Overview

Example: CU230P-2 PN Control Unit

The CU230P-2 Control Units are designed for drives with integrated technological functions for pump, fan and compressor applications. The I/O interface, the fieldbus interfaces and the additional software functions optimally support these applications.

Note:

Shield plates and shield connection kits are available. These can be used in the wiring installation for the Control Units and PM230/PM240P-2 Power Modules to ensure that it complies with EMC guidelines.
For more information, see Shield connection kits and shield plates for Control Units and Power Modules in section Supplementary system components.

PM330 Power Modules are supplied with the accessories needed to create an EMC-compliant wiring installation for Control Units and Power Modules. The Control Unit mounting surface on the Power Modules has mounting slots for shielding terminals.

Function

Below is a list of functions sorted according to the following categories:

Control modes

- Linear and quadratic torque characteristic for fluid flow and positive displacement machines
- ECO mode for additional energy saving in U/f control mode
- Sensorless vector control for sophisticated control tasks and high-output motors

Connections

- 2 analog inputs (current/voltage can be selected) to directly connect pressure/level sensors
- 2 additional analog inputs to connect Pt1000/LG-Ni1000/DIN-Ni1000 temperature sensors
- Direct control of valves and flaps using two 230 V AC relays

Interfaces

- PROFINET, EtherNet/IP, PROFIBUS, USS, BACnet MS/TP, FLN P1, and Modbus-RTU communication

Software functions

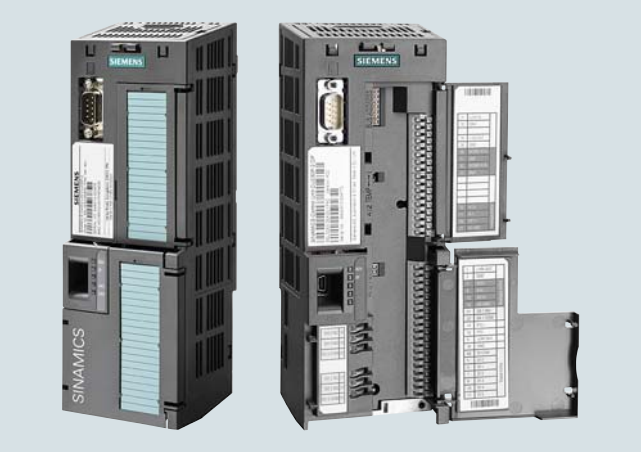
- Automatic restart function after power failure
- Automatic restart
- Flying restart
- Skip frequencies
- 1 PID controller for the closed-loop control of the motor speed as process controller for temperature, pressure, air quality or levels
- 3 freely-programmable PID controllers
- Hibernation mode
- Load check function to monitor belts and flow
- Cascade connection
- Multi-zone controller
- Essential service mode
- Real time clock with three time generators

IOP-2 wizards for special applications with and without PID controller, such as

- Pumps: Positive displacement (constant load torque) and centrifugal pumps (quadratic load torque)
- Fans: Radial and axial fans (quadratic load torque)
- Compressors: Positive displacement (constant load torque) and fluid flow machines (quadratic load torque)

Design

CU230P-2 HVAC, CU230P-2 DP and CU230P-2 PN Control Units



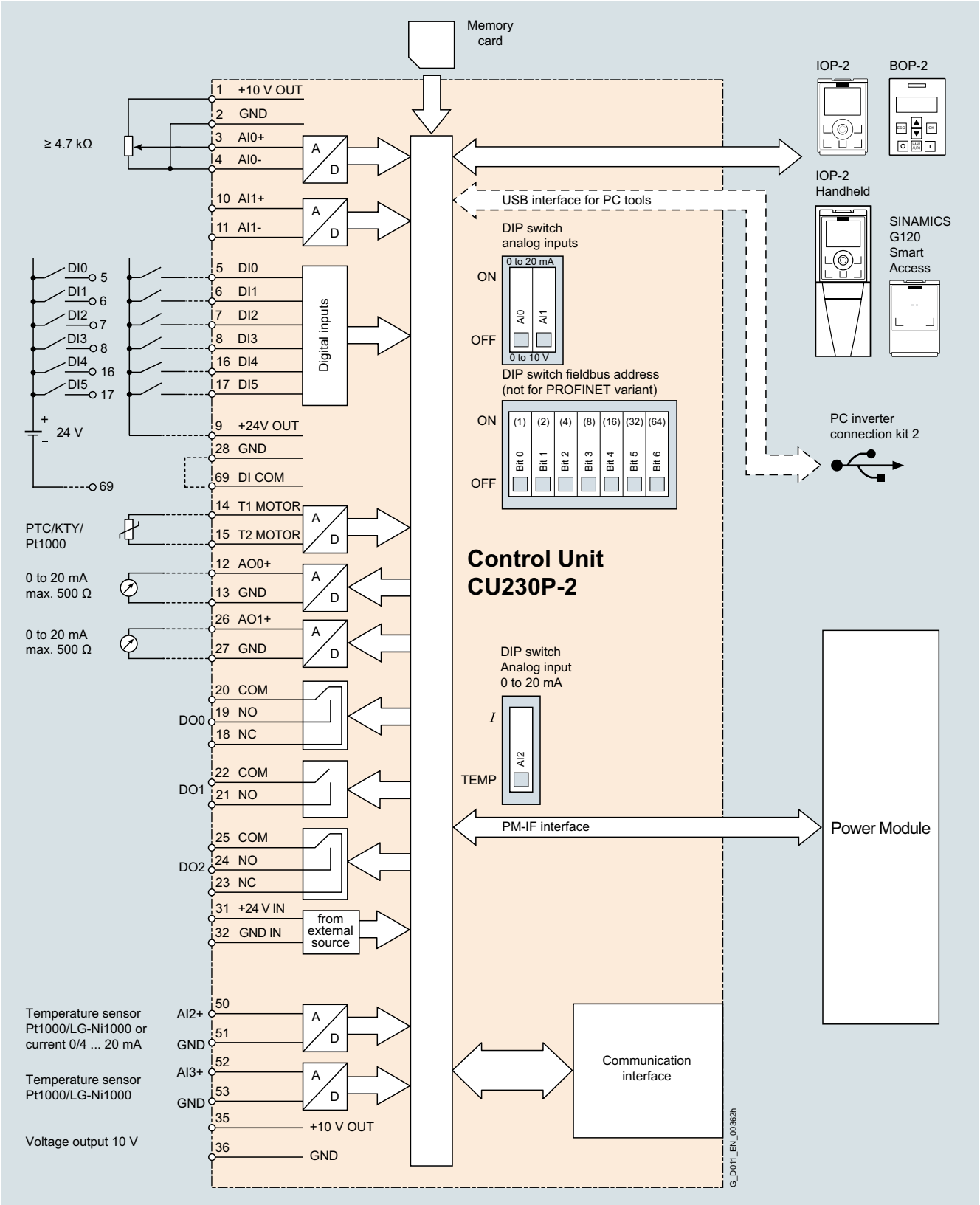
Example: CU230P-2 Control Unit with open and closed terminal covers

Terminal No.	Signal	Features
Digital inputs (DI) – Standard		
69	DI COM	Reference potential for digital inputs
5 ... 8, 16.17	DI0 ... DI5	Freely programmable isolated, inputs in compliance with IEC 61131-2
Digital outputs (DO)		
18	DO0, NC	Relay output 1 NC contact (5 A, 30 V DC or 2 A, 250 V AC) [1]
19	DO0, NO	Relay output 1 NO contact (5 A, 30 V DC or 2 A, 250 V AC)
20	DO0, COM	Relay output 1 Common contact (5 A, 30 V DC or 2 A, 250 V AC) [1]
21	DO1, NO	Relay output 2 NO contact (0.5 A, 30 V DC)
22	DO1, COM	Relay output 2 Common contact (0.5 A, 30 V DC)
23	DO2, NC	Relay output 3 NC contact (5 A, 30 V DC or 2 A, 250 V AC) [1]
24	DO2, NO	Relay output 3 NO contact (5 A, 30 V DC or 2 A, 250 V AC)
25	DO2, COM	Relay output 3 Common contact (5 A, 30 V DC or 2 A, 250 V AC) [1]

Terminal No.	Signal	Features
Analog inputs (AI)		
3	AI0+	Differential input, switchable between current and voltage Value range: 0 ... 10 V, -10 ... +10 V, 0/2 ... 10 V, 0/4 ... 20 mA
4	AI0-	
10	AI1+	Differential input, switchable between current and voltage Value range: 0 ... 10 V, -10 ... +10 V, 0/2 ... 10 V, 0/4 ... 20 mA
11	AI1-	
50	AI2+	Non-isolated input, switchable between current and temperature sensors, type Pt1000/LG-Ni1000/DIN-Ni1000 Value range: 0/4 ... 20 mA, Pt1000: -88 ... +240 °C (-126 ... +464 °F) LG-Ni1000/DIN-Ni1000: -88 ... +165 °C (-126 ... +329 °F)
51	GND	Reference potential of the AI2/internal electronics ground
52	AI3+	Non-isolated input for temperature sensors, type Pt1000/LG-Ni1000/DIN-Ni1000 Value range: Pt1000: -88 ... +240 °C (-126 ... 464 °F) LG-Ni1000/DIN-Ni1000: -88 ... +165 °C (-126 ... 329 °F)
53	GND	Reference potential of the AI3/internal electronics ground
Analog outputs (AO)		
12	AO0+	Non-isolated output Freely programmable Value range: 0 ... 10 V; 0/4 ... 20 mA
13	GND	Reference potential of the AO0/internal electronics ground
26	AO1+	Non-isolated output Freely programmable Value range: 0 ... 10 V; 0/4 ... 20 mA
27	GND	Reference potential of the AO1/internal electronics ground
Motor temperature sensor interface		
14	T1 MOTOR	Positive input for motor temperature sensor Type: PTC, Pt1000, KTY sensor, bimetal
15	T2 MOTOR	Negative input for motor temperature sensor
Power supply		
9	+24 V OUT	Power supply output 24 V DC, max. 100 mA
28	GND	Reference potential of the power supply/internal electronics ground
1	+10 V OUT	Power supply output 10 V DC ±0.5 V, max. 10 mA
2	GND	Reference potential of the power supply/internal electronics ground
31	+24 V IN	Power supply input 20.4 ... 28.8 V DC, max. 1500 mA
32	GND IN	Reference potential of the power supply input
35	+10 V OUT	Power supply output 10 V DC ±0.5 V, max. 10 mA
36	GND	Reference potential of the power supply/internal electronics ground

[1] The following applies to systems complying with UL: A maximum of 3 A, 30 V DC or 2 A, 250 V AC may be connected via terminals 18 / 20 (DO0 NC) and 23 / 25 (DO2 NC).

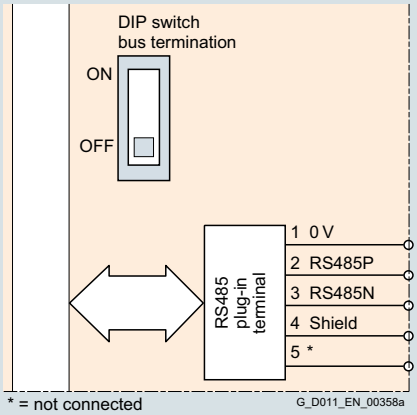
Integration



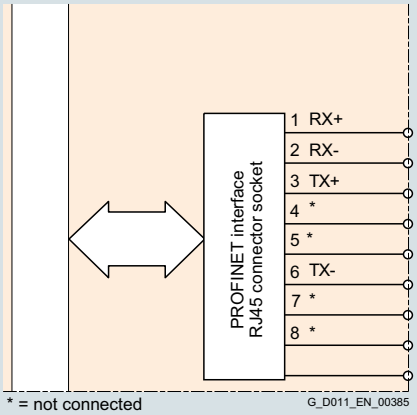
Connection diagram for the CU230P-2 Control Unit series

More information about the interfaces of the Control Unit is available on the Internet at
https://support.industry.siemens.com/cs/document/109477360

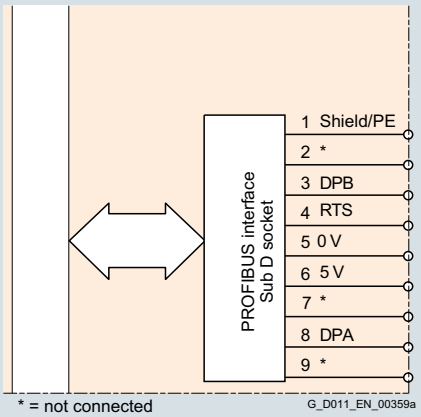
Integration (continued)



Communication interface USS, Modbus RTU, BACnet MS/TP, FLN P1 for CU230P-2 HVAC



PROFINET communication interface, EtherNet/IP



PROFIBUS DP communication interface

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CU230P-2 Control Units

Selection and ordering data

Fieldbus	Profile	Inputs	Outputs	Integrated safety technology	Designation	**Control Unit** Article No.
CU230P-2 series – the specialist for pumps, fans, compressors, water, buildings Technology functions (selection): Free blocks (FFB), 4 × PID controller, cascade connection, hibernation mode, essential service mode, multi-zone control						
• USS • Modbus RTU • BACnet MS/TP • FLN P1	–	6 digital 4 analog	3 digital 2 analog	–	CU230P-2 HVAC	**6SL3243-0BB30-1HA3**
• PROFIBUS DP	• PROFIdrive				CU230P-2 DP	**6SL3243-0BB30-1PA3**
• PROFINET	• PROFIdrive • PROFIenergy				CU230P-2 PN	**6SL3243-0BB30-1FA0**
• EtherNet/IP - ODVA AC drive - SINAMICS profile	–					

Optional firmware memory cards for CU230P-2 Control Units

Designation		Article No.
SINAMICS SD card 512 MB + firmware V4.7 SP9 (Multicard V4.7 SP9)		**6SL3054-7TE00-2BA0**
SINAMICS SD card 512 MB + firmware V4.7 SP10 (Multicard V4.7 SP10)	NEW	**6SL3054-7TF00-2BA0**

For more information about firmware V4.7 SP9: https://support.industry.siemens.com/cs/document/109750805

For more information about firmware V4.7 SP10: https://support.industry.siemens.com/cs/document/109755811

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Technical specifications

Control Unit	CU230P-2 HVAC 6SL3243-0BB30-1HA3	CU230P-2 DP 6SL3243-0BB30-1PA3	CU230P-2 PN 6SL3243-0BB30-1FA0
Electrical specifications			
Operating voltage	24 V DC via the Power Module or by connecting to an external 20.4 ... 28.8 V DC power supply		
Current consumption, max.	0.5 A		
Protective insulation	PELV according to EN 50178 Protective separation from the line supply using double/reinforced insulation		
Power loss, max.	5 W		
Interfaces			
Digital inputs – Standard	6 isolated inputs, optically isolated; free reference potential (own potential group) NPN/PNP logic can be selected using the wiring		
• Switching level: 0 → 1	11 V		
• Switching level: 1 → 0	5 V		
• Input current	5.5 mA		
Digital outputs	3 relays		
• 2 relay changeover contacts	250 V AC, 2 A (inductive load) 30 V DC, 5 A (ohmic load) The following applies to UL-compliant installations: A maximum of 3 A, 30 V DC or 2 A, 250 V AC may be connected via terminals 18 / 20 (DO0 NC) and 23 / 25 (DO2 NC).		
• 1 relay NO contact	30 V DC, 0.5 A (ohmic load)		
Analog inputs	Analog inputs are protected against inputs in a voltage range of ± 30 V and have a common-mode voltage in the ± 15 V range		
• 2 differential inputs	Switchable with DIP switch between voltage and current: -10 ... +10 V, 0/4 ... 20 mA, 12-bit resolution These differential inputs can be configured as additional digital inputs. Switching thresholds: 0 → 1: Rated voltage 4 V 1 → 0: Rated voltage 1.6 V		
• 1 non-isolated input	Switchable with DIP switch between 0/4 ... 20 mA current and temperature sensors, type Pt1000/LG-Ni1000/DIN-Ni1000, 12-bit resolution		
• 1 non-isolated input	Temperature sensors, type Pt1000/LG-Ni1000/DIN-Ni1000, 12-bit resolution		
Analog outputs	The analog outputs have short-circuit protection		
• 2 non-isolated outputs	Switchable between voltage and current using parameter setting: 0 ... 10 V, 0/4 ... 20 mA Voltage mode: 10 V, min. burden 10 kΩ Current mode: 20 mA, max. burden 500 Ω		
PTC/KTY interface	1 motor temperature sensor input, connectable sensors PTC, Pt1000, KTY and bimetal, accuracy ±5 °C		
Bus interface			
Fieldbus protocols	• USS • Modbus RTU • BACnet MS/TP • FLN P1 (switchable using software)	• PROFIBUS DP	• PROFINET • EtherNet/IP - ODVA AC drive - SINAMICS profile
Profile	–	• PROFIdrive	• PROFIdrive • PROFIenergy
Hardware	Plug-in terminal, insulated, USS: max. 187.5 kBaud Modbus RTU: 19.2 kBaud, Bus terminating resistor that can be switched in	9-pin SUB-D socket, insulated, max. 12 Mbit/s Slave address can be set using DIP switches	2 × RJ45, PROFIdrive profile V4.1, device name can be stored on the device Max. 100 Mbit/s (full duplex)

Technical specifications (continued)

Control Unit	CU230P-2 HVAC 6SL3243-0BB30-1HA3	CU230P-2 DP 6SL3243-0BB30-1PA3	CU230P-2 PN 6SL3243-0BB30-1FA0
Tool interfaces			
Memory card	SINAMICS SD card		
Operator panels			
• Intelligent Operator Panel IOP-2	Can be directly plugged on		
• Basic Operator Panel BOP-2	Can be directly plugged on		
• Blanking cover	Required when no operator panel is plugged in order to achieve degree of protection IP55 on PM230 Power Modules degree of protection IP55/UL Type 12		
PC interface	USB (connection via PC inverter connection kit 2)		
Open-loop/closed-loop control techniques			
U/f linear/quadratic/parameterizable	✓		
U/f with flux current control (FCC)	✓		
U/f ECO; linear/quadratic	✓		
Vector control, sensorless	✓		
Software functions			
Setpoint input	✓		
Fixed frequencies	16, parameterizable		
JOG	✓		
Digital motorized potentiometer (MOP)	✓		
Ramp smoothing	✓		
Extended ramp-function generator (with ramp smoothing OFF3)	✓		
Slip compensation	✓		
Signal interconnection with BICO technology	✓		
Free function blocks (FFB) for logical and arithmetic operations	✓		
Switchable drive data sets (DDS)	✓ (4)		
Switchable command data sets (CDS)	✓ (4)		
Flying restart	✓		
Automatic restart after line supply failure or operating fault (AR)	✓		
Technology controller (internal PID)	✓		
Hibernation mode with internal/external PID controller	✓		
Belt monitoring with and without sensor (load torque monitoring)	✓		
Dry-running/overload protection monitoring (load torque monitoring)	✓		
Thermal motor protection	✓ (I^2t, sensor: PTC/Pt1000/KTY/bimetal)		
Thermal inverter protection	✓		
Motor identification	✓		
Auto-ramping (V_{dcmax} controller)	✓		
Kinetic buffering (V_{dcmin} controller)	✓		
Possible braking functions	• DC braking (PM230, PM240P-2, PM330, Cabinet) • Compound braking (PM240P-2) • Dynamic braking with optional Braking Module and braking resistor (PM330, Cabinet)		

Technical specifications (continued)

Control Unit	CU230P-2 HVAC	CU230P-2 DP	CU230P-2 PN
	6SL3243-0BB30-1HA3	6SL3243-0BB30-1PA3	6SL3243-0BB30-1FA0
Mechanical specifications and ambient conditions			
Degree of protection	IP20		
Signal cable cross-section	0.15 ... 1.5 mm^2 (AWG28 ... AWG16)		
Operating temperature	For CU230P-2 HVAC/DP: -10 ... 60 °C (14 ... 140 °F) For CU230P-2 PN:-10 ... 55 °C (14 ... 131 °F) With IOP-2/BOP-2: 0 ... 50 °C (32 ... 122 °F) Derating of 3 K/1000 m applies to Control Units as of an installation altitude of 1000 m (3281 ft) above sea level.		
Storage temperature	-40 ... +70 °C (-40 ... +158 °F)		
Relative humidity	<95 %, condensation not permissible		
Dimensions			
• Width	73 mm (2.87 in)		
• Height	199 mm (7.83 in)		
• Depth	65.5 mm (2.58 in)		
Weight, approx.	0.61 kg (1.34 lb)		