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SINAMICS

SINAMICS G120P
CU230P-2 Control Units

Compact Operating Instructions

Edition 01/2017
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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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

<table>
<thead>
<tr>
<th>WARNING</th>
<th>Danger to life if the safety instructions and residual risks are not observed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>If the safety instructions and residual risks in the associated hardware documentation are not observed, accidents involving severe injuries or death can occur.</td>
</tr>
<tr>
<td></td>
<td>- Observe the safety instructions given in the hardware documentation.</td>
</tr>
<tr>
<td></td>
<td>- Consider the residual risks for the risk evaluation.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>WARNING</th>
<th>Danger to life or malfunctions of the machine as a result of incorrect or changed parameterization</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>As a result of incorrect or changed parameterization, machines can malfunction, which in turn can lead to injuries or death.</td>
</tr>
<tr>
<td></td>
<td>- Protect the parameterization (parameter assignments) against unauthorized access.</td>
</tr>
<tr>
<td></td>
<td>- Respond to possible malfunctions by applying suitable measures (e.g. EMERGENCY STOP or EMERGENCY OFF).</td>
</tr>
</tbody>
</table>
1.2 Industrial security

Note

Industrial security

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

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

The customer is responsible for preventing unauthorized access to its plants, systems, machines and networks. Systems, machines and components should only be connected to the enterprise network or the internet if and to the extent necessary and with appropriate security measures (e.g. use of firewalls and network segmentation) in place.

Additionally, Siemens’ guidance on appropriate security measures should be taken into account. For more information about industrial security, please visit: Industrial security (http://www.siemens.com/industrialsecurity).

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

To stay informed about product updates, subscribe to the Siemens Industrial Security RSS Feed at:


⚠️ WARNING

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

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

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


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

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

- Compact Operating Instructions in German and English
- The inverter contains open-source software (OSS). OSS comprises open source text and satisfies special license terms.

The OSS license terms are saved in the inverter. You can transfer the OSS license terms to a PC using a memory card where you can read them.

Transferring OSS license terms to a PC

Procedure

To transfer OSS license terms 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. The inverter writes file "Read_OSS.ZIP" to the memory card within approximately 30 seconds.
5. Switch off the inverter power supply.
6. Withdraw the memory card from the inverter.
7. Insert the memory card into the card reader of a PC.
8. Please read the license terms.

You have transferred the OSS license terms to a PC.
Installing

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
- PM240P-2
- PM240-2
- PM250
- 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

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 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.
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.

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.

**Procedure**

1. Locate the lower edge of the Operator Panel into the matching recess of the Control Unit.
2. Plug the Operator Panel onto the inverter until the latch audibly engages.

You have plugged an operator panel onto the Control Unit. The operator panel is ready for operation when you connect the inverter to
Mounting the operator panel or dummy cover on the IP55 Power Module

Either an operator panel or the dummy cover must be plugged on for the inverter to achieve degree of protection IP55.

1. Attaching the operator panel or dummy cover:
   Press the operator panel or dummy cover onto the inverter as shown until you hear it click into place.

2. Removing the operator panel or dummy cover:
   Use a suitable screwdriver to press the interlock downwards.

Tools to commission the converter (Page 33)

The following accessory is included in the Power Module scope of supply to connect the Control Unit with the operator panel:

- An adapter, required for PM230 IP55 Power Modules, FSA … FSC
- A connecting cable and a bar to fix the connector, required for PM230 IP55 Power Modules, FSD … FSF
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.

<table>
<thead>
<tr>
<th>Number</th>
<th>Component</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Memory card slot</td>
</tr>
<tr>
<td>2</td>
<td>Selecting the fieldbus address:</td>
</tr>
<tr>
<td></td>
<td>• CU230P-2 DP</td>
</tr>
<tr>
<td></td>
<td>• CU230P-2 HVAC</td>
</tr>
<tr>
<td></td>
<td>• CU230P-2 BT</td>
</tr>
<tr>
<td>3</td>
<td>Terminal strips</td>
</tr>
<tr>
<td>4</td>
<td>Fieldbus interfaces at the lower side</td>
</tr>
<tr>
<td>5</td>
<td>Status LED</td>
</tr>
<tr>
<td></td>
<td>RDY</td>
</tr>
<tr>
<td></td>
<td>BF</td>
</tr>
<tr>
<td></td>
<td>LNK1 (PROFINET)</td>
</tr>
<tr>
<td></td>
<td>LNK2 (PROFINET)</td>
</tr>
<tr>
<td>6</td>
<td>USB interface for connection to a PC</td>
</tr>
<tr>
<td>7</td>
<td>Switch for AI 0 and AI 1 (U/I)</td>
</tr>
<tr>
<td></td>
<td>• I 0/4 mA … 20 mA</td>
</tr>
<tr>
<td></td>
<td>• U -10/0 V … 10 V</td>
</tr>
<tr>
<td>8</td>
<td>Switch for AI 2</td>
</tr>
<tr>
<td></td>
<td>Current or temperature input</td>
</tr>
<tr>
<td>9</td>
<td>Connection to the operator panel</td>
</tr>
</tbody>
</table>

Table 3-1 Number of inputs and outputs

<table>
<thead>
<tr>
<th>Digital inputs DI</th>
<th>Digital outputs DO</th>
<th>Analog inputs AI</th>
<th>Analog outputs AO</th>
<th>Input for motor temperature sensor</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>3</td>
<td>4</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>
## 3.2 Overview of the interfaces

### Table 3-2 Permissible cables and wiring options

<table>
<thead>
<tr>
<th>Solid or flexible conductors</th>
<th>Finely stranded conductor with non-insulated end sleeve</th>
<th>Finely stranded conductor with partially insulated end sleeve</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 mm 0.5 mm² 1.5 mm²</td>
<td>8 mm 0.5 mm² 1.0 mm²</td>
<td>8 mm 0.5 mm²</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Shield connection kit</th>
<th>Article number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shield connection kit 1 for the CU230P-2 Control Units with all fieldbus interfaces except for PROFINET.</td>
<td>6SL3264-1EA00-0FA0</td>
</tr>
<tr>
<td>Shield connection kit 3 for the CU230P-2 and CU240E-2 Control Units with PROFINET interface.</td>
<td>6SL3264-1EA00-0HB0</td>
</tr>
</tbody>
</table>

- 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:


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

**CU230P-2 PN**

<table>
<thead>
<tr>
<th>Pin</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>RX+, receive data +</td>
</tr>
<tr>
<td>2</td>
<td>RX+, receive data -</td>
</tr>
<tr>
<td>3</td>
<td>TX+, Transmit data +</td>
</tr>
<tr>
<td>4</td>
<td>---</td>
</tr>
<tr>
<td>5</td>
<td>---</td>
</tr>
<tr>
<td>6</td>
<td>TX-, transmit data -</td>
</tr>
<tr>
<td>7</td>
<td>---</td>
</tr>
<tr>
<td>8</td>
<td>---</td>
</tr>
</tbody>
</table>

**CU230P-2 DP**

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

**CU230P-2 HVAC**

<table>
<thead>
<tr>
<th>Pin</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0 V, reference potential</td>
</tr>
<tr>
<td>2</td>
<td>P+, RS485P, receive and transmit</td>
</tr>
<tr>
<td>3</td>
<td>N-, RS485N, receive and transmit</td>
</tr>
<tr>
<td>4</td>
<td>Cable shield</td>
</tr>
<tr>
<td>5</td>
<td>---</td>
</tr>
</tbody>
</table>
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

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

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

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 at the terminals.

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".

Additional options for wiring the digital inputs

---

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.

---

Remove the jumper between terminals 28 and 69.

---

Connecting M-switching contacts with an external power supply
3.4 Factory interface settings

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

Control Units with PROFIBUS or PROFINET interface

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

---

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

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

Figure 3-2 Factory setting of the CU230P-2 DP and CU230P-2 PN Control Units
Control Units with USS 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]

Figure 3-3 Factory setting of CU230P-2 HVAC Control Units

Changing the function of the terminals

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"
3.5 Default setting of the interfaces

Default setting 7: "Fieldbus with data set switchover"

Factory setting for inverters with PROFIBUS or PROFINET interface

- Control via PROFIdrive telegram 1
- 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 the BOP-2: FB cdS
Default setting 9: "Standard I/O with MOP"

Motorized potentiometer, setpoint after the ramp-function generator: \( r_{1050} \)

Speed setpoint (main setpoint): \( p_{1070}[0] = 1050 \)

Designation in the 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

Motorized potentiometer, setpoint after the ramp-function generator: \( r_{1050} \)

Speed setpoint (main setpoint): \( p_{1070}[0] = 755[0] \)

Designation in the BOP-2: Std ASP
Default setting 14: "Process industry with fieldbus"

- **Control via PROFlode telegram 20**
  - DI 3 = 0
  - DI 3 = 1
  - Fieldbus is not active

- **ON/OFF**
  - DI 3 = 0
  - DI 3 = 1

- **External fault**
  - DI 3 = 0
  - DI 3 = 1

- **Acknowledge fault**
  - DI 3 = 0
  - DI 3 = 1

- **Switch over control and Telegram 20 setpoint**
  - DI 3 = 0
  - DI 3 = 1
  - MOP

- **Motorized potentiometer (MOP), raise**
  - DI 3 = 0
  - DI 3 = 1

- **Motorized potentiometer, lower**
  - DI 3 = 0
  - DI 3 = 1

**Telegram 20, PZD02**
- **Speed setpoint**

**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 the BOP-2: Proc Fb
3.5 Default setting of the interfaces

**Default setting 15: "Process industry"**

- 5DI 0: ON/OFF1
- 6DI 1: External fault
- 7DI 2: Acknowledge fault
- 8DI 3: Switchover setpoint
- 16DI 4: No function
- 17DI 5: Motorized potentiometer, lower

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

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

**Designation in the BOP:** Proc

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

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

- 5DI 0: ON/OFF1 clockwise
- 6DI 1: ON/OFF counterclockwise
- 7DI 2: Acknowledge fault
- 8DI 0: Speed setpoint

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

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

**Designation in the BOP:** 2-wIrE 1

**DO 0:** p0730
**AO 0:** p0771[0], **DO 1:** p0731, **AO 1:** p0771[1]
3.5 Default setting of the interfaces

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

<table>
<thead>
<tr>
<th>5DI 0</th>
<th>ON/OFF 1 clockwise</th>
</tr>
</thead>
<tbody>
<tr>
<td>6DI 1</td>
<td>ON/OFF counterclockwise</td>
</tr>
<tr>
<td>7DI 2</td>
<td>Acknowledge fault</td>
</tr>
<tr>
<td>8AI 0+</td>
<td>Speed setpoint</td>
</tr>
</tbody>
</table>

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]

Designation in the BOP-2: 2-wrE2

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

<table>
<thead>
<tr>
<th>5DI 0</th>
<th>Enable / OFF1</th>
</tr>
</thead>
<tbody>
<tr>
<td>6DI 1</td>
<td>ON clockwise</td>
</tr>
<tr>
<td>7DI 2</td>
<td>ON counterclockwise</td>
</tr>
<tr>
<td>8AI 0+</td>
<td>Speed setpoint</td>
</tr>
</tbody>
</table>

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 the BOP-2: 3-wrE1
3.5 Default setting of the interfaces

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

- 5DI 0: Enable / OFF1
- 6DI 1: ON
- 7DI 2: Reversing
- 16DI 4: Acknowledge fault
- 3AI 0+: Speed setpoint
- 18DO 0: Fault
- 19
- 20
- 21DO 1: Alarm
- 22
- 12AO 0: Speed actual value
- 26AO 1: Current actual value

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

Speed setpoint (main setpoint): p1070[0] = 755[0]
Designation in the BOP-2: 3-wrE 2

Default setting 21: "USS fieldbus"

- 7DI 2: Acknowledge fault
- 18DO 0: Fault
- 19
- 20
- 21DO 1: Alarm
- 22
- 12AO 0: Speed actual value
- 26AO 1: Current actual value

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 the BOP-2: FB USS
Default setting 101: "Universal application"

- **ON/OFF1**  
- **External fault**  
- **Essential service mode, speed setpoint 15**  
- **Fixed speed setpoint 1**  
- **Fixed speed setpoint 2**  
- **Fixed speed setpoint 3**  
- **Fixed speed setpoint 1, 2, 3 or 15**  
- **Speed setpoint**

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 the 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 Kp, integral time Ti, differentiation time constant Td: p2280 (Kp) = 1, p2285 (Ti) = 30 s, p2274 (Td) = 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 the 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 Kp, integral time Ti, differentiation time constant Td: p2280 (Kp) = 1.2, p2285 (Ti) = 25 s, p2274 (Td) = 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 the BOP-2: P_F Stw
Default setting 105: "Fan pressure control + ESM with fixed setpoint"

- 5DI 0: ON/OFF
- 6DI 1: Essential service mode, speed setpoint 15
- Fixed value 1
- Technology controller
- Fixed speed setpoint 15
- 3AI 0+: Pressure sensor (0 V ... 10 V = 0 % ... 100 %)
- 18DO 0: Fault
- 19
- 20
- 21DO 1: Alarm
- 22
- 23DO 2: Operation
- 24
- 25
- 12AO 0: Speed actual value
- 26AO 1: Current actual value

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 the BOP-2: P_F Pc5
3.5 Default setting of the interfaces

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

- **5DI 0**: ON/OFF
- **3AI 0**: Technology controller
- **18DO 0**: Temperature sensor (0 V ... 10 V ± 0 % ... 100 %)
- **21DO 1**: Fault
- **23DO 2**: Alarm
- **26AO 1**: Operation
- **12AO 0**: Speed actual value
- **26AO 1**: Current actual value

**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 = 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 the BOP-2: P_F ctF1
Default setting 107: "Cooling tower with LG-NI1000 sensor + hibernation"

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 = 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 the BOP-2: P_F ctF2
3.5 Default setting of the interfaces

Default setting 108: "USS fieldbus"

- Control via USS: 9600 baud, 2 PZD, 4 PKW
- 7DI: Acknowledge fault
- 18DI: Fault
- 19
- 20
- 21DO: Alarm
- 22
- 12AO: Speed actual value
- 26AO: Current actual value

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

Designation in the BOP-2: P_F USS

Default setting 109: "Modbus RTU field"

- Control via Modbus RTU: 9600 baud
- 7DI: Acknowledge fault
- 18DI: Fault
- 19
- 20
- 21DO: Alarm
- 22
- 12AO: Speed actual value
- 26AO: Current actual value

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

Designation in the BOP-2: P_F Mod
3.5 Default setting of the interfaces

Default setting 110: "BACnet MS/TP fieldbus"

Control via BACnet MS/TP: 9600 baud

- 7DI 2: Acknowledge fault
- 18DO 0: Fault
- 21DO 1: Alarm
- 12AO 0: Speed actual value
- 26AO 1: Current actual value

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

Designation in the BOP-2: P_F bAc

Default setting 111: "Fixed setpoints"

Fixed speed setpoint 1
Fixed speed setpoint 2
Fixed speed setpoint 3
Fixed speed setpoint 4

- 18DO 0: Fault
- 21DO 1: Alarm
- 23DO 2: Operation
- 12AO 0: Speed actual value
- 26AO 1: Current actual value

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 the BOP-2: P_F _F55
Default setting 112: "CO2 sensor, 2 PID setpoints"

- **CO2 sensor** (0 V ... 10 V ± 0 % ... 100 %)
- **Fault**
- **Alarm**
- **Operation**
- **Speed actual value**
- **Current actual value**

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:
- **CO2 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 the BOP-2: P_F_CO2
Default setting 113: "Temperature-dependent pressure setpoint"

- **Input**: DI 0, AO 0+ (Actual value -10 V ... 10 V)
- **Output**: AO 0, AO 1, DI 0, AI 0, AI 2
- **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 the BOP-2: P_F_tIP5
3.5 Default setting of the interfaces

**Default setting 114: "P1 fieldbus"**

![Diagram of P1 fieldbus settings](Image)

- **Control via fieldbus P1: 4800 baud**
- **DO 0: p0730, …, DO 2: p0732**
- **AO 0: p0771[0], AO 1: p0771[1]**
- **DI 2: r0722.2**
- Designation in the 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 the BOP-2: P_F_PID
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 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

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:

Overview of the manuals (Page 49)

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

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

4.2 Commissioning with BOP-2 operator panel

4.2.1 Start quick commissioning and select the application class

Starting quick commissioning

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

**Procedure**

1. 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.

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

You must select the application class if you are not using a PM230, but instead, a PM240-2, PM240P-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)**

Select the motor standard.

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

Set the inverter supply voltage.

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

Motors without motor code stamped on the rating plate:

- INDUCT: Third-party induction motor
- 1L... IND: 1LE1, 1LG6, 1LA7, 1LA9 induction motors
Motors with motor code stamped on the rating plate:

- 1LE1 IND 100: 1LE1 . 9
- 1PC1 IND: 1PC1
- 1PH8 IND: Induction motor
- 1FP1: Reluctance motor

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

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

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

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

- MOT CODE
- P301

Rated motor voltage

- MOT VOLT
- P304

Rated motor current

- MOT CURR
- P305

Rated motor power

- MOT POW
- P307

Rated motor frequency

- MOT FREQ
- P310

Rated motor speed

- MOT RPM
- P311

Motor cooling:

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

Select the appropriate application:

- VEC STD: In all applications, 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.
Select the control mode:

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

### Select a suitable control mode

<table>
<thead>
<tr>
<th>Control mode</th>
<th>U/f control with linear or square-law characteristic</th>
<th>Vector control without encoder</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Closed-loop control characteristics</strong></td>
<td><img src="image1" alt="Graph" /></td>
<td><img src="image2" alt="Graph" /></td>
</tr>
<tr>
<td>Typical correction time after a speed change: 100 ms ... 200 ms</td>
<td>Typical correction time after a speed change: &lt; 100 ms</td>
<td></td>
</tr>
<tr>
<td>Typical correction time after a load surge: 500 ms</td>
<td>Typical correction time after a load surge: 200 ms</td>
<td></td>
</tr>
<tr>
<td>The control mode is suitable to address the following requirements:</td>
<td>The vector control controls and limits the motor torque</td>
<td></td>
</tr>
<tr>
<td>- Motor power ratings &lt; 45 kW</td>
<td>Torque accuracy that can be achieved: ± 5 % for 15 % ... 100 % of the rated speed</td>
<td></td>
</tr>
<tr>
<td>- Ramp-up time 0 → Rated speed (dependent on the rated motor power): 1 s (0.1 kW) ... 10 s (45 kW)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Applications with increasing load torque without load surges</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The control mode is insensitive with respect to inaccurate motor data settings</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Application examples

- Pumps, fans, and compressors with flow characteristic
- Pumps and compressors with displacement machines

### Motors that can be operated

- Induction motors
- Induction, synchronous and reluctance motors

### Power Modules that can be operated

- No restrictions

### Max. output frequency

- 550 Hz
- 240 Hz
- 150 Hz with PM330 Power Module

### Commissioning

- Contrary to vector control, no speed controller has to be set
Select the default setting for the interfaces of the inverter that is suitable for your application.

Default setting of the interfaces (Page 16)

Figure 4-1 Minimum and maximum motor frequency

**CAUTION**

*Material damage caused by the motor unexpectedly accelerating*

Depending on the particular Power Module, the inverter sets the minimum frequency $p1080$ to 20% of the maximum frequency. Also for a setpoint = 0, for $p1080 > 0$, after the motor is switched on it accelerates to the minimum frequency. Material damage can occur if the motor unexpectedly accelerates.

- If the application requires a minimum frequency = 0, then set $p1080 = 0$.

Scaling of analog input 0

Figure 4-2 Ramp-up and ramp-down time of the motor

Ramp-down time for the OFF3 command

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.
4.2 Commissioning with BOP-2 operator panel

- **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**: Measure the motor data with the motor rotating. The inverter switches off the motor after the motor data identification has been completed.

  Complete quick commissioning:

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

<table>
<thead>
<tr>
<th>WARNING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk of death due to machine motion while motor data identification is active</td>
</tr>
</tbody>
</table>

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. measuring 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. Press the HAND/AUTO key.

2. The BOP-2 displays the symbol indicating manual operation.

Switch on the motor.

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

If the 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, switch off the motor as described below, and switch over the inverter control from HAND to AUTO.

Switch on the motor to start the rotating measurement.

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

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

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

If required, switch off the motor.

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:


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.

Generic Station Description for PROFIBUS: GSD (http://support.automation.siemens.com/WW/view/en/23450835)


Alternative for the download for GSD and GSDML

GSD and GSDML are saved in the inverter. If you insert a memory card in the inverter and set p0804 = 12, then the inverter writes the GSD or the GSDML to the memory card. You can then transfer the file to your programming device or PC using the memory card.

4.3.1 PROFINET and PROFIBUS

Examples for telegrams via PROFIBUS and PROFINET

Telegram 1:

<table>
<thead>
<tr>
<th>STW1</th>
<th>Control word 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZSW1</td>
<td>Status word 1</td>
</tr>
<tr>
<td>PZD01/02</td>
<td>Process data 16-bit</td>
</tr>
<tr>
<td>NSOLL_A</td>
<td>Speed setpoint</td>
</tr>
<tr>
<td>NIST_A</td>
<td>Speed actual value</td>
</tr>
</tbody>
</table>
4.3 Connecting the inverter to the fieldbus

Telegram 20:

<table>
<thead>
<tr>
<th>PZD01</th>
<th>PZD02</th>
<th>PZD03</th>
<th>PZD04</th>
<th>PZD05</th>
<th>PZD06</th>
</tr>
</thead>
<tbody>
<tr>
<td>STW1</td>
<td>NSOLL_A</td>
<td>ZSW1</td>
<td>NIST_A_GLATT</td>
<td>IAIST_GLATT</td>
<td>MIST_GLATT</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Bit</th>
<th>Meaning</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0 = OFF</td>
<td>The motor brakes with the ramp-down time p1121 of the ramp-function generator. The inverter switches off the motor at standstill.</td>
</tr>
<tr>
<td></td>
<td>0 → 1 = ON</td>
<td>The inverter goes into the &quot;ready&quot; state. If, in addition bit 3 = 1, then the inverter switches on the motor.</td>
</tr>
<tr>
<td>1</td>
<td>0 = OFF</td>
<td>Switch off the motor immediately, the motor then coasts down to a standstill.</td>
</tr>
<tr>
<td></td>
<td>1 = No OFF</td>
<td>Precondition in order to be able to switch on the motor using bit 0 (ON command).</td>
</tr>
<tr>
<td>2</td>
<td>0 = Quick stop</td>
<td>The motor brakes with the OFF3 ramp-down time p1135 down to standstill.</td>
</tr>
<tr>
<td></td>
<td>1 = No quick stop</td>
<td>Precondition in order to be able to switch on the motor using bit 0 (ON command).</td>
</tr>
<tr>
<td>3</td>
<td>0 = Inhibit operation</td>
<td>Switch off the motor immediately → motor coasts down to a standstill.</td>
</tr>
<tr>
<td></td>
<td>1 = Enable operation</td>
<td>Precondition in order to be able to switch on the motor using bit 0 (ON command).</td>
</tr>
<tr>
<td>4</td>
<td>0 = Disable RFG</td>
<td>The inverter immediately sets its ramp-function generator output to 0.</td>
</tr>
<tr>
<td></td>
<td>1 = Do not disable RFG</td>
<td>The ramp-function generator can be enabled.</td>
</tr>
<tr>
<td>5</td>
<td>0 = Stop RFG</td>
<td>The output of the ramp-function generator stops at the actual value.</td>
</tr>
<tr>
<td></td>
<td>1 = Enable RFG</td>
<td>The output of the ramp-function generator follows the setpoint.</td>
</tr>
<tr>
<td>6</td>
<td>0 = Inhibit setpoint</td>
<td>The inverter brakes the motor with the ramp-down time p1121 of the ramp-function generator.</td>
</tr>
<tr>
<td></td>
<td>1 = Enable setpoint</td>
<td>Motor accelerates with the ramp-up time p1120 to the setpoint.</td>
</tr>
<tr>
<td>7</td>
<td>0 → 1 = Acknowledge faults</td>
<td>Acknowledge fault. If the ON command is still active (bit 0 = 1), the inverter switches to &quot;closing lockout&quot; state.</td>
</tr>
<tr>
<td>8, 9</td>
<td>Reserved</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>0 = No control via PLC</td>
<td>The inverter ignores the process data from the fieldbus.</td>
</tr>
<tr>
<td></td>
<td>1 = Control via PLC</td>
<td>Control via fieldbus, the inverter accepts the process data from the fieldbus.</td>
</tr>
<tr>
<td>11</td>
<td>1 = Direction reversal</td>
<td>Invert setpoint in the inverter.</td>
</tr>
<tr>
<td>12</td>
<td>Not used</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>1 = MOP up</td>
<td>Increase the setpoint saved in the motorized potentiometer.</td>
</tr>
<tr>
<td>14</td>
<td>1 = MOP down</td>
<td>Reduce the setpoint saved in the motorized potentiometer.</td>
</tr>
<tr>
<td>15</td>
<td>Reserved</td>
<td>Changes over between settings for different operation interfaces (command data sets).</td>
</tr>
</tbody>
</table>
4.3 Connecting the inverter to the fieldbus

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

<table>
<thead>
<tr>
<th>Bit</th>
<th>Meaning</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1 = Ready to start</td>
<td>Power supply switched on; electronics initialized; pulses locked.</td>
</tr>
<tr>
<td>1</td>
<td>1 = Ready</td>
<td>Motor is switched on (ON/Off1 = 1), no fault is active. With the command &quot;Enable operation&quot; (STW1.3), the inverter switches on the motor.</td>
</tr>
<tr>
<td>2</td>
<td>1 = Operation enabled</td>
<td>Motor follows setpoint. See control word 1, bit 3.</td>
</tr>
<tr>
<td>3</td>
<td>1 = Fault active</td>
<td>The inverter has a fault. Acknowledge fault using STW1.7.</td>
</tr>
<tr>
<td>4</td>
<td>1 = OFF2 inactive</td>
<td>Coast down to standstill is not active.</td>
</tr>
<tr>
<td>5</td>
<td>1 = OFF3 inactive</td>
<td>Quick stop is not active.</td>
</tr>
<tr>
<td>6</td>
<td>1 = Closing lockout active</td>
<td>It is only possible to switch on the motor after an OFF1 followed by ON.</td>
</tr>
<tr>
<td>7</td>
<td>1 = Alarm active</td>
<td>Motor remains switched on; no acknowledgement is necessary.</td>
</tr>
<tr>
<td>8</td>
<td>1 = Speed deviation within the tolerance range</td>
<td>Setpoint / actual value deviation within the tolerance range.</td>
</tr>
<tr>
<td>9</td>
<td>1 = Master control requested</td>
<td>The automation system is requested to accept the inverter control.</td>
</tr>
<tr>
<td>10</td>
<td>1 = Comparison speed reached or exceeded</td>
<td>Speed is greater than or equal to the corresponding maximum speed.</td>
</tr>
<tr>
<td>11</td>
<td>1 = torque limit reached</td>
<td>Comparison value for current or torque has been reached or exceeded.</td>
</tr>
<tr>
<td>12</td>
<td>1 = Holding brake open</td>
<td>Signal to open and close a motor holding brake.</td>
</tr>
<tr>
<td>13</td>
<td>0 = Alarm, motor overtemperature</td>
<td>--</td>
</tr>
<tr>
<td>14</td>
<td>1 = Motor rotates clockwise</td>
<td>Internal inverter actual value &gt; 0</td>
</tr>
<tr>
<td></td>
<td>0 = Motor rotates counterclockwise</td>
<td>Internal inverter actual value &lt; 0</td>
</tr>
<tr>
<td>15</td>
<td>0 = Alarm, inverter thermal overload</td>
<td></td>
</tr>
</tbody>
</table>

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

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

4.3.2 Modbus RTU

Settings for Modbus RTU

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>p0015 = 109</td>
<td><strong>Macro drive unit</strong>&lt;br&gt;Set communication via Modbus RTU&lt;br&gt;Default setting of the interfaces (Page 16)</td>
</tr>
<tr>
<td><strong>p2020</strong></td>
<td><strong>Fieldbus interface baud rate</strong>&lt;br&gt;p0015 = 109 sets p2020 = 6&lt;br&gt;4: 2400 baud&lt;br&gt;5: 4800 baud&lt;br&gt;6: 9600 baud&lt;br&gt;7: 19200 baud&lt;br&gt;8: 38400 baud&lt;br&gt;9: 57600 baud&lt;br&gt;10: 76800 baud&lt;br&gt;11: 93750 baud&lt;br&gt;12: 115200 baud&lt;br&gt;13: 187500 baud</td>
</tr>
<tr>
<td><strong>p2021</strong></td>
<td><strong>Fieldbus interface address</strong>&lt;br&gt;Valid USS addresses: 1 … 247.&lt;br&gt;The parameter is only active if address 0 is set at the Control Unit address switch.&lt;br&gt;A change only becomes active after the inverter power supply is switched off and switched on again.</td>
</tr>
<tr>
<td><strong>p2024</strong></td>
<td><strong>Fieldbus interface times</strong>&lt;br&gt;[0] Maximum permissible telegram processing time of the Modbus slave&lt;br&gt;[2] dead time between two telegrams</td>
</tr>
<tr>
<td><strong>p2030 = 2</strong></td>
<td><strong>Fieldbus interface protocol selection</strong>&lt;br&gt;p0015 = 109 sets p2013 = 2 → Modbus RTU</td>
</tr>
<tr>
<td><strong>p2031</strong></td>
<td><strong>Fieldbus interface Modbus parity</strong>&lt;br&gt;0: No parity&lt;br&gt;1: Odd parity&lt;br&gt;2: Even parity</td>
</tr>
</tbody>
</table>
4.3 Connecting the inverter to the fieldbus

4.3.3 BACnet MS/TP

Settings for BACnet MS/TP

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>p0015 = 110</td>
<td><strong>Macro drive unit</strong></td>
</tr>
<tr>
<td></td>
<td>Set communication via BACnet MS/TP</td>
</tr>
<tr>
<td></td>
<td>Default setting of the interfaces (Page 16)</td>
</tr>
<tr>
<td>p2020</td>
<td><strong>Fieldbus interface baud rate</strong></td>
</tr>
<tr>
<td></td>
<td>p0015 = 110 sets p2020 = 6</td>
</tr>
<tr>
<td></td>
<td>4: 2400 baud</td>
</tr>
<tr>
<td></td>
<td>5: 4800 baud</td>
</tr>
<tr>
<td></td>
<td>6: 9600 baud</td>
</tr>
<tr>
<td></td>
<td>7: 19200 baud</td>
</tr>
<tr>
<td></td>
<td>8: 38400 baud</td>
</tr>
<tr>
<td></td>
<td>9: 57600 baud</td>
</tr>
<tr>
<td></td>
<td>10: 76800 baud</td>
</tr>
<tr>
<td></td>
<td>11: 93750 baud</td>
</tr>
<tr>
<td></td>
<td>12: 115200 baud</td>
</tr>
<tr>
<td></td>
<td>13: 187500 baud</td>
</tr>
<tr>
<td>p2021</td>
<td><strong>Fieldbus interface address</strong></td>
</tr>
<tr>
<td></td>
<td>Valid USS addresses: 1 … 127.</td>
</tr>
<tr>
<td></td>
<td>The parameter is only active if address 0 is set at the Control Unit address switch.</td>
</tr>
<tr>
<td></td>
<td>A change only becomes active after the inverter power supply is switched off and switched on again.</td>
</tr>
<tr>
<td>p2024</td>
<td><strong>Fieldbus interface times</strong></td>
</tr>
<tr>
<td></td>
<td>[0] maximum permissible processing time (APDU timeout)</td>
</tr>
<tr>
<td>p2025</td>
<td><strong>Fieldbus SS BACnet settings</strong></td>
</tr>
<tr>
<td></td>
<td>[0] = device object instance number</td>
</tr>
<tr>
<td></td>
<td>[1] = info maximum number frames</td>
</tr>
<tr>
<td></td>
<td>[2] = APDU number of retries</td>
</tr>
<tr>
<td></td>
<td>[3] = maximum master address</td>
</tr>
<tr>
<td>p2026</td>
<td><strong>Fieldbus interface BACnet COV increment</strong></td>
</tr>
<tr>
<td></td>
<td>Change in value at which point the inverter sends and UnConfirmedCOVNotification or and ConfirmedCOVNotification.</td>
</tr>
<tr>
<td>r2029</td>
<td><strong>Fieldbus interface error statistics</strong></td>
</tr>
<tr>
<td></td>
<td>[0] number of error-free telegrams</td>
</tr>
<tr>
<td></td>
<td>[1] number of rejected telegrams</td>
</tr>
<tr>
<td></td>
<td>[2] number of framing errors</td>
</tr>
<tr>
<td></td>
<td>[3] number of overrun errors</td>
</tr>
<tr>
<td></td>
<td>[4] number of parity errors</td>
</tr>
<tr>
<td></td>
<td>[5] number of starting character errors</td>
</tr>
<tr>
<td></td>
<td>[6] number of checksum errors</td>
</tr>
<tr>
<td></td>
<td>[7] number of length errors</td>
</tr>
<tr>
<td>p2030 = 5</td>
<td><strong>Fieldbus interface protocol selection</strong></td>
</tr>
<tr>
<td></td>
<td>p0015 = 110 sets p2013 = 5 → BACnet MS/TP</td>
</tr>
</tbody>
</table>
## Control word

<table>
<thead>
<tr>
<th>Parameter</th>
<th>BACNet</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>r2090</td>
<td>p0840</td>
<td>BV20</td>
</tr>
<tr>
<td>.01</td>
<td>p0844</td>
<td>BV27</td>
</tr>
<tr>
<td>.02</td>
<td>p0848</td>
<td>BV28</td>
</tr>
<tr>
<td>.03</td>
<td>p0852</td>
<td>BV26</td>
</tr>
<tr>
<td>.04</td>
<td>p1140</td>
<td>BV26</td>
</tr>
<tr>
<td>.05</td>
<td>p1141</td>
<td>BV26</td>
</tr>
<tr>
<td>.06</td>
<td>p1142</td>
<td>BV26</td>
</tr>
<tr>
<td>.07</td>
<td>p2103</td>
<td>BV22</td>
</tr>
<tr>
<td>.08, .09</td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td>.10</td>
<td>p0854</td>
<td>BV93</td>
</tr>
<tr>
<td>.11</td>
<td>p1113</td>
<td>BV21</td>
</tr>
<tr>
<td>.12</td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td>.13</td>
<td>p1035</td>
<td>N/A</td>
</tr>
<tr>
<td>.14</td>
<td>p1036</td>
<td>N/A</td>
</tr>
<tr>
<td>.15</td>
<td></td>
<td>N/A</td>
</tr>
</tbody>
</table>

Precondition in order to be able to switch on the motor (ON command).

The ramp-function generator can be enabled.

The output of the ramp-function generator follows the setpoint.

Motor accelerates with the ramp-up time p1120 to the setpoint.

Control via fieldbus, the inverter accepts the process data from the fieldbus.

Invert setpoint in the inverter.

Increase the setpoint saved in the motorized potentiometer.

Reduce the setpoint saved in the motorized potentiometer.
### 4.4 Frequently required parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>p0015</td>
<td><strong>Macro drive unit</strong>&lt;br&gt;Set defaults for inputs and outputs via a macro.</td>
</tr>
<tr>
<td>r0018</td>
<td><strong>Control Unit firmware version</strong></td>
</tr>
<tr>
<td>p0096</td>
<td><strong>Application class</strong>&lt;br&gt;0: Expert&lt;br&gt;1: Standard Drive Control&lt;br&gt;2: Dynamic Drive Control</td>
</tr>
<tr>
<td>p0100</td>
<td><strong>IEC/NEMA mot stds</strong>&lt;br&gt;0: Europe 50 [Hz]&lt;br&gt;1: NEMA motor (60 Hz, US units)&lt;br&gt;2: NEMA motor (60 Hz, SI units)</td>
</tr>
<tr>
<td>p0304</td>
<td><strong>Rated motor voltage [V]</strong></td>
</tr>
<tr>
<td>p0305</td>
<td><strong>Rated motor current [A]</strong></td>
</tr>
<tr>
<td>p0307</td>
<td><strong>Rated motor power [kW] or [hp]</strong></td>
</tr>
<tr>
<td>p0310</td>
<td><strong>Rated motor frequency [Hz]</strong></td>
</tr>
<tr>
<td>p0311</td>
<td><strong>Rated motor speed [rpm]</strong></td>
</tr>
<tr>
<td>p0601</td>
<td><strong>Motor temperature sensor type</strong>&lt;br&gt;0: No sensor (factory setting)&lt;br&gt;1: PTC (→ P0604)&lt;br&gt;2: KTY84 (→ P0604)&lt;br&gt;4: Bimetal</td>
</tr>
<tr>
<td>p0625</td>
<td><strong>Motor ambient temperature during commissioning [° C]</strong></td>
</tr>
<tr>
<td>p0640</td>
<td><strong>Current limit [A]</strong></td>
</tr>
<tr>
<td>r0722</td>
<td><strong>Digital inputs status</strong>&lt;br&gt;Selection of the possible settings:</td>
</tr>
<tr>
<td>.0</td>
<td>Terminal 5  DI 0  Terminal 16  DI 1</td>
</tr>
<tr>
<td>.1</td>
<td>Terminal 6  DI 1</td>
</tr>
<tr>
<td>.2</td>
<td>Terminal 7  DI 2</td>
</tr>
<tr>
<td>.3</td>
<td>Terminal 8  DI 3</td>
</tr>
<tr>
<td>.4</td>
<td>Terminal 16  DI 4</td>
</tr>
<tr>
<td>.5</td>
<td>Terminal 17  DI 5</td>
</tr>
<tr>
<td>.11</td>
<td>Terminal 3, 4  AI 0</td>
</tr>
<tr>
<td>.12</td>
<td>Terminal 10, 11  AI 1</td>
</tr>
<tr>
<td>p0730</td>
<td><strong>Signal source for terminal DO 0</strong>&lt;br&gt;Selection of the possible settings:</td>
</tr>
<tr>
<td></td>
<td>Terminals 19, 20 (NO contact)  Terminals 18, 20 (NC contact)</td>
</tr>
<tr>
<td>p0731</td>
<td><strong>Signal source for terminal DO 1</strong>&lt;br&gt;Selection of the possible settings:</td>
</tr>
<tr>
<td></td>
<td>Terminals 21, 22 (NO contact)  Terminals 21, 22 (NC contact)</td>
</tr>
<tr>
<td>p0732</td>
<td><strong>Signal source for terminal DO 2</strong>&lt;br&gt;Selection of the possible settings:</td>
</tr>
<tr>
<td></td>
<td>Terminals 24, 25 (NO contact)  Terminals 23, 25 (NC contact)</td>
</tr>
</tbody>
</table>
### 4.4 Frequently required parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>r0755</td>
<td>Analog inputs actual value [%]</td>
</tr>
<tr>
<td></td>
<td>0: Terminals 3, 4 AI 0</td>
</tr>
<tr>
<td></td>
<td>1: Terminals 10, 11 AI 1</td>
</tr>
<tr>
<td></td>
<td>2: Terminals 50, 51 AI 2</td>
</tr>
<tr>
<td></td>
<td>3: Terminals 52, 53 AI 3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>p0756</th>
<th>Analog input type</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>AI 0: Unipolar voltage input (0 V … +10 V)</td>
</tr>
<tr>
<td>1</td>
<td>AI 1: Unipolar voltage input monitored (+2 V… +10 V)</td>
</tr>
<tr>
<td>2</td>
<td>AI 2: Unipolar current input (0 mA …+20 mA)</td>
</tr>
<tr>
<td>3</td>
<td>AI 3: Unipolar current input monitored (+4 mA …+20 mA)</td>
</tr>
<tr>
<td>4</td>
<td>AI 4: Bipolar voltage input (-10 V …+10 V)</td>
</tr>
<tr>
<td>5</td>
<td>AI 5: LG-Ni1000 temperature sensor</td>
</tr>
<tr>
<td>6</td>
<td>AI 6: PT1000 temperature sensor</td>
</tr>
<tr>
<td>7</td>
<td>AI 7: No sensor connected</td>
</tr>
<tr>
<td>8</td>
<td>AI 8: Temperature sensor DIN Ni 1k (6180 ppm / K)</td>
</tr>
<tr>
<td>9</td>
<td>AI 9: Temperature sensor DIN Ni 1k (6180 ppm / K)</td>
</tr>
<tr>
<td>10</td>
<td>AI 10: Temperature sensor DIN Ni 1k (6180 ppm / K)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>p0771</th>
<th>Analog outputs signal source</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Terminals 12, 13 AO 0: Analog output locked</td>
</tr>
<tr>
<td>1</td>
<td>Terminals 26, 27 AO 1: Speed actual value</td>
</tr>
<tr>
<td>2</td>
<td>AO 0: Output frequency, smoothed</td>
</tr>
<tr>
<td>3</td>
<td>AO 1: Actual current value (smoothed absolute value)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>p0776</th>
<th>Analog outputs, type</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>AO 0: Current output (0 mA … +20 mA)</td>
</tr>
<tr>
<td>1</td>
<td>AO 1: Voltage output (0 V … +10 V)</td>
</tr>
<tr>
<td>2</td>
<td>AO 2: Current output (+4 mA ... +20 mA)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>p0922</th>
<th>PROFIdrive telegram selection</th>
</tr>
</thead>
<tbody>
<tr>
<td>p1001</td>
<td>Fixed speed setpoint 1</td>
</tr>
<tr>
<td>p1002</td>
<td>Fixed speed setpoint 2</td>
</tr>
<tr>
<td>p1003</td>
<td>Fixed speed setpoint 3</td>
</tr>
<tr>
<td>p1004</td>
<td>Fixed speed setpoint 4</td>
</tr>
<tr>
<td>p1058</td>
<td>Jog 1 speed setpoint</td>
</tr>
<tr>
<td>p1059</td>
<td>Jog 2 speed setpoint</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>p1070</th>
<th>Main setpoint</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Main setpoint = 0</td>
</tr>
<tr>
<td>755</td>
<td>Analog input 0</td>
</tr>
<tr>
<td>1024</td>
<td>Fixed setpoint</td>
</tr>
<tr>
<td>1050</td>
<td>Motorized potentiometer</td>
</tr>
<tr>
<td>2050</td>
<td>PZD 2 from the fieldbus</td>
</tr>
</tbody>
</table>

| p1080     | Minimum speed [rpm] |
| p1082     | Maximum speed [rpm] |
| p1120     | Ramp-function generator ramp-up time [s] |
| p1121     | Ramp-function generator ramp-down time [s] |

<table>
<thead>
<tr>
<th>p1300</th>
<th>Open-loop/closed-loop control operating mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>U/f control with linear characteristic</td>
</tr>
<tr>
<td>1</td>
<td>U/f control with linear characteristic and FCC</td>
</tr>
<tr>
<td>2</td>
<td>U/f control with parabolic characteristic</td>
</tr>
<tr>
<td>20</td>
<td>Speed control (without encoder)</td>
</tr>
</tbody>
</table>

| p1310     | Starting (voltage boost) permanent |
| p1800     | Pulse frequency setpoint |
### 4.4 Frequently required parameters

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

5.1 Overview of the manuals

Manuals with additional information that can be downloaded:

- CU230P-2 Compact Operating Instructions
  Commissioning the inverter (this manual)

- CU230P-2 operating instructions
  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

  Parameter lists, alarms and faults. Graphic function diagrams

- "Fieldbus" function manual
  Configuring fieldbuses.

- BOP-2 operating instructions
  Using the operator panel.

- IOP operating instructions
  Using the operator panel, installing the door mounting kit for IOP
5.2 Technical support

  The commissioning wizards in the IOP

- Power Module Installation Manual
  Installing Power Modules, reactors and filters. Technical specifications, maintenance

  Installation descriptions for inverter components, e.g. line reactors or 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)
Further information
SINAMICS converters:
www.siemens.com/sinamics
PROFINET
www.siemens.com/profinet

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Digital Factory
Motion Control
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91050 ERLANGEN
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