SIEMENS

SINAMICS

SINAMICS G120P CU230P-2 Control Units

Compact Operating Instructions

Edition 01/2016

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A5E37058917B 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.

Siemens AG
Division Digital Factory
Postfach 48 48
90026 NÜRNBERG
GERMANY

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Table of contents

This manual describes how you install the CU230P-2 Control Unit of the SINAMICS G120P inverter and commission it.

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

1 Fundamental safety instructions

1.1 General safety instructions

⚠ WARNING

Risk of death if the safety instructions and remaining risks are not carefully observed

If the safety instructions and residual risks are not observed in the associated hardware documentation, 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.

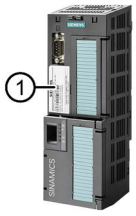
2 Scope of delivery

The delivery comprises at least the following components:

- A CU230P-2 Control Unit ready for operation with installed firmware. Options for upgrading and downgrading the firmware can be found on the Internet:

  Firmware (http://support.automation.siemens.com/WW/news/en/67364620).

  The fieldbus interface of the Control Unit depends on the Article No. The Article No., the designation and the version of the hardware (e.g. 02) and firmware (e.g. 4.6) can be found on the rating plate ① of the Control Unit.

	Designation	Article number	Fieldbus
	CU230P-2 HVAC	6SL3243-0BB30-1HA3	USS, Modbus RTU, BACnet MS/TP, P1
	CU230P-2 DP	6SL3243-0BB30-1PA3	PROFIBUS DP
	CU230P-2 PN	6SL3243-0BB30-1FA0	PROFINET IO, EtherNet/IP

- 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 10)
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.

Installing

3

3.1 Plugging the Control Unit onto the Power Module

Permissible Power Modules

You may operate the Control Unit with the following Power Modules:

- PM230
- PM240
- PM240-2
- PM250
- PM260
- PM330

Installing the Control Unit - General

Each Power Module has an appropriate holder for the Control Unit and a release mechanism.

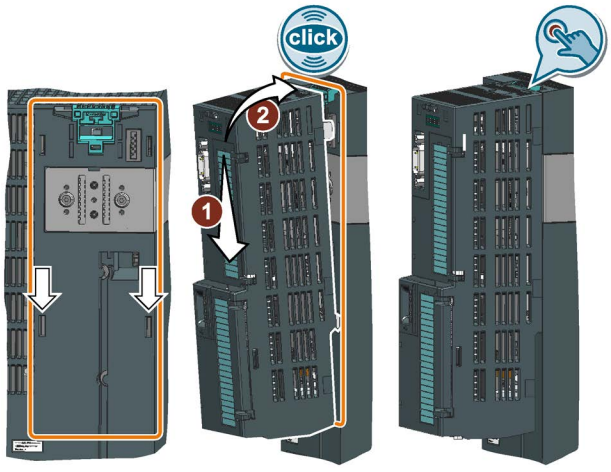
Inserting the Control Unit

1
2

Proceed as follows to plug the Control Unit onto a Power Module:

1. Place the two catches of the Control Unit in the matching grooves of the Power Module.
2. Press the Control Unit onto the Power Module until you hear that it latches.

You have now plugged the Control Unit onto the Power Module.



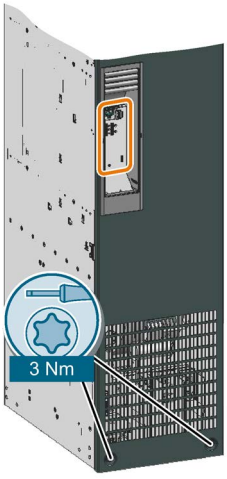
Removing the Control Unit

Remove the Control Unit from the Power Module by pressing the release mechanism.

Special features for the PM240 FSGX Power Module

To insert or detach the Control Unit, you must release the two screws at the front cover, slightly shift the front cover upwards and remove towards the front.

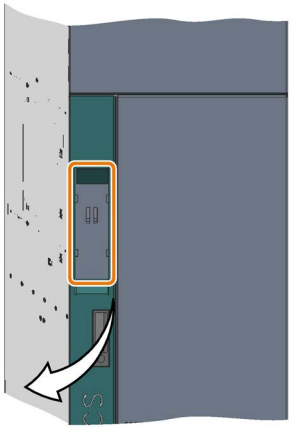
Reattach the front cover before you commission the device.



Special features for the PM330 Power Module

To insert or detach the Control Unit, you must open the left-hand cover of the Power Module.

Close the cover before you commission the inverter.

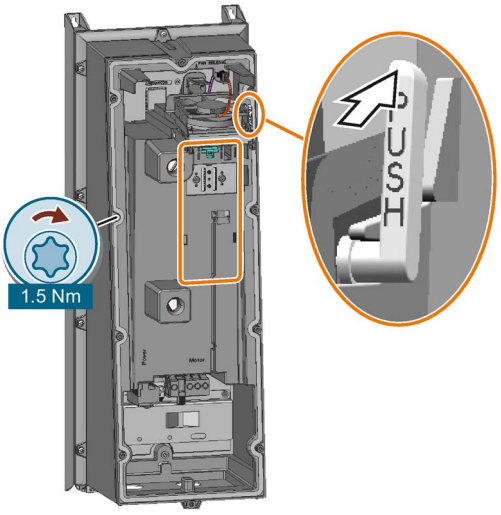


Special features for the PM230 Power Module IP55, FSA … FSC

To insert or detach the Control Unit, you must release eight or ten fixing screws of the cover and then remove the cover.

The Power Module release mechanism is shown in the diagram.

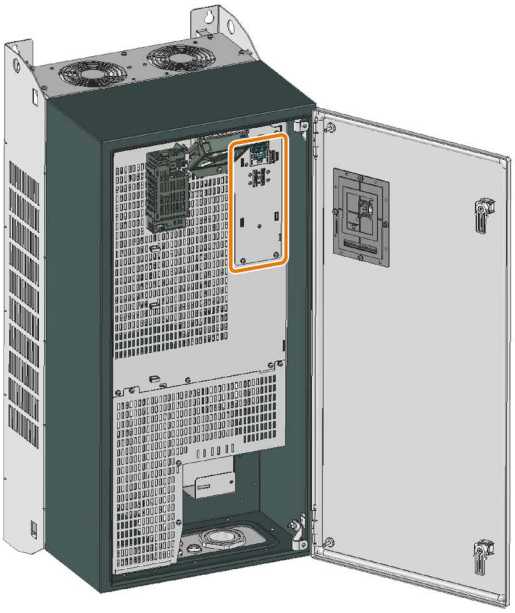
Attach the cover again before you commission the inverter. Do not damage the seal of the cover when attaching it.



Special features for the PM230 Power Module IP55, FSD … FSF

To insert or detach the Control Unit, you must open the front door of the Power Module.

Close the door before you commission the inverter. Check to ensure that the seals are not damaged.



Plugging on an operator panel

Procedure

1
2

To plug an Operator Panel on the Control Unit, proceed as follows:

1. Locate the lower edge of the Operator Panel into the matching recess of the Control Unit.
2. Press the Operator Panel onto the inverter until you hear the latching mechanism engage.

You have plugged an operator panel onto the Control Unit.

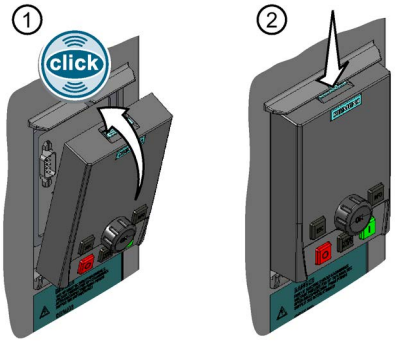
The operator panel is ready for operation when you connect the inverter to the power supply.

Mounting the operator panel or dummy cover on the IP55 Power Module

Note

For degree of protection IP55 and UL-type 12, either an operator panel has to be inserted or the dummy cover.

The Basic Operator Panel (BOP-2) and the Intelligent Operator Panel (IOP) are available as operator panels.



① **Plugging on an operator panel**: Press the operator panel onto the inverter as shown until you hear it engage.

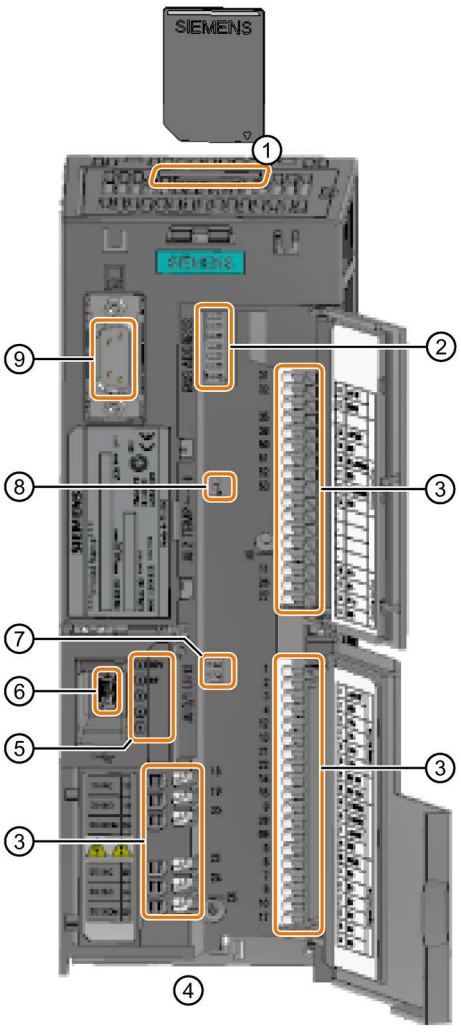
② **Removing an operator panel:** Using a suitable screwdriver, press the release element downwards.

A dummy cover is plugged on and removed just the same as an operator panel.

3.2 Overview of the interfaces

Interfaces at the front of the Control Unit

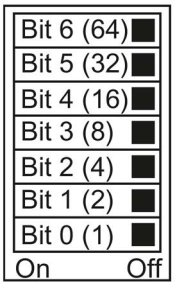
To access the interfaces at the front of the Control Unit, you must lift the Operator Panel (if one is being used) and open the front doors.



① Memory card slot

② Selecting the fieldbus address:

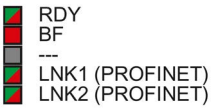
- CU230P-2 DP
- CU230P-2 HVAC
- CU230P-2 BT



③ Terminal strips

④ Fieldbus interfaces at the lower side

⑤ Status LED



⑥ USB interface for connection to a PC

⑦ Switch for AI0 and AI1 (U/I)

- I 0/4 mA … 20 mA
- U -10/0 V … 10 V

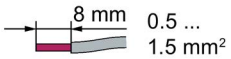
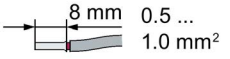
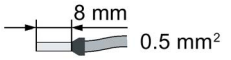
⑧ Switch for AI2 (current/temperature)

⑨ Connection to the operator panel

Table 3- 1 Number of inputs and outputs

Digital inputs DI	Digital outputs DO	Analog inputs AI	Analog outputs AO	Input for motor temperature sensor
6	3	4	2	1

Permissible conductors and cross-sections

Solid or flexible conductors	Finely stranded conductor with non-insulated end sleeve	Finely stranded conductor with partially insulated end sleeve
		
Cables with twin end sleeves are not permissible.		

EMC-compliant wiring

Measures to ensure EMC-compliant wiring of the Control Unit:

- Use the shield connection kit of the Control Unit to connect the shield and provide strain relief for cables/conductors.

Shield connection kit 1 for the CU230P-2 Control Units with all fieldbus interfaces except for PROFINET.	6SL3264-1EA00-0FA0
Shield connection kit 3 for the CU230P-2 and CU240E-2 Control Units with PROFINET interface.	6SL3264-1EA00-0HB0

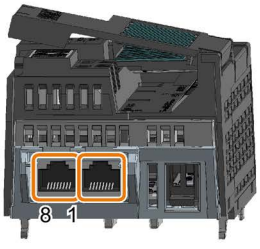
- If you use shielded cables, then you must connect the shield to the mounting plate of the control cabinet or with the shield support of the inverter through a good electrical connection and a large surface area.

Additional information about EMC-compliant wiring is available on the Internet:

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

Interfaces at the lower side of the CU230P-2 Control Unit

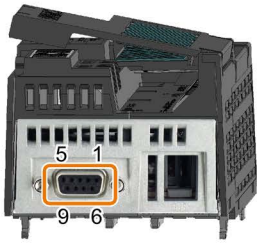
CU230P-2 PN



X150 X150
P1 P2

Pin
1 RX+, receive data +
2 RX-, receive data -
3 TX+. Transmit data +
4 ---
5 ---
6 TX-, transmit data -
7 ---
8 ---

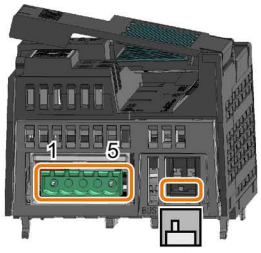
CU230P-2 DP



X127
Socket

Pin
1 Shield, ground connection
2 ---
3 RxD/TxD-P, receive and transmit (B/B')
4 CNTR-P, control signal
5 DGND, reference potential for data (C/C')
6 VP, supply voltage
7 ---
8 RxD/TxD-N, receive and transmit (A/A')
9 ---

CU230P-2 HVAC

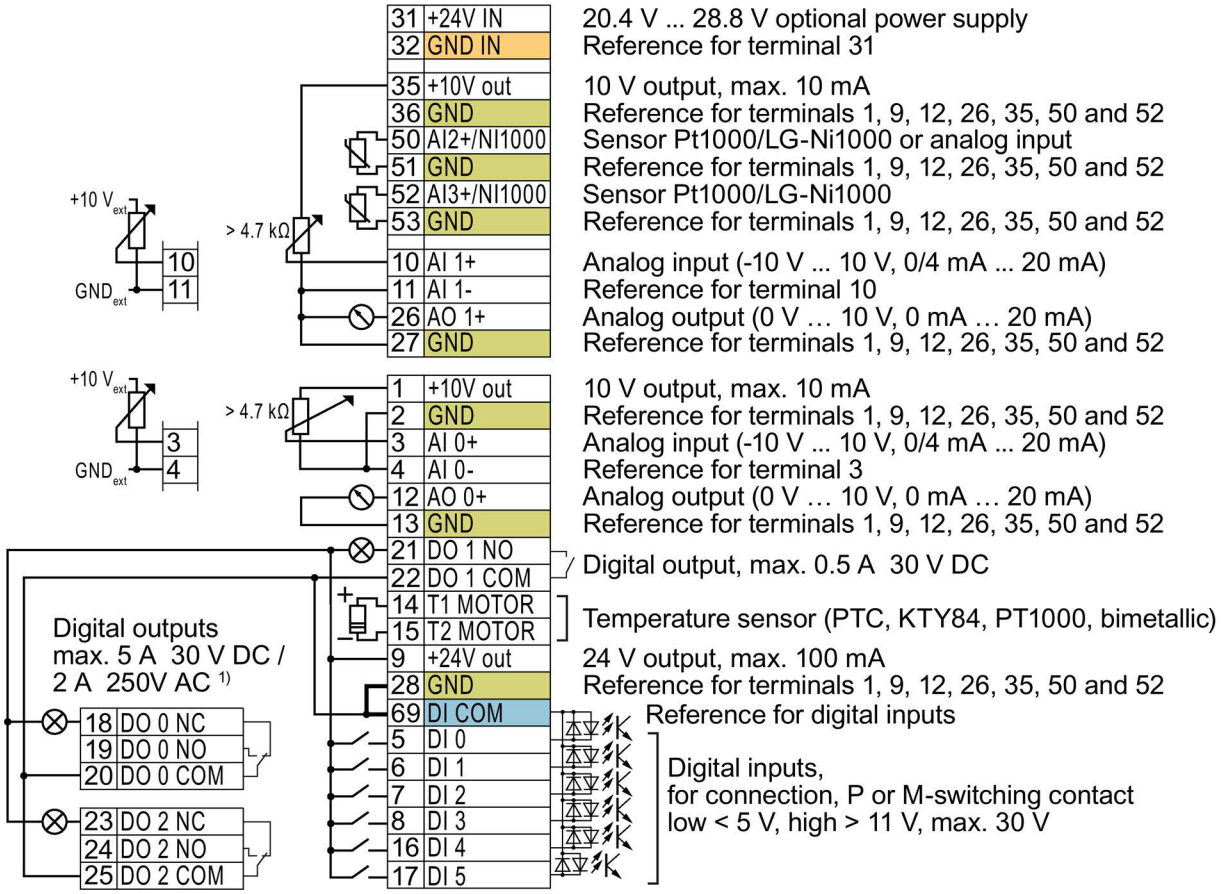


X128 OFF ON
Bus termination

Pin
1 0 V, reference potential
2 P+, RS485P, receive and transmit
3 N-, RS485N, receive and transmit
4 Cable shield
5 ---

3.3 Terminal strips

Terminal strips with wiring example



1) The following applies to systems compliant with UL: Maximum current, 3 A 30 VDC or 2 A 250 VAC

GND — All terminals labelled with reference potential "GND" are connected internally in the inverter.

DI COM — Reference potential "DI COM" is electrically isolated from "GND". The Control Unit is delivered with a jumper between terminals 28 and 69.
→ If, as shown above, you wish to use the 24-V supply from terminal 9 as supply for the digital inputs, then it is mandatory that this jumper is used.

Terminals 31, 32
GND IN — When an optional 24 V power supply is connected at terminals 31, 32, even when the Power Module is disconnected from the line supply, the Control Unit remains in operation. The Control Unit thus maintains fieldbus communication, for example.

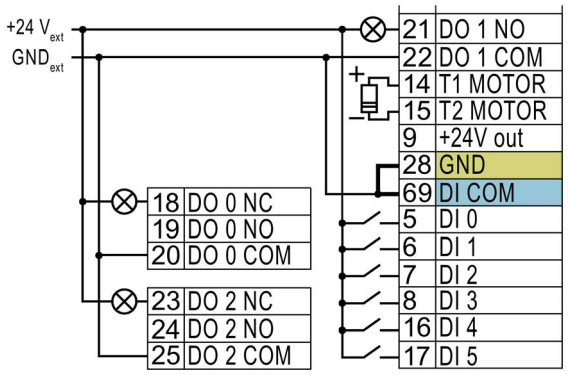
→ At terminals 31, 32, only connect a power supply that is in accordance with SELV (Safety Extra Low Voltage) or PELV (Protective Extra Low Voltage).

→ If you also wish to use the power supply at terminals 31, 32 for the digital inputs, then you must connect "DI COM" and "GND IN" with one another.

Terminals 3, 4 and 10, 11: You may use the internal 10 V power supply or an external power supply for the analog inputs.
→ When you use the internal 10 V power supply, you must connect AI 0 or AI 1 with "GND".

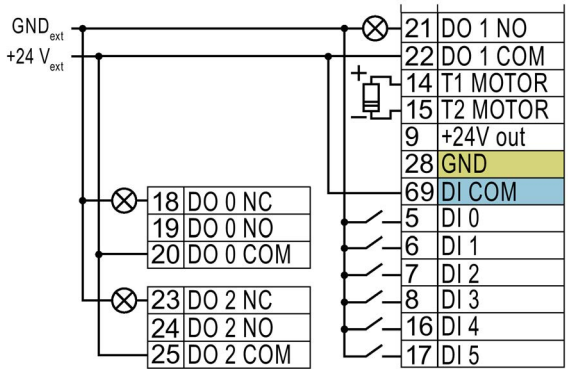
Image 3-1 Wiring the digital inputs with p-switching contacts and an internal 24 V power supply (terminal 9)

Additional options for wiring the digital inputs



Connecting P-switching contacts with an external power supply

You must remove the jumper between terminals 28 and 69 if it is necessary to have electrical isolation between the external power supply and the internal inverter power supply.



Connecting M-switching contacts with an external power supply

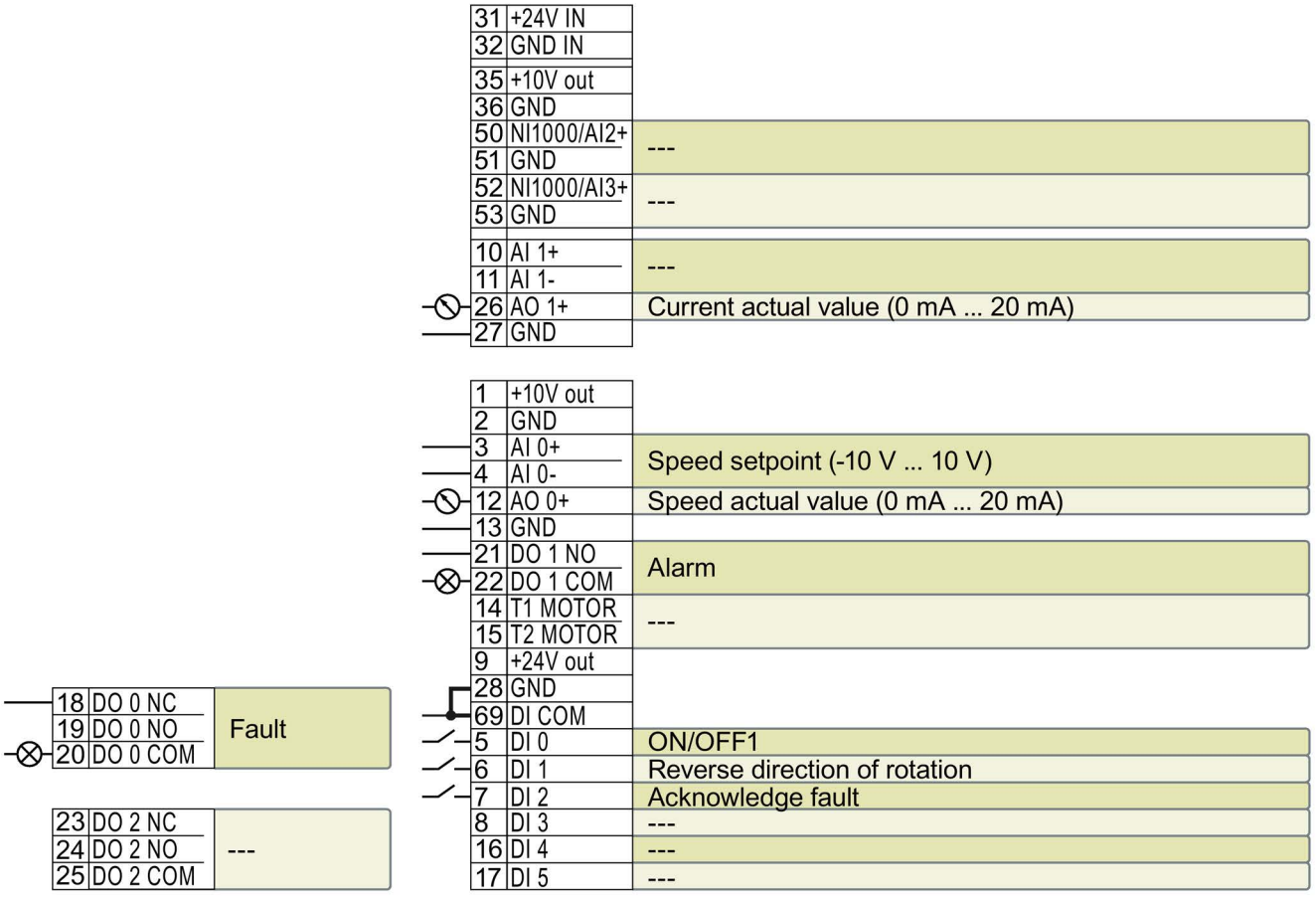
Remove the jumper between terminals 28 and 69.

Factory interface settings

The factory setting of the interfaces depends on the Control Unit.

Control Units with USS or CANopen interface

The fieldbus interface is not active.



--- No function.

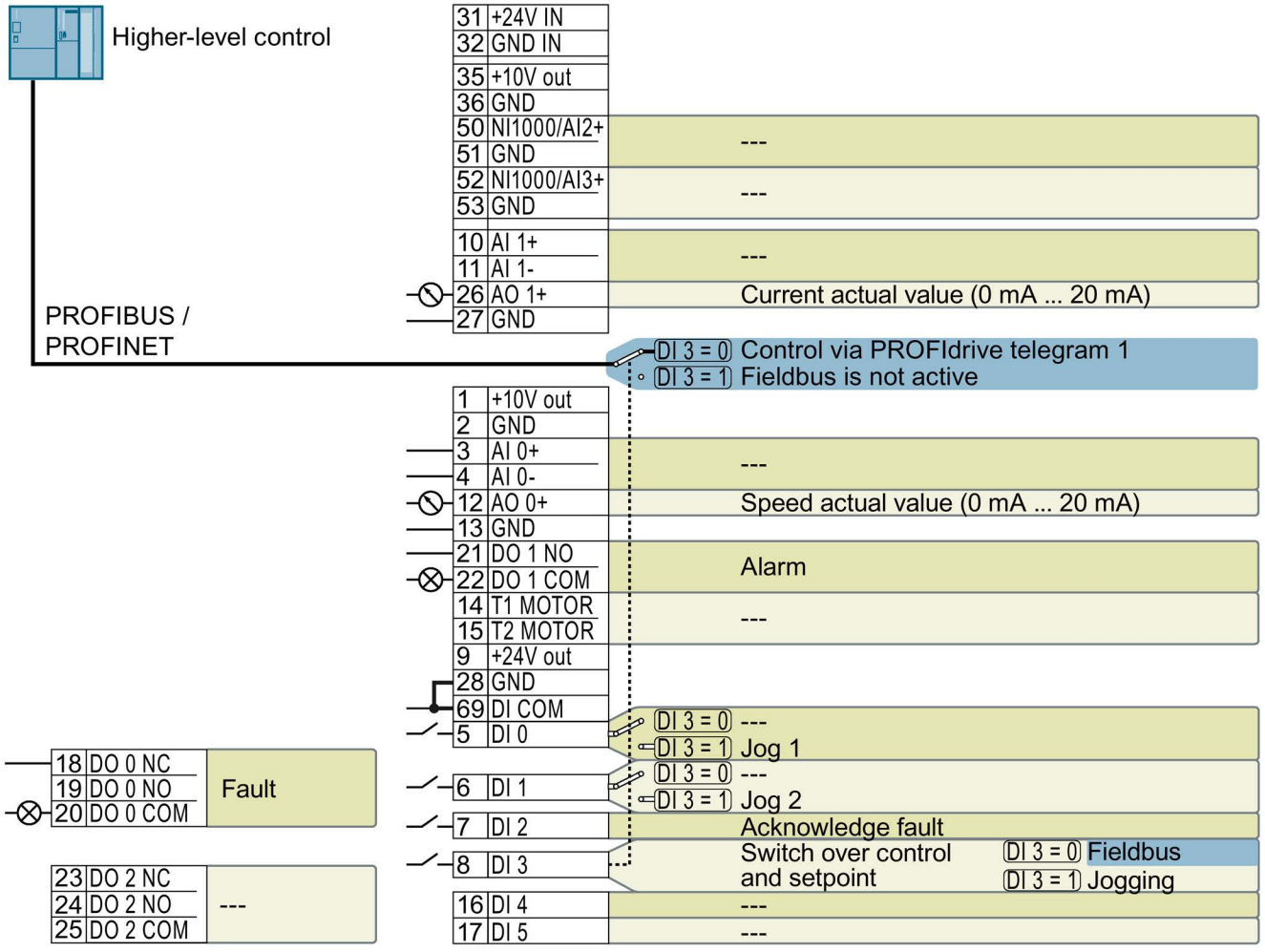
DO x: p073x AO 0: p0771[0] DI x: r0722.x AI 0: r0755[0]

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

Image 3-2 Factory setting of the CU230P-2 HVAC and CU230P-2 CAN Control Units

Control Units with PROFIBUS or PROFINET interface

The function of the fieldbus interface and digital inputs DI 0, DI 1 depends on DI 3.



--- No function.

DO x: p073x AO 0: p0771[0] DI x: r0722.x

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

Image 3-3 Factory setting of the CU230P-2 DP and CU230P-2 PN Control Units

Changing the function of the terminals

The function of the terminals marked in color in the two diagrams above, can be set.

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

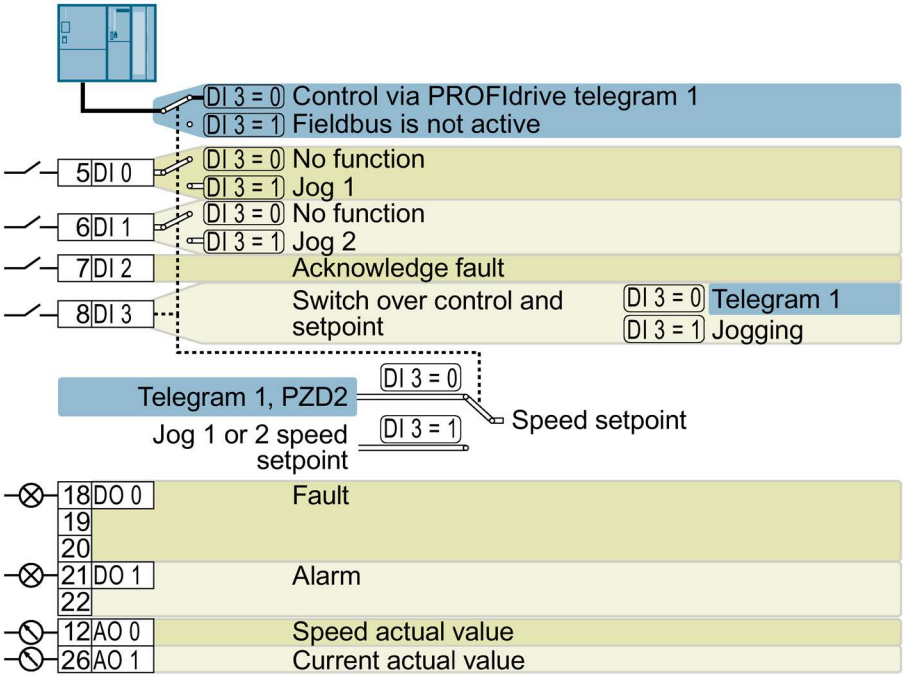
The terminal settings made in the factory described above correspond to the following default settings:

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

3.4 Preassignment of the interfaces

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

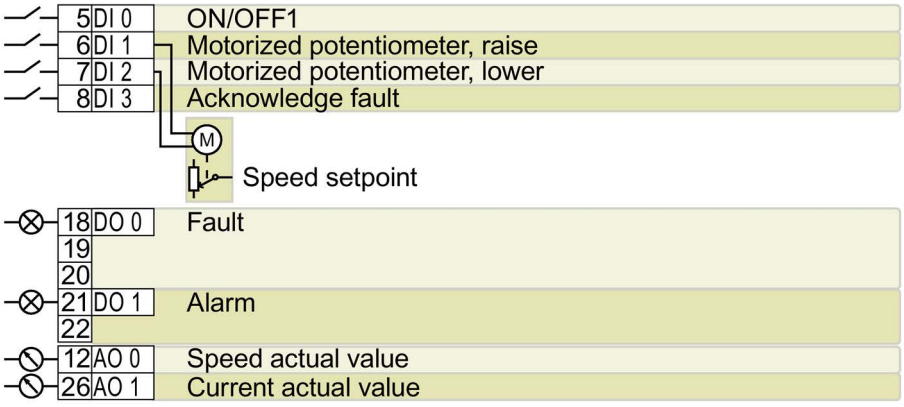
Speed setpoint (main setpoint): p1070[0] = 2050[1]

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

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

Designation in BOP-2: FB cdS

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



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

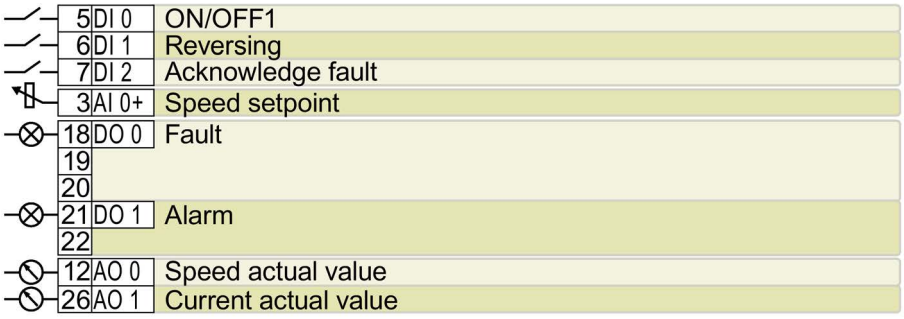
Motorized potentiometer, setpoint after the ramp-function generator: r1050

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

Designation in BOP-2: Std MoP

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

Factory setting for inverters with USS, Modbus, BACnet, MS/TP or P1 interface

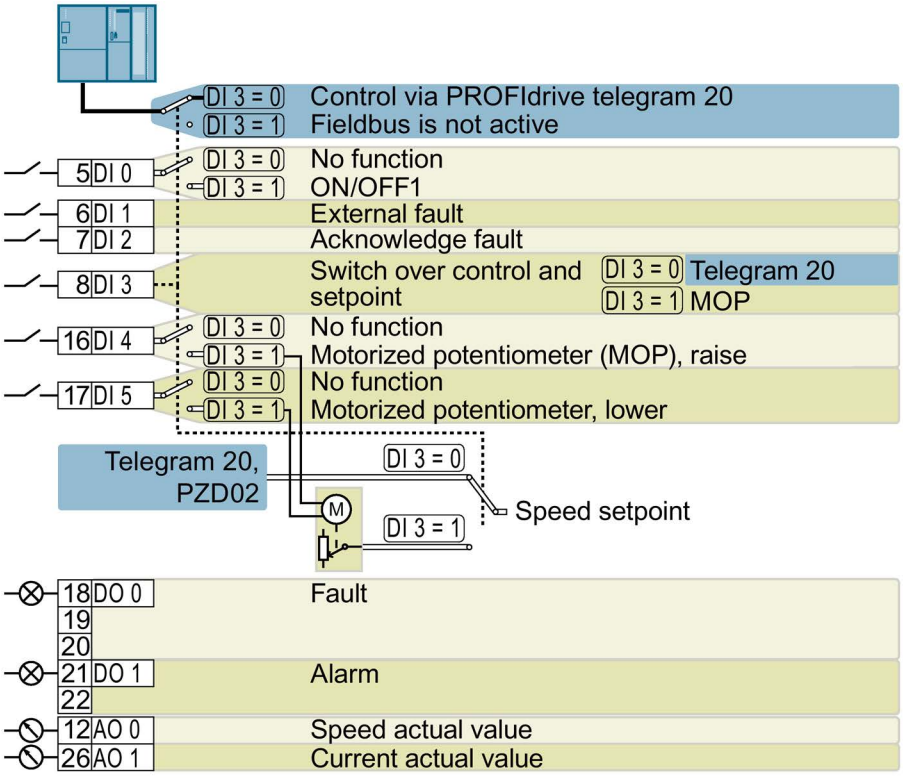


DO 0: p0730, DO 1: p0731 AO 0: p0771[0], AO 1: p0771[1] DI 0: r0722.0, …, DI 2: r0722.2 AI 0: r0755[0]

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

Designation in BOP-2: Std ASP

Default setting 14: "Process industry with fieldbus"



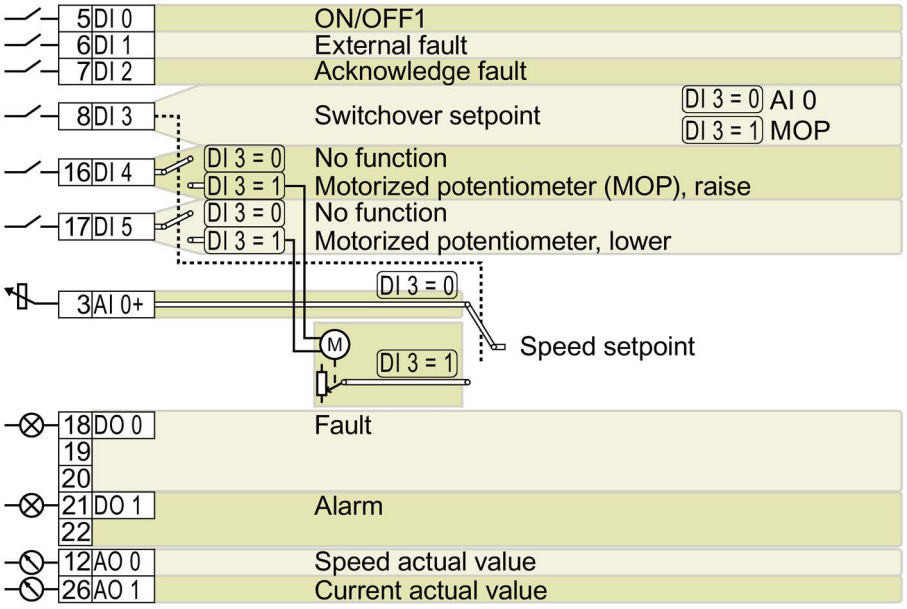
DO 0: p0730, DO 1: p0731 AO 0: p0771[0], AO 1: p0771[1] DI 0: r0722.0, …, DI 5: r0722.5

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

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

Designation in BOP-2: Proc Fb

Default setting 15: "Process industry"



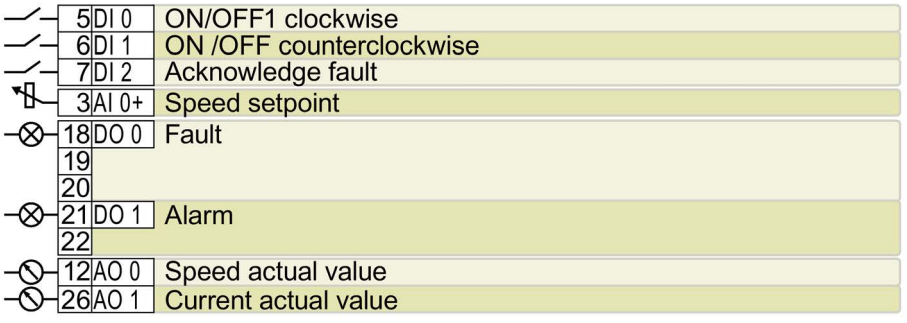
DO 0: p0730, DO 1: p0731 AO 0: p0771[0], AO 1: p0771[1] DI 0: r0722.0, …, DI 5: r0722.5 AI 0: r0755[0]

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

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

Designation in BOP-2: Proc

Default setting 17: "2-wire (forward/backward 1)"

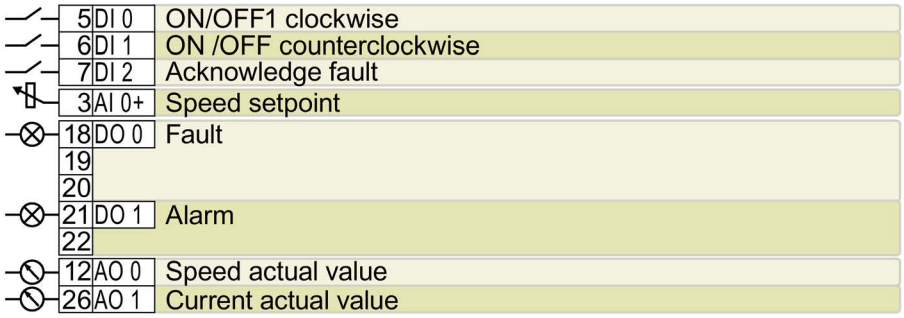


DO 0: p0730, DO 1: p0731 AO 0: p0771[0], AO 1: p0771[1] DI 0: r0722.0, …, DI 2: r0722.2 AI 0: r0755[0]

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

Designation in BOP-2: 2-wIrE 1

Default setting 18: "2-wire (forward/backward 2)"

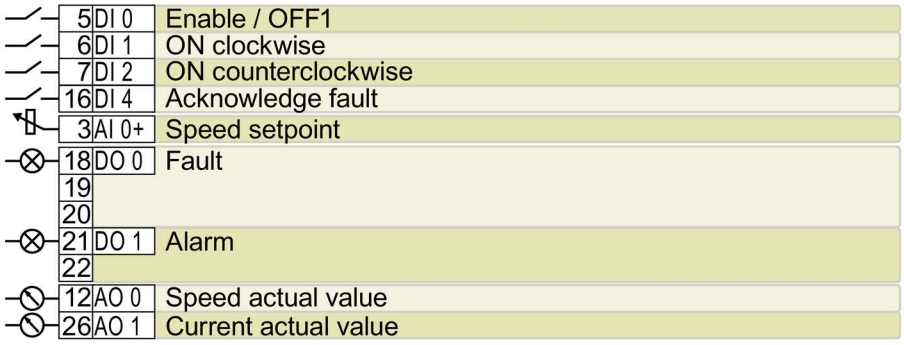


DO 0: p0730, DO 1: p0731 AO 0: p0771[0], AO 1: p0771[1] DI 0: r0722.0, …, DI 2: r0722.2 AI 0: r0755[0]

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

Designation in BOP-2: 2-wIrE 2

Default setting 19: "3-wire (enable/forward/backward)"

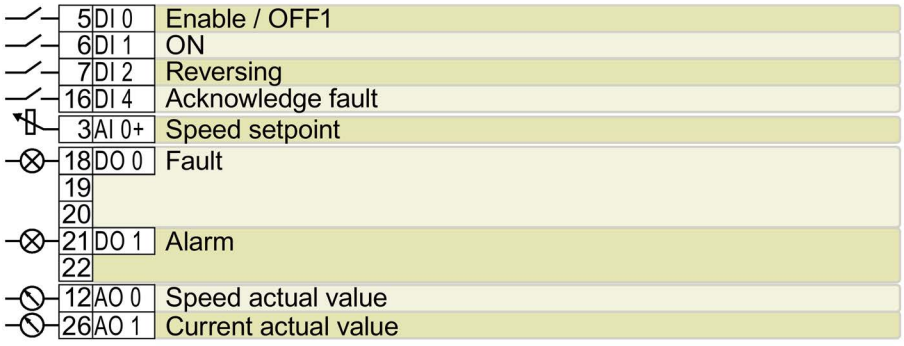


DO 0: p0730, DO 1: p0731 AO 0: p0771[0], AO 1: p0771[1] DI 0: r0722.0, …, DI 4: r0722.4 AI 0: r0755[0]

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

Designation in BOP-2: 3-wIrE 1

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

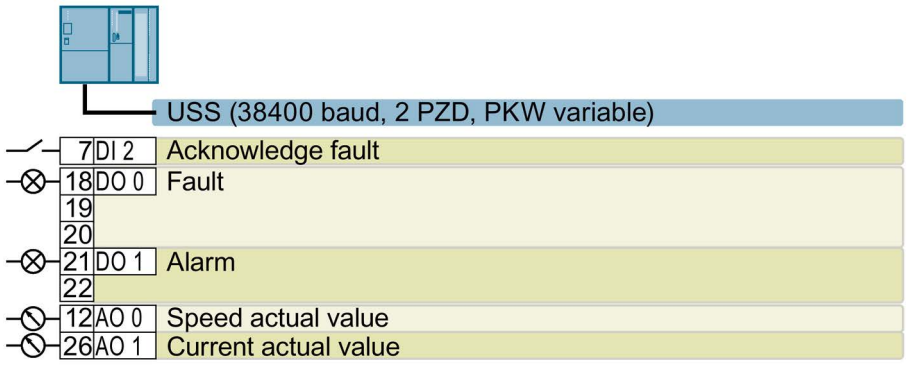


DO 0: p0730, DO 1: p0731 AO 0: p0771[0], AO 1: p0771[1] DI 0: r0722.0, …, DI 4: r0722.4 AI 0: r0755[0]

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

Designation in BOP-2: 3-wIrE 2

Default setting 21: "USS fieldbus"

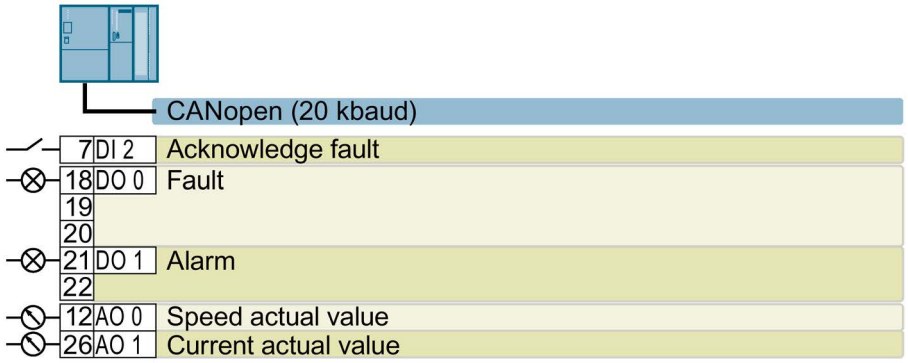


DO 0: p0730, DO 1: p0731 AO 0: p0771[0], AO 1: p0771[1] DI 2: r0722.2

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

Designation in BOP-2: FB USS

Default setting 22: "CAN fieldbus"

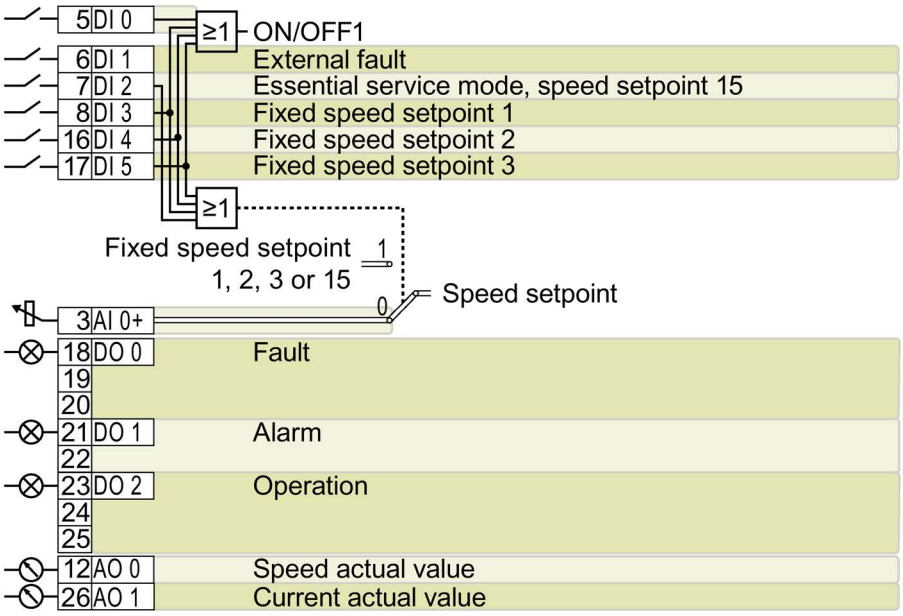


DO 0: p0730, DO 1: p0731 AO 0: p0771[0], AO 1: p0771[1] DI 2: r0722.2

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

Designation in BOP-2: FB CAN

Default setting 101: "Universal application"



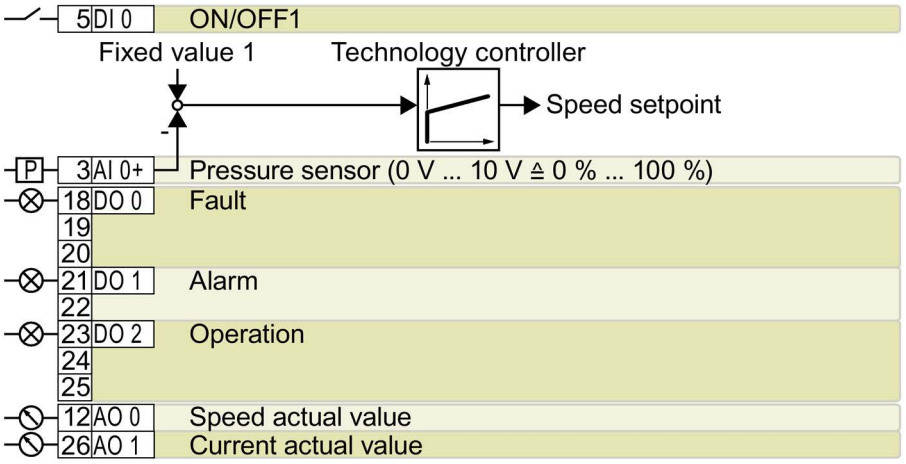
DO 0: p0730, …, AO 0: p0771[0], AO 1: p0771[1] DI 0: r0722.0, …, DI 5: r0722.5 AI 0: r0755[0]
DO 2: p0732

Additional settings:

- Fixed speed setpoint 1: p1001 = 800 rpm
- Fixed speed setpoint 2: p1002 = 1000 rpm
- Fixed speed setpoint 3: p1003 = 1200 rpm
- If several of the DI 3 ... DI 5 = high, the inverter adds the corresponding fixed speeds.
- Fixed speed setpoint 15 for essential service mode (ESM): p1015 = 1500 rpm
- "Flying restart" is enabled: p1200 = 1
- Automatic restart is active. After a power failure, the inverter automatically acknowledges possible faults and switches on the motor: p1210 = 26

Designation in BOP-2: P_F 6PA

Default setting 103: "Pump pressure control"



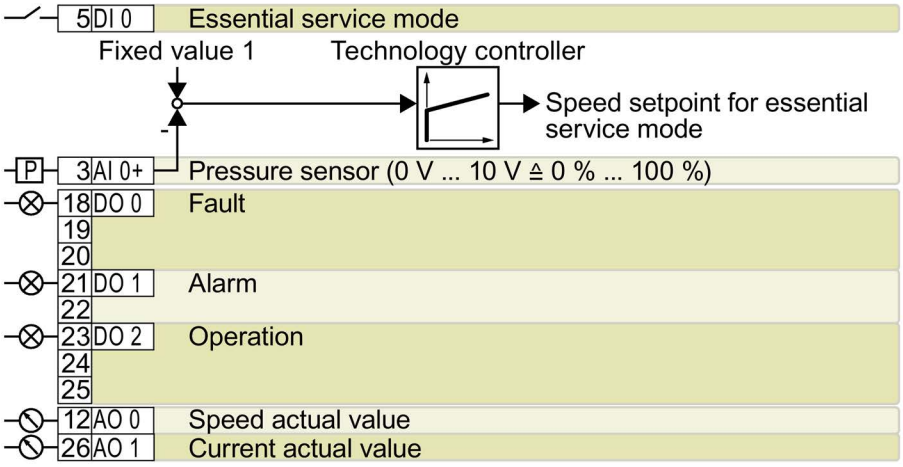
DO 0: p0730, …, DO 2: p0732 AO 0: p0771[0], AO 1: p0771[1] DI 0: r0722.0 AI 0: r0755[0]

Additional settings:

- Differential pressure control using the technology controller
- Technological unit: p0595 = 1 (%), reference variable: p0596 = 1
- Default setting of the technology controller:
  - Enable: p2200 = 1
  - Fixed value 1: p2201 = 50 %
  - Ramp-up/down time for setpoint: p2257 = p2258 = 30 s
  - Ramp-up/down time for controller output: p2293 = 30 s
  - Upper and lower limits, actual value: p2267 = 120 %, p2268 = -10 %
  - Actual value filter time constant: p2265 = 10 s
  - Proportional gain K_P, integral time T_I, differentiation time constant T_D: p2280 (K_P) = 1, p2285 (T_I) = 30 s, p2274 (T_D) = 0 s
- "Flying restart" is enabled: p1200 = 1
- Automatic restart is active. After a power failure, the inverter automatically acknowledges possible faults and switches on the motor: p1210 = 26

Designation in BOP-2: P_F dPc

Default setting 104: "ESM stairwell pressure control"



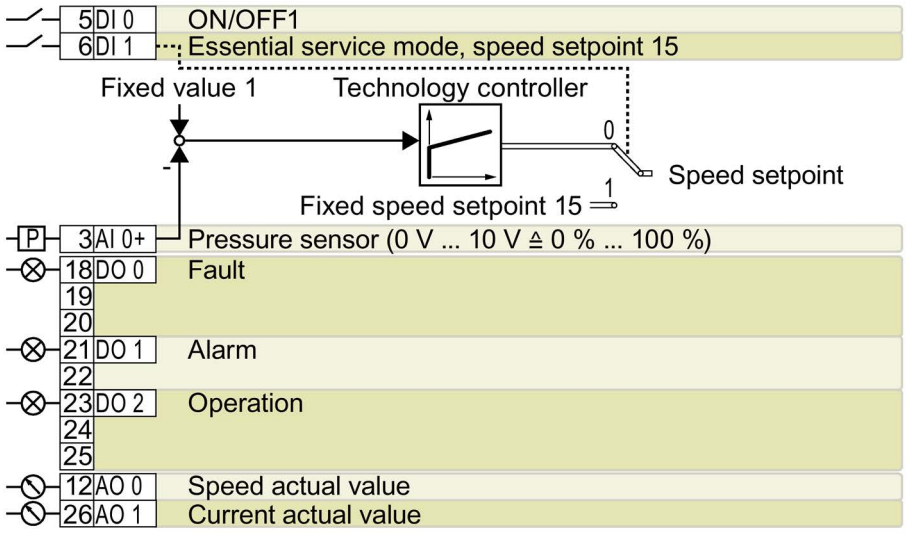
DO 0: p0730, …, DO 2: p0732 AO 0: p0771[0], AO 1: p0771[1] DI 0: r0722.0 AI 0: r0755[0]

Additional settings:

- Pressure control using the technology controller
- Analog inputs smoothing time constant: p0753 = 500 ms
- Technological unit: p0595 = 1 (%), reference variable: p0596 = 1
- Default setting of the technology controller:
  - Enable: p2200 = 1
  - Fixed value 1: p2201 = 40 %
  - Ramp-up/down time for setpoint: p2257 = p2258 = 30 s
  - Ramp-up/down time for controller output: p2293 = 30 s
  - Upper and lower limits, actual value: p2267 = 120 %, p2268 = -10 %
  - Actual value filter time constant: p2265 = 10 s
  - Proportional gain K_P, integral time T_I, differentiation time constant T_D: p2280 (K_P) = 1.2, p2285 (T_I) = 25 s, p2274 (T_D) = 0 s
  - Technology controller minimum limiting p2292 = 30 %
  - Technology controller output signal start value p2302 = 35 %
- "Flying restart" is enabled: p1200 = 1
- Automatic restart is active. After a power failure, the inverter automatically acknowledges possible faults and switches on the motor: p1210 = 26

Designation in BOP-2: P_F Stw

Default setting 105: "Fan pressure control + ESM with fixed setpoint"



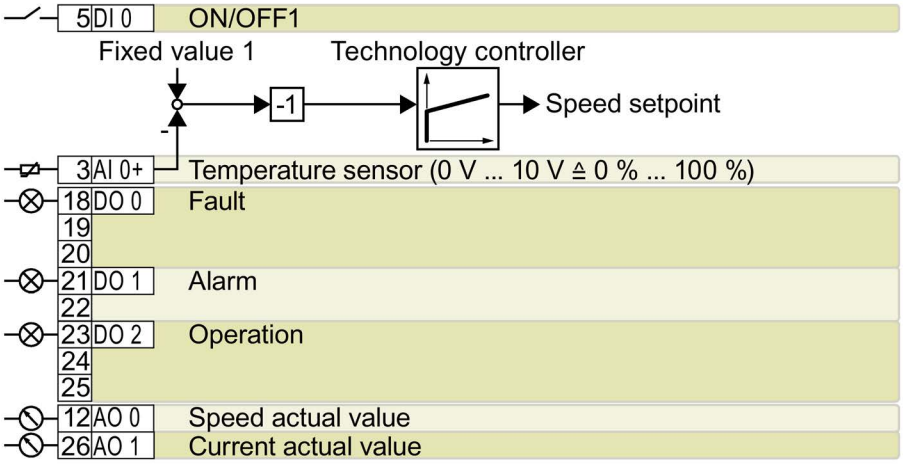
DO 0: p0730, …, AO 0: p0771[0], AO 1: p0771[1] DI 0: r0722.0, DI 1: r0722.1 AI 0: r0755[0]
DO 2: p0732

Additional settings:

- Pressure control using the technology controller
- Analog inputs smoothing time constant: p0753 = 500 ms
- Technological unit: p0595 = 1 (%), reference variable: p0596 = 1
- Fixed speed setpoint 15 for essential service mode (ESM): p1015 = 1350 rpm
- Default setting of the technology controller:
  - Enable: p2200 = 1
  - Fixed value 1: p2201 = 40 %
  - Ramp-up/down time for setpoint: p2257 = p2258 = 30 s
  - Ramp-up/down time for controller output: p2293 = 30 s
  - Upper and lower limits, actual value: p2267 = 120 %, p2268 = -10 %
  - Actual value filter time constant: p2265 = 10 s
  - Proportional gain K_P, integral time T_I, differentiation time constant T_D: p2280 (K_P) = 1.1, p2285 (T_I) = 35 s, p2274 (T_D) = 0 s
  - Technology controller minimum limiting p2292 = 20 %
  - Technology controller output signal start value p2302 = 50 %
- "Flying restart" is enabled: p1200 = 1
- Automatic restart is active. After a power failure, the inverter automatically acknowledges possible faults and switches on the motor: p1210 = 26

Designation in BOP-2: P_F Pc5

Default setting 106: "Cooling tower with active sensor + hibernation"



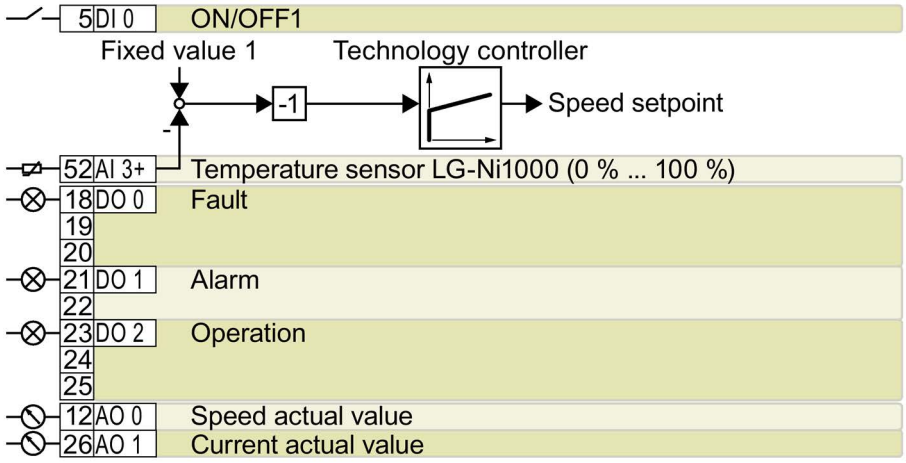
DO 0: p0730, …, DO 2: p0732 AO 0: p0771[0], AO 1: p0771[1] DI 0: r0722.0 AI 0: r0755[0]

Additional settings:

- Temperature control using the technology controller
- Analog inputs smoothing time constant: p0753 = 100 ms
- Technological unit: p0595 = 1 (%), reference variable: p0596 = 1
- Default setting of the technology controller:
  - Enable: p2200 = 1
  - Fixed value 1: p2201 = 26 %
  - Ramp-up/down time for setpoint: p2257 = p2258 = 30 s
  - Ramp-up/down time for controller output: p2293 = 30 s
  - Upper and lower limits, actual value: p2267 = 120 %, p2268 = -10 %
  - Actual value filter time constant: p2265 = 10 s
  - Proportional gain K_P, integral time T_I, differentiation time constant T_D: p2280 (K_P) = 1.2, p2285 (T_I) = 25 s, p2274 (T_D) = 0 s
  - Technology controller system deviation inversion: p2306 = 1
- Default setting hibernation mode:
  - Activated: p2398 = 1
  - Start speed: p2390 = 50 rpm
  - Delay time: p2391 = 60 s
  - Restart value with technology controller: p2392 = 1 %
  - Restart speed relative w/o technology controller: p2393 = 100 rpm
- "Flying restart" is enabled: p1200 = 1
- Automatic restart is active. After a power failure, the inverter automatically acknowledges possible faults and switches on the motor: p1210 = 26

Designation in BOP-2: P_F ctF1

Default setting 107: "Cooling tower with LG-Ni1000 sensor + hibernation"



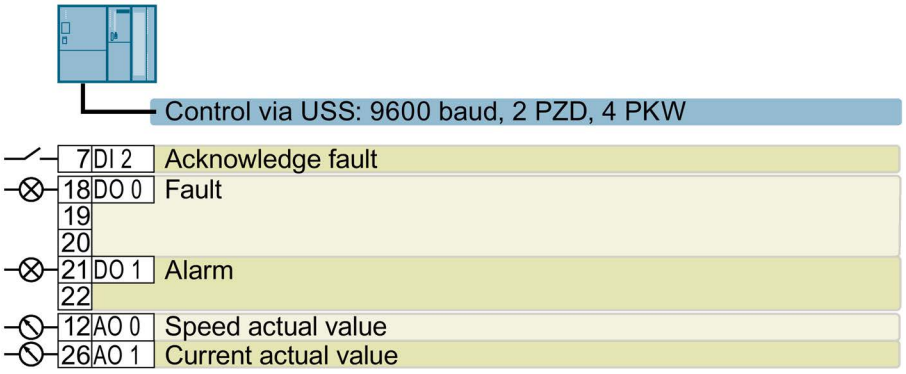
DO 0: p0730, …, DO 2: p0732 AO 0: p0771[0], AO 1: p0771[1] DI 0: r0722.0 AI 3: r0755[3]

Additional settings:

- Temperature control using the technology controller
- Analog inputs smoothing time constant: p0753 = 100 ms
- Technological unit: p0595 = 1 (%), reference variable: p0596 = 1
- Default setting of the technology controller:
  - Enable: p2200 = 1
  - Fixed value 1: p2201 = 26 %
  - Ramp-up/down time for setpoint: p2257 = p2258 = 30 s
  - Ramp-up/down time for controller output: p2293 = 30 s
  - Upper and lower limits, actual value: p2267 = 120 %, p2268 = -100 %
  - Actual value filter time constant: p2265 = 10 s
  - Proportional gain K_P, integral time T_I, differentiation time constant T_D: p2280 (K_P) = 1.2, p2285 (T_I) = 25 s, p2274 (T_D) = 0 s
  - Technology controller minimum limiting p2292 = 20 %
  - Technology controller system deviation inversion: p2306 = 1
- Default setting hibernation mode:
  - Activated: p2398 = 1
  - Start speed: p2390 = 50 rpm
  - Delay time: p2391 = 60 s
  - Restart value with technology controller: p2392 = 1 %
  - Restart speed relative w/o technology controller: p2393 = 100 rpm
- "Flying restart" is enabled: p1200 = 1
- Automatic restart is active. After a power failure, the inverter automatically acknowledges possible faults and switches on the motor: p1210 = 26

Designation in BOP-2: P_F ctF2

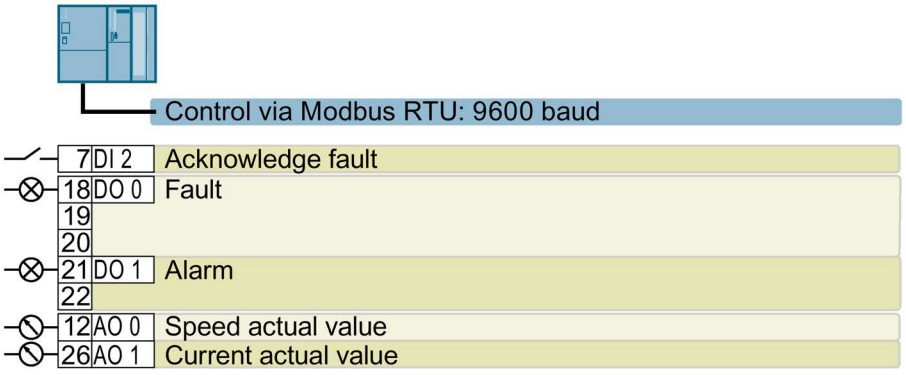
Default setting 108: "USS fieldbus"



DO 0: p0730, …, DO 2: p0732 AO 0: p0771[0], AO 1: p0771[1] DI 2: r0722.2

Designation in BOP-2: P_F USS

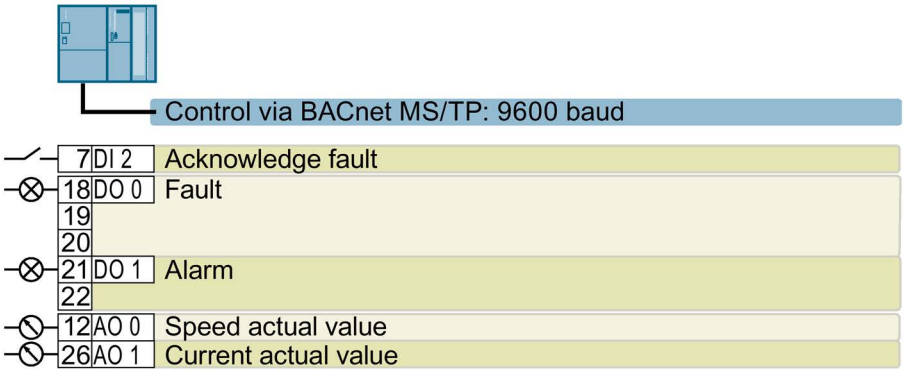
Default setting 109: "Modbus RTU field"



DO 0: p0730, …, DO 2: p0732 AO 0: p0771[0], AO 1: p0771[1] DI 2: r0722.2

Designation in BOP-2: P_F Mod

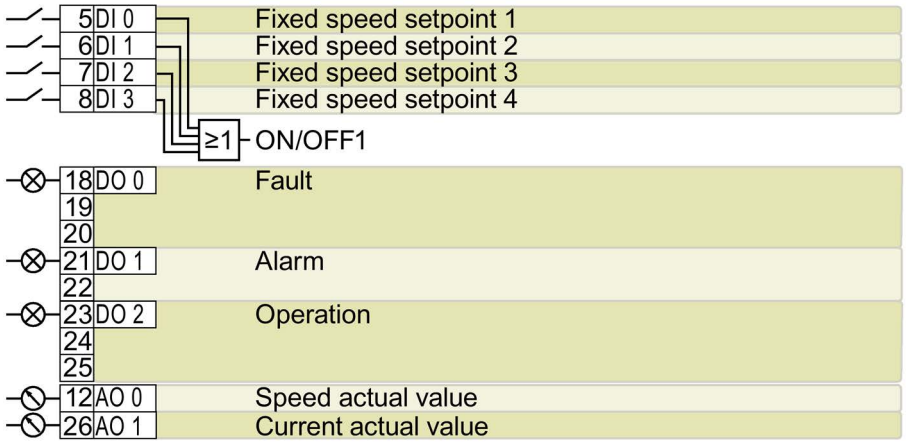
Default setting 110: "BACnet MS/TP fieldbus"



DO 0: p0730, …, DO 2: p0732 AO 0: p0771[0], AO 1: p0771[1] DI 2: r0722.2

Designation in BOP-2: P_F bAc

Default setting 111: "Fixed setpoints"



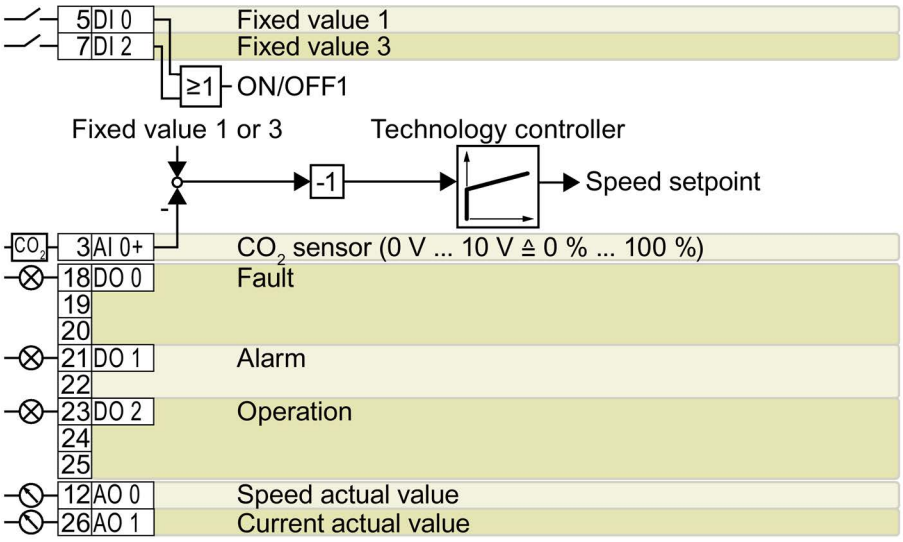
DO 0: p0730, …, DO 2: p0732 AO 0: p0771[0], AO 1: p0771[1] DI 0: r0722.0, …, DI 3: r0722.3

Additional settings:

- Fixed speed setpoint 1: p1001 = 300 rpm
- Fixed speed setpoint 2: p1002 = 600 rpm
- Fixed speed setpoint 3: p1003 = 900 rpm
- Fixed speed setpoint 4: p1004 = 1200 rpm
- If several of the DI 0 ... DI 3 = high, the inverter adds the corresponding fixed speeds.
- "Flying restart" is enabled: p1200 = 1
- Automatic restart is active. After a power failure, the inverter automatically acknowledges possible faults and switches on the motor: p1210 = 26

Designation in BOP-2: P_F _F55

Default setting 112: "CO2 sensor, 2 PID setpoints"



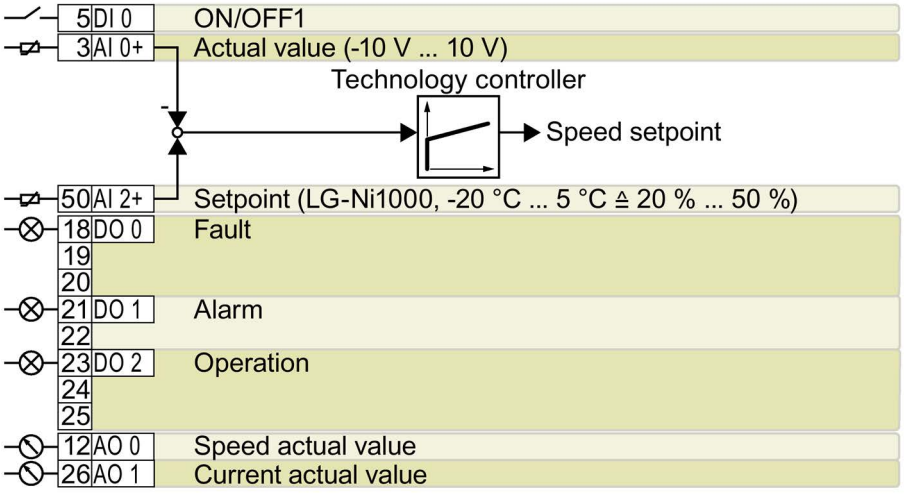
DO 0: p0730, …, AO 0: p0771[0], AO 1: p0771[1] DI 0: r0722.0, DI 2: r0722.2 AI 0: r0755[0]
DO 2: p0732

Additional settings:

- CO_2 control using the technology controller
- Analog inputs smoothing time constant: p0753 = 500 ms
- Technological unit: p0595 = 1 (%), reference variable: p0596 = 1
- Default setting of the technology controller:
  - Enable: p2200 = 1
  - Fixed value 1: p2201 = 50 %
  - Fixed value 3: p2203 = 10 %
  - Technology controller setpoint 1: p2253 = r2224 (active fixed value)
  - Ramp-up/down time for setpoint: p2257 = p2258 = 30 s
  - Upper and lower limits, actual value: p2267 = 120 %, p2268 = -10 %
  - Actual value filter time constant: p2265 = 10 s
  - Technology controller system deviation inversion: p2306 = 1
- "Flying restart" is enabled: p1200 = 1
- Automatic restart is active. After a power failure, the inverter automatically acknowledges possible faults and switches on the motor: p1210 = 26

Designation in BOP-2: P_F_CO2

Default setting 113: "Temperature-dependent pressure setpoint"



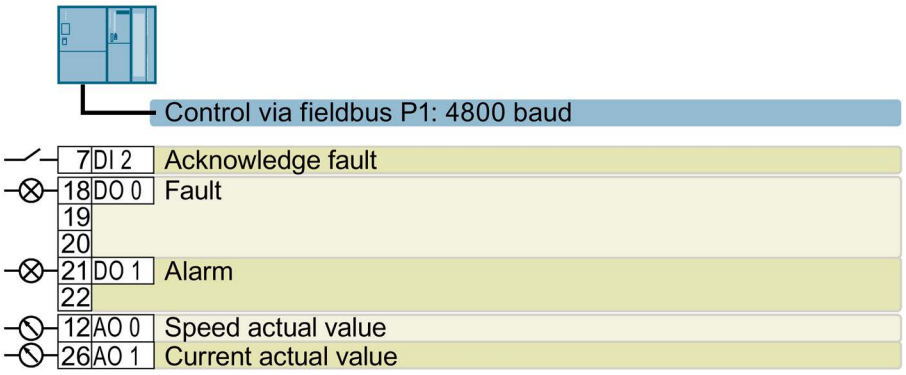
DO 0: p0730, …, AO 0: p0771[0], AO 1: p0771[1] DI 0: r0722.0 AI 0: r0755[0], AI 2: r0755[2]
DO 2: p0732

Additional settings:

- Temperature control using the technology controller
- Technological unit: p0595 = 1 (%), reference variable: p0596 = 1
- Default setting of the technology controller:
  - Enable: p2200 = 1
  - Upper and lower limits, setpoint: p20229 = 0.5 , p20230 = 0.2
  - Ramp-up/down time for setpoint: p2257 = p2258 = 30 s
  - Ramp-up/down time for controller output: p2293 = 30 s
  - Upper and lower limits, actual value: p2267 = 120 %, p2268 = -10 %
  - Actual value filter time constant: p2265 = 10 s
  - Technology controller minimum limiting p2292 = 20 %
- "Flying restart" is enabled: p1200 = 1
- Automatic restart is active. After a power failure, the inverter automatically acknowledges possible faults and switches on the motor: p1210 = 26

Designation in BOP-2: P_F_tP5

Default setting 114: "P1 fieldbus"



DO 0: p0730, …, DO 2: p0732 AO 0: p0771[0], AO 1: p0771[1] DI 2: r0722.2

Designation in BOP-2: p_f_P1

Default setting 120: "PID settings for pumps and fans"

The default setting restores the function of the terminal strip to the factory setting.

Technology controller setting:

- Ramp-up/down time for setpoint: p2257 = p2258 = 30 s
- Ramp-up/down time for controller output: p2293 = 30 s
- Actual value upper limit: p2267 = 120%
- Actual value filter time constant: p2265 = 10 s

Designation in BOP-2: P_F_PID

Commissioning

4

4.1 Tools to commission the converter

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 on to the Control Unit or as handheld with a connection cable to the Control Unit. 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

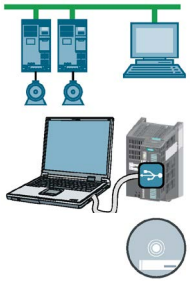
Additional information about the compatibility of the IOP and Control Units is available in the Internet:

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

The BOP-2 is an operator panel for snapping on to the Control Unit. The BOP-2 has a two-line display for operation and diagnostics of the inverter.

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

Overview of the manals (Page 49)



STARTER and Startdrive 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

DVD article number

STARTER: 6SL3072-0AA00-0AG0

Startdrive: 6SL3072-4CA02-1XG0

System requirements and download:

STARTER (http://support.automation.siemens.com/WW/view/en/26233208)

Startdrive (http://support.automation.siemens.com/WW/view/en/68034568)

Help regarding operation:

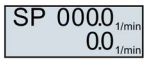
STARTER videos (http://www.automation.siemens.com/mcms/mc-drives/en/low-voltage-inverter/sinamics-g120/videos/Pages/videos.aspx)

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

4.2 Commissioning with BOP-2 operator panel

4.2.1 Starting quick commissioning

Preconditions

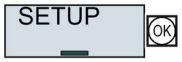


- The power supply is switched on.
- The operator panel displays setpoints and actual values.

Procedure

Proceed as follows to carry out quick commissioning:

1. 

Press the ESC key.
2. 
Press one of the arrow keys until the BOP-2 displays the "SETUP" menu.
3. 

In the "SETUP" menu, press the OK key to start quick commissioning.
4. 

If you wish to restore all of the parameters to the factory setting before the quick commissioning:
   4.1. Switchover the display using an arrow key: nO → YES
   4.2. Press the OK key.
5. 

You must select the application class if you are not using a PM230 Power Module, but instead a PM240, PM240-2 or PM330 Power Module. The next steps after having selected an application class are described in the operating instructions.

 Overview of the manuals (Page 49)

6. 

Motor standard

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

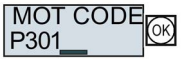
7. 

Supply voltage for the inverter
8. Enter the motor data:
   8.1. 

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

8.2. 

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.

8.3. 

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).

8.4. 

Rated voltage

8.5. 

Rated current

8.6. 

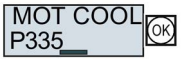
Rated power

8.7. 

Rated frequency

8.8. 

Rated speed

8.9. 

Motor cooling

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

9. Application and control mode

9.1. 

Select the application:

VEC STD	In all applications, which do not fit the other setting options.
PUMP FAN	Applications involving pumps and fans
SLVC 0HZ	Applications with short ramp-up and ramp-down times. However, this setting is not suitable for hoisting gear and cranes/lifting gear.
PUMP 0HZ	Setting only for steady-state operation with slow speed changes. We recommend setting VEC STD if load surges in operation cannot be ruled out.

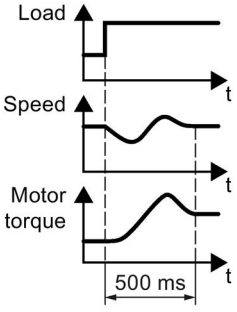
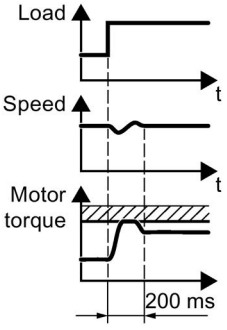
The selection option depends on the Power Module being used. There is no selection option for PM230 Power Modules.

9.2. 

Select the control mode:

VF LIN	U/f control with linear characteristic
VF LIN F	Flux current control (FCC)
VF QUAD	U/f control with square law characteristic
SPD N EN	Vector control without encoder

Selecting the suitable control mode

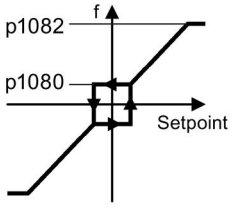
Control mode	U/f control or flux current control (FCC)	Vector control
Motors that can be operated	Induction motors	Induction, synchronous and reluctance motors
Power Modules that can be operated	No restrictions	
Application examples	• Pumps, fans, and compressors with flow characteristic	• Pumps and compressors with displacement machines
Closed-loop control characteristics	• Typical correction time after a speed change: 100 ms … 200 ms • Typical correction time after a load surge: 500 ms • The control mode is suitable to address the following requirements: – Motor power ratings < 45 kW – Ramp-up time 0 → Rated speed (dependent on the rated motor power): 1 s (0.1 kW) … 10 s (45 kW) – Applications with increasing load torque without load surges • The control mode is insensitive with respect to inaccurate motor data settings 	• Typical correction time after a speed change: < 100 ms • Typical correction time after a load surge: 200 ms • The vector control controls and limits the motor torque • Torque accuracy that can be achieved: ± 5 % for 15 % … 100 % of the rated speed  • We recommend vector control for the following applications: – Motor power ratings > 11 kW – For load surges 10 % … >100 % of the rated motor torque • The vector control is necessary for a ramp-up time 0 → Rated speed (dependent on the rated motor power): < 1 s (0.1 kW) … < 10 s (250 kW).
Max. output frequency	550 Hz	240 Hz
Torque control	Without torque control	Torque control with higher-level speed control
Commissioning	• Contrary to vector control, no speed controller has to be set	

10. MAc PAr P15 OK — Select the default setting for the interfaces of the inverter that is suitable for your application.

    Preassignment of the interfaces (Page 16)

11. MIN HZ P1080 OK — Minimum and maximum motor speed

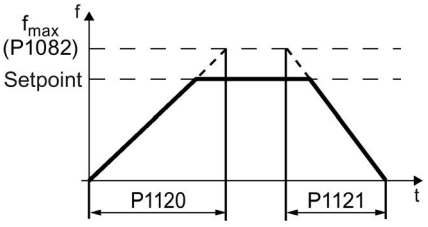
12. MAX HZ P1082 OK



13. AI SCALE P758 OK — Scaling of analog input 0

14. RAMP UP P1120 OK — Motor ramp-up time

15. RAMP DWN P1121 OK — Motor ramp-down time



16. OFF3 RP P1135 OK — Ramp-down time for the OFF3 command

17. MOT ID P1900 OK — 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 one of the following cases is applicable:

    - You have selected the control mode "SPD N EN". However, the motor cannot rotate freely – for example, if the traversing range is mechanically limited.
    - You have selected U/f control as control mode, e.g. "VF LIN" or "VF QUAD".

    ROT — Measuring the motor data while it is rotating. The inverter switches off the motor after the motor data identification has been completed.

18. FINISH OK — Complete quick commissioning:

    18.1. Switchover the display using an arrow key: nO → YES

    18.2. Press the OK key.

You have completed quick commissioning.

4.2.2 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

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.

4.3 Connecting the inverter to the fieldbus

Where can I find instructions for the fieldbus connection of the inverter?

Instructions for connecting to a fieldbus can be downloaded from the Internet:

- Application examples (http://support.automation.siemens.com/WW/view/en/60733299)
- Operating Instructions: CU230P-2 operating instructions (https://support.industry.siemens.com/cs/ww/en/view/109478827)
- "Fieldbuses" function manual: Manuals for the Control Unit (http://support.automation.siemens.com/WW/view/en/30563628/133300)

Description files for fieldbuses

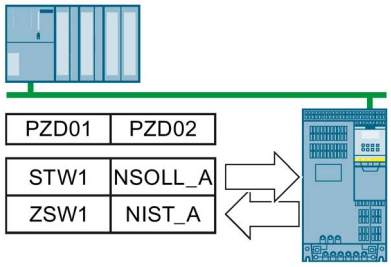
The description files are electronic device data sheets which contain all the required information of a higher-level controller. You can configure and operate the inverter on a fieldbus with the appropriate description file.

Description file	Download	Alternative to download
Generic Station Description (GSD) for PROFIBUS	GSD (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 memory card once you insert this card in the inverter and set p0804 = 12. You can then transfer the file to your programming device or PC using the memory card.
GSD Markup Language (GSDML) for PROFINET	GSDML (http://support.automation.siemens.com/WW/view/en/26641490)	
EDS for Ethernet/IP	EDS (http://support.automation.siemens.com/WW/view/en/78026217)	---
PICS for BACnet MS/TP	PICS (http://www.big-eu.org/uploads/tx_teproddb/catalog_pdf/PICS_CU230P-2_HVAC_v46_HF.docx)	---

4.3.1 PROFINET and PROFIBUS

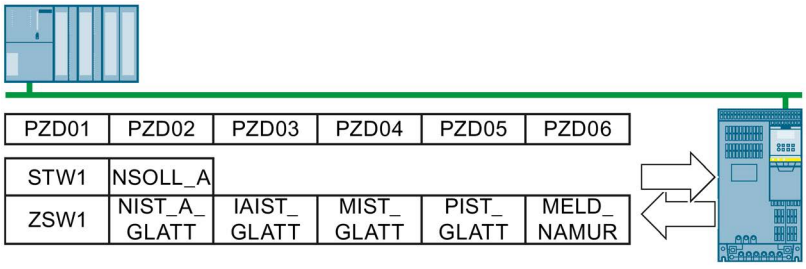
Examples for telegrams via PROFIBUS and PROFINET

Telegram 1:



STW1	Control word 1
ZSW1	Status word 1
PZD01/02	Process data 16-bit
NSOLL_A	Speed setpoint
NIST_A	Speed actual value

Telegram 20:



STW1	Control word 1	IAIST_GLATT	Smoothed current actual value
ZSW1	Status word 1	MIST_GLATT	Smoothed torque
PZD01/02	Process data 16-bit	PIST_GLATT	Smoothed active power
NSOLL_A	Speed setpoint	MELD_NAMUR	Control word according to the VIK-NAMUR definition
NIST_A_GLATT	Smoothed actual speed value		

Control word 1 (STW1), PZD receive word 1 (word: r2050[0], bits: r2090.00 … r2090.15)

Bit	Meaning	Explanation
0	0 = OFF1	The motor brakes with the ramp-down time p1121 of the ramp-function generator. The inverter switches off the motor at standstill.
	0 → 1 = ON	The inverter goes into the "ready" state. If, in addition bit 3 = 1, then the inverter switches on the motor.
1	0 = OFF2	Switch off the motor immediately, the motor then coasts down to a standstill.
	1 = No OFF2	Precondition in order to be able to switch on the motor using bit 0 (ON command).
2	0 = Quick stop (OFF3)	The motor brakes with the OFF3 ramp-down time p1135 down to standstill.
	1 = No quick stop (OFF3)	Precondition in order to be able to switch on the motor using bit 0 (ON command).
3	0 = Inhibit operation	Switch off the motor immediately → motor coasts down to a standstill.
	1 = Enable operation	Precondition in order to be able to switch on the motor using bit 0 (ON command).
4	0 = Disable RFG	The inverter immediately sets its ramp-function generator output to 0.
	1 = Do not disable RFG	The ramp-function generator can be enabled.
5	0 = Stop RFG	The output of the ramp-function generator stops at the actual value.
	1 = Enable RFG	The output of the ramp-function generator follows the setpoint.

Bit	Meaning	Explanation
6	0 = Inhibit setpoint	The inverter brakes the motor with the ramp-down time p1121 of the ramp-function generator.
	1 = Enable setpoint	Motor accelerates with the ramp-up time p1120 to the setpoint.
7	0 → 1 = Acknowledge faults	Acknowledge fault. If the ON command is still active (bit 0 = 1), the inverter switches to "closing lockout" state.
8, 9	Reserved	
10	0 = No control via PLC	The inverter ignores the process data from the fieldbus.
	1 = Control via PLC	Control via fieldbus, the inverter accepts the process data from the fieldbus.
11	1 = Direction reversal	Invert setpoint in the inverter.
12	Not used	
13	1 = MOP up	Increase the setpoint saved in the motorized potentiometer.
14	1 = MOP down	Reduce the setpoint saved in the motorized potentiometer.
15	Reserved	Changes over between settings for different operation interfaces (command data sets).

Status word 1 (ZSW1), PZD send word 1 (word: p2051[0], bits: p2080[0] … p2080[15])

Bit	Meaning	Comments
0	1 = Ready to start	Power supply switched on; electronics initialized; pulses locked.
1	1 = Ready	Motor is switched on (ON/OFF1 = 1), no fault is active. With the command "Enable operation" (STW1.3), the inverter switches on the motor.
2	1 = Operation enabled	Motor follows setpoint. See control word 1, bit 3.
3	1 = Fault active	The inverter has a fault. Acknowledge fault using STW1.7.
4	1 = OFF2 inactive	Coast down to standstill is not active.
5	1 = OFF3 inactive	Quick stop is not active.
6	1 = Closing lockout active	It is only possible to switch on the motor after an OFF1 followed by ON.
7	1 = Alarm active	Motor remains switched on; no acknowledgement is necessary.
8	1 = Speed deviation within the tolerance range	Setpoint / actual value deviation within the tolerance range.
9	1 = Master control requested	The automation system is requested to accept the inverter control.
10	1 = Comparison speed reached or exceeded	Speed is greater than or equal to the corresponding maximum speed.
11	1 = torque limit reached	Comparison value for current or torque has been reached or exceeded.
12	1 = Holding brake open	Signal to open and close a motor holding brake.
13	0 = Alarm, motor overtemperature	--
14	1 = Motor rotates clockwise	Internal inverter actual value > 0
	0 = Motor rotates counterclockwise	Internal inverter actual value < 0
15	0 = Alarm, inverter thermal overload	

Fault word according to the VIK-NAMUR definition (MELD_NAMUR), PZD send word 16 (word: p2051[5], bits: r3113.00 … r3113.15)

Bit	Meaning
0	0 = Control Unit has a no fault
	1 = Control Unit fault
1	1 = line fault: Phase failure or inadmissible voltage
2	1 = DC link overvoltage
3	1 = Power Module fault, e.g. overcurrent or overtemperature
4	1 = inverter overtemperature
5	1 = ground fault/phase fault in the motor cable or in the motor
6	1 = motor overload
7	1 = communication error to the higher-level control
8	1 = error in a safe monitoring channel
10	1 = internal communication error in the inverter
11	1 = line fault
15	1 = other fault

4.3.2 Modbus RTU

Settings for Modbus RTU

Parameter	Explanation		
p0015 = 109	**Macro drive unit** Set communication via Modbus RTU  Preassignment of the interfaces (Page 16)		
p2020	**Fieldbus interface baud rate** p0015 = 109 sets p2020 = 6	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** Valid USS addresses: 1 … 247. The parameter is only active if address 0 is set at the Control Unit address switch. A change only becomes active after the inverter power supply is switched off and switched on again.		
p2024	**Fieldbus interface times**	[0] Maximum permissible telegram processing time of the Modbus slave [2] dead time between two telegrams	
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 = 2	**Fieldbus interface protocol selection** p0015 = 109 sets p2013 = 2 → Modbus RTU		
p2031	**Fieldbus interface Modbus parity**	0: No parity 1: Odd parity 2: Even parity	

4.3.3 BACnet MS/TP

Settings for BACnet MS/TP

Parameter	Explanation		
p0015 = 110	**Macro drive unit** Set communication via BACnet MS/TP Preassignment of the interfaces (Page 16)		
p2020	**Fieldbus interface baud rate** p0015 = 110 sets p2020 = 6	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** Valid USS addresses: 1 … 127. The parameter is only active if address 0 is set at the Control Unit address switch. A change only becomes active after the inverter power supply is switched off and switched on again.		
p2024	**Fieldbus interface times**	[0] maximum permissible processing time (APDU timeout)	
p2025	**Fieldbus SS BACnet settings**	[0] = device object instance number [1] = info maximum number frames [2] = APDU number of retries [3] = maximum master address	
p2026	**Fieldbus interface BACnet COV increment** Change in value at which point the inverter sends and UnConfirmedCOVNotification or and ConfirmedCOVNotification.		
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 = 5	**Fieldbus interface protocol selection** p0015 = 110 sets p2013 = 5 → BACnet MS/TP		

Control word

Parameter			BACNet	Meaning	
r2090	.00	p0840	BV20	ON/OFF1	Switch on motor
	.01	p0844	BV27	No OFF2	Precondition in order to be able to switch on the motor (ON command).
	.02	p0848	BV28	No quick stop (OFF3)	
	.03	p0852	BV26	Enable operation	
	.04	p1140	BV26	Do not disable RFG	The ramp-function generator can be enabled
	.05	p1141	BV26	Enable RFG	The output of the ramp-function generator follows the setpoint
	.06	p1142	BV26	Enable setpoint	Motor accelerates with the ramp-up time p1120 to the setpoint
	.07	p2103	BV22	Acknowledge faults	
	.08 , .09	---	N/A	Reserved	
	.10	p0854	BV93	Master control by PLC	Control via fieldbus, the inverter accepts the process data from the fieldbus
	.11	p1113	BV21	Direction reversal	Invert setpoint in the inverter
	.12	---	N/A	Reserved	
	.13	p1035	N/A	MOP raise	Increase the setpoint saved in the motorized potentiometer
	.14	p1036	N/A	MOP lower	Reduce the setpoint saved in the motorized potentiometer
	.15	---	N/A	Reserved	

4.4 Frequently required parameters

Parameter		Explanation				
p0015		**Macro drive unit** Set defaults for inputs and outputs via a macro.				
r0018		**Control Unit firmware version**				
p0096		**Application class**	0: Expert 1: Standard Drive Control 2: Dynamic Drive Control			
p0100		**IEC/NEMA mot stds**	0: Europe 50 [Hz] 1: NEMA motor (60 Hz, US units) 2: NEMA motor (60 Hz, SI units)			
p0304		**Rated motor voltage** [V]				
p0305		**Rated motor current** [A]				
p0307		**Rated motor power** [kW] or [hp]				
p0310		**Rated motor frequency** [Hz]				
p0311		**Rated motor speed** [rpm]				
p0601		**Motor temperature sensor type**				
		Terminal 14	T1 motor (+)	0: No sensor (factory setting) 1: PTC (→ P0604)	2: KTY84 (→ P0604) 4: Bimetal	
		Terminal 15	T2 motor (-)			
p0625		**Motor ambient temperature during commissioning** [° C]				
p0640		**Current limit** [A]				
r0722		**Digital inputs status**				
	.0	Terminal 5	DI 0	Selection of the possible settings:		
	.1	Terminal 6	DI 1	p0840 ON/OFF (OFF1) p0844 no coast down (OFF2) p0848 no quick stop (OFF3) p0855 unconditionally release holding brake p1020 fixed speed setpoint selection bit 0 p1021 fixed speed setpoint selection bit 1 p1022 fixed speed setpoint selection bit 2 p1023 fixed speed setpoint selection bit 3 p1035 motorized potentiometer raise setpoint p1036 motorized potentiometer lower setpoint p2103 acknowledge faults p1055 jog bit 0 p1056 jog bit 1	p1110 inhibit negative direction p1111 inhibit positive direction p1113 setpoint inversion p1122 bypass ramp-function generator p1140 enable/inhibit ramp-function generator p1141 continue/freeze ramp-function generator p1142 enable/inhibit setpoint p1230 DC braking activation p2103 acknowledge faults p2106 external fault 1 p2112 external alarm 1 p2200 technology controller enable
	.2	Terminal 7	DI 2			
	.3	Terminal 8	DI 3			
	.4	Terminal 16	DI 4			
	.5	Terminal 17	DI 5			
	.11	Terminal 3, 4	AI 0			
	.12	Terminal 10, 11	AI 1			
p0730		**Signal source for terminal DO 0**	Selection of the possible settings:			
		Terminals 19, 20 (NO contact) Terminals 18, 20 (NC contact)	52.0 ready for switching on 52.1 ready for operation 52.2 operation enabled 52.3 fault present 52.4 coast down active (OFF2) 52.5 quick stop active (OFF3) 52.7 alarm present 52.14 motor rotates forwards	53.0 DC braking active 53.1 n_act > p2167 (n_off) 53.2 n_act ≤ p1080 (n_min) 53.3 I_act > p2170 53.4 n_act > p2155 53.5 n_act ≤ p2155 53.6 n_act ≥ n_set 53.10 technology controller output at lower limit 53.11 technology controller output at upper limit		
p0731		**Signal source for terminal DO 1**				
		Terminals 21, 22 (NO contact)				
p0732		**Signal source for terminal DO 2**				
		Terminals 24, 25 (NO contact) Terminals 23, 25 (NC contact)				

Parameter		Explanation			
r0755		**Analog inputs actual value** [%]			
	[0]	Terminals 3, 4	AI 0		
	[1]	Terminals 10, 11	AI 1		
	[2]	Terminals 50, 51	AI 2		
	[3]	Terminals 52, 53	AI 3		
p0756		**Analog input type**		0: Unipolar voltage input (0 V …+10 V) 1: Unipolar voltage input monitored (+2 V... +10 V) 2: Unipolar current input (0 mA …+20 mA) 3: Unipolar current input monitored (+4 mA …+20 mA) 4: Bipolar voltage input (-10 V …+10 V) 6: LG-Ni1000 temperature sensor 7: PT1000 temperature sensor 8: No sensor connected 10: Temperature sensor DIN Ni 1k (6180 ppm / K)	
	[0]	AI 0			
	[1]	AI 1			
	[2]	AI 2			
	[3]	AI 3			
p0771		**Analog outputs signal source**		Selection of the possible settings:	
	[0]	Terminals 12, 13	AO 0	0: Analog output locked 21: Speed actual value 24: Output frequency smoothed	25: Output voltage smoothed 26: DC-link voltage smoothed 27: Actual current value (smoothed absolute value)
	[1]	Terminals 26, 27	AO 1		
p0776		**Analog outputs, type**		0: Current output (0 mA … +20 mA) 1: Voltage output (0 V … +10 V) 2: Current output (+4 mA ... +20 mA)	
	[0]	AO 0			
	[1]	AO 1			
p0922		**PROFIdrive telegram selection**			
p1001		**Fixed speed setpoint 1**			
p1002		**Fixed speed setpoint 2**			
p1003		**Fixed speed setpoint 3**			
p1004		**Fixed speed setpoint 4**			
p1058		**Jog 1 speed setpoint**			
p1059		**Jog 2 speed setpoint**			
p1070		**Main setpoint**	Selection of the possible settings:		
			0: Main setpoint = 0 755[0]: Analog input 0 1024: Fixed setpoint	1050: Motorized potentiometer 2050[1]: PZD 2 from the fieldbus	
p1080		**Minimum speed [rpm]**			
p1082		**Maximum speed [rpm]**			
p1120		**Ramp-function generator ramp-up time [s]**			
p1121		**Ramp-function generator ramp-down time [s]**			
p1300		**Open-loop/closed-loop control operating mode**	Selection of the possible settings:		
			0: U/f control with linear characteristic 1: U/f control with linear characteristic and FCC 2: U/f control with parabolic characteristic	20: Speed control (without encoder) 22: Torque control (without encoder)	
p1310		**Starting (voltage boost) permanent**			
p1800		**Pulse frequency setpoint**			

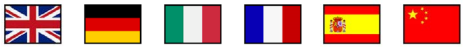
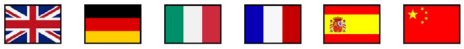
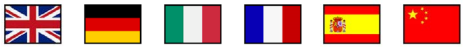
Parameter	Explanation		
p1900	**Motor data identification and rotating measurement**		
	0: Locked 1: Identify motor data and optimize the speed controller 2: Identify motor data (at standstill) 3: Optimize the speed controller (rotating in operation) 11: Ident. motor data and opt. speed controller, change to operation (not available with PM230 or PM250 Power Module) 12: Identify motor data (at standstill), change to operation (not available with PM230 or PM250 Power Module)		
p2030	**Fieldbus interface protocol selection**	The possible settings depend on the Control Unit:	
		0: No protocol 1: USS 2: Modbus RTU 3: PROFIBUS	5: BacNet 7: PROFINET 8: P1 10: EtherNet/IP
r2050	**Words received via fieldbus (16 bit)** r2050[0]: PZD01 … r2050[11]: PZD12		
p2051	**Words sent via fieldbus (16 bit)** p2051[0]: PZD01 … p2051[16]: PZD17		
p2080	**Binector-connector converter, status word 1** p2080[0]: Bit 0 … p2080[15]: Bit 15		
r2090	**PROFIdrive PZD1 receive bit-by-bit (control word 1)** r2090.00: Bit 0 … r2090.15: Bit 15		
p2200	**Technology controller enable**	1: Technology controller is enabled	
p2201 … p2215	**Technology controller fixed value 1 ... 15**		
p2220 … p2223	**Technology controller fixed value selection bit 0 ... 3**		
r2224	**Technology controller fixed value active**		
p2253	**Technology controller setpoint 1**		
p2254	**Technology controller setpoint 2**		
p2257	**Technology controller ramp-up time**		
p2258	**Technology controller ramp-down time**		
p2264	**Technology controller actual value**		
p2265	**Technology controller actual value filter time constant**		
p2267	**Technology controller upper limit actual value**		
p2268	**Technology controller lower limit actual value**		
p2271	**Technology controller actual value inversion (sensor type)**	0: No inversion 1: invert actual value signal (this should be set if the actual value decreases with increasing motor speed)	
p2274	**Technology controller differentiation time constant**		
p2280	**Technology controller proportional gain**		
p2285	**Technology controller integral time**		
p2293	**Technology controller ramp-up/ramp-down time**		

More information

5

5.1 Overview of the manuals

Manuals with additional information that can be downloaded:

- CU230P-2 Compact Operating Instructions
  (https://support.industry.siemens.com/cs/ww/en/view/109477360)
  Commissioning the inverter (this manual).
  
- CU230P-2 operating instructions
  (https://support.industry.siemens.com/cs/ww/en/view/109478827)
  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.
  
- CU230P-2 List Manual (https://support.industry.siemens.com/cs/ww/en/view/109477248)
  Parameter list, alarms and faults. Graphic function diagrams.
  
- "Fieldbus" function manual
  (https://support.industry.siemens.com/cs/ww/en/view/109477369)
  Configuring fieldbuses.
  
- 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.
  

- Power Module Installation Manual
  (https://support.industry.siemens.com/cs/ww/en/ps/13224/man)
  Installing Power Modules, reactors and filters. Technical data, maintenance.
   
- 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.
  

5.2 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)

SINAMICS G120P, CU230P-2
DOCUMENTATION PACK

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Further information

SINAMICS inverter:
www.siemens.com/sinamics

PROFINET:
www.siemens.com/profinet

Siemens AG
Digital Factory
Motion Control
Postfach 3180
91050 ERLANGEN
GERMANY

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www.siemens.com/drives