



Variable Speed Drive for pumps and fans

SINAMICS G120P

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- Power range: 0.37 kW to 75 kW (IP20) / 90 kW (IP55)
 - Voltage range: 3AC 380...480 V
 - Standard with RS485: /USS, Modbus/RTU, BACnetMS/TP
 - Optional control units with PROFIBUS DP, CANopen
 - 4 internal PID controllers
 - High degree of protection IP55/UL Type 12, and for control cabinet IP20
 - With EMC filter class A (C2) or class B (C1)
 - Modular design of power and control electronics

Use

Variable speed drive for energy-optimized speed control of pumps and fan motors in building control applications:

- Speed control of supply and extract air fans in air handling units based on demand
- Speed control of circulating pumps in HVAC plants based on demand
- Increased pressure and control of pump levels

Functions

Specially designed functions for pumps and fans are already implemented:

- Automatic restart
application resumes start up after a power outage or error
- Flying restart
switch on drive while motor is running
- ECO mode
Energy savings by automatically adapting the motor current to prevailing load conditions, for uses with less dynamics and a constant speed setpoint
- Motor staging
One VSD is used to control up to 4 motors depending on the flow rate, for example, for strongly varying volumetric flows
- Hibernation
automatic sleep mode to optimize control and energy use
- 4 integrated PID controllers
to control drive speed based on pressure, temperature, flow rates, levels, air quality, or other process variables
- Essential Service Mode (ESM) for emergency operation
special inverter operating mode that increase availability of the drive system in the event of fire
- Multi-zone controller
 - Controls a zone for pressure or temperature with up to 3 sensors, or
 - Control of two independent zones with one sensor each
- Bypass mode
automatic switchover to mains operation upon reaching the setpoint
- Freely programmable 7-day digital time switches (3)
- Real-time clock
for process control based on time, e.g. temperature setpoint at night for heating control
- Freely programmable logical function blocks
for mapping simple PLC-like functionality
- Motor temperature monitoring with either temperature sensor or contact via PTC, KTY and ThermoClick Sensor)
 - Overcurrent protection
 - Load torque monitoring
 - Overvoltage protection (Vdc_max controller)
- Braking function using DC braking

Types

Basic design

SINAMICS G120P refers to the combination of the SINAMICS Control Unit CU230P-2 BT with the SINAMICS Power Module PM230 matched to the specific pumps and fans as well as operator panel or blanking cover. The Operator panel or blanking cover is not part of delivery and must be ordered separately.

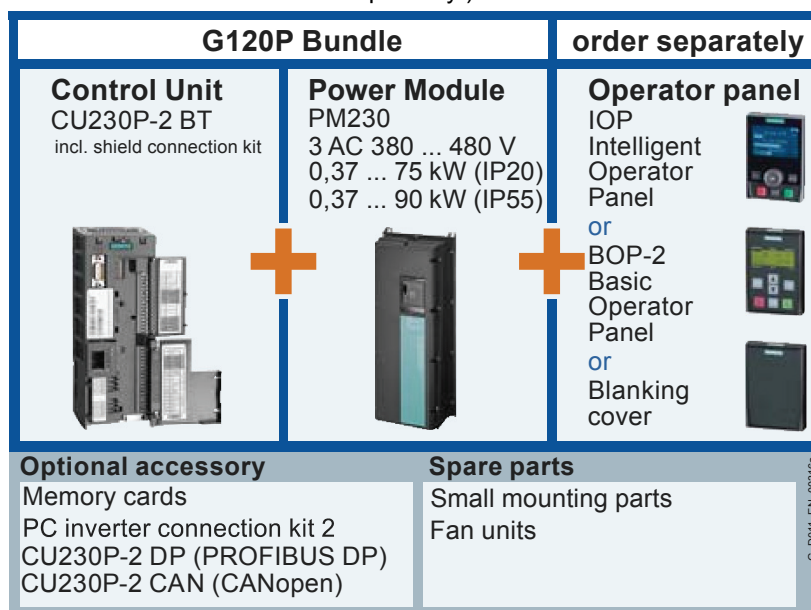
The CU230P-2 is available in the following versions:

- CU230P-2 BT with RS485 interface for USS, Modbus RTU and BACnet MS/TP.
Included in the delivery of the G120P bundle.
- CU230P-2 CAN with CANopen interface. Order separately.
- CU230P-2 DP with PROFIBUS DP interface. Order separately.

The Power Modul PM230 is available in the following versions:

- IP55 with integrated EMC filter A (C2) or integrated EMC filter B (C1)
- IP20 with integrated EMC filter A (C2) or unfiltered with external EMC filter B (C1)

- IP20 with integrated filter A, or unfiltered, in Push-Through version (not available as a bundle. Must be ordered separately.)



Note

IP20 versions with frame size A-C contain a screening kit for the Power Module PM230.
For frame size D-F the screening kit must be ordered separately, if necessary.

Type key
G120P bundle IP55

Order no. / MLFB	Type	Filter class	Protection IP55	Size	Power (kW)
6SL3200-6AM11-3AH0	G120P-0.37/35A	A	IP55	A	0.37
6SL3200-6AM11-7AH0	G120P-0.55/35A	A	IP55	A	0.55
6SL3200-6AM12-2AH0	G120P-0.75/35A	A	IP55	A	0.75
6SL3200-6AM13-1AH0	G120P-1.1/35A	A	IP55	A	1.1
6SL3200-6AM14-1AH0	G120P-1.5/35A	A	IP55	A	1.5
6SL3200-6AM15-8AH0	G120P-2.2/35A	A	IP55	A	2.2
6SL3200-6AM17-7AH0	G120P-3/35A	A	IP55	A	3
6SL3200-6AM21-0AH0	G120P-4/35A	A	IP55	B	4
6SL3200-6AM21-3AH0	G120P-5.5/35A	A	IP55	B	5.5
6SL3200-6AM21-8AH0	G120P-7.5/35A	A	IP55	B	7.5
6SL3200-6AM22-6AH0	G120P-11/35A	A	IP55	C	11
6SL3200-6AM23-2AH0	G120P-15/35A	A	IP55	C	15
6SL3200-6AM23-8AH0	G120P-18.5/35A	A	IP55	C	18.5
6SL3200-6AM24-5AH0	G120P-22/35A	A	IP55	D	22
6SL3200-6AM26-0AH0	G120P-30/35A	A	IP55	D	30
6SL3200-6AM27-5AH0	G120P-37/35A	A	IP55	E	37
6SL3200-6AM28-8AH0	G120P-45/35A	A	IP55	E	45
6SL3200-6AM31-1AH0	G120P-55/35A	A	IP55	F	55
6SL3200-6AM31-4AH0	G120P-75/35A	A	IP55	F	75
6SL3200-6AM31-7AH0	G120P-90/35A	A	IP55	F	90
6SL3200-6AM11-3BH0	G120P-0.37/35B	B	IP55	A	0.37
6SL3200-6AM11-7BH0	G120P-0.55/35B	B	IP55	A	0.55
6SL3200-6AM12-2BH0	G120P-0.75/35B	B	IP55	A	0.75
6SL3200-6AM13-1BH0	G120P-1.1/35B	B	IP55	A	1.1
6SL3200-6AM14-1BH0	G120P-1.5/35B	B	IP55	A	1.5
6SL3200-6AM15-8BH0	G120P-2.2/35B	B	IP55	A	2.2
6SL3200-6AM17-7BH0	G120P-3/35B	B	IP55	A	3
6SL3200-6AM21-0BH0	G120P-4/35B	B	IP55	B	4
6SL3200-6AM21-3BH0	G120P-5.5/35B	B	IP55	B	5.5

6SL3200-6AM21-8BH0	G120P-7.5/35B	B	IP55	B	7.5
6SL3200-6AM22-6BH0	G120P-11/35B	B	IP55	C	11
6SL3200-6AM23-2BH0	G120P-15/35B	B	IP55	C	15
6SL3200-6AM23-8BH0	G120P-18.5/35B	B	IP55	D	18.5
6SL3200-6AM24-5BH0	G120P-22/35B	B	IP55	D	22
6SL3200-6AM26-0BH0	G120P-30/35B	B	IP55	D	30
6SL3200-6AM27-5BH0	G120P-37/35B	B	IP55	E	37
6SL3200-6AM28-8BH0	G120P-45/35B	B	IP55	E	45
6SL3200-6AM31-1BH0	G120P-55/35B	B	IP55	F	55
6SL3200-6AM31-4BH0	G120P-75/35B	B	IP55	F	75
6SL3200-6AM31-7BH0	G120P-90/35B	B	IP55	F	90

Type key
G120P bundle IP20

Order no. / MLFB	Type	Filter class	Protection IP20	Size	Power (kW)
6SL3200-6AE11-3AH0	G120P-0.37/32A	A	IP20	A	0,37
6SL3200-6AE11-7AH0	G120P-0.55/32A	A	IP20	A	0,55
6SL3200-6AE12-2AH0	G120P-0.75/32A	A	IP20	A	0,75
6SL3200-6AE13-1AH0	G120P-1.1/32A	A	IP20	A	1,1
6SL3200-6AE14-1AH0	G120P-1.5/32A	A	IP20	A	1,5
6SL3200-6AE15-8AH0	G120P-2.2/32A	A	IP20	A	2,2
6SL3200-6AE17-7AH0	G120P-3/32A	A	IP20	A	3
6SL3200-6AE21-0AH0	G120P-4/32A	A	IP20	B	4
6SL3200-6AE21-3AH0	G120P-5.5/32A	A	IP20	B	5,5
6SL3200-6AE21-8AH0	G120P-7.5/32A	A	IP20	B	7,5
6SL3200-6AE22-6AH0	G120P-11/32A	A	IP20	C	11
6SL3200-6AE23-2AH0	G120P-15/32A	A	IP20	C	15
6SL3200-6AE23-8AH0	G120P-18.5/32A	A	IP20	C	18,5
6SL3200-6AE24-5AH0	G120P-22/32A	A	IP20	D	22
6SL3200-6AE26-0AH0	G120P-30/32A	A	IP20	D	30
6SL3200-6AE27-5AH0	G120P-37/32A	A	IP20	E	37
6SL3200-6AE28-8AH0	G120P-45/32A	A	IP20	E	45
6SL3200-6AE31-1AH0	G120P-55/32A	A	IP20	F	55
6SL3200-6AE31-4AH0	G120P-75/32A	A	IP20	F	75
6SL3200-6AE11-3BH0	G120P-0.37/32B	B	IP20	A	0,37
6SL3200-6AE11-7BH0	G120P-0.55/32B	B	IP20	A	0,55
6SL3200-6AE12-2BH0	G120P-0.75/32B	B	IP20	A	0,75
6SL3200-6AE13-1BH0	G120P-1.1/32B	B	IP20	A	1,1
6SL3200-6AE14-1BH0	G120P-1.5/32B	B	IP20	A	1,5
6SL3200-6AE15-8BH0	G120P-2.2/32B	B	IP20	A	2,2
6SL3200-6AE17-7BH0	G120P-3/32B	B	IP20	A	3
6SL3200-6AE21-0BH0	G120P-4/32B	B	IP20	B	4
6SL3200-6AE21-3BH0	G120P-5.5/32B	B	IP20	B	5,5
6SL3200-6AE21-8BH0	G120P-7.5/32B	B	IP20	B	7,5
6SL3200-6AE22-6BH0	G120P-11/32B	B	IP20	C	11
6SL3200-6AE23-2BH0	G120P-15/32B	B	IP20	C	15
6SL3200-6AE23-8BH0	G120P-18.5/32B	B	IP20	C	18,5
6SL3200-6AE24-5BH0	G120P-22/32B	B	IP20	D	22
6SL3200-6AE26-0BH0	G120P-30/32B	B	IP20	D	30
6SL3200-6AE27-5BH0	G120P-37/32B	B	IP20	E	37
6SL3200-6AE28-8BH0	G120P-45/32B	B	IP20	E	45
6SL3200-6AE31-1BH0	G120P-55/32B	B	IP20	F	55
6SL3200-6AE31-4BH0	G120P-75/32B	B	IP20	F	75

Accessories

Description	Order no. / MLFB	Type (ASN)
SINAMICS G120P IP20 / IP55, Basic Operator Panel (BOP-2)	6SL3255-6AA00-4CA0	G120P-BOP-2
SINAMICS G120P IP20 / IP54, Intelligent Operator Panel (IOP)	6SL3255-6AA00-4JA0	G120P-IOP
SINAMICS G120P blanking cover for POWER MODULE PM230 class IP55 / UL Type12	6SL3256-6BA00-0AA0	G120P-BCover
SINAMICS G120P Door kit (IP54) / BOP-2 (IP55), KIT UL TYP12 for Intelligent Operator Panel IOP and Basic Operator Panel BOP-2 consisting of: Seals, mounting materials, and connection cable (5M)	6SL3256-6AP00-0JA0	G120P-Door-Kit
SINAMICS G120 PC-inverter connection kit-2 includes start-up software on DVD and 3M USB cable for CONTROL UNITS CU230P-2	6SL3255-0AA00-2CA0	G120P-PC-Kit
SINAMICS G120P MMC Parameter memory card	6SL3254-0AM00-0AA0	G120P-MMC-Card
STARTER Parameter Software for Sinamics and Micromaster Drives. VERSION V4.3 DVD for Windows 2000 SP4, Windows Server 2003 SP2, Windows XP Prof SP3, Windows 7 Prof. (32 BIT) and Windows 7 Ultimate (32 BIT). German, English, French, Italian and Spanish. Free updates for license holders available online.	6SL3072-0AA00-0AG0	G120P-Starter
TX OPEN module for Desigo Integration	S55661-J100	TXI1.OPEN
Control Unit CU230P-2 DP with PROFIBUS DP. I/O: 6 DI, 3 DO, 4 AI, 2 AO, 1 Motor Temperature Sensor Input, 2 PSU-OUT(10V DC, 24V DC), 1 PSU-IN (24V DC), USB- and MMC-interface	6SL3243-0BB30-1PA2	CU230P-2 DP
Control Unit CU230P-2 CAN with CANOPEN. I/O: 6 DI, 3 DO, 4 AI, 2 AO, 1 Motor Temperature Sensor Input, 2 PSU-OUT(10V DC, 24V DC), 1 PSU-IN (24V DC), USB- and MMC-interface	6SL3243-0BB30-1CA2	CU230P-2 CAN
SINAMICS G120P PM230, IP20 Screening Termination KIT for FSD and FSE. Includes: Screening plate and fixing elements	6SL3262-1AD00-0DA0	G120P-Screen-FSDE
SINAMICS G120P PM230, IP20 Screening Termination KIT for FSF. Includes: Screening plate and fixing elements	6SL3262-1AF00-0DA0	G120P-Screen-FSF

Description	Order no. / MLFB	Type (ASN)
Control Unit CU230P-2 BT with USS, MODBUS RTU, BACNET MS/TP. I/O: 6 DI, 3 DO, 4 AI, 2 AO, 1 Motor Temperature Sensor Input, 2 PSU-OUT(10V DC, 24V DC), 1 PSU-IN (24V DC), USB- and MMC interface.	6SL3243-6BB30-1HA2	CU230P-2 BT
SINAMICS G120 CU screening termination KIT 1 includes screening plate and fixing elements for CONTROL UNITS CU230P-2	6SL3264-1EA00-0FA0	G120P-CUScreen
SINAMICS G120P PM230, IP20 Screening Termination KIT for FSA. Includes: Screening plate and fixing elements	6SL3266-1EA00-0KA0	G120P-Screen-FSA
SINAMICS G120P PM230, IP20 Screening Termination KIT for FSB. Includes: Screening plate and fixing elements	6SL3266-1EB00-0KA0	G120P-Screen-FSB
SINAMICS G120P PM230, IP20 Screening Termination KIT for FSC. Includes: Screening plate and fixing elements	6SL3266-1EC00-0KA0	G120P-Screen-FSC
SINAMICS G120P Small mounting parts for POWER MODUL PM230 IP55 / UL Type12 FSA	6SL3200-0SK02-0AA0	G120P-MSetFSA-IP55
SINAMICS G120P Small mounting parts for POWER MODUL PM230 IP55 / UL Type12 FSB G120P	6SL3200-0SK03-0AA0	G120P-MSetFSB-IP55
SINAMICS G120P Small mounting parts for POWER MODUL PM230 IP55 / UL Type12 FSC G120P	6SL3200-0SK04-0AA0	G120P-MSetFSC-IP55
SINAMICS G120P Small mounting parts for POWER MODUL PM230 IP55 / UL Type12 FSD G120P	6SL3200-0SK05-0AA0	G120P-MSetFSD-IP55
SINAMICS G120P Small mounting parts for POWER MODUL PM230 IP55 / UL Type12 FSE G120P	6SL3200-0SK06-0AA0	G120P-MSetFSE-IP55
SINAMICS G120P Small mounting parts for POWER MODUL PM230 IP55 / UL Type12 FSF G120P	6SL3200-0SK07-0AA0	G120P-MSetFSF-IP55
External fan unit for PM230 IP20 and IP55/UL Type12 FSA and PM2x0-2 Push-Through FSA	6SL3200-0SF21-0AA0	G120P-FExtFSA
External fan unit for PM230 IP20 and IP55/UL Type12 FSA and PM2x0-2 Push-Through FSB	6SL3200-0SF22-0AA0	G120P-FExtFSB
External fan unit for PM230 IP20 and IP55/UL Type12 FSA and PM2x0-2 Push-Through FSC	6SL3200-0SF23-0AA0	G120P-FExtFSC
External fan unit for PM230 IP20 FSD and FSE	6SL3200-0SF05-0AA0	G120P-FExtFSDE-IP20
External fan unit for PM230 IP20 FSF	6SL3200-0SF08-0AA0	G120P-FExtFSF-IP20
Internal fan unit for PM230 IP55/UL Type12 FSA, FSB and FSC	6SL3200-0SF31-0AA0	G120P-FIntFSAC-IP55
External fan unit for PM230 IP55/UL Type12 FSD and FSE	6SL3200-0SF24-0AA0	G120P-FExtFSDE-IP55
External fan unit for PM230 IP55/UL Type12 FSF	6SL3200-0SF26-0AA0	G120P-FExtFSF-IP55
Internal fan unit for PM230 IP55/UL Type12 FSD, FSE and FSF	6SL3200-0SF32-0AA0	G120P-FIntFSDF-IP55

Software

A Licence for the use of the commissioning software STARTER is part of every G120P BT Bundle. You can find the most recent version here www.siemens.com/starter. STARTER is also included in the SINAMCIS G120P PC-inverter connection KIT-2, or can be ordered separately. See Accessories.

Technical design

Connections and interfaces	• Field bus interfaces for Control Unit CU230P-2 supporting – RS485/USS, Modbus/RTU, BACnetMS/TP (standard delivery) – PROFIBUS DP – CANopen • 2 x LG-Ni1000-/Pt1000 direct connection of temperature sensors • 230-V relay for direct control of auxiliary equipment • Isolated digital inputs with separate voltage classification to prevent erroneous voltage • Isolated analog inputs for EMC-compliant design without the need for additional components
Energy efficiency	• Optimized inverter topology – Limits for harmonic currents and THD compliant as per IEC/EN 61000-3-12 without the need for additional measures ($R_{sce} \geq 120$) – Reduced line harmonic distortions – No reactors → less weight and small installation space requirements – Lower apparent power → smaller cable cross-sections • Implemented energy-savings functions. See Functions.
User friendly	The following functions and tools ensure a high-level of user-friendliness: • Simply "integrated" application-specific wizards for the IOP (Intelligent Operator Panel) • Clear-text scripts for integration with the STARTER commissioning tool for more complex applications • Operator unit with clear-text display and comprehensive diagnostics (IOP) • SINAMICS Micro Memory Card (MMC)/SIMATIC Memory Card (SD card) for saving parameter settings, cloning, and on-site commissioning • Plug-in terminal block mains and motor lines for frame sizes A – C
Design integration	G120P is compatible with Desigo systems as of version 4.1 and can be integrated via Modbus and USS.

Product documentation

Getting Started	Design, installation, commissioning and troubleshooting the SINAMICS G120P Variable speed drive. Document no: A5E03653438A AB
Getting Started Guide Hardware IP55	Quick guide with dimensions and design and installation notes. Document no: A5E02923634A
Getting Started Guide Hardware IP20	Quick guide with dimensions and design and installation notes. Document no: A5E03460238A
Hardware Installation Manual IP55	Guide with all the information needed to install, mount, connect, and service SINAMICS G120P systems. Document no: A5E02923635A AB
Hardware Installation Manual IP20	Guide with all the information needed to install, mount, connect, and service SINAMICS G120P systems. Document no: A5E03448282B AA
Application examples	Application examples and useful tips for using the Variable speed drive are available at: http://support.automation.siemens.com/WW/view/en/20208582/136000

General product information	Detailed information and support tools for the Variable speed drive are available at: http://www.siemens.com/g120p
Operating Instructions Control-Unit	Guide for installers, commissioners, and operators on control unit CU230P-2 Document no: A5E02430659B AD
Parameter manual control unit	Guide with list information including parameters and error codes. Document no: A5E02297932B AE
Desigo	Information on commissioning and integrating into Desigo systems including parameter settings Document no: CM110576
PICS	SINAMICS BACnet Protocol Implementation Conformance Statement Document no: CM2Y5111
Data sheet: system components	Data sheet with general information on the supplemental system components IOP, BOP-2, and the blanking cover Document no.: CM1N5116en

Notes

Engineering	The SIZER software supports users during engineering with comprehensive physical and technical background information. www.siemens.com/sizer
Installation	• For use without control cabinet, i.e. wall mounting – IP55 for use with blanking cover or BOP-2 – IP54 for use with IOP • IP20 when used with a control cabinet
Commissioning	The following tools allow for quick commissioning without expert knowledge: • STARTER software tool with graphical masks for standard applications www.siemens.com/starter • Application-specific wizards (IOP) • User-defined parameter lists, with reduced, self-selected number of parameters • Simple, on-site commissioning using handheld variants • Commissioning in series using the cloning function with the IOP or MMC card • Commissioning without documentation thanks to the integrated help function (IOP)
Operation	The control unit has two LEDs, RDY (Ready) and BE (bus error) to indicate inverter status with continuous red or green or flashing LEDs.
Maintenance	With the G120P variable speed drive the power module can be replaced without re-commissioning the unit. The modular design means that only defective, individual components need to be replaced during a repair and not the whole drive. G120P is maintenance friendly. The fans are checked and replaced as needed every approx. 40,000 hours of operation.

Technical data

Electrical data	Power rating (low overload LO)	0.37 ... 90 kW
	Line supply voltage	3 AC 380 ... 480 V ± 10 %
	Line frequency	47...63 Hz
	Overload capability Frame Size A - C (low overload LO)	1.5x rated output current (150 %) for 3 s every 300 s 1.1x rated output current (110 %) for 57 s every 300 s
	Overload capability Frame Size D - F (low overload LO)	1.1x rated output current (110 %) for 60 s every 300 s
	Rated input current (LO: at 40 °C)	1.3...166 A (IP55) 1.3...135 A (IP20)
	Rated output current (LO: at 40 °C)	1.3...178 A (IP55) 1.3...145 A (IP20)
	Operating temperature	0 °C to 60 °C at reduced power (see Factors that reduce power)
	Relative humidity	< 95 % RH, non-condensing
	Output frequency	0...650 Hz
	Pulse frequency	4 kHz (Default) up to 16 kHz The pulse frequency can be changed manually in 2 kHz steps-
	Skip frequency range	4, parameterizable
	Fixed frequencies	15, programmable
	Digital inputs and outputs	6 DI, 3 DO, 4 AI, 2 AO 1 x KTY/PTC/ThermoClick sensor 2 x PSU-out (DC 10 V, DC 24 V) 1 x PSU-in (DC 24 V)
Mechanical data	Vibration stress	
	Transport ¹⁾ to EN 60721-3-2	Class 2M3
	Operation Test value to EN 60068-2-6	class 3M2
	Shock stress	
	Transport ¹⁾ to EN 60721-3-2 All devices and components	Class 2M3
	Operation Test values as per EN 60068-2-27 sizes A to F	Class 3M2
Environmental conditions	Protection class to EN 61800-5-1	Class I (with protective conductor system) and Class III (PELV)
	Protection from physical contact to EN 61800-5-1	When properly used
	Permissible ambient or coolant temperature (air) during operation for network-side power components and power modules	
	Low overload (low overload LO)	0 ... 40 °C (32 ... 104 °F) without Derating > 40 ... 60 °C with derating (see Factors that reduce power)
	High overload (high overload HO)	0 ... 50 °C (32 ... 122 °F) without derating > 50 ... 60 °C with derating (see Factors that reduce power)
	Permissible ambient or coolant temperature (air) during operation for control units and supplemental 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 above sea level

Norms and standards

Climatic ambient conditions:	
• Storage ¹⁾ to EN 60721-3-1	Class 1K3 Temperature -25 to +55 °C.
• Transport ¹⁾ to EN 60721-3-2	Class 2K4 Temperature -40 ... +70 °C, max. Air humidity 95 % at 40 °C
• Operation to EN 60721-3-3	Class 3K3 Condensing, spray water, and ice formation are not permitted (EN 60204, part 1)
Environmental class/chemical contaminants:	
• Storage ¹⁾ to EN 60721-3-1	Class 1C2
• Transport ¹⁾ to EN 60721-3-2	Class 2C2
• Operation to EN 60721-3-3	Class 3C2
Organic/biological influences:	
• Storage ¹⁾ to EN 60721-3-1	Class 1B1
• Transport ¹⁾ to EN 60721-3-2	Class 2B1
• Operation to EN 60721-3-3	Class 3B1
Degree of contamination to EN 61800-5-1	2
Compliance with standards	UL ²⁾ , CE, c-tick
CE labeling	as per low-voltage directive 2006/95/EC
EMC directive to EN 61800-3: 2004	
• Frame sizes FSA to FSF with integrated mains filter, class A	Category C2 ³⁾ (meets class A as per EN 55011)
• Sizes FSA to FSF with integrated or external mains filter, class B	Category C1 ³⁾ (meets class B as per EN 55011 for interference transmitted through lines)
Variable speed electrical drives – Part 3: EMC product standard including special test procedures	EN 61800-3: 2004
Electromagnetic compatibility, part 3-12:	EN 61000-3-12: 2011 (Rsce > 250)
Limit values for harmonic currents	

¹⁾ Packages for transport

²⁾ UL approval soon for frame sizes FSD to FSF

³⁾ Using shielded motor cable up to 25 m

Factors that reduce power

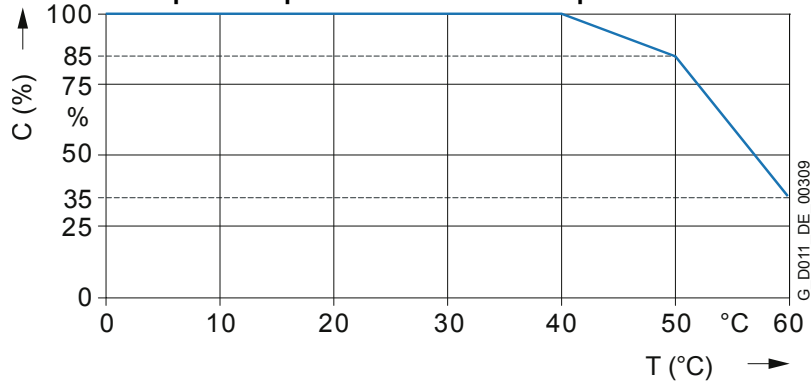
Derating table

Rate power consumption ¹⁾ at 3 AC 50 Hz 400 V		Measured 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	30	45.0	38.25	31.5	27.0	22.5	20.25	18.0
30	40	60.0	52.7	43.4	37.2	31.0	27.9	24.8
37	50	75.0	63.75	52.5	45.0	37.5	33.75	30.0
45	60	90.0	76.5	63.0	54.0	45.0	40.5	36.0
55	75	110	93.5	77.0	—	—	—	—
75	100	145	123.3	101.5	—	—	—	—
90	125	178	151.3	124.6	—	—	—	—

¹⁾ Rated power based on measured output current /N. The play for low overload (LO) forms the basis for measured output current /N.

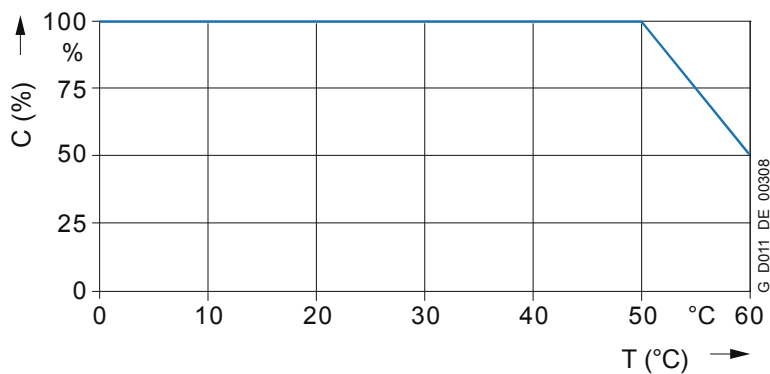
Low overload (LO) for
power modules PM230
frame sizes A to F

Reduction in power dependent on ambient temperature



T (°C) = ambient temperature
C (%) = permissible output current

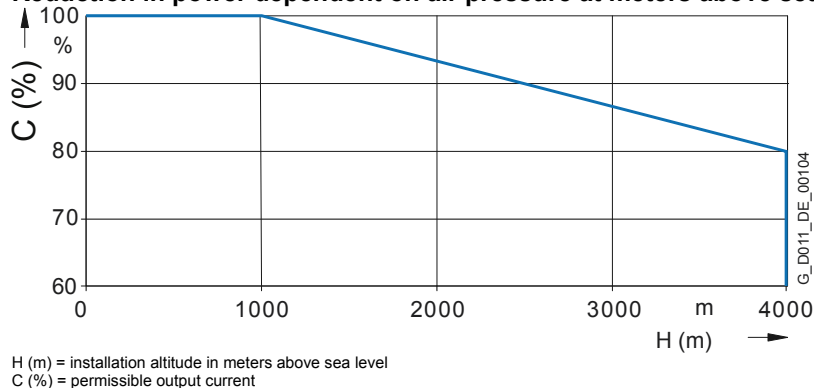
High overload (HO) for
power modules PM230
frame sizes A to F



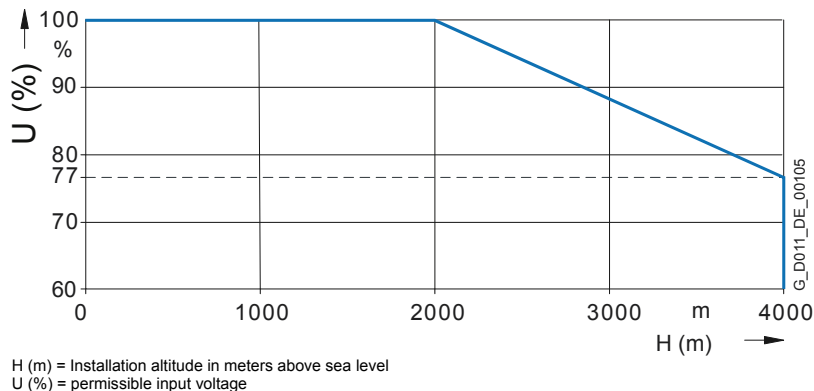
T (°C) = ambient temperature
C (%) = permissible output current

Permissible output current based on installation altitude

Reduction in power dependent on air pressure at meters above sea level

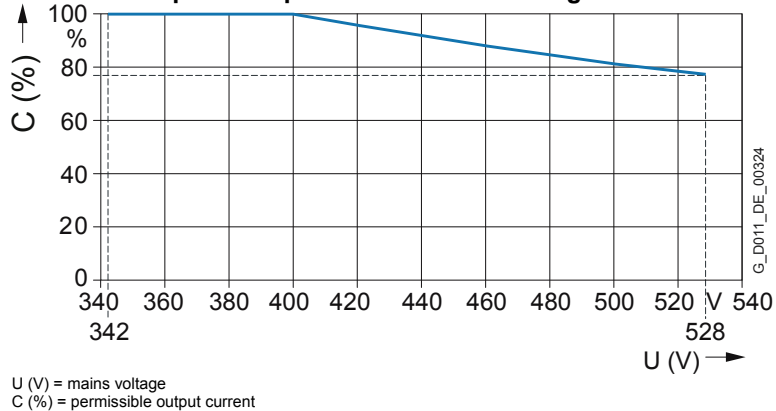


Permissible input voltage based on installation altitude

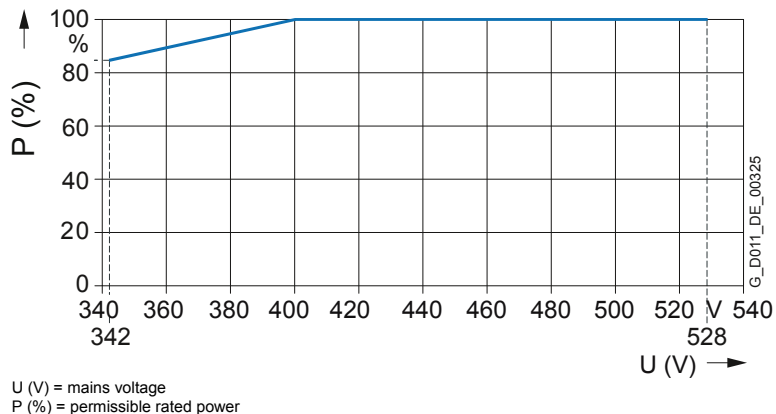


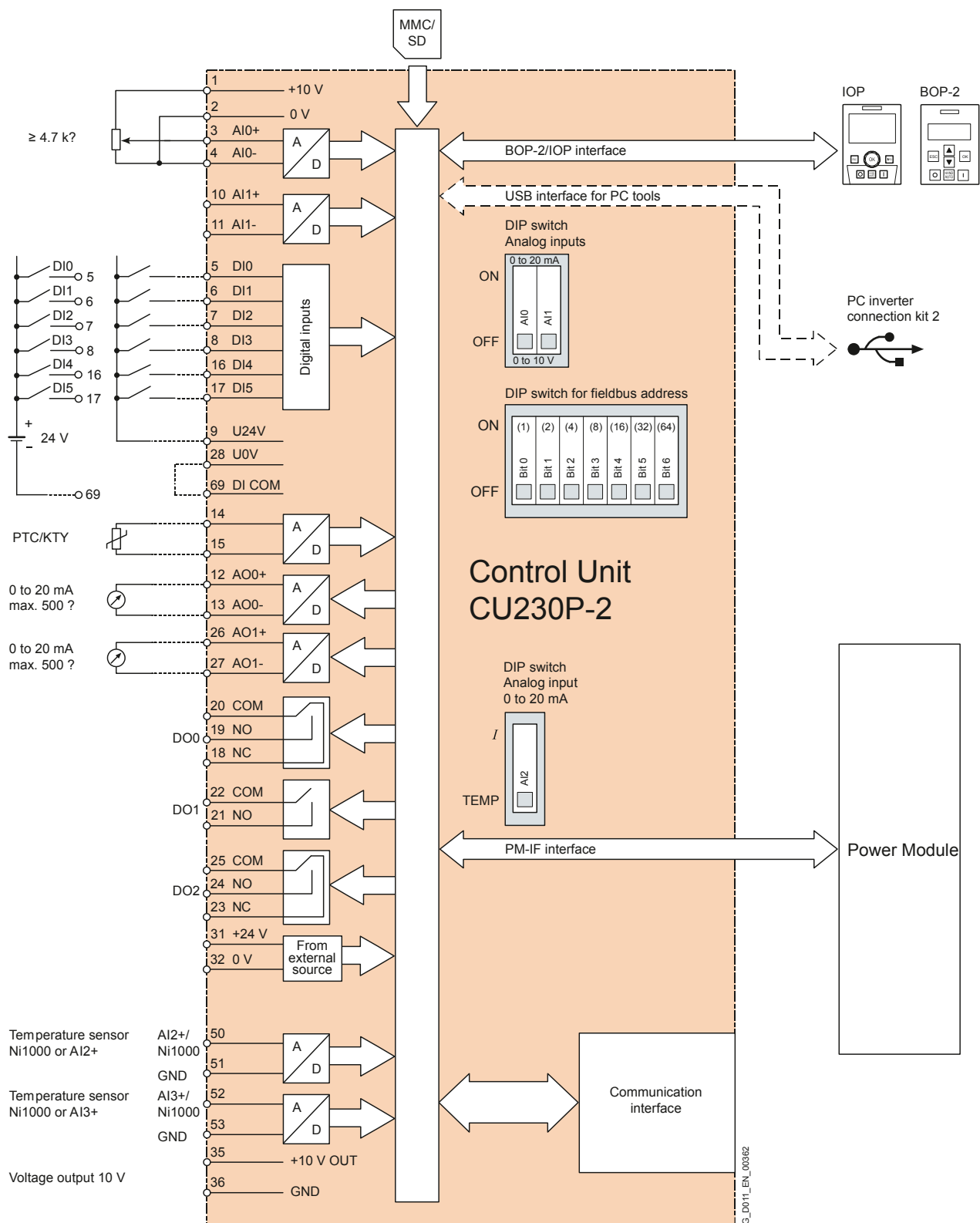
Permissible output current dependent on mains voltage

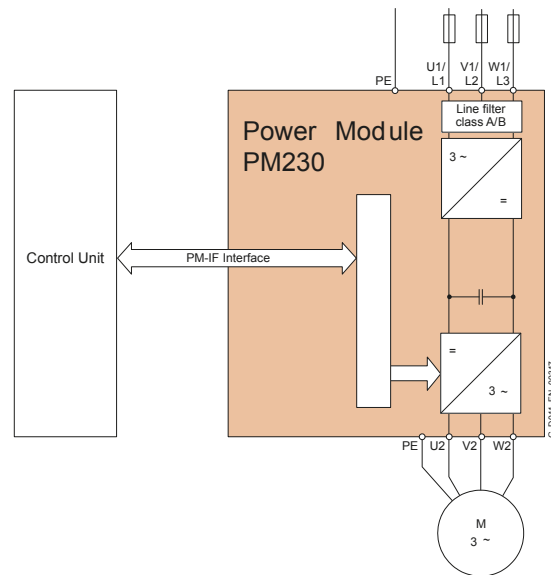
Reduction in power dependent on mains voltage



Permissible rated power dependent on mains voltage



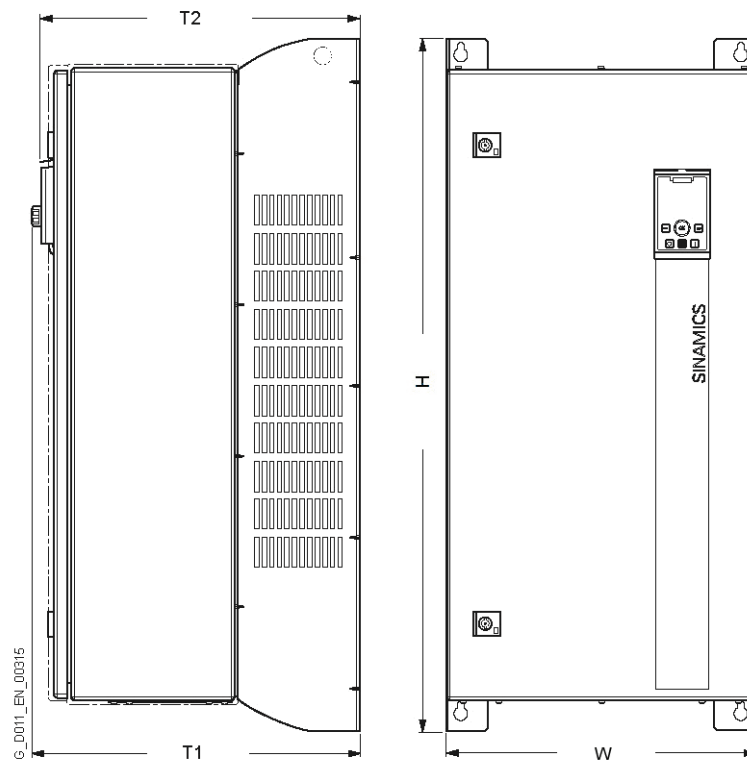




Connection diagram for power module PM230 with integrated mains filter, class A or B

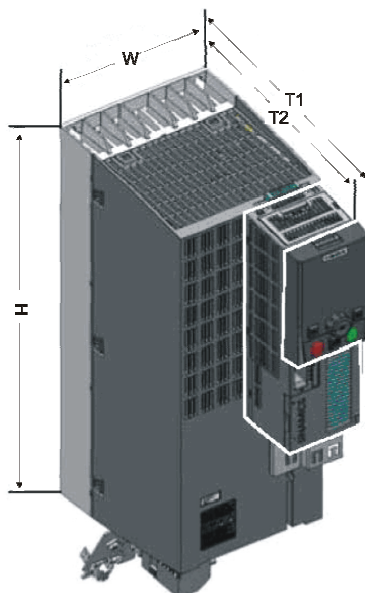
Dimensions

Dimensions for power module PM230, IP55 with integrated mains filter A/B



Frame size	Dimensions in mm				
	W	H	T1 with IOP	T1 with blanking cover / BOP-2	T2 without cover
A	154	460	264	259	249
B	180	540	264	259	249
C	230	620	264	259	249
D	320	640	344	339	329
E	320	751	344	339	329
F	410	915	431	426	416

Dimensions for power module PM230, IP20



Power Module PM230, IP20 with integrated filter A

Frame Size	Dimensions (mm)					Distances (mm) ²⁾	
	H ¹⁾	W	T1 with IOP	T1 with blanking cover / BOP-2	T2 without cover	Wasteheat (top)	Cooling air (bottom)
FSA	196	73	243	233	223	80	100
FSB	292	100	243	233	223	80	100
FSC	355	140	243	233	223	80	100
FSD	512	275	282	272	262	300	300
FSE	635	275	282	272	262	300	300
FSF	934	350	394	384	374	350	350

Power Module PM230, IP20 with external filter B

Frame Size	Dimensions (mm)					Distances (mm) ²⁾	
	H ¹⁾	W	T1 with IOP	T1 with blanking cover / BOP-2	T2 without cover	Wasteheat (top)	Cooling air (bottom)
FSA	202	73	308	298	288	80	100
FSB	297	100	328	318	308	80	100
FSC	359	140	338	328	318	80	100
FSD	512	375	282	272	262	300	300
FSE	635	385	282	272	262	300	300
FSF	934	500	394	384	374	350	350

¹⁾ Using a screening termination kit: FSA: + 80 mm; FSB: + 78 mm; FSC: + 77 mm; FSD, FSE, FSF: + 123 mm

²⁾ The Power Modules can be mounted side-by-side. Due to tolerance reasons, we recommend a lateral distance of about 1 mm

For the frame sizes FSA...FSC the external filter B is premounted on the back. For the frame sizes FSD...FSF the filter is mounted separately on the side. The dimensions above represent the entire space required.