

SINAMICS G120

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

SINAMICS G120 standard inverters

Overview

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

With different device versions (frame sizes FSA to FSGX) in a power range from 0.37 kW to 250 kW (0.5 hp to 400 hp), it is suitable for a wide variety of drive solutions.



Examples of SINAMICS G120, frame sizes FSA, FSB and FSC; each with Power Module, Control Unit and Basic Operator Panel



Examples of SINAMICS G120, frame sizes FSD, FSE and FSF; each with Power Module, Control Unit and Basic Operator Panel

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Overview



Examples of SINAMICS G120, frame size FSGX; with Power Module

Modularity

SINAMICS G120 is a modular inverter system comprising a variety of functional units. The main units are:

- the Control Unit (CU)
- the Power Module (PM)

The Control Unit controls and monitors the Power Module and the connected motor using several different control types that can be selected. It supports communication with a local or central control and monitoring devices.

The Power Module supplies the motor in a power range 0.37 kW to 250 kW (0.5 hp to 400 hp). The Power Module is controlled by a microprocessor in the Control Unit. State-of-the-art IGBT technology with pulse-width modulation is used to achieve the highest degree of reliability and flexible motor operation. Comprehensive protection functions provide a high degree of protection for the Power Module and the motor.

Furthermore, a large number of additional components are available, such as:

- Intelligent Operator Panel (IOP) for parameterizing, diagnosing, controlling and copying drive parameters
- Basic Operator Panel (BOP) for parameterizing, diagnosing, controlling and copying drive parameters
- Line filters, Classes A and B
- Line reactors
- Braking resistors
- Sine-wave filters
- Output reactors

Safety Integrated

The SINAMICS G120 standard inverters are available in a number of different versions for safety-related applications. All Power Modules are already designed for Safety Integrated. A Safety Integrated Drive can be created by combining a Power Module with the appropriate Fail-safe Control Unit.

The SINAMICS G120 fail-safe frequency inverter provides four safety functions, certified in accordance with EN 954-1, Category 3 and IEC 61508 SIL 2:

- Safe Torque Off (STO) to protect against active movement of the drive
- Safe Stop 1 (SS1) for continuous monitoring of a safe braking ramp
- Safely Limited Speed (SLS) for protection against dangerous movements when a speed limit is exceeded
- Safe Brake Control (SBC) for controlling motor brakes that are active in the de-energized state, e.g. motor holding brakes

The functions "Safe Stop 1" and "Safely Limited Speed" can both be implemented without having to use a motor sensor or encoder; the implementation cost is minimal. Existing systems in particular can be updated with safety technology without the need to change the motor or mechanical system.

The safety functions "Safely Limited Speed" and "Safe Stop 1" are not certified for pull-through loads as in the case of lifting gear and winders.

Additional information is provided in the part Highlights, section Safety Integrated.

Efficient Infeed Technology

The innovative Efficient Infeed Technology is used in PM250 and PM260 Power Modules. This technology allows the energy produced by motors operating in generator mode connected to standard inverters to be fed back into the supply system. Additional cooling and additional space requirement in the control cabinet can be avoided as components such as braking resistors, brake choppers and line reactors are not required. Further, wiring and engineering costs are significantly reduced. At the same time, considerable savings can be achieved in terms of energy consumption and operating costs.

Additional information is included in the part Highlights, section Efficient Infeed Technology.

Innovative cooling concept and coated electronic modules

The innovative cooling concept and coated electronic modules significantly increase the service life and usage time of the device. These features are based on the following principles:

- The power loss is exclusively dissipated using an external heat sink
- Electronic modules not located in air duct
- Standardized convection cooling of Control Unit
- All cooling air from the fan is directed through the heat sink

STARTER commissioning tool

The STARTER commissioning tool simplifies the commissioning and maintenance of SINAMICS G120 inverters. The operator guidance combined with comprehensive, user-friendly functions for the relevant drive solution allow you to commission the device quickly and easily.

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Benefits

- Modularity ensures flexibility for a drive concept that is fit-for-the-future
 - Modules can be replaced under voltage (hot swapping)
 - Pluggable terminals
 - The modules can be easily replaced, which makes the system extremely service friendly.
- The safety functions make it easier to integrate drives into safety-oriented machines or plants
- Communications-capable via PROFINET or PROFIBUS with PROFIdrive Profile 4.0
 - Reduced number of interfaces
 - Plantwide engineering
 - Easy to handle
- The innovative circuit design (bidirectional input rectifier with "pared-down" DC link) allows the kinetic energy of a load to be fed back into the supply system when Power Modules PM250 and PM260 are used. This feedback capability provides enormous potential for savings because generated energy no longer has to be converted into heat in a braking resistor
- Innovative SiC semiconductor technology ensures that when a PM260 Power Module is used, the inverter is more compact than a comparable standard converter with an optional sine-wave filter for the same power rating
- An innovative cooling concept and coated electronic modules increase robustness and service life
 - External heatsink
 - Electronic components are not located in air duct
 - Control Unit that is completely cooled by convection
 - Additional coating of the most important components
- Simple unit replacement and quick copying of parameters using the optional Basic Operator Panel or the optional MMC memory card
- Quiet motor operation as a result of the high pulse frequency
- Compact, space-saving design
- Software parameters for simple adaptation to 50 Hz or 60 Hz motors (IEC or NEMA motors)
- 2-/3-wire control (static/pulsed signals) for universal control via digital inputs (only CU240 Control Units)
- Engineering and commissioning with uniform engineering tools such as SIZER, STARTER, and Drive ES: ensure fast engineering and easy commissioning – STARTER is integrated in STEP 7 with Drive ES Basic with all the advantages of central data storage and totally integrated communication
- Certified worldwide for compliance with CE, UL, cUL, c-tick and Safety Integrated according to IEC 61508 SIL 2

Applications

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. Each Control Unit can be combined with each Power Module.

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. There are a large number of components for expanding the system (e.g. line-side power components, DC link components, load-side power components, and supplementary system components). However, it should be noted that not all of the components are required for all of the Power Modules (example: Braking resistors are not required for the PM250 and PM260 Power Modules!). The precise data is provided in the technical specifications tables of the particular components.

Control Units

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

Two series of Control Units are available for SINAMICS G120 corresponding to their software packages (CU230 and CU240). Each Control Unit comprises a defined I/O quantity structure, a special fieldbus interface and possible additional safety functions. The following Control Units and accessories are available for standard SINAMICS G120 inverters:

CU230 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

CU240 Control Units

Several Control Units are available in different versions:

- CU240E
- CU240S
- CU240S DP
- CU240S DP-F
- CU240S PN
- CU240S PN-F