

# SINAMICS G110

## Inverter chassis units

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

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# SINAMICS G110

## Inverter chassis units 0.12 kW to 3 kW (0.16 hp to 4.0 hp)

### SINAMICS G110 chassis units

#### Overview



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



SINAMICS G110, frame sizes FSB and FSC

SINAMICS G110 is a frequency inverter with basic functions for a variety of industrial variable-speed drive applications.

The particularly compact SINAMICS G110 inverter operates with voltage frequency control on single-phase supplies with 200 V to 240 V.

It is the ideal low-cost frequency inverter solution for the lower power range of the SINAMICS family.

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

- EMC filters
- Line reactors
- Fuses
- Circuit-breakers

The following **accessories** are also available:

- Operator panels
- Mounting accessories
- Commissioning tool

The latest technical documentation (catalogs, dimensional drawings, certificates, user manuals and operating instructions) is available on the internet at:

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

and also on CD-ROM CA 01 Vol. 2 "Configuring" in the SD configurator, which can be ordered from the following address:

<http://www.siemens.com/automation/CA01>

#### Benefits

- Simple installation, parameterization, and commissioning
- Robust EMC design
- Large parameter range enables configurations for a wide range of applications
- Simple cable connection
- Scalable functionality with analog and USS variants
- Low-noise motor operation resulting from 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, repeatable digital input response time for rapid-response applications
- Fine adjustment of setpoint using a high-resolution 10-bit analog input (analog variants only)
- LED for status information
- Variants with internal 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 (RS485)
- Bus-capable serial RS485 interface (USS variants only) enables integration in a networked drive system
- 2/3-wire method (static/pulsated signals) for universal control via digital inputs
- Variable lower voltage limit in DC link to ensure controlled motor braking if the power fails

#### Accessories (overview)

- BOP operator panel
- Adapter for DIN rail attachment (frame sizes A and B)
- PC inverter connection kit
- STARTER commissioning tool

#### Line-side power components (overview)

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

# SINAMICS G110

## Inverter chassis units 0.12 kW to 3 kW (0.16 hp to 4.0 hp)

### SINAMICS G110 chassis units

#### Application

SINAMICS G110 is especially suited for use with pumps and fans, or as a drive in various industrial sectors, such as the food, textile and packaging industries, as well as for conveyor systems, factory gate and garage door operating mechanisms, and as a universal drive for moving billboards.

#### Design

The SINAMICS G110 inverter chassis units are equipped with a control and power module and provide CPM 110 inverters (Controlled Power Module) with 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 variants and versions:

- The **analog variant** 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 variant** (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).

With frame size FSA, cooling is achieved through a heat sink and natural convection. The 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. With frame sizes FSB and FSC, an integrated fan is used to cool the heat sink which has resulted in the compact design.

The connections for all inverter variants are easily accessible and in the same location. To ensure optimum electromagnetic compatibility and easy connection, the line and motor connections are located on opposite sides (as with contactors). The control terminal block does not require screws to install it.

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

#### Function

- Careful handling of the machine mechanical system due to a skipped frequency band in case of resonance, parameterizable ramp up/ramp down times up to 650 s, ramp smoothing, as well as bringing the inverter into circuit on turning motor (flying start)
- Increased installation availability by automatic restart facility following power failure or fault
- Fast current limit (FCL) for trip-free operation in case of sudden load changes
- Programmable V/f characteristic (e.g. for synchronous motors)
- Fast DC and compound braking without external braking resistor
- Limitation of DC link voltage by means of the  $V_{DCmax}$  controller
- Slip compensation, electronic motor potentiometer function and three fixed speed setpoints
- Configurable voltage boost for higher dynamic response when starting and accelerating
- Motor holding brake function to control an external mechanical brake

# SINAMICS G110

## Inverter chassis units 0.12 kW to 3 kW (0.16 hp to 4.0 hp)

### Controlled Power Modules

#### Selection and Ordering Data

Output		Rated input current (at 230 V)	Rated output current	Frame size	Version	SINAMICS G110 without filter	SINAMICS G110 with integrated filter	Filter class <sup>1)</sup> With use of 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	<b>6SL3211-0AB11-2UA1</b>	<b>6SL3211-0AB11-2BA1</b>	<b>B</b>	A <sup>2)</sup>	2)
					USS	<b>6SL3211-0AB11-2UB1</b>	<b>6SL3211-0AB11-2BB1</b>	<b>B</b>	A <sup>2)</sup>	2)
					Analog (with flat heat sink)	<b>6SL3211-0KB11-2UA1</b>	<b>6SL3211-0KB11-2BA1</b>	<b>B</b>	A <sup>2)</sup>	2)
					USS (with flat heat sink)	<b>6SL3211-0KB11-2UB1</b>	<b>6SL3211-0KB11-2BB1</b>	<b>B</b>	A <sup>2)</sup>	2)
0.25	0.33	4.5	1.7	FSA	Analog	<b>6SL3211-0AB12-5UA1</b>	<b>6SL3211-0AB12-5BA1</b>	<b>B</b>	A <sup>2)</sup>	2)
					USS	<b>6SL3211-0AB12-5UB1</b>	<b>6SL3211-0AB12-5BB1</b>	<b>B</b>	A <sup>2)</sup>	2)
					Analog (with flat heat sink)	<b>6SL3211-0KB12-5UA1</b>	<b>6SL3211-0KB12-5BA1</b>	<b>B</b>	A <sup>2)</sup>	2)
					USS (with flat heat sink)	<b>6SL3211-0KB12-5UB1</b>	<b>6SL3211-0KB12-5BB1</b>	<b>B</b>	A <sup>2)</sup>	2)
0.37	0.5	6.2	2.3	FSA	Analog	<b>6SL3211-0AB13-7UA1</b>	<b>6SL3211-0AB13-7BA1</b>	<b>B</b>	A <sup>2)</sup>	2)
					USS	<b>6SL3211-0AB13-7UB1</b>	<b>6SL3211-0AB13-7BB1</b>	<b>B</b>	A <sup>2)</sup>	2)
					Analog (with flat heat sink)	<b>6SL3211-0KB13-7UA1</b>	<b>6SL3211-0KB13-7BA1</b>	<b>B</b>	A <sup>2)</sup>	2)
					USS (with flat heat sink)	<b>6SL3211-0KB13-7UB1</b>	<b>6SL3211-0KB13-7BB1</b>	<b>B</b>	A <sup>2)</sup>	2)
0.55	0.75	7.7	3.2	FSA	Analog	<b>6SL3211-0AB15-5UA1</b>	<b>6SL3211-0AB15-5BA1</b>	<b>B</b>	A <sup>2)</sup>	2)
					USS	<b>6SL3211-0AB15-5UB1</b>	<b>6SL3211-0AB15-5BB1</b>	<b>B</b>	A <sup>2)</sup>	2)
					Analog (with flat heat sink)	<b>6SL3211-0KB15-5UA1</b>	<b>6SL3211-0KB15-5BA1</b>	<b>B</b>	A <sup>2)</sup>	2)
					USS (with flat heat sink)	<b>6SL3211-0KB15-5UB1</b>	<b>6SL3211-0KB15-5BB1</b>	<b>B</b>	A <sup>2)</sup>	2)
0.75	1.0	10.0	3.9 (at 40 °C)	FSA	Analog	<b>6SL3211-0AB17-5UA1</b>	<b>6SL3211-0AB17-5BA1</b>	<b>B</b>	A <sup>2)</sup>	2)
					USS	<b>6SL3211-0AB17-5UB1</b>	<b>6SL3211-0AB17-5BB1</b>	<b>B</b>	A <sup>2)</sup>	2)
					Analog (with flat heat sink)	<b>6SL3211-0KB17-5UA1</b>	<b>6SL3211-0KB17-5BA1</b>	<b>B</b>	A <sup>2)</sup>	2)
					USS (with flat heat sink)	<b>6SL3211-0KB17-5UB1</b>	<b>6SL3211-0KB17-5BB1</b>	<b>B</b>	A <sup>2)</sup>	2)
1.1	1.5	14.7	6.0	FSB	Analog	<b>6SL3211-0AB21-1UA1</b>	<b>6SL3211-0AB21-1AA1</b>	B	<b>A <sup>2)</sup></b>	<b>A <sup>2)</sup></b>
					USS	<b>6SL3211-0AB21-1UB1</b>	<b>6SL3211-0AB21-1AB1</b>	B	<b>A <sup>2)</sup></b>	<b>A <sup>2)</sup></b>
1.5	2.0	19.7	7.8 (at 40 °C)	FSB	Analog	<b>6SL3211-0AB21-5UA1</b>	<b>6SL3211-0AB21-5AA1</b>	B	<b>A <sup>2)</sup></b>	<b>A <sup>2)</sup></b>
					USS	<b>6SL3211-0AB21-5UB1</b>	<b>6SL3211-0AB21-5AB1</b>	B	<b>A <sup>2)</sup></b>	<b>A <sup>2)</sup></b>
2.2	3.0	27.2	11.0	FSC	Analog	<b>6SL3211-0AB22-2UA1</b>	<b>6SL3211-0AB22-2AA1</b>	B	<b>A <sup>2)</sup></b>	<b>A <sup>2)</sup></b>
					USS	<b>6SL3211-0AB22-2UB1</b>	<b>6SL3211-0AB22-2AB1</b>	B	<b>A <sup>2)</sup></b>	<b>A <sup>2)</sup></b>
3.0	4.0	35.6	13.6 (at 40 °C)	FSC	Analog	<b>6SL3211-0AB23-0UA1</b>	<b>6SL3211-0AB23-0AA1</b>	B	<b>A <sup>2)</sup></b>	<b>A <sup>2)</sup></b>
					USS	<b>6SL3211-0AB23-0UB1</b>	<b>6SL3211-0AB23-0AB1</b>	B	<b>A <sup>2)</sup></b>	<b>A <sup>2)</sup></b>

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.

<sup>1)</sup> The **highlighted** filter class is quoted on the rating plate of the inverter.

<sup>2)</sup> Class B also with additional filter.

# SINAMICS G110

## Inverter chassis units 0.12 kW to 3 kW (0.16 hp to 4.0 hp)

### Controlled Power Modules

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#### 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 frequency	47 ... 63 Hz
Output frequency	0 ... 650 Hz
cos $\varphi$	≥ 0.95
Inverter efficiency	
<ul style="list-style-type: none"> <li>• with devices &lt; 0.75 kW (1.0 hp)</li> <li>• with devices ≥ 0.75 kW (1.0 hp)</li> </ul>	90 ... 94 % ≥ 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
Inrush current	Less than rated input current
Control methods	Linear $V/f$ characteristic (with parameterizable voltage boost); quadratic $V/f$ characteristic; multipoint characteristic (parameterizable $V/f$ characteristic)
Pulse frequency	8 kHz (standard) 2 ... 16 kHz (in 2 kHz increments)
Fixed frequencies	3, programmable
Skipped frequency range	1, programmable
Setpoint resolution	0.01 Hz digital 0.01 Hz serial 10 bit analog (motorized potentiometer 0.1 Hz)
Digital inputs	3 programmable digital inputs, non-floating, PNP, SIMATIC-compatible
Analog input (analog variant)	1, for setpoint (0 V ... 10 V, scalable or for use as 4th digital input)
Digital output	1 isolated optocoupler output (24 V DC, 50 mA, ohmic, NPN type)
Universal serial interface (USS variant)	RS485, for operation with USS protocol
Motor cable length, max.	
<ul style="list-style-type: none"> <li>• Shielded</li> <li>• Unshielded</li> </ul>	25 m 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 up to +50 °C with derating
Storage temperature	-40 ... +70 °C
Relative humidity	95 % (non-condensing)
Installation altitude	Up to 1000 m above sea level without derating <ul style="list-style-type: none"> <li>• Rated output current at 4000 m above sea level: 90 %</li> <li>• Line voltage up to 2000 m above sea level: 100 % at 4000 m above sea level: 75 %</li> </ul>
Standard SCCR (Short Circuit Current Rating) <sup>1)</sup>	10 kA
Protective functions for	<ul style="list-style-type: none"> <li>• Undervoltage</li> <li>• Overvoltage</li> <li>• Ground fault</li> <li>• Short-circuit</li> <li>• Stall prevention</li> <li>• Thermal motor protection <math>I^2t</math></li> <li>• Inverter overtemperature</li> <li>• Motor overtemperature</li> </ul>
Compliance with standards	UL, cUL, CE, c-tick
CE mark	Conformity with Low-Voltage Directive 73/23/EEC and Machinery Directive 98/37/EC

<sup>1)</sup> 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

## Inverter chassis units 0.12 kW to 3 kW (0.16 hp to 4.0 hp)

### Controlled Power Modules

#### Technical specifications (continued)

	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 variant 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

Output		Power loss W	Rated output current in A at 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** (continued)**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 EU gazette:

- 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**

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

For use in environment with contamination degree 2.

On the Internet at  
<http://www.ul.com>

**Machinery directive**

The inverters are suitable for installation in machines. Compliance with the machinery directive 98/37/EEC requires a separate certificate of conformity. This must be provided by the plant constructor or the installer of the machine.

**EMC directive**

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

The modified EMC product standard EN 61800-3 for electrical drive systems is valid 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 the SINAMICS G110 frequency inverters from Siemens AG:

- 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 Instruction Manual, however, specifies the conditions regarding compliance with the product standard if the frequency inverter is expanded to a PDS. The EMC directive in the EU is complied with for a PDS by observance of the product standard EN 61800-3 for variable-speed electrical drive systems. The frequency inverters on their own do not generally require identification according to the EMC directive.

- In the new EN 61800-3 of July 2005, a distinction is no longer made between "general availability" and "restricted availability". Instead, different categories have been defined, C1 to C4, in accordance with the environment of the PDS at the operating site:
  - **Category C1:** Drive systems for rated voltages < 1000 V for use in environment 1
  - **Category C2:** Stationary drive systems not connected by means of a plug connector for rated voltages < 1000 V. When used in environment 1, the system must be installed and commissioned by personnel familiar with EMC requirements. A warning is required.
  - **Category C3:** Drive systems for rated voltages < 1000 V for exclusive use environment 2. A warning is required.
  - **Category C4:** Drive systems for rated voltages ≥ 1000 V, for rated currents ≥ 400 A, or for use in complex systems in environment 2. An EMC plan must be created.
- The EMC product standard EN 61800-3 also defines limit values for conducted interference and radiated interference for "environment 2" (= 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 installed in a system that contains line filters on the higher-level infeed side.
- With SINAMICS G110 Power Drive Systems (PDS) that fulfill EMC product standard EN 61800-3 can be set up (see the setup instructions). 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.
- Regarding the compliance of limit values for line harmonics, EMC product standard EN 61800-3 for PDS refers to compliance with EN 61000-3-2 and EN 61000-3-12.
- Regardless of the configuration with SINAMICS G110 and its components, the mechanical engineer 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 interferences at the line supply connection point and outside the machine remain below the relevant limit values. Any suitable technical means can be used to ensure this.

# SINAMICS G110

## Inverter chassis units 0.12 kW to 3 kW (0.16 hp to 4.0 hp)

### Controlled Power Modules

#### Technical specifications (continued)

##### Overview of SINAMICS G110 components and PDS categories

Environment 1 (Residential, commercial)	Category C1	Category C2	Environment 2 (Industrial)
	Unfiltered devices and external filter class B with low leakage currents (shielded motor cable up to 5 m)	<b>Category C2</b> 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) + warning <u>or</u> All devices with integrated filter + external filter class B (shielded motor cable up to 25 m)	
		<b>Category C2</b> 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 + 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!	
		<b>Category C3</b> 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 + external filter, class B (shielded motor cable up to 25 m) A warning 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!	
		<b>Category C4</b> Not applicable to SINAMICS G110	

#### Electromagnetic compatibility

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

The table below lists the measured results for emissions of and immunity to interference for the SINAMICS G110 inverters.

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

EMC phenomenon Standard/test	Relevant criteria	Limit value
Noise emissions EN 61800-3 (environment 1)	Conducted via mains cable	150 kHz to 30 MHz  Unfiltered devices: not tested All devices with internal/external filter: Depending on filter type and planned PDS installation: Category C1: limit complies with EN 55011, class B. Category C2: limit complies with EN 55011, class A, group 1 All devices with an internal/external filter also fulfill the limit for category C3 installations. Limit complies with EN 55011, class A, group 2.
	Emitted by the drive	30 MHz to 1 GHz  All devices Limit complies with EN 55011, class A, group 1.
ESD immunity EN 61000-4-2	ESD by air discharge	Test level 3 8 kV
	ESD by contact discharge	Test level 3 6 kV
Electrical fields immunity EN 61000-4-3	Electrical field applied to unit	Test level 3 80 MHz to 1 GHz 10 V/m
Burst interference immunity EN 61000-4-4	Applied to all cable terminations	Test level 4 4 kV
Surge immunity EN 61000-4-5	Applied to mains cables	Test level 3 2 kV
Immunity to RFI emissions, conducted EN 61000-4-6	Applied to mains, motor and control cables	Test level 3 0.15 MHz to 80 MHz 80 % AM (1 kHz) 10 V

# SINAMICS G110

## Inverter chassis units 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 via a 5-digit display.

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

The BOP offers a function that enables you to copy parameters quickly and easily. 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 supply includes a 9-pin Sub-D connector, an RS232 standard cable (3 m) and the STARTER commissioning tool <sup>1)</sup> on DVD.

#### Commissioning tool

STARTER is a commissioning tool with a graphical 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.
<b>BOP</b> (Basic Operator Panel)	<b>6SL3255-0AA00-4BA1</b>
<b>PC inverter connection kit</b> incl. 9-pin Sub-D connector, standard RS232 cable (3 m), and STARTER commissioning tool <sup>1)</sup> on DVD	<b>6SL3255-0AA00-2AA1</b>
<b>Adapter for DIN rail attachment</b>	
• Size 1 (frame size FSA)	<b>6SL3261-1BA00-0AA0</b>
• Size 2 (frame size FSB)	<b>6SL3261-1BB00-0AA0</b>
<b>Documentation DVD</b> , with operating instructions, parameter list and Getting Started guide	<b>6SL3271-0CA00-0AG0</b>
<b>STARTER commissioning tool</b> <sup>1)</sup> on DVD	<b>6SL3072-0AA00-0AG0</b>

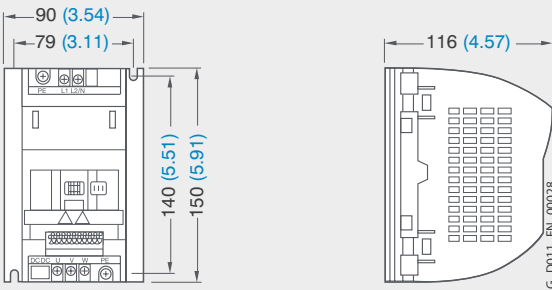
<sup>1)</sup> STARTER commissioning tool also available on the Internet at <http://support.automation.siemens.com/WWW/view/en/10804985/133100>

# SINAMICS G110

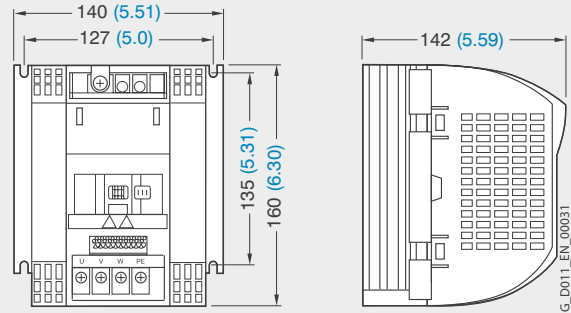
## Inverter chassis units 0.12 kW to 3 kW (0.16 hp to 4.0 hp)

### Controlled Power Modules

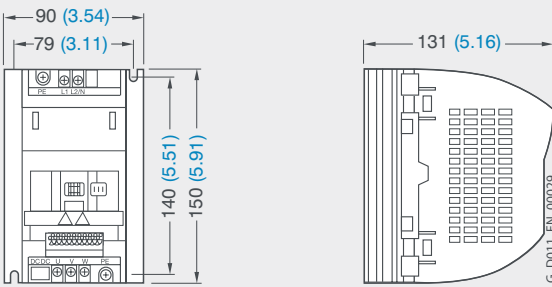
#### Dimensional drawings



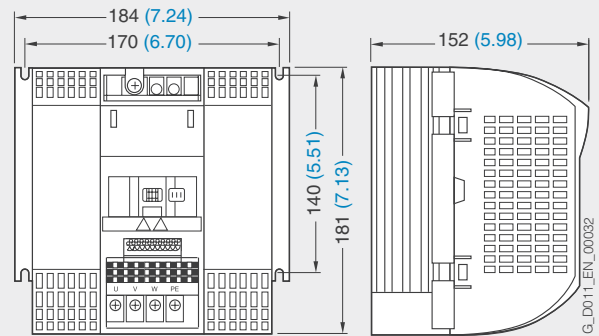
Inverter frame size FSA; 0.12 kW (0.16 hp) to 0.37 kW (0.5 hp)



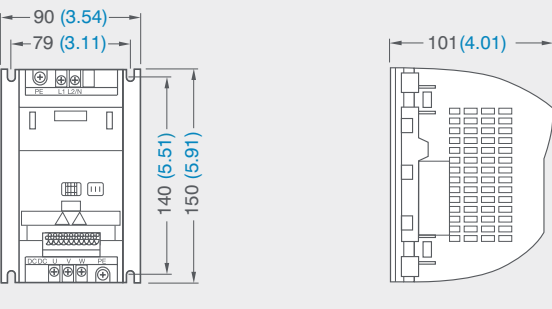
Inverter frame size FSB; 1.1 kW (1.5 hp) to 1.5 kW (2.0 hp)



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



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



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

Fixing with screws and washers  
(not included in the scope of supply)

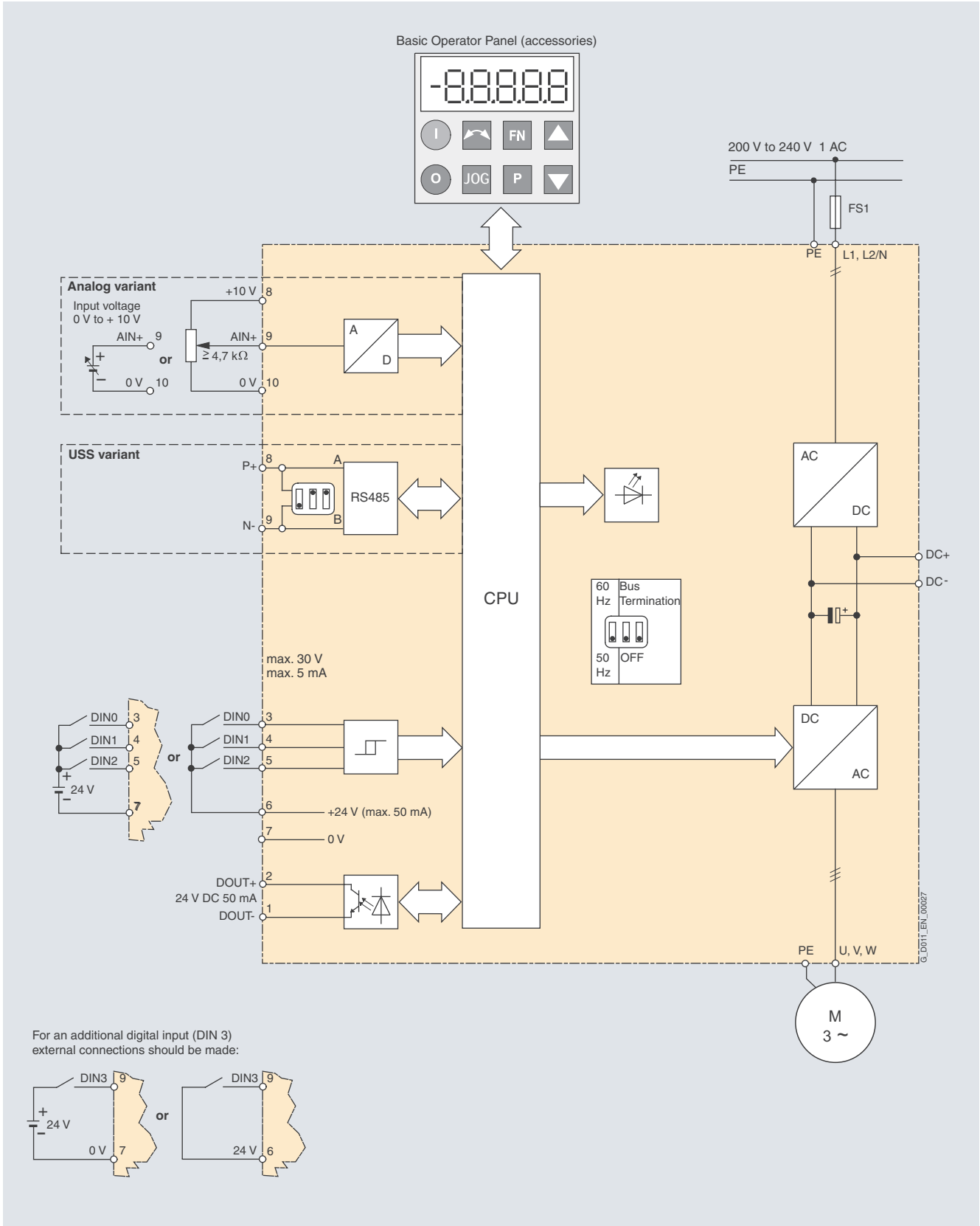
- Frame size FSA: 2 × M4
- Frame size FSB: 4 × M4
- Frame size FSC: 4 × M5

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).

**Schematics**

*General circuit diagram*



# SINAMICS G110

Inverter chassis units 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 to variable-speed drives.

Available 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 <sup>1)</sup> on DVD incl. operating instructions, parameter list and Getting Started guide
- Screwdriver

### Selection and Ordering Data

	Order No.
<b>Starter kit</b> 0.75 kW (1.0 hp), German	<b>6SL3200-0AB10-0AA0</b>

<sup>1)</sup> STARTER commissioning tool also available on the Internet at <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 “filter class B with low leakage currents”, have a leakage current of < 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.

**Filter class B with low leakage currents**

With this filter, the 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 with

- 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)

With Category C1 installations, generally a pulse frequency of 16 kHz is recommended for converter 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 power supply.

If the ratio of the rated inverter power to 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  $\leq 16$  A per phase”, there are special aspects for drives with 120 W to 550 W and 230 V single-phase supplies which can be used in non-industrial applications (environment 1).

For devices with 120 W to 370 W, either the recommended line reactors must be installed or a permission obtained from the power supplier 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  $\leq 75$  A per phase”, a permission to operate drives on the public low-voltage network must be obtained from the power supplier. For limits of the harmonic currents, see the instruction manual.

# SINAMICS G110

## Inverter chassis units 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 inverter. EMC filters and line reactors are not suitable for base-type installation

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). Fuses of type 3NA3 are recommended for European countries. Further 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 countries.

Output		Filter class B with low leakage currents	Line reactor	Additional EMC filter, class B	Fuse	Circuit-breakers
kW	hp	Order No.	Order No.	Order No.	Order No.	Order No.
<b>Line-side power components for inverters without filter</b>						
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
<b>Line-side power components for inverters with integrated filter class A/B</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