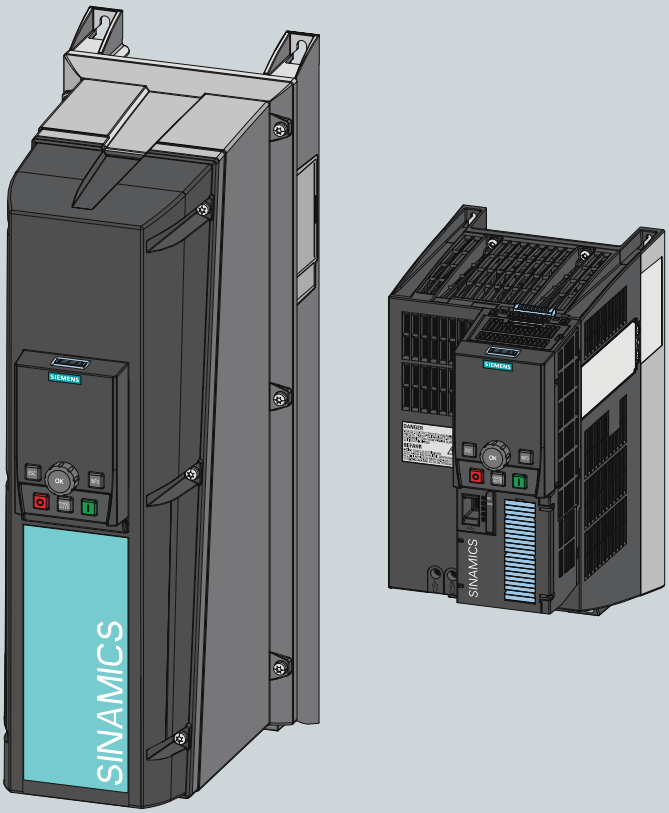
SINAMICS G120

Frequency converters with Control Units
CU230P-2
CU240B-2
CU240E-2

Getting Started · 01/2011



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SINAMICS G120

Frequency converters with Control Units CU230P-2; CU240B-2; CU240E-2

Getting Started

Edition 01/2011, Firmware V4.4

01/2011

A5E02792536C AB

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
with a safety alert symbol, indicates that minor personal injury can result if proper precautions are not taken.

CAUTION
without a safety alert symbol, indicates that property damage can result if proper precautions are not taken.

NOTICE
indicates that an unintended result or situation can occur if the corresponding information is not taken into account.

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 for the specific task, 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.

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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 adhered to. The information in the relevant documentation must be observed.

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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
Industry Sector
Postfach 48 48
90026 NÜRNBERG
GERMANY

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℗ 02/2011

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Table of contents

Objective of these instructions

This Getting Started describes how you commission and operate a SINAMICS G120 frequency converter using the Application Wizards of the IOP. For special frequency converter functions, e.g. the automatic restart or flying restart function, please use the **Operating Instructions** and the **List Manual** of the corresponding Control Unit.

The functions and properties of the IOP are described in detail in the "SINAMICS IOP" operating instructions and are only explained here to an extent that is necessary to understand the described functions.

Additional information on SINAMICS G120

All manuals for SINAMICS G120 frequency converters can be downloaded from the Internet: Manuals (http://support.automation.siemens.com/WW/view/en/22339653/133300)

and are additionally available on DVD:
SD Manual Collection – all of the manuals on low-voltage motors, geared motors and low-voltage frequency converters, 5 languages

Order number: 6SL3298-0CA00-0MG0 (supplied once)

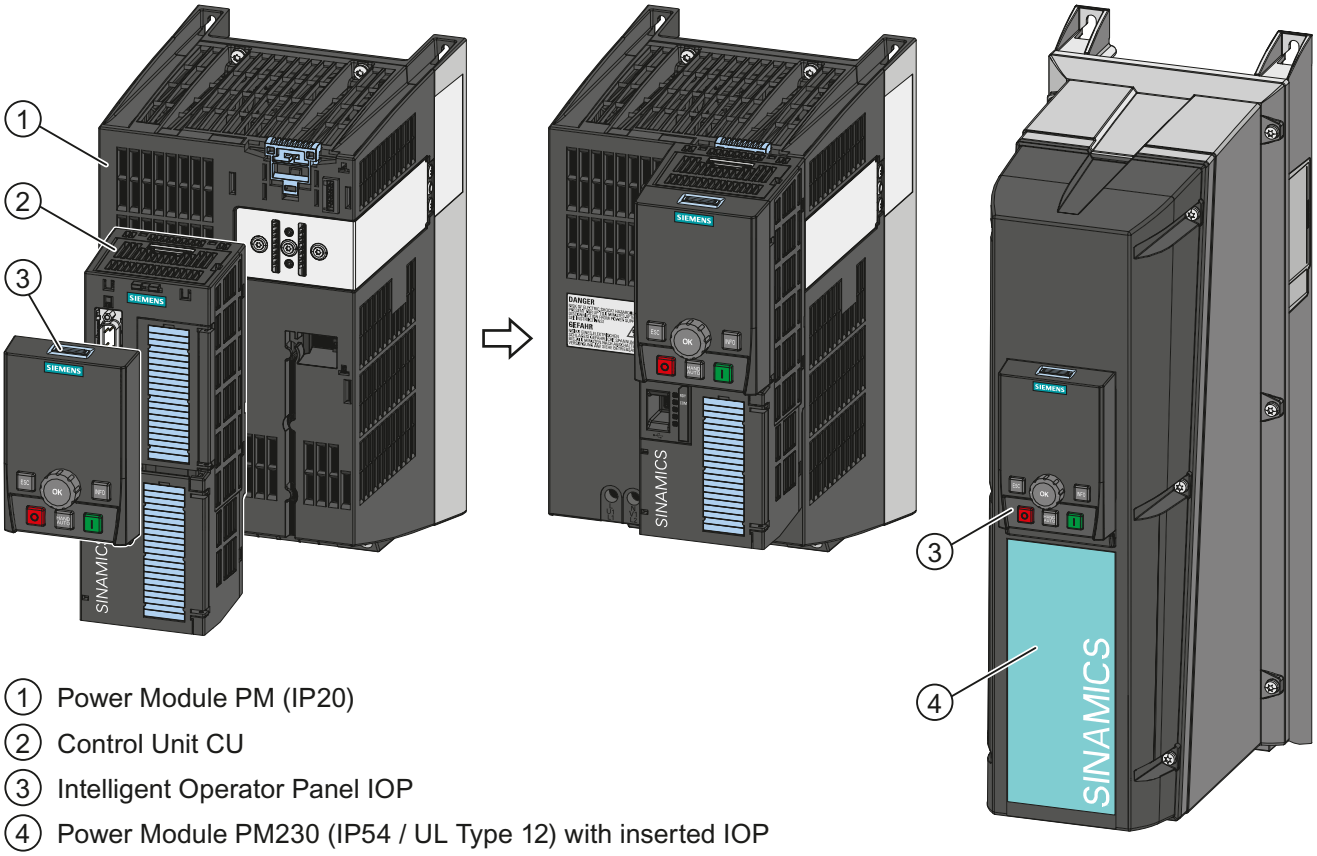
Order number: 6SL3298-0CA10-0MG0 (update service for 1 year; supplied 4 times)

Design of the frequency converter

1

Components and design of the frequency converter

SINAMICS G120 frequency converters comprise a *Power Module* (PM) and *Control Unit* (CU).



(1) Power Module PM (IP20)
(2) Control Unit CU
(3) Intelligent Operator Panel IOP
(4) Power Module PM230 (IP54 / UL Type 12) with inserted IOP

Figure 1-1 Design of the frequency converter (example)

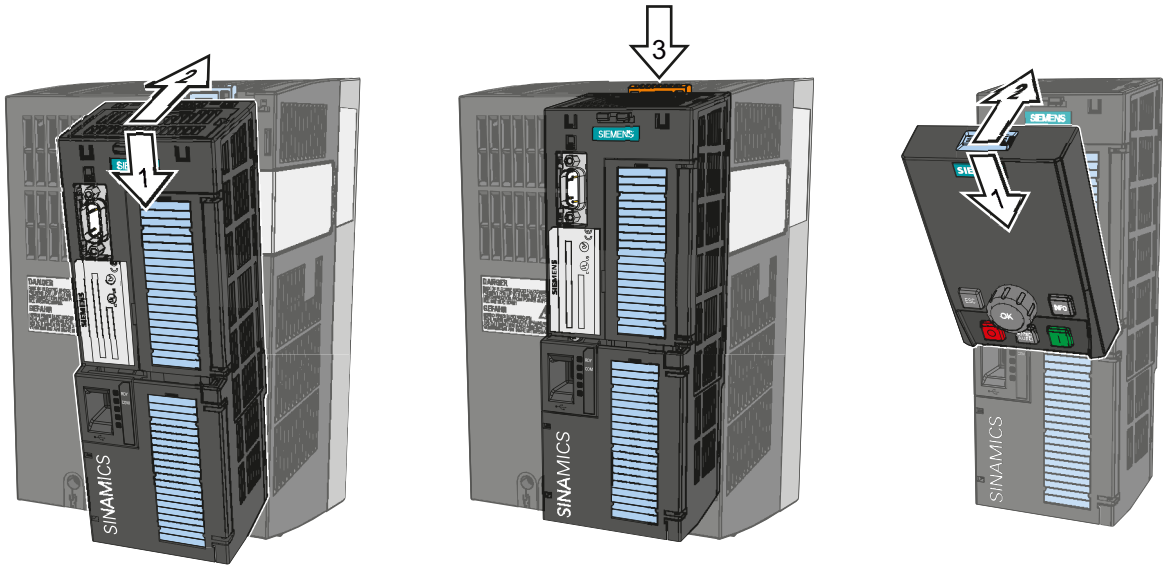


Figure 1-2 Assembling components

Components for commissioning

The following tools are available to commission the frequency converter:

- Intelligent Operator Panel IOP
- Basic Operator Panel BOP-2
- STARTER commissioning tool (PC software)

Figure 1-3 Operator control options

Table 1- 1 Components and tools for commissioning and data backup

Component or tool			Order number
Operator panel for commissioning, diagnostics and controlling frequency converters	BOP-2 - for snapping onto the frequency converter • Copies drive parameters • Two-line display • Guided commissioning		6SL3255-0AA00-4CA1
	IOP - to snap onto the frequency converter or with the handheld • Copies drive parameters • Plain text display • Menu-based operation and application wizards		6SL3255-0AA00-4JA0 IOP Handheld: 6SL3255-0AA00-4HA0
	IOP/BOP-2 Mounting Kit IP54/UL Type 12		6SL3256-0AP00-0JA0
Tools for the PC	STARTER commissioning tool (PC software) connected to the frequency converter via USB cable		STARTER on DVD: 6SL3072-0AA00-0AG0 Downloading: STARTER (http://support.automation.siemens.com/WW/view/en/10804985/130000)
	PC Connection Kit The kit contains a STARTER DVD and USB cable		6SL3255-0AA00-2CA0
	Drive ES Basic To commission the frequency converter via the PROFIBUS interface. Includes STARTER		6SW1700-5JA00-4AA0
	Memory card to save and transfer the frequency converter settings	MMC card	6SL3254-0AM00-0AA0
		SD card	6ES7954-8LB00-0AA0

1.1 Control Units

Different Control Unit versions

The Control Units differ by the following main factors:

- Fieldbus interface type
- Type and scope of the functions
  - e.g. for CU230P-2… through additional specific technology functions for pumps, fans and compressors
  - e.g. for CU240E-2… through additional integrated safety functions
- Type and number of available inputs and outputs

CU230P-2… Functions	CU230P-2 HVAC	CU230P-2 CAN	CU230P-2 DP
Fieldbus	USS or Modbus RTU or BACnet MS/TP	CANopen	PROFIBUS DP
Technology functions	For instance: Energy-saving mode, cascade control, extended emergency operation, multi-zone controller, bypass		
Digital inputs	6		
Analog inputs	**AI0 and AI1**: Voltage or current; **AI2:** Current or temperature sensor (Ni1000/PT1000); **AI3:** Temperature sensor (Ni1000/PT1000);		
Digital outputs	3		
Analog outputs	2		

CU240B/E-2… Functions	CU240B-2	CU240B-2 DP	CU240E-2	CU240E-2 F	CU240E-2 DP	CU240E-2 DP-F
Fieldbus	USS or Modbus RTU	PROFIBUS DP	USS or Modbus RTU	USS or Modbus RTU	PROFIBUS DP	PROFIBUS DP with PROFIsafe
Integrated safety functions	-	-	STO	STO, SS1, SLS	STO	STO, SS1, SLS
Digital inputs	4		6			
Fail-safe digital inputs*	-		1	3	1	3
Analog inputs	1		2			
Digital outputs	1		3			
Analog outputs	1		2			

*) A fail-safe digital input is created by combining two "standard" digital inputs

1.2 Power Module

Power Modules are available in various degrees of protection with a different topology in the power range from between 0.37 kW up to 250 kW. The Power Modules are sub-divided into various frame sizes (FS).

Power Modules with degree of protection IP20: PM240, PM250, PM260

Frame size	FSA	FSB	FSC	FSD	FSE	FSF	FSGX
PM240, 3AC 400V - power units with integrated braking chopper[1)]							
Power range (LO) in kW	0.37 … 1.5	2.2 … 4	7.5 … 15	18.5 … 30	37 … 45	55 … 132	160 … 250
Line filter, Class A	○	●	●	●	●	◑	◑
PM250, 3AC 400V - power units capable of energy recovery							
Power range (LO) in kW	---	---	7.5 … 15	18.5 … 30	37 … 45	55 … 90	---
Line filter, Class A	---	---	●	●	●	●	---
PM260, 3AC 690V - power units capable of energy recovery							
Power range (LO) in kW	---	---	---	11 … 18.5	---	30 … 55	---
Line filter, Class A	---	---	---	○/●	---	○/●	---
Sine-wave filter	---	---	---	●	---	●	---

○ = without; ● = integrated; ◑ = from 110 kW for external mounting

1) The Power Module PM240 FSGX is supplied without braking chopper, but is prepared for installation of an optional braking chopper

PM230 Power Module, IP55 degree of protection / UL Type 12

Frame size	FSA	FSB	FSC	FSD	FSE	FSF
PM230, 3AC 400V - power units with low line harmonics						
Power range (LO) in kW	0.37 … 3	4 … 7.5	11 … 18.5	22 … 30	37 … 45	55 … 90
Line filter, Class A	●	●	●	●	●	●
Line filter, Class B	●	●	●	●	●	●

1.3 IOP Intelligent Operator Panel

The IOP is an operator device with which you can commission the frequency converter locally, enter parameters and monitor operation.

Selection menus and status displays are shown on the text and graphics display. The display is subdivided into various areas

- Status and diagnostics display
- Status message
- Selection menu

① Status and diagnostics display
② Status message, here: Output voltage
③ Status message here: Output frequency
④ Selection menu: Wizard / Control / Menu

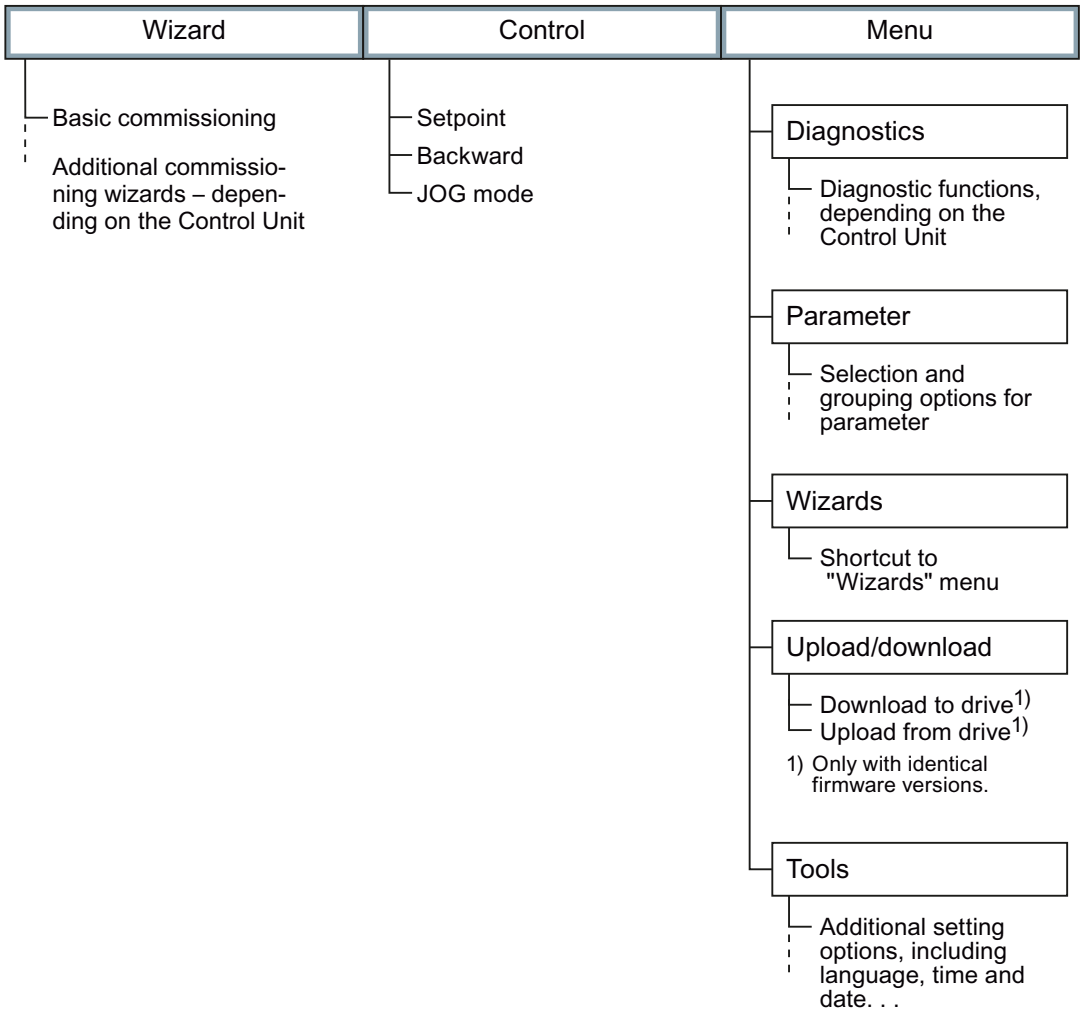
Handling the IOP

	• You can select a menu by turning the navigation wheel, e.g. WIZARD • You confirm your selection by pressing on the navigation wheel (OK).
	By pressing, you can toggle between external command sources and the IOP as command source. • MANUAL means: Manual control using the IOP buttons • AUTO means: The frequency converter responds to the external control commands (e.g. fieldbus or terminals)
	• In the AUTO mode: without function • In the MANUAL mode: Pressing starts the frequency converter
	• In the AUTO mode: without function • In the MANUAL mode: – Press briefly: OFF1 - the motor comes to a standstill along the selected down ramp (P1121) – Pressing longer than 3 seconds: OFF2 - the motor coasts down to standstill
	• Pressing supplies information about the actual display • You return to the display by pressing again
	• Press briefly: Return to the previous display • Pressing longer than 3 seconds: The IOP returns to the status screen

Menu structure

The menu structure shown here applies to the IOP with FW 1.1 and FW1.1HF. It provides an overview of where you can find application Wizards and additional setting functions.

Instead of using the application Wizards, you can also use individual parameters to directly change all of the settings.



Connecting the Power Module to the motor and power supply

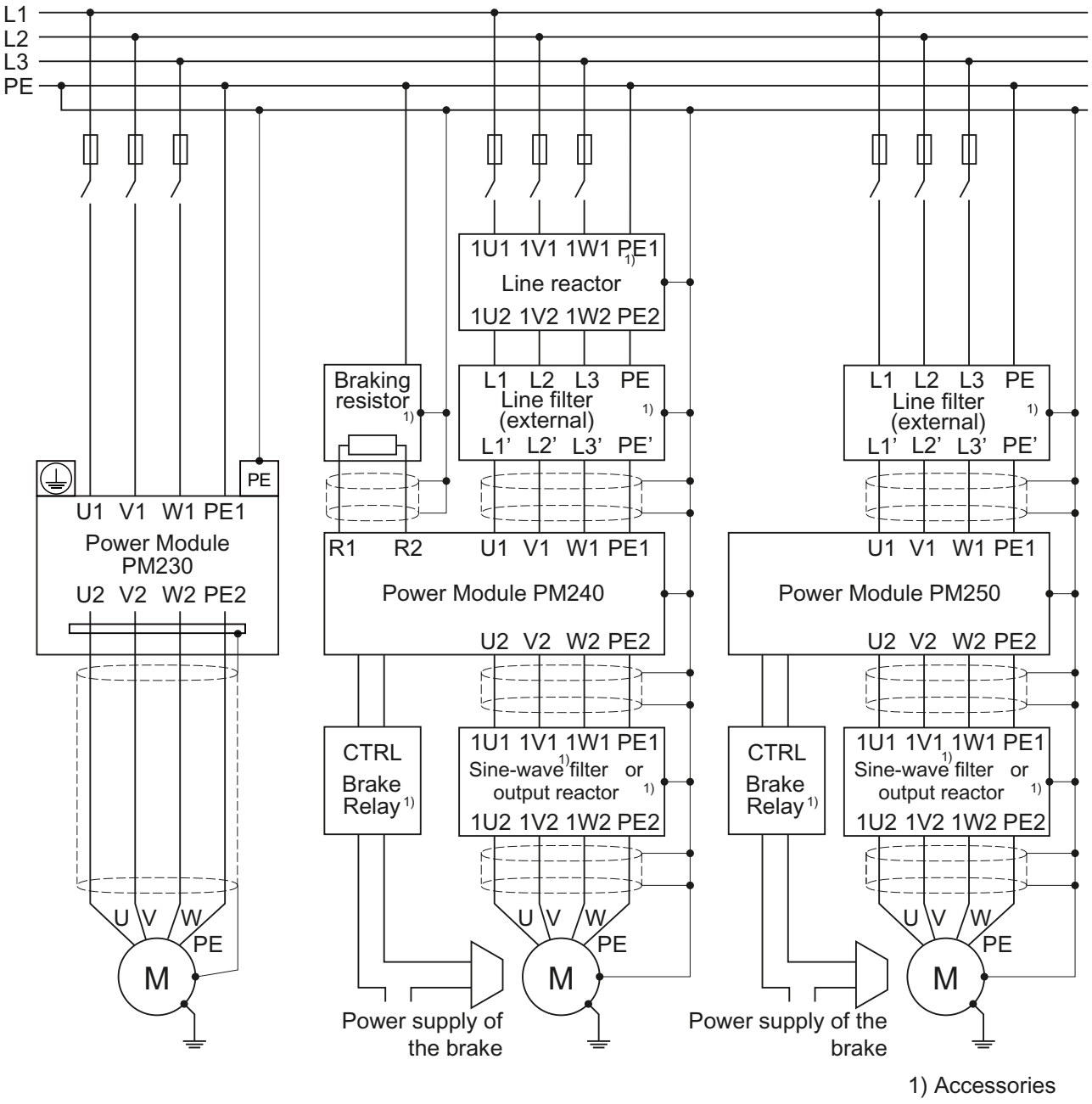
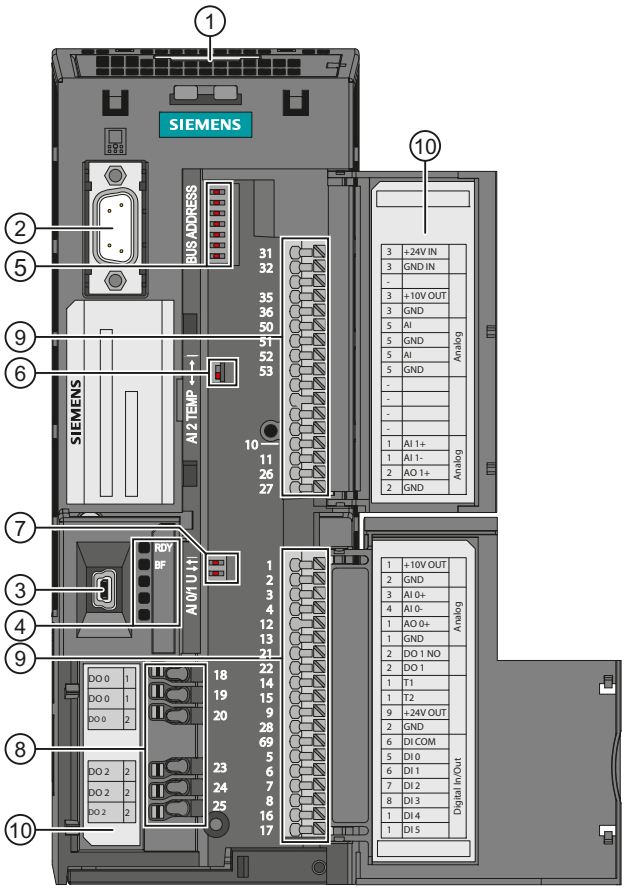


Figure 2-1 Connection diagrams for PM230, PM240, PM250

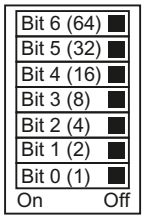
Note: The PM260 has an integrated line and sine-wave filter. Otherwise, the wiring of the PM260 corresponds to that of the PM250.

2.1 Interfaces of the Control Units

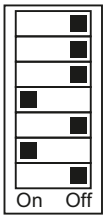
2.1.1 Interfaces of the CU230P-2

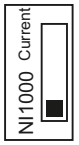


1. Slot for memory card (MMC or SD card)
2. Interface for operator panel (IOP or BOP-2)
3. USB interface for STARTER
4. Status LED — RDY, BF
5. DIP switch for fieldbus address

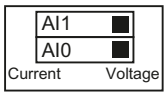


Example 1: Address = 10 (= 2+8)



6. 

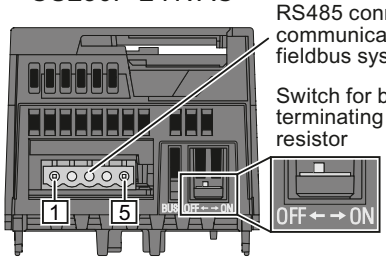
NI1000 DIP switch AI2 (terminals 50/51)

7. 

DIP switch for AI0 and AI1 (terminals 3/4 and 10/11)

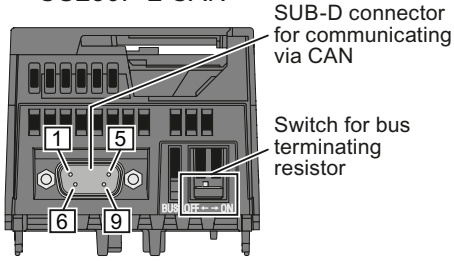
8. Digital outputs
9. Terminal strip
10. Terminal designation

CU230P-2 HVAC



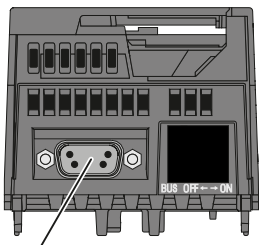
Contact	Designation
1	0 V, reference potential
2	RS485P, receiving and sending (+)
3	RS485N, receiving and sending (+)
4	Cable shield
5	Not connected

CU230P-2 CAN



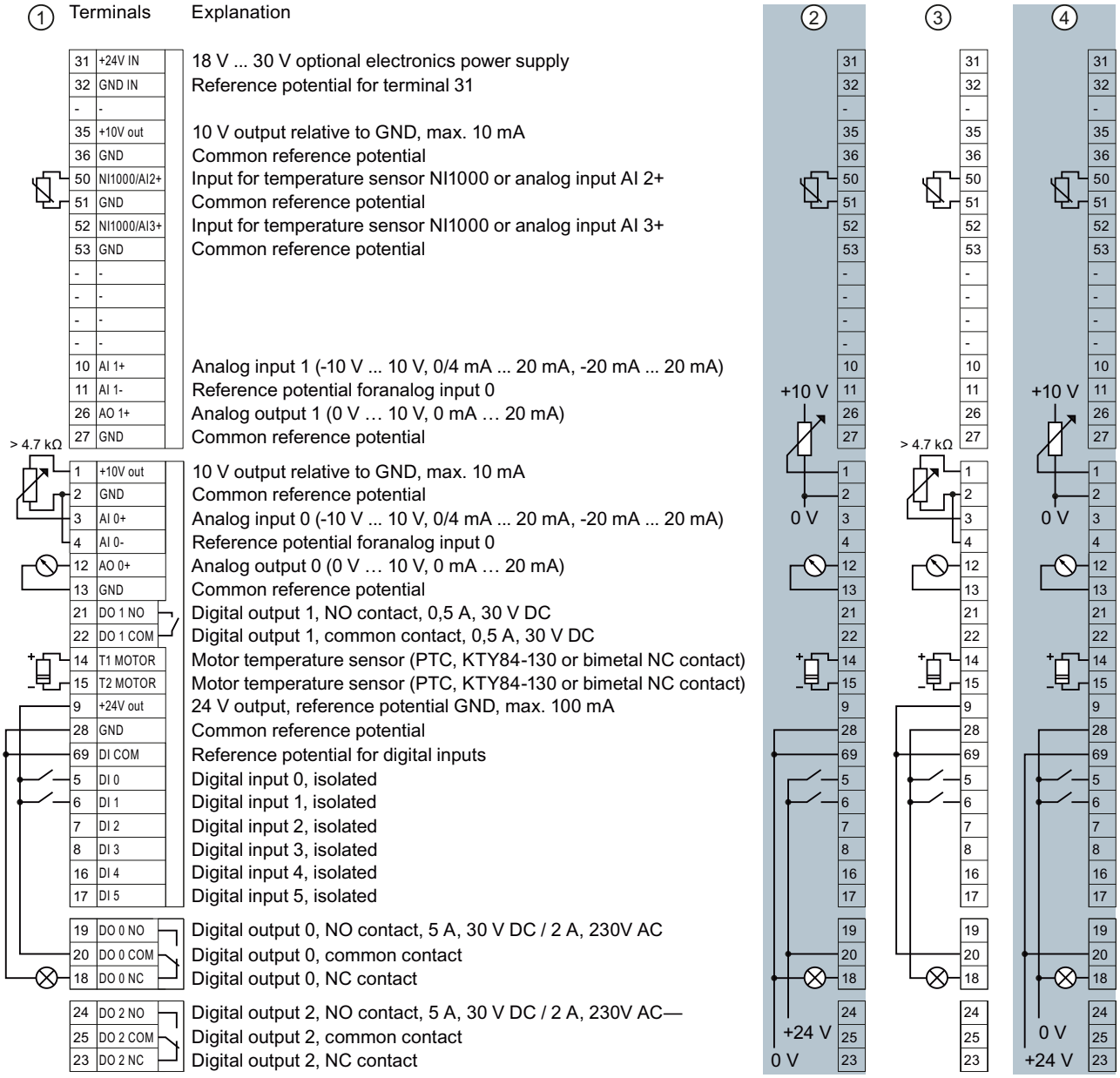
Contact	Designation
1	Not assigned
2	CAN_L, CAN signal (dominant low)
3	CAN_GND, CAN ground
4	Not assigned
5	(CAN _SHLD), optional shield
6	(GND), optional CAN ground
7	CAN_H, CAN signal (dominant high)
8	Not assigned
9	Not assigned

CU230P-2 DP



SUB D socket for communicating via PROFIBUS DP

2.1.2 Terminal strips of the CU230P-2



The wiring of the terminal strip is not shown completely, but as example for each terminal type.

If you require more than six digital inputs, use terminals 3 and 4 (AI 0) or terminals 10 and 11 (AI 1) as additional digital inputs DI 11 or DI 12.

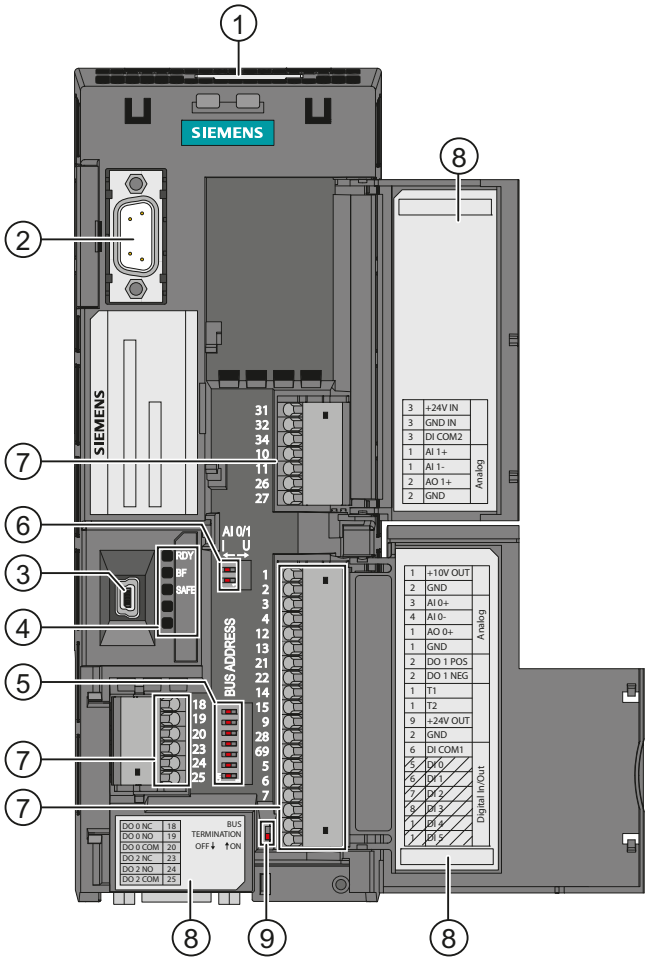
① Wiring when using the internal power supplies. DI = high, if the switch is closed.

② Wiring when using external power supplies. DI = high, if the switch is closed.

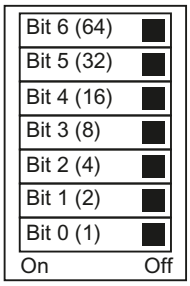
③ Wiring when using the internal power supplies. DI = low, if the switch is closed.

④ Wiring when using external power supplies. DI = low, if the switch is closed.

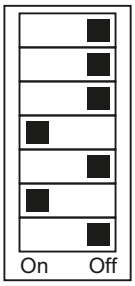
2.1.3 Interfaces of the CU240B-2 and CU240E-2



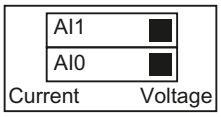
1. Slot for memory card (MMC or SD card)
2. Interface for operator panel (IOP or BOP-2)
3. USB interface for STARTER
4. Status LED
   - RDY
   - BF
   - SAFE
5. DIP switch for fieldbus address



Example:
Address = 10
(= 2+8)

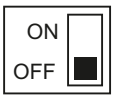


6. DIP switch for AI0 and AI1 (terminals 3/4 and 10/11)



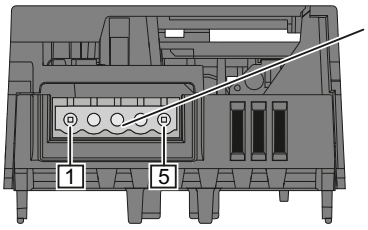
7. Terminal strip
8. Terminal designation
9. Depending on the fieldbus:

   CU240B-2, CU240E-2, CU240E-2 F
   Bus termination



   CU240B-2 DP, CU240E-2 DP, CU240E-2 DP-F
   No function

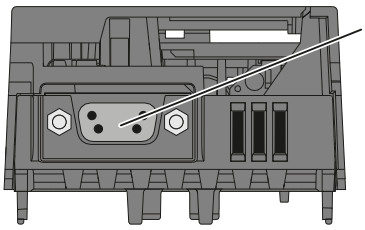
CU240B-2, CU240E-2, CU240E-2 F



RS485 connector for communicating via fieldbus systems

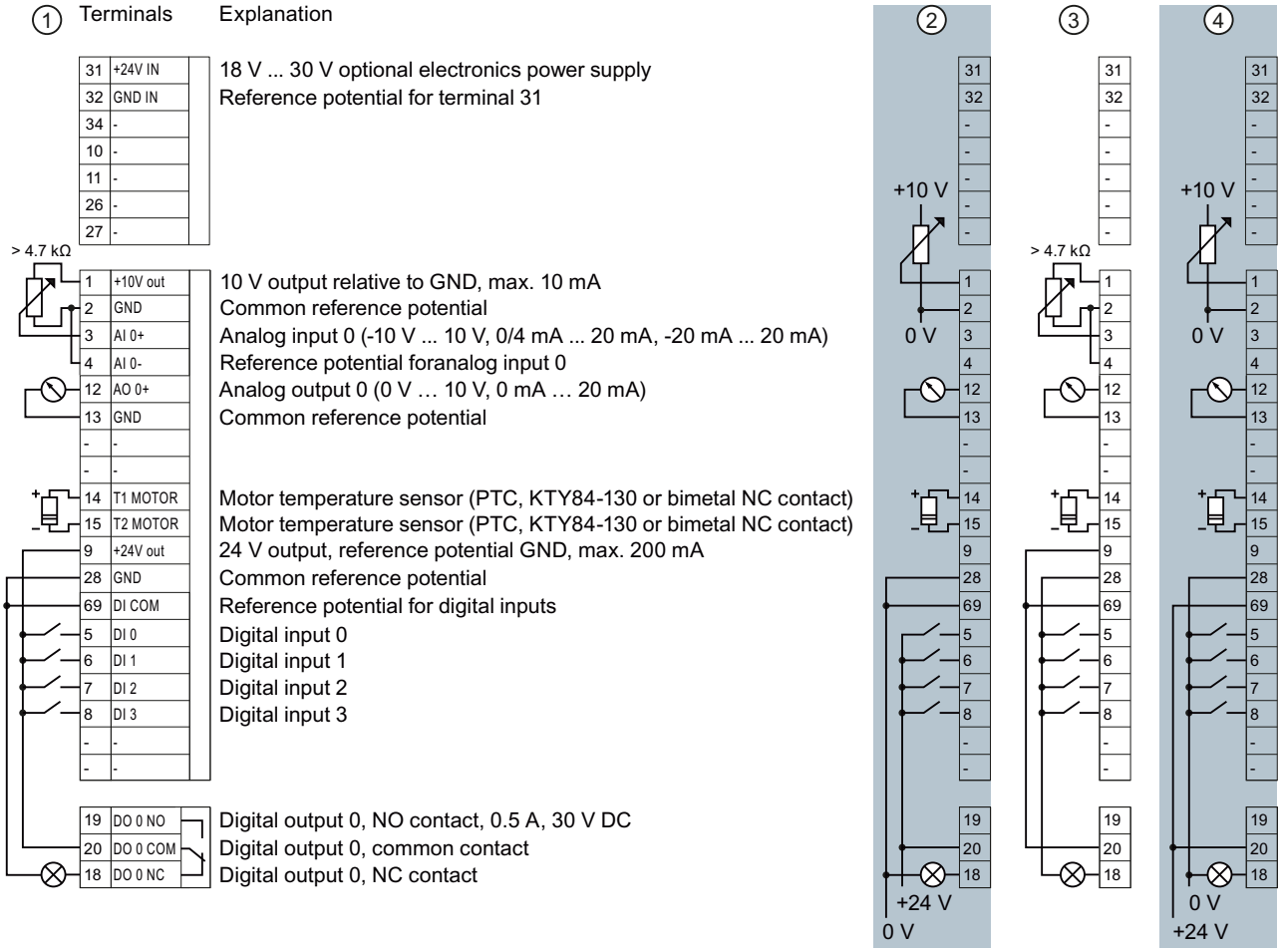
Contact	Designation
1	0 V, reference potential
2	RS485P, receiving and sending (+)
3	RS485N, receiving and sending (+)
4	Cable shield
5	Not connected

CU240B-2 DP, CU240E-2 DP, CU240E-2 DP-F



SUB D socket for communicating via PROFIBUS DP

2.1.4 Terminal strips on CU240B-2 Control Units



If you require more than four digital inputs, use terminals 3 and 4 (AI 0) as additional digital input DI 11.

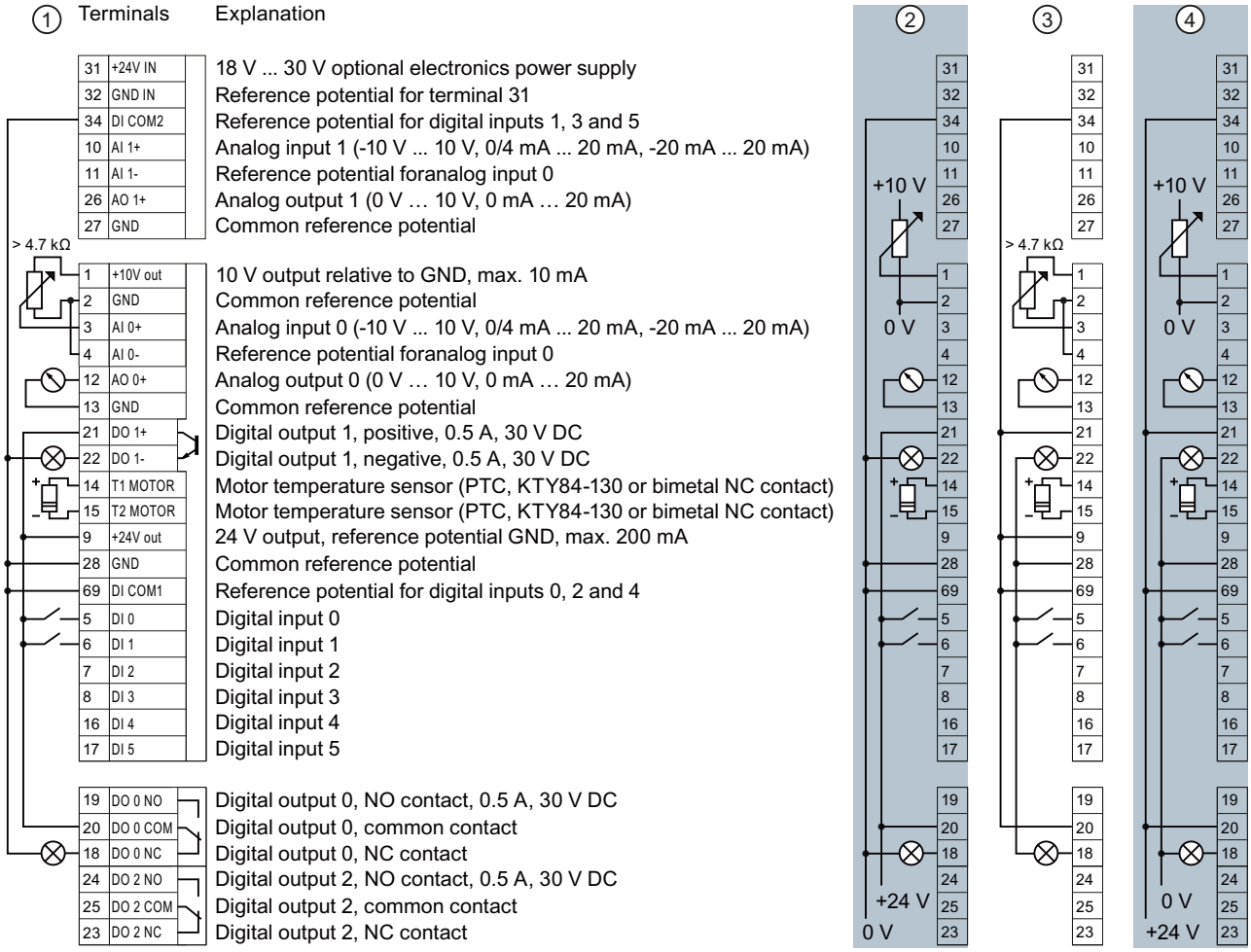
① Wiring when using the internal power supplies. DI = high, if the switch is closed.

② Wiring when using external power supplies. DI = high, if the switch is closed.

③ Wiring when using the internal power supplies. DI = low, if the switch is closed.

④ Wiring when using external power supplies. DI = low, if the switch is closed.

2.1.5 Terminal strips on CU240E-2 Control Units



The terminal strip wiring is not completely shown, only as example for each type of input and output.

If you require more than six digital inputs, use terminals 3 and 4 (AI 0) or terminals 10 and 11 (AI 1) as additional digital inputs DI 11 or DI 12.

① Wiring when using the internal power supplies. DI = high, if the switch is closed.

② Wiring when using external power supplies. DI = high, if the switch is closed.

③ Wiring when using the internal power supplies. DI = low, if the switch is closed.

④ Wiring when using external power supplies. DI = low, if the switch is closed.

2.2 Selecting the interface assignment

The inverter offers different pre-defined settings for its interfaces. Choose the appropriate setting (macro) and wire the terminal strips according to the chosen setting.

If none of the pre-defined settings suites your application completely, do the following steps:

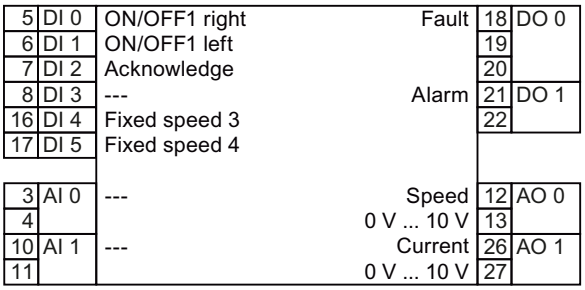
1. Wire the terminal strips according to your application.
2. Choose the best fitting setting (macro).
3. Set your chosen macro during basic commissioning.
4. Change the function of the inappropriate terminals.

Macros 1 … 5 with fixed frequency – CU240E-2

Macro 1	Two-wire control with two fixed speeds

p1003 = Fixed speed 3
p1004 = Fixed speed 4

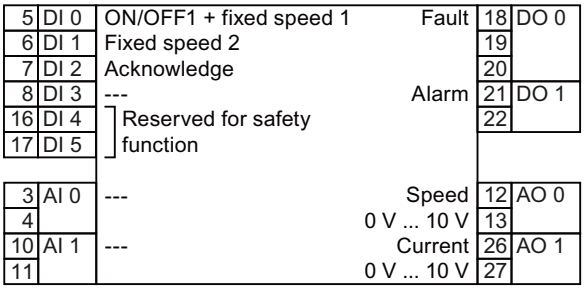
DI 4 and DI 5 = HIGH:
Frequency converter added
fixed speed 3 + fixed speed 4



Macro 2	Two fixed speeds with safety function

p1001 = Fixed speed 1
p1002 = Fixed speed 2

DI 0 and DI 1 = HIGH:
Motor rotates with
fixed speed 1 + fixed speed 2

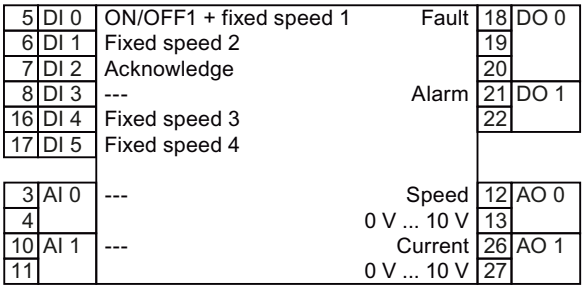


You must enable the safety function, see Section: Enable the fail-safe "Safe Torque Off" function (STO) (Page 29).

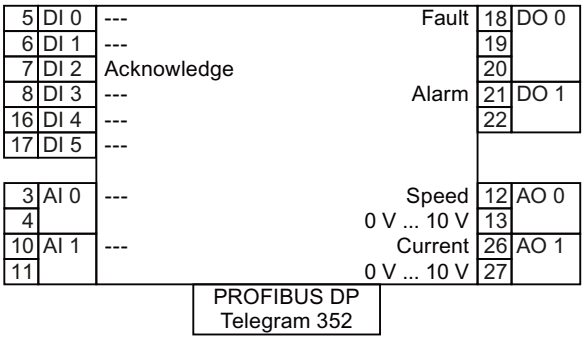
Macro 3	Four fixed speeds

p1001 = Fixed speed 1
p1002 = Fixed speed 2
p1003 = Fixed speed 3
p1004 = Fixed speed 4

Several DI = HIGH:
Frequency converter adds corresponding fixed speeds

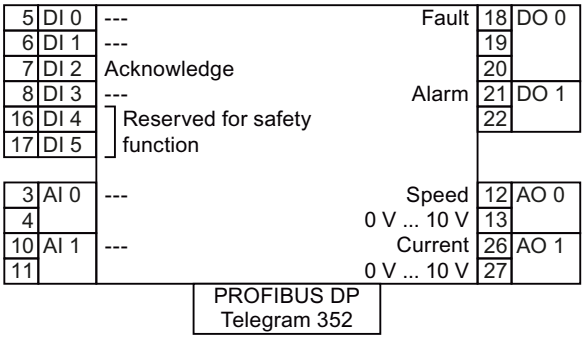


Macro 4	PROFIBUS DP fieldbus



Refer to the following Section on how you can obtain the GSD file: Getting the GSD file (Page 34).

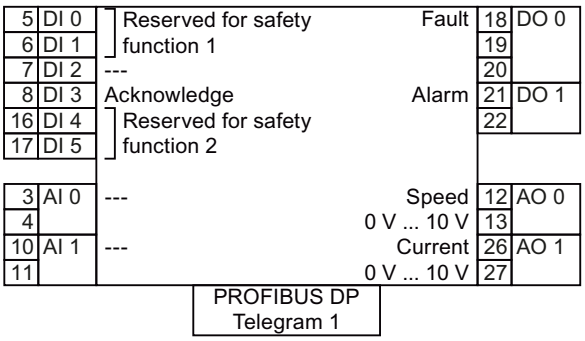
Macro 5	Fieldbus with safety function



You must enable the safety function, see Section: Enable the fail-safe "Safe Torque Off" function (STO) (Page 29). Refer to the following Section on how you can obtain the GSD file: Getting the GSD file (Page 34).

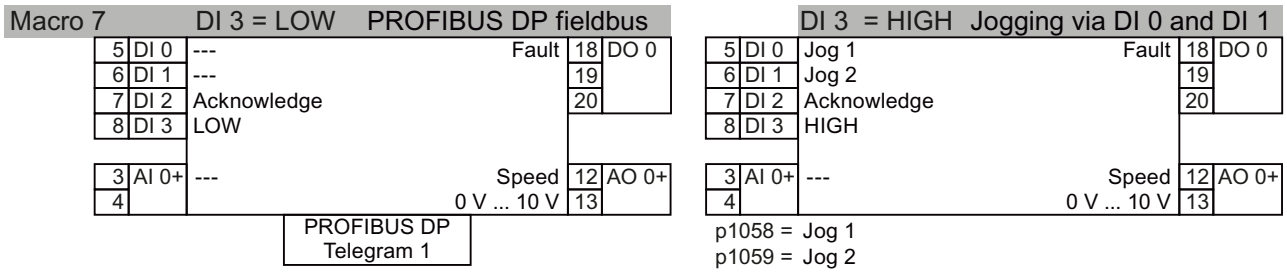
Two safety functions – macro 6 – CU240E-2 F and CU240E-2 DP F

Macro 6	PROFIBUS DP fieldbus with two safety functions



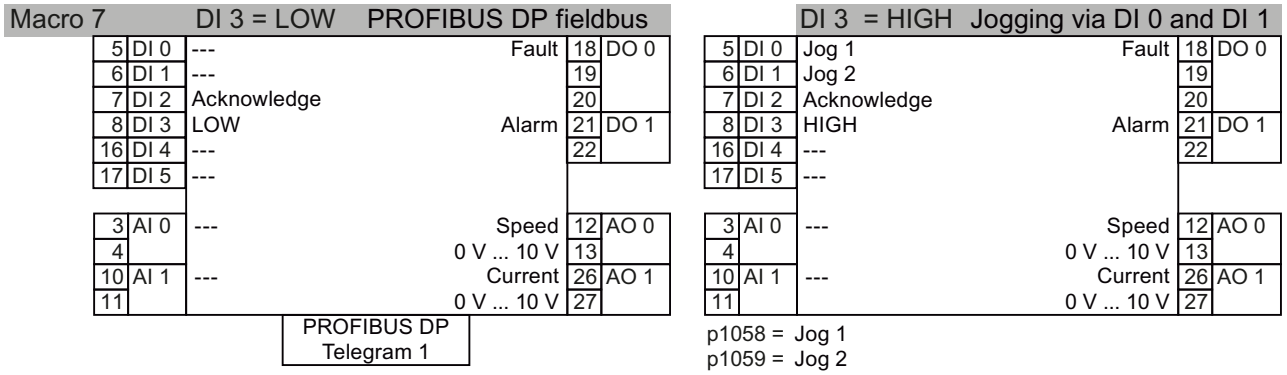
You must enable the safety function, see Section: Enable the fail-safe "Safe Torque Off" function (STO) (Page 29). Refer to the following Section on how you can obtain the GSD file: Getting the GSD file (Page 34).

Automatic / local - changeover between fieldbus and jog mode macro 7 – CU240B-2



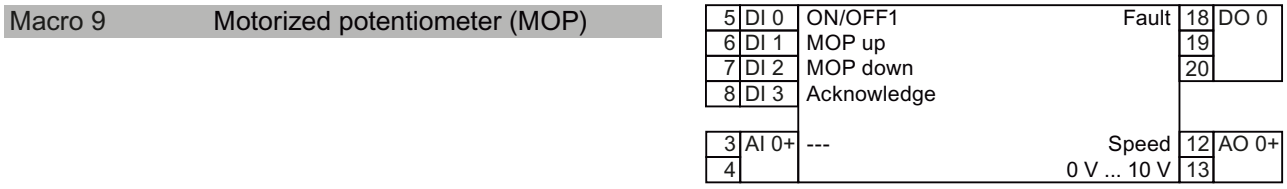
Refer to the following Section on how you can obtain the GSD file: Getting the GSD file (Page 34).

Automatic / local - changeover between fieldbus and jog mode macro 7 – CU230P-2 and CU240E-2



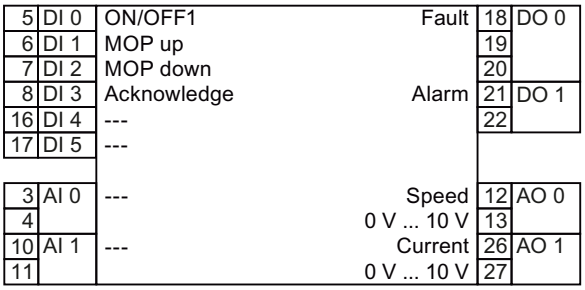
Refer to the following Section on how you can obtain the GSD file: Getting the GSD file (Page 34).

Motorized potentiometer – macro 9 – CU240B-2



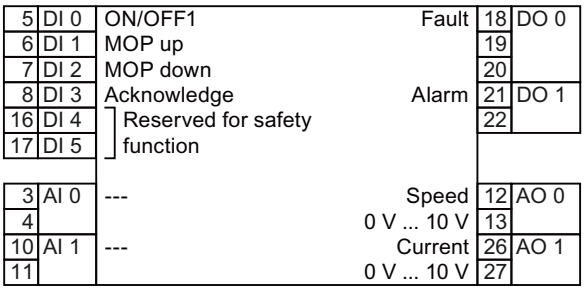
Motorized potentiometer – macro 9 – CU230P-2 and CU240E-2

Macro 9	Motorized potentiometer (MOP)



Motorized potentiometer with safety function – macro 8 – CU240E-2,

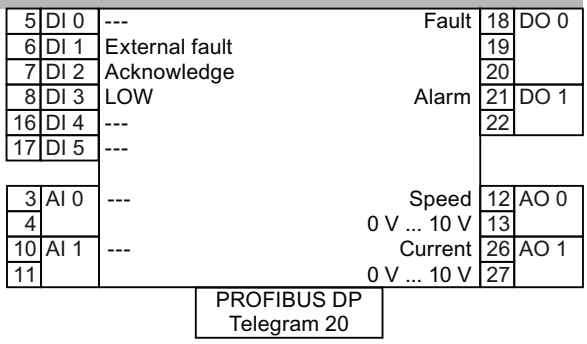
Macro 8	Motorized potentiometer (MOP) with safety function



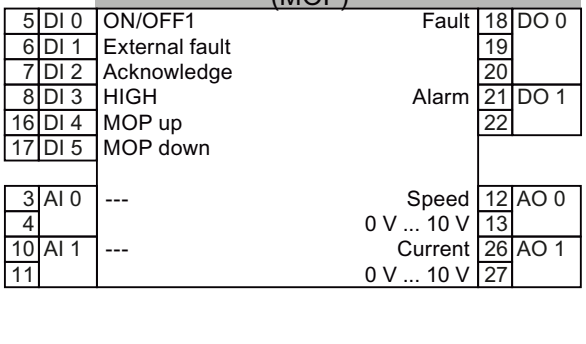
You must enable the safety function, see Section: Enable the fail-safe "Safe Torque Off" function (STO) (Page 29).

Process industry – macros 14 and 15 – CU230P-2 and CU240E-2

Macro 14	DI 3 = LOW	PROFIBUS DP fieldbus



DI 3 = HIGH	Motorized potentiometer (MOP)



Refer to the following Section on how you can obtain the GSD file: Getting the GSD file (Page 34).

Macro 15	DI 3 = LOW	Analog setpoint			DI 3 = HIGH	Motorized potentiometer (MOP)		
5 DI 0	ON/OFF1	Fault	18	DO 0	ON/OFF1	Fault	18	DO 0
6 DI 1	External fault		19		External fault		19	
7 DI 2	Acknowledge		20		Acknowledge		20	
8 DI 3	LOW	Alarm	21	DO 1	HIGH	Alarm	21	DO 1
16 DI 4	---		22		MOP up		22	
17 DI 5	---				MOP down			
3 AI 0	Setpoint	Speed	12	AO 0	---	Speed	12	AO 0
4	I□■U -10 V ... 10 V	0 V ... 10 V	13			0 V ... 10 V	13	
10 AI 1	---	Current	26	AO 1	---	Current	26	AO 1
11		0 V ... 10 V	27			0 V ... 10 V	27	

Two- or three-wire control – macros 12, 17, 18, 19, 20 – CU240B-2

	Macro 12	Macro 17	Macro 18
Two-wire control	Method 1	Method 2	Method 3
Control command 1	ON/OFF1	ON/OFF1 right	ON/OFF1 right
Control command 2	Reversing	ON/OFF1 left	ON/OFF1 left

5 DI 0	Control command 1	Fault	18	DO 0	
6 DI 1	Control command 2		19		
7 DI 2	Acknowledge		20		
8 DI 3	---				
3 AI 0+	Setpoint	Speed	12	AO 0+	
4	I□■U -10 V ... 10 V	0 V ... 10 V	13		

	Macro 19	Macro 20
Three-wire control	Method 1	Method 2
Control command 1	Enable/OFF1	Enable/OFF1
Control command 2	ON right	ON
Control command 3	ON left	Reversing

5 DI 0	Control command 1	Fault	18	DO 0	
6 DI 1	Control command 2		19		
7 DI 2	Control command 3		20		
8 DI 3	Acknowledge				
3 AI 0+	Setpoint	Speed	12	AO 0+	
4	I□■U -10 V ... 10 V	0 V ... 10 V	13		

Two- or three-wire control – macros 12, 17, 18, 19, 20 – CU230P-2 and CU240E-2

	Macro 12	Macro 17	Macro 18
Two-wire control	Method 1	Method 2	Method 3
Control command 1	ON/OFF1	ON/OFF1 right	ON/OFF1 right
Control command 2	Reversing	ON/OFF1 left	ON/OFF1 left

5 DI 0	Control command 1	Fault	18	DO 0	
6 DI 1	Control command 2		19		
7 DI 2	Acknowledge		20		
8 DI 3	---	Alarm	21	DO 1	
16 DI 4	---		22		
17 DI 5	---				
3 AI 0	Setpoint	Speed	12	AO 0	
4	I□■U -10 V ... 10 V	0 V ... 10 V	13		
10 AI 1	---	Current	26	AO 1	
11		0 V ... 10 V	27		

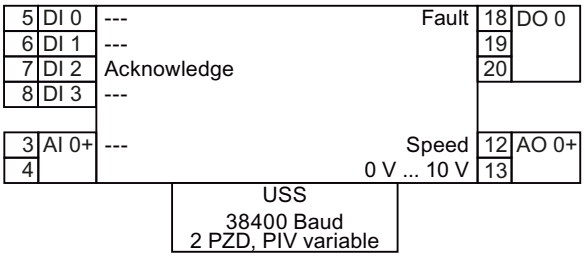
	Macro 19	Macro 20
Three-wire control	Method 1	Method 2
Control command 1	Enable/OFF1	Enable/OFF1
Control command 2	ON right	ON
Control command 3	ON left	Reversing

5 DI 0	Control command 1	Fault	18	DO 0	
6 DI 1	Control command 2		19		
7 DI 2	Control command 3		20		
8 DI 3	Acknowledge	Alarm	21	DO 1	
16 DI 4	---		22		
17 DI 5	---				
3 AI 0	Setpoint	Speed	12	AO 0	
4	I□■U -10 V ... 10 V	0 V ... 10 V	13		
10 AI 1	---	Current	26	AO 1	
11		0 V ... 10 V	27		

Communication via USS – macro 21 – CU240B-2

Macro 21	Fieldbus USS

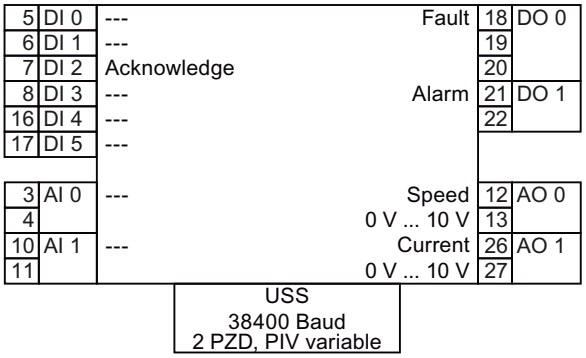
p2020 = Baud rate
p2022 = PZD number
p2023 = PKW number



Communication via USS – macro 21 – CU230P-2 HVAC and CU240E-2

Macro 21	Fieldbus USS

p2020 = Baud rate
p2022 = PZD number
p2023 = PKW number

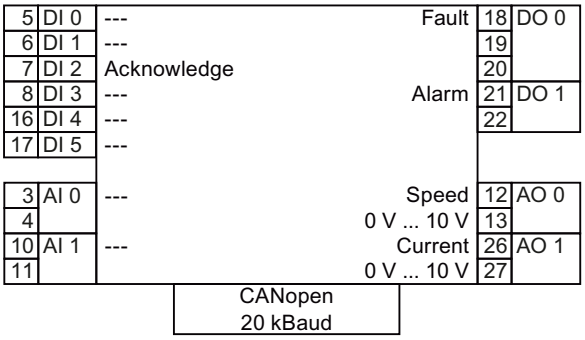


Further information about the fieldbus USS can be found in the operating instructions.

Communication via CAN – macro 22 – CU230P-2 CAN

Macro 22	Fieldbus CANopen

p8622 = Baud rate



Further information about the CANopen fieldbus can be found in the operating instructions.

Commissioning

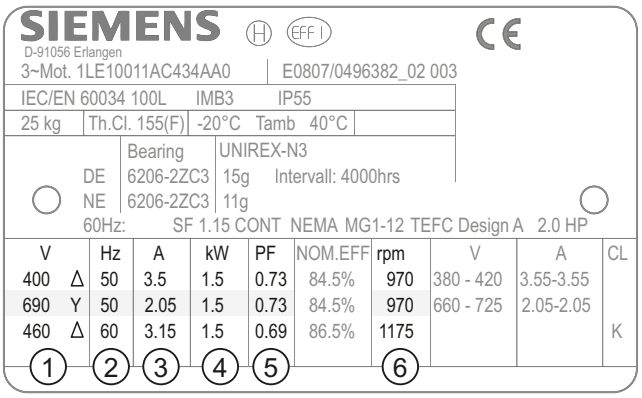
3

You carry out commissioning with the IOP using one of thebasic commissioning wizards (Page 12). If the IOP does not contain the actual frequency converter software, a message is displayed "Update is required". You can find the required data in the Internet under (http://support.automation.siemens.com/WW/view/en/43896115).

In the basic commissioning select the control mode for the motor, enter the motor data and define the function of the frequency converter interfaces. You can find the cabling diagrams in Section Selecting the interface assignment (Page 21) .

When commissioning with an application wizard, you may have to supplement the wiring of the terminal strip to meet the needs of the application.

Table 3- 1 Motor data on the rating plate



1. Motor voltage = P0304
2. Motor frequency = P0310
3. Motor current = P0305
4. Motor power = P0307
5. Motor power factor = P0308
6. Rated motor speed = P0311

Overview of the commissioning

- When commissioning with wizards, the first step is to RESET to the factory settings. This ensures that the frequency converter is in a defined basic setting.

  After the basic commissioning, the wizard that you selected guides you through application-specific settings.
- Before the frequency converter accepts your commissioning data, you must check these and confirm them. You do this using the last but one menu item OVERVIEW OF THE SETTINGS. In this screen, scroll down to CONTINUE and acknowledge it with OK.
- The last step is the prompt SAVE or INTERRUPT WIZARD? Select SAVE! Commissioning using the wizards has now been completed.
- You can subsequently change your frequency converter settings (Section The most important parameters at a glance (Page 30).
- Once you have completed commissioning, you should back up the settings of your frequency converter e.g. on the IOP, so that they are not lost if the frequency converter develops a defect (Section Data backup on the memory card (Page 34)).

3.1 Settings in the basic commissioning menu

Start the menu: WIZARD / BASIC COMMISSIONING

The "Basic Commissioning" wizard guides you through commissioning in the following steps:

No.	Input screen of the IOP	Selected setting on the IOP	Parameter
01/21	Restore factory settings	[1] yes	P0970 = …
02/21	Control mode	[0] V/f with linear characteristic	P1300 = …
03/21	Encoder type	[0] Not activated	P0400 = …
04/21	Encoder pulses	Encoder type not activated P0408 is set as default	Confirm with OK
05/21	Motor data	[0] Europe 50 Hz, kW	P0100 = …
06/21	Characteristic	50 Hz / 87 Hz	Select characteristic
07/21	Motor connections	Observe the motor connection (star / delta)!	Confirm with OK
08/21	Motor data	Enter motor data for 50 Hz (refer to 06/23)	Confirm with OK
09/21	Rated power	Enter [kW] (or [hp]) according to the motor rating plate	P0307 =
10/21	Motor speed	Enter [rpm] according to the motor rating plate	P0311 =
11/21	Motor current	Enter [A] according to the motor rating plate	P0305 =
12/21	Motor voltage	Enter [V] according to the motor rating plate	P0304 =
13/21	Motor data ID	[1] Stationary and rotating measurement[1)] If the motor cannot freely rotate, e.g. if travel is mechanically limited, select the setting [2] "MotID only stationary".	P1900 = …
14/21	I/O configuration	Select a pre-defined setting, see Section: Selecting the interface assignment (Page 21)	P0015 = …
15/21	Minimum speed	Enter the minimum speed [rpm], above which the motor should operate.	P1080 = …
16/21	Ramp-up	Time [s] in which the motor should accelerated from standstill up to the maximum speed (P1082).	P1120 = …
17/21	Ramp-down	Time [s] in which the motor should be decelerated from the maximum speed (P1082) down to standstill.	P1121 = …
18/21	Overview of the settings	Check list + **Select < Continue>** + OK	P3900 = …
19/21	Save settings	Save	Confirm with OK
20/21	Saving, please wait	…	Confirm with OK
21/21	Motor data ID	A motor data ID is started at the next ON command.	Confirm with OK

1) If the IOP Assistant does not offer this setting, after completing the basic commissioning, set parameter p1900 to a value of 1 using the parameter menu.

Identifying motor data

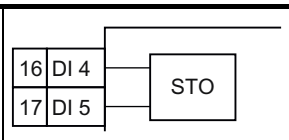
Alarm A07791 is output for as long as the frequency converter has still not identified the motor data. You must switch on the motor (e.g. from the IOP) to identify the motor data. The frequency converter switches-off the motor after the motor data identification has been completed.

⚠ CAUTION
Motor data identification for dangerous loads Secure dangerous plant and system parts before starting the motor data identification, e.g. by fencing off the dangerous location or lowering a suspended load to the floor.

3.2 Enable the fail-safe "Safe Torque Off" function (STO)

In this manual, we describe the commissioning of the STO safety function when it is controlled via a fail-safe digital input.

You will find a detailed description of all safety functions and their control using PROFIsafe in the Safety Integrated Function Manual.

Terminals		Set the following parameters for releasing STO:	
Fail-safe digital input		p9761 = …	Enter password for fail-safe function (factory setting = 0)
		p9762 = …	Enter new password, if required (0 … FFFF FFFF)
		p9763 = …	Confirm new password
		p0010 = 95	Enter commissioning of fail-safe functions
		p9601 = 1	STO is selected via terminal strip
		p9659 = …	Set the forced checking procedure timer. To fulfill the requirements of standards EN 954-1, ISO 13849-1 and IEC 61508 regarding timely error detection, the inverter must regularly test its safety-relevant circuits to ensure that they function correctly.
		p9700 = 208	Copy fail-safe parameters
		p9701 = 220	Confirm fail-safe parameters
		p0010 = 0	Finish commissioning of fail-safe functions

3.3 The most important parameters at a glance

Table 3- 2 **Defining the interfaces of the frequency converter**

Parameter	Possible settings
p0015	**Macro drive unit** Define the pre-assignment for the inputs and outputs using one of the macros 1 to 22 .

Table 3- 3 **Selecting the fieldbus protocol**

Parameter	Possible settings (selection options, depend on the CU type)
p2030	0: No protocol (this means: Control via digital inputs / connecting terminals) 1: USS 2: Modbus 3: PROFIBUS DP 4: CAN 5: BACnet

Table 3- 4 **Setting the ramp-function generator**

Parameter	Meaning
p1080	Minimum speed in [rpm]
p1082	Maximum speed in [rpm]
p1120	Ramp-up time of the motor after switching on in [s]
p1121	Ramp-down time of the motor after switching off in [s]

Table 3- 5 **Setting the control mode**

Parameter	Possible settings
p1300	**Setting the open-loop and closed-loop control mode of a drive** 0: V/f control with linear characteristic 1: Linear V/f characteristic with Flux Current Control (FCC) 2: V/f control with square-law characteristic 3: Freely selectable V/f characteristic 4: Linear V/f characteristic ECO 5: Linear V/f characteristic for applications requiring a precise frequency in textile systems 6: Linear V/f characteristic with FCC for applications requiring a precise frequency in textile systems 7: Square-law V/f characteristic with ECO 19: V/f control without characteristic 20: Vector control without speed encoder 22: Torque control without speed encoder

Table 3- 6 **Motor data according to the rating plate**

Parameter	Possible settings
p0100	**Motor standard IEC / NEMA** 0: Europe 50 [Hz]
p0300	**Motor type selection** 0: No motor 1: Induction motor 2: Synchronous motor
p0304	Motor voltage in [V]
p0305	Motor current in [A]
p0307	Motor frequency in [kW] or [hp]
p0310	Motor frequency in [Hz]
p0311	Motor speed in [rpm]
p0625	Ambient temperature of the motor in [°C]
p0640	Current limit of the motor in [A]

Changing the function of a terminal

Table 3- 7 **Digital inputs**

Parameter	Terminals CU240B-2	Terminals CU240E-2	Terminals CU230P-2	Signal	Command sources of important functions
p0722.0	5 / 69	5 / 69	5 / 69	DI 0	p0840 - ON/OFF (OFF1) p2103 - acknowledge faults p1055/p1056 - jog mode p1035/p1036 - motorized potentiometer p1020 … p1023 - fixed speed setpoint p1230 - activate DC braking p2200 - enable technology controller
p0722.1	6 / 69	6 / 69	6 / 69	DI 1	
p0722.2	7 / 69	7 / 69	7 / 69	DI 2	
p0722.3	8 / 69	8 / 34	8 / 69	DI 3	
p0722.4	-	9 / 34	9 / 69	DI 4	
p0722.5	-	10 / 34	10 / 69	DI 5	

Table 3- 8 Changing the function of a digital input

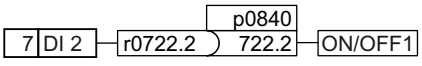
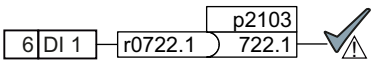
Changing the function	Examples
1. Select the required function marked using a "BI" parameter. 2. Set this parameter to the value of the status parameter r0722.x of the required digital input.	*Function*: Switch-on motor via DI 2. *Setting*: p0840 = 722.2 
	Function: Acknowledge fault using DI 1. *Setting*: p3981 = 722.1 

Table 3- 9 **Digital outputs (relay outputs)**

Parameter	Terminals CU240B-2	Terminals CU240E-2	Terminals CU230P-2	Signal	Important status signals
p0730	18 / 19 / 20	18 / 19 / 20	18 / 19 / 20	DO 0	r52.2 - operation enabled (motor running) r52.3 - fault active 52.7 - alarm active
p0731	-	21 / 22	21 / 22	DO 1	
p0732	-	23 / 24 / 25	23 / 24 / 25	DO 2	

Table 3- 10 Changing the function of a digital output

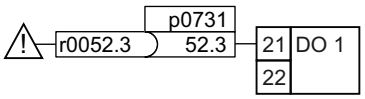
Changing the function	Example
1. Select the required function marked using a "BO" parameter. 2. Set the parameter p073x of the required digital output to the value of the "BO" parameter.	*Function*: Signal "Fault" on DO 1. *Setting*: p0731 = 52.3 

Table 3- 11 **Analog inputs and temperature sensors**

Parameter	Terminals CU240B-2	Terminals CU240E-2	Terminals CU230P-2	Signal	Possible settings
p0756 [0]	3 / 4	3 / 4	3 / 4	AI 0	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: Ni1000 temperature sensor (-50 °C … +150 °C) 7: PT1000 temperature sensor (-50 …+250°C) 8: No sensor connected
p0756 [1]	-	10 / 11	10 / 11	AI 1	
p0756 [2]	-	-	50 / 51	AI 2	
p0756 [3]	-	-	52 / 53	AI 3	
p0755 [0…3]	Analog inputs, actual value in percent				

Table 3- 12 Changing the function of an analog input

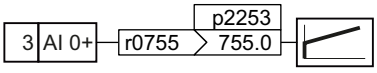
Changing the function	Examples
1. Select the required function marked using a "CI" parameter. 2. Set this parameter to the value of status parameter r0755.x of the analog input.	*Function*: AI 0 provides the setpoint for the PID controller. *Setting*: p2253 = 55[0] 
Use parameter p0756[0] and the I/U switch on the front of the frequency converter to configure the analog input as voltage or current input.	

Table 3- 13 **Analog outputs**

Parameter	Terminals CU240B-2	Terminals CU240E-2	Terminals CU230P-2	Signal	Setting
p0771[0]	12 / 13	12 / 13	12 / 13	AO 0	Important status signals: 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)
p0771[1]	-	26 / 27	26 / 27	AO 1	
p0776[0, 1]	Analog outputs, type				0: Current output (0 mA … +20 mA)1: Voltage output (0 V … +10 V) 2: Current output (+4 mA ... +20 mA)

Table 3- 14 Changing the function of an analog output

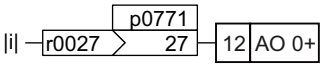
Changing the function	Examples
1. Select the required function marked using a "CO" parameter. 2. Set parameter p0771 of the analog output to the value of the "CO" parameter.	*Function*: Signal "Current" at AO 0. *Setting*: p0771 = 27 
Use parameter p0776[0] to configure the analog input as voltage or current input.	

Table 3- 15 **Motor temperature sensor interface**

Parameter	Terminal	Abbreviation	Possible setting
p0601	14	T1 motor (+)	0: No sensor (factory setting) 1: PTC thermistor (→ P0604) 2: KTY84 (→ P0604) 4: ThermoClick sensor
	15	T2 motor (-)	
p0604	Motor temperature alarm threshold		

3.4 Data backup on the memory card

To save the settings of the frequency converter you require an empty memory card. Proceed as follows:

- Switch off the frequency converter power supply
- Wait until the frequency converter is in a completely no-voltage condition and no LED on the Control Unit is lit.
- Insert the empty memory card into the card slot on the Control Unit.
- Then switch-on the frequency converter power supply again.

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

Note

If the memory card already contains settings of another frequency converter, then the frequency converter does not write its settings to the memory card, but takes the settings from the memory card.

3.5 Getting the GSD file

The GSD is a description file for a PROFIBUS slave. You have two options for obtaining the GSD of your inverter:

1. You can find the SINAMICS inverter GSD on the Internet (http://support.automation.siemens.com/WW/view/en/22339653/133100).
2. The GSD is saved in the inverter. The inverter writes its GSD to the memory card if you insert the memory card in the inverter and set p0804 to 12. Using the memory card, you can then transfer the GSD to your PG/your PC.

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Siemens AG
Industry Sector
Drive Technologies
Motion Control Systems
Postfach 3180
91050 ERLANGEN
GERMANY

www.siemens.com/sinamics-g120

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