

SIEMENS



Motion Control Drives

# SINAMICS Inverters for Single-Axis Drives Built-In Units

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[siemens.com/drives](http://siemens.com/drives)

## SINAMICS V20 basic converters

### 0.12 kW to 30 kW (0.16 hp to 40 hp)




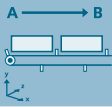
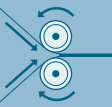
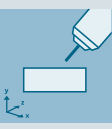
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### Introduction

### Application

Use	Requirements for torque accuracy/speed accuracy/position accuracy/coordination of axes/functionality					
	Continuous motion			Non-continuous motion		
	Basic	Medium	High	Basic	Medium	High
<b>Pumping, ventilating, compressing</b> 	Centrifugal pumps Radial / axial fans Compressors	Centrifugal pumps Radial / axial fans Compressors	Eccentric screw pumps	Hydraulic pumps Metering pumps	Hydraulic pumps Metering pumps	Descaling pumps Hydraulic pumps
	<b>V20</b> G120C G120P	G120P G130/G150 G180 <sup>1)</sup>	S120	G120	S110	S120
<b>Moving</b> 	Conveyor belts Roller conveyors Chain conveyors	Conveyor belts Roller conveyors Chain conveyors Lifting/lowering devices Elevators Escalators/ moving walkways Indoor cranes Marine drives Cable railways	Elevators Container cranes Mining hoists Excavators for open-cast mining Test bays	Acceleration conveyors Storage and retrieval machines	Acceleration conveyors Storage and retrieval machines Cross cutters Reel changers	Storage and retrieval machines Robotics Pick & place Rotary indexing tables Cross cutters Roll feeds Engagers/ disengagers
	<b>V20</b> G110D G110M G120C ET 200pro FC-2 <sup>2)</sup>	G120 G120D G130/G150 G180 <sup>1)</sup>	S120 S150 DCM	V90 G120 G120D	S110 S210 DCM	S120 S210 DCM
<b>Processing</b> 	Mills Mixers Kneaders Crushers Agitators Centrifuges	Mills Mixers Kneaders Crushers Agitators Centrifuges Extruders Rotary furnaces	Extruders Winders/unwinders Lead/follower drives Calenders Main press drives Printing machines	Tubular bagging machines Single-axis motion control such as • Position profiles • Path profiles	Tubular bagging machines Single-axis motion control such as • Position profiles • Path profiles	Servo presses Rolling mill drives Multi-axis motion control such as • Multi-axis positioning • Cams • Interpolations
	<b>V20</b> G120C	G120 G130/G150 G180 <sup>1)</sup>	S120 S150 DCM	V90 G120	S110 S210	S120 S210 DCM
<b>Machining</b> 	Main drives for • Turning • Milling • Drilling	Main drives for • Drilling • Sawing	Main drives for • Turning • Milling • Drilling • Gear cutting • Grinding	Axis drives for • Turning • Milling • Drilling	Axis drives for • Drilling • Sawing	Axis drives for • Turning • Milling • Drilling • Lasering • Gear cutting • Grinding • Nibbling and punching
	S110	S110 S120	S120	S110	S110 S120	S120

With the compact SINAMICS V20 converter, Siemens offers a simple and economical drive solution for applications with simple motion sequences and basic requirements.

SINAMICS V20 sets itself apart with its quick commissioning times, ease of operation, robustness and cost-efficiency.

Practical application examples and descriptions are available on the Internet at [www.siemens.com/sinamics-applications](http://www.siemens.com/sinamics-applications)

### More information

You may also be interested in these drives:

- More performance for the control cabinet in IP20 degree of protection ⇒ SINAMICS G120C
- With positioning function in the control cabinet in IP20 degree of protection ⇒ SINAMICS G120
- With positioning function for distributed drive solutions in IP65 degree of protection ⇒ SINAMICS G120D ([Catalog D 31.2](#))

<sup>1)</sup> Industry-specific inverters.

<sup>2)</sup> Information on the SIMATIC ET 200pro FC-2 frequency converter is available in [Catalog D 31.2](#) and at [www.siemens.com/et200pro-fc](http://www.siemens.com/et200pro-fc)

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### SINAMICS V20 basic converters

#### Overview



SINAMICS V20 converters, frame sizes: FSAA, FSAB, FSA, FSB, FSC, FSD and FSE

#### **SINAMICS V20 – The cost-effective, reliable and easy-to-use converter for basic applications**

Today, in an increasing number of applications in plant and machinery construction, individual automation and drive solutions are demanded that automate simple motion sequences with low associated requirements.

The compact SINAMICS V20, the basic performance converter, offers a simple and cost-effective drive solution for these types of applications. SINAMICS V20 sets itself apart with its quick commissioning times, ease of operation, robustness and cost-efficiency.

With seven frame sizes, it covers a power range extending from 0.12 kW to 30 kW (0.16 hp to 40 hp).

#### **Minimizing costs**

SINAMICS V20 keeps engineering and commissioning costs as well as those in operation as low as possible. To increase energy efficiency, the converter is equipped with a control technique to achieve optimum energy efficiency through automatic flux reduction. Not only this, it displays the actual energy consumption and has additional, integrated energy-saving functions. This allows energy consumption to be slashed drastically.

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#### Benefits

##### **Easy to install**

- Push-through and wall mounting
  - Side-by-side mounting possible for both
  - Compact installation allows smaller cabinets to be used
  - Push-through mounting allows the cabinet to be cooled more easily
  - Frame sizes FSAA and FSAB (230 V 1 AC) are 24 % smaller compared to the previous frame size FSA within the same power range
- Plug & Play
  - Can be run "out-of-the-box" without other options
  - Basic operator actions at a built-in BOP (Basic Operator Panel)
- Connection of SINAMICS V20 with USS or Modbus RTU via terminals
  - Easy integration into existing systems
  - Easier commissioning through standard libraries and connection macros
  - Full flexibility of Modbus RTU settings widens communication with controller
  - Simple connection to a control system (e.g. SIMATIC S7 PLC via Modbus RTU/USS)
- Integrated Braking Module
  - Converters  $\geq 7.5$  kW (frame sizes FSD and FSE) have an integrated Braking Module. In this case, the braking resistor can be directly connected. The dynamic energy is dissipated as heat in a braking resistor with an adjustable duty cycle of between 5 % and 100 %.
  - Possible to use dynamic braking to increase braking performance
- EMC category C1
  - The devices are optionally available with an integrated RFI suppression filter, enabling compliance with the radio interference limit values laid out in IEC 61800-3 category C1 when installed in the control cabinet in an EMC-compliant manner. Frame sizes FSAA and FSAB therefore satisfy the radio interference requirements for industrial applications as well as for use in residential and business environments, including commercial applications such as refrigerated counters, fitness equipment, ventilation systems, industrial washing machines, etc.

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### SINAMICS V20 basic converters

#### Benefits (continued)

##### Easy to use

- Parameter settings can be easily transferred from one unit to another using the battery-operated parameter loader.
  - Less technical support required
  - Short commissioning time
  - The product is delivered to the customer already preset
- Integrated connection and application macros
  - To simplify I/O configuration and make the appropriate settings
  - Shorter commissioning time
  - Integrated and optimized application setting
  - Simple connection and application macros can be selected instead of configuring long, complicated parameter lists
  - Errors caused by wrong parameter settings can be avoided
- Keep Running Mode allows uninterrupted operation
  - This function provides higher productivity in production by automatic adaptation in the case of unstable line supplies
  - Stable operation under difficult line supply conditions
  - Higher productivity through prevention of interruptions to the production line
  - Adaptation to application-relevant reactions through flexible definition in case of faults/alarms
- Wide voltage range, advanced cooling design and coated PCBs increase robustness of the drive in difficult environments
  - Operation possible when the line supply voltage fluctuates
  - Reliable operation at line voltages:
    - 200 V ... 240 V 1 AC (-10 %/+10 %) <sup>1)</sup>
    - 380 V ... 480 V 3 AC (-15 %/+10 %)
  - Operating and ambient temperatures between -10 °C and +40 °C (max. +60 °C with derating)
- Wireless commissioning, operation and diagnostics via mobile device or laptop thanks to the optional SINAMICS V20 Smart Access web server module
  - Enables easy access to the converter, even when it is installed in difficult-to-access areas
  - Simple operation thanks to intuitive user interface and commissioning wizard
  - Flexible choice of terminal devices as the web server works with every HTML5-compatible web browser
- Expansion of the 400 V converters with two digital inputs and two digital outputs (relay outputs) thanks to optional SINAMICS V20 I/O Extension Module
  - Higher flexibility of the frequency converter without additional outlay for installation, hardware and software
  - Additional functionalities such as multi-pump control, with which up to four pumps can be controlled with a frequency converter

##### Easy to save money

Energy reduction during operation and standby

- ECO mode for V/f, V<sup>2</sup>/f
  - The integrated ECO mode for V/f, V<sup>2</sup>/f control automatically adapts the magnetic flux in the motor to save energy. The energy consumption can be shown in kWh, CO<sub>2</sub> or even in the local currency.
  - Energy saving during low dynamic load cycles
  - Specifies the actual energy that has been saved
- Hibernation mode
  - Converter and motor are only activated when used by the plant or machine
  - Smart hibernation saves energy
  - Motor service life is extended
  - Reduced pump wear at low speed
  - Less time needed to program PLC code for pump/fan applications (PLC)
- DC link coupling
  - Applications that use SINAMICS V20 drives with the same power rating can share a common DC bus to reuse the regenerative energy
  - Generate and save energy in applications that use coupled motors
  - The converters can then optimally share the load mutually.
  - Reduce the need for dynamic braking and external components

##### Integrated energy flow monitoring

- Energy consumption and savings are monitored without the need for power measurement equipment
  - Intuitive values of power consumption and savings without additional investments for measurement equipment
  - Values can be shown as kWh, CO<sub>2</sub> or as a currency

##### Cost-savings for low-overload applications with SINAMICS V20 converters, frame size FSE

SINAMICS V20 frame size FSE converters feature two different load cycles:

- Low overload (LO): 110 % ×  $I_L$ <sup>2</sup> for 60 s (cycle time: 300 s)
- High overload (HO): 150 % ×  $I_H$ <sup>3</sup> for 60 s (cycle time: 300 s)

With the low-overload cycle, the converter can reach a higher output current and power. A smaller converter can be used. Optimally designed for variable applications:

- Low overload for applications with a low dynamic response (continuous duty)
- High overload for applications with a high dynamic response (cyclic duty)

##### Complete motion control solutions from Siemens – SINAMICS V20 and SIMATIC

Siemens offers comprehensive solutions from a single source for general motion control applications with a selection of different SINAMICS application examples:

- Ready-to-run application examples, including wiring diagrams, parameter descriptions
- Sample configurations for connecting SINAMICS with SIMATIC, including hardware, software and wiring examples, installation instructions for the supplied S7 project, drive parameterization, and HMI sample projects
  - Correctly configured project, ready for operation
  - Optimal leveraging of TIA advantages
  - Free download via the Online Support portal: [www.siemens.com/sinamics-applications](http://www.siemens.com/sinamics-applications)

<sup>1)</sup> Single-phase devices can also be connected to two phases of a three-phase 120/240 V power supply system. The voltage between L1 and L2 should be within the range of 200 V to 240 V, -10 % to +10 % (phase-phase or phase-neutral conductor). Further information can be found at: <https://support.industry.siemens.com/cs/document/109476260>

<sup>2)</sup> The output current  $I_L$  is based on the duty cycle for low overload (LO).


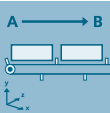
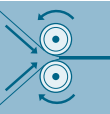
<sup>3)</sup> The output current  $I_H$  is based on the duty cycle for high overload (HO).

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### SINAMICS V20 basic converters

#### Application

Typical applications		
	<b>Pumping, ventilating, compressing</b> <ul style="list-style-type: none"> <li>Centrifugal pumps</li> <li>Radial/axial fans</li> <li>Compressors</li> </ul>	<b>Advantages</b> <ul style="list-style-type: none"> <li>High availability through automatic restart and flying restart after power failures</li> <li>Broken belt detection by monitoring the load torque</li> <li>Pump protection against cavitation</li> <li>Hammer start and blockage clearing modes for clogged pumps</li> <li>PID controller for process values (e.g. temperature, pressure, level, flow)</li> <li>PID auto tuning to optimize controller parameters</li> <li>Hibernation mode stops the motor when demand is low</li> <li>Motor staging extends the flow range by adding two more fixed-speed drives (cascade)</li> <li>Frost and condensation protection prevents moisture in motors under extreme environmental conditions</li> <li>With optional SINAMICS V20 I/O Extension Module for 400 V converters: Multi-pump control <sup>1)</sup>, with which up to four pumps can be controlled with a frequency converter and applications that require additional digital inputs and digital outputs (e.g. in water supply systems for buildings)</li> </ul>
	<b>Moving</b> <ul style="list-style-type: none"> <li>Conveyor belts</li> <li>Roller conveyors</li> <li>Chain conveyors</li> <li>Moving walkways</li> <li>Bucket conveyors</li> </ul>	<b>Advantages</b> <ul style="list-style-type: none"> <li>Soft, jerk-free acceleration reduces the stress on the gear units, bearings, drums and rollers</li> <li>Super torque start for conveyor belts with high breakaway torque</li> <li>Dynamic behavior by using braking resistor or DC braking</li> <li>Direct control of mechanical holding brake</li> <li>Broken belt detection by monitoring the load torque</li> <li>Precise stopping with Quick Stop (switch-off positioning) independently of the control cycle</li> </ul>
	<b>Processing</b> <ul style="list-style-type: none"> <li>Single drives in the processing industry such as mills, mixers, kneaders, crushers, agitators, centrifuges</li> <li>Single drives in commercial applications such as ovens, mixers, industrial washing machines</li> <li>Main drives in machines with mechanically coupled axes such as spinning machines, braiding machines for textiles, ropes and wires</li> </ul>	<b>Advantages</b> <ul style="list-style-type: none"> <li>Frost and condensation protection prevents moisture in motors under extreme environmental conditions</li> <li>Higher productivity with uninterrupted production due to Keep Running Mode</li> <li>Exchange of regenerative energy via the DC link</li> <li>Super torque start for machines with a high breakaway torque</li> </ul>

<sup>1)</sup> Further information on the multi-pump control can be found in the operating instructions and on the Internet at:  
[www.siemens.com/sinamics-v20/documentation](http://www.siemens.com/sinamics-v20/documentation)

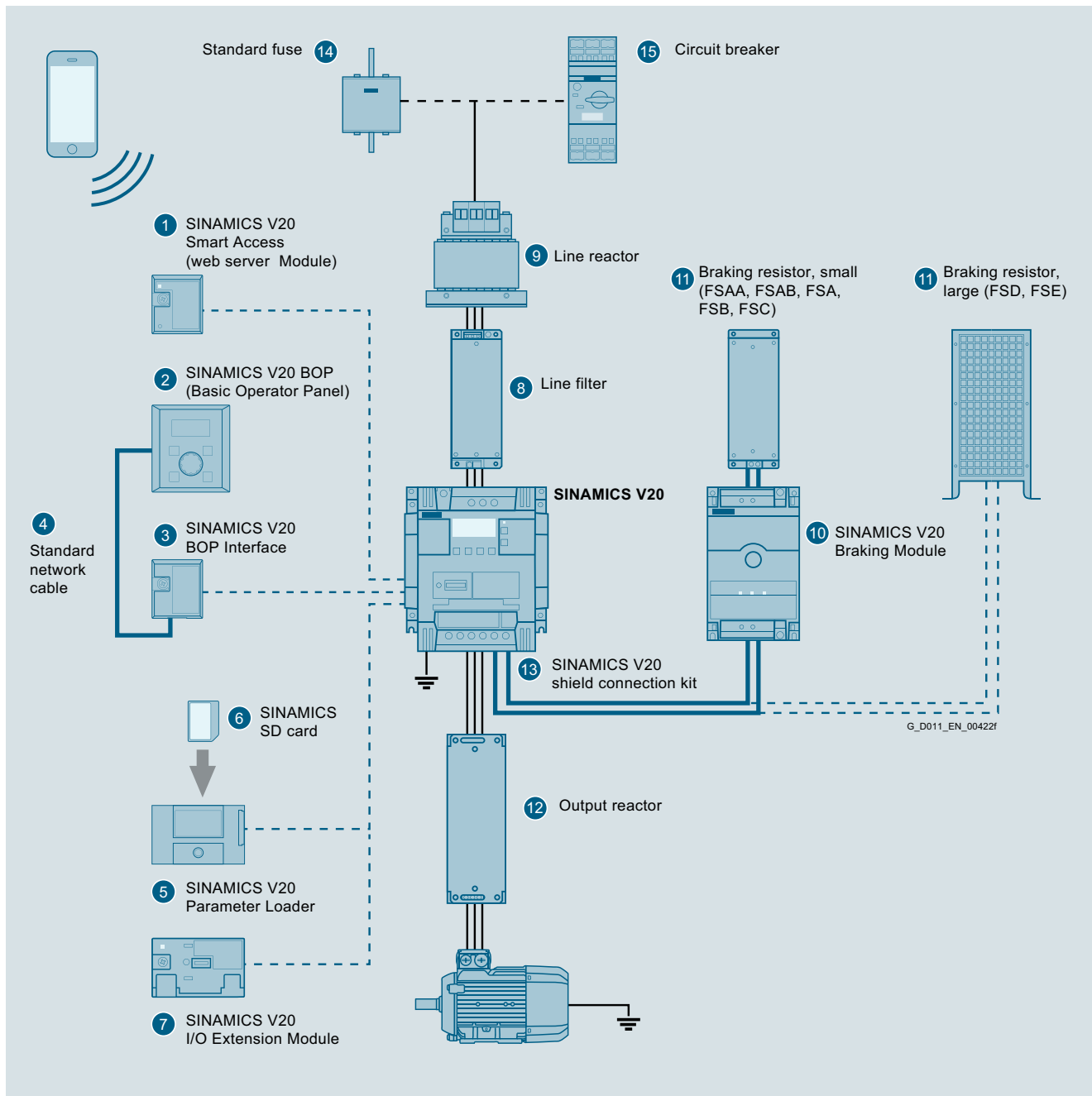
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## SINAMICS V20 basic converters

### Design

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SINAMICS V20 converter and accessories

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### SINAMICS V20 basic converters

#### Design (continued)

Accessories		
①	<b>SINAMICS V20 Smart Access</b>	Wireless commissioning, operation, and diagnostics with mobile device or laptop using web server module
②	<b>SINAMICS V20 BOP</b>	<ul style="list-style-type: none"> <li>• Same function as the integrated BOP (Basic Operator Panel)</li> <li>• Can also be used for remote mounting</li> <li>• Values and setpoints are changed by rotating the wheel</li> <li>• For distributed mounting with IP54 and UL Type 1 enclosure rating</li> </ul>
③	<b>SINAMICS V20 BOP Interface</b>	<ul style="list-style-type: none"> <li>• Connection between converter and BOP</li> <li>• RJ45 interface is compatible with standard network cable</li> </ul>
④	<b>Standard network cable</b>	<ul style="list-style-type: none"> <li>• Cable not included in delivery</li> <li>• You can use any standard network cable with standard RJ45 connector</li> </ul>
⑤	<b>SINAMICS V20 Parameter Loader</b>	<ul style="list-style-type: none"> <li>• Up to 100 parameter sets with parameter settings can be written from the memory card to the converter, or saved from the converter to the memory card</li> <li>• The converter does not have to be connected to the line supply</li> </ul>
⑥	<b>SINAMICS SD card</b>	<ul style="list-style-type: none"> <li>• Memory card, 512 MB</li> <li>• Standard SD cards up to 32 GB are supported</li> </ul>
⑦	<b>SINAMICS V20 I/O Extension Module</b>	• Expansion of the 400 V converters with two digital inputs and two digital outputs (relay outputs)
⑧	<b>Line filter</b>	<ul style="list-style-type: none"> <li>• Improved EMC characteristics</li> <li>• Longer motor cable for frame sizes FSAA, FSAB, FSA</li> </ul>
⑨	<b>Line reactor</b>	<ul style="list-style-type: none"> <li>• Reduces the harmonic current</li> <li>• Improves the power factor</li> <li>• Recommended if input current (rms value) is higher than the rated current of the converter</li> </ul>
⑩	<b>SINAMICS V20 Braking Module</b>	<ul style="list-style-type: none"> <li>• Shortens the deceleration ramp time</li> <li>• Suitable for 230 V 1 AC and 400 V 3 AC</li> <li>• Adjustable duty cycle from 5 % to 100 %</li> <li>• For frame sizes FSAA, FSAB, FSA, FSB, and FSC</li> <li>• FSD and FSE already have an integrated braking unit</li> </ul>
⑪	<b>Braking resistor</b>	<ul style="list-style-type: none"> <li>• Dissipates regenerative energy as heat</li> <li>• 5 % duty cycle as default setting</li> </ul>
⑫	<b>Output reactor</b>	<p>For longer motor cable</p> <ul style="list-style-type: none"> <li>• 230 V 1 AC: 200 m (shielded and unshielded)</li> <li>• 400 V 3 AC: <ul style="list-style-type: none"> <li>- for frame sizes FSA to FSD: 150 m (shielded and unshielded)</li> <li>- for frame size FSE: 200/300 m (shielded/unshielded)</li> </ul> </li> </ul>
⑬	<b>Shield connection kit</b>	<ul style="list-style-type: none"> <li>• Shield connection</li> <li>• Strain relief</li> </ul>
⑭	<b>Standard fuse</b>	Recommended fuse corresponding to the IEC/UL standard
⑮	<b>Circuit breaker</b>	Recommended circuit breaker corresponding to the IEC/UL standard

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#### Function

Feature	Comment	Feature	Comment
<b>Connection and application macros</b>	<p>Sets groups of parameters to simplify commissioning</p> <ul style="list-style-type: none"> <li>• Connection macros for connections</li> <li>• Application macros for applications</li> </ul>	<b>ECO mode</b>	Economy mode – searches for most efficient rated point
<b>Keep Running Mode</b>	<p>Single-parameter setting for a mode which keeps the motor going – enables</p> <ul style="list-style-type: none"> <li>• <math>V_{DC \max}</math> controller</li> <li>• Kinetic buffering</li> <li>• Restart after fault</li> <li>• Flying start.</li> <li>• Disables alarms etc.</li> </ul>	<b>Hibernation mode</b>	Intelligent economy mode in idle state
		<b>PID controller</b>	Integrated PID controller with auto-tuning function
		<b>Kinetic buffering (<math>V_{DC \min}</math> controller)</b>	Retention of minimal DC voltage through regenerative energy for continued operation
		<b><math>V_{DC \max}</math> controller</b>	Automatic change of ramp down time/braking time
		<b><math>I_{\max}</math> controller</b>	Automatic change of ramp up time to avoid over-current



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**SINAMICS V20 basic converters****Function (continued)**

Feature	Comment
<b>Automatic restart</b>	Automatic restart of drive once the power has been restored following a power failure. All faults are acknowledged automatically and the drive is switched on again
<b>Flying restart</b>	Allows the converter to be switched to a rotating motor
<b>Energy consumption monitoring</b>	Displays a simple estimate of energy or cost saved against use of a line-connected motor
<b>50/60 Hz adaptation</b>	Easy selection of operation with 50 Hz (Europe, Asia) / 60 Hz (USA)
<b>V/f and V<sup>2</sup>/f</b>	V/f: perfectly suitable for almost any application in which the speed of asynchronous (induction) motors is to be changed V <sup>2</sup> /f: suited to loads with quadratic load curves, e.g. turbo machines such as pumps and fans
<b>FCC</b>	Maintains motor flux current for improved efficiency
<b>Programmable V/f coordinates</b>	Freely adjusts the V/f characteristics, e.g. torque behavior of the synchronous motor
<b>JOG</b>	Moves the motor to test the direction or moves the load to specific position. When the BOP switches to JOG mode, pressing the start button of the BOP will run the motor up to the JOG frequency. Releasing the start button stops the motor
<b>DC braking</b>	Stops the motor which runs at constant speed and only comes to a standstill in longer time intervals, e.g. centrifuges, saws, grinding machines and conveyor belts
<b>Mechanical holding brake control</b>	The motor holding brake prevents the motor from undesirable turning when the converter is switched off. The converter has an internal logic to control an external motor holding brake
<b>USS</b>	Universal Serial Interface Protocol
<b>Modbus RTU</b>	Modbus RTU communication available via the RS485 link
<b>Super torque mode</b>	Big torque boost for starting high-inertia applications
<b>Hammer start mode</b>	A number of torque pulses at start-up to start difficult or "stuck" loads
<b>Blockage clearing mode</b>	Multiple-reverse function to clear blocked pumps
<b>Simple parameter-based menu on internal or external BOPs</b>	Easy selection for displaying values, editing parameters, converter setup
<b>Simple text menu for setup</b>	The parameter number will be shown as short text in the 7-segment LED display
<b>Motor frequency display scaling</b>	User settable display scaling for special applications i.e. rather than Hz, it shows application-specific values like "gallons per minute", "potatoes per hour", etc.

Feature	Comment
<b>Customization of parameter defaults</b>	Customers or OEMs can set their own special "permanent" defaults which can only be deleted in special mode
<b>Converter status in case of a fault</b>	Record the fault with running data <ul style="list-style-type: none"> <li>• Fault code</li> <li>• Drive setpoint</li> <li>• Drive status</li> <li>• DC link voltage</li> <li>• Output current</li> <li>• Output voltage</li> </ul>
<b>List of modified parameters</b>	When this filter is activated, the parameter list only displays the parameters which were modified by users
<b>Load torque monitoring</b>	Detects the load torque to establish failure of the mechanical connection between motor and load machine, overload, motor blocking or no-load operation, e.g. in the event of a V-belt tear in a fan or when a load machine jams
<b>Phase loss detection</b>	Detects and protects against phase loss
<b>Cavitation protection</b>	Protects against cavitation damage to pumps
<b>Condensation protection</b>	Automatic application of DC current to motor to protect from condensation
<b>Frost protection</b>	Automatically rotates motor to stop fluids freezing when temperature falls near or below freezing e.g. for the sequential connection of multiple pumps working in one system
<b>Motor staging</b>	Automatic control and staging of several motors
<b>Multi-pump control <sup>1)</sup></b>	Control of up to four pumps with a frequency converter by means of optional SINAMICS V20 I/O Extension Module
<b>Dual ramp parameterizable</b>	Switchable ramps for specific applications
<b>Programmable fixed frequency setpoint</b>	16 fixed frequencies can be defined and switched by digital inputs or communication
<b>Drive data sets (DDS)</b>	3 parameter sets for the motor and load. The user can switch the parameter set to suit the motors and applications
<b>Command data sets (CDS)</b>	3 parameter sets for the setpoint and command. The user can switch the parameter set to suit the control system
<b>Flexible voltage boost</b>	Increases the output voltage to compensate resistive losses or increase the output torque
<b>Skippable frequency bandwidth</b>	Defines 1 to 4 frequencies to avoid effects of mechanical resonance and suppress frequencies within an adjustable skip frequency bandwidth
<b>2-wire/3-wire control</b>	The wide range of setting options is especially intended to allow emulation of existing control methods on the plant or system side if the converter has to be integrated into an existing application

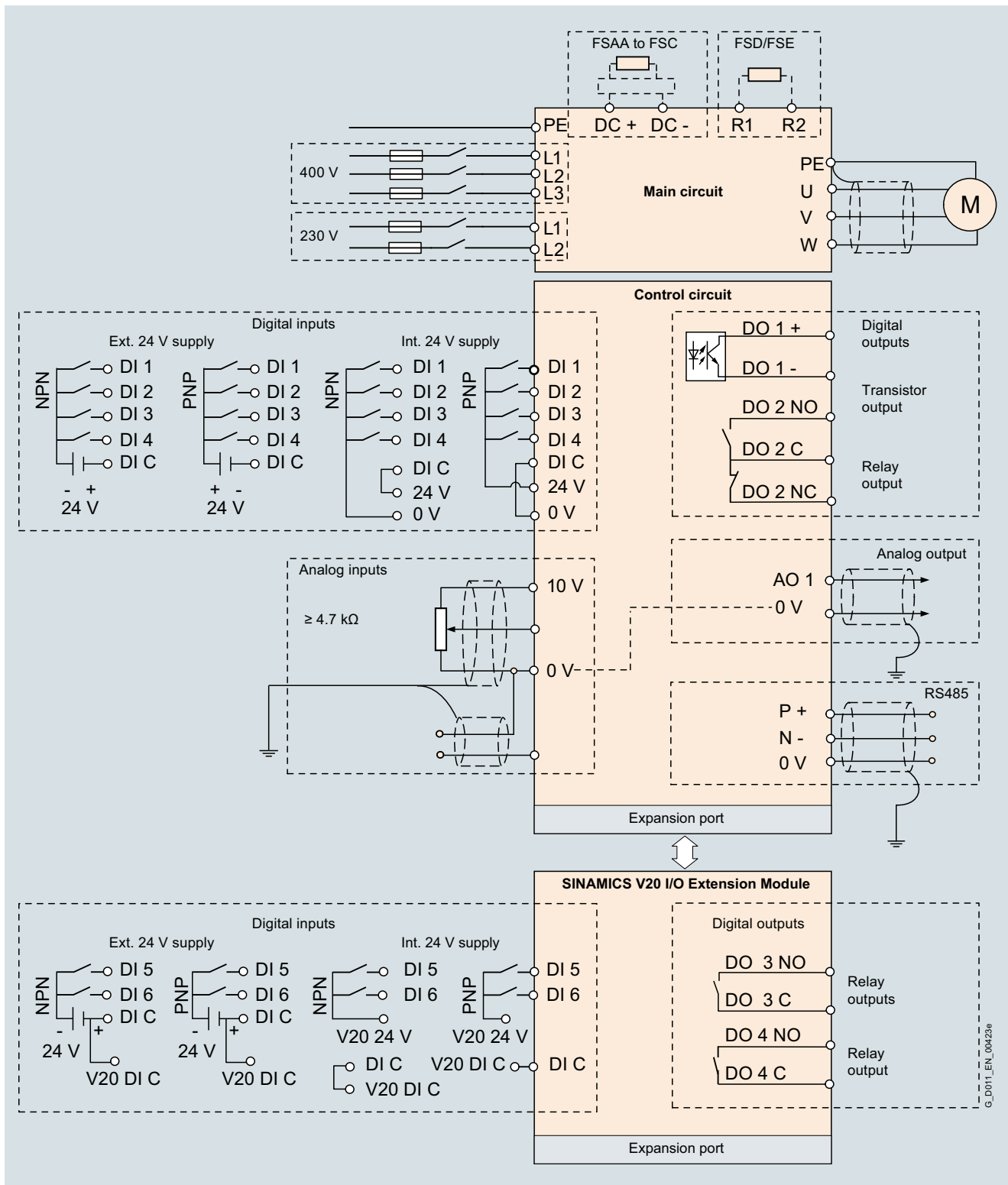
<sup>1)</sup> Further information on the multi-pump control can be found in the operating instructions and on the Internet at:  
[www.siemens.com/sinamics-v20/documentation](http://www.siemens.com/sinamics-v20/documentation)

# SINAMICS V20 basic converters

0.12 kW to 30 kW (0.16 hp to 40 hp)

## SINAMICS V20 basic converters

### Integration



Connection example for SINAMICS V20

## SINAMICS V20 basic converters

0.12 kW to 30 kW (0.16 hp to 40 hp)

### SINAMICS V20 basic converters

#### Selection and ordering data

Rated power <sup>1)</sup>		Output current $I_H$ <sup>2)</sup>	Fan	Frame size	SINAMICS V20 without integrated line filter	SINAMICS V20 with integrated line filter Category C1 <sup>3)</sup>
kW	hp	A			Article No.	Article No.
<b>200 ... 240 V 1 AC <sup>4)</sup></b>						
0.12	0.16	0.9	–	FSA	<b>6SL3210-5BB11-2UV1</b>	<b>6SL3210-5BB11-2BV1</b>
0.25	0.33	1.7	–	FSA	<b>6SL3210-5BB12-5UV1</b>	<b>6SL3210-5BB12-5BV1</b>
0.37	0.5	2.3	–	FSA	<b>6SL3210-5BB13-7UV1</b>	<b>6SL3210-5BB13-7BV1</b>
0.55	0.75	3.2	–	FSAB	<b>6SL3210-5BB15-5UV1</b>	<b>6SL3210-5BB15-5BV1</b>
0.75	1	4.2	–	FSAB	<b>6SL3210-5BB17-5UV1</b>	<b>6SL3210-5BB17-5BV1</b>

Rated power <sup>1)</sup>		Output current $I_H$ <sup>2)</sup>	Fan	Frame size	SINAMICS V20 without integrated line filter	SINAMICS V20 with integrated line filter Category C2 <sup>5)</sup>
kW	hp	A			Article No.	Article No.
<b>200 ... 240 V 1 AC <sup>4)</sup></b>						
1.1	1.5	6	1	FSB	<b>6SL3210-5BB21-1UV0</b>	<b>6SL3210-5BB21-1AV0</b>
1.5	2	7.8	1	FSB	<b>6SL3210-5BB21-5UV0</b>	<b>6SL3210-5BB21-5AV0</b>
2.2	3	11	1	FSC	<b>6SL3210-5BB22-2UV0</b>	<b>6SL3210-5BB22-2AV0</b>
3	4	13.6	1	FSC	<b>6SL3210-5BB23-0UV0</b>	<b>6SL3210-5BB23-0AV0</b>

Rated power <sup>6)</sup>		Output Current $I_L$ <sup>7)</sup>	Power based on the output current $I_H$ <sup>2)</sup>		Output current $I_H$ <sup>2)</sup>	Fan	Frame size	SINAMICS V20 without integrated line filter	SINAMICS V20 with integrated line filter Category C3 <sup>8)</sup>
kW	hp	At 400 V/ 480 V A	kW	hp	At 400 V/ 480 V A			Article No.	Article No.
<b>380 ... 480 V 3 AC</b>									
0.37	0.5	1.3/1.3	0.37	0.5	1.3/1.3	–	FSA	<b>6SL3210-5BE13-7UV0</b>	<b>6SL3210-5BE13-7CV0</b>
0.55	0.75	1.7/1.7	0.55	0.75	1.7/1.7	–	FSA	<b>6SL3210-5BE15-5UV0</b>	<b>6SL3210-5BE15-5CV0</b>
0.75	1	2.2/2.2	0.75	1	2.2/2.2	–	FSA	<b>6SL3210-5BE17-5UV0</b>	<b>6SL3210-5BE17-5CV0</b>
1.1	1.5	3.1/3.1	1.1	1.5	3.1/3.1	1	FSA	<b>6SL3210-5BE21-1UV0</b>	<b>6SL3210-5BE21-1CV0</b>
1.5	2	4.1/4.1	1.5	2	4.1/4.1	1	FSA	<b>6SL3210-5BE21-5UV0</b>	<b>6SL3210-5BE21-5CV0</b>
2.2	3	5.6/4.8	2.2	3	5.6/4.8	1	FSA	<b>6SL3210-5BE22-2UV0</b>	<b>6SL3210-5BE22-2CV0</b>
3	4	7.3/7.3	3	4	7.3/7.3	1	FSB	<b>6SL3210-5BE23-0UV0</b>	<b>6SL3210-5BE23-0CV0</b>
4	5	8.8/8.24	4	5	8.8/8.24	1	FSB	<b>6SL3210-5BE24-0UV0</b>	<b>6SL3210-5BE24-0CV0</b>
5.5	7.5	12.5/11	5.5	7.5	12.5/11	1	FSC	<b>6SL3210-5BE25-5UV0</b>	<b>6SL3210-5BE25-5CV0</b>
7.5	10	16.5/16.5	7.5	10	16.5/16.5	2	FSD	<b>6SL3210-5BE27-5UV0</b>	<b>6SL3210-5BE27-5CV0</b>
11	15	25/21	11	15	25/21	2	FSD	<b>6SL3210-5BE31-1UV0</b>	<b>6SL3210-5BE31-1CV0</b>
15	20	31/31	15	20	31/31	2	FSD	<b>6SL3210-5BE31-5UV0</b>	<b>6SL3210-5BE31-5CV0</b>
22	30	45/40	18.5	25	38/34	2	FSE	<b>6SL3210-5BE31-8UV0</b>	<b>6SL3210-5BE31-8CV0</b>
30	40	60/52	22	30	45/40	2	FSE	<b>6SL3210-5BE32-2UV0</b>	<b>6SL3210-5BE32-2CV0</b>

<sup>1)</sup> Rated power of the 230 V 1 AC devices based on the output current  $I_H$ . The output current  $I_H$  is based on the duty cycle for high overload (HO): 150 %  $I_H$  for 60 s within a cycle time of 300 s.

<sup>2)</sup> The output current  $I_H$  is based on the duty cycle for high overload (HO): 150 %  $I_H$  for 60 s within a cycle time of 300 s.

<sup>3)</sup> EN 61800-3 category C1, 1st environment (residential, commercial). Max. shielded motor cable length 5 m for frame sizes FSA and FSAB with or without external line filter.

<sup>4)</sup> Single-phase devices can also be connected to two phases of a 3-phase 230 V power supply system. You can find detailed information here: <https://support.industry.siemens.com/cs/document/109476260>

<sup>5)</sup> EN 61800-3 Category C2, 1st environment (residential, commercial). Max. shielded motor cable length 25 m for frame sizes FSB and FSC.

<sup>6)</sup> Rated power of the 400 V 3 AC devices based on the output current  $I_L$ . The output current  $I_L$  is based on the duty cycle for low overload (LO): 110 %  $I_L$  for 60 s within a cycle time of 300 s.

<sup>7)</sup> The output current  $I_L$  is based on the duty cycle for low overload (LO): 110 %  $I_L$  for 60 s within a cycle time of 300 s.

<sup>8)</sup> EN 61800-3 Category C3, 2nd environment (industrial). Shielded motor cable length for frame size FSA max. 10 m, for frame sizes FSB to FSD max. 25 m and for frame size FSE max. 50 m. To achieve 25 m of shielded motor cable length, even for C2 category FSA converters, unfiltered converters with external line filters must be used.

## Selection and ordering data (continued)

### Accessories

Description	Article No.
<b>RS485 terminating resistor</b> Content: 50 units	<b>6SL3255-0VC00-0HA0</b>
<b>DIN rail mounting set</b>	
<ul style="list-style-type: none"> <li>For frame sizes FSAA, FSAB, and FSA               <ul style="list-style-type: none"> <li>For frame sizes FSAA and FSAB, the migration mounting set is also required for installation</li> <li>For frame size FSA with fan, the operating instructions must be followed for assembly</li> </ul> </li> </ul>	<b>6SL3261-1BA00-0AA0</b>
<ul style="list-style-type: none"> <li>For frame size FSB</li> </ul>	<b>6SL3261-1BB00-0AA0</b>
<b>Migration mounting set</b> Required in addition to the DIN rail mounting set for installing frame sizes FSAA and FSAB	<b>6SL3266-1ER00-0VA0</b>

## Technical specifications

	SINAMICS V20
<b>Power range</b>	230 V 1 AC: 0.12 ... 3 kW (0.16 ... 4 hp) 400 V 3 AC: 0.37 ... 30 kW (0.5 ... 40 hp)
<b>Offset factor <math>\cos \phi</math></b>	$\geq 0.95$
<b>Power factor <math>\lambda</math></b>	0.72
<b>Line voltage</b>	230 V 1 AC: 200 ... 240 V 1 AC (-10 ... +10 %) <sup>1)</sup> 400 V 3 AC: 380 ... 480 V 3 AC (-15 ... +10 %)
<b>Maximum output voltage</b>	100 % of input voltage
<b>Line frequency</b>	50 Hz/60 Hz
<b>Line supply type</b>	<ul style="list-style-type: none"> <li>TN, TT, TT grounded line supply</li> <li>IT for               <ul style="list-style-type: none"> <li>230 V 1 AC unfiltered devices, frame sizes FSAA/FSAB</li> <li>400 V 3 AC unfiltered devices</li> </ul> </li> </ul>
<b>Overload capability</b>	<ul style="list-style-type: none"> <li>Up to 15 kW               <ul style="list-style-type: none"> <li>High overload (HO): 150 % <math>I_H</math> for 60 s within a cycle time of 300 s.</li> </ul> </li> <li>From 18.5 kW               <ul style="list-style-type: none"> <li>Low overload (LO): 110 % <math>I_L</math> for 60 s within a cycle time of 300 s.</li> <li>High overload (HO): 110 % <math>I_H</math> for 60 s within a cycle time of 300 s.</li> </ul> </li> </ul>
<b>Output frequency</b>	0 ... 550 Hz, resolution: 0.01 Hz
<b>Pulse frequency</b>	2 ... 16 kHz
<b>Efficiency</b>	98 %
<b>Programmable fixed frequency setpoints</b>	16
<b>Analog inputs</b>	AI1: bipolar current/voltage mode AI2: unipolar current/voltage mode can be used as digital inputs
<ul style="list-style-type: none"> <li>Resolution</li> </ul>	12 bit
<b>Analog output</b>	AO1 current output 0 ... 20 mA
<b>Digital inputs</b>	DI1 ... DI4: isolated; for 400 V converters with optional SINAMICS V20 I/O Extension Module two additional digital inputs DI5 and DI6 PNP/NPN selectable via terminal
<ul style="list-style-type: none"> <li>Input current, max.</li> </ul>	15 mA
<b>Digital outputs</b>	DO1: transistor output DO2: relay output; for 400 V converters with optional SINAMICS V20 I/O Extension Module two additional digital outputs (relay outputs) DO3 and DO4 250 V AC 0.5 A with resistive load 30 V DC 0.5 A with resistive load
<b>Integrated interface</b>	
<ul style="list-style-type: none"> <li>Type</li> <li>Protocols</li> </ul>	RS485 USS, Modbus RTU
<b>Extension interface</b>	SINAMICS V20 BOP Interface, SINAMICS V20 Smart Access, SINAMICS V20 Parameter Loader, SINAMICS V20 I/O Extension Module (cannot be operated simultaneously with SINAMICS V20 Parameter Loader)

<sup>1)</sup> Single-phase devices can also be connected to two phases of a 3-phase 230 V power supply system. You can find detailed information at: <https://support.industry.siemens.com/cs/document/109476260>

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**SINAMICS V20 basic converters****Technical specifications** (continued)

	SINAMICS V20
<b>Control modes</b>	
• V/f linear/square/multi-point	✓
• V/f with flux current control (FCC)	✓
<b>Functions</b>	
<b>Easy to use</b>	
Automatic restart	✓
Parameter cloning	✓
Drive data sets (DDS)	✓ (3)
Command data sets (CDS)	✓ (3)
JOG	✓
Pre-configured connection macros and application macros	✓
Simple parameter-based menu on internal or external SINAMICS V20 BOP	✓
Simple text menu for setup	✓
USS	✓
Modbus RTU	✓
Motor frequency display scaling	✓
Customization of parameter defaults	✓
Energy consumption monitoring	✓
List of modified parameters	✓
Converter status in case of a fault	✓
<b>Application</b>	
Keep Running Mode	✓
Flying restart	✓
PID controller	✓
Kinetic buffering ( $V_{DC\ min}$ controller)	✓
Skippable frequency bandwidth	4
<b>Braking functions</b>	
• DC braking	✓
• Compound braking	✓
• Dynamic braking	✓
2-wire/3-wire control	✓
Mechanical holding brake control	✓
Super torque mode	✓
Hammer start mode	✓
Blockage clearing mode	✓
Hibernation mode	✓
Motor staging	✓
Multi-pump control <sup>1)</sup> (for 400 V converters with optional SINAMICS V20 I/O Extension Module)	✓
Dual ramp parameterizable	✓
Wobble function	✓
BICO function	✓
Slip compensation	✓

	SINAMICS V20
<b>Protection</b>	
DC link voltage control	✓
Load torque monitoring	✓
Phase loss detection	✓
Cavitation protection	✓
Condensation protection	✓
Frost protection	✓
<b>Control</b>	
ECO mode	✓
$V_{DC\ max}$ controller	✓
$I_{max}$ controller	✓
Programmable V/f coordinates	✓
Flexible voltage boost	✓
50/60 Hz adaptation	✓

<sup>1)</sup> Further information on the multi-pump control can be found in the operating instructions and on the Internet at:  
[www.siemens.com/sinamics-v20/documentation](http://www.siemens.com/sinamics-v20/documentation)

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### SINAMICS V20 basic converters

#### Technical specifications (continued)

SINAMICS V20	
<b>General technical specifications</b>	
<b>Degree of protection</b>	IP20
<b>Mounting</b>	Wall mounting, side-by-side mounting, push-through mounting for FSB, FSC, FSD, and FSE
<b>Ambient temperature</b>	
• Operation	-10 ... +40 °C (14 ... 104 °F) without derating >40 ... 60 °C (104 ... 140 °F) with derating
• Storage	-40 ... +70 °C (-40 ... +158 °F)
<b>Relative humidity</b>	95 % (non-condensing)
<b>Cooling</b>	
• FSAA, FSAB, FSA up to 0.75 kW	Convection cooling
• FSA, FSB, FSC, FSD, FSE	Power electronics cooled using heat sinks with external fan
<b>Installation altitude</b>	Up to 4000 m (13124 ft) above sea level 1000 ... 4000 m (3281 ... 13124 ft): output current derating 2000 ... 4000 m (6562 ... 13124 ft): input voltage derating
<b>Motor cable length</b>	
• Unshielded	
- FSAA to FSD	50 m (164 ft)
- FSE	100 m (328 ft)
• Shielded	
- FSA	10 m (32.8 ft) for converter size FSA with integrated line filter category C3 To achieve 25 m (82 ft) shielded motor cable length, unfiltered converters with external line filters have to be used
- FSAA to FSD	25 m (82 ft)
- FSE	50 m (164 ft)
• Longer motor cables with an additional output reactor	
- 230 V 1 AC	200 m (656 ft) (shielded and unshielded)
- 400 V 3 AC	150 m (492 ft) (shielded and unshielded) for frame sizes FSA to FSD 200 m/300 m (656 ft/984 ft) (shielded/unshielded) for frame size FSE
<b>Vibration load</b>	
• Transport	5 ... 9 Hz: Deflection, 3.5 mm 9 ... 200 Hz: Vibration $1 \times g$ Vibration class: 2M3
• Operation	Area of application IIa 10 ... 58 Hz: Deflection, 0.075 mm 58 ... 200 Hz: Vibration $1 \times g$
<b>Shock load</b>	
• Operation	Area of application II Peak acceleration: $5 \times g$ Duration of shock: 30 ms

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### SINAMICS V20 basic converters

#### Technical specifications (continued)

SINAMICS V20								
General technical specifications (continued)								
	FSAA without fan	FSAB without fan	FSA without fan	FSA with 1 fan	FSB with 1 fan	FSC with 1 fan	FSD with 2 fans	FSE with 2 fans
<b>Dimensions</b>								
• Width in mm (in)	68 (2.68)	68 (2.68)	90 (3.54)	90 (3.54)	140 (5.51)	184 (7.24)	240 (9.45)	245 (9.65)
• Height in mm (in)	142 (5.59)	142 (5.59)	150 (5.91)	166 (6.54)	160 (6.3)	182 (7.17)	206.5 (8.13)	264.5 (10.41)
• Depth in mm (in)	107.8 (4.24)	127.8 (5.03)	145.5 (5.73)	145.5 (5.73)	164.5 (6.48)	169 (6.65)	172.5 (6.79)	209 (8.23)
<b>Weight, approx.</b>								
• 230 V 1 AC								
- Without integrated line filter	0.6 kg (1.32 lb)	0.8 kg (1.76 lb)	–	–	1.6 kg (3.53 lb)	2.5 kg (5.51 lb)	–	–
- With integrated line filter category C1	0.7 kg (1.54 lb)	0.9 kg (1.98 lb)	–	–	–	–	–	–
- With integrated line filter category C2	–	–	–	–	1.8 kg (3.97 lb)	2.8 kg (6.17 lb)	–	–
• 400 V 3 AC								
- Without integrated line filter	–	–	0.9 kg (1.98 lb)	1 kg (2.21 lb)	1.6 kg (3.53 lb)	2.4 kg (5.29 lb)	3.9 kg (8.60 lb)	6.4 kg (14.1 lb)
- With integrated line filter category C3	–	–	1 kg (2.21 lb)	1.1 kg (2.43 lb)	1.8 kg (3.97 lb)	2.6 kg (5.73 lb)	4.3 kg (9.48 lb)	7 kg (15.4 lb)
<b>Mounting clearance, min.</b>								
• Top	100 mm (3.94 in)							
• Bottom	100 mm (3.94 in) 85 mm (3.35 in) for fan-cooled FSA							
• Side	0 mm							
<b>Certificates of suitability</b>								
cULus, CE, RCM, KC								
<b>Environmental classes</b>								
Pollution class: 3S2 Gas class: 3C2 (SO <sub>2</sub> , H <sub>2</sub> S) Climate class: 3K3								
<b>CE marking, according to</b>								
European Low Voltage Directive (EN 61800-5-1/EN 60204-1) and European EMC Directive (EN 61800-3)								
<b>UL marking, according to</b>								
UL508C								
<b>EMC standards, radiated emissions and disturbance voltage (conducted emissions)</b>								
• EN 61800-3 category C1, 1st environment (residential, commercial)	230 V 1 AC, FSAA and FSAB with integrated line filter, or unfiltered with external line filter, shielded cables ≤5 m (4.92 ft)							
• EN 61800-3 category C2, 1st environment (residential, commercial)	<ul style="list-style-type: none"> <li>• 230 V 1 AC, FSB and FSC with integrated line filter, shielded cables ≤25 m (82 ft)</li> <li>• 400 V 3 AC without integrated line filter with external line filter, shielded cables, FSA <sup>1)</sup> up to FSE ≤25 m (82 ft)</li> </ul>							
• EN 61800-3 category C3, 2nd environment (industrial)	<ul style="list-style-type: none"> <li>• 400 V 3 AC with integrated line filter, shielded cables, FSA ≤10 m (32.8 ft), FSB to FSD ≤25 m (82 ft), FSE ≤50 m (164 ft)</li> </ul>							
<b>Note</b>								
The EMC product standard EN 61800-3 does not apply directly to a frequency converter but to a PDS (Power Drive System), which covers the complete circuitry, motor and cables in addition to the converter. The converters themselves are in general not subject to marking in accordance with the EMC directive.								

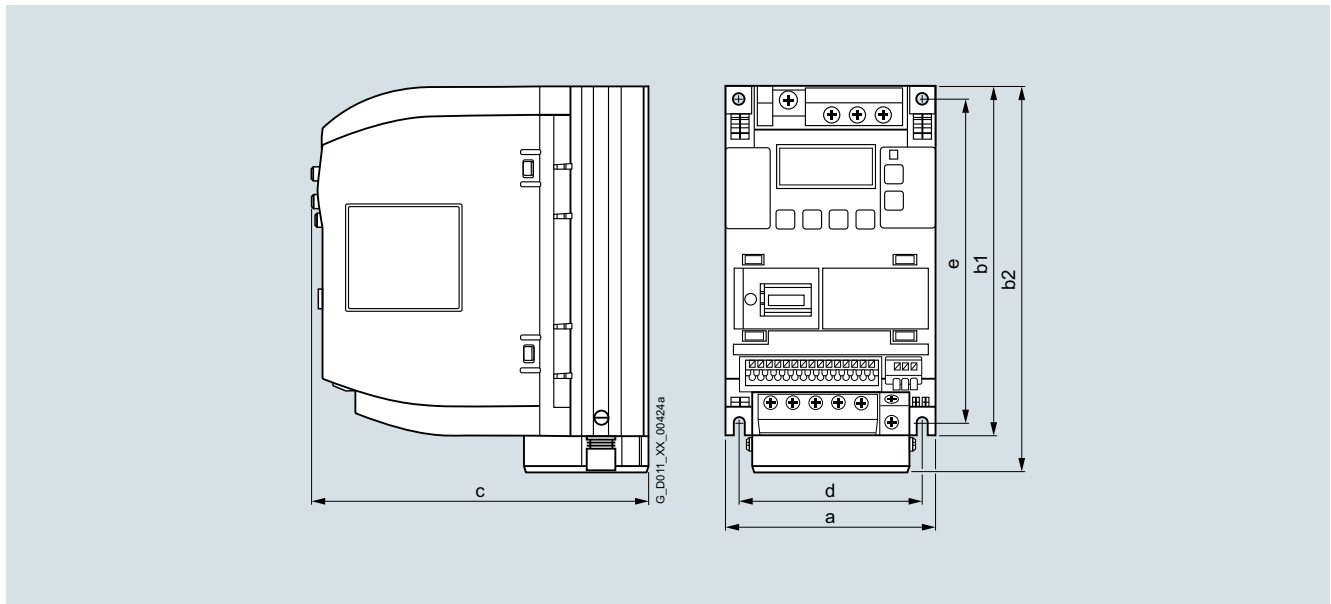
<sup>1)</sup> To achieve 25 m (82 ft) shielded motor cable lengths with FSA frame size converters, unfiltered converters with external line filters have to be used.

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### SINAMICS V20 basic converters

#### Dimensional drawings



Frame size	Dimensions in mm (inches)				Drilling dimensions in mm (inches)	
	a (width)	b1 (height) without fan	b2 (height) with fan	c (depth)	d	e
FSAA	68 (2.68)	142 (5.59)	–	107.8 (4.24)	58 (2.28)	132 (5.2)
FSAB	68 (2.68)	142 (5.59)	–	127.8 (5.03)	58 (2.28)	132 (5.2)
FSA	90 (3.54)	150 (5.91)	166 (6.54)	145.5 (5.73)	79 (3.11)	140 (5.51)
FSB	140 (5.51)	–	160 (6.3)	164.5 (6.48)	127 (5)	135 (5.31)
FSC	184 (7.24)	–	182 (7.17)	169 (6.65)	170 (6.69)	140 (5.51)
FSD	240 (9.45)	–	206.5 (8.13)	172.5 (6.79)	223 (8.78)	166 (6.54)
FSE	245 (9.65)	–	264.5 (10.41)	209 (8.23)	228 (8.98)	206 (8.11)

Frame size	Mounting clearance, min. in mm (inches)		
	Top	Bottom	Side
FSAA and FSAB	100 (3.94)	100 (3.94)	0
FSA without fan	100 (3.94)	100 (3.94)	0
FSA with fan	100 (3.94)	85 (3.35)	0
FSB to FSE	100 (3.94)	100 (3.94)	0

#### More information

A Getting Started Manual is supplied in hard copy form with every SINAMICS V20. Further documentation, such as Operating Instructions and List Manuals, is available for download free of charge from the Internet at:

[www.siemens.com/sinamics-v20/documentation](http://www.siemens.com/sinamics-v20/documentation)

Detailed information on SINAMICS V20, the latest technical documentation (brochures, dimensional drawings, certificates, manuals and operating instructions) is available on the Internet at:

[www.siemens.com/sinamics-v20](http://www.siemens.com/sinamics-v20)

In addition, the Drive Technology Configurator (DT Configurator) can be used on the Internet. The DT Configurator can be found in the Siemens Industry Mall at the following address:

[www.siemens.com/dt-configurator](http://www.siemens.com/dt-configurator)

Furthermore, the SINAMICS SELECTOR app is a practical tool that helps you find article numbers for SINAMICS V20, SINAMICS G120C, SINAMICS G120P and SINAMICS G120 converters in the output range from 0.12 kW to 630 kW quickly and easily. You will find the free downloads for Android and for iOS at the following link:

[www.siemens.com/sinamics-selector](http://www.siemens.com/sinamics-selector)



**SINAMICS V20 basic converters**

0.12 kW to 30 kW (0.16 hp to 40 hp)

**SINAMICS V20 Starter Kit****Overview****SINAMICS V20 Starter Kit**

A SINAMICS V20 Starter Kit comprises the following components:

- SINAMICS V20 converter (230 V 1 AC with integrated filter, frame size FSAA, 0.37 kW)
- SINAMICS V20 BOP (Basic Operator Panel)
- SINAMICS V20 BOP Interface
- SINAMICS V20 Parameter Loader
- SINAMICS V20 Smart Access

The delivery quantity is limited to three per customer.

**Selection and ordering data**

Description	Article No.
<b>SINAMICS V20 Starter Kit</b>	<b>NEW 6SL3200-0AE50-0AA0</b>

## SINAMICS V20 basic converters

0.12 kW to 30 kW (0.16 hp to 40 hp)

Line-side components > Line filters

### Overview



Line filter for frame size FSA

230 V converters without integrated line filters can satisfy EN 61800-3 category C1 with the specified line filters class B when used with a shielded output cable with a maximum length of 5 m.

230 V converters with integrated line filters frame sizes FSB and FSC satisfy the requirements of EN 61800-3 category C2 even without an external line filter when they are used with a shielded output cable with a maximum length of 25 m.

400 V converters with or without integrated line filters can satisfy EN 61800-3 category C2 with the line filters class B listed below if they are used with a shielded output cable with a maximum length of 25 m.

## SINAMICS V20 basic converters

0.12 kW to 30 kW (0.16 hp to 40 hp)

Line-side components > Line filters

### Selection and ordering data

Rated power		SINAMICS V20		Line filter class B for category C1, shielded motor cable length max. 5 m
kW	hp	6SL3210-	Frame size	Article No.
<b>200 ... 240 V 1 AC</b>				
0.12	0.16	5BB11-2UV1	FSAA	<b>6SL3203-0BB21-8VA0</b>
0.25	0.33	5BB12-5UV1	FSAA	
0.37	0.5	5BB13-7UV1	FSAA	
0.55	0.75	5BB15-5UV1	FSAB	
0.75	1	5BB17-5UV1	FSAB	

Rated power		SINAMICS V20		Line filter class B for category C2, shielded motor cable length max. 25 m
kW	hp	6SL3210-	Frame size	Article No.
<b>200 ... 240 V 1 AC</b>				
1.1	1.5	5BB21-1 . V0	FSB	<b>6SE6400-2FL02-6BB0</b>
1.5	2	5BB21-5 . V0	FSB	
2.2	3	5BB22-2 . V0	FSC	

Rated power		SINAMICS V20		Line filter class B for category C2, shielded motor cable length max. 25 m
kW	hp	6SL3210-	Frame size	Article No.
<b>380 ... 480 V 3 AC</b>				
0.37	0.5	5BE13-7UV0	FSA	<b>6SL3203-0BE17-7BA0</b>
0.55	0.75	5BE15-5UV0	FSA	
0.75	1	5BE17-5UV0	FSA	
1.1	1.5	5BE21-1UV0	FSA	
1.5	2	5BE21-5UV0	FSA	
2.2	3	5BE22-2UV0	FSA	
3	4	5BE23-0UV0	FSB	<b>6SL3203-0BE21-8BA0</b>
4	5	5BE24-0UV0	FSB	
5.5	7.5	5BE25-5UV0	FSC	<b>6SL3203-0BE23-8BA0</b>
7.5	10	5BE27-5UV0	FSD	
11	15	5BE31-1UV0	FSD	
15	20	5BE31-5UV0	FSD	
22	30	5BE31-8UV0	FSE	
30	40	5BE32-2UV0	FSE	

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## SINAMICS V20 basic converters

0.12 kW to 30 kW (0.16 hp to 40 hp)

Line-side components &gt; Line filters

### Technical specifications

Line voltage 200 ... 240 V 1 AC		Line filter class B	
		6SL3203-0BB21-8VA0	6SE6400-2FL02-6BB0
<b>Rated current</b>	A	18	26
<b>Line supply connection</b>		Screw terminal	Screw terminal
• Conductor cross-section	mm <sup>2</sup>	0.25 ... 10	1.5 ... 6
<b>Load connection</b>		Shielded cable	Shielded cable
• Length	m (ft)	20 (65.6)	0.43 (1.41)
<b>PE connection</b>		M5 stud	M5 stud
<b>Degree of protection</b>		IP20	IP20
<b>Dimensions</b>			
• Width	mm (in)	59 (2.32)	149 (5.87)
• Height	mm (in)	153 (6.02)	213 (8.39)
• Depth	mm (in)	55 (2.17)	50.5 (1.99)
<b>Weight, approx.</b>	kg (lb)	0.9 (1.98)	1 (2.20)
<b>Suitable for SINAMICS V20</b>	Type	6SL3210-5BB11-2UV1 6SL3210-5BB12-5UV1 6SL3210-5BB13-7UV1 FSAA 6SL3210-5BB15-5UV1 6SL3210-5BB17-5UV1 FSAB	6SL3210-5BB21-1UV0 6SL3210-5BB21-5UV0 FSB 6SL3210-5BB22-2UV0 FSC

Line voltage 380 ... 480 V 3 AC		Line filter class B			
		6SL3203-0BE17-7BA0	6SL3203-0BE21-8BA0	6SL3203-0BE23-8BA0	6SL3203-0BE27-5BA0
<b>Rated current</b>	A	11.4	23.5	49.4	72
<b>Line supply connection</b>		Screw terminals	Screw terminals	Screw terminals	Screw terminals
L1, L2, L3					
• Conductor cross-section	mm <sup>2</sup>	1 ... 2.5	2.5 ... 6	6 ... 16	16 ... 50
<b>Load connection</b>		Shielded cable	Shielded cable	Shielded cable	Shielded cable
U, V, W					
• Cable cross-section	mm <sup>2</sup>	1.5	4	10	16
• Length	m (ft)	0.45 (1.48)	0.5 (1.64)	0.54 (1.77)	1 (3.28)
<b>PE connection</b>		On housing via M5 screw stud	On housing via M5 screw stud	On housing via M6 screw studs	On housing via M6 screw studs
• Conductor cross-section	mm <sup>2</sup>	1 ... 2.5	1.5 ... 6	6 ... 16	16 ... 50
<b>Degree of protection</b>		IP20	IP20	IP20	IP20
<b>Dimensions</b>					
• Width	mm (in)	73 (2.87)	100 (3.94)	140 (5.51)	100 (3.94)
• Height	mm (in)	202 (7.95)	297 (11.69)	359 (14.13)	400 (15.75)
• Depth	mm (in)	65 (2.56)	85 (3.35)	95 (3.74)	140 (5.51)
<b>Weight, approx.</b>	kg (lb)	1.75 (3.86)	4 (8.82)	7.3 (16.1)	7.6 (16.8)
<b>Suitable for SINAMICS V20</b>	Type	6SL3210-5BE13-7UV0 6SL3210-5BE15-5UV0 6SL3210-5BE17-5UV0 6SL3210-5BE21-1UV0 6SL3210-5BE21-5UV0 6SL3210-5BE22-2UV0 FSA	6SL3210-5BE23-0UV0 6SL3210-5BE24-0UV0 FSB 6SL3210-5BE25-5UV0 FSC	6SL3210-5BE27-5UV0 6SL3210-5BE31-1UV0 6SL3210-5BE31-5UV0 FSD 6SL3210-5BE31-8UV0 FSE	6SL3210-5BE32-2UV0 FSE

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**SINAMICS V20 basic converters**

0.12 kW to 30 kW (0.16 hp to 40 hp)

Line-side components &gt; Line reactors

**Overview**

Line reactors for frame sizes FSA to FSE

Line reactors are used to smooth voltage peaks or to bridge commutating dips. Line reactors also reduce the effects of harmonics on the converter and the line supply.

**Selection and ordering data**

Rated power		SINAMICS V20		Line reactor
kW	hp	6SL3210-	Frame size	Article No.
<b>200 ... 240 V 1 AC</b>				
0.12	0.16	5BB11-2 . V1	FSAA	<b>6SE6400-3CC00-4AB3</b>
0.25	0.33	5BB12-5 . V1	FSAA	
0.37	0.5	5BB13-7 . V1	FSAA	
0.55	0.75	5BB15-5 . V1	FSAB	<b>6SE6400-3CC01-0AB3</b>
0.75	1	5BB17-5 . V1	FSAB	
1.1	1.5	5BB21-1 . V0	FSB	<b>6SE6400-3CC02-6BB3</b>
1.5	2	5BB21-5 . V0	FSB	
2.2	3	5BB22-2 . V0	FSC	
3	4	5BB23-0 . V0	FSC	<b>6SE6400-3CC03-5CB3</b>

Rated power		SINAMICS V20		Line reactor
kW	hp	6SL3210-	Frame size	Article No.
<b>380 ... 480 V 3 AC</b>				
0.37	0.5	5BE13-7 . V0	FSA	<b>6SL3203-0CE13-2AA0</b>
0.55	0.75	5BE15-5 . V0	FSA	
0.75	1	5BE17-5 . V0	FSA	
1.1	1.5	5BE21-1 . V0	FSA	<b>6SL3203-0CE21-0AA0</b>
1.5	2	5BE21-5 . V0	FSA	
2.2	3	5BE22-2 . V0	FSA	
3	4	5BE23-0 . V0	FSB	<b>6SL3203-0CE21-8AA0</b>
4	5	5BE24-0 . V0	FSB	
5.5	7.5	5BE25-5 . V0	FSC	<b>6SL3203-0CE21-8AA0</b>
7.5	10	5BE27-5 . V0	FSD	
11	15	5BE31-1 . V0	FSD	<b>6SL3203-0CE23-8AA0</b>
15	20	5BE31-5 . V0	FSD	
22	30	5BE31-8 . V0	FSE	<b>6SL3203-0CJ24-5AA0</b>
30	40	5BE32-2 . V0	FSE	<b>6SL3203-0CD25-3AA0</b>

## SINAMICS V20 basic converters

0.12 kW to 30 kW (0.16 hp to 40 hp)

Line-side components > Line reactors

### Technical specifications

Line voltage 200 ... 240 V 1 AC		Line reactor			
		6SE6400-3CC00-4AB3	6SE6400-3CC01-0AB3	6SE6400-3CC02-6BB3	6SE6400-3CC03-5CB3
<b>Rated current</b>	A	3.4	8.1	22.8	29.5
<b>Line supply/load connection</b>		Screw terminals	Screw terminals	Screw terminals	Screw terminals
• Conductor cross-section	mm <sup>2</sup>	1 ... 2.5	1 ... 2.5	1.5 ... 6	2.5 ... 10
<b>PE connection</b>		M5 stud bolts	M5 stud bolts	M5 stud bolts	M5 stud bolts
<b>Degree of protection</b>		IP20	IP20	IP20	IP20
<b>Dimensions</b>					
• Width	mm (in)	75.5 (2.97)	75.5 (2.97)	150 (5.91)	185 (7.28)
• Height	mm (in)	200 (7.87)	200 (7.87)	213 (8.39)	245 (9.65)
• Depth	mm (in)	50 (1.97)	50 (1.97)	50 (1.97)	50 (1.97)
<b>Weight, approx.</b>	kg (lb)	0.5 (1.10)	0.5 (1.10)	1.2 (2.65)	3.05 (6.72)
<b>Suitable for SINAMICS V20</b>	Type	6SL3210-5BB11-2 . V1 6SL3210-5BB12-5 . V1 FSA	6SL3210-5BB13-7 . V1 FSA	6SL3210-5BB21-1 . V0 6SL3210-5BB21-5 . V0 FSB	6SL3210-5BB23-0 . V0 FSC

Line voltage 380 ... 480 V 3 AC		Line reactor					
		6SL3203- OCE13-2AA0	6SL3203- OCE21-0AA0	6SL3203- OCE21-8AA0	6SL3203- OCE23-8AA0	6SL3203- OCJ24-5AA0	6SL3203- OCD25-3AA0
<b>Rated current</b>	A	4	11.3	22.3	47	47	63
<b>Power loss</b> at 50/60 Hz	W	23/26	36/40	53/59	88/97	90/115	90/115
<b>Line supply/load connection</b>		Screw terminals	Screw terminals	Screw terminals	Screw terminals	Screw terminals	Screw terminals
1L1, 1L2, 1L3 2L1, 2L2, 2L3							
• Conductor cross-section	mm <sup>2</sup>	4	4	10	16	16	16
<b>PE connection</b>		M4 × 8; U washer; spring lock washer	M4 × 8; U washer; spring lock washer	M5 × 10; U washer; spring lock washer	M5 × 10; U washer; spring lock washer	M8 screw	M8 screw
<b>Degree of protection</b>		IP20	IP20	IP20	IP20	IP20	IP20
<b>Dimensions</b>							
• Width	mm (in)	125 (4.92)	125 (4.92)	125 (4.92)	190 (7.48)	275 (10.8)	275 (10.8)
• Height	mm (in)	120 (4.72)	140 (5.51)	145 (5.71)	220 (8.66)	455 (17.9)	455 (17.9)
• Depth	mm (in)	71 (2.8)	71 (2.8)	91 (3.58)	91 (3.58)	84 (3.31)	84 (3.31)
<b>Weight, approx.</b>	kg (lb)	1.1 (2.43)	2.1 (4.63)	2.95 (6.5)	7.8 (17.2)	13 (28.7)	13 (28.7)
<b>Suitable for SINAMICS V20</b>	Type	6SL3210- 5BE13-7 . V0 6SL3210- 5BE15-5 . V0 6SL3210- 5BE17-5 . V0 6SL3210- 5BE21-1 . V0 FSA	6SL3210- 5BE21-5 . V0 6SL3210- 5BE22-2 . V0 FSA	6SL3210- 5BE25-5 . V0 FSC 6SL3210- 5BE27-5 . V0 FSD	6SL3210- 5BE31-1 . V0 6SL3210- 5BE31-5 . V0 FSD	6SL3210- 5BE31-8 . V0 FSE	6SL3210- 5BE32-2 . V0 FSE

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## SINAMICS V20 basic converters

0.12 kW to 30 kW (0.16 hp to 40 hp)

### Line-side components > Recommended line-side overcurrent protection devices

#### Selection and ordering data

Overcurrent protection devices are absolutely necessary for the operation of the converters. The following table lists recommendations for fuses.

- Siemens fuses of type 3NA3 for use in the area of validity of IEC
- UL-listed fuses Class J for use in USA and Canada

Recommendations on further overcurrent protection devices are available at:

<https://support.industry.siemens.com/cs/document/109755266>

The Short Circuit Current Rating (SCCR) according to UL for industrial control panel installations to NEC Article 409 or UL 508A/508C or UL 61800-5-1 is as follows for Class J fuses for

- SINAMICS V20: 65 kA

SCCR and ICC values for combination with further overcurrent protection devices are available at:

<https://support.industry.siemens.com/cs/document/109755266>

#### Notes for installations in Canada:

The converters are intended for line supply systems with over-voltage category III. More information is available in the technical documentation on the Internet at:

[www.siemens.com/sinamics-v20/documentation](http://www.siemens.com/sinamics-v20/documentation)

More information about the listed Siemens fuses is available in Catalog LV 10 as well as in the Industry Mall.

Rated power		SINAMICS V20		IEC-compliant		UL/cUL-compliant	
				Fuse		Fuse type	
				Current		Rated voltage 600 V AC	
kW	hp	6SL3210-	Frame size	A	Article No.	Class	Current A
<b>200 ... 240 V 1 AC</b>							
0.12	0.16	5BB11-2 . V1	FSAA	10	<b>3NA3803</b>	J	15
0.25	0.33	5BB12-5 . V1	FSAA	10	<b>3NA3803</b>	J	15
0.37	0.5	5BB13-7 . V1	FSAA	10	<b>3NA3803</b>	J	15
0.55	0.75	5BB15-5 . V1	FSAB	10	<b>3NA3803</b>	J	15
0.75	1	5BB17-5 . V1	FSAB	16	<b>3NA3805</b>	J	15
1.1	1.5	5BB21-1 . V0	FSB	20	<b>3NA3807</b>	J	30
1.5	2	5BB21-5 . V0	FSB	32	<b>3NA3812</b>	J	30
2.2	3	5BB22-2 . V0	FSC	35	<b>3NA3814</b>	J	50
3	4	5BB23-0 . V0	FSC	50	<b>3NA3820</b>	J	50
<b>380 ... 480 V 3 AC</b>							
0.37	0.5	5BE13-7 . V0	FSA	6	<b>3NA3801</b>	J	15
0.55	0.75	5BE15-5 . V0	FSA	6	<b>3NA3801</b>	J	15
0.75	1	5BE17-5 . V0	FSA	6	<b>3NA3801</b>	J	15
1.1	1.5	5BE21-1 . V0	FSA	6	<b>3NA3801</b>	J	15
1.5	2	5BE21-5 . V0	FSA	10	<b>3NA3803</b>	J	15
2.2	3	5BE22-2 . V0	FSA	16	<b>3NA3805</b>	J	15
3	4	5BE23-0 . V0	FSB	16	<b>3NA3805</b>	J	20
4	5	5BE24-0 . V0	FSB	20	<b>3NA3807</b>	J	20
5.5	7.5	5BE25-5 . V0	FSC	32	<b>3NA3812</b>	J	20
7.5	10	5BE27-5 . V0	FSD	63	<b>3NA3822</b>	J	60
11	15	5BE31-1 . V0	FSD	63	<b>3NA3822</b>	J	60
15	20	5BE31-5 . V0	FSD	63	<b>3NA3822</b>	J	60
22	30	5BE31-8 . V0	FSE	63	<b>3NA3822</b>	J	80
30	40	5BE32-2 . V0	FSE	80	<b>3NA3824</b>	J	90

## SINAMICS V20 basic converters

0.12 kW to 30 kW (0.16 hp to 40 hp)

DC link components > Braking resistors

### Overview



Braking resistors for frame sizes FSA and FSC

An external braking resistor can be used to dissipate the regenerative energy produced by the motor, thus giving greatly improved braking and deceleration capabilities.

A braking resistor which is required for dynamic braking can be used with all frame sizes of converters. Frame sizes FSD and FSE have an internal braking chopper, allowing you to connect the braking resistor directly to the converter. For frame sizes FSAA to FSC, an additional Braking Module is required for connecting the braking resistor to the converter.

### Selection and ordering data

Rated power		SINAMICS V20		Braking resistor
kW	hp	6SL3210-	Frame size	Article No.
<b>200 ... 240 V 1 AC</b>				
0.12	0.16	5BB11-2 . V1	FSAA	<b>6SE6400-4BC05-0AA0</b>
0.25	0.33	5BB12-5 . V1	FSAA	
0.37	0.5	5BB13-7 . V1	FSAA	
0.55	0.75	5BB15-5 . V1	FSAB	
0.75	1	5BB17-5 . V1	FSAB	
1.1	1.5	5BB21-1 . V0	FSB	<b>6SE6400-4BC11-2BA0</b>
1.5	2	5BB21-5 . V0	FSB	
2.2	3	5BB22-2 . V0	FSC	<b>6SE6400-4BC12-5CA0</b>
3	4	5BB23-0 . V0	FSC	
<b>380 ... 480 V 3 AC</b>				
0.37	0.5	5BE13-7 . V0	FSA	<b>6SL3201-0BE14-3AA0</b>
0.55	0.75	5BE15-5 . V0	FSA	
0.75	1	5BE17-5 . V0	FSA	
1.1	1.5	5BE21-1 . V0	FSA	<b>6SL3201-0BE21-0AA0</b>
1.5	2	5BE21-5 . V0	FSA	
2.2	3	5BE22-2 . V0	FSA	<b>6SL3201-0BE21-8AA0</b>
3	4	5BE23-0 . V0	FSB	
4	5	5BE24-0 . V0	FSB	<b>6SL3201-0BE21-8AA0</b>
5.5	7.5	5BE25-5 . V0	FSC	
7.5	10	5BE27-5 . V0	FSD	<b>6SL3201-0BE23-8AA0</b>
11	15	5BE31-1 . V0	FSD	
15	20	5BE31-5 . V0	FSD	<b>6SE6400-4BD21-2DA0</b>
22	30	5BE31-8 . V0	FSE	
30	40	5BE32-2 . V0	FSE	



## SINAMICS V20 basic converters

0.12 kW to 30 kW (0.16 hp to 40 hp)

DC link components > Braking resistors

### Technical specifications

DC link voltage 240 ... 360 V DC		Braking resistor		
		6SE6400-4BC05-0AA0	6SE6400-4BC11-2BA0	6SE6400-4BC12-5CA0
<b>Resistance</b>	Ω	180	68	39
<b>Rated power <math>P_{DB}</math></b> (Continuous braking power)	kW	0.05	0.12	0.25
<b>Peak power <math>P_{max}</math></b>	kW	1	2.4	4.5
<b>Degree of protection <sup>1)</sup></b>		IP20	IP20	IP20
<b>Power connections</b>		3 × 1.5 mm <sup>2</sup> (shielded)	3 × 1.5 mm <sup>2</sup> (shielded)	3 × 1.5 mm <sup>2</sup> (shielded)
• Length	m (ft)	0.5 (1.64)	0.5 (1.64)	0.9 (2.95)
<b>Thermostatic switch (NC contact)</b>				
• Switching capacity		250 V AC/max. 2.5 A	250 V AC/max. 2.5 A	250 V AC/max. 2.5 A
• Conductor cross-section	mm <sup>2</sup>	0.5 ... 2.5	0.5 ... 2.5	0.5 ... 2.5
<b>Dimensions</b>				
• Width	mm (in)	72 (2.83)	149 (5.87)	185 (7.28)
• Height	mm (in)	230 (9.06)	239 (9.41)	285 (11.2)
• Depth	mm (in)	43.5 (1.71)	43.5 (1.71)	150 (5.91)
<b>Weight, approx.</b>	kg (lb)	1 (2.20)	1.6 (3.53)	3.8 (8.38)
<b>Certificates of suitability</b>		cURus	cURus	cURus
<b>Suitable for SINAMICS V20</b>	Type	6SL3210-5BB11-2 . V1 6SL3210-5BB12-5 . V1 6SL3210-5BB13-7 . V1 FSAA 6SL3210-5BB15-5 . V1 6SL3210-5BB17-5 . V1 FSAB	6SL3210-5BB21-1 . V0 6SL3210-5BB21-5 . V0 FSB 6SL3210-5BB22-2 . V0 FSC	6SL3210-5BB23-0 . V0 FSC

DC link voltage 510 ... 720 V DC		Braking resistor				
		6SL3201-0BE14-3AA0	6SL3201-0BE21-0AA0	6SL3201-0BE21-8AA0	6SL3201-0BE23-8AA0	6SE6400-4BD21-2DA0
<b>Resistance</b>	Ω	370	140	75	30	27
<b>Rated power <math>P_{DB}</math></b> (Continuous braking power)	kW	0.075	0.2	0.375	0.925	1.2
<b>Peak power <math>P_{max}</math></b>	kW	1.5	4	7.5	18.5	24
<b>Degree of protection <sup>1)</sup></b>		IP20	IP20	IP20	IP20	IP20
<b>Power connections</b>		M4 screw stud	M4 screw stud	M4 screw stud	M4 screw stud	M6 screw stud
<b>Thermostatic switch (NC contact)</b>						
• Switching capacity		250 V AC/ max. 2.5 A	250 V AC/ max. 2.5 A	250 V AC/ max. 2.5 A	250 V AC/ max. 2.5 A	250 V AC/ max. 2.5 A
• Conductor cross-section	mm <sup>2</sup>	0.5 ... 2.5	0.5 ... 2.5	0.5 ... 2.5	0.5 ... 2.5	0.5 ... 2.5
<b>Dimensions</b>						
• Width	mm (in)	105 (4.13)	105 (4.13)	175 (6.89)	250 (9.84)	270 (10.63)
• Height	mm (in)	295 (11.61)	345 (13.58)	345 (13.58)	490 (19.29)	515 (20.28)
• Depth	mm (in)	100 (3.94)	100 (3.94)	100 (3.94)	140 (5.51)	175 (6.89)
<b>Weight, approx.</b>	kg (lb)	1.48 (3.26)	1.8 (3.97)	2.73 (6.02)	6.2 (13.67)	7.4 (16.3)
<b>Certificates of suitability</b>		cURus	cURus	cURus	cURus	cURus
<b>Suitable for SINAMICS V20</b>	Type	6SL3210-5BE13-7 . V0 6SL3210-5BE15-5 . V0 6SL3210-5BE17-5 . V0 6SL3210-5BE21-1 . V0 6SL3210-5BE21-5 . V0 FSA	6SL3210-5BE22-2 . V0 FSA 6SL3210-5BE23-0 . V0 6SL3210-5BE24-0 . V0 FSB	6SL3210-5BE25-5 . V0 FSC 6SL3210-5BE27-5 . V0 FSD	6SL3210-5BE31-1 . V0 6SL3210-5BE31-5 . V0 FSD	6SL3210-5BE31-8 . V0 6SL3210-5BE32-2 . V0 FSE

<sup>1)</sup> With correctly connected load connection cable.

## SINAMICS V20 basic converters

0.12 kW to 30 kW (0.16 hp to 40 hp)

### DC link components > SINAMICS V20 Braking Module

#### Overview



SINAMICS V20 Braking Module

A Braking Module and the matching external braking resistor are required to bring drives to a controlled standstill in the event of a power failure.

The Braking Module is applicable for frame sizes FSAA to FSC only; FSD and FSE already have an integrated braking chopper.

#### Selection and ordering data

Description	Article No.
<b>SINAMICS V20 Braking Module</b>	<b>6SL3201-2AD20-8VA0</b>

#### Technical specifications

	<b>SINAMICS V20 Braking Module</b> 6SL3201-2AD20-8VA0
<b>Maximum power rating</b>	
• 230 V converters	3 kW with 8 A
• 400 V converters	5.5 kW with 7 A
<b>Braking chopper duty cycle, max.</b>	100 %
<b>Cable length, max.</b>	
• Braking Module to converter	1 m (3.28 ft)
• Braking Module to braking resistor	10 m (32.8 ft)
<b>Mounting</b>	Cabinet mounting (4 × M4 screws)
<b>Protective functions</b>	<ul style="list-style-type: none"> <li>• Short-circuit protection</li> <li>• Overtemperature protection</li> </ul>
<b>Dimensions</b>	
• Width	90 mm (3.54 in)
• Height	150 mm (5.91 in)
• Depth	88 mm (3.46 in)
<b>Weight, approx.</b>	0.71 kg (1.57 lb)
<b>Suitable for SINAMICS V20</b>	Frame sizes FSAA, FSAB, FSA, FSB, FSC

**SINAMICS V20 basic converters**

0.12 kW to 30 kW (0.16 hp to 40 hp)

Load-side power components &gt; Output reactors

**Overview**

Output reactors reduce the voltage stress on the motor windings. At the same time, the capacitive charging/discharging currents, which place an additional load on the power unit when long motor cables are used, are reduced.

Output reactors for frame sizes FSA and FSB

**Selection and ordering data**

Rated power		SINAMICS V20		Output reactor
kW	hp	6SL3210-	Frame size	Article No.
<b>200 ... 240 V 1 AC</b>				
0.12	0.16	5BB11-2 . V1	FSA	<b>6SE6400-3TC00-4AD3</b>
0.25	0.33	5BB12-5 . V1	FSA	
0.37	0.5	5BB13-7 . V1	FSA	
0.55	0.75	5BB15-5 . V1	FSAB	
0.75	1	5BB17-5 . V1	FSAB	
1.1	1.5	5BB21-1 . V0	FSB	<b>6SE6400-3TC01-0BD3</b>
1.5	2	5BB21-5 . V0	FSB	
2.2	3	5BB22-2 . V0	FSC	<b>6SE6400-3TC03-2CD3</b>
3	4	5BB23-0 . V0	FSC	

Rated power		SINAMICS V20		Output reactor
kW	hp	6SL3210-	Frame size	Article No.
<b>380 ... 480 V 3 AC</b>				
0.37	0.5	5BE13-7 . V0	FSA	<b>6SL3202-0AE16-1CA0</b>
0.55	0.75	5BE15-5 . V0	FSA	
0.75	1	5BE17-5 . V0	FSA	
1.1	1.5	5BE21-1 . V0	FSA	
1.5	2	5BE21-5 . V0	FSA	
2.2	3	5BE22-2 . V0	FSA	<b>6SL3202-0AE18-8CA0</b>
3	4	5BE23-0 . V0	FSB	
4	5	5BE24-0 . V0	FSB	<b>6SL3202-0AE21-8CA0</b>
5.5	7.5	5BE25-5 . V0	FSC	
7.5	10	5BE27-5 . V0	FSD	<b>6SL3202-0AE23-8CA0</b>
11	15	5BE31-1 . V0	FSD	
15	20	5BE31-5 . V0	FSD	<b>6SE6400-3TC05-4DD0</b>
22	30	5BE31-8 . V0	FSE	
30	40	5BE32-2 . V0	FSE	

## SINAMICS V20 basic converters

0.12 kW to 30 kW (0.16 hp to 40 hp)

Load-side power components &gt; Output reactors

### Technical specifications

Line voltage 200 ... 240 V 1 AC		Output reactor (for a 4 kHz pulse frequency)		
		6SE6400-3TC00-4AD3	6SE6400-3TC01-0BD3	6SE6400-3TC03-2CD3
<b>Rated current</b>	A	4	10	26
<b>Power loss, max.</b>	kW	0.0104	0.0498	0.0653
<b>Connection to the Power Module/ motor connection</b>		Screw terminals	Screw terminals	Screw terminals
• Conductor cross-section	mm <sup>2</sup>	1 ... 2.5	1.5 ... 6	2.5 ... 10
<b>PE connection</b>		M5 stud bolts	M5 stud bolts	M5 stud bolts
<b>Cable length, max.</b> between output reactor and motor				
• Shielded	m (ft)	200 (656)	200 (656)	200 (656)
• Unshielded	m (ft)	200 (656)	200 (656)	200 (656)
<b>Dimensions</b>				
• Width	mm (in)	75.5 (2.97)	150 (5.91)	185 (7.28)
• Height	mm (in)	200 (7.87)	213 (8.39)	245 (9.65)
• Depth	mm (in)	50 (1.97)	80 (3.15)	80 (3.15)
<b>Degree of protection</b>		IP20	IP20	IP20
<b>Weight, approx.</b>	kg (lb)	1.3 (2.87)	4.1 (9.04)	6.6 (14.6)
<b>Suitable for SINAMICS V20</b>	Type	6SL3210-5BB11-2 . V1 6SL3210-5BB12-5 . V1 6SL3210-5BB13-7 . V1 FSAA 6SL3210-5BB15-5 . V1 6SL3210-5BB17-5 . V1 FSAB	6SL3210-5BB21-1 . V0 6SL3210-5BB21-5 . V0 FSB 6SL3210-5BB22-2 . V0 FSC	6SL3210-5BB23-0 . V0 FSC

Line voltage 380 ... 480 V 3 AC		Output reactor (for a 4 kHz pulse frequency)				
		6SL3202- OAE16-1CA0	6SL3202- OAE18-8CA0	6SL3202- OAE21-8CA0	6SL3202- OAE23-8CA0	6SE6400- 3TC05-4DD0
<b>Rated current</b>	A	6.1	9	18.5	39	54
<b>Power loss, max.</b>	kW	0.09	0.08	0.08	0.11	0.2
<b>Connection to the Power Module/ motor connection</b>		Screw terminals	Screw terminals	Screw terminals	Screw terminals	Flat connector for cable lug
• Conductor cross-section	mm <sup>2</sup>	4	4	10	16	M6
<b>PE connection</b>		M4 screw stud	M4 screw stud	M5 screw stud	M5 screw stud	M6 screw
<b>Cable length, max.</b> between output reactor and motor						
• Shielded	m (ft)	150 (492)	150 (492)	150 (492)	150 (492)	200 (656)
• Unshielded	m (ft)	150 (492)	150 (492)	150 (492)	150 (492)	300 (984)
<b>Dimensions</b>						
• Width	mm (in)	207 (8.15)	207 (8.15)	247 (9.72)	257 (10.12)	225 (8.86)
• Height	mm (in)	175 (6.89)	180 (7.09)	215 (8.46)	235 (9.25)	210 (8.27)
• Depth	mm (in)	72.5 (2.85)	72.5 (2.85)	100 (3.94)	114.7 (4.52)	150 (5.91)
<b>Degree of protection</b>		IP20	IP20	IP20	IP20	IP00
<b>Weight, approx.</b>	kg (lb)	3.4 (7.50)	3.9 (8.60)	10.1 (22.3)	11.2 (24.7)	10.7 (23.6)
<b>Suitable for SINAMICS V20</b>	Type	6SL3210- 5BE13-7 . V0 6SL3210- 5BE15-5 . V0 6SL3210- 5BE17-5 . V0 6SL3210- 5BE21-1 . V0 6SL3210- 5BE21-5 . V0 FSA	6SL3210- 5BE22-2 . V0 FSA 6SL3210- 5BE23-0 . V0 FSB	6SL3210- 5BE24-0 . V0 FSB 6SL3210- 5BE25-5 . V0 FSC	6SL3210- 5BE27-5 . V0 6SL3210- 5BE31-1 . V0 6SL3210- 5BE31-5 . V0 FSD	6SL3210- 5BE31-8 . V0 6SL3210- 5BE32-2 . V0 FSE

## SINAMICS V20 basic converters

0.12 kW to 30 kW (0.16 hp to 40 hp)

Supplementary system components > SINAMICS V20 Parameter Loader

### Overview



SINAMICS V20 Parameter Loader

Up to 100 parameter sets with parameter settings can be written from the memory card to the converter or saved from the converter to the memory card without connecting the converter to the line supply.

### Design

- SD card socket
- 5 V DC socket for connection to an external DC power supply
- Battery supply (2 × AA) integrated  
Enables the SINAMICS V20 Parameter Loader to be operated and data uploaded and downloaded even when mains power is not available. If the converter is being supplied from the mains power, the battery power can be omitted for the SINAMICS V20 Parameter Loader.

### Function

With the SINAMICS V20 Parameter Loader, parameter sets can be uploaded and downloaded between the converter and an SD card.

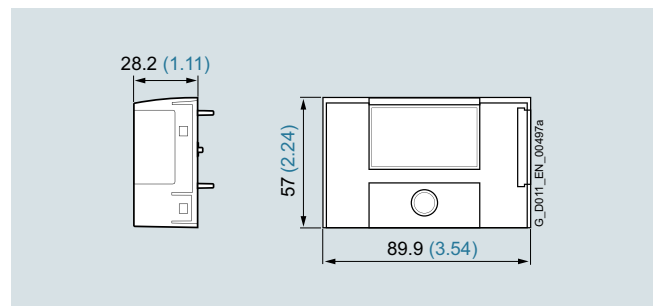
### Integration

The SINAMICS V20 Parameter Loader and the SINAMICS V20 I/O Extension Module cannot be operated simultaneously.

### Selection and ordering data

Description	Article No.
<b>SINAMICS V20 Parameter Loader</b> For uploading/downloading parameter sets between the converter and an SD card	<b>6SL3255-0VE00-0UA1</b>
<b>Accessories</b>	
<b>SINAMICS SD card</b>	<b>6SL3054-4AG00-2AA0</b>

### Dimensional drawings



SINAMICS V20 Parameter Loader

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

## SINAMICS V20 basic converters

0.12 kW to 30 kW (0.16 hp to 40 hp)

### Supplementary system components > SINAMICS V20 BOP and SINAMICS V20 BOP Interface

#### Overview



SINAMICS V20 BOP

The SINAMICS V20 supports an external SINAMICS V20 BOP (Basic Operator Panel) for remote control of the converter.



SINAMICS V20 BOP Interface

The SINAMICS V20 BOP Interface is used for connecting the SINAMICS V20 BOP to enable remote control of the converter.

The SINAMICS V20 BOP Interface has an RS232 interface for connecting the SINAMICS V20 BOP to the converter, and a plug connector for connection to the expansion port of the converter.

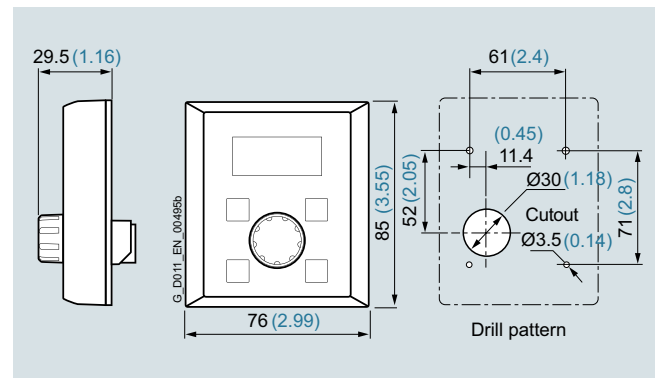
#### Integration

The SINAMICS V20 BOP is connected to the converter via the optional SINAMICS V20 BOP Interface.

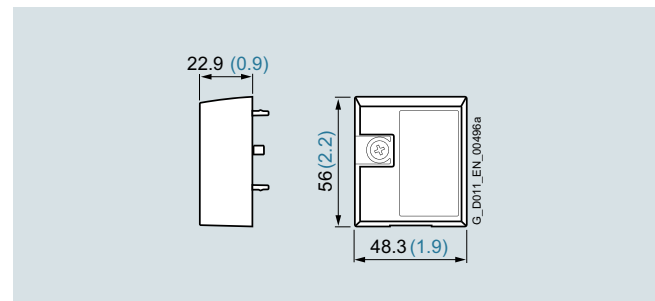
#### Selection and ordering data

Description	Article No.
<b>SINAMICS V20 BOP (Basic Operator Panel)</b> For remote control of the converter  To connect the SINAMICS V20 BOP to the converter, the SINAMICS V20 BOP Interface must be ordered together with a network cable with a standard RJ45 connector.	<b>6SL3255-0VA00-4BA1</b>
<b>SINAMICS V20 BOP Interface</b> incl. plug connector for connection to converter  The BOP Interface connects the SINAMICS V20 BOP to the converter.	<b>6SL3255-0VA00-2AA1</b>

#### Dimensional drawings



SINAMICS V20 BOP



SINAMICS V20 BOP Interface

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

**SINAMICS V20 basic converters**

0.12 kW to 30 kW (0.16 hp to 40 hp)

Supplementary system components &gt; SINAMICS V20 Smart Access

**Overview**

SINAMICS V20 Smart Access

It is also easy and convenient to commission and operate the SINAMICS V20 frequency converter using a smartphone, tablet, or laptop and the SINAMICS V20 Smart Access web server module.

**Integration**

SINAMICS V20 with Smart Access

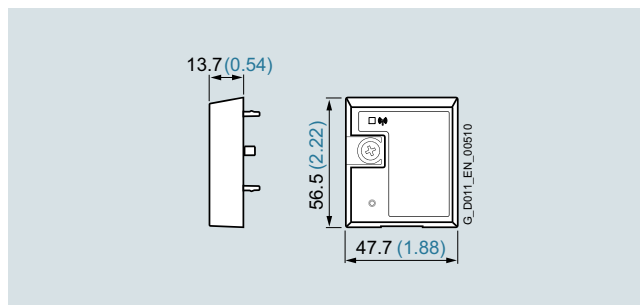
The optional SINAMICS V20 Smart Access is simply plugged onto the converter.

**Function**

- Commissioning using commissioning wizard
- Setting and saving parameters
- Testing motor in JOG mode
- Monitoring of converter data
- Quick diagnostics
- Saving the settings and restoring to factory settings

**Selection and ordering data**

Description	Article No.
<b>SINAMICS V20 Smart Access</b> For wireless commissioning, operation and diagnostics of the converter using a smartphone, tablet, or laptop	<b>NEW 6SL3255-0VA00-5AA0</b>

**Dimensional drawings**

SINAMICS V20 Smart Access

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

## SINAMICS V20 basic converters

0.12 kW to 30 kW (0.16 hp to 40 hp)

Supplementary system components > SINAMICS V20 I/O Extension Module

### Overview



SINAMICS V20 I/O Extension Module

The SINAMICS V20 I/O Extension Module can be directly mounted on the 400 V converters and thus provides two additional digital inputs and two additional digital outputs (relay outputs).

Use of the SINAMICS V20 I/O Extension Module enhances the flexibility of the 400 V converter without additional outlay for installation, hardware and software. This provides additional functionalities such as multi-pump control, with which up to four pumps can be controlled with a frequency converter<sup>1)</sup>.

Typical areas of use are pump, fan and compressor applications or applications that require additional digital inputs and digital outputs.

### Integration



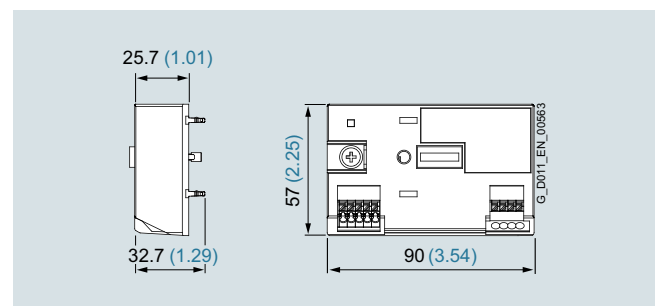
The optional SINAMICS V20 I/O Extension Module is simply plugged onto the converter. Equipped with connections at the front and rear, the SINAMICS V20 I/O Extension Module can be used in combination with other accessories of the SINAMICS V20 converter such as the Smart Access or the BOP and the BOP Interface.

The SINAMICS V20 I/O Extension Module and the SINAMICS V20 Parameter Loader cannot be operated simultaneously.

### Selection and ordering data

Description	Article No.
<b>SINAMICS V20 I/O Extension Module</b> For expansion of the 400 V converters with two digital inputs and two digital outputs (relay outputs)	<b>NEW 6SL3256-0VE00-6AA0</b>

### Dimensional drawings



SINAMICS V20 I/O Extension Module

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

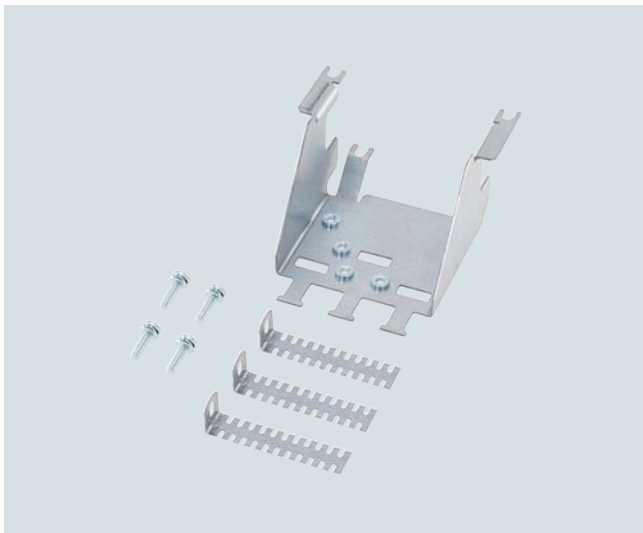
<sup>1)</sup> Further information on the multi-pump control can be found in the operating instructions and on the Internet at: [www.siemens.com/sinamics-v20/documentation](http://www.siemens.com/sinamics-v20/documentation)



**SINAMICS V20 basic converters**

0.12 kW to 30 kW (0.16 hp to 40 hp)

Supplementary system components &gt; SINAMICS V20 shield connection kits

**Overview**

SINAMICS V20 shield connection kit

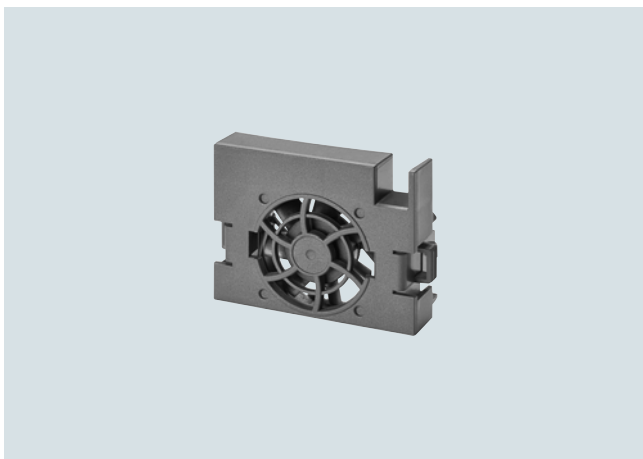
The shield connection kit offers

- Shield connection
- Strain relief

**Selection and ordering data**

Description	Article No.
<b>SINAMICS V20 shield connection kit</b>	
• For frame sizes FSAA and FSAB	<b>6SL3266-1AR00-0VA0</b>
• For frame size FSA	<b>6SL3266-1AA00-0VA0</b>
• For frame size FSB	<b>6SL3266-1AB00-0VA0</b>
• For frame size FSC	<b>6SL3266-1AC00-0VA0</b>
• For frame size FSD	<b>6SL3266-1AD00-0VA0</b>
• For frame size FSE	<b>6SL3266-1AE00-0VA0</b>

Supplementary system components &gt; SINAMICS V20 replacement fans

**Overview**

SINAMICS V20 replacement fans for frame size FSA



SINAMICS V20 replacement fans for frame size FSD

The fans are designed for extra long service life. Replacement fans can be ordered.

**Selection and ordering data**

Description	Article No.
<b>SINAMICS V20 replacement fans</b>	
• For frame size FSA	<b>6SL3200-0UF01-0AA0</b>
• For frame size FSB	<b>6SL3200-0UF02-0AA0</b>
• For frame size FSC	<b>6SL3200-0UF03-0AA0</b>
• For frame size FSD	<b>6SL3200-0UF04-0AA0</b>
• For frame size FSE	<b>6SL3200-0UF05-0AA0</b>