SINAMICS G120P
Pump, fan and compressor inverters

SINAMICS G120
Standard inverters

SINAMICS G110D
Distributed inverters

Catalog News D 11.1 N · October 2010

SINAMICS Drives

Answers for industry.

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E86060-K6710-A121-A3-7600 IK PI N

Motion Control
SIMOTION, SINAMICS S120 and Motors for Productions Machines

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E86060-K4921-E101-A1-7600 PM 21 N

SINAMICS S110 PM 22
The Basic Positioning Drive

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Technical Information incl. LV 1 T

Interactive Catalog CA 01
Industry Automation and Motion Control
The Offline-Mall (DVD)

E86060-D4001-A510-C8-7600

Industry Mall

Internet:
http://www.siemens.com/industrymall

Additional documentation

You will find all information material, such as brochures, catalogs, manuals and operating instructions for standard drive systems up-to-date on the Internet at the address

http://www.siemens.com/sinamicsg120/printmaterial

You can order the listed documentation or download it in common file formats (PDF, ZIP).

new New products in this catalog.

[1)] German

SINAMICS Drives

SINAMICS G

Pump, fan and compressor inverters, Standard inverters, Distributed inverters

Catalog D 11.1 N · October 2010

The products and systems described in this catalog are manufactured and distributed using a certified quality management system in accordance with DIN EN ISO 9001: 2008 (Certificate Registration No. DE-001258 QM08) and DIN EN ISO 14001:2004 (Certificate Registration No. DE-001258 UM). The certificate is recognized in all IQNet countries.

Note:
The News Catalog D 11.1 N · October 2010 supplements Catalog D 11.1 · 2009.
It contains new products as well as up-dated technical specifications and ordering data.
Catalog D 11.1 · 2009 remains valid.

Refer to the Industry Mall for current updates of this catalog:
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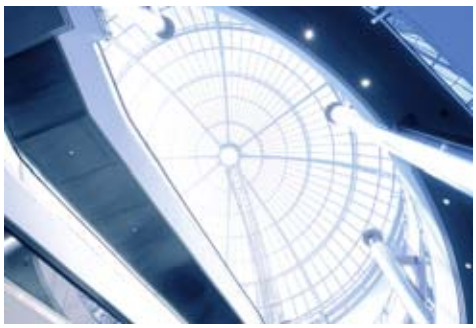
The products contained in this catalog can also be found in the Interactive Catalog CA 01 on DVD.
Order No.:
E86060-D4001-A510-C8-7600

Please contact your local Siemens branch



Answers for industry.

Siemens Industry answers the challenges in the manufacturing and the process industry as well as in the building automation business. Our drive and automation solutions based on Totally Integrated Automation (TIA) and Totally Integrated Power (TIP) are employed in all kinds of industry. In the manufacturing and the process industry. In industrial as well as in functional buildings.

Siemens offers automation, drive, and low-voltage switching technology as well as industrial software from standard products up to entire industry solutions. The industry software enables our industry customers to optimize the entire value chain – from product design and development through manufacture and sales up to after-sales service. Our electrical and mechanical components offer integrated technologies for the entire drive train – from couplings to gear units, from motors to control and drive solutions for all engineering industries. Our technology platform TIP offers robust solutions for power distribution.

Check out the opportunities our automation and drive solutions provide. And discover how you can sustainably enhance your competitive edge with us.

SINAMICS G120P
Pump, fan and compressor inverters 0.37 to 90 kW (0.5 to 125 hp)

Overview

Energy awareness, economy and energy efficiency – Siemens offers an answer to these trends with the new SINAMICS G120P inverter series. SINAMICS G120P is an innovative, energy-efficient inverter series that has been designed for user-friendliness and optimized specifically for pumps, fans and compressors in the industrial environment, but also for tasks in building automation.

SINAMICS G120P offers efficient drive solutions for a wide range of applications. With their easy handling, the drives support the user not only in optimizing existing frequency-controlled drives, but also in converting fixed-speed drives and in retrofitting.

The SINAMICS G120P inverter series features advanced hardware and software functions that make a substantial contribution towards saving energy and thus make more careful use of our natural resources. SINAMICS G120P is also particularly "line-friendly", i.e. the inverter topology keeps harmonic currents to a minimum. There is no need to use a line reactor at the line infeed.

SINAMICS G120P is ideally suited to applications such as closed-loop speed control of fans for ventilation, circulating pumps for heating and cooling systems, booster pumps or pumps for level control and fans for stairwells.

Example of SINAMICS G120P to IP54 degree of protection/UL Type12, frame sizes FSA, FSB and FSC; comprising PM230 Power Module and with mounted IOP Intelligent Operator Panel

Example of SINAMICS G120P to IP54 degree of protection/UL Type12, frame sizes FSD, FSE and FSF; comprising PM230 Power Module and with mounted IOP Intelligent Operator Panel

Overview (continued)

The specialist for pump, fan and compressor applications

SINAMICS G120P is ideally suited to pump, fan and compressor applications in the industrial environment, in the process industry, water industry, and in the building automation business. SINAMICS G120P is extremely suitable for, e.g.:

- Pumps for pressure boosting stations
- Level control
- Cooling tower fan control
- Fans for supply air and exhaust air
- Fans for tunnels and multi-storey car parks
- Fans for stairwells
- Compressors for supplying compressed air

To meet these specific requirements, SINAMICS G120P is equipped with an extensive quantity structure:

- Fieldbus interface of the CU230P-2 optionally with
  - RS485/USS, Modbus/RTU, BACnetMS/TP
  - PROFIBUS DP
  - CANopen
- NI1000/PT1000 interface for direct connection of temperature sensors
- 230 V relay for direct connection of auxiliary equipment
- Isolated digital inputs with a separate potential group to prevent potential transfers
- Isolated analog inputs for EMC-compatible installation without the need for additional components

Technology function

Functions specific to pumps, fans and compressors are already integrated, e.g.:

- Automatic restart:
  Application restart on power failure or fault occurrence
- Flying restart:
  Connection of the inverter when the motor is running
- ECO mode:
  Automatic adaptation of the motor current to the prevailing load conditions, e.g. for applications with a low dynamic response and a constant speed setpoint
- Motor staging:
  For applications that require simultaneous operation of between 1 and 4 motors depending on load, e.g. closed-loop control of highly variable flow volumes
- Hibernation:
  Drive is started/stopped in line with the current setpoints
- 4 integrated PID controllers:
  For controlling the speed of the drive as a function of pressure, temperature, flowrate, level, air quality and other process variables
- Extended emergency mode:
  Special inverter "operating mode" that enhances the availability of the drive system in the event of a fire
- Multi-zone controller:
  Closed-loop control of a zone with up to three sensors for pressure or temperature, or closed-loop control of two independent zones each with one sensor
- Bypass mode:
  When the setpoint is reached or a fault occurs, there is a changeover to line operation
- Programmable timer switches
- Real-time clock for time-dependent process controls, e.g. temperature reduction for heating control at night
- Freely programmable logical function blocks for simulating simple PLC functions

User-friendliness

A high degree of user-friendliness is one of the main characteristics of the SINAMICS G120P

- Simple application-specific commissioning wizard "on board" the IOP (Intelligent Operator Panel)
- Plain text scripts for integration in the STARTER commissioning software tool for more complex applications
- Operator panel with plain text display and extensive diagnostics functions (IOP)
- Micro memory card (MMC)/SIMATIC memory card for storing parameter settings, cloning and local commissioning
- Plug-in terminal blocks for supply cables and motor cables (for power outputs of up to 18.5 kW)
- Fast replacement of drive components thanks to modular structure

Guided operation using wizards

SINAMICS G120P offers two basic options for guided parameterization/setting in a target application:

1. Commissioning of simple applications with the help of the application wizards integrated into the IOP.

The following wizards are available:

- Quick commissioning
- Pump with/without PID control
- Fan with/without PID control
- Compressor with/without PID control
- PID setting
- Boost setting

An appropriate connection diagram for the standard wiring can be found in the documentation of the IOP.

2. Commissioning of more complex applications using plain text scripts through solution-based dialog prompting in the STARTER software:

The wizards support setpoint input for process values, setpoint exchange by means of timers, simple integration of technological functions such as motor staging or hibernation. The connection diagrams for standard wiring that are required for the wizards are also supplied.

The following wizards are currently available:

- Fan for exhaust air with closed-loop control of pressure/air quality
- Fan for cooling tower with closed-loop control of cooling water temperature
- Fan for stairwell with closed-loop control of pressure and enhanced fire emergency operation
- Fan for tunnel/mult-storey car park with closed-loop control of air quality and enhanced fire emergency operation
- Fan for supply air with closed-loop control of pressure/temperature/air quality/flowrate
- Pumps with closed-loop control of pressure
- Pumps with closed-loop control of level
- Pumps for cooling circuits with closed-loop control of temperature
- Compressor with closed-loop control of pressure

Overview (continued)

Modularity

SINAMICS G120P is a modular inverter system comprising a variety of components. These are:

- CU230P-2 Control Unit
- PM230 Power Module
- Operator panel or blanking cover

The CU230P-2 Control Unit controls and monitors the Power Module and the connected motor using several different closed-loop control types that can be selected. It supports communication to a local or central controller as well as to the monitoring equipment and enables the connection of all process-related auxiliary equipment and external components (sensors, valves, contactors, etc.).

The PM230 Power Module supplies the motor in a power range 0.37 kW to 90 kW (LO). State-of-the-art IGBT technology with pulse-width modulation is used for reliable and flexible motor operation. Comprehensive protection functions provide a high degree of protection for the Power Module and the motor.

The IOP operator panel supports user-friendly local commissioning, control and diagnostics and enables complete inverter data sets to be pre-parameterized and cloned.

As an alternative, a blanking cover can be used to cover the interface for the operator panel.

Line supply conditions

The inverter topology implemented ensures minimal line harmonic distortion. This means that the harmonic currents are low and the relevant low-frequency single harmonics as well as the THD value (Total Harmonic Distortion) satisfy the EN 61000-3-12 and IEC 61000-3-12 standards.

Reliable operation in harsh environments

SINAMICS G120P is designed for use under harsh environmental conditions:

- High degree of protection IP55/UL Type12 for installation outside the control cabinet
- Operation at ambient temperature of up to 60 °C
- The power loss is dissipated using an external heat sink, separate internal air circulation
- Coated modules for increased resistance to humidity and dust

STARTER commissioning tool

The STARTER commissioning tool is used to commission and diagnose SINAMICS G120P inverters. The operator guidance combined with comprehensive, user-friendly functions for the relevant drive solution allow you to commission the device quickly and easily.

Benefits

Energy efficiency

SINAMICS G120P was developed with the objective of increasing efficiency throughout the entire process chain and minimizing energy consumption. For this purpose, hardware and software functions have been integrated into the inverter as standard. The main features are:

- Extremely high active power component of apparent power thanks to efficient inverter topology: For the same drive power, the G120P consumes less current from the supply than a comparable inverter.
- ECO mode through automatic adaptation of the motor current to the prevailing load conditions with closed-loop control mode V/F ECO and vector without sensor (SLVC) and savings of up to 40 % under partial load conditions
- Hibernation as a function of setpoints in the process
- Automatic switchover to line operation at rated speed (bypass mode)
- Omission of mechanical closed-loop control systems and the associated efficiency losses, by using four internal PID controllers
- Auto-ramping function for current limitation purposes

Optimum energy management through innovative technology

Optimized inverter topology

- Limit values for harmonic currents and THD compliant with IEC/EN 61000-3-12 are fulfilled without the need for additional measures ($R_{sce} \geq 120$)
- Reduced line harmonic distortions
- No reactors → Compact design
- Lower apparent power → Smaller cable cross-sections

ECO mode

- Energy-saving capability through automatic adaptation of the magnetic flux in the motor to prevailing load conditions (lower motor losses under partial load conditions)

Hibernation

- Energy-saving capability: The drive is started/stopped in line with the currently applicable setpoints, thereby avoiding excessive mechanical loads

Straightforward, application-specific commissioning and operation using operator panel

- Local commissioning without specialized knowledge of inverters using application-specific wizards
- Unique: Micro Memory Card (MMC)/SIMATIC memory card for pre-parameterization and cloning inverter data sets
- Data backup for easy replacement
- USB port integrated on the CU230P-2 for commissioning and easy diagnostics using the STARTER PC tool
- Commissioning/diagnostics and controlling of inverters

Flexible deployment of integrated functions

- PLC functions for local control tasks
  Flexible use of integrated function blocks → No need for additional, external components
- 4 integrated PID controllers
  Distributed closed-loop control for motor-independent process control without higher-level controller (PLC)
- 3 freely programmable digital timer switches
  Control for freely selectable daily and weekly programs

Benefits (continued)

Flexible deployment across a wide range of applications

- Isolated digital inputs with separate potential group
- Isolated analog inputs
  - Potential transfer avoided
  - EMC-compliant design without the need for additional components in line with process industry requirements
- NI1000/PT1000 temperature sensor interface
  - Direct connection of temperature sensors without external interface unit
- 230 V relay
  - Direct control for auxiliary equipment, e.g. reactor or valve actuators

Flexible, modular system for challenging environmental conditions

- Operation at ambient temperatures of up to +60 °C
- Modular design of power and control electronics
  - Power range can be easily extended
  - Fast exchange of power units
- Removable operator panel
  - Protection against unauthorized access
  - IP54/UL Type12 degree of protection with IOP operator panel
  - IP55/UL Type12 degree of protection with BOP-2 operator panel or blanking cover
- Replacement of individual components without the need for reinstallation

Design

Ordering guide

SINAMICS G120P is a modular inverter series comprising:

- CU230P-2 Control Unit
- PM230 Power Module
- Operator panel or blanking cover

In line with the modular design, the ordering process is also modular, i.e. at least three order numbers are associated with one SINAMICS G120P order:

1. CU230P-2 Control Unit (FW version V4.3.2 and higher)
When the Control Unit is selected, the communications interface of the inverter is defined:

- CU230P-2 HVAC → USS, Modbus RTU, BACnet MS/TP
- CU230P-2 DP → PROFIBUS
- CU230P-2 CAN → CANopen

2. PM230 Power Module
The power unit is selected according to the performance requirements of the application or the degree of protection:

- PM230 IP55/UL Type12

3. Operator panel or blanking cover

Various operator panels as well as the STARTER software commissioning tool are available for commissioning the inverter.

Commissioning of the G120P is especially simple using the IOP (Intelligent Operator Panel). The IOP is optimized for easy commissioning of pump, fan and compressor applications aided by application wizards. It has a graphics-based display and it offers comprehensive control and diagnostic functions as well as extensive Help functions.

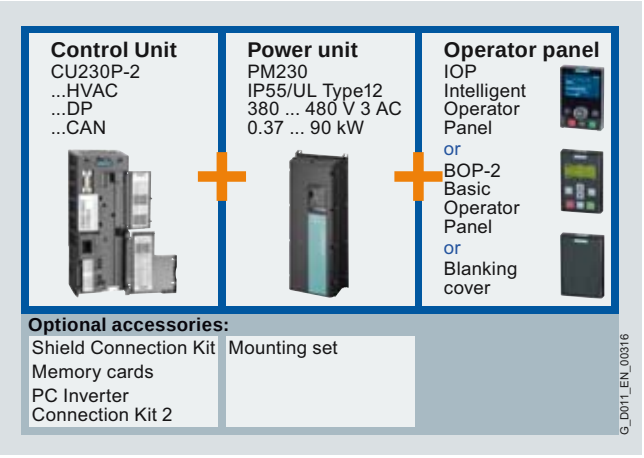
As an alternative, the BOP-2 (Basic Operator Panel) or a blanking cover without any operating functions can be used.

- IOP (Intelligent Operator Panel), IP54/UL Type12
- BOP-2 (Basic Operator Panel), IP55/UL Type12
- Blanking cover (for covering the operator panel interface), IP55/UL Type12

To achieve a high degree of protection, either an operator panel or the blanking cover must be mounted.

Supplementary optional components are:

- Mounting set
- Shield Connection Kit for CU230P-2 Control Unit
- MMC (Micro Memory Card) /SIMATIC memory card (SD card) for storing/copying parameter sets
- Internal or external fan units for PM230 IP55/UL Type12
- PC Inverter Connection Kit 2 for direct connection to a PC via USB



Supplementary system components

The following supplementary system components are available for the pump, fan and compressor inverter SINAMICS G120P:

Intelligent Operator Panel IOP

The IOP supports both entry-level personnel and drive experts. Thanks to the large plain text display, the menu prompting and the Application Wizards, it is easy to commission, diagnose and locally control standard drives. Users are guided interactively through the commissioning process by the integrated Application Wizards.

Basic Operator Panel BOP-2

Menu prompting and the 2-line display support fast and user-friendly commissioning of the inverter. Simultaneous display of the parameter and parameter value, as well as parameter filtering, means that basic commissioning of a drive can also be performed without a printed parameter list.

Design (continued)

Blanking cover

The blanking cover is mounted on the inverter in place of an operator panel, provided that an operator panel is not required.

MMC memory card/SIMATIC memory card (SD card)

The parameter settings for an inverter can be stored on the MMC/SIMATIC memory card. When service is required, e.g. after the inverter has been replaced and the data have been downloaded from the memory card the drive system is immediately ready for use again. The associated slot is located on the top of the Control Unit.

PC Inverter Connection Kit 2

For controlling and commissioning the inverter directly from a PC if the appropriate STARTER software commissioning tool has been installed. The STARTER commissioning tool on DVD is included in the scope of delivery of the PC Inverter Connection Kit.

Shield Connection Kit 1 for CU230P-2

The Shield Connection Kit offers optimum shield connection and strain relief for all signal and communication cables. It includes a matching shield bonding plate and all of the necessary connecting and retaining elements for mounting.

Spare parts

Mounting set for PM230 IP55/UL Type12

Various mounting sets depending on the frame size are available for the PM230 IP55/UL Type12 Power Modules, for the event that spare parts are required.

Fan units

The PM230 IP55/UL Type12 is equipped with both an internal and external fan unit. These can be exchanged if necessary.

Configuration

The following electronic configuring and engineering tools are available for the SINAMICS G120P inverters:

Selection guide, DT Configurator

More than 100 000 products with approximately 5 million possible product versions from the area of drive technology are listed in the interactive Catalog CA 01 – the Offline Mall from Siemens IA&DT. In order to make it easier to select the optimum motor and/or inverter from the wide range of Motion Control, the DT Configurator was developed, which is integrated as a "Selection guide" in this catalog on the DVD together with the selection and engineering tools.

Online DT Configurator

In addition, the DT Configurator can be used in the Internet without requiring any installation. The DT Configurator can be found in the Industry Mall from Siemens under the following address:
http://www.siemens.com/dt-configurator

SIZER configuration tool

The SIZER PC tool makes it easy to configure the SINAMICS and MICROMASTER 4 drive family. It provides support when selecting the hardware and firmware components necessary to implement a drive task. SIZER supports the configuration of the complete drive system, from simple single-motor drives up to complex multi-axis applications.

STARTER commissioning tool

The STARTER commissioning tool is used to commission, optimize and diagnose drives in a menu-prompted fashion. In addition to SINAMICS drives, STARTER is also suitable for MICROMASTER 4 units and the frequency converters for the distributed I/O SIMATIC ET 200S FC and
SIMATIC ET 200pro FC.

Technical specifications

Unless explicitly specified otherwise, the following technical specifications are valid for all the following components of the SINAMICS G120P inverter series.

Mechanical specifications	
Vibratory load	
• Transport [1] acc. to EN 60721-3-2	Class 2M3
• Operation Test values acc. to EN 60068-2-6	Class 3M2
Shock load	
• Transport [1] acc. to EN 60721-3-2 - All units and components	Class 2M3
• Operation Test values acc. to EN 60068-2-27 - Frame sizes FSA to FSF	Class 3M2
Ambient conditions	
Protection class acc. to EN 61800-5-1	Class I (with protective conductor system) and Class III (PELV)
Touch protection acc. to EN 61800-5-1	For the intended purpose
Permissible ambient and coolant temperature (air) during operation for line-side power components and Power Modules	
• Low overload (LO)	0 … 40 °C (32 … 104 °F) without derating > 40 … 60 °C see derating characteristics
• High overload (HO)	0 … 50 °C (32 … 122 °F) without derating > 50 … 60 °C see derating characteristics
Permissible ambient and coolant temperature (air) during operation for Control Units and supplementary system components	With CU230P-2: 0 ... 60 °C (32 ... 140 °F) With IOP: 0 ... 50 °C (32 ... 122 °F) With BOP-2: 0 ... 50 °C (32 ... 122 °F) With blanking cover: 0 ... 60 °C (32 ... 140 °F) Up to 2 000 m (6562 ft) above sea level
Climatic ambient conditions	
• Storage [1] acc. to EN 60721-3-1	Class 1K3 Temperature -25 ... +55 °C (-13 ... +131 °F)
• Transport [1] acc. to EN 60721-3-2	Class 2K4 Temperature -40 … +70 °C (-40 ... +158 °F) Max. humidity 95% at 40 °C (104 °F)
• Operation acc. to EN 60721-3-3	Class 3K3 Condensation, splashwater, and ice formation not permitted (EN 60204, Part 1)
Environmental class/harmful chemical substances	
• Storage [1] acc. to EN 60721-3-1	Class 1C2
• Transport [1] acc. to EN 60721-3-2	Class 2C2
• Operation acc. to EN 60721-3-3	Class 3C1
Organic/biological influences	
• Storage [1] acc. to EN 60721-3-1	Class 1B1
• Transport [1] acc. to EN 60721-3-2	Class 2B1
• Operation acc. to EN 60721-3-3	Class 3B1
Degree of pollution acc. to EN 61800-5-1	2

Standards	
Standards conformance	UL [2], CE, c-tick
CE mark	According to Low-Voltage Directive 2006/95/EC
EMC Directive acc. to EN 61800-3	
• Frame sizes FSA to FSF with integrated line filter class A	Category C2 [3] (corresponds to class A acc. to EN 55011)
• Frame sizes FSA to FSF with integrated line filter class B	Category C1 [3] (corresponds to class B acc. to EN 55011 for conducted interference emission)

Note:
The EMC product standard EN 61800-3 does not apply directly to a frequency inverter but to a PDS (Power Drive System), which comprises the complete circuitry, motor and cables in addition to the frequency inverters. The frequency inverters on their own do not generally require identification according to the EMC Directive.

[1] In transport packaging.

[2] UL approval for frame sizes FSD to FSF will be available soon.

[3] With shielded motor cable up to 25 m.

Technical specifications (continued)

Compliance with standards

CE mark

The SINAMICS G120P inverters meet the requirements of the Low-Voltage Directive 2006/95/EC.

Low-Voltage Directive

The inverters comply with the following standards listed in the official journal of the EU:

- EN 60204-1
  Safety of machinery, electrical equipment of machines
- EN 61800-5-1
  Electrical power drive systems with variable speed – Part 5-1: Requirements regarding safety – electrical, thermal, and energy requirements

UL listing

Inverter devices in UL category NMMS certified to UL, in compliance with UL508C. UL list numbers E121068 and E192450.

For use in environments with pollution degree 2.

On the Internet at http://www.ul.com.

Machinery Directive

The inverters are suitable for installation in machines. Compliance with the Machinery Directive 2006/42/EC requires a separate certificate of conformity. This must be provided by the plant construction company or the organization marketing the machine.

EMC Directive

- EN 61800-3
  Variable-speed electric drives
  Part 3: EMC product standard including specific test methods

The following information applies to SINAMICS G120P frequency inverters from Siemens AG:

- The EMC product standard EN 61800-3 does not apply directly to a frequency inverter but to a PDS (Power Drive System), which comprises the complete circuitry, motor and cables in addition to the frequency inverters.
- Frequency inverters are normally only supplied to experts for installation in machines or systems. A frequency inverter must, therefore, only be considered as a component which, on its own, is not subject to the EMC product standard EN 61800-3. The inverter's operating instructions, however, specifies the conditions regarding compliance with the product standard if the frequency inverter is expanded to become a PDS. For a PDS, the EMC Directive in the EU is complied with by observing the product standard EN 61800-3 for variable-speed electric drive systems. The frequency inverters on their own do not generally require identification according to the EMC Directive.
- In the Standard EN 61800-3 of July 2005, a distinction is no longer made between "general availability" and "restricted availability". Instead, different categories C1 to C4 have been defined in accordance with the environment of the PDS at the operating location:
  - **Category C1:** Drive systems for rated voltages < 1 000 V for use in the first environment
  - **Category C2:** Stationary drive systems not connected by means of a plug connector for rated voltages < 1 000 V. When used in the first environment, the system must be installed and commissioned by personnel familiar with EMC requirements. A warning note is required.
  - **Category C3:** Drive systems for rated voltages < 1 000 V for exclusive use in the second environment. A warning note is required.
  - **Category C4:** Drive systems for rated voltages ≥ 1 000 V or for rated currents ≥ 400 A or for use in complex systems in the second environment. An EMC plan must be generated.
- The EMC product standard EN 61800-3 also defines limit values for conducted interference and radiated interference for the so-called "second environment" (= industrial power supply systems that do not supply households). These limit values are below the limit values of filter class A to EN 55011. Unfiltered inverters can be used in industrial environments as long as they are part of a system that contains line filters on the higher-level infeed side.
- With SINAMICS G120P, Power Drive Systems (PDS) that fulfill the EMC product standard EN 61800-3 can be configured when observing the installation instructions in the product documentation.
- A differentiation must be made between the product standards for electrical drive systems (PDS) of the range of standards EN 61800 (of which Part 3 covers EMC topics) and the product standards for the devices/systems/machines, etc. This will probably not result in any changes in the practical use of frequency inverters. Since frequency inverters are always part of a PDS and these are part of a machine, the machine manufacturer must observe various standards depending on their type and environment (e.g. EN 61000-3-2 for line harmonics and EN 55011 for radio interference). The product standard for PDS on its own is, therefore, either insufficient or irrelevant.
- With respect to the compliance with limits for line supply harmonics, the EMC product standard EN 61800-3 for PDS refers to compliance with the EN 61000-3-2 and EN 61000-3-12 standards.
- Regardless of the configuration with SINAMICS G120P and its components, the machine construction company (OEM) can also apply other measures to ensure that the machine complies with the EU EMC Directive. The EU EMC Guideline is generally fulfilled when the relevant EMC product standards are observed. If they are not available, the generic standards (e.g. DIN EN 61000-x-x) can be used instead. It is important that the conducted and emitted interference at the line connection point and outside the machine remain below the relevant limit values. Any suitable technical measures can be applied to ensure this.

Overview

Example: CU230P-2 HVAC Control Unit with PM230 IP55/UL Type12 Power Module frame size FSC

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. The integration of technological functions is a significant differentiating feature to the other Control Units of the SINAMICS G120P drive family.

Selection and ordering data

Communication	Digital inputs	Digital outputs	Analog inputs	Analog outputs	Designation		**Control Unit** Order No.
Standard							
RS485/USS; Modbus RTU, BACnet MS/TP	6	3	4	2	CU230P-2 HVAC	new	**6SL3243-0BB30-1HA1**
PROFIBUS DP	6	3	4	2	CU230P-2 DP	new	**6SL3243-0BB30-1PA1**
CANopen	6	3	4	2	CU230P-2 CAN	new	**6SL3243-0BB30-1CA1**

Function

Closed-loop control

- Linear and square torque characteristisc for fluid flow and positive displacement machines
- ECO mode for additional energy saving
- Vector control without sensor for sophisticated control tasks

Connections

- Two analog inputs (current/voltage can be selected) to directly connect pressure/level sensors
- Two additional analog inputs to connect NI1000/PT1000 temperature sensors
- Direct control of valves and flaps using two 230 V relays

Interfaces

- PROFIBUS, USS, BACnet MS/TP, CANopen and Modbus RTU communication

Software functions

- Automatic restart function after power failure
- Flying restart
- Skip frequencies
- PID controller for temperature, pressure, air quality, level
- Energy saving through "hibernation"
- Load check function to monitor belts and flow
- Motor staging
- 4 integrated PID controllers
- Multi-zone controller
- Extended emergency mode
- Real time clock with three time generators

IOP wizards for special applications such as e.g.

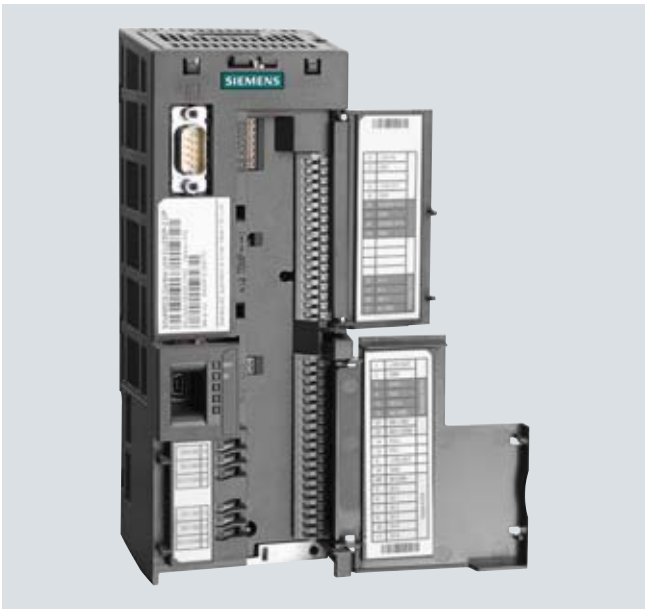
- Pumps: Positive displacement (constant load torque) and centrifugal pumps (square load torque) with and without PID controller
- Fans: Radial and axial fans (square load torque) with and without PID controller
- Compressors: Positive displacement (constant load torque) and fluid flow machines (square load torque) with and without PID controller

CU230P-2 Control Units

1

Design

CU230P-2 HVAC, CU230P-2 DP, CU230P-2 CAN Control Units

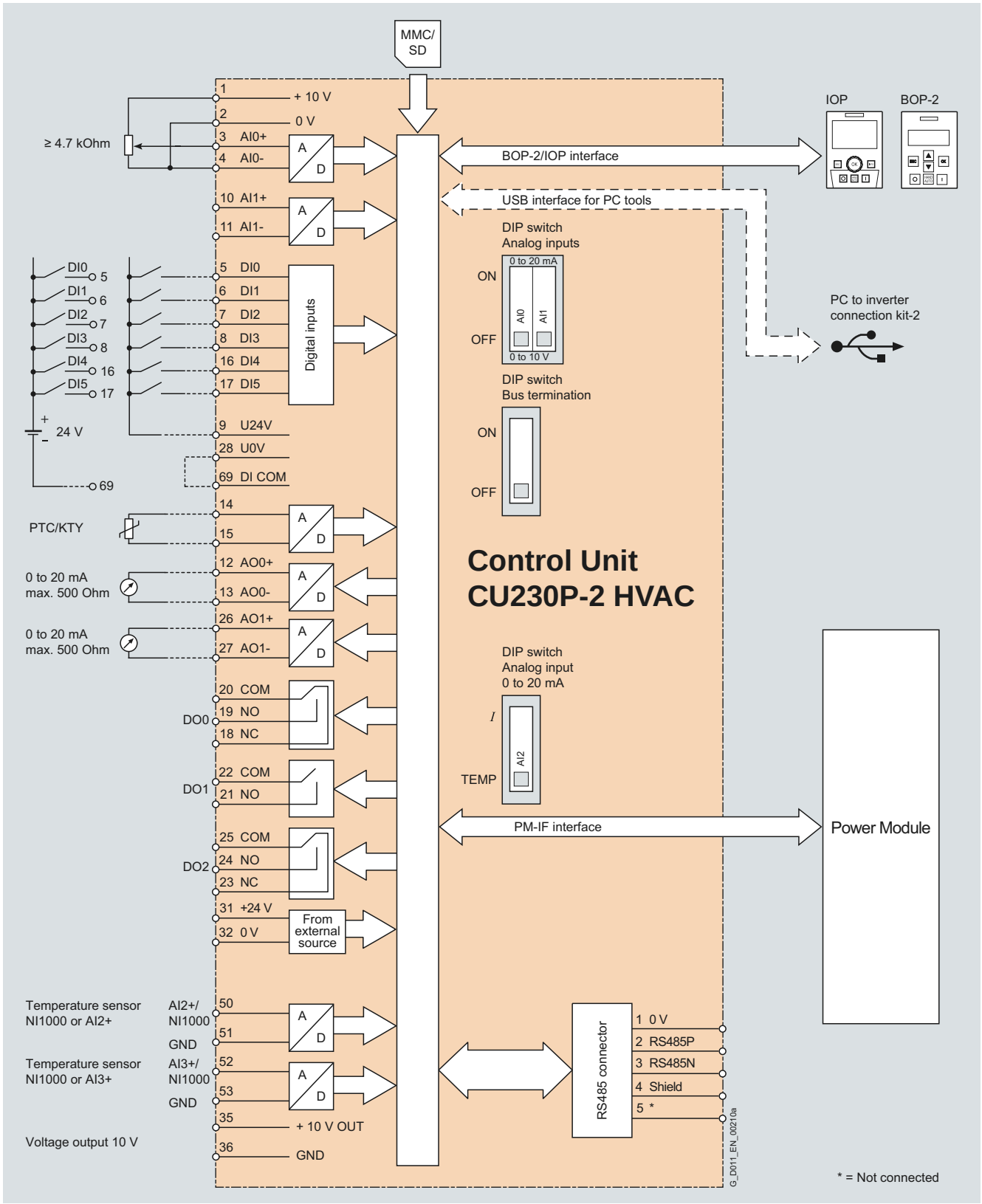


Example: CU230P-2 DP Control Unit with open terminal covers

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 (2 A, 230 V AC)
19	DO0, NO	Relay output 1 NO contact (2 A, 230 V AC)
20	DO0, COM	Relay output 1 Common contact (2 A, 230 V AC)
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 (2 A, 230 V AC)
24	DO2, NO	Relay output 3 NO contact (2 A, 230 V AC)
25	DO2, COM	Relay output 3 Common contact (2 A, 230 V AC)

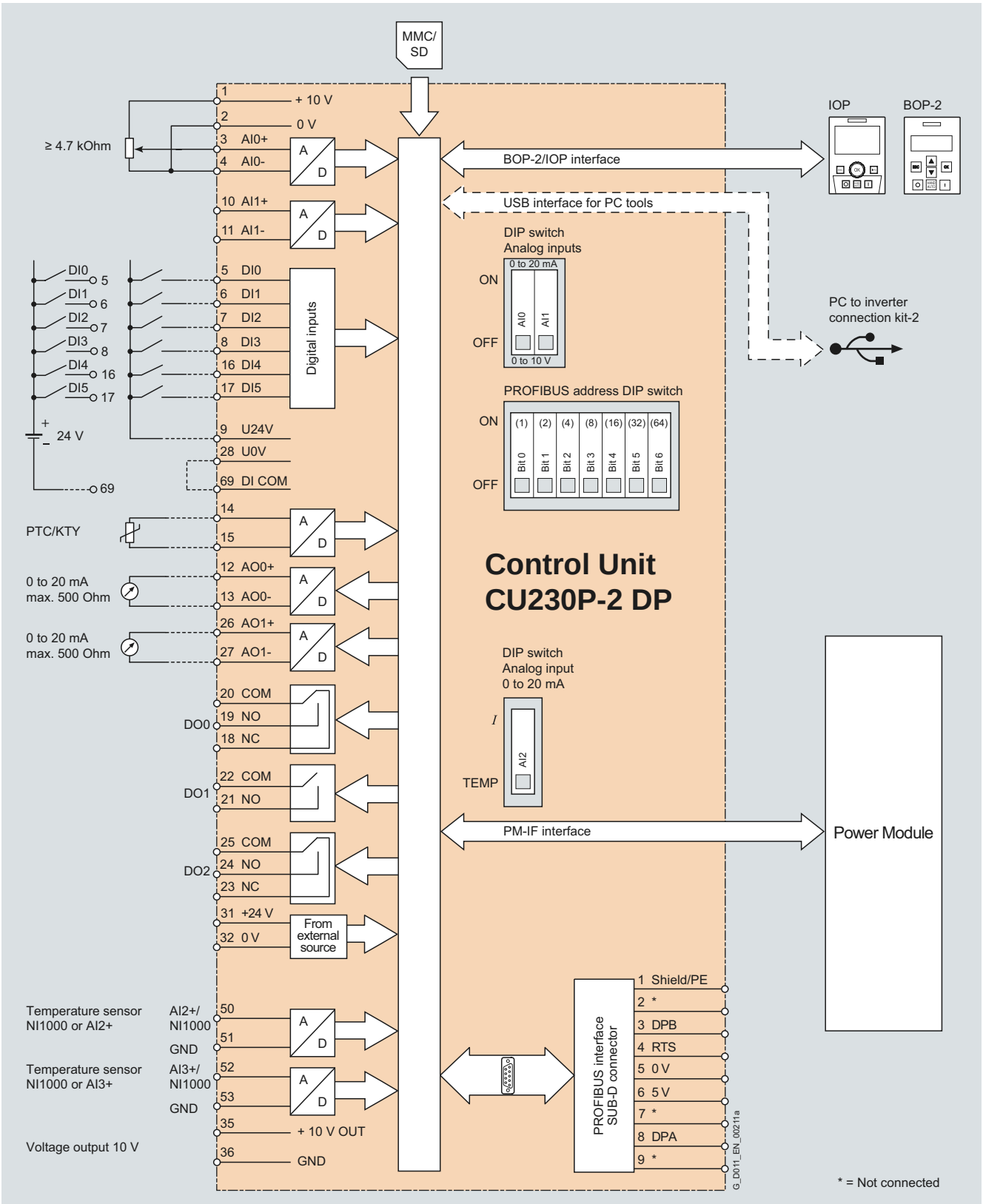
Terminal No.	Signal	Features
Analog inputs (AI)		
3	AI0+	Differential input, switchable between current, voltage Value range: 0 ... 10 V, -10 ... +10 V, 0/2 ... 10 V, 0/4 ... 20 mA
4	AI0-	
10	AI1+	Differential input, switchable between current, voltage Value range: 0 ... 10 V, -10 ... +10 V, 0/2 ... 10 V, 0/4 ... 20 mA
11	AI1-	
50	AI2+/NI1000	Non-isolated input, switchable between current, temperature sensors, type PT1000/ NI1000 Value range: 0/4 ... 20 mA, PT1000 -50 ... +250 °C; NI1000 -50 ... +150 °C
51	GND	Reference potential of the AI2/internal electronics ground
52	AI3+/NI1000	Non-isolated input for temperature sensors, type PT1000/ NI1000 Value range: PT1000 -50 ... +250 °C; NI1000 -50 ... +150 °C
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	AO 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	AO GND	Reference potential of the AO1/internal electronics ground
Motor temperature sensor interface		
14	T1 Motor	Positive input for motor temperature sensor Type: PTC, KTY sensor, Thermoclick
15	T2 Motor	Negative input for motor temperature sensor
Power supply		
9	+24 V OUT	Power supply output 24 V DC, max. 200 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 18 ... 30 V DC, max. 1 500 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

Integration



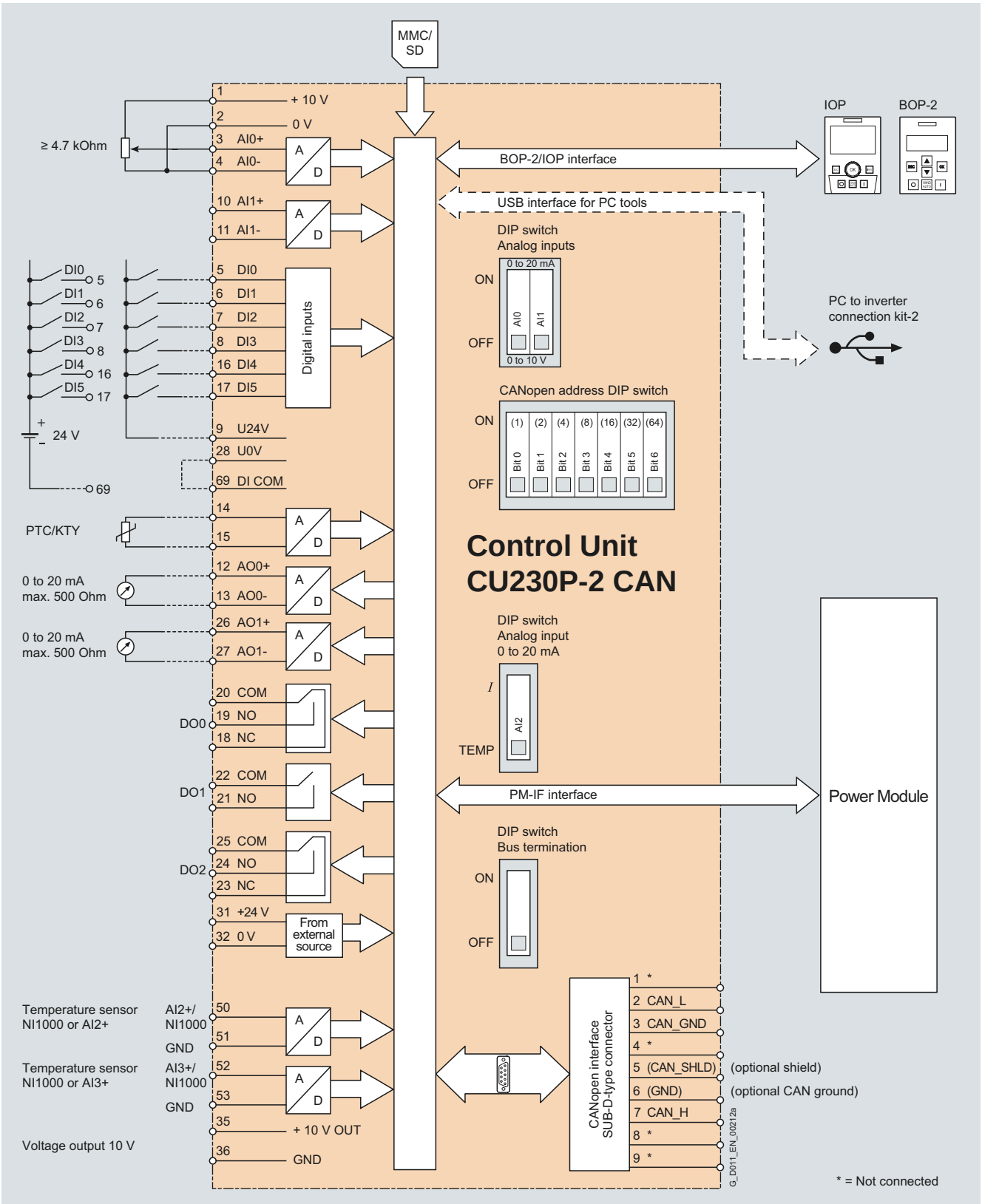
CU230P-2 HVAC Control Unit connection diagram

Integration (continued)



CU230P-2 DP Control Unit connection diagram

Integration (continued)



CU230P-2 CAN Control Unit connection diagram

CU230P-2 Control Units

Technical specifications

Control Unit	CU230P-2 HVAC 6SL3243-0BB30-1HA1	CU230P-2 DP 6SL3243-0BB30-1PA1	CU230P-2 CAN 6SL3243-0BB30-1CA1
Electrical specifications			
Operating voltage	24 V DC via the Power Module or by connecting to an external 18 ... 30 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	< 5.5 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 Max. input current 15 mA		
Digital outputs	2 relay change-over contacts 250 V AC 2 A (inductive load), 30 V DC 5 A (ohmic load) 1 relay NO contact 30 V DC, 0.5 A (ohmic load)		
Analog inputs	2 differential inputs, switchable using DIP switch between voltage and current: -10 ... +10 V, 0/4 ... 20 mA, 10-bit resolution 1 non-isolated input, switchable using DIP switch between current and temperature sensor, type NI1000/PT1000, 0/4 ... 20 mA; 10-bit resolution 1 non-isolated input, temperature sensor, type NI1000/PT1000, 10-bit resolution The two differential analog inputs can be configured as additional digital inputs. Switching thresholds: 0 → 1: Rated voltage 4 V 1 → 0: Rated voltage 1.6 V Analog inputs are protected against inputs in a voltage range of ± 30 V and have a common-mode voltage in the ± 15 V range		
Analog outputs	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 The analog outputs have short circuit protection		
PTC/KTY interface	1 motor temperature sensor input, sensors that can be connected PTC, KTY and Thermoclick, accuracy ±5 °C		
Bus interface			
Type	**RS485**	**PROFIBUS DP**	**CANopen**
Protocols	USS Modbus RTU BACnet MS/TP (switchable per software)	PROFIdrive Profile V4.1	CANopen
Hardware	Terminal Insulated USS: max. 187.5 kBaud Modbus RTU:19.2 kBaud bus terminating resistors can be switched in	9-pin SUB-D connector Insulated Max. 12 Mbit/s Slave address can be set using DIP switches	9-pin SUB-D socket Insulated Max. 1 Mbit/s
Tool interface			
Memory card	1 Micro Memory Card or 1 SIMATIC memory card (SD card)		
Operator panels	• IOP supported connection options between CU230P-2 and IOP: can be directly plugged on • BOP-2 Supported connection options between CU230P-2 and BOP-2: can be directly plugged on • Blanking cover, if an operator panel is not required		
PC interface	USB		

Technical specifications (continued)

Control Unit	CU230P-2 HVAC 6SL3243-0BB30-1HA1	CU230P-2 DP 6SL3243-0BB30-1PA1	CU230P-2 CAN 6SL3243-0BB30-1CA1
Open-loop/closed-loop control techniques			
***V/f* linear/square/parameterizable**	✓		
***V/f* with flux current control (FCC)**	✓		
***V/f* ECO linear/square**	✓		
Vector control, sensorless	✓		
Vector control, with sensor	–		
Torque control, without encoder	✓		
Torque control, with encoder	–		
Software functions			
Setpoint input	✓		
Fixed frequencies	16, parameterizable		
JOG	✓		
Digital motorized potentiometer (MOP)	✓		
Ramp smoothing	✓		
Extended ramp-function generator (with ramp smoothing Off3)	✓		
Positioning down ramp	–		
Slip compensation	✓		
Signal interconnection with BICO technology	✓		
Free function blocks (FFB) for logic 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)	✓		
Energy-saving function (hibernation) with internal PID controller	✓		
Energy-saving function (hibernation) with 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/KTY/Thermoclick)		
Thermal inverter protection	✓		
Motor identification	✓		
Motor holding brake	–		
Auto-ramping (V_{dcmax} controller)	✓		
Kinetic buffering (V_{dcmin} controller)	–		
Braking functions for • DC braking • Compound braking • Dynamic braking with integrated brake chopper	 ✓ – (not for PM230 Power Module) – (not for PM230 Power Module)		
Mechanical specifications and ambient conditions			
Degree of protection	IP20		
Signal cable cross-section • min. • max.	 0.15 mm^2 (AWG28) 1.5 mm^2 (AWG16)		
Operating temperature	0 ... +60 °C (32 ... 140 °F)		
Storage temperature	-40 ... +70 °C (-40 ... +158 °F)		
Relative humidity	< 95 % RH, condensation not permissible		
Dimensions • Width • Height • Depth	 73 mm 199 mm 65.5 mm		
Weight, approx.	0.61 kg		

Overview

Example: SINAMICS G120P, frame size FSC, view from the rear

Example: SINAMICS G120P, frame size FSC, view from inside (without CU230 Control Unit)

The topology of the PM230 Power Module has been designed so that only minimal line harmonics and apparent power losses are generated. This not only provides benefits with regard to saving energy, but also makes a positive contribution towards protecting the environment.

- The topology ensures a significant reduction in the line harmonics.
  - The harmonics and the THD (Total Harmonic Distortion) are below the limits required by the EN 61000-3-12 or IEC 61000-3-12 standard.
  - Additional components such as line reactors are not required. This saves space in the installation.
- The active power component of the apparent power is very high, i.e. the devices consume less current from the supply for the same drive output. This, in turn, means that the supply cables can have smaller dimensions.

Frame sizes FSA to FSF of the PM230 Power Module to IP55 degree of protection/UL Type12 are available with integrated line filter class A for C2 or class B for C1 installations.

The permissible cable lengths between the inverter and the motor are limited to a maximum of 25 m with shielded cables for compliance with EMC Category C2 (Filter A) and C1 (Filter B, conducted).

The line system configurations that are supported are symmetrical systems with grounded neutral point.

The PM230 Power Module is not approved for safety-oriented applications.

Selection and ordering data

To ensure that a suitable Power Module is selected, the following currents should be used for applications:

- **rated output current for applications with low overload (LO)**
- **base load current for applications with high overload (HO)**

With reference to the rated output current, the modules support at least 2-pole to 6-pole low-voltage motors, e.g. the new 1LE1 motor series (please refer to the Appendix of Catalog D 11.1 · 2009 for further information). The rated power is merely a guide value. The rated power merely represents a benchmark. For a description of the overload performance, please refer to the general technical specifications of the Power Modules.

Rated power [1]		Rated output current [2]	Power based on the base load current [3]		Base load current [3]	Frame size	SINAMICS PM230 Power Module with integrated line filter class A	SINAMICS PM230 Power Module with integrated line filter class B
		I_{rated}			I_H			
kW	hp	A	**kW**	hp	A		Order No.	Order No.
380 … 480 V 3 AC								
0.37	0.5	1.3	**0.25**	0.33	0.9	FSA	new **6SL3223-0DE13-7AA0**	new **6SL3223-0DE13-7BA0**
0.55	0.75	1.7	**0.37**	0.5	1.3	FSA	new **6SL3223-0DE15-5AA0**	new **6SL3223-0DE15-5BA0**
0.75	1.0	2.2	**0.55**	0.75	1.7	FSA	new **6SL3223-0DE17-5AA0**	new **6SL3223-0DE17-5BA0**
1.1	1.5	3.1	**0.75**	1.0	2.2	FSA	new **6SL3223-0DE21-1AA0**	new **6SL3223-0DE21-1BA0**
1.5	2.0	4.1	**1.1**	1.5	3,1	FSA	new **6SL3223-0DE21-5AA0**	new **6SL3223-0DE21-5BA0**
2.2	3.0	5.9	**1.5**	2.0	4.1	FSA	new **6SL3223-0DE22-2AA0**	new **6SL3223-0DE22-2BA0**
3.0	4.0	7.7	**2.2**	3.0	5.9	FSA	new **6SL3223-0DE23-0AA0**	new **6SL3223-0DE23-0BA0**
4.0	5.0	10.2	**3.0**	4.0	7.7	FSB	new **6SL3223-0DE24-0AA0**	new **6SL3223-0DE24-0BA0**
5.5	7.5	13.2	**4.0**	5.0	10.2	FSB	new **6SL3223-0DE25-5AA0**	new **6SL3223-0DE25-5BA0**
7.5	10	18	**5.5**	7.5	13.2	FSB	new **6SL3223-0DE27-5AA0**	new **6SL3223-0DE27-5BA0**
11.0	15	26	**7.5**	10	18	FSC	new **6SL3223-0DE31-1AA0**	new **6SL3223-0DE31-1BA0**
15.0	20	32	**11.0**	15	26	FSC	new **6SL3223-0DE31-5AA0**	new **6SL3223-0DE31-5BA0**
18.5	25	38	**15.0**	20	32	FSC	new **6SL3223-0DE31-8AA0**	
22	30	45	**18.5**	25	38	FSD	new **6SL3223-0DE32-2AA0**	new **6SL3223-0DE32-2BA0**
30	40	60	**22**	30	45	FSD	new **6SL3223-0DE33-0AA0**	new **6SL3223-0DE33-0BA0**
37	50	75	**30**	40	60	FSE	new **6SL3223-0DE33-7AA0**	new **6SL3223-0DE33-7BA0**
45	60	90	**37**	50	75	FSE	new **6SL3223-0DE34-5AA0**	new **6SL3223-0DE34-5BA0**
55	75	110	**45**	60	90	FSF	new **6SL3223-0DE35-5AA0**	new **6SL3223-0DE35-5BA0**
75	100	145	**55**	75	110	FSF	new **6SL3223-0DE37-5AA0**	new **6SL3223-0DE37-5BA0**
90	125	178	**75**	100	145	FSF	new **6SL3223-0DE38-8AA0**	new **6SL3223-0DE38-8BA0**

[1] Rated power based on the rated output current I_{rated}. The rated output current I_{rated} is based on the duty cycle for low overload (LO).

[2] The rated output current I_{rated} is based on the duty cycle for low overload (LO). These current values are valid for 400 V and are stamped on the rating plate of the Power Module.

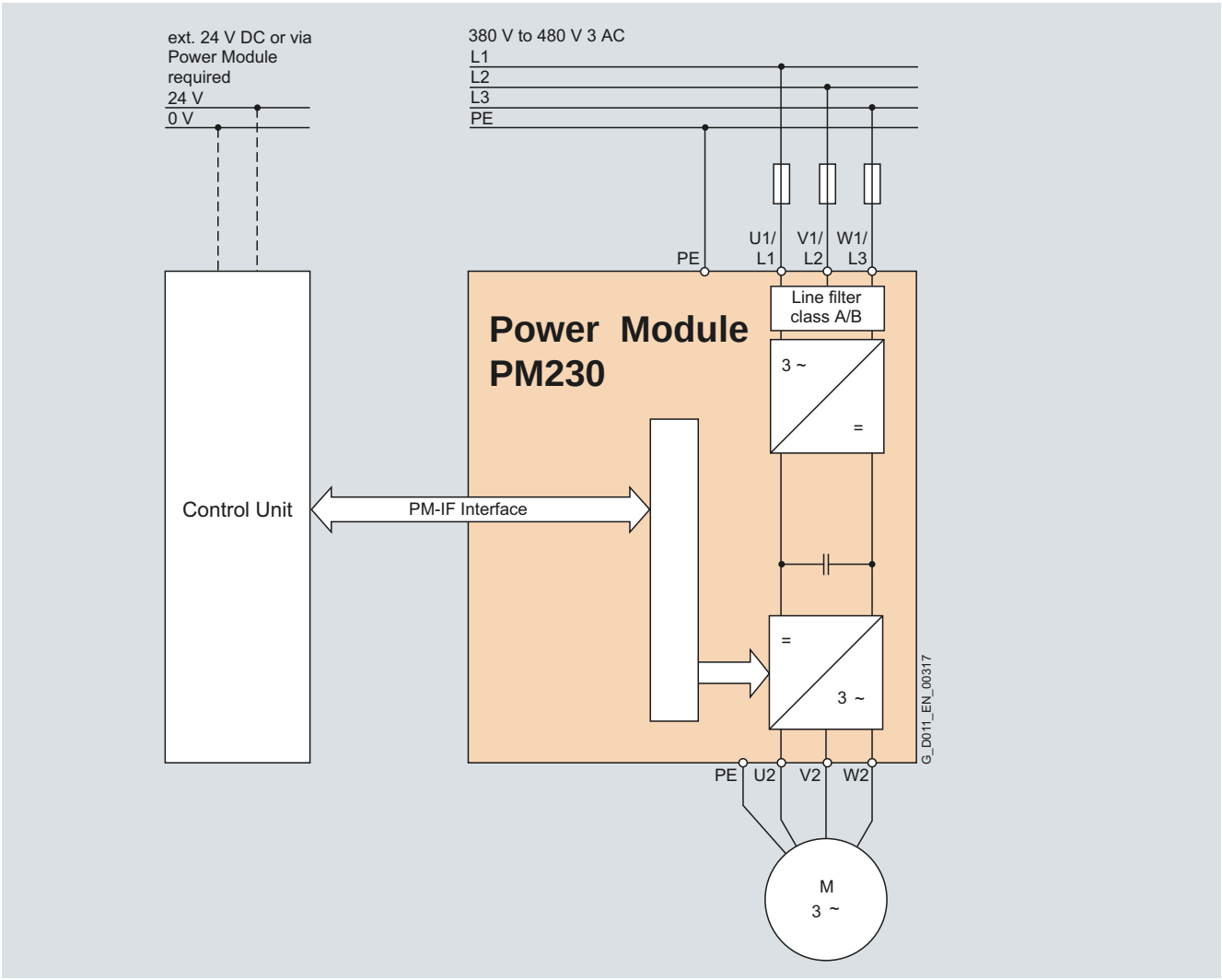
[3] The base load current I_H is based on the duty cycle for high overload (HO).

Integration

PM230 Power Modules communicate with the Control Unit via the PM-IF interface.

PM230 Power Modules have the following interfaces:

- PM-IF interface to connect the PM230 Power Module to the Control Unit. The PM230 Power Module also supplies power to the Control Unit using an integrated power supply.
- Motor connection using screw terminals or screw studs
- 2 PE/protective conductor connections



Connection diagram for PM230 Power Module with integrated line filter class A or B

Maximum permissible cable lengths from the motor to the inverter

	Maximum permissible motor cable lengths (shielded/unshielded) in m					
	Frame sizes					
	FSA	FSB	FSC	FSD	FSE	FSF
PM230 Power Module with integrated filter A (Category C2)						
Without output reactor/sine-wave filter	25/100	25/100	25/100	25/100	25/100	25/100
PM230 Power Module with integrated filter B (Category C1, conducted)						
Without output reactor/sine-wave filter	25/100	25/100	25/100	25/100	25/100	25/100

Technical specifications

General technical specifications

	PM230 Power Modules
System operating voltage	380 … 480 V 3 AC ± 10 %
Line supply requirements **Line short circuit voltage u_K**	R_{sc} > 100 or u_K < 1 %
Input frequency	47 … 63 Hz
Output frequency	
• Control type *V/f*	0 … 650 Hz
• Control type Vector	0 … 200 Hz
Pulse frequency	4 kHz for higher pulse frequencies up to 16 kHz, see the derating data
Power factor	0.9
Modulation depth	93 %
Overload capability	
• Low overload (LO): 0.37 … 90 kW	1.1 × rated output current (i.e. 110 % overload) for 57 s with a cycle time of 300 s 1.5 × rated output current (i.e. 150 % overload) for 3 s with a cycle time of 300 s
• High overload (HO): 0.25 ... 75 kW	1.5 × rated output current (i.e. 150 % overload) for 57 s with a cycle time of 300 s 2 × rated output current (i.e. 200 % overload) for 3 s with a cycle time of 300 s
Electromagnetic compatibility	Integrated line filter to EN 61800-3 C2 and EN 61800-3 C1
Possible braking methods	DC braking
Degree of protection	IP55/UL Type12
Operating temperature	
• Low overload (LO)	0 … 40 °C without derating, > 40 … 60 °C see derating characteristics
• High overload (HO)	0 … 50 °C without derating, > 50 … 60 °C see derating characteristics
Storage temperature	-40 … +70 °C
Relative humidity	< 95 % RH, condensation not permissible
Cooling	Power units with increased air cooling using integrated fans
Installation altitude	Up to 1 000 m above sea level without derating, > 1 000 m see derating characteristics
Protection functions	• Undervoltage • Overvoltage • Overcontrol/overload • Ground fault • Short circuit • Stall protection • Motor blocking protection • Motor overtemperature • Inverter overtemperature • Parameter locking
Standards conformance	UL [1], CE, c-tick
CE mark	According to Low-Voltage Directive 2006/95/EC

[1] UL approval for frame sizes FSD to FSF will be available soon.

Technical specifications (continued)

Line supply voltage 380 ... 480 V 3 AC		PM230 IP55/UL Type12 Power Modules				
With integrated line filter class A		6SL3223-0DE13-7AA0	6SL3223-0DE15-5AA0	6SL3223-0DE17-5AA0	6SL3223-0DE21-1AA0	6SL3223-0DE21-5AA0
With integrated line filter class B		6SL3223-0DE13-7BA0	6SL3223-0DE15-5BA0	6SL3223-0DE17-5BA0	6SL3223-0DE21-1BA0	6SL3223-0DE21-5BA0
Output current at 50 Hz 400 V 3 AC						
• Rated current I_{rated} [1]	A	1.3	1.7	2.2	3.1	4.1
• Base load current I_L [1]	A	1.3	1.7	2.2	3.1	4.1
• Base load current I_H [2]	A	0.9	1.3	1.7	2.2	3.1
• I_{max}	A	2.0	2.6	3.4	4.7	6.2
Rated power						
• based on I_L	kW (hp)	0.37 (0.5)	0.55 (0.75)	0.75 (1.0)	1.1 (1.5)	1.5 (2.0)
• based on I_H	kW (hp)	0.25 (0.33)	0.37 (0.5)	0.55 (0.75)	0.75 (1.0)	1.1 (1.5)
Rated pulse frequency	kHz	4	4	4	4	4
Efficiency η		0.86	0.90	0.92	0.94	0.95
Power loss (at rated current)	kW	0.06	0.06	0.06	0.07	0.08
Cooling air requirement	m^3/s	0.007	0.007	0.007	0.007	0.007
Sound pressure level L_{pA} (1 m)	dB(A)	61.9	61.9	61.9	61.9	61.9
24 V DC power supply for Control Unit	A	1	1	1	1	1
Input current [3]						
• Rated current	A	1.3	1.8	2.3	3.2	4.2
• based on I_H	A	0.9	1.3	1.8	2.3	3.2
Line supply connection U1/L1, V1/L2, W1/L3		Screw terminals, plug-in	Screw terminals, plug-in	Screw terminals, plug-in	Screw terminals, plug-in	Screw terminals, plug-in
• Conductor cross-section	mm^2	1 … 2.5	1 … 2.5	1 … 2.5	1 … 2.5	1 … 2.5
Motor connection U2, V2, W2		Screw terminals, plug-in	Screw terminals, plug-in	Screw terminals, plug-in	Screw terminals, plug-in	Screw terminals, plug-in
• Conductor cross-section	mm^2	1 … 2.5	1 … 2.5	1 … 2.5	1 … 2.5	1 … 2.5
Motor cable length [4], **max.**						
• Shielded	m	25	25	25	25	25
• Unshielded	m	100	100	100	100	100
Degree of protection		IP55/UL Type12	IP55/UL Type12	IP55/UL Type12	IP55/UL Type12	IP55/UL Type12
Dimensions						
• Width	mm	154	154	154	154	154
• Height (with integrated filter A or B)	mm	460	460	460	460	460
• Depth						
- Without operator panel	mm	249	249	249	249	249
- With operator panel, max.	mm	264	264	264	264	264
Frame size		FSA	FSA	FSA	FSA	FSA
Weight, approx.	kg	4.3	4.3	4.3	4.3	4.3

1) The rated output current I_{rated} and the base load current I_L are based on the duty cycle for low overload (LO).

2) The base load current I_H is based on the duty cycle for high overload (HO).

3) The input current depends on the motor load and line impedance and applies for a line impedance corresponding to u_K = 1 %. The rated input currents apply for a load at rated power (based on I_{rated}) – these current values are specified on the rating plate.

4) Max. motor cable length 25 m (shielded) for PM230 Power Modules with integrated line filter to maintain the limit values of EN 61800-3 Category C2 (filter A) or C1 (filter B). C1 installations for conducted emissions. With unshielded cables, Categories C2 and C1 are not achieved.

Technical specifications (continued)

Line supply voltage 380 ... 480 V 3 AC		PM230 Power Modules				
With integrated line filter class A		6SL3223-0DE22-2AA0	6SL3223-0DE23-0AA0	6SL3223-0DE24-0AA0	6SL3223-0DE25-5AA0	6SL3223-0DE27-5AA0
With integrated line filter class B		6SL3223-0DE22-2BA0	6SL3223-0DE23-0BA0	6SL3223-0DE24-0BA0	6SL3223-0DE25-5BA0	6SL3223-0DE27-5BA0
Output current at 50 Hz 400 V 3 AC						
• Rated current I_{rated} [1]	A	5.9	7.7	10.2	13.2	18
• Base load current I_L [1]	A	5.9	7.7	10.2	13.2	18
• Base load current I_H [2]	A	4.1	5.9	7.7	10.2	13.2
• I_{max}	A	8.9	11.8	15.4	20.4	27
Rated power						
• based on I_L	kW (hp)	2.2 (3.0)	3 (4.0)	4 (5.0)	5.5 (7.5)	7.5 (10)
• based on I_H	kW (hp)	1.5 (2.0)	2.2 (3.0)	3 (4.0)	4 (5.0)	5.5 (7.5)
Rated pulse frequency	kHz	4	4	4	4	4
Efficiency η		0.96	0.96	0.97	0.97	0.97
Power loss (at rated current)	kW	0.1	0.12	0.14	0.18	0.24
Cooling air requirement	m^3/s	0.007	0.007	0.009	0.009	0.009
Sound pressure level L_{pA} (1 m)	dB(A)	61.9	61.9	62.8	62.8	62.8
24 V DC power supply for Control Unit	A	1	1	1	1	1
Input current [3]						
• Rated current	A	6.1	8.0	11	14	19
• based on I_H	A	4.2	6.1	8.0	11	14
Line supply connection U1/L1, V1/L2, W1/L3		Screw terminals, plug-in	Screw terminals, plug-in	Screw terminals, plug-in	Screw terminals, plug-in	Screw terminals, plug-in
• Conductor cross-section	mm^2	1 … 2.5	1 … 2.5	2.5 … 6	4 … 6	4 … 6
Motor connection U2, V2, W2		Screw terminals, plug-in	Screw terminals, plug-in	Screw terminals, plug-in	Screw terminals, plug-in	Screw terminals, plug-in
• Conductor cross-section	mm^2	1 … 2.5	1 … 2.5	2.5 … 6	4 … 6	4 … 6
Motor cable length [4], **max.**						
• Shielded	m	25	25	25	25	25
• Unshielded	m	100	100	100	100	100
Degree of protection		IP55/UL Type12	IP55/UL Type12	IP55/UL Type12	IP55/UL Type12	IP55/UL Type12
Dimensions						
• Width	mm	154	154	180	180	180
• Height (with integrated filter A or B)	mm	460	460	540	540	540
• Depth						
- Without operator panel	mm	249	249	249	249	249
- With operator panel, max.	mm	264	264	264	264	264
Frame size		FSA	FSA	FSB	FSB	FSB
Weight, approx.	kg	4.3	4.3	6.3	6.3	6.3

1) The rated output current I_{rated} and the base load current I_L are based on the duty cycle for low overload (LO).

2) The base load current I_H is based on the duty cycle for high overload (HO).

3) The input current depends on the motor load and line impedance and applies for a line impedance corresponding to u_K = 1 %. The rated input currents apply for a load at rated power (based on I_{rated}) – these current values are specified on the rating plate.

4) Max. motor cable length 25 m (shielded) for PM230 Power Modules with integrated line filter to maintain the limit values of EN 61800-3 Category C2 (filter A) or C1 (filter B). C1 installations for conducted emissions. With unshielded cables, Categories C2 and C1 are not achieved.

Technical specifications (continued)

Line supply voltage 380 ... 480 V 3 AC		PM230 Power Modules				
With integrated line filter class A		6SL3223-0DE31-1AA0	6SL3223-0DE31-5AA0	6SL3223-0DE31-8AA0	6SL3223-0DE32-2AA0	6SL3223-0DE33-0AA0
With integrated line filter class B		6SL3223-0DE31-1BA0	6SL3223-0DE31-5BA0		6SL3223-0DE32-2BA0	6SL3223-0DE33-0BA0
Output current at 50 Hz 400 V 3 AC						
• Rated current I_{rated} [1]	A	26	32	38	45	60
• Base load current I_L [1]	A	26	32	38	45	60
• Base load current I_H [2]	A	18	26	32	38	45
• I_{max}	A	39	52	64	76	90
Rated power						
• based on I_L	kW (hp)	11 (15)	15 (20)	18.5 (25)	22 (30)	30 (40)
• based on I_H	kW (hp)	7.5 (10)	11 (15)	15 (20)	18.5 (25)	22 (30)
Rated pulse frequency	kHz	4	4	4	4	4
Efficiency η		0.97	0.97	0.98	0.97	0.97
Power loss (at rated current)	kW	0.32	0.39	0.46	0.52	0.68
Cooling air requirement	m^3/s	0.020	0.020	0.020	0.039	0.039
Sound pressure level L_{pA} (1 m)	dB(A)	66.1	66.1	66.1	56	56
24 V DC power supply for Control Unit	A	1	1	1	1	1
Input current [3]						
• Rated current	A	27	33	39	42	56
• based on I_H	A	19	27	33	36	42
Line supply connection U1/L1, V1/L2, W1/L3		Screw terminals, plug-in	Screw terminals, plug-in	Screw terminals, plug-in	M6 screw studs	M6 screw studs
• Conductor cross-section	mm^2	6 … 16	10 … 16	10 … 16	16 … 35	16 … 35
Motor connection U2, V2, W2		Screw terminals, plug-in	Screw terminals, plug-in	Screw terminals, plug-in	M6 screw studs	M6 screw studs
• Conductor cross-section	mm^2	6 … 16	10 … 16	10 … 16	16 … 35	16 … 35
Motor cable length [4], max.						
• Shielded	m	25	25	25	25	25
• Unshielded	m	100	100	100	100	100
Degree of protection		IP55/UL Type12	IP55/UL Type12	IP55/UL Type12	IP55/UL Type12	IP55/UL Type12
Dimensions						
• Width	mm	230	230	230	320	320
• Height (with integrated filter A or B)		620	620	620	640	640
• Depth						
- Without operator panel	mm	249	249	249	329	329
- With operator panel, max.	mm	264	264	264	344	344
Frame size		FSC	FSC	FSC	FSD	FSD
Weight, approx.						
• With integrated filter	kg	9.5	9.5	9.5	31	31

[1] The rated output current I_{rated} and the base load current I_L are based on the duty cycle for low overload (LO).

[2] The base load current I_H is based on the duty cycle for high overload (HO).

[3] The input current depends on the motor load and line impedance and applies for a line impedance corresponding to u_K = 1 %. The rated input currents apply for a load at rated power (based on I_{rated}) – these current values are specified on the rating plate.

[4] Max. motor cable length 25 m (shielded) for PM230 Power Modules with integrated line filter to maintain the limit values of EN 61800-3 Category C2 (filter A) or C1 (filter B). C1 installations for conducted emissions. With unshielded cables, Categories C2 and C1 are not achieved.

Technical specifications (continued)

Line supply voltage 380 ... 480 V 3 AC		PM230 Power Modules				
With integrated line filter class A		6SL3223-0DE33-7AA0	6SL3223-0DE34-5AA0	6SL3223-0DE35-5AA0	6SL3223-0DE37-5AA0	6SL3223-0DE38-8AA0
With integrated line filter class B		6SL3223-0DE33-7BA0	6SL3223-0DE34-5BA0	6SL3223-0DE35-5BA0	6SL3223-0DE37-5BA0	6SL3223-0DE38-8BA0
Output current at 50 Hz 400 V 3 AC						
• Rated current I_{rated} [1]	A	75	90	110	145	178
• Base load current I_L [1]	A	75	90	110	145	178
• Base load current I_H [2]	A	60	75	90	110	145
• I_{max}	A	120	150	180	220	290
Rated power						
• based on I_L	kW (hp)	37 (50)	45 (60)	55 (75)	75 (100)	90 (125)
• based on I_H	kW (hp)	30 (40)	37 (50)	45 (60)	55 (75)	75 (100)
Rated pulse frequency	kHz	4	4	4	4	4
Efficiency η		0.97	0.97	0.97	0.97	0.97
Power loss (at rated current)	kW	0.99	1.2	1.4	1.9	2.3
Cooling air requirement	m^3/s	0.039	0.039	0.117	0.117	0.117
Sound pressure level L_{pA} (1 m)	dB(A)	56	56	61	61	61
24 V DC power supply for Control Unit	A	1	1	1	1	1
Input current [3]						
• Rated current	A	70	84	102	135	166
• based on I_H	A	56	70	84	102	135
Line supply connection U1/L1, V1/L2, W1/L3		M6 screw studs	M6 screw studs	M8 screw studs	M8 screw studs	M8 screw studs
• Conductor cross-section	mm^2	25 … 50	25 … 50	35 … 120	35 … 120	35 … 120
Motor connection U2, V2, W2		M6 screw studs	M6 screw studs	M8 screw studs	M8 screw studs	M8 screw studs
• Conductor cross-section	mm^2	25 … 50	25 … 50	35 … 120	35 … 120	35 … 120
Motor cable length [4], **max.**						
• Shielded	m	25	25	25	25	25
• Unshielded	m	100	100	100	100	100
Degree of protection		IP55/UL Type12	IP55/UL Type12	IP55/UL Type12	IP55/UL Type12	IP55/UL Type12
Dimensions						
• Width	mm	320	320	410	410	410
• Height (with integrated filter A or B)		751	751	915	915	915
• Depth						
- Without operator panel	mm	329	329	416	416	416
- With operator panel, max.	mm	344	344	431	431	431
Frame size		FSE	FSE	FSF	FSF	FSF
Weight, approx.						
• With integrated filter A or B	kg	37 (filter A) 38 (filter B)	37 (filter A) 38 (filter B)	70	70	70

1) The rated output current I_{rated} and the base load current I_L are based on the duty cycle for low overload (LO).

2) The base load current I_H is based on the duty cycle for high overload (HO).

3) The input current depends on the motor load and line impedance and applies for a line impedance corresponding to u_K = 1 %. The rated input currents apply for a load at rated power (based on I_{rated}) – these current values are specified on the rating plate.

4) Max. motor cable length 25 m (shielded) for PM230 Power Modules with integrated line filter to maintain the limit values of EN 61800-3 Category C2 (filter A) or C1 (filter B). C1 installations for conducted emissions. With unshielded cables, Categories C2 and C1 are not achieved.

Characteristic curves

Derating data

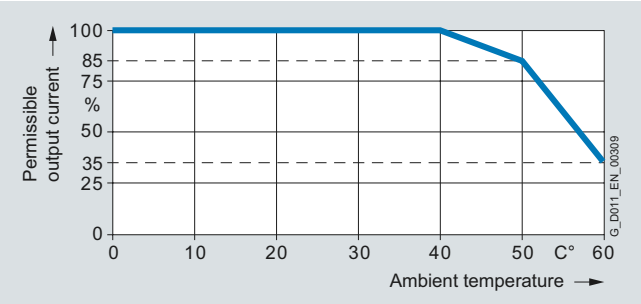
Pulse frequency

Rated power [1] at 50 Hz 400 V 3 AC		Rated output current in A at a pulse frequency of						
kW	hp	4 kHz	6 kHz	8 kHz	10 kHz	12 kHz	14 kHz	16 kHz
0.37	0.5	1.3	1.11	0.91	0.78	0.65	0.59	0.52
0.55	0.75	1.7	1.45	1.19	1.02	0.85	0.77	0.68
0.75	1.0	2.2	1.87	1.54	1.32	1.10	0.99	0.88
1.1	1.5	3.1	2.64	2.17	1.86	1.55	1.40	1.24
1.5	2.0	4.1	3.49	2.87	2.46	2.05	1.85	1.64
2.2	3.0	5.9	5.02	4.13	3.54	2.95	2.66	2.36
3.0	4.0	7.7	6.55	5.39	4.62	3.85	3.47	3.08
4.0	5.0	10.2	8.67	7.14	6.12	5.1	4.59	4.08
5.5	7.5	13.2	11.22	9.24	7.92	6.6	5.94	5.28
7.5	10	18.0	15.3	12.6	10.8	9.0	8.1	7.2
11.0	15	26.0	22.1	18.2	15.6	13.0	11.7	10.4
15.0	20	32.0	27.2	22.4	19.2	16.0	14.4	12.8
18.5	25	38.0	32.3	26.6	22.8	19.0	17.1	15.2
22.0	30	45.0	38.25	31.5	27.0	22.5	20.25	18.0
30.0	40	60.0	52.7	43.4	37.2	31.0	27.9	24.8
37.0	50	75.0	63.75	52.5	45.0	37.5	33.75	30.0
45.0	60	90.0	76.5	63.0	54.0	45.0	40.5	36.0
55.0	75	110.0	93.5	77.0	–	–	–	–
75.0	100	145.0	123.3	101.5	–	–	–	–
90.0	125	178.0	151.3	124.6	–	–	–	–

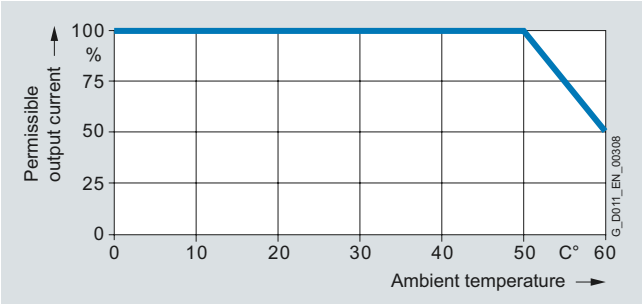
[1] Rated power based on the rated output current I_{rated}. The rated output current I_{rated} is based on the duty cycle for low overload (LO).

Characteristic curves (continued)

Ambient temperature

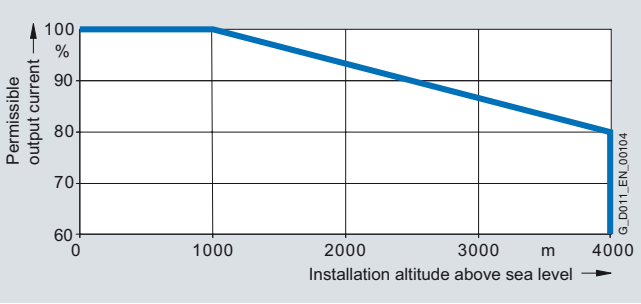


Low overload (LO) for PM230 Power Modules frame sizes FSA to FSF

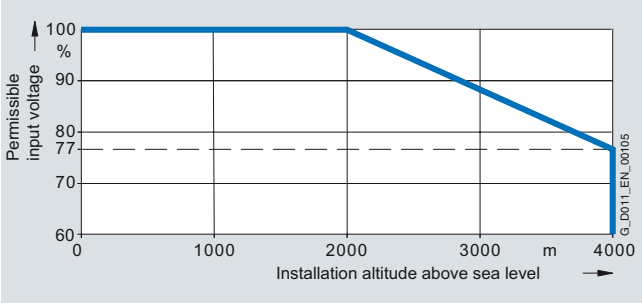


High overload (HO) for PM230 Power Modules frame sizes FSA to FSF

Installation altitude

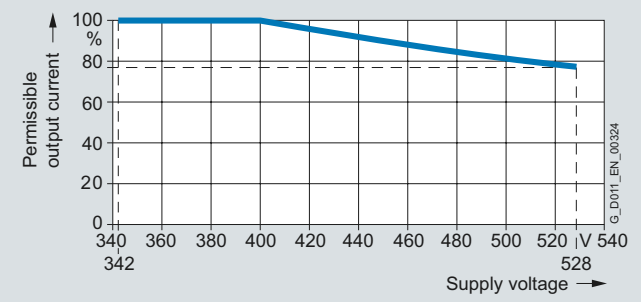


Permissible output current as a function of installation altitude

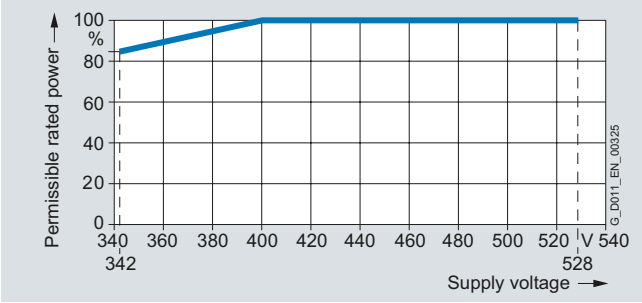


Permissible input voltage as a function of installation altitude

Line supply voltage



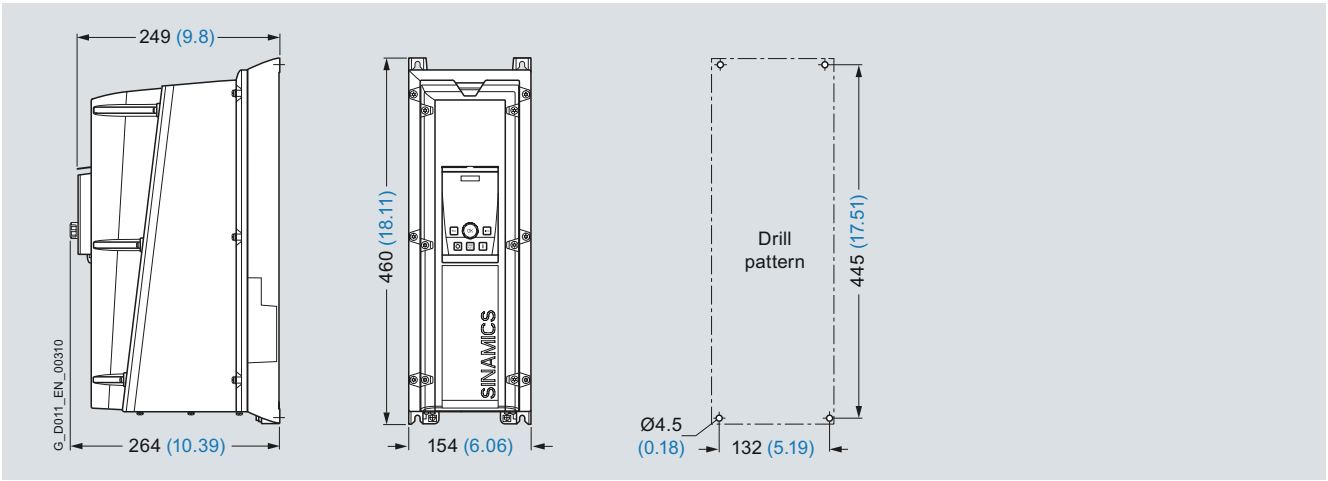
Permissible output current as a function of the line voltage



Permissible rated power as a function of the line voltage

Note:
The operating temperature ranges of the Control Units should be taken into account. The temperature ranges are specified in the technical specifications under Control Units.

Dimensional drawings



PM230 Power Module frame size FSA with integrated line filter class A/B

Mounted with 4 M4 studs, 4 M4 nuts, 4 M4 washers.

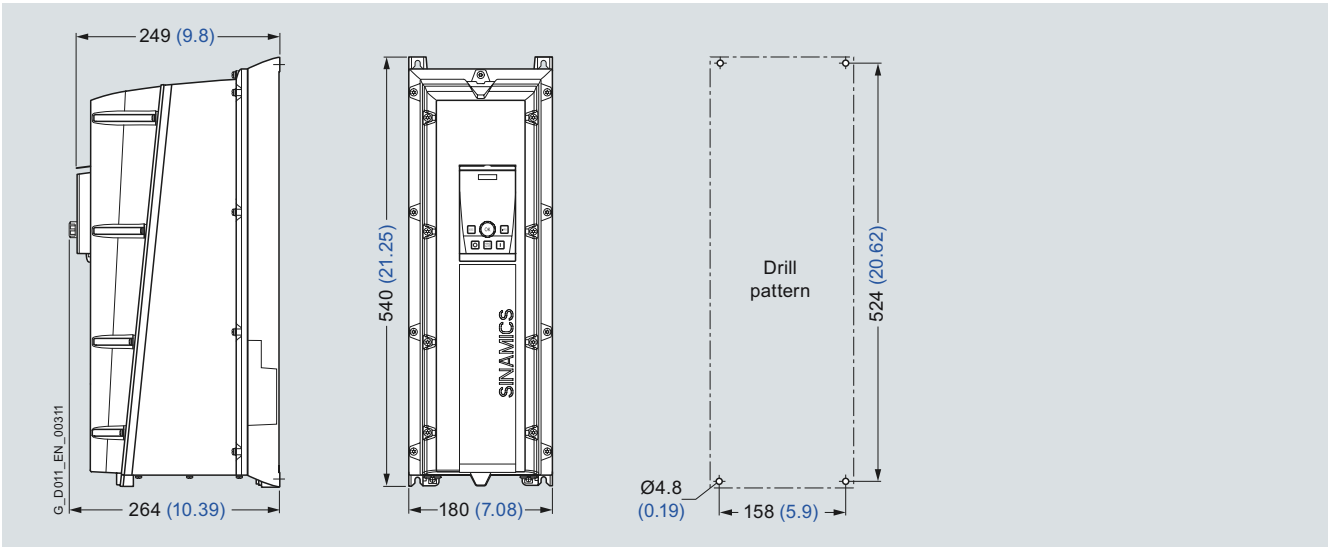
Ventilation clearance required at top and bottom: 100 mm (3.94 inches).

Ventilation clearance required at sides: 0 mm (0 inches)

When the IOP is plugged on, the mounting depth increases by 15 mm (0.59 inches).

Exception: for BOP-2/blanking cover mounting depth +5 mm (+0.2 inches).

All dimensions in mm (values in brackets are in inches).



PM230 Power Module frame size FSB with integrated line filter class A/B

Mounted with 4 M4 studs, 4 M4 nuts, 4 M4 washers.

Ventilation clearance required at top and bottom: 100 mm (3.94 inches).

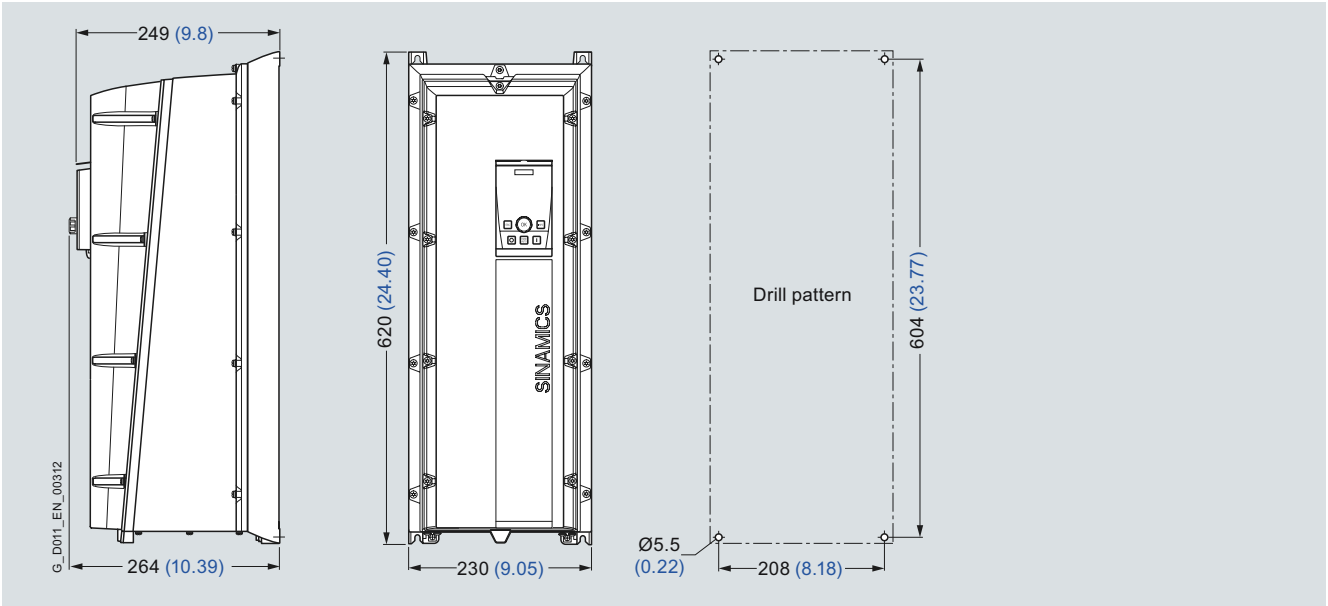
Ventilation clearance required at sides: 0 mm (0 inches)

When the IOP is plugged on, the mounting depth increases by 15 mm (0.59 inches).

Exception: for BOP-2/blanking cover mounting depth +5 mm (+0.2 inches).

All dimensions in mm (values in brackets are in inches).

Dimensional drawings (continued)



PM230 Power Module frame size FSC with integrated line filter class A/B

Mounted with 4 M5 studs, 4 M5 nuts, 4 M5 washers.

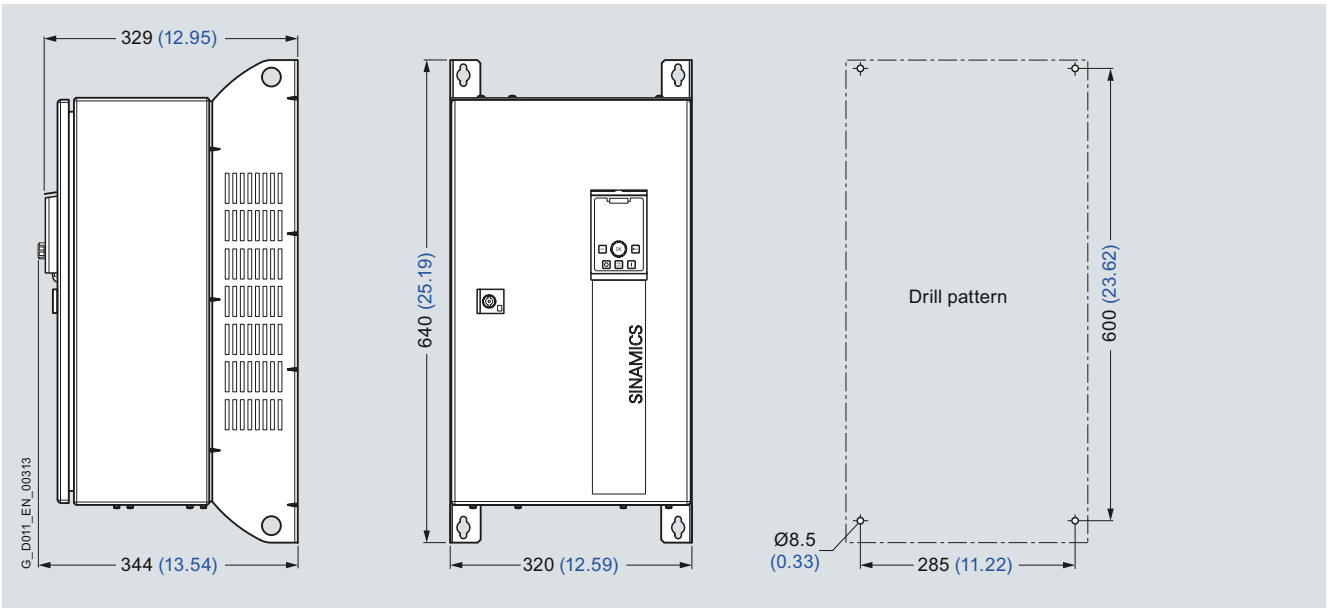
Ventilation clearance required at top and bottom: 125 mm (4.92 inches).

Ventilation clearance required at sides: 0 mm (0 inches)

When the IOP is plugged on, the mounting depth increases by 15 mm (0.59 inches).

Exception: for BOP-2/blanking cover mounting depth +5 mm (+0.2 inches).

All dimensions in mm (values in brackets are in inches).



PM230 Power Module frame size FSD with integrated line filter class A/B

Mounted with 4 M8 studs, 4 M8 nuts, 4 M8 washers.

Ventilation clearance required at top and bottom: 300 mm (11.81 inches).

Ventilation clearance required at sides:

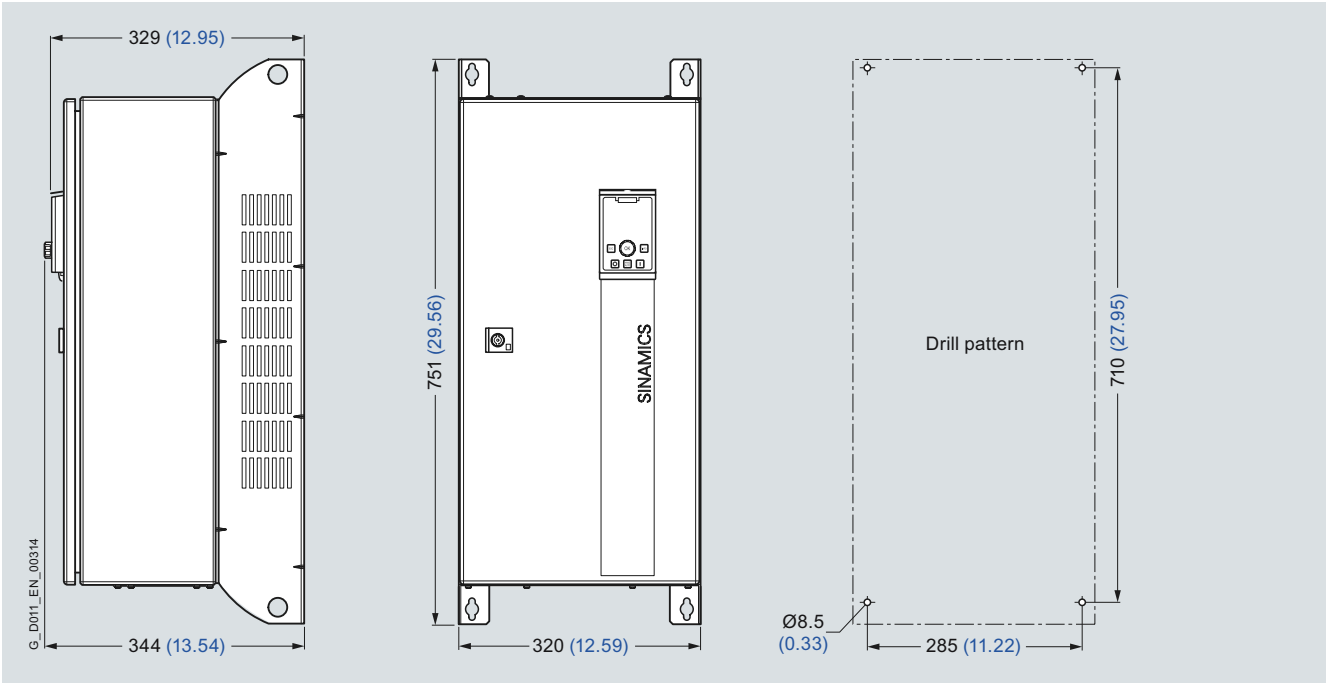
- Ambient temperature ≤ 40 °C: 0 mm (0 inches)
- Ambient temperature > 40 °C: 50 mm (1.97 inches)

When the IOP is plugged on, the mounting depth increases by 15 mm (0.59 inches).

Exception: for BOP-2/blanking cover mounting depth +5 mm (+0.2 inches).

All dimensions in mm (values in brackets are in inches).

Dimensional drawings (continued)



PM230 Power Module frame size FSE with integrated line filter class A/B

Mounted with 4 M8 studs, 4 M8 nuts, 4 M8 washers.

Ventilation clearance required at top and bottom: 300 mm (11.81 inches).

Ventilation clearance required at sides:

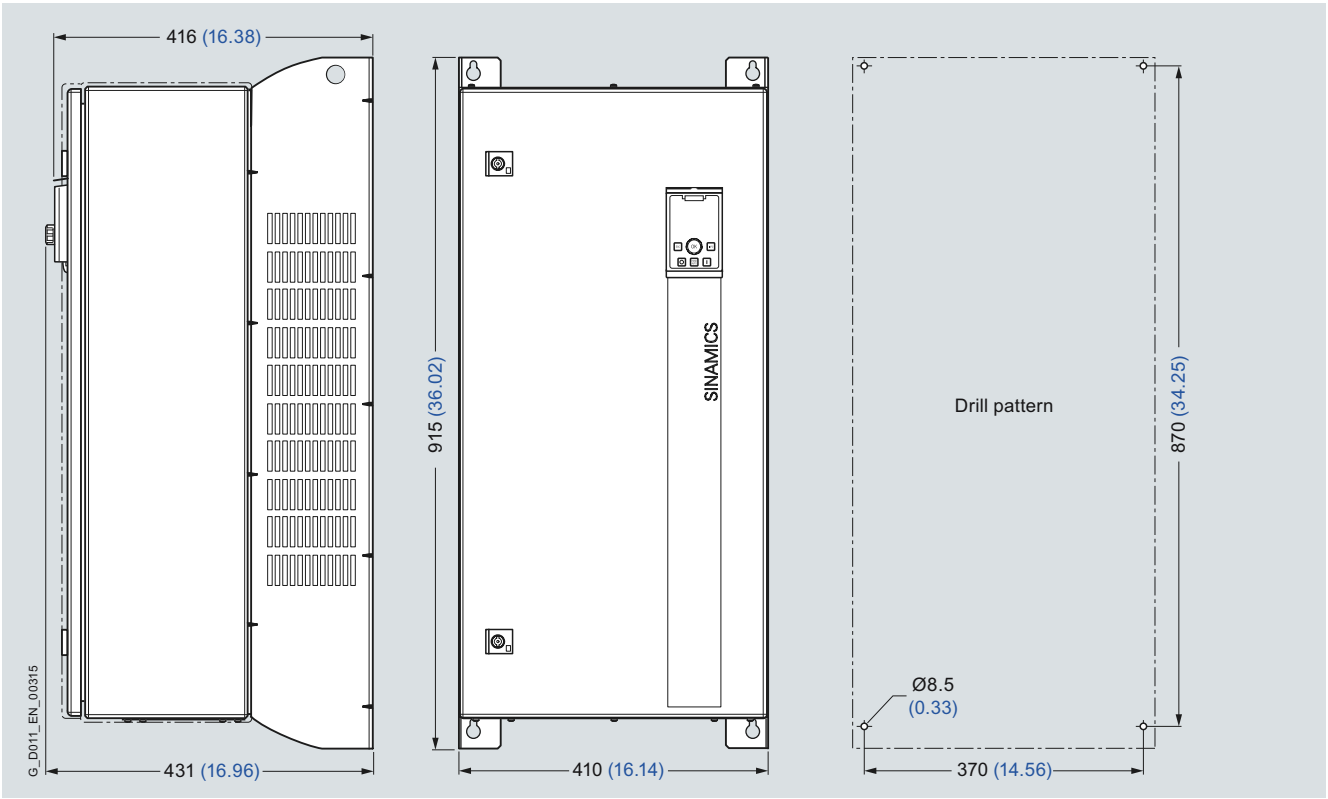
- Ambient temperature ≤ 40 °C: 0 mm (0 inches)
- Ambient temperature > 40 °C: 50 mm (1.97 inches)

When the IOP is plugged on, the mounting depth increases by 15 mm (0.59 inches).

Exception: for BOP-2/blanking cover mounting depth +5 mm (+0.2 inches).

All dimensions in mm (values in brackets are in inches).

Dimensional drawings (continued)



PM230 Power Module frame size FSF with integrated line filter class A/B

Mounted with 4 M8 studs, 4 M8 nuts, 4 M8 washers.

Ventilation clearance required at top and bottom: 350 mm (13.78 inches).

Ventilation clearance required at sides:

- Ambient temperature ≤ 40 °C: 0 mm (0 inches)
- Ambient temperature > 40 °C: 50 mm (1.97 inches)

When the IOP is plugged on, the mounting depth increases by 15 mm (0.59 inches).

Exception: for BOP-2/blanking cover mounting depth +5 mm (+0.2 inches).

All dimensions in mm (values in brackets are in inches).

Overview

The following table lists recommendations for additional line-side components, such as fuses and circuit breakers (line-side components dimensioned in accordance with IEC standards). The specified circuit breakers are UL-certified.

3NA3 fuses are recommended for European countries. The 3NE1 fuses are UL-compliant (corresponds to UL). The values in the table take into account the overload capability of the inverter.

Additional information about the listed fuses and circuit breakers can be found in Catalogs LV 1 and LV 1 T.

Selection and ordering data

Rated power [1]		SINAMICS PM230 IP55/UL Type 12 Power Modules		Fuse		Circuit breaker
kW	hp	Type 6SL3223-...	Frame size	Type 3NA3 Order No.	Type 3NE1 UL Order No.	Order No.
380 … 480 V 3 AC						
0.37	0.50	0DE13-7 . A0	FSA	**3NA3803**	**3NE1813-0**	**3RV1021-1CA10**
0.55	0.75	0DE15-5 . A0	FSA			**3RV1021-1DA10**
0.75	1.0	0DE17-5 . A0	FSA			**3RV1021-1FA10**
1.1	1.5	0DE21-1 . A0	FSA			**3RV1021-1GA10**
1.5	2.0	0DE21-5 . A0	FSA			**3RV1021-1JA10**
2.2	3.0	0DE22-2 . A0	FSA			**3RV1021-1KA10**
3.0	4.0	0DE23-0 . A0	FSA			**3RV1021-4AA10**
4.0	5.0	0DE24-0 . A0	FSB	**3NA3805**		**3RV1021-4BA10**
5.5	7.5	0DE25-5 . A0	FSB	**3NA3807**	**3NE1814-0**	**3RV1021-4DA10**
7.5	10	0DE27-5 . A0	FSB	**3NA3810**	**3NE1815-0**	**3RV1031-4EA10**
11.0	15	0DE31-1 . A0	FSC	**3NA3814**	**3NE1803-0**	**3RV1031-4FA10**
15.0	20	0DE31-5 . A0	FSC	**3NA3820**	**3NE1817-0**	**3RV1031-4HA10**
18.5	25	0DE31-8AA0	FSC			**3RV1042-4KA10**
22	30	0DE32-2 . A0	FSD	**3NA3822**	**3NE1818-0**	
30	40	0DE33-0 . A0	FSD	**3NA3824**	**3NE1820-0**	**3RV1042-4MA10**
37	50	0DE33-7 . A0	FSE	**3NA3830**	**3NE1021-0**	**3VL1712-.DD33-....**
45	60	0DE34-5 . A0	FSE	**3NA3832**	**3NE1022-0**	**3VL1716-.DD33-....**
55	75	0DE35-5 . A0	FSF	**3NA3836**	**3NE1224-0**	**3VL3720-.DC36-....**
75	100	0DE37-5 . A0	FSF	**3NA3140**	**3NE1225-0**	**3VL3725-.DC36-....**
90	125	0DE38-8 . A0	FSF	**3NA3144**	**3NE1227-0**	**3VL4731-.DC36-....**

[1] Rated power based on the rated output current I_{rated}. The rated output current I_{rated} is based on the duty cycle for low overload (LO).

Overview

The Intelligent Operator Panel IOP is an extremely user-friendly and powerful operator panel for the SINAMICS G120, SINAMICS G120D and SINAMICS G120P standard drives and SIMATIC ET 200 frequency converters.

The IOP supports both entry-level personnel and drive experts. Thanks to the large plain text display, the menu prompting and the Application Wizards, it is easy to commission standard drives. A drive can be essentially commissioned without having to use a printed parameter list as the parameters are displayed in plain text, and due to the explanatory help texts and the parameter filtering function.

Application Wizards interactively guide you when commissioning important applications such as conveyor technology, pumps, fans and compressors. There are Quick Commissioning Wizards for general commissioning.

The drives are manually and simply controlled using directly assigned buttons and the navigation wheel. The IOP has a dedicated switchover button to switch over from the automatic to the manual mode.

The frequency inverter can be diagnosed in a user-friendly fashion using the plain text display of faults and alarms. Help texts can be obtained by pressing the INFO button.

Up to two process values can either be graphically or numerically visualized on the status screen/status display. Process values can also be displayed in technological units.

IOP supports series commissioning of identical drives. For this purpose, a parameter list can be copied from a frequency inverter into the IOP and when required, downloaded into other drive units of the same type.

The IOP includes the following language packages: English, French, German, Italian and Spanish.

Updating the IOP

The IOP can be updated and expanded using the integrated USB interface.

Data to support future drive systems can be transferred from the PC to the IOP via drag & drop. Further, the USB interface allows user languages and wizards that become available in the future to be subsequently downloaded and the firmware to be updated for the IOP.

The IOP is supplied with power via the USB interface during an update.

Benefits

- Simple commissioning of standard applications using wizards, it is not necessary to know the parameter structure
- Diagnostics using plain text display; can be used locally on-site without documentation
- Direct manual operation of the drive – you can toggle between the automatic and manual modes
- Status display with freely selectable units; display of real physical values
- Intuitive navigation using a wheel - just like in everyday applications
- Graphic display, for e.g. status values in bar-type diagrams such as pressure, flowrate
- Commissioning without documentation using the integrated help function
- Series commissioning using the clone function (parameter set data is saved for fast replacement)
- User-defined parameter list with a reduced number of self-selected parameters (to generate your own commissioning screens)
- 5 integrated languages
- Simple update of languages, wizards and firmware via USB

Selection and ordering data

	Order No.
Intelligent Operator Panel IOP	**6SL3255-0AA00-4JA0**

1

Overview

The Basic Operator Panel BOP-2 can be used to commission drives, monitor drives in operation and input individual parameter settings.

Commissioning of standard drives is easy with the menu-driven dialog on a 2-line display. Simultaneous display of the parameter and parameter value, as well as parameter filtering, means that basic commissioning of a drive can be performed easily and, in most cases, without a printed parameter list.

The drives are manually and simply controlled using directly assigned navigation buttons. The BOP-2 has a dedicated switch-over key to switch over from the automatic to the manual mode.

Diagnostics can easily be performed on the connected frequency inverter by following the menus.

Up to two process values can be numerically visualized on the status screen/status display.

BOP-2 supports series commissioning of identical drives. For this purpose, a parameter list can be copied from a frequency inverter into the BOP-2 and when required, downloaded into other drive units of the same type.

Benefits

- Shorten commissioning times – Easy commissioning of standard drives using basic commissioning wizards (Setup)
- Minimize standstill times – Fast detection and rectification of errors (Diagnostics)
- Greater transparency in the process – The status screen/status display of the BOP makes process variable monitoring easy (Monitoring)
- Direct mounting on the frequency inverter (also see IOP)
- Convenient user interface
  - Easy navigation using clear menu structure and clearly assigned control keys
  - 2-line display

Selection and ordering data

		Order No.
Basic Operator Panel BOP-2	new	**6SL3255-0AA00-4CA1**

More information

Operator panel	IOP	BOP-2
Description	 Thanks to the large plain text display, the menu prompting and the Application Wizards, it is easy to commission standard drives. Integrated Application Wizards interactively guide the user when commissioning important applications such as pumps, fans, compressors and conveyor technology.	 Commissioning of standard drives is easy with the menu-driven dialog on a 2-line display. Simultaneous display of the parameter and parameter value, as well as parameter filtering, means that basic commissioning of a drive can be performed easily and, in most cases, without a printed parameter list.
Applications	• Directly mounted on SINAMICS G120P • Achievable degree of protection of IP54/UL Type12 • 5 languages available	• Directly mounted on SINAMICS G120P • Achievable degree of protection of IP55/UL Type12
Quick commissioning without expert knowledge	• Standard commissioning using the clone function • User-defined parameter list with a reduced number of self-selected parameters • Simple commissioning of standard applications using application-specific wizards, it is not necessary to know the parameter structure • Commissioning largely without documentation	• Standard commissioning using the clone function
High degree of operator friendliness and intuitive operation	• Direct manual operation of the drive – you can toggle between the automatic and manual modes • Intuitive navigation using the wheel - just like in everyday applications • Graphic display for e.g. status values in bar-type diagrams such as pressure, flowrate • Status display with freely selectable units; display of real physical values	• Direct manual operation of the drive – you can toggle between the automatic and manual modes • 2-line display for indicating up to 2 process values with text • Status display of predefined units
Minimization of maintenance times	• Diagnostics using plain text display; can be used locally on-site without documentation • Simple update of languages, wizards and firmware via USB	• Diagnostics with menu prompting on 7-segment display

1

Supplementary system components - Blanking cover for PM230 Power Modules in design IP55

Overview

SINAMICS G120P frame size FSC with blanking cover

The blanking cover is designed to be used with the PM230 Power Module in frame sizes FSA to FSF. It is plugged on the inverter instead of an operator panel if an operator panel is not required. The blanking cover is mechanically identical to the Intelligent Operator Panel or the Basic Operator Panel. When it is plugged onto the PM230 Power Module, IP55 degree of protection/UL Type12 is achieved.

Selection and ordering data

		Order No.
Blanking cover for PM230 Power Module	new	**6SL3256-1BA00-0AA0**

Supplementary system components MMC memory card/SIMATIC memory card

Overview

MMC memory card, SIMATIC memory card (SD card)

The parameter settings for an inverter can be stored on the MMC memory card or the SD memory card which will be referred to below as the SIMATIC memory card. When service is required, e.g. after the inverter has been replaced and the data have been downloaded from the memory card the drive system is immediately ready for use again.

- Parameter settings can be written from the memory card to the inverter or saved from the inverter to the memory card.
- Up to 100 parameter sets can be stored.
- Supports series commissioning without the use of additional commissioning tools (e.g. BOP-2 and STARTER).

Note:
The memory card is not required for operation and does not have to remain inserted.

Selection and ordering data

		Order No.
MMC memory card		**6SL3254-0AM00-0AA0**
SIMATIC memory card (SD memory card) (for CU230P-2 only)	new	**6ES7954-8LB00-0AA0**

Supplementary system components
PC Inverter Connection Kit 2

Overview

For controlling and commissioning an inverter directly from a PC, if the STARTER commissioning tool has been installed on the PC. With these, the inverter can be

- parameterized (commissioning, optimization)
- monitored (diagnostics)
- controlled (master control via the STARTER commissioning tool for test purposes).

A USB cable (3 m) and the STARTER commissioning tool are included as scope of delivery on a DVD.

Selection and ordering data

	Order No.
PC Inverter Connection Kit 2 for CU2.0.-2 Control Units • CU230P-**2** Including USB cable (3 m) and STARTER commissioning tool [1] on DVD	**6SL3255-0AA00-2CA0**

Supplementary system components
Shield Connection Kit 1 for CU230P-2 Control Units

Overview

The Shield Connection Kit 1 offers for all signal and communication cables

- Optimum shield connection
- Strain relief

It contains the following:

- A matching shield bonding plate
- All of the necessary connecting and retaining elements for mounting

The Shield Connection Kit 1 is suitable for the following SINAMICS G120 P Control Units:

- CU230P-2 HVAC
- CU230P-2 DP
- CU230P-2 CAN

Selection and ordering data

	Order No.
Shield Connection Kit 1 for CU230P-2 Control Units	**6SL3264-1EA00-0FA0**

[1] The STARTER commissioning tool is also available on the Internet under http://support.automation.siemens.com/WW/view/en/10804985/133100

Spare parts
Mounting set

1

Overview

With each PM230 IP55/UL Type12 Power Module the following components are supplied from the factory according to the frame-size:

PM230 IP55/UL Type12

Frame sizes FSA to FSC	Frame sizes FSD to FSF
• 1 Sub-D connector with mounting material for connecting the CU230P-2 HVAC/DP/CAN to the operator panel (e.g. IOP) • 1 motor connector and 1 power supply connector • 2 serrated strips including mounting material for shield connection • 3 sleeves for inserting in the cutouts for the signal cables of the cable bonding plate • Ferrite core (only necessary for devices with integrated filter B)	• 1 adapter cable for connecting the CU230P-2 HVAC/DP/CAN to the operator panel (e.g. IOP) • 4 clips for shield connection for the signal cables • 6 serrated strips including mounting material for the motor and supply cables • 4 sleeves (preinstalled in the cutouts for the signal cables of the cable bonding plate) • 1 cable bonding plate without cutouts for individual connection method design • 1 cabinet key

A 2-page Quick Start Guide complete with mounting instructions is supplied with each PM230 IP55/UL Type12.

A mounting set is available as an order option. It contains the following:

PM230 IP55/UL Type12

Frame sizes FSA to FSC	Frame sizes FSD to FSF
• 1 Sub-D connector with mounting material • 1 motor connector and 1 power supply connector • 2 serrated strips including mounting material for shield connection • 3 sleeves for inserting in the cutouts for the signal cables of the cable bonding plate • Ferrite core (only necessary for devices with integrated filter B) • Screws for fixing the cable bonding plate and the cover	• 1 adapter cable including mounting material • 6 serrated strips including mounting material for the motor and supply cables • 1 cabinet key

Selection and ordering data

Mounting set for PM230 IP55/UL Type12 Power Module		Order No.
Frame size FSA	new	**6SL3200-0SK02-0AA0**
Frame size FSB	new	**6SL3200-0SK03-0AA0**
Frame size FSC	new	**6SL3200-0SK04-0AA0**
Frame size FSD	new	**6SL3200-0SK05-0AA0**
Frame size FSE	new	**6SL3200-0SK06-0AA0**
Frame size FSF	new	**6SL3200-0SK07-0AA0**

Overview

The Power Module fans are designed for extra long service life. For special requirements, replacement fans are available that can be exchanged quickly and easily. The two pictures show the mounting location of the internal or external fan units:

Example: PM230 IP55/UL Type12 Power Module, frame size FSC with external fan unit in heat sink

Example: PM230 IP55/UL Type12 Power Module, frame size FSC with internal fan unit via the CU230P-2 Control Unit

Selection and ordering data

Rated power		SINAMICS PM230 IP55/UL Type12 Power Module			External fan unit
kW (LO)	hp (LO)	Type 6SL3223-...	Frame size		Order No.
380 … 480 V 3 AC ± 10 %					
0.37	0.50	0DE13-7 . A0	FSA	new	**6SL3200-0SF21-0AA0**
0.55	0.75	0DE15-5 . A0			
0.75	1.0	0DE17-5 . A0			
1.1	1.5	0DE21-1 . A0			
1.5	2	0DE21-5 . A0			
2.2	3	0DE22-2 . A0			
3.0	4	0DE23-0 . A0			
4.0	5	0DE24-0 . A0	FSB	new	**6SL3200-0SF22-0AA0**
5.5	7.5	0DE25-5 . A0			
7.5	10	0DE27-5 . A0			
11.0	15	0DE31-1 . A0	FSC	new	**6SL3200-0SF23-0AA0**
15.0	20	0DE31-5 . A0			
18.5	25	0DE31-8AA0			
22	30	0DE32-2 . A0	FSD	new	**6SL3200-0SF24-0AA0**
30	40	0DE33-0 . A0			
37	50	0DE33-7 . A0	FSE		
45	60	0DE34-5 . A0			
55	75	0DE35-5 . A0	FSF	new	**6SL3200-0SF26-0AA0**
75	100	0DE37-5 . A0			
90	125	0DE38-8 . A0			

Rated power		SINAMICS PM230 IP55/UL Type12 Power Module			Internal fan unit
kW (LO)	hp (LO)	Type 6SL3223-...	Frame size		Order No.
380 … 480 V 3 AC ± 10 %					
0.37	0.50	0DE13-7 . A0	FSA	new	**6SL3200-0SF31-0AA0**
0.55	0.75	0DE15-5 . A0			
0.75	1.0	0DE17-5 . A0			
1.1	1.5	0DE21-1 . A0			
1.5	2	0DE21-5 . A0			
2.2	3	0DE22-2 . A0			
3.0	4	0DE23-0 . A0			
4.0	5	0DE24-0 . A0	FSB		
5.5	7.5	0DE25-5 . A0			
7.5	10	0DE27-5 . A0			
11.0	15	0DE31-1 . A0	FSC		
15.0	20	0DE31-5 . A0			
18.5	25	0DE31-8AA0			
22	30	0DE32-2 . A0	FSD	new	**6SL3200-0SF32-0AA0**
30	40	0DE33-0 . A0			
37	50	0DE33-7 . A0	FSE		
45	60	0DE34-5 . A0			
55	75	0DE35-5 . A0	FSF		
75	100	0DE37-5 . A0			
90	125	0DE38-8 . A0			

Documentation SINAMICS G120P

Overview

SINAMICS G120P is a modular inverter system that comprises different function units – these are primarily the Control Unit and the Power Module. The documentation is also organized in a modular structure. The following manuals are available:

	Manuals			
	Hardware Installation Manual	Operating Instructions	List Manual	Getting Started
Control Units				
CU230P-2	–	de, en, fr, it, es	de, en	de, en, fr, it, es [1]
Power Modules				
PM230	de, en	–	– [2]	multilingual

Manuals are available in the following forms:

Paper documentation

A Getting Started Guide is supplied as hard copy with every Power Module and Control Unit.

Online version on Internet as download

The documentation is also available on the Internet under http://www.siemens.com/sinamics-g120/documentation

More information

Language	Manual in language
de	German
en	English
fr	French
it	Italian
es	Spanish
multilingual	de, en, fr, it, es

Hardware Installation Manual

The hardware installation manual describes the procedures that must be undertaken regarding a product so that the product can be used at the required location and in the required way. The hardware installation manual contains all relevant information on setting up, installing, and wiring up and the necessary dimension drawings and wiring/circuit diagrams.

Usage phases: Installation and commissioning phase

Operating Instructions

Operating instructions are a comprehensive collection of all information necessary for the normal and safe operation of products, parts of plants and complete plants (EN 62079).

Usage phases: Planning and engineering phase, implementation phase, installation and commissioning phase, application phase, maintenance and service phase.

List Manual/Parameter list

The List Manual or the parameter list describes all parameters, function charts, and faults/warnings for the product/system as well as their meanings and setting options. It contains parameter data and fault/warning descriptions with functional correlations.

Usage phases: Commissioning of components that have already been connected, engineering plant and system functions and fault cause/diagnostics.

Getting Started

The Getting Started or Getting Started Guide provides information about getting started for the first-time user as well as references to additional information. It contains information about the basic steps to be taken during commissioning. The information in the other documentation should be carefully observed for all of the other work required.

Usage phases: Commissioning of components that have already been connected.

[1] For the CU230P-2 Control Unit and other Control Units, a Getting Started is available in each language.

[2] The parameter settings for the Power Modules are included in the List Manual for the Control Units.

SINAMICS G120
Standard inverters
0.37 to 250 kW (0.5 to 400 hp)

2

News SINAMICS G120 Standard inverters

Overview

The SINAMICS G120 frequency inverter is designed to provide precise and cost-effective speed/torque control of three-phase motors.

The new operator panel BOP-2 expands the SINAMICS G120 by a user-friendly operator panel with structured system menus and commissioning wizards.

The following versions have been revised and their technical specifications and ordering data have been updated:

- **Control Units CU230P-2 HVAC**
  Pump, fan, compressor Control Units with USS, BACnet and Modbus RTU communication
- **Control Units CU230P-2 DP**
  Pump, fan, compressor Control Units with PROFIBUS communication
- **Control Units CU230P-2 CAN**
  Pump, fan, compressor Control Units with CANopen communication

Application

SINAMICS G120 is ideally suited

- as a universal drive in all industrial and commercial applications
- e.g. in the automotive, textile, printing and chemical industries
- for higher-level applications, e.g. in conveyor systems

Design

SINAMICS G120 standard inverters are modular frequency inverters for standard drives. Each SINAMICS G120 comprises two operative units – the Power Module and Control Unit.

Guidelines for module selection

The procedure to select a complete SINAMICS G120 frequency inverter should be as follows:

1.	Select a suitable Control Unit (depending on the required communication, hardware and software version and safety functionality).
2.	Select a suitable Power Module (depending on the power and technology required).
3.	Select the optional and additional components.

Updated Control Units

The Control Unit performs closed-loop control functions for the inverter. In addition to closed-loop control, the Control Unit has additional functions that can be adapted to the relevant application by parameterization.

Updated Control Units of the CU230P-2 product series are available for SINAMICS G120. Each Control Unit comprises a defined I/O quantity structure and a special fieldbus.

CU230P-2 Control Units

The CU230P-2 Control Units have been specifically designed for pump, fan and compressor applications. The following three versions are available:

- CU230P-2 HVAC
- CU230P-2 DP
- CU230P-2 CAN

Supplementary system components

The following supplementary system components are available for the new components of the SINAMICS G120 standard inverters:

Intelligent Operator Panel IOP

The IOP supports both entry-level personnel and drive experts. Thanks to the large plain text display, the menu prompting and the Application Wizards, it is easy to commission, diagnose and locally control standard drives. Users are guided interactively through the commissioning process by the integrated Application Wizards.

Basic Operator Panel BOP-2

The Basic Operator Panel BOP-2 can be plugged onto the Control Unit and can be used to commission drives, monitor drives in operation and input individual parameter settings. The BOP also provides a function for quick copying of parameters.

MMC memory card/SIMATIC memory card (SD card)

The parameter settings for an inverter can be stored on the memory card. When service is required, e.g. after the inverter has been replaced and the data have been downloaded from the memory card the drive system is immediately ready for use again. The associated slot is located on the top of the Control Unit.

PC Inverter Connection Kit 2

For controlling and commissioning an inverter directly from a PC if the appropriate software (STARTER commissioning tool) has been installed.
The STARTER commissioning tool on DVD is included in the PC Inverter Connection Kit.

Shield Connection Kit 1 for CU230P-2

The Shield Connection Kit offers optimum shield connection and strain relief for all signal and communication cables. It includes a matching shield bonding plate and all of the necessary connecting and retaining elements for mounting.

Configuration

The following electronic configuring and engineering tools are available for the SINAMICS G120 standard inverters:

Selection guide, DT Configurator

More than 100 000 products with approximately 5 million possible product versions from the area of drive technology are listed in the interactive Catalog CA 01 – the Offline Mall from Siemens IA&DT. In order to make it easier to select the optimum motor and/or inverter from the wide range of Motion Control, the DT Configurator was developed, which is integrated as a "Selection guide" in this catalog on the DVD together with the selection and engineering tools.

Online DT Configurator

In addition, the DT Configurator can be used in the Internet without requiring any installation. The DT Configurator can be found in the Industry Mall from Siemens under the following address:
http://www.siemens.com/dt-configurator

SIZER configuration tool

The SIZER PC tool makes it easy to configure the SINAMICS and MICROMASTER 4 drive family. It provides support when selecting the hardware and firmware components necessary to implement a drive task. SIZER supports the configuration of the complete drive system, from simple single-motor drives up to complex multi-axis applications.

STARTER commissioning tool

The STARTER commissioning tool is used to commission, optimize and diagnose drives in a menu-prompted fashion. In addition to SINAMICS drives, STARTER is also suitable for MICROMASTER 4 units and the frequency converters for the distributed I/O SIMATIC ET 200S FC and SIMATIC ET 200pro FC.

Drive ES engineering system

Drive ES is the engineering system used to integrate Siemens drive technology into the SIMATIC automation world easily, efficiently and cost-effectively in terms of communication, configuration and data management. The STEP 7 Manager user interface provides the ideal basis for this. Various software packages are available for SINAMICS: Drive ES Basic, Drive ES SIMATIC and Drive ES PCS 7.

CU230P-2 Control Units

Overview

Example: CU230P-2 HVAC Control Unit with Intelligent Operator Panel IOP on Power Module PM240, frame size FSC

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. The integration of technological functions is a significant differentiating feature to the other Control Units of the SINAMICS G120 drive family.

Selection and ordering data

Communication	Digital inputs	Digital outputs	Analog inputs	Analog outputs	Designation		**Control Unit** Order No.
Standard							
RS485/USS; Modbus RTU, BACnet MS/TP	6	3	4	2	CU230P-2 HVAC	new	**6SL3243-0BB30-1HA1**
PROFIBUS DP	6	3	4	2	CU230P-2 DP	new	**6SL3243-0BB30-1PA1**
CANopen	6	3	4	2	CU230P-2 CAN	new	**6SL3243-0BB30-1CA1**

Function

Closed-loop control

- Linear and square torque characteristisc for fluid flow and positive displacement machines
- ECO mode for additional energy saving
- Vector control without sensor for sophisticated control tasks

Connections

- Two analog inputs (current/voltage can be selected) to directly connect pressure/level sensors
- Two additional analog inputs to connect NI1000/PT1000 temperature sensors
- Direct control of valves and flaps using two 230 V relays

Interfaces

- PROFIBUS, USS, BACnet MS/TP, CANopen and Modbus RTU communication

Software functions

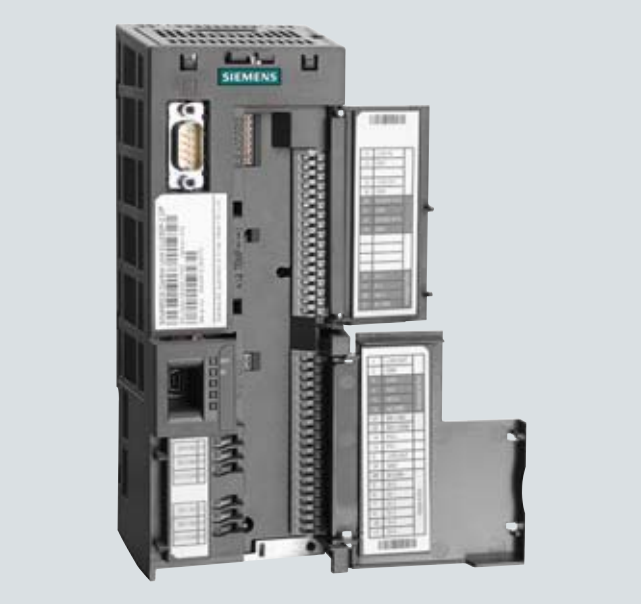
- Automatic restart function after power failure
- Flying restart
- Kinetic buffering ($V_{dc\ min}$ control)
- Skip frequencies
- PID controller for temperature, pressure, air quality, level
- Energy saving through "hibernation"
- Load check function to monitor belts and flow
- Motor staging
- 4 integrated PID controllers
- Multi-zone controller
- Extended emergency mode
- Real time clock with three time generators

IOP wizards for special applications such as e.g.

- Pumps: Positive displacement machines (constant load torque) and centrifugal pumps (square load torque) with and without PID controller
- Fans: Radial and axial fans (square load torque) with and without PID controller
- Compressors: Positive displacement machines (constant load torque) and fluid flow machines (square load torque) with and without PID controller

Design

CU230P-2 HVAC, CU230P-2 DP, CU230P-2 CAN Control Units



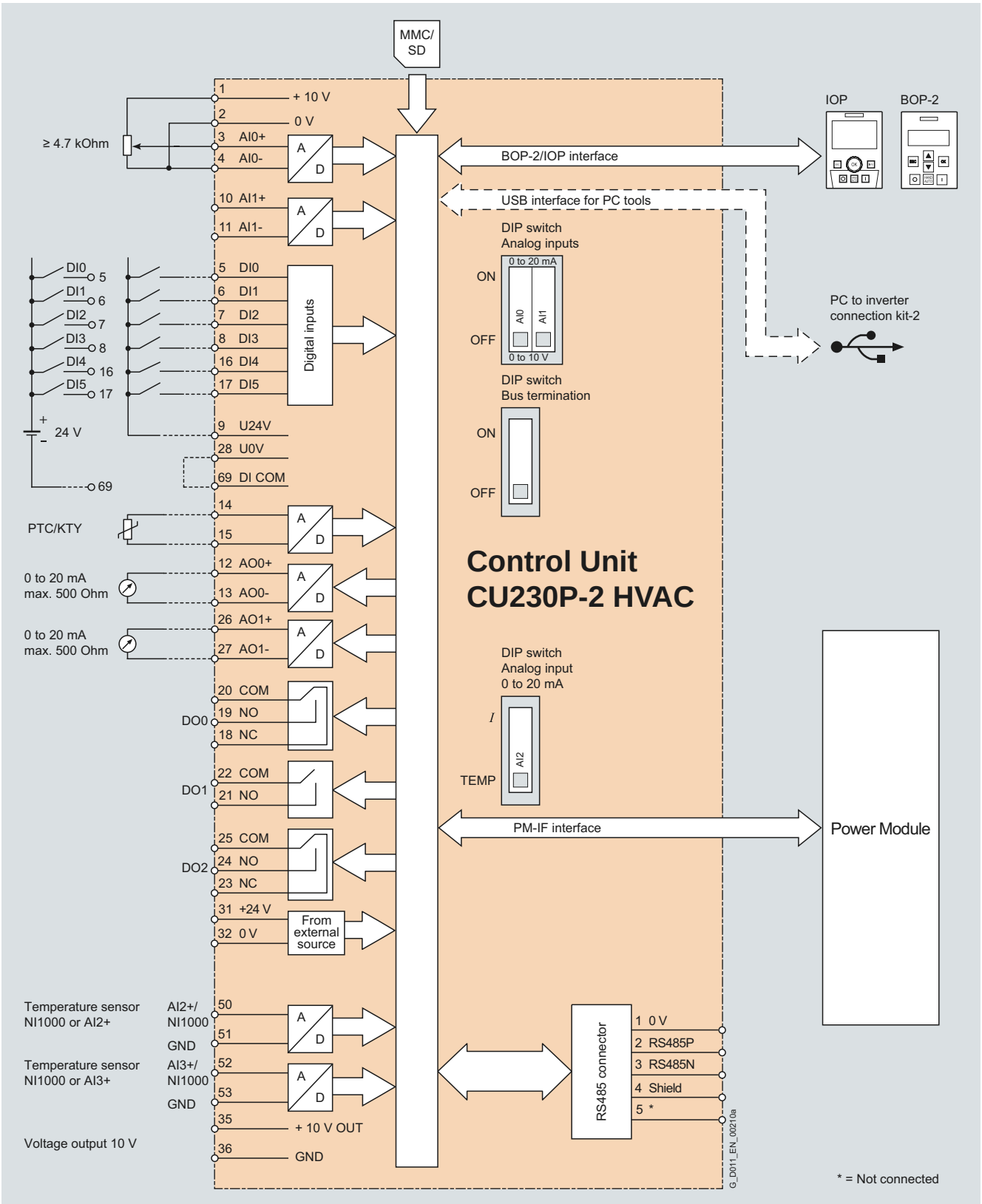
Example: CU230P-2 DP Control Unit with open terminal covers

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 (2 A, 230 V AC)
19	DO0, NO	Relay output 1 NO contact (2 A, 230 V AC)
20	DO0, COM	Relay output 1 Common contact (2 A, 230 V AC)
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 (2 A, 230 V AC)
24	DO2, NO	Relay output 3 NO contact (2 A, 230 V AC)
25	DO2, COM	Relay output 3 Common contact (2 A, 230 V AC)

Terminal No.	Signal	Features
Analog inputs (AI)		
3	AI0+	Differential input, switchable between current, 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, voltage Value range: 0 ... 10 V, -10 ... +10 V, 0/2 ... 10 V, 0/4 ... 20 mA
11	AI1-	
50	AI2+/NI1000	Non-isolated input, switchable between current, temperature sensors, type PT1000/ NI1000 Value range: 0/4 ... 20 mA, PT1000 -50 ... +250 °C; NI1000 -50 ... +150 °C
51	GND	Reference potential of the AI2/ internal electronics ground
52	AI3+/NI1000	Non-isolated input for temperature sensors, type PT1000/ NI1000 Value range: PT1000 -50 ... +250 °C; NI1000 -50 ... +150 °C
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	AO 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	AO GND	Reference potential of the AO1/internal electronics ground
Motor temperature sensor interface		
14	T1 motor	Positive input for motor temperature sensor Type: PTC, KTY sensor, Thermoclick
15	T2 motor	Negative input for motor temperature sensor
Power supply		
9	+24 V OUT	Power supply output 24 V DC, max. 200 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 18 ... 30 V DC, max. 1 500 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

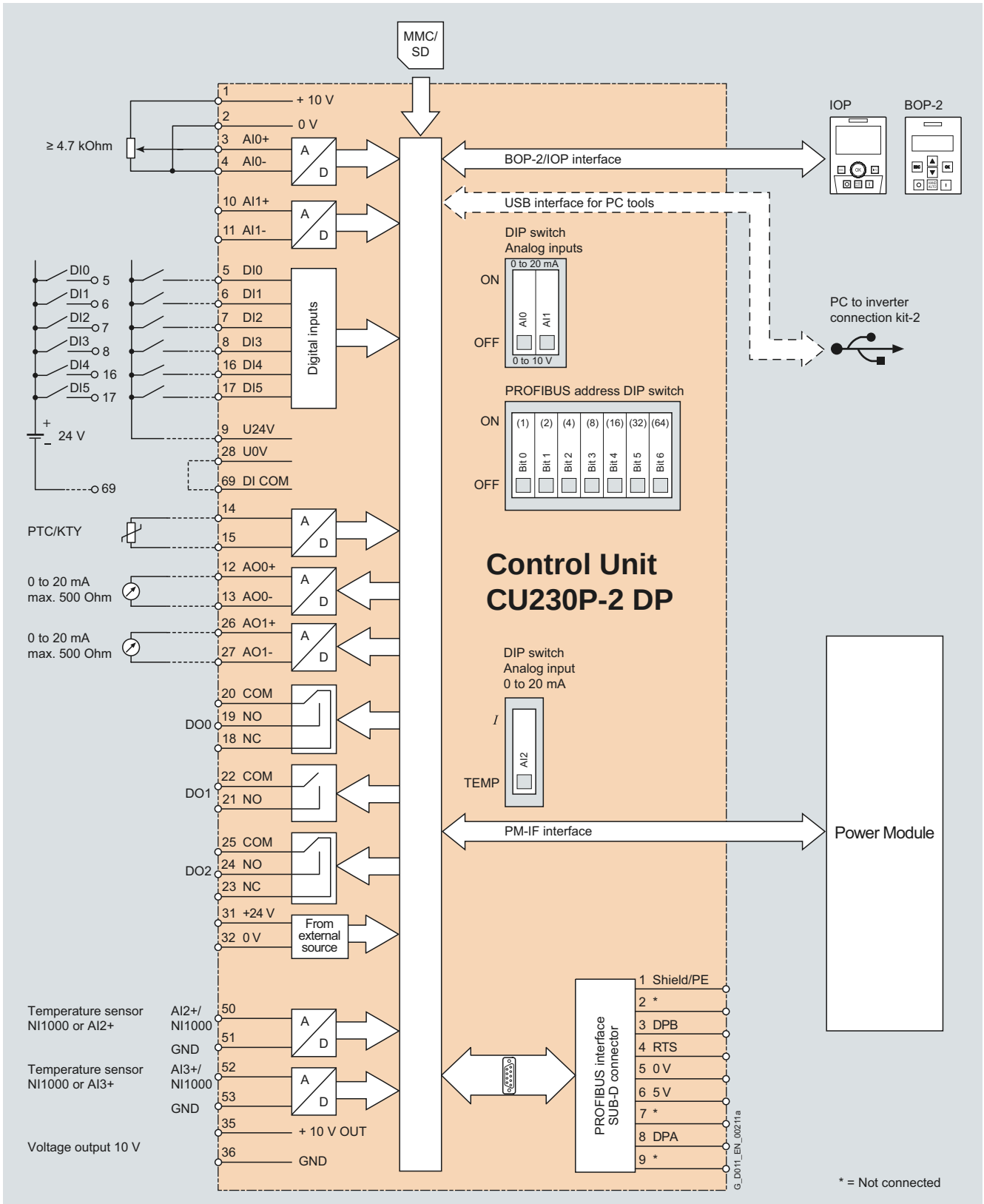
2

Integration



CU230P-2 HVAC Control Unit connection diagram

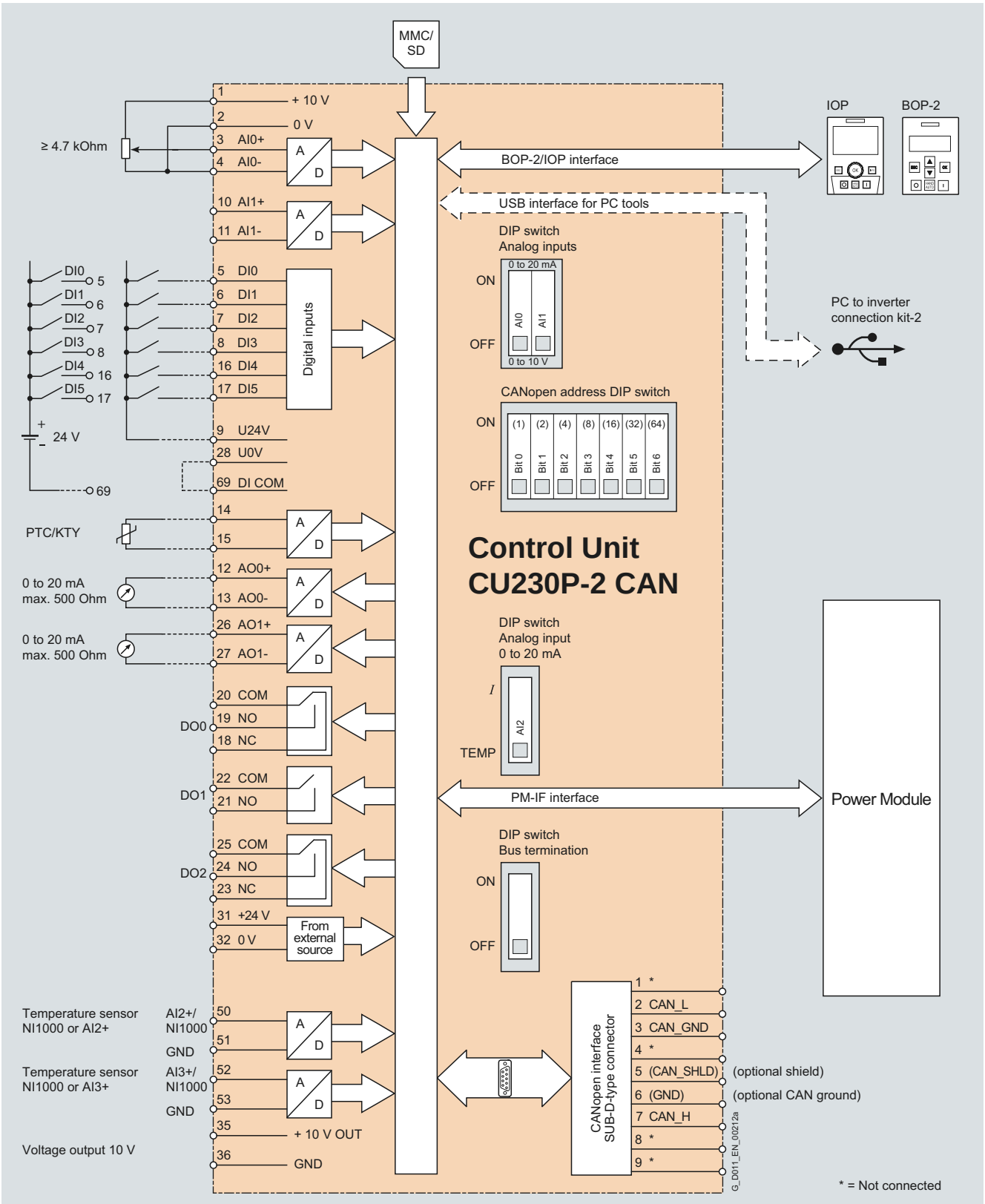
Integration (continued)



CU230P-2 DP Control Unit connection diagram

2

Integration (continued)



CU230P-2 CAN Control Unit connection diagram

Technical specifications

Control Unit	CU230P-2 HVAC 6SL3243-0BB30-1HA1	CU230P-2 DP 6SL3243-0BB30-1PA1	CU230P-2 CAN 6SL3243-0BB30-1CA1
Electrical specifications			
Operating voltage	24 V DC via the Power Module or by connecting to an external 18 ... 30 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	< 5.5 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 Max. input current 15 mA		
Digital outputs	2 relay change-over contacts 250 V AC 2 A (inductive load), 30 V DC 5 A (ohmic load) 1 relay NO contact 30 V DC, 0.5 A (ohmic load)		
Analog inputs	2 differential inputs, switchable using DIP switch between voltage and current: -10 ... +10 V, 0/4 ... 20 mA, 10-bit resolution 1 non-isolated input, switchable using DIP switch between current and temperature sensor, type NI1000/PT1000, 0/4 ... 20 mA; 10-bit resolution 1 non-isolated input, temperature sensor, type NI1000/PT1000, 10-bit resolution The two differential analog inputs can be configured as additional digital inputs. Switching thresholds: 0 → 1: Rated voltage 4 V 1 → 0: Rated voltage 1.6 V Analog inputs are protected against inputs in a voltage range of ± 30 V and have a common-mode voltage in the ± 15 V range		
Analog outputs	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 The analog outputs have short circuit protection		
PTC/KTY interface	1 motor temperature sensor input, sensors that can be connected PTC, KTY and Thermoclick, accuracy ±5 °C		
Bus interface			
Type	**RS485**	**PROFIBUS DP**	**CANopen**
Protocols	USS Modbus RTU BACnet MS/TP (switchable per software)	PROFIdrive Profile V4.1	CANopen
Hardware	Terminal Insulated USS: max. 187.5 kBaud Modbus RTU:19.2 kBaud bus terminating resistors can be switched in	9-pin SUB-D connector Insulated Max. 12 Mbit/s Slave address can be set using DIP switches	9-pin SUB-D socket Insulated Max. 1 Mbit/s
Tool interfaces			
Memory card	1 Micro Memory Card or 1 SIMATIC memory card (SD card)		
Operator panels	IOP Supported connection options between CU230P-2 and IOP: Can be directly plugged on, door-mounted or handheld (IOP handheld not possible in combination with G120P) BOP-2 Supported connection options between CU230P-2 and BOP-2: Can be directly plugged on or door-mounted		
PC interface	USB		

Technical specifications (continued)

Control Unit	CU230P-2 HVAC 6SL3243-0BB30-1HA1	CU230P-2 DP 6SL3243-0BB30-1PA1	CU230P-2 CAN 6SL3243-0BB30-1CA1
Open-loop/closed-loop control techniques			
***V/f* linear/square/parameterizable**	✓		
***V/f* with flux current control (FCC)**	✓		
***V/f* ECO linear/square**	✓		
Vector control, sensorless	✓		
Vector control, with sensor	–		
Torque control, without encoder	✓		
Torque control, with encoder	–		
Software functions			
Setpoint input	✓		
Fixed frequencies	16, parameterizable		
JOG	✓		
Digital motorized potentiometer (MOP)	✓		
Ramp smoothing	✓		
Extended ramp-function generator (with ramp smoothing Off3)	✓		
Positioning down ramp	–		
Slip compensation	✓		
Signal interconnection with BICO technology	✓		
Free function blocks (FFB) for logic 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)	✓		
Energy-saving function (hibernation) with internal PID controller	✓		
Energy-saving function (hibernation) with 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/KTY/Thermoclick)		
Thermal inverter protection	✓		
Motor identification	✓		
Motor holding brake	–		
Auto-ramping (V_{dcmax} controller)	✓		
Kinetic buffering (V_{dcmin} controller)	✓		
Braking functions for PM240 • DC braking • Compound braking • Dynamic braking with integrated brake chopper	✓		
Braking functions for PM250 Regenerative feedback	✓		
Mechanical specifications and ambient conditions			
Degree of protection	IP20		
Signal cable cross-section • min. • max.	 0.15 mm² (AWG28) 1.5 mm² (AWG16)		
Operating temperature	0 ... +60 °C (32 ... 140 °F)		
Storage temperature	-40 ... +70 °C (-40 ... +158 °F)		
Relative humidity	< 95 % RH, condensation not permissible		
Dimensions • Width • Height • Depth	 73 mm 199 mm 65.5 mm		
Weight, approx.	0.61 kg		

Overview

Intelligent Operator Panel IOP

The Intelligent Operator Panel IOP is an extremely user-friendly and powerful Operator Panel for the SINAMICS G120, SINAMICS G120D and SINAMICS G120P standard drives and SIMATIC ET 200 frequency converters.

The IOP supports both entry-level personnel and drive experts. Thanks to the large plain text display, the menu prompting and the Application Wizards, it is easy to commission standard drives. A drive can be essentially commissioned without having to use a printed parameter list as the parameters are displayed in plain text, and due to the explanatory help texts and the parameter filtering function.

Application Wizards interactively guide you when commissioning important applications such as conveyor technology, pumps, fans and compressors. There are Quick Commissioning Wizards for general commissioning.

The drives are manually and simply controlled using directly assigned buttons and the navigation wheel. The IOP has a dedicated switchover button to switch over from the automatic to the manual mode.

The frequency inverter can be diagnosed in a user-friendly fashion using the plain text display of faults and alarms. Help texts can be obtained by pressing the INFO button.

Up to two process values can either be graphically or numerically visualized on the status screen/status display. Process values can also be displayed in technological units.

IOP supports series commissioning of identical drives. For this purpose, a parameter list can be copied from a frequency inverter into the IOP and when required, downloaded into other drive units of the same type.

The operating temperature of the IOP is 0 ... 50 °C (32 ... 122 °F).

The IOP includes the following language packages: English, French, German, Italian and Spanish.

The IOP can be installed in control cabinet doors using the optionally available door mounting kit.

Updating the IOP

The IOP can be updated and expanded using the integrated USB interface. Data to support future drive systems can be transferred from the PC to the IOP via drag & drop. Further, the USB interface allows user languages and wizards that become available in the future to be subsequently downloaded and the firmware to be updated for the IOP.

The IOP is supplied with power via the USB interface during an update.

IOP Handheld

A handheld version of the IOP can be ordered for mobile use. In addition to the IOP, this includes a housing with rechargeable batteries, charging unit and RS232 connecting cable. The charging unit is supplied with connector adapters for Europe, the US and UK. When the batteries are fully charged, the operating time is up to 8 hours.

A PC Inverter Connection Kit 6SL3255-0AA00-2AA1 is required to connect the IOP to the CU240S and CU240E Control Units.

To connect the IOP Handheld to SINAMICS G110D and SINAMICS G120D, the RS232 connecting cable with optical interface is additionally required.

Benefits

- Simple commissioning of standard applications using wizards, it is not necessary to know the parameter structure
- Diagnostics using plain text display; can be used locally on-site without documentation
- Direct manual operation of the drive – you can toggle between the automatic and manual modes
- Status display with freely selectable units; display of real physical values
- Intuitive navigation using a wheel - just like in everyday applications
- Graphic display, for e.g. status values in bar-type diagrams such as pressure, flowrate
- Quickly and simply mounted in the door - mechanically and electrically
- Simple local commissioning on-site using the handheld version
- Commissioning without documentation using the integrated help function
- Series commissioning using the clone function (parameter set data is saved for fast replacement)
- User-defined parameter list with a reduced number of self-selected parameters (to generate your own commissioning screens)
- 5 integrated languages
- Simple update of languages, wizards and firmware updates via USB

Selection and ordering data

	Order No.
Intelligent Operator Panel IOP	**6SL3255-0AA00-4JA0**
IOP Handheld For use with SINAMICS G120, SINAMICS G110D, SINAMICS G120D, SIMATIC ET 200S FC or SIMATIC ET 200pro FC Included in the scope of delivery: • IOP • Handheld housing • Rechargeable batteries (4 × AA) • Charging unit (international) • RS232 connecting cable (3 m long, can only be used for SINAMICS G120 and SIMATIC ET 200S FC) • USB cable (1 m long)	**6SL3255-0AA00-4HA0**

Accessories

	Order No.
IOP/BOP-2 Door Mounting Kit IP54 degree of protection for mounting the IOP in control cabinet doors with sheet steel thicknesses of 1 … 3 mm Included in the scope of delivery: • Seal • Mounting material • Connecting cable (5 m long)	**6SL3256-0AP00-0JA0**
RS232 connecting cable With optical interface to connect the SINAMICS G110D, SINAMICS G120D or SIMATIC ET 200pro FC inverters to the IOP Handheld (2.5 m long)	**3RK1922-2BP00**

Integration

Using the IOP with the frequency inverters

IOP	SINAMICS G120 with CU230P-2 Control Unit	SINAMICS G120 with CU240E or CU240S Control Unit	SINAMICS G110D and SINAMICS G120D
Plugging the IOP onto the inverter (power supply from the Control Unit)	✓	–	–
IOP door mounting with door mounting kit (power supply from the Control Unit)	✓	–	–
Mobile use of the IOP Handheld (supplied from rechargeable batteries)	✓	✓ (PC Inverter Connection Kit required, 6SL3255-0AA00-2AA1)	✓ (RS232 connecting cable with optical interface required, 3RK1922-2BP00)

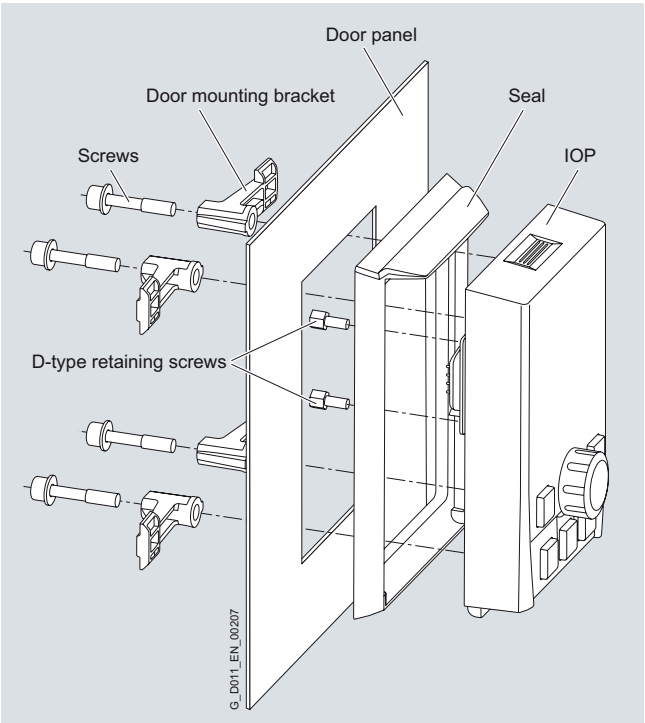
Mounting the IOP on a CU230P-2 Control Unit

The IOP can be directly plugged onto the CU230P-2 Control Unit.

CU230P-2 Control Unit with plugged-on IOP

Mounting the IOP/BOP-2 in a door

Using the optionally available door mounting kit, the IOP/BOP-2 can be simply mounted in a control cabinet door with just a few manual operations (presently only available in conjunction with the SINAMICS G120 and CU230P-2 Control Units). Degree of protection IP54/UL Type 12 is achieved when mounting in a door.



Door mounting kit with plugged-on IOP

Overview

The Basic Operator Panel BOP-2 can be used to commission drives, monitor drives in operation and input individual parameter settings.

Commissioning of standard drives is easy with the menu-driven dialog on a 2-line display. Simultaneous display of the parameter and parameter value, as well as parameter filtering, means that basic commissioning of a drive can be performed easily and, in most cases, without a printed parameter list.

The drives are manually and simply controlled using directly assigned navigation buttons. The BOP-2 has a dedicated switch-over key to switch over from the automatic to the manual mode.

Diagnostics can easily be performed on the connected frequency inverter by following the menus.

Up to two process values can be numerically visualized on the status screen/status display.

BOP-2 supports series commissioning of identical drives. For this purpose, a parameter list can be copied from a frequency inverter into the BOP-2 and when required, downloaded into other drive units of the same type.

The operating temperature of the BOP-2 is 0 ... 50 °C (32 ... 122 °F).

Benefits

- Shorten commissioning times – Easy commissioning of standard drives using basic commissioning wizards (Setup)
- Minimize standstill times – Fast detection and rectification of errors (Diagnostics)
- Greater transparency in the process – The status display of the BOP makes process variable monitoring easy (Monitoring)
- Direct mounting on the frequency inverter or door mounting (also see IOP)
- Convenient user interface
  - Easy navigation using clear menu structure and clearly assigned control keys
  - 2-line display

Using the BOP-2 with SINAMICS G120 frequency inverters:

BOP-2	G120 CU240S, CU240E	G120 CU230P-2
Plugging the BOP-2 onto the inverter	–	✓
IOP/BOP-2 door mounting with door mounting kit	–	✓

Integration

Mounting the BOP-2 on a CU230P-2 Control Unit

The BOP-2 can be directly mounted on a CU230P-2 Control Unit.

Selection and ordering data

		Order No.
Basic Operator Panel BOP-2	new	**6SL3255-0AA00-4CA1**

Accessories

	Order No.
IOP/BOP-2 door mounting kit IP55 degree of protection for mounting the BOP-2 in control cabinet doors with sheet steel thicknesses from 1 … 3 mm Included in the scope of delivery: • Seal • Mounting material • Connecting cable (5 m long)	**6SL3256-0AP00-0JA0**

More information

Operator panel	IOP	BOP-2
Description	  Thanks to the large plain text display, the menu prompting and the Application Wizards, it is easy to commission standard drives. Integrated Application Wizards interactively guide the user when commissioning important applications such as pumps, fans, compressors and conveyor technology.	 Commissioning of standard drives is easy with the menu-driven dialog on a 2-line display. Simultaneous display of the parameter and parameter value, as well as parameter filtering, means that basic commissioning of a drive can be performed easily and, in most cases, without a printed parameter list.
Can be flexibly used	• It is either directly mounted on the Control Unit, mounted in the door or used as handheld device (dependent on the inverter type) • As a handheld device it can be used with a wide range of inverters • 5 languages available	• It is either directly mounted on the Control Unit or mounted in the door (dependent on the inverter type)
Quick commissioning without expert knowledge	• Standard commissioning using the clone function • User-defined parameter list with a reduced number of self-selected parameters • Simple commissioning of standard applications using application-specific wizards, it is not necessary to know the parameter structure • Simple local commissioning on-site using the handheld version • Commissioning largely without documentation	• Standard commissioning using the clone function
High degree of operator friendliness and intuitive operation	• Direct manual operation of the drive – you can toggle between the automatic and manual modes • Intuitive navigation using the wheel - just like in everyday applications • Graphic display for e.g. status values in bar-type diagrams such as pressure, flowrate • Status display with freely selectable units; display of real physical values	• Direct manual operation of the drive – you can toggle between the automatic and manual modes • 2-line display for indicating up to 2 process values with text • Status display of predefined units
Minimization of maintenance times	• Diagnostics using plain text display; can be used locally on-site without documentation • Simple update of languages, wizards and firmware via USB	• Diagnostics with menu prompting on 7-segment display

Supplementary system components MMC memory card/SIMATIC memory card

Overview

MMC memory card, SIMATIC memory card (SD card)

The parameter settings for an inverter can be stored on the MMC memory card or the SD memory card which will be referred to below as the SIMATIC memory card. When service is required, e.g. after the inverter has been replaced and the data have been downloaded from the memory card the drive system is immediately ready for use again.

- Parameter settings can be written from the memory card to the inverter or saved from the inverter to the memory card.
- Up to 100 parameter sets can be stored.
- Supports series commissioning without the use of additional commissioning tools (e.g. BOP-2 and STARTER).

Note:
The memory card is not required for operation and does not have to remain inserted.

Selection and ordering data

		Order No.
MMC memory card		**6SL3254-0AM00-0AA0**
SIMATIC memory card (SD memory card) (for CU230P-2 only)	new	**6ES7954-8LB00-0AA0**

Supplementary system components PC Inverter Connection Kit 2

Overview

For controlling and commissioning an inverter directly from a PC, if the STARTER commissioning tool has been installed on the PC. With these, the inverter can be

- parameterized (commissioning, optimization)
- monitored (diagnostics)
- controlled (master control via the STARTER commissioning tool for test purposes).

A USB cable (3 m) and the STARTER commissioning tool are included as scope of delivery on a DVD.

Selection and ordering data

	Order No.
PC Inverter Connection Kit 2 for CU2.0.-2 Control Units • CU230P-**2** Including USB cable (3 m) and STARTER commissioning tool [1] on DVD	**6SL3255-0AA00-2CA0**

Supplementary system components - Shield Connection Kit 1 for CU230P-2 Control Units

Overview

The Shield Connection Kit 1 offers for all signal and communication cables

- Optimum shield connection
- Strain relief

It contains the following:

- A matching shield bonding plate
- All of the necessary connecting and retaining elements for mounting

The Shield Connection Kit 1 is suitable for the following SINAMICS G120 Control Units:

- CU230P-2 HVAC
- CU230P-2 DP
- CU230P-2 CAN

Selection and ordering data

	Order No.
Shield Connection Kit 1 for CU230P-2 Control Units	**6SL3264-1EA00-0FA0**

[1] The STARTER commissioning tool is also available on the Internet under http://support.automation.siemens.com/WW/view/en/10804985/133100

Overview

SINAMICS G120 is a modular inverter system that comprises different function units – these are primarily the Control Unit and the Power Module. The documentation is also organized in a modular structure. The following manuals are available:

	Manuals			
	Hardware Installation Manual	Operating Instructions	List Manual	Getting Started
Control Units				
CU230P-2	–	de, en, fr, it, es	de, en	de, en, fr, it, es [1]
CU240S	–	de, en	de, en [2]	de, en, fr, it, es
CU240E	–	de, en	de, en [2]	de, en, fr, it, es
Power Modules				
PM240	de, en	–	– [3]	multilingual
PM250	de, en	–	– [3]	multilingual
PM260	de, en	–	– [3]	multilingual

Manuals are available in the following forms:

Paper documentation

A Getting Started Guide is supplied as hard copy with every Power Module and Control Unit.

Online version on Internet as download

The documentation is also available on the Internet under http://www.siemens.com/sinamics-g120/documentation

More information

Language	Manual in language
de	German
en	English
fr	French
it	Italian
es	Spanish
Multilingual	de, en, fr, it, es

Hardware Installation Manual

The hardware installation manual describes the procedures that must be undertaken regarding a product so that the product can be used at the required location and in the required way. The hardware installation manual contains all relevant information on setting up, installing, and wiring up and the necessary dimension drawings and wiring/circuit diagrams.

Usage phases: Installation and commissioning phase

Operating Instructions

Operating instructions are a comprehensive collection of all information necessary for the normal and safe operation of products, parts of plants and complete plants (EN 62079).

Usage phases: Planning and engineering phase, implementation phase, installation and commissioning phase, application phase, maintenance and service phase.

List Manual/Parameter list

The List Manual or the parameter list describes all parameters, function charts, and faults/warnings for the product/system as well as their meanings and setting options. It contains parameter data and fault/warning descriptions with functional correlations.

Usage phases: Commissioning of components that have already been connected, engineering plant and system functions and fault cause/diagnostics.

Getting Started/Getting Started Guide

The Getting Started or Getting Started Guide provides information about getting started for the first-time user as well as references to additional information. It contains information about the basic steps to be taken during commissioning. The information in the other documentation should be carefully observed for all of the other work required.

Usage phases: Commissioning of components that have already been connected.

[1] For the CU230P-2 Control Unit and other Control Units, a Getting Started is available in each language.

[2] A common List Manual is available for the CU240S and CU240E Control Units in each language.

[3] The parameter settings for the Power Modules are included in the List Manual for the Control Units.

SINAMICS G110D
Distributed inverters
0.75 to 7.5 kW (1.0 to 10 hp)

Supplementary system components
Connector kit for braking resistor

Overview

A connector kit is available for connecting other braking resistors to SINAMICS G110D.

Selection and ordering data

		Order No.
Connector kit for braking resistor	new	**6SL3563-4RA00-0GA0**

Supplementary system components
UL connector kit

Overview

A special UL connector kit is required for using SINAMICS G110D in UL-compatible applications. This comprises all parts that are needed to connect power and the motor (contacts, contact housing, metal connector housing and a cable of about 7 m in length).

Selection and ordering data

		Order No.
UL connector kit for power and motor	new	**6SL3563-4UA00-0GA0**

Supplementary system components
Protection bar

Overview

Protection bars are available for the various frame sizes for protecting the connectors from shearing off in response to mechanical forces. These are mounted above and to the side of the SINAMICS G110D and protect the connectors or key-operated switches of the optional manual local control.

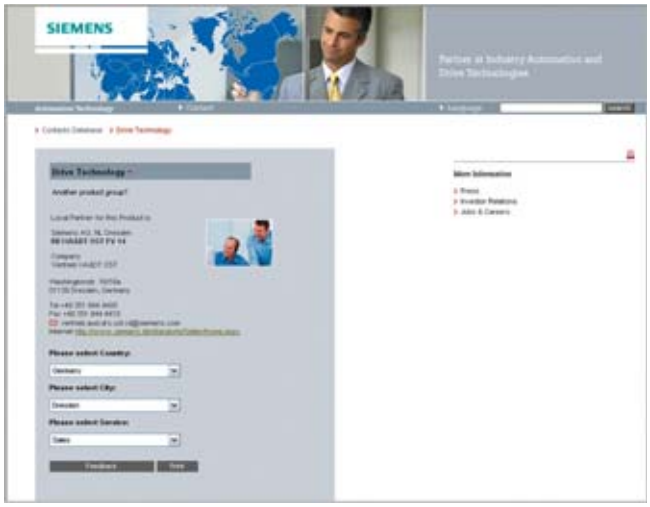
Selection and ordering data

Protection bar		Order No.
• for frame sizes FSA and FSB	new	**6SL3263-1HA20-0GA0**
• for frame size FSC	new	**6SL3263-1HC20-0GA0**

Appendix

4

Partner at Industry Automation and Drive Technologies



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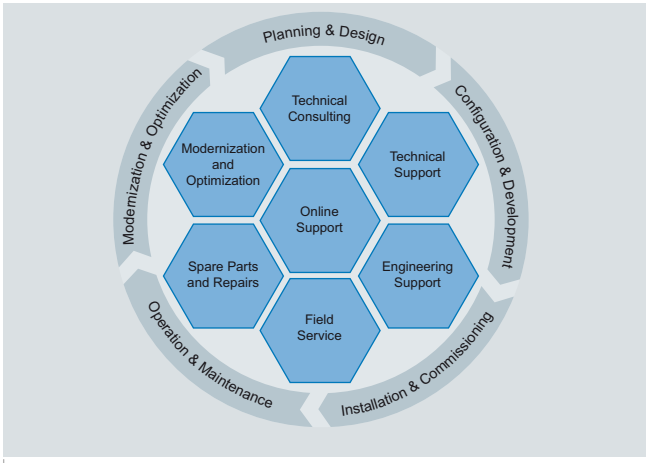

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Catalog improvement suggestions

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  (for customers based outside Germany)

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Catalogs

Industry Automation, Drive Technologies and Low Voltage Distribution

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Interactive Catalog on DVD

	Catalog
for Industry Automation, Drive Technologies and Low Voltage Distribution	**CA 01**

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Motion Control

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SINUMERIK & SINAMICS Equipment for Machine Tools	NC 61
SIMOTION, SINAMICS S120 and Motors for Production Machines	PM 21
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Low-Voltage

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