

Who offers the perfect drive for every application?



SINAMICS: The complete and seamless drive family for every power rating, voltage and performance level


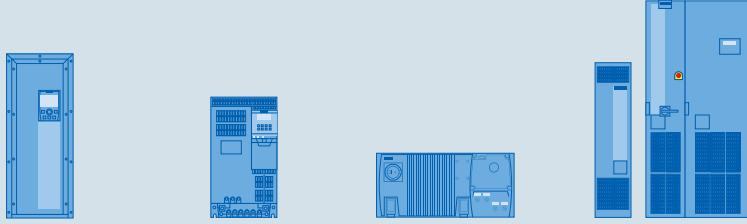

Answers for industry.

SIEMENS

SINAMICS:

The No. 1 for drive applications

Several important trends can be identified in drive technology. The increasing range of different versions in machinery and plant construction demands drive solutions that must be highly flexible and scalable. Further, customers from all sectors of industry are demanding solutions perfectly tailored to their own requirements that can be easily handled. In addition, the subjects of energy efficiency and integrated safety technology are also becoming more and more important.

Low voltage						
AC						
For basic applications		For high-performance applications				For basic servo applications
						
SINAMICS G110		SINAMICS G110D		SINAMICS G120P		SINAMICS S110
V/f control	V/f control/ FCC	V/f control/FCC Vector control	V/f control/Vector control			Servo control
0.12 – 3 kW	0.75 – 7.5 kW	0.37 – 90 kW	0.37 – 250 kW	0.75 – 7.5 kW	75 – 1500 kW	0.12 – 90 kW
Pumps, fans, conveyor belts	Conveyor technology	Pumps, fans, compressors	Pumps, fans, conveyor belts, compressors, mixers, crushers, extruders			Single-axis position- ing, applications in machinery and plant construction

Siemens offers a platform that allows all of these requirements and demands to be perfectly fulfilled: SINAMICS, a complete and integrated family of drives that covers all performance levels. And not only this, it sets itself apart as a result of the highest degree of flexibility, functionality and efficiency. SINAMICS sets new standards in drive technology and offers a whole raft of advantages that the machinery and plant construction sectors can benefit from – which also applies to the process industry and building technology.

At home in all sectors

From basic single-motor drives through coordinated drives up to multi-axis and motion control drives for sophisticated and demanding tasks: SINAMICS offers the optimum drive for each and every application. They all have a modular, scalable design and a standard look & feel which makes them so unique.

Customized solutions

Whether for single- or multi-axis applications, basic open-loop speed control or closed-loop servo control with a high dynamic performance: In order to cost-effectively address customized drive solutions, a well-conceived system is demanded – a system that ensures that only those components and functions that are actually required for the specific application are used.

Minimizing costs

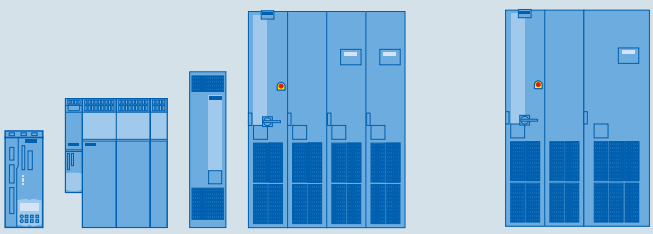

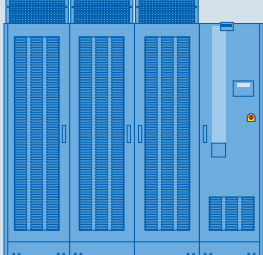
Costs for engineering and commissioning drive solutions must be kept as low as possible. This is why standard tools are required to select, engineer and commission drives – therefore facilitating fast, simple and favorably-priced engineering.

Innovative concepts

For both small and large applications – innovative concepts create the prerequisites for distributed, intelligent drive technology and therefore open up completely new perspectives in plant and machinery construction.

At home in all sectors:

- Mixers/crushers
- Pumps/fans/compressors
- Conveyor technology/handling
- Extrusion
- Textiles
- Metal forming technology
- Woodworking
- Rolling mills
- Packaging
- Machine tools
- Printing and paper machines

		DC	Medium voltage
			AC
For advanced applications		For basic and demanding applications	For applications with high power ratings
 <p>SINAMICS S120 SINAMICS S150</p>		 <p>SINAMICS DCM</p>	 <p>SINAMICS GM150 / SM150 / GL150 / SL150</p>
V/f control/Vector control/Servo control		Closed-loop speed/torque control	V/f control/Vector control
0.12 – 4500 kW	75 – 1200 kW	6 kW – 30 MW	0.8 – 120 MW
Motion control applications in production machines (packaging, textile and printing machines, paper machines, plastics machines) machine tools, plants, process lines and rolling mills		Rolling mill drives, wire drawing machines, extruders, kneaders, cable railways and lifts, test stand drives	Pumps, fans, compressors, mixers, extruders, crushers, rolling mills, mine hoists, excavators, test stands

Engineering Tools

STARTER – for fast commissioning, optimization and diagnostics

An infinite number of application possibilities – as a result of the modular system

The individual SINAMICS versions are based on a common platform concept: The identical software and hardware components are used for identical functions over a wide range. Functions such as drive control, operator control, diagnostics and communication with higher-level controllers are implemented in a standard fashion – across the whole of the SINAMICS family. This makes it easier to handle the drive technology and ensures valuable synergies to be utilized within the overall SINAMICS portfolio: The time and resources required for training are reduced. Not only this, support, service and maintenance and spare parts management are also simplified.

High degree of flexibility and combinability

On one hand, SINAMICS covers a wide range of applications, and on the other hand, stands for the highest degree of standardization regarding functionality and engineering. This makes SINAMICS a unique universal platform for drive-related tasks. Depending on the particular task, components from the different family members can be flexibly combined with one another to create the optimum drive solution for the application.

Broad performance spectrum

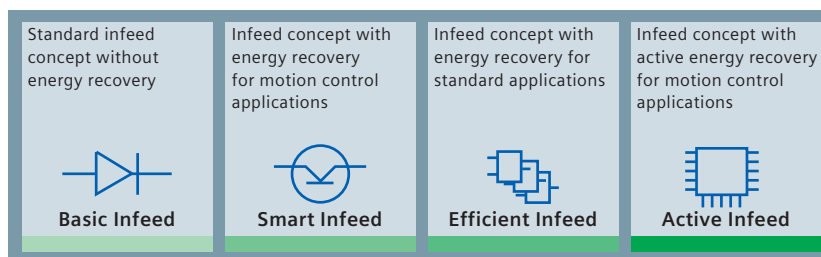
SINAMICS covers a broad performance spectrum. Components that are finely graduated with respect to one another permit drive solutions, which are perfectly tailored to the particular application, to be cost-effectively and efficiently realized.

Designed for global use

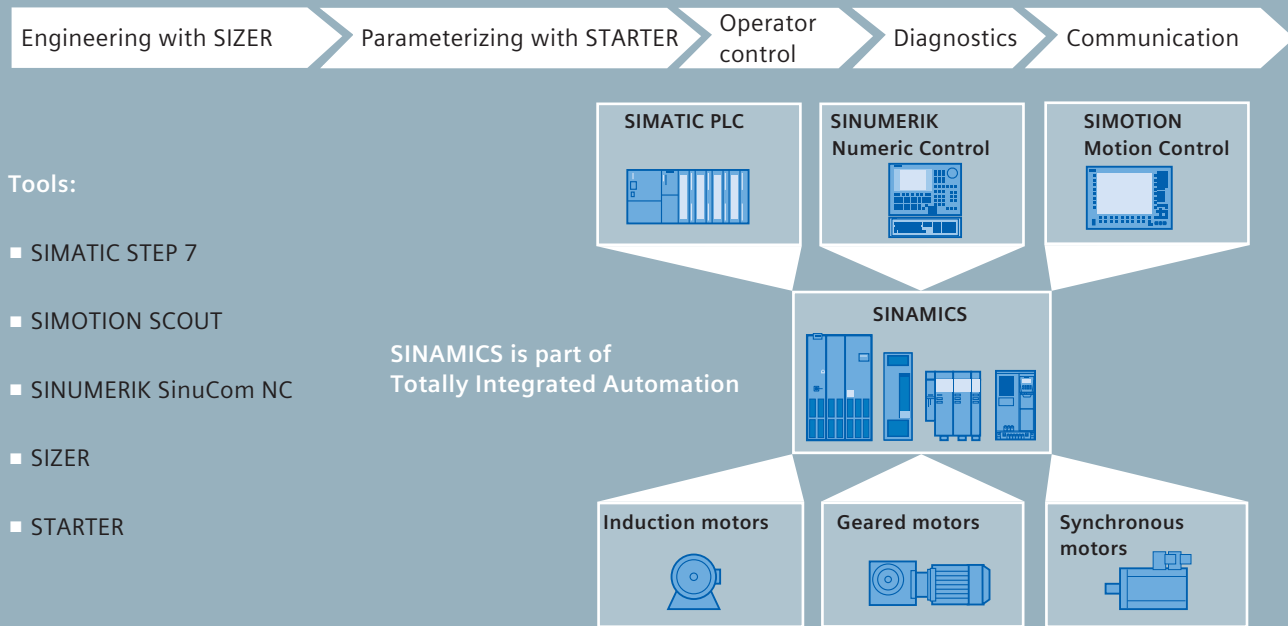
With its different voltages, the SINAMICS family is suitable for all of the different line supply types encountered around the world. It also complies with international standards and regulations, which means that the drive units do not have to be re-certified when they are exported. A global network of regional Siemens offices and service partners is available to provide high-performance support.

Energy-efficient solutions with SINAMICS

Especially in drive technology, the effective and efficient use of energy is playing an increasingly more important role. Here, SINAMICS is setting standards with various infeed techniques. Line supply infeeds with energy recovery capability feed excess energy back into the line supply when they are regenerating. The various infeed and energy recovery techniques – such as Basic Infeed, Smart Infeed, Efficient Infeed and Active Infeed – are all technologies that guarantee operating companies of plants high energy-saving potential, effectiveness of their plants and frequently the possibility of eliminating components that were required up until now.



SINAMICS – fully integrated



Up to 70% energy saving through variable-speed operation

Especially for pump, fan and compressor drives, energy savings of up to 70% can be achieved by using SINAMICS frequency converters. The reason for this is as follows: For fixed-speed drives, the motors always operate at the full speed designed for the maximum possible flow rate and the excess energy is dissipated – wasted – in the mechanical control elements such as throttles or valves. On the other hand, a frequency converter continually adapts the motor speed to the actual demand. The drive system then only draws the energy that it actually requires. The savings are enormous. Typical secondary effects of mechanical controls – such as pressure surges, eddies, vibration and temperature increase of the piping system – are all eliminated for frequency converter-based variable-speed operation.

SINAMICS Safety Integrated

Safety functions that are integrated in the drive are available for most of the SINAMICS family – this represents a real milestone. The majority of the various drive types have the most important safety function – Safe Torque Off (STO). However, also more demanding safety functions are available such as Safely Limited Speed (SLS). The integration of the safety technology allows safety concepts to be implemented in-line with those required in practice – and this also simplifies the installation. The safety functions for SINAMICS units are certified according to IEC 61508/SIL 2, EN ISO 13849-1 Cat. 3 and PL d.

Higher cost-effectiveness and efficiency

SINAMICS-based drive solutions provide a platform for achieving a higher degree of cost-effectiveness and competitiveness – for machinery and plant construction companies as well as for end users:

- Solutions optimally tailored to the application by using different drive versions
- Shorter project times/order administration using user-friendly and standard engineering and commissioning procedures
- High energy efficiency
- High-performance, innovative safety concepts
- Maintenance-friendly machines and plants with a high degree of availability through standard, powerful diagnostic functions
- Lower spare parts inventory through the optimized range of components

Numerous interfacing possibilities

SINAMICS offers several options when it comes to interfacing to higher-level control systems. These options include: coupling via digital or analog interface to conventional control systems or via PROFIBUS DP or PROFINET.

Totally Integrated Automation

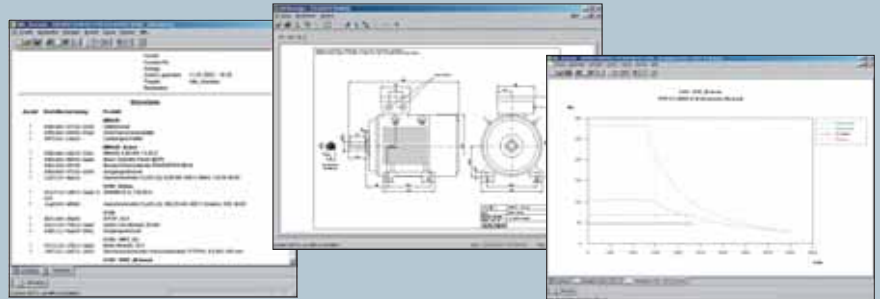
SINAMICS is part of Totally Integrated Automation – the extensive and integrated range of products and systems from Siemens. Thanks to its standard and integrated engineering, data management and communication to the automation level, SINAMICS allows highly efficient solutions to be created in conjunction with SIMATIC, SINUMERIK and SIMOTION.

Engineering with SIZER

Dimensioning the optimum components in steps guided by the program



Result of the engineering, e.g. parts list, characteristics and dimension drawings



Standard engineering

An essential feature of SINAMICS is the highest degree of standardization when it comes to engineering. Powerful and standard tools support users in all project phases. This already starts when dimensioning the drive components.

SIZER engineering software

The SIZER engineering software helps when engineering a complete drive system and allows single-motor drives up to complex multi-axis drives to be simply handled. The Workflow Wizard intuitively guides application engineers in a user-friendly way through the individual engineering phases – step-by-step. SIZER is available in German, English, Italian and French.

SIZER helps you to

- Calculate loads
- Select and dimension motor and power components
- Configure additional system components

SIZER provides

- Engineering data: characteristics, technical data, mounting drawings and dimension drawings
- Parts list with the associated ordering data

Further, SIZER provides support when electronically ordering the components, including a data link to SAP systems through its integrated EDP interface.

Enhanced engineering security

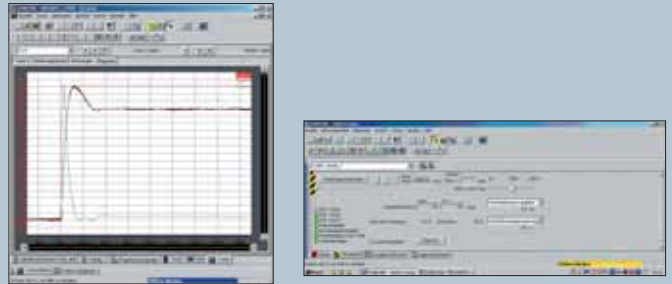
A guided tour makes it easier for entry-level personnel to get acquainted with SIZER. The help functions integrated in SIZER competently support you during the complete engineering phase and provide extensive physical and technical background knowledge. All of this helps prevent users from selecting incorrect combinations and subsequently ordering the wrong components.

Commissioning with STARTER

Graphic screen forms to configure and commission the drive



An oscilloscope function records set point and actual value curves



STARTER commissioning software

The STARTER tool can be used to commission the complete range of SINAMICS drives. This intelligent tool allows the drive components to be simply configured and commissioned – using user-friendly menus and graphics. What is especially helpful is that STARTER allows all of the relevant data to be imported from the electronic type plates of the drive components. For the user, this means that the associated time and costs are significantly reduced. It also speeds up the parameterization process and reduces the risk of incorrect data being entered. Integrated test functions can be used to check the entries being made and optimize the parameters. Velocity characteristics as well as set point and actual value curves can also be logged over time. Clearly structured graphics enable users to perform diagnostics and find their way quickly and easily around the system.

STARTER is available in German, English, French, Italian and Spanish.

Even stronger as a team

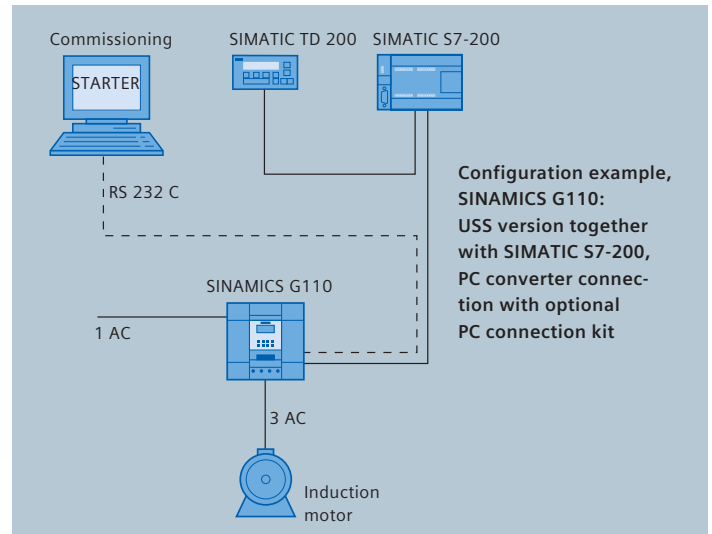
SIZER and STARTER can run as dedicated Windows applications. They are linked to the drives via the serial interface or via PROFIBUS DP.

In conjunction with SIMOTION, STARTER can also be integrated into SCOUT, the engineering system of the motion control system. The same is true when the drives are operated in conjunction with the SIMATIC industrial automation system. Here, STARTER is embedded in the STEP 7 engineering software, which means that the drive technology is fully integrated into the PLC environment.

Completely integrated automation solutions are obtained by interlinking SINAMICS with SIMOTION, SIMATIC and SINUMERIK. Creating solutions from a single source that can be engineered, parameterized and commissioned using just one central engineering software. This well thought-out concept is also reflected in the service functionality, as diagnostics and troubleshooting are simple – whether performed locally on-site or via teleservice.

SINAMICS G110:

The versatile single-motor drive for low power ratings



Design

SINAMICS G110 converters have an especially compact design and are supplied ready to be connected up. Further, they can be quickly installed and simply wired. The digital inputs can be freely parameterized and can be flexibly adapted to the widest range of applications. SINAMICS G110 is either parameterized using STARTER, the PC-based tool, or using an optional operator panel (Basic Operator Panel).

Applications

- As drive in industry and the trades
- In many sectors – e.g. food & beverage, textiles, packaging
- Conveyor, pump and fan applications
- For factory/garage door drives and barriers
- For moveable billboards
- Series commissioning of several converters with the same parameters can be transferred to other converters

Your advantages

- Can be flexibly used as a result of the diverse parameterization options (analog and USS)
- For low-profile electrical cabinets – also with heat sinks without ribs
- Simple installation, parameterization and commissioning
- Powerful diagnostics using the optional operator panel
- Fast series commissioning by copying parameters
- Freely parameterizable digital inputs
- Reduced stress on the mechanical system as a result of the skippable frequency bandwidth to avoid resonance effects, parameterizable ramp-up/ramp-down times and by switching the converter to a rotating motor (flying restart)
- Higher plant availability through automatic restart after a power failure
- Fast current limiting for disturbance-free operation when sudden load surges occur
- Integrated EMC filter for industrial and public line supplies
- Low-noise motor operation through a high pulse frequency
- Increased plant and system availability through an automatic restart after line failure or an operational fault

Technical data

Electrical data	SINAMICS G110
Line voltages; power ranges	1-ph. 200 ... 240 V AC, $\pm 10\%$; 0.12 ... 3.0 kW
Line supply types	IT, TN, TT
Line frequency	50 Hz/60 Hz
Output frequency	0 ... 650 Hz
Open-loop control techniques	V/f control, linear (M~n) V/f control, square law (M~n ²) V/f control, parameterizable
Fixed frequencies	3, parameterizable
Skippable frequency ranges	1, parameterizable
Digital inputs	3 parameterizable digital inputs, 24 V DC
Analog version: Analog input	Optional, 1 analog input for set point from 0 ... 10 V scalable or can be used as 4th digital input
Digital output	1x 24 V DC digital output
Communication interface	USS version: serial RS 485 interface for operation with the USS protocol
Functions	
Software functions	Automatic restart following operational interruption due to line failure: Parameterizable ramp-up times 0 ... 650 s; ramp rounding-off. The converter can be bumplessly switched to a rotating motor.
Protection functions	Undervoltage, overvoltage; ground fault; short circuit; stall protection; thermal motor protection I ² ; converter overtemperature; motor overtemperature
Motors that can be connected	Induction motors
Mechanical data	
Degree of protection	IP20
Cooling type	≤ 0.75 kW: convection cooling, version with flat heat sink; > 0.75 kW: internal air cooling (integrated fan)
Standards	
In conformance with the following standards	CE, UL, cUL, c-tick

SINAMICS G120P:

The versatile single-motor drive for pumps, fans and compressors



Design

SINAMICS G120P comprises a control unit as well as Power Module which are implemented as a compact device and the IOP (Intelligent Operator Panel).

Applications: Ideal for building technology, water and process industries

The SINAMICS G120P frequency converter is a cost-effective energy-efficient pump, fan and compressor drive that is simple to operate and which is packed with a wide range of functions. It has been specifically designed for the industrial environment as well as for applications in heating, ventilation and air-conditioning. In applications such as e.g. closed-loop speed control of fans for ventilation and air extraction, circulating pumps for heating and cooling systems or for pumps to increase the pressure and control the level, this new frequency converter is the perfect solution.

Your advantages

Energy and cost saving

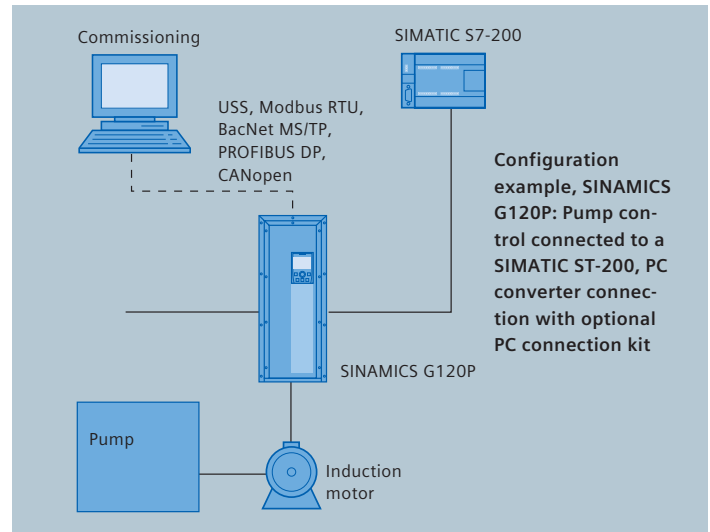
- Minimum apparent power losses
- The motor current is automatically adapted to the load situation
- Hibernation mode

Fast and simple installation and commissioning

- Wizard functions for commissioning, maintenance and diagnostics
- Wizard-based operator panel
- Parameter backup/cloning with operator panel, MMC card or automation system
- Line harmonics and conformance with the standards without any additional components

Can be flexibly adapted to requirements

- Integrated PLC functions for local control tasks
- EMC-compliant design using isolated digital inputs
- Integrated NI1000/PT1000 temperature sensor interface and motor temperature sensor



Technical data

Electrical data	SINAMICS G120P
Line voltages; power ranges	3-ph. 380 ... 480 V AC, $\pm 10\%$
Line supply types	TN
Line frequency	47 Hz/63 Hz
Output frequency	0 ... 650 Hz
Open-loop control technique	V/f control (linear, square law, FCC, ECO) Vector control without encoder (SLVC)
Fixed frequencies	16, parameterizable
Skippable frequency ranges	4, parameterizable
Digital inputs	6 DI, 4 AI
Digital output	3 DO, 2 AO
Additional inputs and outputs	1 x KTY/PTC/T-click 2 x PSU-out (10 V DC, 24 V DC) 1 x PSU-in (24 V DC)
Communication interface	Control Unit CU230P-2 offers a wide range of communication protocols, e.g. USS, Modbus RTU, BacNet MS/TP, PROFIBUS DP, CANopen
Functions	
Software functions	Energy-saving mode; hibernation; flying restart; motor staging; 4 PID technology controllers; logical and arithmetic functions, which use function blocks; extended essential service mode; multi-zone controller; bypass; protection functions, motor temperature monitoring
Protection functions	Motor temperature monitoring with and without temperature sensor (via PTC, KTY and ThermoClick sensor); overcurrent protection; torque monitoring; overvoltage protection (VDCmax controller)
Motors that can be connected	Induction motors
Mechanical data	
Degree of protection	<ul style="list-style-type: none"> • With operator unit: IP54/UL Type 12 • With blanking cover: IP55/UL Type 12
Cooling type	Convection
Standards	
In conformance with the following standards	UL, CE, c-tick, cUL

*) STO: Safe Torque Off; SS1: Safe Stop 1; SLS: Safely Limited Speed; SBC: Safe Brake Control

SINAMICS G120:

The modular single-motor drive for small up to average power ratings



Design

SINAMICS G120 frequency converters have a modular design comprising the control unit (CU) and the power unit (Power Modular, PM) for the power range from 0.37 kW to 250 kW. The wide range of components available allows users to configure their optimum converter in an easy-to-understand way. The corresponding modules can be simply combined depending on the requirements relating to hardware, communications and safety technology. The G120 system is being continuously expanded with new elements and options as a result of ongoing innovation. Operator panels are available for parameter assignment, operator control and visualization. These have been optimized for simple commissioning, operator control and diagnostics. The STARTER commissioning software is used.

Applications

- As general purpose drive in all areas of industry and the trades
- For applications in the conveyor technology area
- In the automobile, textile, printing, chemical and packaging sectors
- In the steel, oil and gas and offshore areas as well the renewable energy sector

Safety Integrated functions:

Fully integrated in the standard automation and with low associated costs in the drives. Integrate safety simply and reap the benefits – from engineering up to an operational plant or system.

Energy efficiency:

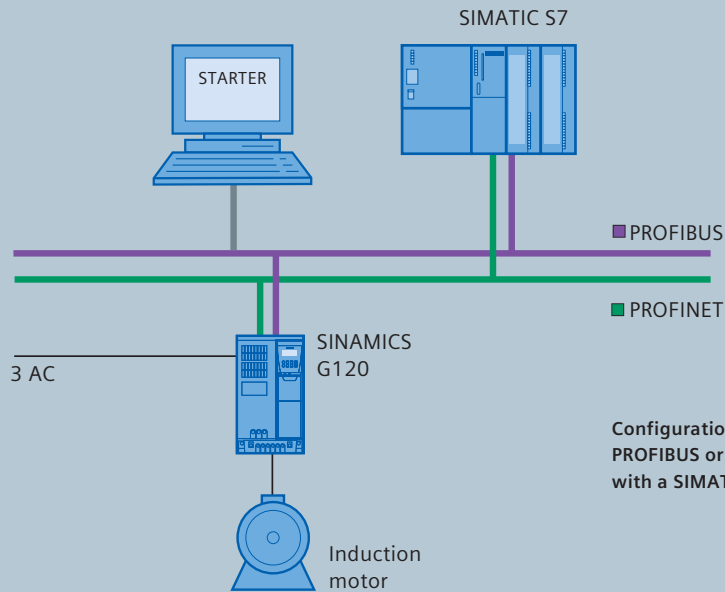
Energy saving using innovative functions and energy recovery in regenerative operation.

Rugged environments and endurance:

High degree of ruggedness using a clever cooling concept. User-friendly from installation up to maintenance: Commissioning Wizards, plain text operator panel, USB port, micro memory card.

Your advantages

- IP20 degree of protection for installation in electrical cabinets
- Expandable drive concepts that are fit for the future as well as high maintenance and operator friendliness – thanks to the standardization and modularity
- Certified safety technology using integrated safety functions: STO, SS1, SLS and SBC – all without encoder!
- Lower interface costs and plant-wide engineering – via PROFIBUS, PROFINET, Modbus RTU, CANopen and USS, BacNet
- Energy recovery allows energy to be saved, low line harmonics and supplementary components can be eliminated – e.g. braking resistors and cooling mechanisms
- Long lifetime as a result of the high mechanical and electrical ruggedness as well as extensive protection concepts
- Certified worldwide: according to UL and CE, Safety Integrated (IEC 61508/SIL 2)
- Highest degree of ruggedness: convection cooling using an external heat sink
- User-friendly commissioning using the Intelligent Operator Panel (IOP) with integrated Wizard functions, application macros, plain text display, etc.
- Cost-optimized operator panel with user-friendly 2-line display
- EMC filter for industrial and public line supplies
- Application-specific modules for pumps, fans and compressors as well as for the chemical industry



Configuration example, SINAMICS G120: PROFIBUS or PROFINET version together with a SIMATIC S7 control

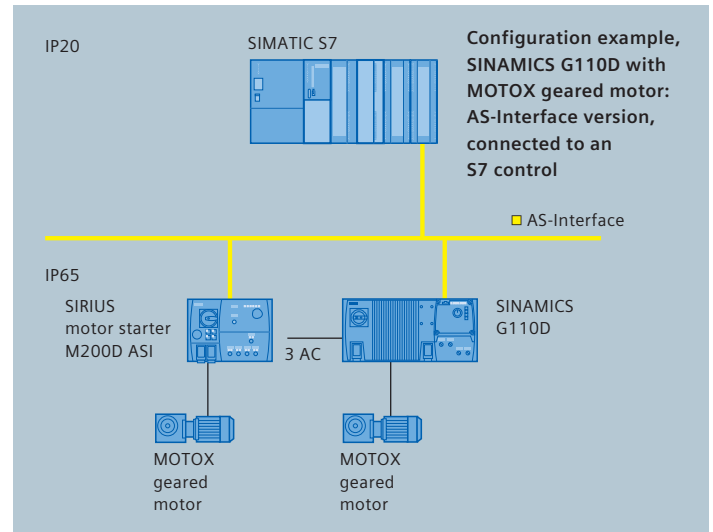
Technical data

Electrical data	SINAMICS G120
Line voltages; power ranges	1-ph. 380 ... 480 V AC, $\pm 10\%$; 0.37 ... 250 kW
Line supply types	IT, TN, TT
Line frequency	50 Hz/60 Hz
Output frequency	0 ... 650 Hz
Open-loop control technique	V/f control, linear (M-n), square law (M-n ²), V/f control, can be parameterized
Fixed frequencies	3, parameterizable
Skippable frequency ranges	1, parameterizable
Digital inputs	3 parameterizable digital inputs, 24 V DC
Analog version: analog input	1 analog input for setpoints from 0 ... 10 V scalable or can be used as 4th digital input
Digital output	1, 24 V DC digital output
Communication interface	USS version: serial RS 485 interface for operation with USS protocol
Functions	
Software functions	Automatic restart following operational interruption due to line failure, converter is bumplessly switched to a rotating motor, parameterizable ramp-up/ramp-down times, ramp rounding-off
Integrated safety functions	STO, SS1, SLS, SBC*
Protection functions	Undervoltage, overvoltage, ground fault, short circuit, stall protection, thermal motor protection I ² t, converter overtemperature, motor overtemperature
Motors that can be connected	Induction motors
Mechanical data	
Degree of protection	IP20
Cooling type	≤ 0.75 kW: convection cooling, version with flat heat sink, > 0.75 kW: internal air cooling (integrated fan)
Standards	
In conformance with the following standards	CE, UL, cUL, C-tick

*) Safe brake control on the Power Module

SINAMICS G110D:

The versatile, distributed single-motor drive for basic solutions



Design

SINAMICS G110D is the compact, distributed variable-speed drive in a high degree of protection for the lower power and performance range from 0.75 kW to 7.5 kW. It comprises a Power Module and Control Unit.

Applications

- For basic conveyor-related applications in the industrial environment, e.g. distribution logistics and airports
- Additional sectors: automobile, food & beverage (without tenside) and packaging

Your advantages

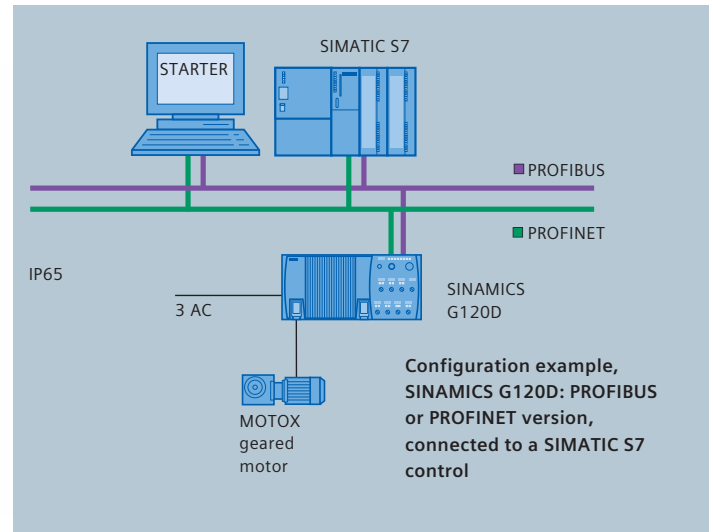
- Fast commissioning and a high degree of maintenance friendliness by using standard plug connectors for the fieldbus, power, inputs and outputs
 - extended communication and diagnostic functions via AS-Interface
 - operator-friendly parameter structure
 - maintenance switch integrated in the drive
 - optional integrated manual control with key-operated switch
- Space-saving, compact and low-profile design as well as the same drilling template across all power ratings
- Standard thanks to the wide power range, standard plug connectors, standard engineering and commissioning using SIZER and STARTER
- Mechanically and electronically rugged, in part as a result of the wide voltage range (380–500 V), completely metal enclosure, coated electronic modules, short circuit-proof inputs and outputs, integrated motor protection
- Integrated brake control with the commonly used brake voltages in one device, Quick-Stop function for fast response and rough positioning

Technical data

Electrical data	SINAMICS G110D
Line voltages; power ranges	3-ph. 380 ... 500 V AC, $\pm 10\%$; 0.75 ... 7.5 kW
Line supply types	IT, TN, TT
Line frequency	47 Hz/63 Hz
Output frequency	0 ... 650 Hz
Open-loop control technique	Vector with/without encoder, V/f , FCC
Fixed frequencies	15, parameterizable
Digital inputs	4, locally at the device; 2, can be addressed via AS-Interface; parameterizable, isolated
Analog version: analog input	1 (0 ... 10 V) 0.5 A, supplied through switched 24 V
Communication interface	AS-Interface
Functions	
Software functions	Digital input signals are locally pre-processed, positioning down ramp; automatic restart; flying restart; slip compensation; motor temperature; jog operation and many more
Protection functions	Motor temperature monitoring with and without temperature sensor (PTC/KTY); duty cycle monitoring; power unit monitoring; plant protection functions
Motors that can be connected	Induction motors
Mechanical data	
Degree of protection	IP65
Cooling type	Convection cooling, with fan for high power ratings
Standards	
In conformance with the following standards	CE, UL

SINAMICS G120D:

The versatile, distributed single-motor drive for high-performance solutions



Design

SINAMICS G120D is convincing as a result of its modular design (Power Module and Control Unit) as well as the integration of innovative functions that are unique worldwide – e.g. for safety technology, energy recovery and communications capability. A wide range of different versions is available in the power ranges 0.75 to 7.5 kW.

Applications

- For complex assembly lines such as e.g. the automobile sector
- And for areas such as airports, food & beverage industry (without tenside), distribution logistics (e.g. electric monorail systems)

Your advantages

- High IP65 degree of protection
- Standardized: Low profile and a standard drilling template over all power ratings – also for G110D – make it especially flexible and easy to replace. It has a modular design comprising a power unit and control module, which keeps the number of spare parts to a minimum.
- Energy recovery permits energy saving, low line harmonics and the elimination of supplementary components such as e.g. braking resistors and cooling mechanisms
- Integrated safety functions without having to use an encoder: STO, SS1 and SLS
- Lower interface costs and plant-wide engineering – via PROFIBUS, PROFINET and PROFIsafe
- Certified worldwide: according to UL and CE, Safety Integrated (IEC 61508/SIL 2)

Technical data

Electrical data	SINAMICS G120D
Line voltages; power ranges	3-ph. 380 ... 500 V AC, $\pm 10\%$; 0.75 ... 7.5 kW
Line supply types	IT, TN, TT
Line frequency	47 Hz/63 Hz
Output frequency	Optional (Efficient Infeed) / 0 ... 650 Hz
Open-loop control technique	V/f control (linear and square law) and parameterizable vector control without encoder; vector control with encoder; closed-loop torque control
Fixed frequencies	16, parameterizable
Digital inputs	Up to 6 digital inputs, depending on the Control Unit, 24 V DC
Digital outputs	2 digital outputs
Communication interface	PROFIBUS/PROFINET
Functions	
Software functions	Parameterizable ramp-up times 0 ... 650 s; ramp rounding-off; automatic restart after power failure; flying restart; signals are locally pre-processed using free function blocks; 3 switchable motor data sets; basic closed-loop process control using a high-quality internal PID controller; positioning down ramp; kinetic buffering
Protection functions	Motor overtemperature (PTC/KTY, I ² t); power unit and duty cycle monitoring; overvoltage and undervoltage; ground fault; stall protection; plant protection functions
Safety functions	STO, SS1, SLS
Motors that can be connected	Induction motors
Mechanical data	
Degree of protection	IP65
Cooling type	Convection cooling, with fan for high power ratings
Standards	
In conformance with the following standards	CE, UL, cUL, C-tick, Safety Integrated IEC 61508/SIL 2

SINAMICS G130 / G150:

The universal frequency converter for high-rating single-motor drives



SINAMICS G130 chassis units and SINAMICS G150 cabinet units are designed for variable-speed drives in machinery and plant construction. They have been specifically designed to meet the requirements of single-motor drives with square-law and constant load characteristic without regenerative feedback into the line supply. Both converters offer a cost-effective drive solution that can be adapted to the particular customer-specified requirements based on a wide range of components and options.

Applications

SINAMICS G130 and SINAMICS G150 are the optimum choice wherever solid, liquid or gaseous substances and materials have to be moved, conveyed, pumped or compressed – wherever variable-speed drives pay off. It essentially involves the following applications:

- Pumps, fans and compressors
- Extruders, mixers and crushers

Your advantages

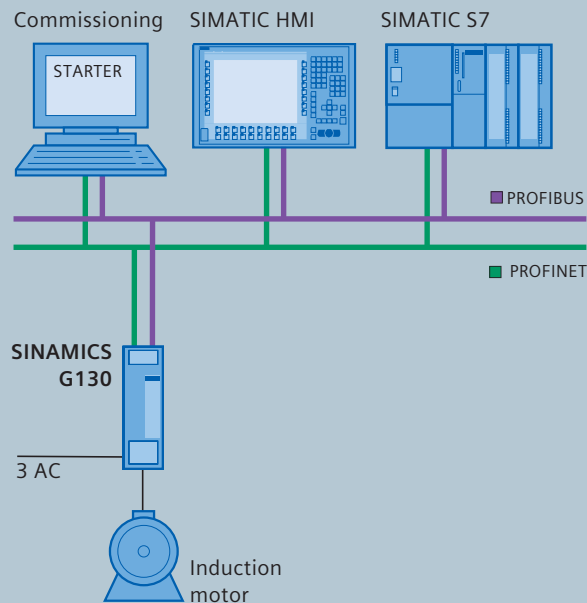
- Especially quiet and compact through the use of state-of-the-art IGBT power semiconductors and an innovative cooling concept
- Can be easily integrated into automation solutions via a standard PROFIBUS interface, PROFINET – or analog and digital interfaces
- Higher degree of plant availability by being able to simply and quickly replace individual modules and power components
- Simple commissioning and parameterization – menu-prompted at the AOP30 user-friendly operator panel with graphics-capable LCD display and plain text display
- Integrated safety functions

SINAMICS G130

With the SINAMICS G130 OEMs and plant builders have a modular drive system at their fingertips. This allows them to implement drive solutions that are perfectly tailored to the particular application. SINAMICS G130 comprises two modular, autonomous components: Power Module and Control Unit. These units can either be mounted separately – or together as a single unit.

The Power Module has a slot for the Control Unit. The user-friendly AOP30 panel is available for commissioning and local operator control. Pre-defined interfaces using terminals or PROFIBUS simplify commissioning and controlling the drive. The Control Unit interfaces can be supplemented by additional modules. SINAMICS G130 chassis units are available for power ratings extending from 75 kW up to 800 kW.

Configuration example,
SINAMICS G130 with SIMATIC S7



Technical data	
Electrical data	SINAMICS G130
Line voltages; power ranges	
3-ph. 380 ... 480 V AC; $\pm 10\%$ ($-15\% < 1$ min)	110 ... 560 kW
3-ph. 500 ... 600 V AC; $\pm 10\%$ ($-15\% < 1$ min)	110 ... 560 kW
3-ph. 660 ... 690 V AC; $\pm 10\%$ ($-15\% < 1$ min)	75 ... 800 kW
Supported line supply types	TN/TT or IT line supplies
Line frequency	47 ... 63 Hz
Output frequency	0 ... 300 Hz
Closed-loop control technique	Vector control with or without speed encoder as well as V/f control
Fixed speeds	15 fixed – plus 1 base speed, can be parameterized
Skippable speed ranges	4, parameterizable
Customer terminal strip	Digital inputs/outputs, analog inputs/outputs, inputs for motor temperature evaluation, number is variable
Communication interface	PROFIBUS DP as standard optional: PROFINET, CANopen
Braking operation	With the Braking Module system component
Functions	
Software functions	Automatic restart after an operational interruption due to line failure; the converter is bumplessly switched to a rotating motor; kinetic buffering; automatic motor identification to optimize the control; parameterizable ramp-up/ramp-down time; ramp rounding-off
Integrated safety functions	STO, SS1*
Protection functions	Motor and power units are thermally monitored; overvoltage, undervoltage, ground fault, short circuit, stall protection
Motors that can be connected	Induction motors and synchronous motors
Mechanical data	
Degree of protection	IP00/IP20 (dependent on the type)
Cooling type	Integrated fan (forced air cooling)
Sound pressure level	≤ 72 dB (A) at 50 Hz line supply frequency
Cabinet system	–
Standards	
In conformance with the following standards	CE, cUL

*) STO: Safe Torque Off; SS1: Safe Stop 1

SINAMICS G130 / G150:

The universal drive solution for high-rating single-motor drives



SINAMICS G150 units are AC/AC drive converters that are accommodated in a standard cabinet. With their standard design and dimensions, these cabinets seamlessly fit into each and every plant or system. They have been optimized for low maintenance and compact dimensions. Further, they can be simply and quickly installed and commissioned.

The drive units can be adapted to the particular requirements using an extensive range of options. They are available with cabinet widths starting at 400 mm increasing in 200-mm steps and can be supplied in various degrees of protection up to IP54 – in two different versions.

Version A

This version offers adequate mounting space for all of the available options. The different versions allow the line supply and motor to either be connected at the top or at the bottom. This results in a high degree of flexibility regarding the mounting & installation in the plant or system.

Version C

This especially space-saving version is intended for situations where the line connection components must be accommodated in a central low-voltage distribution system – and therefore not installed in the cabinet. The user-friendly AOP30 panel is standard for both versions and mounted in the cabinet door. These drive converter cabinet units are available for a range of power ratings from 75 kW up to 1500 kW.

SINAMICS G150 Clean Power – the cost-effective solution for line-friendly operation

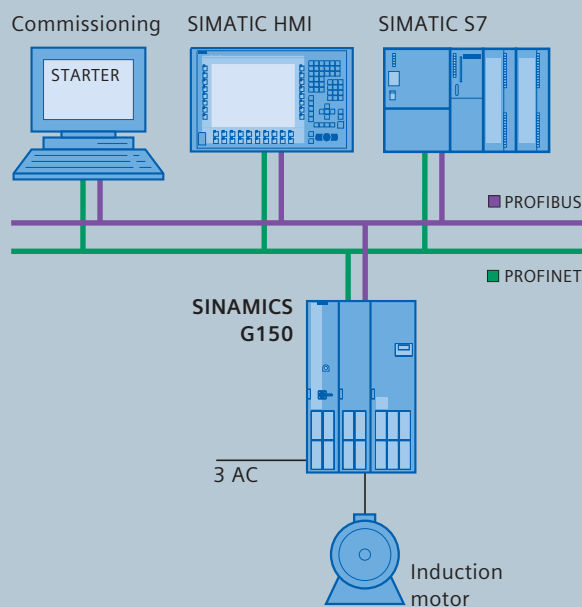
SINAMICS G150 Clean Power is the simple and cost-effective response to the increasing requirements placed on current and voltage quality. This solution, which is fully integrated in the control cabinet, combines the advantages of rugged 6-pulse rectifier technology with an innovative, passive Line Harmonics Filter (LHF compact). This concept sets itself apart as a result of its simplicity, compactness, high reliability and energy efficiency as well as its price-performance ratio. Regarding its harmonic values, SINAMICS G150 Clean Power is the ideal response to the trend towards increasingly higher line supply quality. It easily complies with standard IEEE519, with the most stringent international requirements placed on line harmonics generated by frequency converters – and this even for weak line supplies. With this passive filter, there are no pulse-frequency components in the line current that have to be eliminated – an otherwise complex process. Further, with its innovative filter technology, SINAMICS G150 Clean Power facilitates an extremely compact design in conjunction with increased efficiency and the highest degree of reliability. A three-winding transformer with secondary windings offset by 30° to one another is not required. The passive components of the LHF compact essentially don't influence the probability of failure of the converter – thus ensuring the highest degree of reliability. SINAMICS G150 Clean Power is subject to exhaustive tests and is supplied type-tested and installed as a ready-to-connect package. For SINAMICS G150 Clean Power, the filter is an integral component of the electrical cabinet – which sets itself apart from conventional external passive filters. As a consequence, fuses, switches and contactor do not have to be duplicated – which would otherwise involve additional costs. This solution also does not require an additional line reactor.

Configuration example, SINAMICS G130 and SINAMICS G150 with SIMATIC S7

dv/dt filter compact plus VPL – space and cost saving for motor-friendly voltages

SINAMICS G150 units are available with a dv/dt filter compact plus VPL (Voltage Peak Limiter). This limits both the voltage rate-of-rise dv/dt as well as also the peak voltages to the stringent limit values specified in Standard IEC 60034-25. This reduces the stress on the motor insulation and extends the motor service life. Especially interesting when it comes to retrofit projects: Using this filter, motors that were originally not designed for converter operation can be fed from a frequency converter. This is complemented by the improved EMC properties of the overall system.

The dv/dt filter compact plus VPL saves so much space that it can be completely integrated into the electrical cabinet – even for large power ratings. Further, it is extremely energy-efficient: The “cut-off” voltage peaks are not wasted as thermal energy in resistors, but are fed back into the voltage DC link. Almost no energy in the system is lost as a result of this essentially loss-free technique.



Technical data	
Electrical data	SINAMICS G150
Line voltages; power ranges	
3-ph. 380 ... 480 V AC; ± 10 % (-15 % < 1 min)	110 ... 900 kW
3-ph. 500 ... 600 V AC; ± 10 % (-15 % < 1 min)	110 ... 1000 kW
3-ph. 660 ... 690 V AC; ± 10 % (-15 % < 1 min)	75 ... 1500 kW
Supported line supply types	TN/TT or IT line supplies
Line frequency	47 ... 63 Hz
Output frequency	0 ... 300 Hz
Closed-loop control technique	Vector control with or without speed encoder as well as V/f control
Fixed speeds	15 fixed – plus 1 base speed, can be parameterized
Skippable speed ranges	4, parameterizable
Customer terminal strip	Digital inputs/outputs, analog inputs/outputs, inputs for motor temperature evaluation, number is variable
Communication interface	PROFIBUS DP as standard optional: PROFINET, CANopen
Braking operation	Optional: Braking Module
Functions	
Software functions	Automatic restart after an operational interruption due to line failure; the converter is bumplessly switched to a rotating motor; kinetic buffering; automatic motor identification to optimize the control; parameterizable ramp-up/ramp-down time; ramp rounding-off
Integrated safety functions	STO, SS1*
Protection functions	Motor and power units are thermally monitored; overvoltage, undervoltage, ground fault, short circuit, stall protection
Motors that can be connected	Induction motors and synchronous motors
Mechanical data	
Degree of protection	IP20, optional: IP21/IP23/IP43/IP54
Cooling type	Integrated fan (forced air cooling)
Sound pressure level	≤ 72 dB (A) at 50 Hz line supply frequency
Cabinet system	Rittal TS 8
Standards	
In conformance with the following standards	CE

*) STO: Safe Torque Off; SS1: Safe Stop 1

SINAMICS S110:

The specialist for basic positioning tasks



Within the SINAMICS drive family, SINAMICS S110 is the specialist for basic positioning tasks. With this single-axis drive, both synchronous as well as induction motors – with power ratings from 0.12 to 90 kW – can be positioned right on target using the integrated closed-loop position control. With a precisely tailored range of functions, the drive can handle the most commonly used positioning applications both simply and in a user-friendly fashion. It supports almost all of the encoder types that are commonly used in practice for positioning tasks. SINAMICS S110 is also just as flexible when it comes to connecting to a higher-level control. The connection options extend from the classic ± 10 V interface via coupling using digital inputs/outputs up to the PROFIBUS DP fieldbus interface. What is especially worth mentioning: the integrated safety functions. It has a wide range of Safety Integrated functions that cannot be taken for granted in this drive class. This means it can implement powerful, effective safety functions without any high associated overhead.

Applications

Whether for positioning or productive axes – SINAMICS S110 is the right selection for applications such as:

- Handling equipment
- Feeder and removal devices
- Stacking equipment
- Automatic assembly machines
- Laboratory automation
- Tool changers
- Tracking equipment, e.g. for solar panels
- Medical technology, e.g. for examination tables

Your advantages

- Epos positioning functions for the most commonly used positioning tasks: referencing, jogging, MDI (Manual Data Input), traversing block (up to 16), flying positioning, travel to end stop
- Closed-loop servo control for synchronous and induction

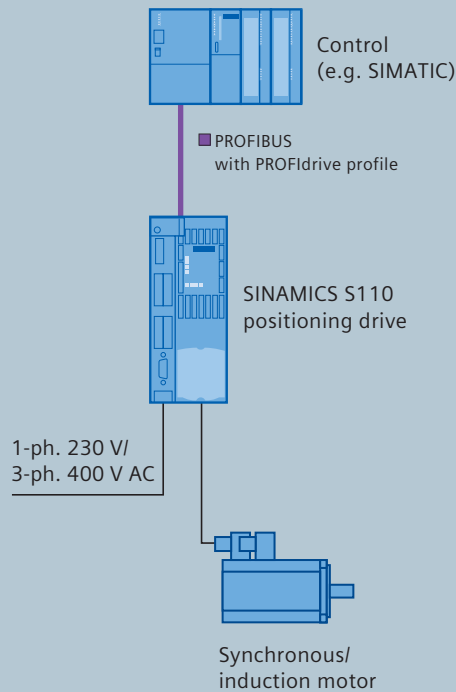
motors

- Integrated safety functions; onboard fail-safe inputs; PROFIsafe profile
- Interfaces: analog interface, pulse/direction interface, digital I/Os, PROFIBUS DP, CANopen, being prepared: PROFINET
- BICO technology and technology controller as supplementary functions for drive-related open-loop and closed-loop control tasks
- Compatibility to SINAMICS S120: the PM340 Power Module can be used; functionally compatible to SINAMICS S120
- Simple drive engineering with SIZER
- User-friendly commissioning with STARTER including auto configuration using the electronic type plate and controller optimization using autotuning

Design

SINAMICS S110 drives have a modular design. The drive intelligence with all of the interfaces is combined in a Control Unit, which is snapped onto a Power Module. It includes the power components with line supply infeed and motor connections. This modular concept ensures a lower variety of parts and simplified spare parts stocking. In conjunction with 1FK7 synchronous motors, an especially optimized drive configuration is obtained. The encoder is connected to the SINAMICS S110 through the DRIVE-CLiQ interface that is extremely easy to use. This interface also permits data to be automatically aligned between the motor and drive – which facilitates fast and reliable commissioning. SINAMICS S110 is functionally compatible to SINAMICS S120 and also uses the same Power Modules.

**Configuration example:
SINAMICS S110 single-axis positioning drive connected to the higher-level control
via the PROFIBUS interface**



Technical data	
Electrical data	SINAMICS S110
Line voltages; power ranges	1-ph. 200 ... 240 V AC, ± 10 %; 0.12 ... 0.75 kW 3-ph. 380 ... 480 V AC, ± 10 %; 0.37 ... 90 kW
Supported line supply types	IT, TN, TT
Line frequency	50 Hz/60 Hz
Open-loop/closed-loop control technique	Closed-loop servo control, V/f control
Digital inputs/outputs	4 DI, 24 V 4 DI/DO, 24 V 1 PTC/KTY temperature sensor connection 3 F-DI, 24 V (fail-safe inputs) 1 F-DO, 24 V (fail-safe outputs)
Analog inputs (AI)	1 AI (12 bits)
Communication interfaces	PROFIBUS DP, CANopen, b.p. ²⁾ : PROFINET, USS-protocol, pulse/direction interface
Functions	
Technological functions	Epos positioning functions: Point-to-point positioning, absolute/relative; linear/rotary axis; flying positioning; traversing blocks (up to 16); BICO technology controller
Integrated safety functions	STO, SOS, SS1, SS2, SLS, SSM, SBC ¹⁾
Limits	Torque limiting/current limiting; power limiting; speed limiting
Monitoring/protection functions	Traversing range limits; following error; standstill; thermal motor and power unit monitoring; overcurrent; overvoltage and undervoltage; stall protection; overspeed; standstill; short circuit and ground fault proof
Motors that can be connected	Synchronous motors (e.g.: 1FK7, 1FT7) Induction motors (e.g.: 1LA, 1PH8)
Supported encoders	Integrated absolute/incremental encoders in motors with DRIVE-CLiQ interface Incremental encoder TTL signal, RS 422 Incremental encoder HTL Absolute encoder SSI
Mechanical data	
Degree of protection	IP20
Cooling type	Internal air cooling
Standards	
In conformance with the following standards	CE, UL, cUL, Safety Integrated IEC 61508/SIL 2 and ISO 13849-1/PL d or Cat. 3

1) STO: Safe Torque Off; SOS: Safe Operating Stop; SS1: Safe Stop 1; SS2: Safe Stop 2;
SLS: Safely Limited Speed; SSM: Safe Speed Monitor; SBC: Safe Brake Control

2) b.p. – being prepared

SINAMICS S120:

The flexible, modular drive system for sophisticated tasks



SINAMICS S120 is the modular drive system with servo and vector control for sophisticated drive tasks in machinery and plant construction. Versions are available both for single- as well as multi-axis applications. SINAMICS S120 covers a range of power ratings from 0.12 kW up to 4500 kW and various control modules with graduated functionality. A precisely tailored drive configuration can be engineered quickly and simply from the modular SINAMICS S120 system – for almost any high-performance drive application.

SINAMICS S120 control modules (Control Units) have extensive onboard drive intelligence even in the basic version: servo and vector control, V/f control, positioning and safety functions, as well as many other functions that are useful in achieving reliable operation. With the closed-loop control techniques provided, both synchronous as well as induction motors can be operated and therefore the complete range of low-voltage motors from Siemens.

Integrated PROFIBUS DP interfaces allow the drives to be simply integrated into the overall automation solution. Among others, PROFINET is supported as an additional fieldbus interface. Seamless, classic automation and drive solutions based on SINAMICS S120 can be implemented, especially in conjunction with SIMATIC automation system. When used with SIMOTION D or SINUMERIK 840D solution line Control Units, even complete motion control and machine tool solutions that are integrated in the drive can be realized.

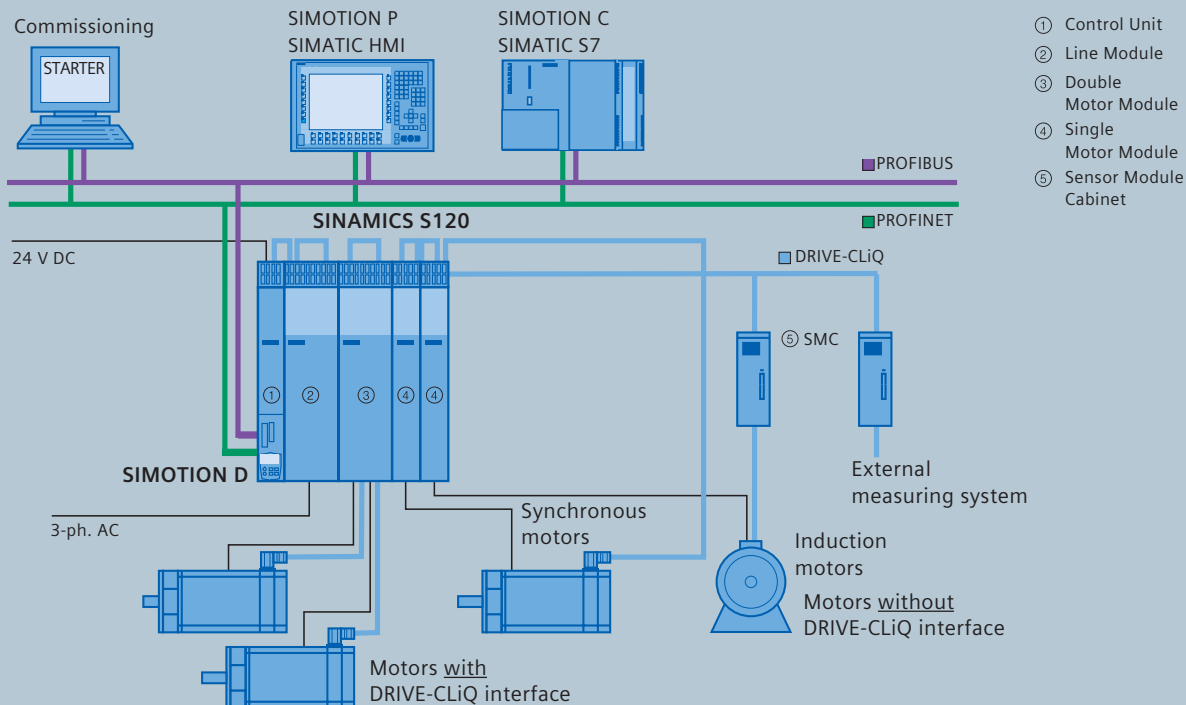


Cabinet Modules – the modular cabinet system for power ratings up to 4500 kW

SINAMICS S120 Cabinet Modules

SINAMICS S120 Cabinet Modules are available as cabinet system specifically for use in plant construction. These can be combined to form a cabinet lineup with a total power rating of up to 4500 kW. A mechanical design – also supported by simulation – careful observance of EMC zone concepts and especially the usability guarantee a high functional reliability during the assembly, commissioning and in operation. Using standard interfaces, the modules can be quickly interlinked to form a ready-to-connect drive solution for multi-motor applications. A wide range of options permit the SINAMICS S120 to be adapted to every drive application.

Configuration schematic
SINAMICS S120 booksize group with SIMOTION/SIMATIC



Applications

As a result of its various features, SINAMICS S120 is predestined for use in production machines and machine tools as well as in plant construction – for example in:

- Packaging machines
- Machines used in the food and beverage industry
- Plastics machines
- Textile machines
- Presses, punches
- Printing and paper machines
- Machines in the woodworking, glass and ceramic sectors
- Assembly and automatic testing machines
- Handling devices
- Lathes, milling and grinding machines
- Rolling mill drives
- Vehicle and gearbox test stands
- Hoisting equipment, cranes

Your advantages

SINAMICS S120 distinguishes itself as a result of the following features:

- Can be universally used in high-performance single- and multi-axis applications
- Can be freely combined to create customized solutions
- Wide range of power ratings
- Wide functional scope
- Integrated safety functions
- Various cooling types are supported: internal air cooling, liquid cooling
- High efficiency through:
 - energy equalization via the DC link
 - line infeed capable of energy recovery (Smart Infeed, Active Infeed)
 - high degree of line supply compatibility and reliable operation even when connected to unstable line supplies as a result of the controlled infeed/regenerative feedback technique (Active Infeed)
- Can be simply integrated into higher-level automation and IT environments
- Simple mounting and installation
- Connection system in-line with requirements in the field
- User-friendly commissioning – among others using autoconfiguration using the electronic type plate and controller optimization using autotuning

SINAMICS S120:

The modular drive system for demanding single- and multi-axis applications



AC/AC units for single-axis applications		DC/AC units for multi-axis applications			
Blocksize	Chassis	Booksize Compact	Booksize	Chassis	Cabinet Modules
0.12 kW to 90 kW	110 kW to 250 kW	0.9 kW to 9.7 kW	1.6 kW to 107 kW	75 kW to 1200 kW	1.6 kW to 4500 kW

SINAMICS S120 AC Drives for high-performance single-motor drives

SINAMICS S120 AC Drives were specifically designed for high-performance single-motor drive applications. They have a modular design and comprise a Power Module in which the infeed and power units are integrated. Power Modules are available for power ratings extending from 0.12 kW up to 250 kW. The Control Unit, which accommodates all of the closed-loop control intelligence, is plugged onto the Power Module. These control modules include all of the drive interfaces – for communication and to connect expansion components.

SINAMICS S120 DC/AC drive units for multi-axis applications

With SINAMICS S120, we are offering multi-axis units with central line supply infeed and DC link. This allows energy-efficient operation by equalizing the energy between various Motor Modules along the DC busbars. SINAMICS S120 DC/AC drive units also have a modular design and comprise a Control Unit, Line Module and Control Modules.

Control Unit

The closed-loop control intelligence for all of the drive axes integrated in the multi-axis group is accommodated in the Control Unit. Control Units also include the drive-related I/Os and interfaces to communicate with higher-level control systems. Control Units are available with different functions and performance levels.

Line Module

The Line Module includes the central line supply infeed for the DC link. Different versions are available depending on the particular type of application: from uncontrolled infeed units for motoring operation up to the controlled infeed/regenerative feedback units. Even when the line supply voltage fluctuates, these units ensure a higher degree of security against failure by maintaining the DC link voltage at a constant level. They regenerate excess energy back into the line supply in a line-friendly fashion. Line Modules are available for power ratings from 5 kW up to 6000 kW.

Motor Modules

One or several Motor Modules are supplied with energy for the motors from the DC link. Both synchronous as well as induction motors can be connected. Motor Modules are available for rated powers extending from 1.6 kW up to 1200 kW. Correspondingly higher powers can be implemented by connecting these in parallel.

Additional modules and components

There are a whole series of supplementary modules and components to connect various position measuring and encoder systems as well as to expand the drive system by adding drive-related I/Os:

- Terminal Modules, Terminal Boards: to expand the drive system by adding drive-related I/Os
- Sensor Modules: to connect position measuring encoders to the drive system
- Communication Boards: to provide the Control Unit with an additional communication port

DRIVE-CLiQ system interface

All of the SINAMICS S120 components are equipped with the high-performance DRIVE-CLiQ system interface. Line and Motor Modules are connected to the Control Unit and Terminal and Sensor Modules are connected to the drive system via DRIVE-CLiQ – simply and efficiently. Motors that have this leading-edge interface can also be directly connected to the drive system.

Different formats – can be flexibly combined

SINAMICS S120 is available in different formats:

- SINAMICS S120 AC Drives
 - compact blocksize format for power ratings from 0.12 kW to 90 kW
 - chassis format for power ratings from 110 kW to 250 kW
- SINAMICS S120 multi-axis units
 - booksize format for power ratings from 1.6 kW to 107 kW – also available with external air cooling and in a cold plate version
 - booksize compact format with power ratings from 0.9 kW to – 9.7 kW
 - chassis format for power ratings from 75 kW to 1200 kW
 - also available with liquid cooling, for applications in dusty, aggressive or salt-laden environments, or when space is restricted
 - Cabinet Modules up to 4500 kW

All of these formats and frame sizes support internal air cooling and can be extremely flexibly combined with one another. Even S120 AC Drives can be combined via the DRIVE-CLiQ interface to create multi-axis applications.

Autoconfiguration using electronic type plates

All SINAMICS S120 components have a digital type plate that contains all of the relevant technical data. For instance, for motors this includes the parameters of the electronic equivalent circuit diagram and the characteristic values of the integrated motor encoder. The control module automatically senses this data via DRIVE-CLiQ and it doesn't have to be entered again when commissioning the drive or replacing components. In addition to technical data, the digital type plate also includes logistical data – for instance, the manufacturer's ID, Order No. and the globally unique identification number. These values can be electronically called up locally on site as well as via remote diagnostics. This allows all of the components used in a machine to be uniquely identified – at any time. This correspondingly simplifies service.

Technical data	
Electrical data	SINAMICS S120
Line voltages; power ranges	1-ph. 200 ... 240 V AC, ± 10 %: 0.12 ... 0.75 kW 3-ph. 380 ... 480 V AC, ± 10 %: 0.37 ... 3000 kW 3-ph. 500 ... 690 V AC, ± 10 %: 75 ... 4500 kW
Power range	0.12 ... 1200 kW (4500 kW Cabinet Modules)
Supported line supply types	IT, TN, TT
Line frequency	50 Hz/60 Hz
Energy recovery	Yes, as option (uncontrolled: Smart Infeed or controlled: Active Infeed)
Open-loop/closed-loop control technique	V/f control; vector control; servo control; Dynamic Servo Control (DSC)
Digital inputs/outputs	Yes, number can be scaled
Analog inputs/outputs	Yes, number can be scaled
Communication interfaces	PROFIBUS DP; PROFINET; CANopen
Functions	
Technological functions	Several command/drive data sets; free interconnectability using BICO technology, using graphic configuring, freely interconnectable logic/control/arithmetic blocks (Drive Control Chart); flying measurement, flying restart, kinetic buffering; motion control in conjunction with SIMOTION D; Numerical Control in conjunction with SINUMERIK 840 solution line; technology controller (PID); Integrated positioning functions
Integrated safety functions ¹⁾	STO, SS1, SS2, SLS, SOS, SSM, SBC ²⁾
Limits	Torque limiting/current limiting; power limiting; speed limiting
Protection functions (excerpt)	Thermal monitoring of the motor and power units; overcurrent; overvoltage and undervoltage; stall protection; overspeed; zero speed; short circuit and ground-fault strength
Motors that can be connected	Induction motors; synchronous motors; torque motors; linear motors
Supported encoders	Resolvers; absolute encoders; incremental encoders sin/cosV _{pp} , incremental encoders TTL signal, RS 422; incremental encoders, HTL
Mechanical data	
Degree of protection	IP00/IP20, optional up to IP54
Cooling type	Internal or external air cooling, liquid cooling; cold plate cooling
Standards	
In conformance with the following standards	CE, UL, cUL, Safety Integrated IEC 61508/SIL 2 and ISO 13849-1/PL d or Cat. 3

1) Availability depends on the format

2) STO: Safe Torque Off; SS1: Safe Stop 1; SS2: Safe Stop 2; SLS: Safely Limited Speed; SOS: Safe Operating Stop; SSM: Safe Speed Monitor; SBC: Safe Brake Control

SINAMICS S150:

The drive solution for sophisticated high-rating single-motor drives



SINAMICS S150 cabinet units are designed for variable-speed drives in the machinery construction and plant building sectors. They are especially suitable when it comes to high requirements placed on the dynamic performance and the speed accuracy – as well as frequent braking cycles with high levels of braking energy and 4-quadrant operation. The drive converter cabinet units provide high-performance closed-loop speed control with a high precision and dynamic performance – and are available in a range of power ratings from 75 kW up to 1200 kW.

Applications

SINAMICS S150 is predestined for use in all applications that place the highest demands on processes with dynamic and reproducible operations. These include:

- Test stand drives
- Centrifuges
- Elevator and crane systems
- Cross-cutters and shears
- Conveyor belts
- Presses
- Cable winches

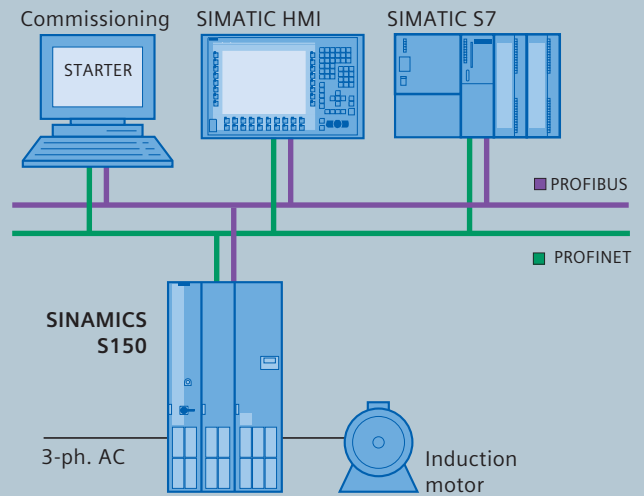
Your advantages

- Regenerative feedback into the line supply as standard – permits unrestricted 4Q operation
- Significant energy saving – especially when there are frequent braking cycles
- High accuracy line supply infeed with a high dynamic performance by using IGBTs – insensitive to line supply voltage fluctuations
- Almost perfectly sinusoidal line currents are impressed as a result of the fast closed-loop current control
- Innovative Clean Power Filter ensures that low-frequency harmonics that are fed back into the line supply are negligible; the stringent THD limit values according to IEEE 519 are surpassed significantly – this therefore avoids losses in the low-voltage distribution and/or line supply transformer and the line supply feeder cable caused by harmonic currents
- Possibility of reactive power compensation (inductive or capacitive)
- Can be simply integrated into automation solutions using the standard PROFIBUS interface as well as various analog and digital interfaces
- Increased plant availability by being able to simply and quickly replace individual modules and power components
- Simple commissioning and parameterization – menu-prompted at the user-friendly AOP30 panel with graphics-capable LCD display and plain text display
- Integrated safety functions

Design

SINAMICS S150 units are drive converters in a standard cabinet that are ready to be connected up. They can be perfectly adapted to the particular application as a result of an extensive range of options. Different versions allow the line supply and motor to either be connected at the top or bottom. This ensures a high degree of flexibility when it comes to mounting and installation. These drive units are available with cabinet widths starting at 1400 mm – increasing in 200-mm steps. The standard degree of protection of the cabinets is IP20, however, this can be optionally extended up to IP54. The user-friendly AOP30 panel is mounted in the door as standard.

Configuration example, SINAMICS S150 with SIMATIC S7



Technical data

Electrical data	SINAMICS S150
Line voltages; power ranges	3-ph. 380 ... 480 V AC; $\pm 10\%$ ($-15\% < 1\text{ min}$); 110 ... 800 kW 3-ph. 500 ... 690 V AC; $\pm 10\%$ ($-15\% < 1\text{ min}$); 75 ... 1200 kW
Supported line supply types	TN/TT or IT line supplies
Line frequency	47 ... 63 Hz
Energy recovery, output frequency	Yes (controlled; Active Infeed) / 0 ... 300 Hz
Closed-loop control technique	Vector control with and without encoder or <i>V/f</i> control
Fixed speeds	15 fixed – plus 1 base speed, can be parameterized
Skippable speed ranges	4, parameterizable
Customer terminal strip	Digital inputs/outputs; analog inputs/outputs; inputs for motor temperature evaluation; the number is variable
Communication interface	PROFIBUS DP as standard/optional: PROFINET; CANopen
Braking operation	4Q operation is possible as standard
Functions	
Software functions	The drive converter can be bumplessly connected to a rotating motor; kinetic buffering; automatic motor identification to optimize the control; parameterizable ramp-up/ramp-down time; ramp smoothing
Integrated safety functions	STO, SS1, SS2, SLS, SSM, SOS*
Protection functions	Undervoltage; overvoltage; ground fault; short circuit; stall protection; thermal motor protection; thermal drive converter protection
Motors that can be connected	Induction motors and synchronous motors
Mechanical data	
Degree of protection	IP20, optional: IP21/IP23/IP43/IP54
Cooling type	Integrated fan (forced air cooling)
Sound pressure level	$\leq 78\text{ dB (A)}$ for a 50 Hz line supply frequency
Cabinet system	Rittal TS 8
Standards	
In conformance with the following standards	CE

*) STO: Safe Torque Off; SS1: Safe Stop 1; SS2: Safe Stop 2; SLS: Safely Limited Speed; SSM: Safe Speed Monitor; SOS: Safe Operating Stop

SINAMICS DCM:

The scalable DC converter for basic and demanding applications



For decades now, DC drives have proven themselves in the widest range of applications. In many areas, DC drives still remain the most favorably-priced drive solution. They have advantages when it comes to reliability, operator friendliness and operating behavior. Just the same as before, in many industrial areas, there are still some good technical and economic reasons for using DC drives. This is the reason that for years now we have continued to consequentially develop our solutions for DC technology – and they are now based on the same technological platform as the innovative and integrated family of SINAMICS drives.

SINAMICS DC MASTER (DCM) combines the advantages of its predecessor, the well-known and well-proven SIMOREG DC MASTER – with all of the advantages of the SINAMICS family. When compared to its predecessors, SINAMICS DC MASTER has retained the quality, reliability and functionality. In fact, when it comes to functionality, it has new features, which also ensure that this technology is fit for the future in the modern automation environment.

Applications

With its high-precision closed-loop motor speed control, SINAMICS DC MASTER ensures optimum processes. For instance, when precisely positioning loads for crane systems, when rolling steel – where the precision of drive systems is decisive for the product quality – for mine hoists as well as cable railways where fast and precise control guarantees the comfort and safety of the passengers. Not only this, SINAMICS DC MASTER has a high dynamic performance. Its current and/or torque rise times lie significantly below 10 milliseconds.

Scalable: always the perfect solution with

SINAMICS DC MASTER

The series of SINAMICS DC MASTER converters is convincing as scalable drive system – both for basic as well as demanding applications. The DC converter is equipped with a standard CUD for standard closed-loop control. Applications requiring a higher computational performance and more interfaces can be addressed by expanding the closed-loop control resources using the Advanced CUD. Different requirements on the computational performance and speed can therefore be precisely fulfilled by either selecting a Standard CUD, an Advanced CUD – or a combination of both. Depending on the particular application, the units are available for armature or field supply as well as two-quadrant operation. The rated DC current range of the units extends from 15 to 3000 and can be increased by connecting DC converters in parallel.

Can be flexibly expanded

SINAMICS DC MASTER can be expanded in a fully modular fashion – to address standard applications up to high-performance solutions. The extensive product range and the whole raft of options allow the DC converter to be optimally adapted to plant- and system-specific requirements – both technically and economically. The interfaces of the CU and the number of digital inputs and outputs can also be expanded using the supplementary SINAMICS modules such as the TM15 and TM31 Terminal Modules.

Simple and fast commissioning

The converters are simply commissioned and parameterized menu-prompted at the AOP30 user-friendly operator panel. This has a graphics-capable LCD display and plain text display. Alternatively, it can also be commissioned using the BOP20 numerical operator panel or PC-supported using the STARTER commissioning tool. The units are pre-configured in the factory. This means that the unit-specific parameters don't have to be set at all and the unit is fully electronically adapted to the particular application using parameters.

High plant availability

SINAMICS DC MASTER and its components ensure a high level of plant availability as a result of their inherent reliability, service friendliness and redundant concepts. The components have been designed so that they can be quickly and simply replaced when service is required. In addition, SINAMICS DC MASTER can be optionally configured for redundant operation. This means that in the very unlikely case that the master or slave unit fails, the complete drive system can still continue to operate.

SINAMICS DCM is available in two versions:

The series of DC converters –

as ready-to-connect converter. Chassis units from 15 to 3000 A rated DC current and rated input voltages from 1-ph. 85 V AC to 3-ph. 950 V AC, as two-quadrant and four-quadrant drives. The optimum current and voltage steps, the overload capability, the wide permissible tolerances for the input quantities as well as the numerous options allow users to select the perfect unit for their applications – just the same as tailored solutions.

The SINAMICS DC MASTER Control Module is the successor of the well-known SIMOREG CM. This is the ideal solution for retrofits and when modernizing existing DC drives. Using this Control Module, an "old" DC drive can be transformed into a new one – quickly, simply and at a favorable cost. It is then equipped with fully-digital closed-loop control and all of the advantages of state-of-the-art open-loop control technology. The motor, mechanical system and the power unit are kept; only the control unit is replaced by the SINAMICS DC MASTER Control Module. The DC drive then has the complete functional scope of a new SINAMICS DC MASTER.

The space-saving design of the SINAMICS DC MASTER Control Module and the fact that the Control Module can be separately installed optimally simplifies integration into the overall plant or system.

The highlights of SINAMICS DC MASTER

- PROFIBUS / PROFINET
- Variance of the Control Units
- Field power supply in line with user requirements
- Optional electronics power supply with 24 V DC
- Power unit is insulated with respect to ground
- Free function blocks and Drive Control Chart
- Functionality can be expanded using SINAMICS components
- Single-phase connection possible
- Coated modules and nickel-plated copper busbars
- Wide temperature range

The Control Module

Technical data	
Electrical data	SINAMICS DCM
Line voltages; power ranges	1-ph. 85 V AC to 3-ph. 950 V AC, 6 kW to 2508 kW (up to 30 MW in a parallel connection)
Supported line supply types	TN/TT or IT line supplies
Line frequency	50 Hz/60 Hz
Energy recovery	Yes, in the appropriate 4Q version
Open-loop/closed-loop control technique	Closed-loop speed control, closed-loop torque control
Digital inputs/outputs	Yes, the number can be scaled
Analog inputs/outputs	Yes, the number can be scaled
Communication interfaces	PROFIBUS, PROFINET, digital, analog, serial (RS 232 / RS 485)
Functions	
Technological functions	BICO technology, technology controller, free function blocks, automatic restart, Drive Control Chart
Limits	Torque limiting / current limiting; power limiting; speed limiting
Protection functions (excerpt)	Thermal monitoring of the motor and power units; overcurrent; overvoltage, and undervoltage; stall protection, overspeed, standstill, short circuit, ground fault
Motors that can be connected	DC motors
Encoders that are supported	Resolvers, absolute encoders; incremental encoders
Mechanical data	
Degree of protection	IP00/IP20
Cooling type	Self-ventilated, forced air cooling
Standards	
In conformance with the following standards	EN, IEC, UL, cUL

SINAMICS GM150 / SM150 / SL150:

The SINAMICS solutions for the medium-voltage range

SINAMICS GM150

SINAMICS GM150 is designed for medium-voltage drives without regenerative feedback into the line supply – for example, for large pumps, fans, extruders, mixers and crushers. This means that it continues the range of functions and applications of the SINAMICS G150 up into the medium-voltage range. Reliable power components, protection measures, insensitive control modules and redundant fans and pumps in the cooling system guarantee smooth, disturbance-free operation – and more specifically, even under the toughest of conditions. Up to approx. 11 MW, the drive units are equipped with the second generation of reliable HV-IGBT power semiconductors. Well-proven IGCT technology is used for even higher power ratings up into the double-digit Megawatt range.

Well thought-out down to the finest detail

Engineering, commissioning and operation are simple and standard – just the same as for the low-voltage drive units. Operator control is menu-prompted at the user-friendly AOP30 panel with plain text display. The space-saving design, the availability of all voltage classes, either air or water cooling, connections that are prepared at either the top or bottom of the unit as well as the seamless integration into higher-level automation systems make integration into the plant or system straightforward.

Intelligent maintenance functions

Using the intelligent maintenance functions, the components automatically issue a signal if maintenance is required. For example, a differential pressure technique determines how dirty the dust filter is. For water-cooled versions, the analog conductivity measurement continually monitors the mode of operation of the ion exchanger and provides a signal well in advance if its ion exchanging capability diminishes too much. This ensures that components are replaced or other maintenance work is carried out at the optimum time – for instance as part of a routine inspection.

When maintenance is required, all of the essential components are accessible from the front. Components can be replaced with just a few manual operations as a result of the well conceived arrangement.



SINAMICS GL150

SINAMICS GL150 is the rugged, single-motor drive for synchronous motors up to 120 MW. The number of components has been reduced to a minimum by using thyristors. The simple design makes SINAMICS GL150 extremely reliable in operation, almost maintenance-free and compact. SINAMICS GL150 is designed as single-motor drive for applications with square-law and constant load characteristics. From its circuit principle, it is suitable for four-quadrant operation – i.e. driving and braking in both directions of rotation – without any additional equipment. Typical applications include: pumps, fans, compressors, extruders and kneaders in the double-digit Megawatt range – such as those used in the oil & gas, petrochemical and chemical sectors – as well as large ships' drives.

SINAMICS SM150

SINAMICS SM150 is the medium-voltage drive converter for sophisticated drive tasks with regenerative feedback into the line supply. It is suitable for single-motor as well as multi-motor drives and continues the range of functions and applications of SINAMICS S150 and SINAMICS S120 Cabinet Modules up into the medium-voltage range. Rolling mills and mine hoists are just some of the typical applications. Thanks to their features, the drive units are tailored to these types of high-dynamic applications with regenerative feedback into the line supply.

4Q operation and Active Infeed

SINAMICS SM150 can handle 4Q operation without any restrictions. The Active Infeed technology makes this drive unit ideal for transferring power between regenerating and motoring applications. For multi-motor drives, this is realized using a common DC bus. Further, Active Infeed can supply capacitive reactive power to compensate for other drive converters. The power factor $\cos\phi$ can be set. Further, the Active Infeed minimizes harmonics and makes the SINAMICS SM150 especially line-friendly.

SINAMICS SL150

SINAMICS SL150 is the cycloconverter for slow-speed synchronous and induction motors with a high torque. A high efficiency of 99 % and a high degree of reliability is achieved due to the design employing thyristor three-phase bridges and relatively few power semiconductors. From its circuit principle, it is suitable for four-quadrant operation without any additional equipment – i.e. for driving and braking in both directions of rotation. Typical applications include rolling mills and mine hoists, or crushers and cement mills as well as excavators for open-cast mines.

Technical data



Name	SINAMICS G110	SINAMICS G120P	SINAMICS G120
	Inverter for variable-speed drives in the lower power range	Versatile single-motor inverter for pumps, fans and compressors	Modular inverter for variable-speed single-motor drives
Format	Blocksize unit	Blocksize unit	Blocksize unit
Drive type	AC/AC unit, ready to be connected up	AC/AC unit, modular	AC/AC unit, modular
Degree of protection	IP20, optional: IP43	<ul style="list-style-type: none"> • With operator unit: IP54/UL Type 12 • With blanking cover IP55/UL Type 12 	IP20, optional: IP43
Line voltage V_{line} /power ranges			
1-ph. 200 ... 240 V AC	0.12 ... 3 kW	–	–
3-ph. 380 ... 480 V AC	–	0.37 ... 90 kW $\pm 10\%$	0.37 ... 250 kW
3-ph. 500 ... 600 V AC	–	–	–
3-ph. 500 ... 690 V AC	–	–	–
3-ph. 660 ... 690 V AC	–	–	11... 55 kW
1-ph. 85 V AC ... 3-ph. 950 V AC	–	–	–
3-ph. 2.3 ... 36 kV AC motor voltage 1.5 ... 4.16 kV	–	–	–
3-ph. 2.3 ... 36 kV AC motor voltage 3.3 kV	–	–	–
Current infeed	Uncontrolled	Uncontrolled	Uncontrolled
Energy recovery	No	–	Optional
Line frequency	47 ... 63 Hz	47 ... 63 Hz	47 ... 63 Hz
Output voltage⁴	0 ... U_{line}	0 ... U_{line}	0 ... U_{line}
Output frequency	0 ... 650 Hz	0 ... 200 Hz (V/f)	0 ... 650 Hz (V/f)
Closed-loop control technique			
V/f open-loop control	Yes	Yes	Yes
Vector control with/without encoder	–	Yes	Yes
Servo control with/without encoder	–	–	–
Closed-loop speed/torque control	Yes	Yes	Yes
Motors			
Induction motors	Yes	Yes	Yes
Synchronous motors	–	–	–
Torque motors	–	–	–
Linear motors	–	–	–
Control dynamic performance			
Vector control/ control for SINAMICS DCM V/f control	Rise time, speed	–	35 ... 40 ms
	Rise time, M control	–	approx. 3 ms
Servo control	Rise time, speed	–	–
	Rise time, M control	–	–
Technological functions	Flying restart, automatic restart, compound braking (2/3 wire control), DC braking	Automatic restart, energy-saving mode, hibernation, flying restart, motor staging, 4 PID technology controllers, logical and arithmetic functions, extended emergency service operation, multi-zone controller, bypass	Flying restart, automatic restart, kinetic buffering, BICO technology, technology controller, free function blocks, compact braking, DC braking, dynamic braking
Safety functions	–	–	STO, SS1, SLS, SBC
Interfaces	Digital, analog, serial (RS 485)	CU230P-2 Control Unit offers a wide range of communication protocols, e.g. USS, Modbus RTU, BacNet MS/TP, PROFIBUS DP, CANopen	Digital, analog, serial (RS 232/RS 485), PROFIBUS and PROFINET, also with PROFIdrive Profile 4 with NAMUR, with PROFIsafe; Modbus RTU, CANopen
Typical application technologies	Standard V/f applications, such as e.g. pumps, fans, blowers, conveyor belts, door/gate drives, moveable billboards, fitness machines	Single-motor drives, e.g. pumps, fans, blowers, compressors in e.g. building technology, water industry and process industry	Single-motor drives, e.g. pumps, fans, blowers, compressors, conveyor belts, extruders, mixers, crushers
Catalog	D11.1	D11.1	D11.1

Low voltage



SINAMICS G110D		SINAMICS G120D		SINAMICS G130		SINAMICS G150		SINAMICS S110	
Distributed drive for basic single-axis applications in the lower power range		Distributed drive for complex single-axis/multi-axis applications		Frequency converter for variable-speed single-motor drives		Single-axis positioning drive			
Blocksize unit		Blocksize unit		Chassis unit		Converter cabinet unit		Blocksize unit	
AC/AC unit, ready to be connected up		AC/AC unit, modular		AC/AC unit, modular		AC/AC unit, ready to be connected up		AC/AC unit, modular	
IP65		IP65		IP00 / IP20		IP20 (IP21 / IP23 / IP43 / IP54)		IP20	
–		–		–		–		0.12 ... 0.75 kW	
0.75 ... 7.5 kW ±10 %		0.75 ... 7.5 kW		110 ... 560 kW		110 ... 900 kW		0.37 ... 90 kW	
–		–		110 ... 560 kW		110 ... 1000 kW		–	
–		–		–		–		–	
–		–		75 ... 800 kW		75 ... 1500 kW		–	
–		–		–		–		–	
–		–		–		–		–	
Uncontrolled		Uncontrolled		Uncontrolled		Uncontrolled		Uncontrolled	
No		Yes		No		No		No	
47 ... 63 Hz		47 ... 63 Hz		47 ... 63 Hz		47 ... 63 Hz		47 ... 63 Hz	
0 ... U_{line}		0 ... U_{line}		0 ... U_{line}		0 ... U_{line}		0 ... U_{line}	
0 ... 200 Hz (V/f)		0 ... 650 Hz		0 ... 300 Hz		0 ... 300 Hz		V/f control: 0 ... 400 Hz ² Vector control: 0 ... 300 Hz ² Servo control: 0 ... 650 Hz ²	
Yes		Yes		Yes		Yes		Yes	
–		Yes		Yes		–		–	
–		–		–		–		Yes	
–		Yes		Yes		Yes		Yes	
Yes		Yes		Yes		Yes		Yes	
–		–		Yes, without encoder		Yes		Yes	
–		–		Yes, without encoder		–		–	
–		–		–		–		–	
–		35 ... 40 ms		11 ... 15 ms		11 ... 15 ms		–	
–		approx. 3 ms		2 ... 3 ms		2 ... 3 ms		–	
–		–		–		–		5 ... 7 ms ³	
–		–		–		–		1 ... 2 ms ³	
Flying restart, automatic restart, BICO technology, technology controller, free function blocks, compound braking, DC braking, dynamic braking		Flying restart, automatic restart, kinetic buffering, BICO technology, technology controller, free function blocks, compound braking, DC braking, dynamic braking		Flying restart, automatic restart, kinetic buffering, BICO technology, technology controller, Drive Control Chart		Basic positioner, BICO technology, technology controller, controller optimization using auto-tuning			
–		STO, SS1, SLS		STO, SS1		STO, SS1		STO, SOS, SBC, SS1, SS2, SLS, SSM	
Digital, analog, serial (RS232), AS-Interface		PROFIBUS and PROFINET, also with PROFIdrive profile 4 with PROFIsafe		Digital, analog, serial (RS 232 / RS 485), PROFIBUS DP, CANopen, PROFINET (PROFIdrive profile 4 with NAMUR), PROFIsafe		Digital, analog, PROFIBUS DP, PROFINET ¹ , CANopen, pulse/direction interface, USS protocol			
Standard V/f applications for conveyor systems, distribution logistics, airports, basic performance applications in the automotive, food & beverage and packaging sectors		Single-motor drives, e.g. EMS's, conveyor belts, high-bay racking units, hoisting gear, pumps, fans, compressors		Single-motor drives, e.g. pumps, fans, blowers, compressors, conveyor belts, extruders, mixers, crushers		Servo-controlled positioning of single-motor drives with synchronous/induction motors		High-performance single-m	
D11.1		D11.1		D11		PM22		PM21	

For power and dynamic performance

5) In conjunction with SINUMERIK up to 1300 Hz



SINAMICS S120				SINAMICS S150		SINAMICS DCM
Modular drive system for demanding single-axis / multi-axis applications				Frequency converter for demanding variable-speed single-motor drives		Scalable DC converter for basic and demanding applications
Chassis unit	Booksize unit	Chassis unit	Cabinet Modules	Converter cabinet unit		DC converter unit
AC/AC unit, modular	DC/AC unit, modular			AC/AC unit, ready to connect up		AC/DC unit, compact
IP20, optional: IP43	IP20	IP00 / IP20, optional: IP43	IP20 (IP21 / IP23 / IP43 / IP54)	IP20 (IP21 / IP23 / IP43 / IP54)		IP00 / IP20
–	–	–	–	–	–	
110 ... 250 kW	1.6 ... 107 kW	110 ... 3000 kW	1.6 ... 3000 kW	110 ... 800 kW	–	
–	–	–	–	–	–	
–	–	75 ... 4500 kW	75 ... 4500 kW	75 ... 1200 kW	–	
–	–	–	–	–	–	
–	–	–	–	–	6 ... 2508 kW (parallel connection up to 30 MW)	
–	–	–	–	–	–	
–	–	–	–	–	–	
Optional, uncontrolled or controlled				Controlled		–
Yes, depending on the infeed				Yes		Yes, with the corresponding ve
				47 ... 63 Hz		45 ... 65 Hz
				0 ... U_{line}		0 ... 1000 V
200 Hz ³	0 ... 400 Hz ²	0 ... 200 Hz ³		0 ... 300 Hz		
160 Hz ³	0 ... 300 Hz ²	0 ... 160 Hz ³				
300 Hz ³	0 ... 650 Hz ^{2,5}	0 ... 300 Hz ³				
	Yes			Yes		–
	Yes			Yes		–
	Yes			Yes		–
	Yes			Yes		Yes
	Yes			Yes		DC motors
	Yes			Yes		
	Yes			–		
11 ... 15 ms ³	8 ... 10 ms ²	11 ... 15 ms ³	11 ... 15 ms ³	11 ... 15 ms	40 ms	
2 ... 3 ms ³	1 ... 2 ms ²	2 ... 3 ms ³	2 ... 3 ms ³	2 ... 3 ms	6 ... 9 ms	
5 ... 7 ms ³	2 ... 3 ms ²	5 ... 7 ms ³	5 ... 7 ms ³	5 ... 7 ms ³	–	
1 ... 2 ms ³	0,5 ... 1 ms ²	1 ... 2 ms ³	1 ... 2 ms ³	1 ... 2 ms ³	–	
Flying restart, automatic restart, kinetic buffering, basic positioner, BICO technology, technology controller, controller optimization using autotuning				Flying restart, automatic restart, kinetic buffering, technology controller, Drive Control Chart, BICO technology		BICO technology, technology controller, free function blocks automatic restart, Drive Control Chart
STO, SS1, SS2, SOS, SLS, SSM	STO, SOS, SBC, SS1, SS2, SLS, SSM	STO, SOS, SS1, SS2, SLS, SSM	STO, SOS, SS1, SS2, SLS, SSM	STO, SS1, SS2, SLS, SSM, SOS		–
Digital, analog, serial (RS 232 / RS 485), PROFIBUS DP, PROFINET, PROFIsafe, CANopen (in conjunction with CU320)						Digital, analog, serial (RS 232 / RS 485), PROFIBUS DP, PROFINET
Motor drives	High-performance multi-motor drives			High-performance single-motor drives for test stands, cross-cutters, centrifuges, conveyor belts, presses		Rolling mill drives, wire-drawing machines, extruders and kneaders, cable railways and lifts, test stand drives
Continuous motion control / motion control / positioning tasks in production machines, e.g. packaging, textile, printing, paper, plastics machines, plants and process lines, presses, converting applications, numerical control applications in machine tools						
PM21, D21.3	PM21	PM21, D21.3	D21.3	D21.3		D23.1

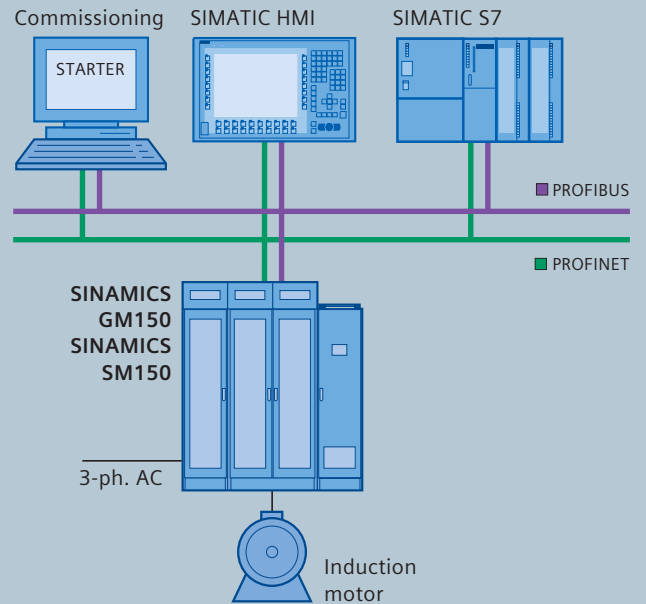
Medium voltage



	SINAMICS GL150	SINAMICS GM150	SINAMICS SM150	SINAMICS SL150
	Frequency converter for synchronous motors with the highest power rating	Frequency converter for medium-voltage variable-speed drives	Frequency converter for demanding medium-voltage single- and multi-axis applications	Cycloconverter for slow-speed synchronous and induction motors with a high torque
	Converter cabinet unit	Converter cabinet unit	Converter cabinet unit	Converter cabinet unit
	AC/AC unit, ready to connect up	AC/AC unit, ready to connect up	AC/AC unit, ready to connect up, DC bus system for several motors connected to a common DC bus	AC/AC unit, ready to connect up
	Air-cooled IP20 (opt. IP42) Liquid-cooled IP41 (opt. IP54)	Air-cooled IP22 (opt. IP42) Liquid-cooled IP43 (opt. IP54)	IP43 (opt. IP54)	IP21 (opt. IP54)
	–	–	–	–
	–	–	–	–
	–	–	–	–
	–	–	–	–
	–	–	–	–
	–	–	–	3000 ... 36,000 kW
	6 ... 120 MW	800 ... 17,500 kW (for induction motors)	–	–
	–	–	2800 ... 30,000 kW (for synchronous motors)	–
	Controlled	Uncontrolled	Controlled	Controlled
Version	Yes	No	Yes	Yes
	–	47 ... 63 Hz	–	–
	–	0 ... U_{line}	–	–
	–	0 ... 250 Hz	–	0 ... 50 Hz
	–	–	Yes	–
	Yes	–	Yes	Yes
	–	–	–	–
	Yes	–	Yes	Yes
	–	–	Yes	Yes
	Yes	–	Yes	Yes
	–	–	–	–
	–	–	–	–
	100 ... 2000 ms	15 ... 35 ms	15 ... 20 ms	–
	40 ... 100 ms	5 ... 10 ms	5 ms	–
	–	–	–	–
	–	–	–	–
	Flying restart, automatic restart, kinetic buffering, technology controller, Drive Control Chart, BICO technology			Flying restart, automatic restart, kinetic buffering, technology controller, Drive Control Chart, BICO technology
	–	–	STO	–
	Digital, analog, serial, PROFIBUS DP, PROFINET	Digital, analog, serial (RS 232 / RS 485), PROFIBUS DP, PROFINET		PROFIBUS DP
	Single-motor drives with the highest rating for compressors, pumps, blowers, extruders, mixers, crushers and ships' drives	Single-motor drives for pumps, blowers, compressors, extruders, mixers, crushers	High-performance single- and multi-axis drives for steel and mining applications	Single-motor drives for rolling mills, mine hoists, ore crushers and cement mills, excavators for open-cast mining
	–	–	D12	–



Configuration example, SINAMICS GM150 and SINAMICS SM150 with SIMATIC S7



Technical data				
Electrical data	SINAMICS GM150	SINAMICS GL150	SINAMICS SM150	SINAMICS SL150
Line voltages; power ranges 3-ph. 2.3 ... 36 kV, ± 10 % (-15 % < 1 min)	800 ... 17,500 kW (with induction motor)	6000 ... 120,000 kW	2800 ... 30,000 kW (with synchronous motor)	3000 ... 36,000 kW
Motor voltage	2.3 ... 4.16 kV	1.8 ... 12.0 kV	3.3 kV	1.5 ... 4 kV
Supported line supply types	IT line supplies			
Line frequency	47 ... 63 Hz			
Energy recovery / output frequency	No / 0 ... 250 Hz	Yes / 0 ... 120 Hz	Yes (controlled; Active Infeed) / 0 ... 250 Hz	Yes / 0 ... 50 Hz
Closed-loop control technique	Vector control with or without speed encoder as well as V/f control			Vector control with or without speed encoder
Fixed speeds	15 fixed – plus 1 base speed, parameterizable			
Skippable speed ranges	4, parameterizable			
Customer terminal strip	Digital inputs/outputs; analog inputs/outputs; inputs for motor temperature evaluation; number is variable			
Communication interface	PROFIBUS DP as standard; optional: PROFINET			PROFIBUS DP
Braking operation	Braking Module optional	4Q operation is possible as standard		
Functions				
Software functions	Automation restart after operational interruption due to line supply failure; the drive converter is bumplessly connected to the rotating motor; kinetic buffering, automatic parameterizable ramp-up/ramp-down times; ramp smoothing, synchronization to the line supply			
Protection functions	Undervoltage; overvoltage; ground fault; short circuit protection; stall protection; thermal motor protection; thermal drive converter protection			
Integrated safety functions	–	–	STO*	–
Motors that can be connected	Induction motors and synchronous motors	Synchronous motors	Induction motors and synchronous motors	Induction motors and synchronous motors
Mechanical data				
Degree of protection	Air-cooled IP22, optional IP42, liquid-cooled IP43, optional IP54	Air-cooled IP20, optional IP41, liquid-cooled IP41, optional IP54	IP43, optional IP54	IP21, optional IP54
Cooling type	Top-mounted fan or liquid cooling		Liquid cooling	Air or liquid cooling
Sound pressure level	≤ 80 dB (A)			
Standards				
In conformance with the following standards	IEC, EN, UL, cUL		IEC, EN	IEC, EU, CE

*) STO: Safe Torque Off

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