

SINAMICS G110

Standard inverters

0.12 kW to 3 kW (0.16 hp to 4.0 hp)

3



3/2	SINAMICS G110 standard inverters
3/2	Overview
3/2	Benefits
3/3	Applications
3/3	Design
3/3	Function
3/4	Controlled Power Modules
3/4	Selection and ordering data
3/5	Technical specifications
3/9	Accessories
3/10	Dimensional drawings
3/11	Circuit diagrams
3/12	Starter Kit
3/12	Overview
3/12	Selection and ordering data
3/13	Line-side power components
3/13	Overview
3/13	Technical specifications
3/14	Selection and ordering data

SINAMICS G110

Standard inverters 0.12 kW to 3 kW (0.16 hp to 4.0 hp)

SINAMICS G110 standard inverters

Overview



SINAMICS G110, frame size FSA (right with flat heat sink)



SINAMICS G110, frame sizes FSB and FSC

SINAMICS G110 is a frequency inverter with basic functions for a wide range of industrial drive applications with variable speeds.

The extremely compact SINAMICS G110 inverter operates with voltage-frequency control at 200 V to 240 V on single-phase line supply systems.

It is the ideal "price-conscious" frequency inverter solution in the lower power range of the SINAMICS product family.

The following **line-side power components** are available for SINAMICS G110 inverters:

- EMC filter
- Line reactors
- Fuses
- Circuit breaker

The **accessories** listed below are also available:

- Operator panel
- Mounting accessories
- Commissioning tool

The latest technical documentation (catalogs, dimensional drawings, certificates, manuals and operating instructions), are available on the Internet under:

<http://www.siemens.com/sinamics-g110/documentation>

and offline on the DVD CA 01 in the SD Configurator. In addition, the SD Configurator can be used on the Internet without requiring any installation. The SD Configurator can be found in the Siemens Mall under the following address:

<http://www.siemens.com/dt-configurator>

Benefits

- Simple installation, parameterization and commissioning
- Robust EMC design
- Extensive parameter range enables configurations for a wide range of applications
- Simple cable connection
- Scaleable functionality with analog and USS versions
- Quiet motor operation as a result of the high pulse frequency
- Status information and alarms via the optional BOP (Basic Operator Panel)
- Rapid copying of parameters via the optional BOP
- External options for PC communication and BOP
- Fast response time of the digital inputs with a high degree of reproducibility for applications demanding fast responses
- Precise setpoint input using a high-resolution 10-bit analog input (analog versions only)
- LED for status information
- Versions with integrated EMC filter, class A or B
- DIP switches for easy adaptation to 50 Hz or 60 Hz applications
- DIP switches for simple bus termination for the USS version (RS 485)
- Bus-capable serial RS485 interface (USS versions only) enables integration into a networked drive system
- 2/3-wire method (static/pulsed signals) for universal control via digital inputs
- Adjustable lower voltage limit in DC link to ensure controlled motor braking if the power fails

Accessories (overview)

- BOP operator panel
- Adapter for mounting on DIN rails (frame sizes FSA and FSB)
- PC Inverter Connection Kit
- STARTER commissioning tool

Line-side power components (overview)

- EMC filter, class B with low leakage currents (additionally available for inverters with integrated filter)
- EMC filter, class B (additionally available for inverters with integrated filter)
- Line reactors

International standards

- Fulfills the requirements of the EU Low-Voltage Directive
- CE mark
- Certified to UL and cUL
- c-tick

Applications

The SINAMICS G110 inverter is especially suited for applications with pumps and fans, as a drive in various sectors, e.g. food and beverages, textiles, packaging, as well as conveyor technology, with factory gate and garage door drives and as a universal drive for moving advertising media.

Design

The SINAMICS G110 standard inverters include a control and power module and for inverters in the CPM 110 version (Controlled Power Module) results in a compact and efficient design. They operate with the latest IGBT technology and digital micro-processor control.

The SINAMICS G110 inverter product range consists of the following versions:

- The **analog type** is available in the following versions:
 - without EMC filter, with heat sink
 - integrated EMC filter, class A/B, with heat sink
 - without EMC filter, with flat heat sink (frame size FSA only)
 - integrated EMC filter, class B, with flat heat sink (frame size FSA only)
- The **USS type** (RS485) is available in the following versions:
 - without EMC filter, with heat sink
 - integrated EMC filter, class A/B, with heat sink
 - without EMC filter, with flat heat sink (frame size FSA only)
 - integrated EMC filter, class B, with flat heat sink (frame size FSA only)

From frame size FSA, cooling is achieved through a heat sink and natural convection. Frame size FSA with flat heat sink offers space-saving and favorable heat dissipation since an additional heat sink can be installed outside the control cabinet. For frame sizes FSB and FSC, an integrated fan is used to cool the heat sink which has resulted in the compact design.

For all of the inverter versions, the connections are easy to access and they all have the same standard position. To ensure optimum electromagnetic compatibility and easy connection, the line and motor connections are separated and located on opposite sides (the same as for contactors). The control terminal block has screwless terminals.

The optional BOP (Basic Operator Panel) can be installed without the use of tools.

Function

- The stress on the machine mechanical system is reduced by using a skippable frequency range to avoid resonance effects, parameterizable ramp-up/ramp-down times up to 650 s, ramp rounding-off as well as being able to switch the inverter to a spinning motor (flying restart circuit)
- Increased plant availability as a result of automatic restarting following a power failure or stoppage
- Fast current limiting (FCL) for fault-free operation in the event of sudden load surges
- Parameterizable V/f characteristic (e.g. for synchronous motors)
- DC braking as well as compound braking for fast braking without an external braking resistor
- DC link voltage limiting using V_{DCmax} controller
- Slip compensation, electronic motorized potentiometer function and three fixed speed setpoints
- Parameterizable voltage boost for a higher dynamic performance when starting and accelerating
- Motor holding brake function to control an external mechanical brake

SINAMICS G110

Standard inverters 0.12 kW to 3 kW (0.16 hp to 4.0 hp)

Controlled Power Modules

Selection and ordering data

With reference to the rated output current, the modules support at least 2-pole to 6-pole low-voltage motors, e.g. the new 1LE1 motor series (please refer to the Appendix for further information).

The rated power is merely a guide value. For a description of the overload performance, please refer to the general technical specifications of the Controlled Power Modules.

Power		Rated input current (at 230 V)	Rated output current	Frame size	Version	SINAMICS G110 without filter	SINAMICS G110 with integrated filter	Filter class ¹⁾ when using shielded cables with a max. cable length of		
kW	hp	A	A			Order No.	Order No.	5 m	10 m	25 m
0.12	0.16	2.3	0.9	FSA	Analog	6SL3211-0AB11-2UA1	6SL3211-0AB11-2BA1	B	A ²⁾	A ²⁾
					USS	6SL3211-0AB11-2UB1	6SL3211-0AB11-2BB1	B	A ²⁾	A ²⁾
					Analog (with flat heat sink)	6SL3211-0KB11-2UA1	6SL3211-0KB11-2BA1	B	A ²⁾	A ²⁾
					USS (with flat heat sink)	6SL3211-0KB11-2UB1	6SL3211-0KB11-2BB1	B	A ²⁾	A ²⁾
0.25	0.33	4.5	1.7	FSA	Analog	6SL3211-0AB12-5UA1	6SL3211-0AB12-5BA1	B	A ²⁾	A ²⁾
					USS	6SL3211-0AB12-5UB1	6SL3211-0AB12-5BB1	B	A ²⁾	A ²⁾
					Analog (with flat heat sink)	6SL3211-0KB12-5UA1	6SL3211-0KB12-5BA1	B	A ²⁾	A ²⁾
					USS (with flat heat sink)	6SL3211-0KB12-5UB1	6SL3211-0KB12-5BB1	B	A ²⁾	A ²⁾
0.37	0.5	6.2	2.3	FSA	Analog	6SL3211-0AB13-7UA1	6SL3211-0AB13-7BA1	B	A ²⁾	A ²⁾
					USS	6SL3211-0AB13-7UB1	6SL3211-0AB13-7BB1	B	A ²⁾	A ²⁾
					Analog (with flat heat sink)	6SL3211-0KB13-7UA1	6SL3211-0KB13-7BA1	B	A ²⁾	A ²⁾
					USS (with flat heat sink)	6SL3211-0KB13-7UB1	6SL3211-0KB13-7BB1	B	A ²⁾	A ²⁾
0.55	0.75	7.7	3.2	FSA	Analog	6SL3211-0AB15-5UA1	6SL3211-0AB15-5BA1	B	A ²⁾	A ²⁾
					USS	6SL3211-0AB15-5UB1	6SL3211-0AB15-5BB1	B	A ²⁾	A ²⁾
					Analog (with flat heat sink)	6SL3211-0KB15-5UA1	6SL3211-0KB15-5BA1	B	A ²⁾	A ²⁾
					USS (with flat heat sink)	6SL3211-0KB15-5UB1	6SL3211-0KB15-5BB1	B	A ²⁾	A ²⁾
0.75	1.0	10.0	3.9 (at 40 °C)	FSA	Analog	6SL3211-0AB17-5UA1	6SL3211-0AB17-5BA1	B	A ²⁾	A ²⁾
					USS	6SL3211-0AB17-5UB1	6SL3211-0AB17-5BB1	B	A ²⁾	A ²⁾
					Analog (with flat heat sink)	6SL3211-0KB17-5UA1	6SL3211-0KB17-5BA1	B	A ²⁾	A ²⁾
					USS (with flat heat sink)	6SL3211-0KB17-5UB1	6SL3211-0KB17-5BB1	B	A ²⁾	A ²⁾
1.1	1.5	14.7	6.0	FSB	Analog	6SL3211-0AB21-1UA1	6SL3211-0AB21-1AA1	B	A ²⁾	A ²⁾
					USS	6SL3211-0AB21-1UB1	6SL3211-0AB21-1AB1	B	A ²⁾	A ²⁾
1.5	2.0	19.7	7.8 (at 40 °C)	FSB	Analog	6SL3211-0AB21-5UA1	6SL3211-0AB21-5AA1	B	A ²⁾	A ²⁾
					USS	6SL3211-0AB21-5UB1	6SL3211-0AB21-5AB1	B	A ²⁾	A ²⁾
2.2	3.0	27.2	11.0	FSC	Analog	6SL3211-0AB22-2UA1	6SL3211-0AB22-2AA1	B	A ²⁾	A ²⁾
					USS	6SL3211-0AB22-2UB1	6SL3211-0AB22-2AB1	B	A ²⁾	A ²⁾
3.0	4.0	35.6	13.6 (at 40 °C)	FSC	Analog	6SL3211-0AB23-0UA1	6SL3211-0AB23-0AA1	B	A ²⁾	A ²⁾
					USS	6SL3211-0AB23-0UB1	6SL3211-0AB23-0AB1	B	A ²⁾	A ²⁾

The current data apply to an ambient temperature of 50 °C unless specified otherwise.

The last digit of the complete order number for the SINAMICS G110 inverters represents the release version. When ordering, a different digit from the one specified may be present as a result of further technical development.

All SINAMICS G110 inverters are supplied without an operator panel (BOP). A BOP or other accessories must be ordered separately.

¹⁾ The filter class **in bold** is stamped on the inverter rating plate.

²⁾ Class B also with additional filter.

SINAMICS G110

Standard inverters 0.12 kW to 3 kW (0.16 hp to 4.0 hp)

Controlled Power Modules

Technical specifications

	Controlled Power Modules
Power range	0.12 ... 3.0 kW (0.16 ... 4.0 hp)
Line voltage	200 ... 240 V 1 AC ±10 %
Line supply frequency	47 ... 63 Hz
Output frequency	0 ... 650 Hz
cos φ	≥ 0.95
Inverter efficiency	
• for units < 0.75 kW (1.0 hp)	90 ... 94 %
• for units ≥ 0.75 kW (1.0 hp)	≥ 95 %
Overload capability	Overload current 1.5 × rated output current (i.e. 150 % overload) for 60 s, then 0.85 × rated output current for 240 s, cycle time 300 s
Pre-charging current	Not higher than the rated input current
Control methods	Linear V/f characteristic (with parameterizable voltage boost); square V/f characteristic; multipoint characteristic (parameterizable V/f characteristic)
Pulse frequency	8 kHz (standard) 2 ... 16 kHz (in 2-kHz increments)
Fixed frequencies	3, parameterizable
Skippable frequency range	1, parameterizable
Setpoint resolution	0.01 Hz digital 0.01 Hz serial 10 bit analog (motorized potentiometer 0.1 Hz)
Digital inputs	3 parameterizable digital inputs, non-isolated, PNP, SIMATIC-compatible
Analog input (analog version)	1, for setpoint (0 ... 10 V, scalable or can be used as 4th digital input)
Digital output	1 isolated optocoupler output (24 V DC, 50 mA, ohmic, NPN type)
Serial interface (USS version)	RS485, for operation with USS protocol
Motor cable length, max.	
• Shielded	25 m
• Unshielded	50 m
Electromagnetic compatibility	All devices with integrated EMC filter for drive systems in category C2 installations (limit value in accordance with EN 55011, class A, group 1) and category C3 installations (limit value in accordance with EN 55011, class A, group 2). All devices with an integrated EMC filter and shielded cables with a maximum length of 5 m also fulfill the limit values of EN 55011, class B for conducted interference.
Braking	DC braking, compound braking
Degree of protection	IP20
Operating temperature	-10 ... +40 °C to +50 °C with derating
Storage temperature	-40 ... +70 °C
Relative humidity	95 % (condensation not permissible)
Installation altitude	Up to 1000 m above sea level without power reduction • Rated output current at 4000 m above sea level: 90 % • Line supply voltage up to 2000 m above sea level: 100 % at 4000 m above sea level: 75 %
Standard SCCR (Short Circuit Current Rating) ¹⁾	10 kA
Protection features for	<ul style="list-style-type: none"> • Undervoltage • Overvoltage • Ground fault • Short circuit • Stall protection • Thermal motor protection I^2t • Inverter overtemperature • Motor overtemperature
Compliance with standards	UL, cUL, CE, c-tick
CE mark	According to Low-Voltage Directive 73/23/EEC and Machinery Directive 98/37/EC

¹⁾ Applies to industrial control cabinet installations to NEC Article 409/UL 508A. For further information, visit us on the Internet at:
<http://support.automation.siemens.com/WW/view/en/23995621>

SINAMICS G110

Standard inverters 0.12 kW to 3 kW (0.16 hp to 4.0 hp)

Controlled Power Modules

Technical specifications

	Controlled Power Modules						
	FSA ≤ 0.37 kW (0.5 hp)	FSA 0.55 kW (0.75 hp) and 0.75 kW (1.0 hp)	FSA ≤ 0.37 kW (0.5 hp) with flat heat sink	FSA 0.55 kW (0.75 hp) and 0.75 kW (1.0 hp) with flat heat sink	FSB 1.1 kW (1.5 hp) and 1.5 kW (2.0 hp)	FSC 2.2 kW (3.0 hp)	FSC 3.0 kW (4.0 hp)
Dimensions (without accessories)							
• Width	90	90	90	90	140	184	184
• Height	150	150	150	150	160	181	181
• Depth	116	131	101	101	142	152	152
Weight, approx.							
• Without filter	0.7	0.8	0.6	0.7	1.4	1.9	2.0
• With filter	0.8	0.9	0.7	0.8	1.5	2.1	2.2

Technical specifications for version with flat heat sink

The design with flat heat sink offers space-saving and favorable heat dissipation since an additional heat sink can be installed outside the control cabinet.

	Controlled Power Modules frame size FSA with flat heat sink				
	0.12 kW (0.16 hp)	0.25 kW (0.33 hp)	0.37 kW (0.5 hp)	0.55 kW (0.75 hp)	0.75 kW (1.0 hp)
Operating temperature	-10 ... +50 °C	-10 ... +50 °C	-10 ... +50 °C	-10 ... +50 °C	-10 ... +40 °C
Total power losses at full load and maximum operating temperature as specified	22 W	28 W	36 W	43 W	54 W
Line-side and control electronics losses	9 W	10 W	12 W	13 W	15 W
Recommended thermal resistance of heat sink	3.0 K/W	2.2 K/W	1.6 K/W	1.2 K/W	1.2 K/W
Recommended output current	0.9 A	1.7 A	2.3 A	3.2 A	3.9 A

Derating data and power loss

Pulse frequency

Power		Power loss W	Rated output current in A for a pulse frequency of							
kW	hp		2 kHz	4 kHz	6 kHz	8 kHz	10 kHz	12 kHz	14 kHz	16 kHz
0.12	0.16	22	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
0.25	0.33	28	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
0.37	0.5	36	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
0.55	0.75	43	3.2	3.2	3.2	3.2	3.0	2.7	2.5	2.2
0.75 (at 40 °C)	1.0 (at 40 °C)	54	3.9	3.9	3.9	3.9	3.6	3.3	3.0	2.7
0.75	1.0	54	3.2	3.2	3.2	3.2	3.0	2.7	2.5	2.2
1.1	1.5	86	6.0	6.0	6.0	6.0	5.9	5.7	5.6	5.4
1.5 (at 40 °C)	2.0 (at 40 °C)	118	7.8	7.8	7.8	7.8	7.6	7.4	7.2	7.0
1.5	2.0	118	6.0	6.0	6.0	6.0	5.9	5.7	5.6	5.4
2.2	3.0	174	11.0	11.0	11.0	11.0	10.8	10.5	10.2	9.9
3.0 (at 40 °C)	4.0 (at 40 °C)	210	13.6	13.6	13.6	13.6	13.3	12.9	12.6	12.3
3.0	4.0	210	11.0	11.0	11.0	11.0	10.8	10.5	10.2	9.9

The current data apply to an ambient temperature of 50 °C unless specified otherwise.

Technical specifications*Compliance with standards***CE mark**

The SINAMICS G110 inverters meet the requirements of the Low-Voltage Directive 73/23/EEC.

Low-Voltage Directive

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

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

UL listing

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

For use in environments with pollution degree 2.

Also see the Internet under <http://www.ul.com>

Machinery Directive

The inverters are suitable for installation in machines. Compliance with the Machinery Directive 98/37/EC requires a separate certificate of conformity. This must be provided by the plant construction company or the organization marketing the machine.

EMC Directive

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

The EMC product standard EN 61800-3 has been valid for electric drive systems since 07/01/2005. The transition period for the predecessor standard EN 61800-3/A11 from February 2001 ended on October 1, 2007. The following information applies to SINAMICS G110 frequency inverters from Siemens:

- The EMC product standard EN 61800-3 does not apply directly to a frequency inverter but to a PDS (Power Drive System), which comprises the complete circuitry, motor and cables in addition to the inverter.
- Frequency inverters are normally only supplied to experts for installation in machines or systems. A frequency inverter must, therefore, only be considered as a component which, on its own, is not subject to the EMC product standard EN 61800-3. The inverter's operating manual, however, specifies the conditions regarding compliance with the product standard if the frequency inverter is expanded to become a PDS. For a PDS, the EMC Directive in the EU is complied with by observing the product standard EN 61800-3 for variable-speed electric drive systems. The frequency inverters on their own do not generally require identification according to the EMC Directive.
- In the standard EN 61800-3 from July 2005, a distinction is no longer made between "general availability" and "restricted availability". Instead, different categories C1 to C4 have been defined in accordance with the environment of the PDS at the operating location:
 - **Category C1:** Drive systems for rated voltages < 1000 V for use in the first environment
 - **Category C2:** Stationary drive systems not connected by means of a plug connector for rated voltages < 1000 V. When used in the first environment, the system must be installed and commissioned by personnel familiar with EMC requirements. A warning note is required.
 - **Category C3:** Drive systems for rated voltages < 1000 V for exclusive use in the second environment. A warning note is required.
 - **Category C4:** Drive systems for rated voltages ≥ 1000 V or for rated currents ≥ 400 A or for use in complex systems in the second environment. An EMC plan must be generated.
- The EMC product standard EN 61800-3 also defines limit values for conducted interference and radiated interference for the so-called "second environment" (= industrial power supply systems that do not supply households). These limit values are below the limit values of filter class A to EN 55011. Unfiltered inverters can be used in industrial environments as long as they are part of a system that contains line filters on the higher-level infeed side.
- With SINAMICS G110, Power Drive Systems (PDS) that fulfill the EMC product standard EN 61800-3 can be configured when observing the installation instructions in the product documentation. The table "Overview of SINAMICS G110 components and PDS categories" and the SINAMICS G110 ordering documentation show which of the components can be installed directly in a PDS.
- A differentiation must be made between the product standards for electrical drive systems (PDS) of the range of standards EN 61800 (of which Part 3 covers EMC topics) and the product standards for the devices/systems/machines, etc. This will probably not result in any changes in the practical use of frequency inverters. Since frequency inverters are always part of a PDS and these are part of a machine, the machine manufacturer must observe various standards depending on their type and environment (e.g. EN 61000-3-2 for line harmonics and EN 55011 for radio interference). The product standard for PDS on its own is, therefore, either insufficient or irrelevant.
- With respect to the compliance with limits for line supply harmonics, the EMC product standard EN 61800-3 for PDS refers to compliance with the EN 61000-3-2 and EN 61000-3-12 standards.
- Regardless of the configuration with SINAMICS G110 and its components, the machine construction company (OEM) can also implement other measures to ensure that the machine complies with the EU EMC Directive. The EU EMC Directive is generally fulfilled when the relevant EMC product standards are observed. If they are not available, the generic standards (e.g. DIN EN 61000-x-x) can be used instead. It is important that the conducted and emitted interference at the line connection point and outside the machine remain below the relevant limit values. Any suitable technical measures can be applied to ensure this.

SINAMICS G110

Standard inverters 0.12 kW to 3 kW (0.16 hp to 4.0 hp)

Controlled Power Modules

Technical specifications

Overview of SINAMICS G110 components and PDS categories

First environment (Residential, commercial)	Category C1 Unfiltered devices and external filter class B with low leakage currents (shielded motor cable up to 5 m)	Second environment (Industry)
	Category C2 All devices with integrated filter (shielded motor cable up to 5 m) <u>or</u> All devices with integrated filter (frame size FSA: up to 10 m; frame sizes FSB and FSC: shielded motor cable up to 25 m) plus warning note <u>or</u> All devices with integrated filter plus external filter, class B (shielded motor cable up to 25 m)	Category C2 All devices with integrated filter (shielded motor cable up to 5 m) <u>or</u> All devices with integrated filter (frame size FSA: up to 10 m; frame sizes FSB and FSC: shielded motor cable up to 25 m) <u>or</u> All devices with integrated filter plus external filter, class B (shielded motor cable up to 25 m) Note: When devices with an integrated filter and a max. motor cable length of 5 m or external class B filters are used, this exceeds the requirements of EN 61800-3 by a considerable margin!
	Category C3 All devices with integrated filter (frame size FSA: up to 10 m; frame sizes FSB and FSC: shielded motor cable up to 25 m) <u>or</u> All devices with integrated filter plus external filter, class B (shielded motor cable up to 25 m) A warning note is required. Note: When devices with an integrated filter and external class B filters are used, this exceeds the requirements of EN 61800-3 by a considerable margin!	
	Category C4 Does not apply to SINAMICS G110	

Electromagnetic compatibility

No impermissible electromagnetic emission occurs if the installation guidelines specific to the product are correctly observed.

The table below lists the measured results for emission and noise immunity for the SINAMICS G110 inverters.

The inverters were installed according to the guidelines with shielded motor cables and shielded control cables.

EMC phenomenon Standard/test	Relevant criteria	Limit value
Noise emission EN 61800-3 (first environment)	Conducted via line supply cable	150 kHz up to 30 MHz Unfiltered devices: not tested All devices with internal/external filter: Depending on the filter type and intended PDS installation: Category C1: The limit value corresponds to EN 55011, class B. Category C2: The limit value corresponds to EN 55011, class A, group 1. Further, all drive units with internal/external filter fulfill the limit value for Category C3 installations. The limit value corresponds to EN 55011, class A, group 2.
	Emitted by the drive	30 MHz to 1 GHz All devices limit value complies with EN 55011, class A, group 1.
ESD immunity EN 61000-4-2	ESD through air discharge	Test severity level 3 8 kV
	ESD through contact discharge	Test severity level 3 6 kV
Noise immunity to electrical fields EN 61000-4-3	Electrical field applied to the device	Test severity level 3 80 MHz up to 1 GHz 10 V/m
Noise immunity to interference pulses EN 61000-4-4	Applied to all cable connections	Test severity level 4 4 kV
Impulse withstand voltage EN 61000-4-5	Applied to the line supply cable	Test severity level 3 2 kV
Noise immunity to HF interference, conducted EN 61000-4-6	Applied to line supply, motor and control cables	Test severity level 3 0.15 MHz to 80 MHz 80 % AM (1 kHz) 10 V

SINAMICS G110

Standard inverters 0.12 kW to 3 kW (0.16 hp to 4.0 hp)

Controlled Power Modules

Accessories

Basic Operator Panel (BOP)



The BOP can be used to make individual parameter settings. Values and units are displayed on a 5-digit display.

One BOP can be used for several inverters. It is plugged directly onto the inverter.

The BOP provides a function to quickly copy parameters. A parameter set of one inverter can be saved and then loaded to another inverter.

PC Inverter Connection Kit



For controlling and commissioning an inverter directly from a PC if the appropriate software (STARTER commissioning tool) has been installed.

Isolated RS232 adapter module for a reliable point-to-point connection to a PC.

The scope of delivery includes a 9-pin Sub-D connector, an RS232 standard cable (3 m) and the STARTER commissioning tool ¹⁾ on DVD.

Commissioning tool

STARTER is a commissioning tool with a graphic user interface for commissioning SINAMICS G110 frequency inverters in Windows NT/2000/XP Professional. It can be used to read, change, store, enter and print parameter lists.

Selection and ordering data

The accessories listed here are suitable for all SINAMICS G110 inverters.

Accessories	Order No.
BOP (Basic Operator Panel)	6SL3255-0AA0-4BA1
PC Inverter Connection Kit including a 9-pin Sub-D connector, an RS232 standard cable (3 m), and the STARTER commissioning tool ¹⁾ on DVD	6SL3255-0AA0-2AA1
Adapter for mounting on DIN rails	
• Size 1 (frame size FSA)	6SL3261-1BA00-0AA0
• Size 2 (frame size FSB)	6SL3261-1BB00-0AA0
SD Manual Collection on DVD ²⁾ multi-language	new 6SL3298-0CA00-0MG0
All manuals for the low-voltage motors, geared motors and low-voltage inverters	
SD Manual Collection on DVD ²⁾ multi-language, update service for 1 year	new 6SL3298-0CA10-0MG0
STARTER commissioning tool ¹⁾ on DVD	6SL3072-0AA00-0AG0

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

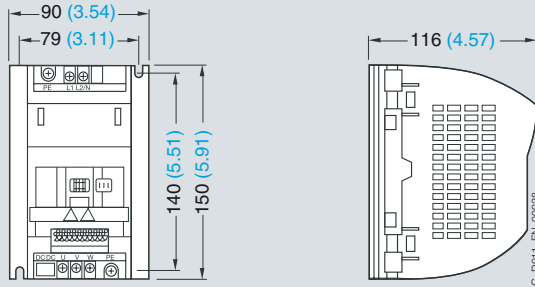
²⁾ Subject to export regulations: AL: N and ECCN: 5D992

SINAMICS G110

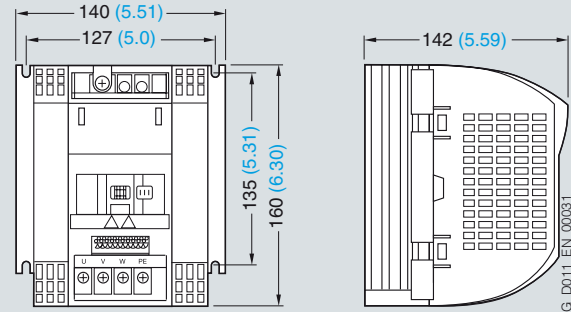
Standard inverters 0.12 kW to 3 kW (0.16 hp to 4.0 hp)

Controlled Power Modules

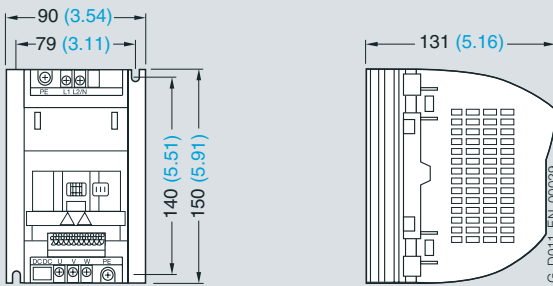
Dimensional drawings



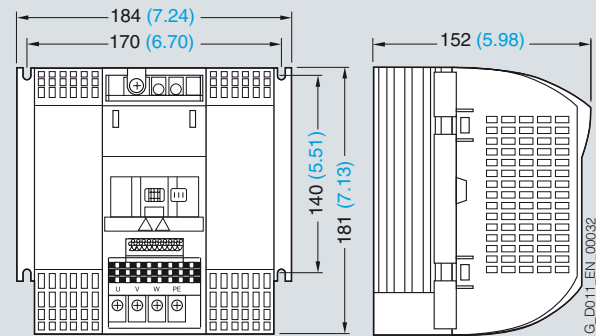
Inverter frame size FSA; 0.12 kW to 0.37 kW (0.16 hp to 0.5 hp)



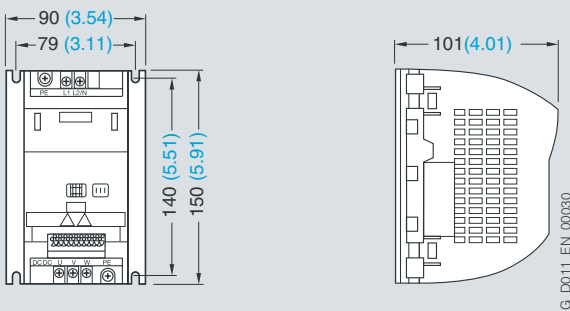
Inverter frame size FSB; 1.1 kW to 1.5 kW (1.5 hp to 2.0 hp)



Inverter frame size FSA; 0.55 kW to 0.75 kW (0.75 hp to 1.0 hp)



Inverter frame size FSC; 2.2 kW to 3.0 kW (3.0 hp to 4.0 hp)



Inverter frame size FSA with flat heat sink; 0.12 kW to 0.75 kW (0.16 hp to 1.0 hp)

Mounted using screws and washers
(not included in the scope of supply)

- Frame size FSA: 2 × M4
- Frame size FSB: 4 × M4
- Frame size FSC: 4 × M5

With attached operator panel (BOP), the mounting depth is increased by 8 mm (0.31 inches).

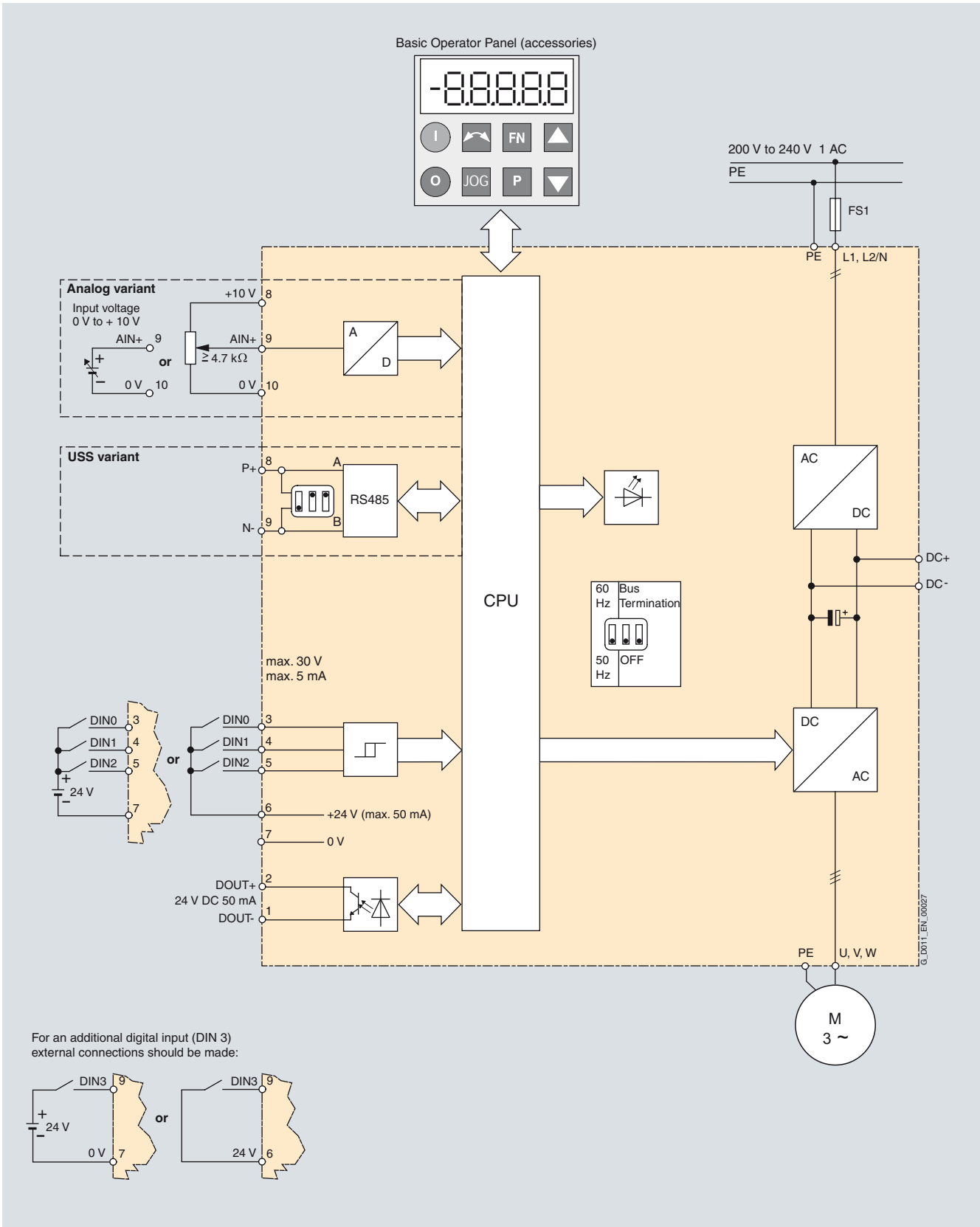
All dimensions in mm (values in brackets are in inches).

SINAMICS G110

Standard inverters 0.12 kW to 3 kW (0.16 hp to 4.0 hp)

Controlled Power Modules

Circuit diagrams
Overview circuit diagram



3

SINAMICS G110

Standard inverters 0.12 kW to 3 kW (0.16 hp to 4.0 hp)

Starter Kit

Overview



The SINAMICS G110 Starter Kit offers an easy introduction into the world of variable-speed drives.

Accommodated in a stackable transport case, it contains:

- Inverter (0.75 kW/1.0 hp) with analog input and integrated EMC filter
- BOP operator panel
- PC Inverter Connection Kit
- Short description, operating instructions, and parameter list (hard copy, in German)
- STARTER commissioning tool ¹⁾ on DVD (incl. operating instructions, parameter list and Getting Started guide)
- Screwdriver

Selection and ordering data

	Order No.
Starter Kit 0.75 kW (1.0 hp), German	6SL3200-0AB10-0AA0

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

Overview**Integrated EMC filter**

Versions with integrated EMC filters class A and class B are available for the corresponding environments.

- **Class A**

The requirements are fulfilled when shielded cables with a max. length of 10 m (for frame size FSA) or 25 m (for frame sizes FSB and FSC) are used. The limits comply with EN 55011 class A for conducted interference.

- **Class B**

The requirements are fulfilled when shielded cables with a max. length of 5 m are used. The limits comply with EN 55011 class B for conducted interference.

An inverter with an integrated filter can be used with a 30 mA residual-current circuit breaker and is only suitable for installations with fixed wiring.

Inverters without filters, which are used with "EMC filter class B with low leakage currents", have a leakage current < 3.5 mA (up to 5 m shielded motor cable).

Additional EMC filter, class B

Available for inverters with an internal EMC filter.

With this filter, the inverter complies with the emission standard EN 55011, class B for conducted interference.

The requirements are fulfilled using shielded cables with a max. length of 25 m.

EMC filter, class B with low leakage currents

With this filter, the unfiltered inverter complies with the emission standard EN 55011, class B for conducted interference. The leakage currents are reduced to < 3.5 mA.

Unfiltered inverters can, therefore, be used for drive systems in Category C1 installations.

The requirements are fulfilled for

- Shielded cables with a max. length of 5 m
- Installation of the inverter in a metal housing (e.g. control cabinet)
- Pulse frequency of 16 kHz (only for frame sizes FSB and FSC)

For Category C1 installations, generally a pulse frequency of 16 kHz is recommended for inverter operation in the inaudible spectrum and for quiet motor operation.

Line reactor

Line reactors are used to smooth voltage peaks or to bridge commutating dips.

Line reactors also reduce the effects of harmonics on the inverter and the line supply.

If the ratio of the rated inverter power to the line supply short-circuit power is less than 1 %, a line reactor must be used in order to reduce the current peaks.

In line with EN 61000-3-2 regulations "Limits for harmonic currents with device input current ≤ 16 A per phase", there are special aspects for drives with 120 W to 550 W and 230-V single-phase line supplies which are used in non-industrial applications (first environment).

For devices with 120 W to 370 W, either the recommended line reactors must be installed or permission obtained from the power utility company for the connection to the public supply system.

In accordance with the specifications of EN 61000-3-12 "Limits for harmonic currents > 16 A and ≤ 75 A per phase", permission must be obtained from the power utility to operate drives connected to the public low-voltage line supply. The harmonic current values should be taken from the operating instructions.

Technical specifications

EMC filters and line reactors cannot be installed as base components.

		EMC filter, class B with low leakage currents		Additional EMC filter, class B		
		6SE6400-2FL01-0AB0	6SE6400-2FL02-6BB0	6SE6400-2FS01-0AB0	6SE6400-2FS02-6BB0	6SE6400-2FL03-5CB0
Dimensions						
• Width	mm	73	149	73	149	185
• Height	mm	200	213	200	213	245
• Depth	mm	43.5	50.5	43.5	50.5	55
Weight, approx.	kg	0.5	1	0.5	1	1.5
		Line reactor				
		6SE6400-3CC00-4AB3	6SE6400-3CC01-0AB3	6SE6400-3CC02-6BB3	6SE6400-3CC03-5CB3	
Dimensions						
• Width	mm	75.5	75.5	150	185	
• Height	mm	200	200	213/233 ¹⁾	245/280 ¹⁾	
• Depth	mm	50	50	50	50	
Weight, approx.	kg	1.31	1.32	2.2	3.05	

¹⁾ The 233 mm or 280 mm dimensions are valid for lateral mounting using a mounting bracket.

SINAMICS G110

Standard inverters 0.12 kW to 3 kW (0.16 hp to 4.0 hp)

Line-side power components

Selection and ordering data

The line-side power components listed here must be selected in accordance with the particular inverter. EMC filters and line reactors cannot be installed as base components.

The inverter and associated line-side power components have the same rated voltage.

All line-side power components are certified to UL (with the exception of fuses). 3NA3 fuses are recommended for European countries. Additional information about the listed fuses and circuit breakers can be found in Catalogs LV 1 and LV 1 T.

UL-listed fuses such as the class NON fuse series from Bussmann are required for North American market.

Power		EMC filter, class B with low leakage currents	Line reactor	Additional EMC filter, class B	Fuse	Circuit breaker
kW	hp	Order No.	Order No.	Order No.	Order No.	Order No.
Line-side power components for inverters without EMC filter						
0.12	0.16	6SE6400-2FL01-0AB0	6SE6400-3CC00-4AB3	–	3NA3803	3RV1021-1DA10
0.25	0.33	6SE6400-2FL01-0AB0	6SE6400-3CC00-4AB3	–	3NA3803	3RV1021-1FA10
0.37	0.50	6SE6400-2FL01-0AB0	6SE6400-3CC01-0AB3	–	3NA3803	3RV1021-1HA10
0.55	0.75	6SE6400-2FL01-0AB0	6SE6400-3CC01-0AB3	–	3NA3803	3RV1021-1JA10
0.75	1.0	6SE6400-2FL01-0AB0	6SE6400-3CC01-0AB3	–	3NA3805	3RV1021-1KA10
1.1	1.5	6SE6400-2FL02-6BB0	6SE6400-3CC02-6BB3	–	3NA3807	3RV1021-4BA10
1.5	2.0	6SE6400-2FL02-6BB0	6SE6400-3CC02-6BB3	–	3NA3810	3RV1021-4CA10
2.2	3.0	6SE6400-2FL02-6BB0	6SE6400-3CC02-6BB3	–	3NA3814	3RV1031-4EA10
3.0	4.0	–	6SE6400-3CC03-5CB3	–	3NA3820	3RV1031-4FA10
Line-side power components for inverters with integrated EMC filter, class A/B						
0.12	0.16	–	6SE6400-3CC00-4AB3	6SE6400-2FS01-0AB0	3NA3803	3RV1021-1DA10
0.25	0.33	–	6SE6400-3CC00-4AB3	6SE6400-2FS01-0AB0	3NA3803	3RV1021-1FA10
0.37	0.50	–	6SE6400-3CC01-0AB3	6SE6400-2FS01-0AB0	3NA3803	3RV1021-1HA10
0.55	0.75	–	6SE6400-3CC01-0AB3	6SE6400-2FS01-0AB0	3NA3803	3RV1021-1JA10
0.75	1.0	–	6SE6400-3CC01-0AB3	6SE6400-2FS01-0AB0	3NA3805	3RV1021-1KA10
1.1	1.5	–	6SE6400-3CC02-6BB3	6SE6400-2FS02-6BB0	3NA3807	3RV1021-4BA10
1.5	2.0	–	6SE6400-3CC02-6BB3	6SE6400-2FS02-6BB0	3NA3810	3RV1021-4CA10
2.2	3.0	–	6SE6400-3CC02-6BB3	6SE6400-2FS02-6BB0	3NA3814	3RV1031-4EA10
3.0	4.0	–	6SE6400-3CC03-5CB3	6SE6400-2FS03-5CB0	3NA3820	3RV1031-4FA10