SIEMENS

SINAMICS G120 — The modular drive

Energy-efficient, safe and rugged

usa.siemens.com/sinamics-g120

Answers for industry.

SINAMICS G120

The modular, safe and energy-efficient drive system

SINAMICS G120 is the universal variable speed drive that addresses a full range of industry requirements. Machinery construction, automotive, textiles, printing, packaging and the chemical industry — they all trust in the well-proven SINAMICS G120 solutions. Whatsmore, the G120 is currently used around the world in higher-level applications such as material handling, steel and oil-and-gas. In addition, the G120 can be used for regenerative energy recovery.

The SINAMICS G120's modular design, comprised of the Control Unit (CU) and Power Module (PM), is offered in a power range extending from 0.37 kW up to 250 kW, making it the perfect system for standard applications. Its wide range of available components allows you to optimally configure the drive as required for your particular application.

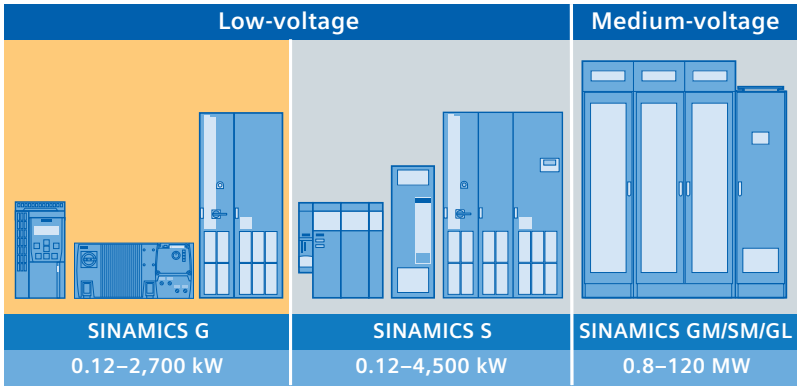
It's as easy as combining the corresponding modules based upon the system hardware, safety and communications requirements. The G120 is continually being innovated to include new elements and options, still maintaining the high degree of user-friendliness — from installation through to maintenance.

Highlights
Mechanical system
• Modular design
• Different cooling concepts for increased ruggedness
Functionality
• Wide range of encoder interfaces
• Application-orientated control modules (with up to 18 DI/DO, 2 AI, 2 AO)
• Positioning capability (EPos)
• Safety Integrated: STO, SS1, SBC, SLS, SDI, SSM
• Power Module with low line harmonics
• Energy recovery without any additional modules
Communication
• Integral component of Totally Integrated Automation with PROFINET, PROFIBUS
• Profiles that are supported: PROFIdrive, PROFIsafe, PROFIenergy
• USS, CANopen, BacNet MS/TP, Modbus RTU to connect to third-party systems

SINAMICS G120 is a member of the SINAMICS family, which stands for innovative drive solutions that are fit for the future

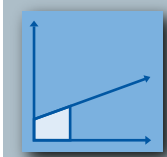
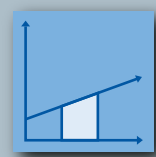
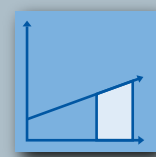
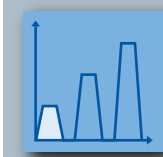
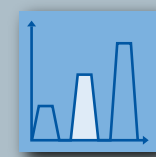
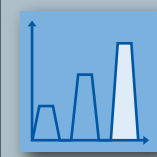
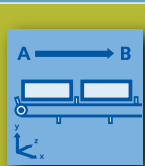
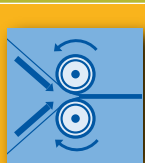
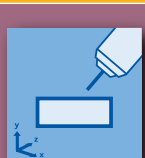
SINAMICS offers the optimal solution for every drive application. It goes without saying that all of the drives can be configured, parameterized, commissioned and operated in the same standard way.

- Wide range of power ratings from 0.12 kW to 120 MW
- Available in low-voltage and medium-voltage versions
- Standard and unified functionality as a result of the common hardware and software platform
- All of the drives are engineered exactly the same way
  -SIZER for engineering
  -STARTER for parameterizing and commissioning
- High degree of flexibility and combinability



SINAMICS drives — power and performance for every application

The modular SINAMICS G120 is especially suitable for the applications shown in these marked boxes.

Use \ Quality*)	Continuous motion			Discontinuous motion		
	 Basic	 Medium	 High	 Basic	 Medium	 High
 Pumps / fans / compressors	Centrifugal pumps Radial/axial fans Compressors	Centrifugal pumps Radial / axial fans Compressors	Eccentric screw pumps	Hydraulic pumps Dosing pumps		Descaling pumps Hydraulic pumps
 Moving	Conveyor belts Roller conveyors Chain conveyors	Conveyor belts Roller conveyors Chain conveyors Vertical material handling / Elevators / Escalators Gantry cranes Ship's drives Cable railways	Elevators Container cranes Mine hoists Open-cast mine excavators Test stands	Accelerating conveyors Rack feeders	Accelerating conveyors Rack feeders Crosscutters Roll changers	Rack feeders Robotics Pick-and-place Indexing tables Crosscutters Roller feeds Engaging/ disengaging
 Processing	Mills Mixers Kneaders Crushers Agitators Centrifuges	Mills Mixers Kneaders Crushers Agitators Centrifuges Extruders Rotary furnaces	Extruders Winders/ unwinders Leading/ following drives Calenders Main press drives Printing machines	Tubular bagging machines Single-axis motion control such as Positioning profiles Path profiles		Servo presses Rolling mill drives Coordinated multi-axis motion control such as • Multi-axis positioning • Cam discs • Interpolation
 Machining	Main drives for Turning Milling Drilling	Main drives for Drilling Sawing	Main drives for Turning Milling Drilling Gear cutting Grinding	Axis drives for Turning Milling Drilling	Axis drives for Drilling Sawing	Axis drives for Turning Milling Drilling Laser machining Gear cutting Grinding Nibbling and punching

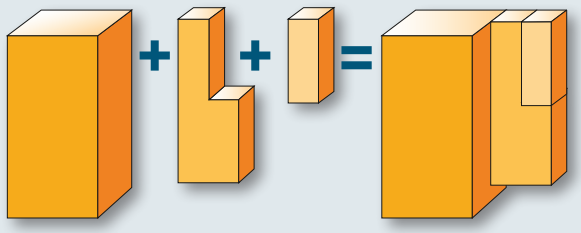
*) Requirements placed on the torque accuracy / speed accuracy / positioning accuracy / axis coordination / functionality

SINAMICS G120 — User-friendliness through modularity

Flexible combinability, high degree of operator friendliness and standard software make SINAMICS G120 a user-friendly solution from the very start.

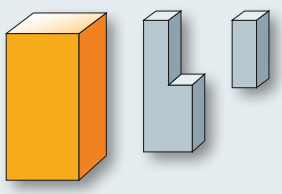
The modularity offers many advantages:

- Parts can be selected quickly and easily
- Lower costs and parts can be replaced faster when service is required
- Fewer parts have to be stocked
- Can be easily expanded
- High reliability through integrated communication



The perfect drive in just a few steps

Select your Power Module



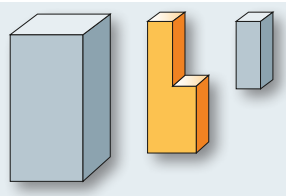
The optimal power unit can be quickly selected based upon the required motor power, the supply voltage and the braking cycles expected.

PM230 Power Module — IP55/IP20 degree of protection
Designed for use in pump, fan and compressor applications with a square-law characteristic, without being able to connect a braking resistor.

PM240/PM240-2 Power Module — IP20 degree of protection
Suitable for many applications, with integrated braking chopper and the possibility of connecting a braking resistor.

PM250 Power Module — IP20 degree of protection
Specialized to address conveyor-related applications, where the braking energy is directly fed back into the line supply.

Select your Control Unit



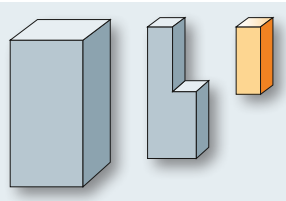
The optimal control module is selected based upon the quantity of I/Os and the required functions, such as Safety Integrated, or special pump, fan and compressor functions.

CU230P-2 Control Unit
Specifically designed for pump, fan and compressor applications.

CU240B-2/CU240E-2 Control Unit
Suitable for a wide range of applications in general machinery construction — e. g. mixers, agitators.

CU250S-2 Control Unit
Suitable for demanding applications — e. g. extruders and centrifuges.

Select the optional components



Depending upon the requirements, additional components can be selected — e. g. an operator panel (IOP or BOP-2) or blanking cover.

A systematic approach to better energy efficiency

By controlling the speed as required by the specific application and regenerating braking energy directly into the line supply, our drives can slash energy usage by up to 65 percent. Moreover, integrated energy-saving functions can reduce your power costs even further.

Efficient Infeed Technology

Efficient Infeed Technology represents a unique innovation in compact-class drives worldwide. This unique characteristic means that you can get a small, lightweight, favorably-priced drive that is capable of energy recovery.

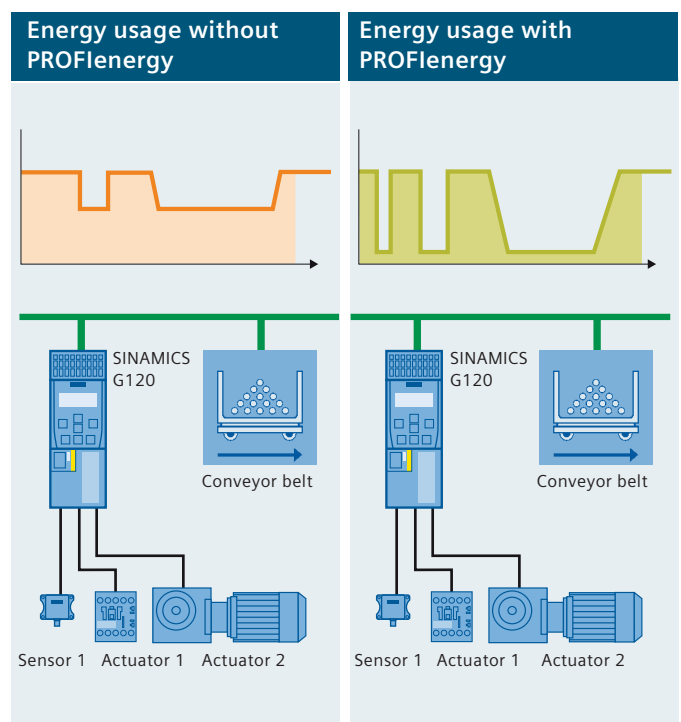
Typical applications include those where a dynamic braking resistor is commonly used, such as downhill conveyors, centrifuges and renewable energies.

	Standard Technology	Efficient Infeed Technology
Line reactor and braking resistor	Required	Not necessary
Configuring and installation costs	Standard	Low
Generated harmonics	Standard	Low
Heat generated when braking	Yes	No
Current consumption and power drawn	Standard	Approx. 22% less / lower
Energy efficiency	Standard	Good

PROFIenergy for sustainability

SINAMICS G120 with the PROFINET interface supports PROFIenergy. PROFIenergy is a profile based upon PROFINET, which allows loads to be shut down in non-operational periods — coordinated and centrally-controlled. Here, standard analytical data can also be provided for the energy management process.

- Standby management
- Transparency of the power and energy demands for the energy management control
- Expensive load peaks are reduced
- The energy band is reduced — therefore lower rates



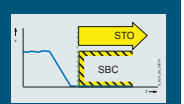
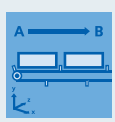
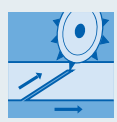
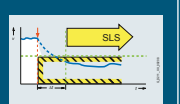
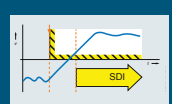
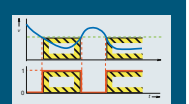
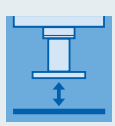
Additional energy-saving functions

- Flux reduction to reduce motor currents in the partial load range can save up to 5 percent energy
- Hibernation mode — the drive is automatically switched on and off depending upon the process requirements
- DC link topology — reduces the line current as a result of the high active power component
- Display of the electrical energy used

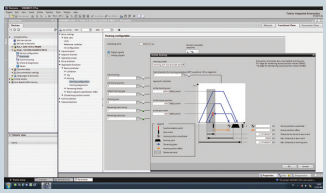
Safety Integrated — the intelligent response to increased safety demands

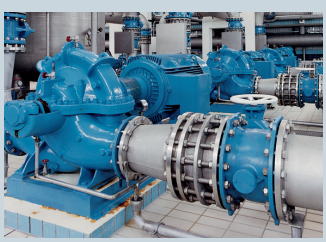
Wherever objects are moved, there is an increased risk of injury to people and damage to machines. The SINAMICS G120 offers Safety Integrated and provides the solutions that reliably master hazardous situations. It has significantly shorter response times and a higher degree of functionality — productivity is mostly maintained and occasionally even increased. The components are certified according to IEC 61508 / SIL2, EN ISO 13849-1 Cat. 3 and PL d.

Safety functions in SINAMICS G120

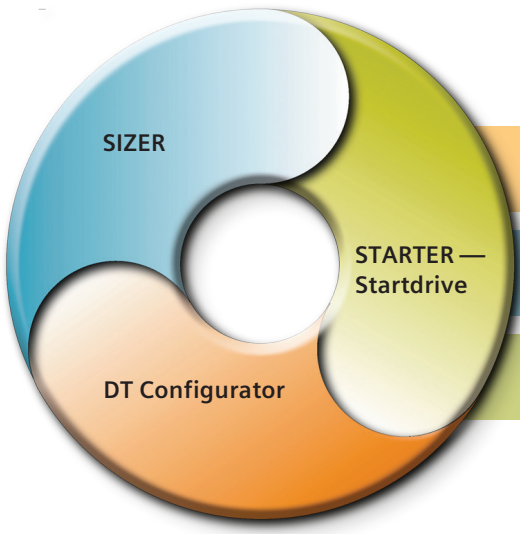
	Safe Torque Off (STO)	Safe Stop 1 (SS1)	Safe Brake Control (SBC) with CU250S-2
			
Benefits	• Prevents the drive from inadvertently starting • The drive is safely switched into a no-torque condition; travel can be quickly resumed as there is no pre-charging time	• Fast and safely monitored stopping of the drive, especially for high moments of inertia • An encoder is not required	• Safe control of holding brakes, which are active in the no-current state • Prevents suspended / pulling loads from sagging
Applications	• e. g. transporting baggage/packages, supplying, removing	• e. g. saws, unwinders, extruders, centrifuges, stacker cranes	• e. g. cranes, winders
	Conveyor belt 	Saw 	Crane 
	Safely Limited Speed (SLS) 	**Safe Direction (SDI)** 	**Safe Speed Monitor (SSM)** 
Benefits	• Reduction and continuous monitoring of the drive speed to directly work at the machine while it is operational • An encoder is not required	• The function ensures that the drive can only rotate in the selected direction	• The function provides a safe output signal if the drive speed falls below a specific limit
Applications	• e. g. presses, punches, winders, conveyors, grinding machines	• e. g. stacker cranes, presses, unwinders	• e. g. grinding machines, conveyor lines, drills, milling machines, packaging machines
	Press 	Loading gantry 	Milling machine 

Application-specific functions

	Functions	Benefits
Basic positioning with EPos		
	• Implementation of process-related positioning tasks – Linear axis and rotary axis – Absolute and relative positioning – Speed / velocity, acceleration / braking and jerk limitation can be specified – Fixed point approach – Monitoring functions – Intervention (e. g. setpoint change) possible, even while moving – Direct setpoint input (MDI) – Positioning using traversing blocks (up to 16 blocks) – Homing – Jog mode	• Implementation of process-related positioning tasks with high dynamic performance • Modules, such as additional positioning modules, encoder interfaces and much more can be eliminated

	Functions	Benefits
Pumps, fans, compressors		
	NI1000 / PT1000 temperature sensor interface	• Temperature sensors can be directly connected
	A 230V relay can be directly connected	• Auxiliaries can be directly controlled
	Automatic restart	• After a power failure, the drive automatically acknowledges the fault and switches itself on again
	Flying restart	• When it is switched on, the inverter synchronizes itself to a motor that is possibly (still) rotating
	Skip frequencies	• Resonance points of the mechanical system and the piping network can be skipped
	Load torque monitoring	• Dry running protection, blocking protection for pumps, belt monitoring for fans
	Real-time clock	• Precise time stamp for fault and alarm reporting, buffer time up to five days
	4 PID controllers to control process variables	• The drive speed is controlled as a function of the temperature /pressure flow, flaps, heating and cooling valves can be controlled
	Hibernation mode	• The inverter is shut down depending on the PID controller if the setpoint is less than the minimum frequency
	Motor staging	• The pumping power is adapted to the demand in an energy-efficient way by switching in up to three additional drives
	Bypass	• Automatic switchover to line operation for a fault or when the rated speed is reached
	3 freely programmable digital timers	• Three selectable events can be controlled as a function of the day of the week / hour / minute
	2-zone / multi-zone control	• Pressure, temperature and air quality can be controlled in up to three zones (average value, minimum, maximum) with one setpoint, or two zones with two setpoints
	Extended safety mode	• Operating mode in the case of a fire (e. g. for smoke-free evacuation routes), suppressing faults for maximum operating time, fault acknowledgment and automatic restart
	Application-specific wizards in the operator panel and in the STARTER software	• Straightforward commissioning based upon process values in the user's language, even for complex applications, e. g. cooling towers or levels

Standard software for user-friendly selection, commissioning and operator control



The SINAMICS G120 is not only easy to configure, it already offers a high degree of operator-friendliness during commissioning and in subsequent operation. The standard software makes this possible.

DT Configurator — your tool for fast product selection and ordering

SIZER — your tool for efficient engineering of a complete drive system

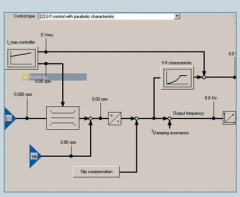
STARTER — Startdrive — your tool for configuration and commissioning in the Totally Integrated Automation Portal

User-friendly operator control Intelligent Operator Panel and Basic Operator Panel

Operator panel	IOP (Intelligent Operator Panel)	BOP-2 (Basic Operator Panel)
Fast commissioning without expert knowledge	• Serial commissioning using the clone function • User-defined parameter list where users can select the number of parameters	
	• Standard applications can be simply commissioned using application-specific wizards — no parameter expertise is required • Simple commissioning on-site using a handheld terminal	• Good overview by simultaneously displaying parameters and parameter values
High degree of operator-friendliness and intuitive operation	• The drive can be manually operated — it is possible to simply toggle between automatic and manual modes	
	• Graphic display of status values, e. g. pressure and flow in bar-type diagrams	• 2-line display for up to two process values with text
	• Status display with freely selectable units to specify physical values	• Status display of predefined units
Waiting times are minimized	• Diagnostics using a plain text display, without any documentation and locally on-site	• Diagnostics with menu prompting with 7-segment display
	• Simple update of languages, wizards and firmware via USB	
Can be flexibly used	• Can be mounted directly on the Control Unit, installed in the door or as handheld terminal (depends on the drive type)	• Can be mounted directly on the Control Unit or installed in the door (depends on the drive type)

Additional customer benefits

	Functions	Benefits
Modularity		
	• Components can be simply combined, also locally on-site • Only part of the drive must be replaced • The customer only pays for the functions that are actually required • Modules can be replaced under voltage and without software re-installation • Power rating and functions can be expanded by replacing individual components • All typical applications can be addressed using one drive	• Lower costs – initial purchase price – when stocking parts – when replacing devices/parts • Fast replacement when service is required • Favorably-priced and fast system upgrade • Simple selection of the optimal drive
Perfect interaction with SIMATIC PLC in the Totally Integrated Automation (TIA) Portal		
	• User-friendly TIA Portal functions for drives • One database for the entire project • One application engineering with STEP 7 motion control • Drive diagnostic messages automatically available in the engineering system, in the control, the web server and the HMI in plain text • Integrated powerful trace to the SIMATIC S7-1500 trace — with identical user navigation	• Lower engineering and training costs – fewer input errors – no additional tools • No multiple entries • Shorter downtimes
User-friendly installation and commissioning		
	• Integrated USB port • Pluggable operator panels can be selected – with graphic display – with 2-line display • Depending upon the application, advanced or basic panel can be selected • Micro Memory Card slot (MMC) • Pluggable terminal strips and power connectors	• Going online is intuitive and simplifies engineering and diagnostics • Fast commissioning without any expertise • Minimized maintenance work times • Simplified, central commissioning, maintenance and diagnostics • Simple serial commissioning and data backup when service is required • Simple installation without special tools
Increased reliability		
	• Push-through version for selected power units • Dissipation of power loss by means of external heat sink • Electronic modules not in the air duct • Coated, especially rugged electronic modules • Wide permissible voltage range 380V–480V ± 10 % • Used in ambient temperatures of up to 60 °C • The air flow only flows through the heat sink	• Power loss is dissipated to the outside, saving space in the cabinet • Significantly increased ruggedness and reliability • Use even under high climatic stress

	Functions	Benefits
Communication with PROFINET		
	• PROFINET – Neighboring device detection (LLDP) – Wireless communication – Ring-type structure possible (MRP, MRPD) – PROFIenergy, PROFIsafe, PROFIdrive – Shared Device • Two integrated PROFINET ports – Standard and fail-safe I/Os can be used as distributed I/O for the control • Many nodes and different network topologies without requiring any additional components • Direct integration of the communication in the drive	• PROFINET – Fast communication with innovative functions – High degree of plant / system availability – Diagnostics capability; energy management – Simple replacement when a fault occurs • Line-type structure without the need for additional components – Reduced wiring costs – Cost savings • Simple handling • Fewer interfaces
Integrated software functions		
	• Ramp-function generator with rounding • Closed-loop speed control with – Pre-control – Droop – Control parameter adaptation – Torque limitation • PID controller with supplementary setpoint • Free function blocks for logic operations and signal processing • Data sets for the drive control and motor data that can be toggled between	• Ramp up and ramp down with different ramps and jerk limitation • The drive speed is precisely controlled without overshoot for setpoint changes with torque equalization between mechanically coupled drives • Control parameters as a function of the speed • Torque limitation • Operation possible with closed-loop tension and dancer roll position control • Fast control tasks can be directly implemented in the drive, e. g. switching between rapid traverse and crawl • Switchover local / remote control or manual / automatic operation, data sets for different motors and open-loop control techniques
Requirement-optimized operating behavior		
	• Voltage / frequency characteristics for constant, square-law torque and with programmable interpolation points for manual optimization • Supplementary boost function to increase the starting torque • Flux Current Control • Flux reduction using ECO-mode	• Basic control techniques for drives with low dynamic requirements, such as – Belt drives – Mixers, mills, agitators – Centrifugal pumps – Radial compressors – Fans • Operation of special motors with non-linear magnetization
	• Vector control with and without encoder	• Field-oriented control mode for demanding drives with closed-loop torque and speed control, such as – Reciprocating pumps and compressors – Centrifuges – Lifting / lowering equipment – Gantry cranes – Extruders

Technical information

Power Modules

Power Modules	PM230 IP55 Restricted braking behavior	PM230 IP20 Restricted braking behavior	PM240 / PM240-2 IP20 Braking with a braking resistor	PM250 IP20 Braking with energy recovery
Line supply voltage	3 AC 380 ... 480 V ± 10 %			
Power rating HO = High Overload LO = Low Overload	Filtered / filter B: 0.25 ... 75 kW (HO) 0.37 ... 90 kW (LO)	0.25 ... 55 kW (HO) 0.37 ... 75 kW (LO)	Non-filtered 0.37 ... 200 kW (HO) 0.55 ... 250 kW (LO) Filtered 0.37 ... 75 kW (HO) 0.55 ... 90 kW (LO)	Non-filtered 15 ... 75 kW (HO) 18.5 ... 90 kW (LO) Filtered 5.5 ... 75 kW (HO) 7.5 ... 90 kW (LO)
Rated input current (dependent on the motor load and line impedance)	0.9 ... 135 A (HO) 1.3 ... 166 A (LO)	0.9 ... 135 A (HO) 1.3 ... 166 A (LO)	PM240 FS A-GX (400V) unfiltered: 2/2.3 ... 442 A (HO/LO) PM240 FS B-F (400V) filtered: 2/2.3 ... 204 A (HO/LO)	13.2 ... 135 A (HO) 18 ... 166 A (LO)
Rated output current (derating for ambient temperatures > 40 °C (LO) or > 50 °C (HO)	0.9 ... 145 A (HO) 1.3 ... 178 A (LO)	0.9 ... 145 A (HO) 1.3...178 A (LO)	PM240 FS A-GX (400 V) unfiltered: 1.3 ... 370 A (HO), 1.7 ... 477 A (LO) PM240 FS B-F (400 V) filtered: 1.3 ... 145 A (HO), 1.7 ... 178 A (LO)	1.3 ... 145 A (HO) 1.7 ... 178 A (LO)
Mounting dimensions (W x H x D) in mm Frame sizes A–F (depth without Control Unit)	Filtered (power in LO): A: 0.37 ... 3 kW: 154 x 460 x 249 B: 4.0 ... 7.5 kW: 180 x 540 x 249 C: 11 ... 18.5 kW: 230 x 620 x 249 D: 22 ... 30 kW: 320 x 640 x 329 E: 37 ... 45 kW: 320 x 751 x 329 F: 55 ... 90 kW: 410 x 915 x 416 Filtered, filter B (power in LO): A: 0.37 ... 3 kW: 154 x 460 x 249 B: 4.0 ... 7.5 kW: 180 x 540 x 249 C: 11 ... 15 kW: 230 x 620 x 249 D: 18.5 ... 30 kW: 320 x 640 x 329 E: 37 ... 45 kW: 320 x 751 x 329 F: 55 ... 90 kW: 410 x 915 x 416	Filtered / Unfiltered (power in LO): A: 0.37 ... 3 kW: 73 x 196 x 182[1)] B: 4.0 ... 7.5 kW: 100 x 292 x 182 C: 11 ... 18.5 kW: 140 x 355 x 182	Unfiltered (power in LO): A: 0.55 ... 3 kW: 73 x 196 x 165[1)] B: 4.0 kW: 153 x 270 x 165 C: 7.5 ... 15.0 kW: 189 x 334 x 185 D: 18.5 ... 30 kW: 275 x 419 x 204 E: 37 ... 45 kW: 275 x 499 x 204 F: 55 ... 132 kW: 350 x 634 x 316 GX: 160 ... 250 kW: 326 x 1533 x 547 Filtered (power in LO): A: 0.55 ... 2.2 kW: 73 x 196 x 165[1)] B: 3.0 ... 4.0 kW: 153 x 270 x 165 C: 7.5 ... 15.0 kW: 189 x 334 x 185 D: 18.5 ... 30 kW: 275 x 512 x 204 E: 37 ... 45 kW: 275 x 635 x 204 F: 55 ... 90 kW: 350 x 934 x 316	Unfiltered (power in LO): D: 18.5 ... 30 kW: 275 x 419 x 204 E: 37 ... 45 kW: 275 x 499 x 204 F: 55 ... 90 kW: 350 x 634 x 316 Filtered (power in LO): C: 7.5 ... 15.5 kW: 189 x 334 x 185 D: 18.5 ... 30 kW: 275 x 512 x 204 E: 37 ... 45 kW: 275 x 635 x 204 F: 55 ... 90 kW: 350 x 934 x 316
Increase in depth as a result of the CU in mm	0	CU230P-2: 65 CU240E-2: 46 CU240B-2: 46	CU230P-2: 65 CU240E-2: 46 CU240B-2: 46 CU250S-2: 67 Exception FS GX: 0	
Increase in depth as a result of the panel in mm	BOP-2: 5 IOP: 15	BOP-2: 12 IOP: 22 Exception FS GX: 0		
Conformance with standards	UL[3)], CE, c-tick, SEMI F47		UL, cUL, CE, c-tick, SEMI F47	UL[3)], cUL[3)], CE, c-tick
CE marking	Acc. to the Low-Voltage Directive 2006/95/EC			
Electrical data				
Line frequency	47 ... 63 Hz			
Overload capability (for Low Overload)	1.1 x rated current for 1 min within 5 min 1.5 x rated current for 3 s within 5 min[2)]			
Overload capability (for High Overload)	1.5 x rated current for 1 min within 5 min 2.0 x rated current for 3 s within 5 min[2)]			
Overload capability (LO/HO)	The continuous output current is not reduced when using the overload capability[2)]			
Output frequency	0 ... 650 Hz (U/f and FCC control modes)			
Pulse frequency	4 kHz (standard) or 4 ... 16 kHz (derating)			4 kHz (standard) or 4 kHz ... 16 kHz (derating) FS F: 4 kHz (standard) or 4 kHz ... 8 kHz (derating)
Drive efficiency	86 ... 98 %		96 ... 97 %	95 ... 97 %
Electromagnetic compatibility	Integrated line filter, Class A or B acc. to EN 61800-3 C2 and EN 61800-3 C1 Table 14	Optional line filter, Class A or B acc. to EN 55011 available		
Functions				
Brake functions	DC braking		Dynamic braking, DC braking, motor holding brake, compound brake	Energy recovery in regenerative operation
Motors that can be connected	Three-phase induction motors and three-phase synchronous motors			
Protection functions	Undervoltage, overvoltage, overcontrol / overload, ground fault, short circuit, stall protection, motor blocked protection, motor overtemperature, drive overtemperature, parameter interlocking			
Degree of protection	IP55 / UL Type 12	IP20		

[1)] Depth reduced by 53 mm for the push-through version
[2)] Reduced overload duty cycle PM230 IP20 from 22 kW (HO and LO) and PM240 from 90 kW (HO), refer to the documentation for details
[3)] UL approval for frame sizes FSD-FSF is being processed

Control Units

Control Units	CU230P-2 optimized for pumps, fans and compressors	CU240B-2 / CU240E-2 optimized for general applications in machinery construction, such as conveyor belts and mixers		CU250S-2 for demanding applications in the area of standard drives, for example extruders, centrifuges
Architecture	Number of I/O optimized for the application Depth = 65.5 mm	Basic number of I/O	Standard number of I/O with integrated safety technology	Extended number of I/O and integrated safety technology Depth = 67 mm
Mounting dimensions [WxHxD] in mm	73 x 199 x 65.5	73 x 199 x 46	73 x 199 x 46	73 x 199 x 67
Communication functions				
Modbus RTU and USS	CU230P-2 HVAC	CU240B-2	CU240E-2, CU240E-2 F	CU250S-2
BACnet MS/TP	CU230P-2 HVAC	–	–	–
CANopen	CU230P-2 CAN	–	–	CU250S-2 CAN
PROFIBUS	CU230P-2 DP	CU240B-2 DP	CU240E-2 DP, CU240E-2 DP-F	CU250S-2 DP
PROFINET	CU230P-2 PN	–	CU240E-2 PN, CU240E-2 PN-F	CU250S-2 PN
USB interface	1	1	1	1
Safety functions acc. to Category 3 of EN 954-1 or acc. to SIL2 of IEC 61508				
Integrated safety functions: STO STO, SS1, SLS, SDI, SSM STO, SBC, SS1 STO, SBC, SS1, SLS, SSM, SDI	 – – – –	 – – – –	 CU240E-2, DP, PN CU240E-2 F, DP-F, PN-F – –	 – – CU250S-2, DP, PN, CAN CU250S-2, DP, PN, CAN with safety license
Electrical data				
Supply voltage	24V DC (via Power Module or externally)			
Digital inputs	6	4	6	11
Digital inputs, fail-safe	–	–	CU240E-2, CU240E-2 DP: 1 CU240E-2 DP-F: 3	3
Analog inputs, parameterizable	2 x (–10 to +10 V, 0/4 to 20 mA) 1 x (0/4 to 20 mA, NI1000/PT1000) 1 x (NI1000/PT1000)	1 x (–10 to +10 V, 0/4 to 20 mA)	2 x (–10 to +10 V, 0/4 to 20 mA)	1 x (–10 to +10 V, 0/4 to 20 mA) 1 x (–10 to +10 V, 0/4 to 20 mA)
Digital outputs	2 x (relay NO/NC, 250V AC, 2A, 30V DC, 5A)[1)] 1 (relay NO, 30 V DC, 0.5 A)	1 x (transistor, 30V DC, 0.5A) 1 x (relay NO/NC, 30V DC, 0.5A)	1 x (transistor, 30V DC, 0.5A) 2 x (relay NO/NC, 30V DC, 0.5A)	4 x (transistor, 30V DC, 0.5A) can be optionally used as digital inputs 1 x relay: NO: 30 V DC, 0.5 A 2 x relay: NO/NC: 30V DC, 0.5A
Analog outputs	2 x (0 to 10 V, 0/4 to 20 mA)	1 x (0 to 10V, 0/4 to 20 mA)	1 x (0 to 10V, 0/4 to 20 mA) 1 x (0 to 10V, 0 to 20 mA)	2 x (0 to 10V, 0/4 to 20 mA)
Functions				
Open-loop / closed-loop control modes	U/f (linear, square-law, free FFC, ECO), field-oriented speed and torque control without encoder			
				Field-oriented speed and torque control with encoder
Setpoints	Setpoint selection: analog value, fixed setpoints (max. 16), motorized potentiometer, communication interface, PID controller for process variables Setpoint channel: minimum speed, maximum speed; ramp-function generator with rounding, 4 skip frequencies			
Protection functions	Drive: overvoltage and undervoltage, as well as phase failure, overcurrent protection, overload i^2t, overtemperature of the control module and power unit, wire breakage of the analog signals, evaluation of 3 external faults / alarms Motor: temperature monitoring with and without temperature sensor, overspeed, locked rotor and stall protection Drive: torque monitoring for dry running protection, belt monitoring Communication: telegram failure, bus interruption Fault signal memory: buffer for 8 fault cases, each with 8 faults with default value and time, buffer for 56 alarms with alarm value and time			
Mechanical data				
Degree of protection	IP20			
Software				
STARTER, SIZER, DT Configurator	x	x	x	x
Startdrive	x	x	x	–
Accessories				
	IOP, BOP-2, shield connection kit, PC inverter connection kit-2, memory card (MMC or SD)			–

[1)] For plants and systems corresponding to UL, the following applies: via terminals 18/20 (DO 0 NC) and 23/25 (DO 2 NC) max. 3A, 30V DC or 2A, 250V AC

Ordering information

Power Modules

PM230 Power Modules — IP20/IP55 degree of protection

PM230 Power Modules are designed for use in pump, fan and compressor applications with square-law torque characteristics. They do not have an integrated braking chopper (single-quadrant applications).

PM240/PM240-2 Power Modules — IP20 degree of protection

PM240 and PM240-2 Power Modules have a braking chopper[9] (four-quadrant applications) and are suitable for a number of applications in general machine building.

PM250 Power Modules — IP20 degree of protection

PM250 Power Modules are suitable for precisely the same applications as the PM240. Any braking energy is directly fed back into the line supply (four-quadrant applications — a braking chopper is not required).

Power Module

Rated power[1] kW	Rated power[1] hp	Rated output current$_N$[2] A	Frame size	PM230 Power Modules, IP20 degree of protection[3] CU230P-2 and CU240B/E-2 Order number	PM230 Power Modules, IP55 degree of protection only CU230P-2 Order number	PM240/PM240-2 Power Modules, IP20 degree of protection all Control Units Order number	PM250 Power Modules, IP20 degree of protection all Control Units Order number
0.37	0.5	1.3	FSA	6SL3210-1NE11-3□L0	6SL3223-0DE13-7□A0	6SL3210-1PE11-8□L0[8]	–
0.55	0.75	1.7		6SL3210-1NE11-7□L0	6SL3223-0DE15-5□A0	6SL3210-1PE11-8□L0[8]	–
0.75	1.0	2.2		6SL3210-1NE12-2□L0	6SL3223-0DE17-5□A0	6SL3210-1PE12-3□L0[8]	–
1.1	1.5	3.1		6SL3210-1NE13-1□L0	6SL3223-0DE21-1□A0	6SL3210-1PE13-2□L0[8]	–
1.5	2.0	4.1		6SL3210-1NE14-1□L0	6SL3223-0DE21-5□A0	6SL3210-1PE14-3□L0[8]	–
2.2	3.0	5.9		6SL3210-1NE15-8□L0	6SL3223-0DE22-2□A0	6SL321□-1PE16-1□L0[4][8]	–
3.0	4.0	7.7		6SL321□-1NE17-7□L0	6SL3223-0DE23-0□A0	6SL321□-1PE18-0UL0[5][8]	–
3.0	4.0	7.7	FSB	–	–	6SL3224-0BE23-0AA0[6]	–
4.0	5.0	10.2		6SL3210-1NE21-0□L0	6SL3223-0DE24-0□A0	6SL3224-0BE24-0□A0	–
5.5	7.5	13.2		6SL3210-1NE21-3□L0	6SL3223-0DE25-5□A0	–	–
7.5	10	18		6SL321□-1NE21-8□L0	6SL3223-0DE27-5□A0	–	–
7.5	10	18	FSC	–	–	6SL3224-0BE25-5□A0	6SL3225-0BE25-5AA1
11.0	15	26		6SL3210-1NE22-6□L0	6SL3223-0DE31-1□A0	6SL3224-0BE27-5□A0	6SL3225-0BE27-5AA1
15.0	20	32		6SL3210-1NE23-2□L0	6SL3223-0DE31-5□A0	6SL3224-0BE31-1□A0	6SL3225-0BE31-5AA1
18.5	25	38		6SL321□-1NE23-8□L0	6SL3223-0DE31-8AA0[6]	–	–
18.5	25	38	FSD	–	6SL3223-0DE31-8BA0[7]	6SL3224-0BE31-5□A0	6SL3225-0BE31-5□A0
22	30	45		6SL3210-1NE24-5□L0	6SL3223-0DE32-2□A0	6SL3224-0BE31-8□A0	6SL3225-0BE31-8□A0
30	40	60		6SL3210-1NE26-0□L0	6SL3223-0DE33-0□A0	6SL3224-0BE32-2□A0	6SL3225-0BE32-2□A0
37	50	75	FSE	6SL3210-1NE27-5□L0	6SL3223-0DE33-7□A0	6SL3224-0BE33-0□A0	6SL3225-0BE33-0□A0
45	60	90		6SL3210-1NE28-8□L0	6SL3223-0DE34-5□A0	6SL3224-0BE33-7□A0	6SL3225-0BE33-7□A0
55	75	110	FSF	6SL3210-1NE31-1□L0	6SL3223-0DE35-5□A0	6SL3224-0BE34-5□A0	6SL3225-0BE34-5□A0
75	100	145		6SL3210-1NE31-5□L0	6SL3223-0DE37-5□A0	6SL3224-0BE35-5□A0	6SL3225-0BE35-5□A0
90	125	178		–	6SL3223-0DE38-8□A0	6SL3224-0BE37-5□A0	6SL3225-0BE37-5□A0
110	150	205		–	–	6SL3224-0BE38-8UA0	–
132	200	250		–	–	6SL3224-0BE41-1UA0	–
160	250	302	FSGX	–	–	6SL3224-0XE41-3UA0	–
200	300	370		–	–	6SL3224-0XE41-6UA0	–
250	400	477		–	–	6SL3224-0XE42-0UA0	–

Integrated line filter:							
Unfiltered		U			U		U
Class A (for TN systems)		A		A	A		A
Class B (for TN systems)				B			
Heat sink versions:							
Standard	0				0		
Push-through	1				1		

1) Specified rated power corresponds to the Low Overload (LO) duty cycle. It generally applies to applications with square-law torque characteristics, such as pumps, fans and compressors. The High Overload (HO) duty cycle generally applies to applications with a constant torque characteristic, as is the case for conveyor belts (data, see Catalog D31).

2) These current values are applicable for 400V
3) PM230 IP20 from 22 kW
4) Push-through only available with filter
5) Unfiltered
6) Integrated Class A filter
7) Integrated Class B filter
8) Use the line reactor and braking resistor of the G120C (see Catalog D31), presently there is no output reactor available
9) FS GX optional braking chopper

Control Units

CU230P-2 Control Units

CU230P-2 Control Units have been specifically designed for pump, fan and compressor applications.

CU240B-2 / CU240E-2 Control Units

The CU240B-2 / CU240E-2 Control Units are suitable for a wide variety of applications in general machine building, such as conveyor belts, mixers and extruders.

CU250S-2 Control Units

The CU250S-2 Control Units are especially suitable for drives that must perform basic positioning tasks.

Control Units						
Inputs	Outputs	Integrated safety technology	Digital inputs fail-safe	Communication	Designation	Control Unit Order number
CU230P-2 series — the specialist for pumps, fans, compressors, water, buildings						
6 digital 4 analog	3 digital 2 analog	–	–	RS485/USS/Modbus RTU/ BACnet MS/TP	CU230P-2 HVAC	6SL3243-0BB30-1HA2
				PROFIBUS DP	CU230P-2 DP	6SL3243-0BB30-1PA2
				PROFINET	CU230P-2 PN	6SL3243-0BB30-1FA0
				CANopen	CU230P-2 CAN	6SL3243-0BB30-1CA2
CU240B-2 series — for basic applications with variable-speed drives						
4 digital 1 analog	1 digital 1 analog	–	–	RS485/USS/Modbus RTU	CU240B-2	6SL3244-0BB00-1BA1
				PROFIBUS DP	CU240B-2 DP	6SL3244-0BB00-1PA1
CU240E-2 series — for standard applications in general machine building, such as conveyor belts and mixers						
6 digital 2 analog	3 digital 2 analog	STO	1F-DI (opt. 2DI each)	RS485/USS/ Modbus RTU	CU240E-2	6SL3244-0BB12-1BA1
				PROFIBUS DP	CU240E-2 DP	6SL3244-0BB12-1PA1
				PROFINET	CU240E-2 PN	6SL3244-0BB12-1FA0
		STO, SS1, SLS, SSM, SDI	3F-DI (opt. 2DI each)	RS485/USS/ Modbus RTU	CU240E-2-F	6SL3244-0BB13-1BA1
				PROFIBUS DP	CU240E-2 DP-F	6SL3244-0BB13-1PA1
				PROFINET	CU240E-2 PN-F	6SL3244-0BB13-1FA0
CU250S-2 series — for demanding applications such as extruders and centrifuges						
11 digital 2 analog	7 digital 2 analog	STO, SBC, SS1	3 F-DI (opt. 2DI each) 1 F-DO	RS485/USS / Modbus RTU	CU250S-2	6SL3246-0BA22-1BA0
				PROFIBUS DP	CU250S-2 DP	6SL3246-0BA22-1PA0
				PROFINET	CU250S-2 PN	6SL3246-0BA22-1FA0
				CANopen	CU250S-2 CAN	6SL3246-0BA22-1CA0
Optional licenses for CU250S-2 for • Safety technology					SINAMICS SD card 512 MB Extended safety license	6SL3054-4AG00-2AA0-Z F01
• Positioning capability					SINAMICS SD card 512 MB Extended functions license	6SL3054-4AG00-2AA0-Z E01
• Safety technology with positioning capability					SINAMICS SD card 512 MB Extended safety plus function license	6SL3054-4AG00-2AA0-Z F01+E01

Optional system components	
Description	Order No.
Intelligent Operator Panel (IOP)	6SL3255-0AA00-4JA0
Operator Panel IOP handheld (degree of protection IP54)	6SL3255-0AA00-4HA0
Basic Operator Panel (BOP-2)	6SL3255-0AA00-4CA1
Door mounting kit for IOP / BOP-2	6SL3256-0AP00-0JA0
Blanking cover for PM230	6SL3256-1BA00-0AA0
SINAMICS Memory Card (SD) 512 MB	6SL3054-4AG00-2AA0
Brake Relay	6SL3252-0BB00-0AA0
Safe Brake Relay	6SL3252-0BB01-0AA0
PC inverter connection kit-2	6SL3255-0AA00-2CA0

Shield connection kits for PM240 and PM250 Power Modules	
	Order No.
Frame size FSA	6SL3262-1AA00-0BA0
Frame size FSB	6SL3262-1AB00-0DA0
Frame size FSC	6SL3262-1AC00-0DA0
Frame size FSD and FSE	6SL3262-1AD00-0DA0
Frame size FSF	6SL3262-1AF00-0DA0
Shield connection kits for Control Units — Kits 1–4	
1) CU230P-2 (HVAC, CAN, DP)	6SL3264-1EA00-0FA0
2) CU240B-2, CU240E-2, CU240E-2 F (USS, DP)	6SL3264-1EA00-0HA0
3) CU230P-2 PN, CU240E-2 PN, CU240E-2 PN-F	6SL3264-1EA00-0HB0
4) CU250S-2 (USS, CAN, DP, PN)	6SL3264-1EA00-0LA0
Engineering and commissioning software	
STARTER commissioning tool on DVD	6SL3072-0AA00-0AG0
Startdrive commissioning tool on DVD	6SL3072-4CA02-1XG0

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