtime group → same as p20096
p20343	PDE 3 run sequence
p20344	BI: PDF 2 input pulse I
p20345	PDF 2 pulse delay time [ms]
r20346	BO: PDF 2 output Q
p20347	PDF 2 runtime group → same as p20096
p20348	PDF 2 run sequence
p20349	BI: PDF 3 input pulse I
p20350	PDF 3 pulse delay time [ms]
r20351	BO: PDF 3 output Q
p20352	PDF 3 runtime group → same as p20096
p20353	PDF 3 run sequence
p20354	BI: MFP 2 input pulse
p20355	MFP 2 pulse duration [ms]
r20356	BO: MFP 2 output Q
p20357	MFP 2 runtime group → same as p20096
p20358	MFP 2 run sequence
p20359	BI: MFP 3 input pulse
p20360	MFP 3 pulse duration [ms]
r20361	BO: MFP 3 output Q
p20362	MFP 3 runtime group → same as p20096
p20363	MFP 3 run sequence
p20372	CI: PLI 0 input X
r20373	CO: PLI 0 output Y

No.	Description			
p20374	PLI 0 X coordinate A transition point			
	[0]	Transition point 0 …	[19]	Transition point 19
p20375	PLI 0 Y coordinate B transition point			
	[0]	Transition point 0 …	[19]	Transition point 19
p20376	PLI 0 runtime group → same as p20096			
p20377	PLI 0 run sequence			
p20378	CI: PLI 1 input X			
r20379	CO: PLI 1 output Y			
p20380	PLI 1 X coordinate A transition point → same as p 20374			
p20381	PLI 1 Y coordinate B transition point → same as p 20375			
p20382	PLI 1 runtime group → same as p20096			
p20383	PLI 1 run sequence			
p60022	Selecting a PROFIsafe telegram			
r61000	PROFINET Name of Station			
r61001	PROFINET IP of Station			

Troubleshooting and additional information 5

5.1 List of alarms and faults

Axxxxx Alarm

Fyyyyy: Fault

Table 5- 1 The most important alarms and faults of the safety functions

Number	Cause	Remedy	
F01600	STOP A Triggered	STO Select and then deselect again.	
F01650	Acceptance test required	Carry out acceptance test and create test certificate. Switch the Control Unit off and then on again.	
F01659	Write task for parameter rejected	Cause: The converter should be reset to the factory setting. The resetting of the safety functions is, however, not allowed, because the safety functions are currently enabled. Remedy with operator panel:	
		p0010 = 30	Parameter reset
		p9761 = …	Enter password for the safety functions.
		p0970 = 5	Reset Start Safety Parameter. The converter sets p0970 = 5 if it has reset the parameters.
		Then reset the converter to the factory setting again.	
A01666	Static 1 signal atF-DI for safe acknowledgment	F-DI to a logical 0 signal.	
A01698	Commissioning mode active for safety functions	This message is withdrawn after the Safety commissioning has ended.	
A01699	Shutdown path test required	After the next time that the "STO" function is deselected, the message is withdrawn and the monitoring time is reset.	
F30600	STOP A Triggered	STO Select and then deselect again.	

Table 5- 2 The most important alarms and faults

Number	Cause	Remedy
F01018	Power-up aborted more than once	1. Switch off the inverter power supply and switch it on again. 2. After this fault, the inverter powers up with the factory settings. 3. Recommission the inverter.
A01028	Configuration error	Explanation: The parameter assignments on the memory card were made with a different type of module (article no.). Check the module parameters and recommission if necessary.
F01033	Unit switchover: Reference parameter value invalid	Set the value of the reference parameter to a value other than 0.0 (p0304, p0305, p0310, p0596, p2000, p2001, p2002, p2003, r2004).

Number	Cause	Remedy
F01034	Unit switchover: Calculation of the parameter values after reference value change unsuccessful	Select the value of the reference parameter so that the parameters involved can be calculated in the per unit notation (p0304, p0305, p0310, p0596, p2000, p2001, p2002, p2003, r2004).
F01122	Frequency at the probe input too high	Reduce the frequency of the pulses at the probe input.
A01590	Motor maintenance interval elapsed	Carry out the maintenance.
A01900	PROFIBUS: Configuration telegram faulty	Explanation: A PROFIBUS master is attempting to establish a connection with a faulty configuration telegram. Check the bus configuration on the master and slave side.
A01910 F01910	Fieldbus SS setpoint timeout	The alarm is generated when p2040 ≠ 0 ms and one of the following causes is present: • The bus connection is interrupted • The MODBUS master is switched off • Communications error (CRC, parity bit, logical error) An excessively low value for the fieldbus monitoring time (p2040)
A01920	PROFIBUS: Cyclic connection interrupt	Explanation: The cyclic connection to PROFIBUS master is interrupted. Establish the PROFIBUS connection and activate the PROFIBUS master with cyclic operation.
F03505	Analog input, wire break	Check the connection to the signal source for interrupts. Check the level of the signal supplied. The input current measured by the analog input can be read out in r0752.
A03520	Temperature sensor fault	Check that the sensor is connected correctly.
A05000 A05001 A05002 A05004 A05006	Power Module overtemperature	Check the following: - Is the ambient temperature within the defined limit values? - Are the load conditions and duty cycle configured accordingly? - Has the cooling failed?
F06310	Supply voltage (p0210) incorrectly parameterized	Check the parameterized supply voltage and if required change (p0210). Check the line voltage.
F07011	Motor overtemperature	Reduce the motor load. Check ambient temperature. Check sensor's wiring and connection.
A07012	I2t motor model overtemperature	Check and if necessary reduce the motor load. Check the motor's ambient temperature. Check thermal time constant p0611. Check overtemperature fault threshold p0605.
A07015	Motor temperature sensor alarm	Check that the sensor is connected correctly. Check the parameter assignment (p0601).
F07016	Motor temperature sensor fault	Make sure that the sensor is connected correctly. Check the parameterization (p0601).
F07086 F07088	Unit switchover: Parameter limit violation	Check the adapted parameter values and if required correct.

Number	Cause	Remedy
F07320	Automatic restart aborted	Increase the number of restart attempts (p1211). The current number of start attempts is shown in r1214. Increase the wait time in p1212 and/or monitoring time in p1213. Create ON command (p0840). Increase the monitoring time of the power unit or switch off (p0857). Reduce the wait time for resetting the fault counter p1213[1] so that fewer faults are registered in the time interval.
A07321	Automatic restart active	Explanation: The automatic restart (AR) is active. During voltage recovery and/or when remedying the causes of pending faults, the drive is automatically switched back on.
F07330	Search current measured too low	Increase search current (P1202), check motor connection.
A07400	V_{DC_max} controller active	If the controller is not to intervene: • Increase the ramp-down times. • Deactivate the V_{DC_max} controller (p1240 = 0 for vector control, p1280 = 0 for V/f control).
A07409	V/f control, current limiting controller active	The alarm automatically disappears after one of the following measures: • Increase the current limit (p0640). • Reduce load. • Increase the ramp-up time to the speed setpoint.
F07426	Technology controller actual value limited	• Adapt the limits to the signal level (p2267, p2268). • Check the actual value scaling (p2264).
A07444	PID autotuning is activated	Automatic setting of the PID controller (autotuning) is active (p2350 > 0). The alarm disappears automatically after completion of the autotuning.
F07445	PID autotuning canceled	The inverter has canceled the automatic setting of the PID controller (autotuning) because of a fault. Remedy: Increase p2355 and restart autotuning.
F07801	Motor overcurrent	Check current limits (p0640). V/f control: Check the current limiting controller (p1340 … p1346). Increase acceleration ramp (p1120) or reduce load. Check motor and motor cables for short-circuit and ground fault. Check motor for star-delta connection and rating plate parameterization. Check power unit / motor combination. Select flying restart function (p1200) if switched to rotating motor.
A07805	Drive: Power unit overload I2t	• Reduce the continuous load. • Adapt the load cycle. • Check the assignment of rated currents of the motor and power unit.
F07807	Short-circuit detected	• Check the inverter connection on the motor side for any phase-phase short-circuit. • Rule out that line and motor cables have been interchanged.
A07850	External alarm 1	The signal for "external alarm 1" has been triggered. Parameter p2112 defines the signal source of the external alarm. Remedy: Rectify the cause of this alarm.

Number	Cause	Remedy
F07860	External fault 1	Remove the external causes for this fault.
F07900	Motor blocked	• Make sure that the motor can rotate freely. • Check the torque limit: r1538 for a positive direction of rotation; r1539 for a negative direction of rotation.
F07901	Motor overspeed	Activate precontrol of the speed limiting controller (p1401 bit 7 = 1).
F07902	Motor stalled	Check whether the motor data has been parameterized correctly and perform motor identification. Check the current limits (p0640, r0067, r0289). If the current limits are too low, the drive cannot be magnetized. Check whether motor cables are disconnected during operation.
A07903	Motor speed deviation	Increase p2163 and/or p2166. Increase the torque, current and power limits.
A07910	Motor overtemperature	Check the motor load. Check the motor's ambient temperature. Check the KTY84 or PT1000 sensor.
A07920	Torque/speed too low	The torque deviates from the torque/speed envelope curve. • Check the connection between the motor and the load. • Adapt the parameterization corresponding to the load.
A07921	Torque/speed too high	
A07922	Torque/speed out of tolerance	
F07923	Torque/speed too low	• Check the connection between the motor and the load. • Adapt the parameterization corresponding to the load.
F07924	Torque/speed too high	
A07927	DC braking active	Not required
A07980	Rotary measurement activated	Not required
A07981	No enabling for rotary measurement	Acknowledge pending faults. Establish missing enables (see r00002, r0046).
A07991	Motor data identification activated	Switch on the motor and identify the motor data.
F08501	Setpoint timeout	• Check the PROFINET connection. • Set the controller to RUN mode. • If the error occurs repeatedly, check the monitoring time set (p2044).
F08502	Monitoring time, sign-of-life expired	• Check the PROFINET connection.
F08510	Send configuration data not valid	• Check the PROFINET configuration
A08511	Receive configuration data not valid	
A08526	No cyclic connection	• Activate the control with cyclic operation. • Check the parameters "Name of Station" and "IP of Station" (r61000, r61001).
A08565	Consistency error affecting adjustable parameters	Check the following: • IP address, subnet mask or default gateway is not correct. • IP address or station name used twice in the network. • Station name contains invalid characters.

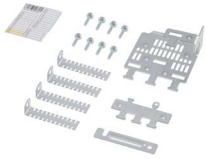
Number	Cause	Remedy
F08700	Communications error	A CAN communications error has occurred. Check the following: • Bus cable • Baud rate (p8622) • Bit timing (p8623) • Master Start the CAN controller manually with p8608 = 1 after the cause of the fault has been resolved!
F13100	Know-how protection: Copy protection error	The know-how protection and the copy protection for the memory card are active. An error occurred during checking of the memory card. • Insert a suitable memory card and switch the inverter power supply temporarily off and then on again (POWER ON). • Deactivate the copy protection (p7765).
F13101	Know-how protection: Copy protection cannot be activated	Insert a valid memory card.
F30001	Overcurrent	Check the following: • Motor data, if required, carry out commissioning • Motor's connection method (Y / Δ) • V/f operation: Assignment of rated currents of motor and Power Module • Line quality • Make sure that the line commutating reactor is connected properly • Power cable connections • Power cables for short-circuit or ground fault • Power cable length • Line phases If this doesn't help: • V/f operation: Increase the acceleration ramp • Reduce the load • Replace the power unit
F30002	DC-link voltage overvoltage	Increase the ramp-down time (p1121). Set the rounding times (p1130, p1136). Activate the DC-link voltage controller (p1240, p1280). Check the line voltage (p0210). Check the line phases.
F30003	DC-link voltage undervoltage	Check the line voltage (p0210).
F30004	Converter overtemperature	Check whether the inverter fan is running. Check whether the ambient temperature is in the permissible range. Check whether the motor is overloaded. Reduce the pulse frequency.
F30005	I2t inverter overload	Check the rated currents of the motor and Power Module. Reduce current limit p0640. When operating with V/f characteristic: Reduce p1341.

Number	Cause	Remedy
F30011	Line phase failure	Check the inverter's input fuses. Check the motor cables.
F30015	Motor cable phase failure	Check the motor cables. Increase the ramp-up or ramp-down time (p1120).
F30021	Ground fault	• Check the power cable connections. • Check the motor. • Check the current transformer. • Check the cables and contacts of the brake connection (a wire might be broken).
F30027	Time monitoring for DC link pre-charging	Check the line voltage. Check the line voltage setting (p0210).
F30035	Overtemperature, intake air	• Check whether the fan is running. • Check the fan filter elements. • Check whether the ambient temperature is in the permissible range.
F30036	Overtemperature, inside area	
F30037	Rectifier overtemperature	See F30035 and, in addition: • Check the motor load. • Check the line phases
A30049	Internal fan defective	Check the internal fan and if required replace.
F30059	Internal fan defective	Check the internal fan and if required replace.
F30074	Communications fault between Control Unit and Power Module	The 24V voltage supply of the inverter (terminals 31 and 32) was interrupted briefly. Please check the voltage supply and the wiring.
A30502	DC link overvoltage	• Check the device supply voltage (p0210). • Check the line reactor dimensioning
A30920	Temperature sensor fault	Check that the sensor is connected correctly.
A50001	PROFINET configuration error	A PROFINET control is attempting to establish a connection with a faulty configuration telegram. Check to see whether "Shared Device" is activated (p8929 = 2).
A50010	PROFINET name of station invalid	Correct the name of station (p8920) and activate (p8925 = 2).
A50020	PROFINET: Second control missing	"Shared Device" is activated (p8929 = 2). However, only the connection to a PROFINET control is present.

For further information, please refer to the List Manual.

Overview of the manuals (Page 84)

5.2 Spare parts

Spare part			Article number
	5 I/O terminal sets, 1 front door set and 1 blanking cover for the operator panel		6SL3200-0SK41-0AA0
	Shield plates including mounting accessories	Frame size AA	6SL3266-1ER00-0KA0
		Frame size A	6SL3266-1EA00-0KA0
		Frame size B	6SL3266-1EB00-0KA0
		Frame size C	6SL3266-1EC00-0KA0
	1 set with plug connectors for line supply, motor and braking resistor	Frame size AA, A	6SL3200-0ST05-0AA0
		Frame size B	6SL3200-0ST06-0AA0
		Frame size C	6SL3200-0ST07-0AA0
	Fan unit for the heat sink, comprising a housing that can be plugged on with integrated fan	Frame size A	6SL3200-0SF12-0AA0
		Frame size B	6SL3200-0SF13-0AA0
		Frame size C	6SL3200-0SF14-0AA0
	Upper fan, comprising upper cover with installed fan	Frame size AA	6SL3200-0SF38-0AA0
		Frame size A	6SL3200-0SF40-0AA0
		Frame size B	6SL3200-0SF41-0AA0
		Frame size C	6SL3200-0SF42-0AA0

Additional information is provided in the Internet:

Spares on Web (https://www.automation.siemens.com/sow?sap-language=EN)

5.3 Technical support

+49 (0)911 895 7222

+44 161 446 5545

+39 (02) 24362000

+34 902 237 238

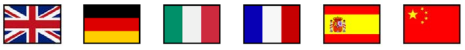
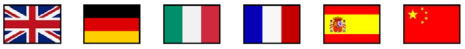
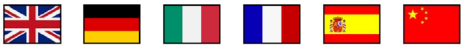
+33 (0) 821 801 122

You can find additional telephone numbers for Technical Support in the Internet:

Product support (http://www.siemens.com/automation/service&support)

5.4 Overview of the manuals

Manuals with additional information that can be downloaded

- SINAMICS G120C compact operating instructions
  (https://support.industry.siemens.com/cs/ww/en/view/109477359)
  Commissioning the inverter (this manual).
  
- SINAMICS G120C operating instructions.
  (https://support.industry.siemens.com/cs/ww/en/view/109478830)
  Installing, commissioning and maintaining the inverter. Advanced commissioning
  
- EMC installation guideline
  (http://support.automation.siemens.com/WW/view/en/60612658)
  EMC-compliant control cabinet design, potential equalization and cable routing
  
- SINAMICS G120C List Manual
  (https://support.industry.siemens.com/cs/ww/en/view/109477254)
  Parameter list, alarms and faults. Graphic function diagrams
  
- "Fieldbus" function manual
  (https://support.industry.siemens.com/cs/ww/en/view/109477369)
  Configuring fieldbuses
  
- "Safety Integrated" function manual
  (https://support.industry.siemens.com/cs/ww/en/view/109477367)

  Configuring PROFIsafe. Installing, commissioning and operating fail-safe functions of the inverter.
- BOP-2 operating instructions
  (https://support.industry.siemens.com/cs/ww/en/view/42185248)
  Using the operator panel.
  
- IOP operating instructions
  (https://support.industry.siemens.com/cs/ww/en/view/109478559)
  Using the operator panel, mounting the door mounting kit for IOP.
  
- Accessories manual (https://support.industry.siemens.com/cs/ww/en/ps/13225/man)
  Installation descriptions for inverter components, e.g. line reactors and line filters. The printed installation descriptions are supplied together with the components.
  

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DOCUMENTATION PACK

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Further information

SINAMICS inverters:
www.siemens.com/sinamics

Safety Integrated:
www.siemens.com/safety-integrated

PROFINET:
www.siemens.com/profinet

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91050 ERLANGEN
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For additional information on SINAMICS G120, scan the QR code.

www.siemens.com/drives