SIEMENS

Operating instructions

SINAMICS

G130

Sine-wave filter

Edition 11/2017

www.siemens.com/drives

SIEMENS

SINAMICS

SINAMICS G130
Sinusoidal filter

Operating Instructions

Safety information 1

General 2

Mechanical installation 3

Electrical installation 4

Technical specifications 5

Firmware version V5.1

11/2017

A5E00992420A

Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

⚠DANGER
indicates that death or severe personal injury **will** result if proper precautions are not taken.

⚠WARNING
indicates that death or severe personal injury **may** result if proper precautions are not taken.

⚠CAUTION
indicates that minor personal injury can result if proper precautions are not taken.

NOTICE
indicates that property damage can result if proper precautions are not taken.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

⚠WARNING
Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

Trademarks

All names identified by ® are registered trademarks of Siemens AG. The remaining trademarks in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owner.

Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

Siemens AG
Division Process Industries and Drives
Postfach 48 48
90026 NÜRNBERG
GERMANY

A5E00992420A
℗ 03/2018 Subject to change

Copyright © Siemens AG 2007 - 2017.
All rights reserved

Table of contents

1 Safety information 5
1.1 General safety instructions 5
1.2 Handling electrostatic sensitive devices (ESD) 10
2 General 11
3 Mechanical installation 15
4 Electrical installation 17
5 Technical specifications 19

Safety information

1

1.1 General safety instructions



⚠WARNING

Electric shock and danger to life due to other energy sources

Touching live components can result in death or serious injury.

- Only work on electrical equipment if you are appropriately qualified.
- Always observe the country-specific safety rules for all work.

Generally, the following steps apply when establishing safety:

1. Prepare for disconnection. Notify all those who will be affected by the procedure.
2. Isolate the drive system from the power supply and take measures to prevent it being switched back on again.
3. Wait until the discharge time specified on the warning labels has elapsed.
4. Check that there is no voltage between any of the power connections, and between any of the power connections and the protective conductor connection.
5. Check that every auxiliary circuit is de-energized.
6. Ensure that the motors cannot move.
7. Identify all other dangerous energy sources, e.g. compressed air, hydraulic systems or water. Switch the energy sources to a safe state.
8. Check that the correct drive system is completely locked.

After you have completed the work, restore the operational readiness by following the above steps in the reverse order.



⚠WARNING

Electric shock due to connection to an unsuitable power supply

When equipment is connected to an unsuitable power supply, exposed components may carry a hazardous voltage that might result in serious injury or death.

- Only use power supplies that provide SELV (Safety Extra Low Voltage) or PELV (Protective Extra Low Voltage) output voltages for all connections and terminals of the electronics modules.



⚠WARNING

Electric shock due to equipment damage

Improper handling may cause damage to equipment. For damaged devices, hazardous voltages can be present at the enclosure or at exposed components; if touched, this can result in death or severe injury.

- Ensure compliance with the limit values specified in the technical data during transport, storage and operation.
- Do not use any damaged devices.



⚠WARNING

Electric shock due to unconnected cable shield

Hazardous touch voltages can occur through capacitive cross-coupling due to unconnected cable shields.

- Connect cable shields and unused conductors of power cables (e.g. brake conductors) at least on one side to the grounded housing potential.



⚠WARNING

Electric shock if there is no ground connection

For missing or incorrectly implemented protective conductor connection for devices with protection class I, high voltages can be present at open, exposed parts, which when touched, can result in death or severe injury.

- Ground the device in compliance with the applicable regulations.



⚠WARNING

Arcing when a plug connection is opened during operation

Opening a plug connection when a system is in operation can result in arcing that may cause serious injury or death.

- Only open plug connections when the equipment is in a voltage-free state, unless it has been explicitly stated that they can be opened in operation.

NOTICE

Property damage due to loose power connections

Insufficient tightening torques or vibration can result in loose power connections. This can result in damage due to fire, device defects or malfunctions.

- Tighten all power connections to the prescribed torque.
- Check all power connections at regular intervals, particularly after equipment has been transported.

⚠WARNING

Spread of fire from built-in devices

In the event of fire outbreak, the enclosures of built-in devices cannot prevent the escape of fire and smoke. This can result in serious personal injury or property damage.

- Install built-in units in a suitable metal cabinet in such a way that personnel are protected against fire and smoke, or take other appropriate measures to protect personnel.
- Ensure that smoke can only escape via controlled and monitored paths.

⚠WARNING

Failure of pacemakers or implant malfunctions due to electromagnetic fields

Electromagnetic fields (EMF) are generated by the operation of electrical power equipment, such as transformers, converters, or motors. People with pacemakers or implants in the immediate vicinity of this equipment are at particular risk.

- If you have a heart pacemaker or implant, maintain a minimum distance of 2 m from electrical power equipment.

⚠WARNING

Unexpected movement of machines caused by radio devices or mobile phones

When radio devices or mobile phones with a transmission power > 1 W are used in the immediate vicinity of components, they may cause the equipment to malfunction. Malfunctions may impair the functional safety of machines and can therefore put people in danger or lead to property damage.

- If you come closer than around 2 m to such components, switch off any radio devices or mobile phones.
- Use the "SIEMENS Industry Online Support App" only on equipment that has already been switched off.

⚠WARNING

Motor fire in the event of insulation overload

There is a greater load on the motor insulation as result of a ground fault in an IT system. If the insulation fails, it is possible that death or severe injury can occur as a result of smoke and fire.

- Use a monitoring device that signals an insulation fault.
- Correct the fault as quickly as possible so the motor insulation is not overloaded.

⚠WARNING

Fire due to inadequate ventilation clearances

Inadequate ventilation clearances can cause overheating of components with subsequent fire and smoke. This can cause severe injury or even death. This can also result in increased downtime and reduced service lives for devices/systems.

- Ensure compliance with the specified minimum clearance as ventilation clearance for the respective component.

⚠WARNING

Unrecognized dangers due to missing or illegible warning labels

Dangers might not be recognized if warning labels are missing or illegible. Unrecognized dangers may cause accidents resulting in serious injury or death.

- Check that the warning labels are complete based on the documentation.
- Attach any missing warning labels to the components, where necessary in the national language.
- Replace illegible warning labels.

NOTICE

Device damage caused by incorrect voltage/insulation tests

Incorrect voltage/insulation tests can damage the device.

- Before carrying out a voltage/insulation check of the system/machine, disconnect the devices as all converters and motors have been subject to a high-voltage test by the manufacturer, and therefore it is not necessary to perform an additional test within the system/machine.

⚠WARNING

Unexpected movement of machines caused by inactive safety functions

Inactive or non-adapted safety functions can trigger unexpected machine movements that may result in serious injury or death.

- Observe the information in the appropriate product documentation before commissioning.
- Carry out a safety inspection for functions relevant to safety on the entire system, including all safety-related components.
- Ensure that the safety functions used in your drives and automation tasks are adjusted and activated through appropriate parameterizing.
- Perform a function test.
- Only put your plant into live operation once you have absolutely guaranteed that the functions relevant to safety are operating correctly.

Note

Important safety instructions for Safety Integrated functions

If you want to use Safety Integrated functions, you must observe the safety instructions in the Safety Integrated manuals.

1.2 Handling electrostatic sensitive devices (ESD)

Electrostatic sensitive devices (ESD) are individual components, integrated circuits, modules or devices that may be damaged by either electric fields or electrostatic discharge.



NOTICE

Damage through electric fields or electrostatic discharge

Electric fields or electrostatic discharge can cause malfunctions through damaged individual components, integrated circuits, modules or devices.

- Only pack, store, transport and send electronic components, modules or devices in their original packaging or in other suitable materials, e.g. conductive foam rubber or aluminum foil.
- Only touch components, modules and devices when you are grounded by one of the following methods:
  - Wearing an ESD wrist strap
  - Wearing ESD shoes or ESD grounding straps in ESD areas with conductive flooring
- Only place electronic components, modules or devices on conductive surfaces (table with ESD surface, conductive ESD foam, ESD packaging, ESD transport container).

The necessary ESD protective measures are clearly illustrated in the following diagram:

- a = conductive floor surface
- b = ESD table
- c = ESD shoes
- d = ESD overall
- e = ESD wristband
- f = cabinet ground connection
- g = contact with conductive flooring

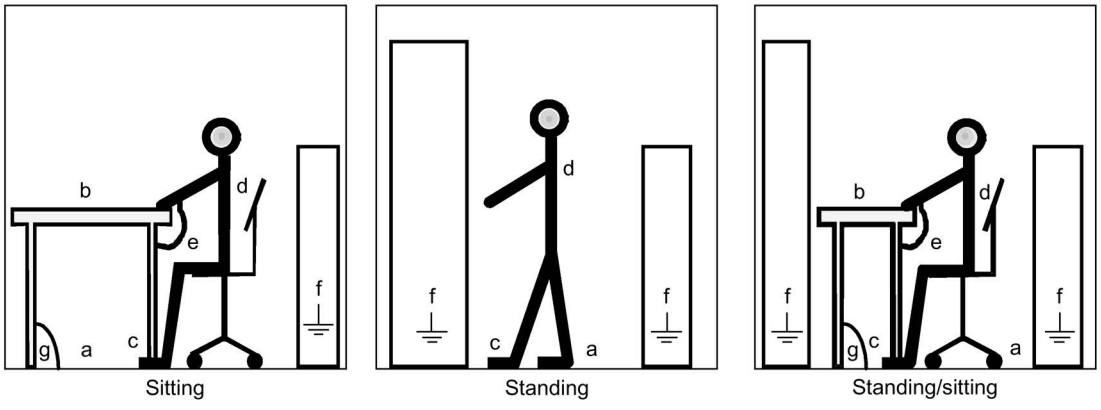


Figure 1-1 ESD protective measures

General

2

Description

The sine-wave filter limits the voltage gradient and the capacitive charge/discharge currents which usually occur with inverter operation. It also prevents additional noise caused by the pulse frequency. The service life of the motor is as long as that attained with direct mains operation.

⚠WARNING

Non-observance of the fundamental safety instructions and residual risks

The non-observance of the fundamental safety instructions and residual risks stated in Chapter 1 can result in accidents with severe injuries or death.

- Adhere to the fundamental safety instructions.
- When assessing the risk, take into account residual risks.

⚠WARNING

Fire through overheating due to insufficient ventilation clearances

Inadequate ventilation clearances can cause overheating with a risk for personnel through smoke development and fire. Furthermore, an increased number of failures and shorter service life of the components can occur.

- Maintain 100 mm ventilation clearances above and to the side of the component.

⚠CAUTION

Burns resulting from high surface temperature of the sine-wave filter

The surface temperature of the sine-wave filters can exceed 80 °C. You can get seriously burnt when touching the surface.

- Mount the sine-wave filter so that it cannot be touched. If this is not possible, attach a clearly visible and understandable warning notice at hazardous positions.

NOTICE

Sine-wave filter damage due to interchanged connections

Interchanging the input and output connections will damage the sine-wave filter.

- Connect the incoming cable from the Power Modules to 1U1, 1V1, 1W1.
- Connect the outgoing cable to the load at 1U2, 1V2, 1W2.

NOTICE

Damage to the Motor Module by using components that have not been released

When using components that have not been released, damage or malfunctions can occur at the devices or the system itself.

- Only use sine-wave filters that SIEMENS has released for SINAMICS.

NOTICE

Risk of damaging the sine-wave filter by exceeding the maximum output frequency

The maximum permissible output frequency when sine-wave filters are used is 115 Hz or 150 Hz. The sine-wave filter can be damaged if the output frequency is exceeded.

- Operate the sine-wave filter with a maximum output frequency of 115 Hz or 150 Hz.

NOTICE

Damage to the sine-wave filter if it is not activated during commissioning

The sine-wave filter may be damaged if it is not activated during commissioning.

- Activate the sine-wave filter during commissioning via parameter p0230 = 3.

NOTICE

Damage to the sine-wave filter if a motor is not connected

Sine-wave filters, which are operated without a motor being connected, can be damaged or destroyed.

- Never operate a sine-wave filter connected to the Power Module without a connected motor.

Note

Cable lengths

Keep the connecting cables to the Power Module as short as possible (max. 5 m).

Assignment of sine-wave filter and Power Module

Table 2- 1 Assignment of sine-wave filter and Power Module

Power Module	Unit rating of the Power Module	Suitable sine-wave filter
Line voltage 3 AC 380 ... 480 V		
6SL3310-1GE32-1AA3	110 kW	**6SL3000-2CE32-3AA0**
6SL3310-1GE32-6AA3	132 kW	**6SL3000-2CE32-3AA0**
6SL3310-1GE33-1AA3	160 kW	**6SL3000-2CE32-8AA0**
6SL3310-1GE33-8AA3	200 kW	**6SL3000-2CE33-3AA0**
6SL3310-1GE35-0AA3	250 kW	**6SL3000-2CE34-1AA0**
Line voltage 3 AC 500 ... 600 V		
6SL3310-1GF31-8AA3	110 kW	**6SL3000-2CF31-7AA0**
6SL3310-1GF32-2AA3	132 kW	**6SL3000-2CF31-7AA0**

Restrictions

The following restrictions must be taken into account when a sine-wave filter is used:

- The output frequency is limited to max. 115 Hz (at 500 – 600 V) and 150 Hz (at 380 – 480 V).
- The modulation type is permanently set to space-vector modulation without overmodulation.
- The maximum output voltage is limited to approx. 85% of the input voltage.
- Maximum permissible motor cable lengths:
  - Unshielded cable: max. 450 m
  - Shielded cable: max. 300 m
- During commissioning, the pulse frequency rises to double the factory setting. This induces current derating, which must be applied to the built-in units' rated currents listed in the technical specifications.

Note

If a filter cannot be parameterized (p0230 ≠ 3) during commissioning, then no provision is made for this SIEMENS sine-wave filter for the SINAMICS G130.

Table 2- 2 Technical specifications for sine-wave filters with SINAMICS G130

Article number SINAMICS G130	Voltage [V]	Pulse frequency [kHz]	Output current [A] 1)
6SL3310-1GE32-1AA3	3-phase 380 – 480 VAC	4	172 A
6SL3310-1GE32-6AA3	3-phase 380 – 480 VAC	4	216 A
6SL3310-1GE33-1AA3	3-phase 380 – 480 VAC	4	273 A
6SL3310-1GE33-8AA3	3-phase 380 – 480 VAC	4	331 A
6SL3310-1GE35-0AA3	3-phase 380 – 480 VAC	4	382 A
6SL3310-1GF31-8AA3	3-phase 500 – 600 VAC	2.5	152 A
6SL3310-1GF32-2AA3	3-phase 500 – 600 VAC	2.5	187 A

1) The values apply to operation with a sine-wave filter and do not correspond with the rated current on the type plate.

Commissioning

When commissioning using the STARTER or AOP30, the sine-wave filter must be activated by means of appropriate selection screenforms or dialog boxes (p0230 = 3), see Chapter "Commissioning" in the SINAMICS G130 Operating Instructions.

The following parameters are changed automatically during commissioning.

Table 2- 3 Parameter settings for sine-wave filters with SINAMICS G130

Parameters	Name	Setting
p0230	Drive filter type, motor side	3: Siemens sine-wave filter
p0233	Power unit motor reactor	Filter inductance
p0234	Power unit sine-wave filter capacitance	Filter capacitance
p0290	Power unit overload response	Disable pulse frequency reduction
p1082	Maximum speed	Fmax filter / pole pair number
p1800	Pulse frequency	Nominal pulse frequency of the filter (see previous table)
p1802	Modulator mode	Space-vector modulation without overmodulation
p1909	Motor data identification, control word	Rs measurement only

Note

Activate the factory settings

When the factory settings are restored, parameter p0230 is reset.
The parameter must be reset if the system is commissioned again.

Mechanical installation

3

Dimension drawing

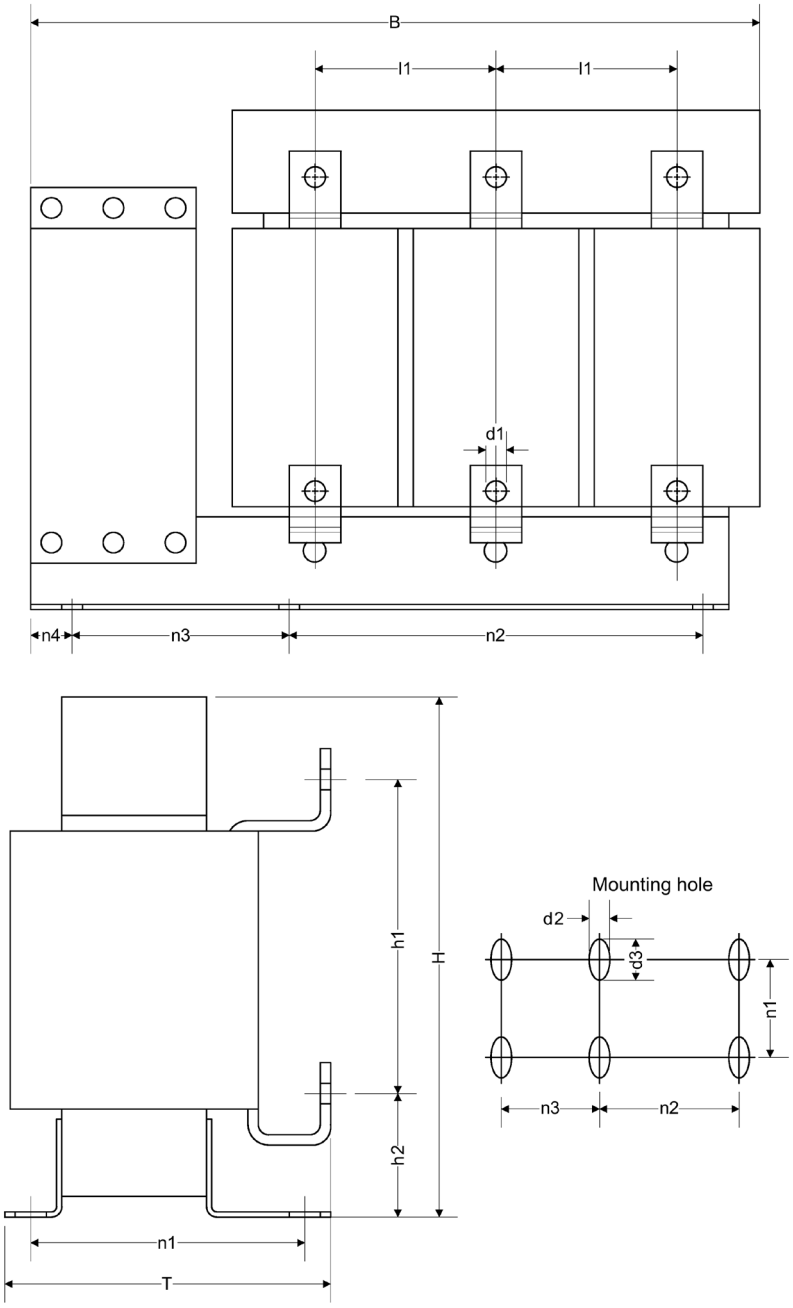


Figure 3-1 Dimension drawing, sine-wave filter

Table 3- 1 Dimensions of the sine-wave filter (all values in mm)

6SL3000-	2CE32-3AA0	2CE32-8AA0	2CE33-3AA0	2CE34-1AA0	2CF31-7AA0
B	620	620	620	620	620
H	300	300	370	370	370
T	320	320	360	360	360
l1	140	140	140	140	140
h1	180	180	220	220	220
h2	65	65	65	65	65
n1 [1)]	280	280	320	320	320
n2 [1)]	150	150	150	150	150
n3 [1)]	225	225	225	225	225
n4	105	105	105	105	105
d1	12	12	12	12	12
d2	11	11	11	11	11
d3	22	22	22	22	22
[1)] The lengths n1, n2 and n3 correspond to the drill hole spacing					

Electrical installation

4

Connection

When connecting the sine-wave filter, you must take into account the following conditions to ensure that the filter functions correctly:

- With analog control cables, connecting the shield at both ends can result in coupled-in noise. To prevent this, the shield must only be connected at one end on the Power Module.
- Control cables must be routed separately from power cables. Power cables are motor cables or connecting cables from the DC link of the Power Module (terminals DCPA/DCNA) to other components (e.g. Braking Module). In particular, you must ensure that control cables and power cables are not routed in parallel in a joint cable raceway, even if all the cables are shielded.
- The cross-sections of the connection cables to 1U1, 1V1, 1W1 and to 1U2, 1V2, 1W2 must be identical, and must be dimensioned appropriately for the current-carrying capacity and routing method (see Chapter "Technical Specifications" in the SINAMICS G130 Operating Instructions).
- You must use shielded motor cables. The shield for the motor cable must be attached to the shield plate and motor housing.
- The ground wire for the motor must be fed directly back to the Power Module.

Technical specifications

5

General technical data

Table 5- 1 General technical data

Output frequency	380 V - 480 V 3 AC: 0 ... 150 Hz 500 V - 600 V 3 AC: 0 ... 115 Hz		
Product standard	EN 61800-5-1		
Ambient conditions	Storage [2]	Transport [2]	Operation
Ambient temperature	-25 ... +70 °C	-25 ... +70 °C	0 ... +50 °C
Relative air humidity [1] (condensation not permissible) corresponds to class	5 ... *95%* 1K4 according to EN 60721-3-1	5 ... 95% at 40 °C 2K3 according to EN 60721-3-2	5 ... *95%* 3K3 according to EN 60721-3-3
Mechanical strength	Storage [2]	Transport [2]	Operation
Vibrational load [1] - Displacement - Acceleration corresponds to class	 1.5 mm at *5* ... 9 Hz 5 m/s² at > 9 ... 200 Hz 1M2 to EN 60721-3-1	 3.5 mm at *5* ... 9 Hz 10 m/s² at > 9 ... 200 Hz 2M2 to EN 60721-3-2	 0.075 mm at 10 ... 58 Hz 10 m/s² at >58 ... 200 Hz -
Shock load [1] - Acceleration corresponds to class	 40 m/s² at 22 ms 1M2 to EN 60721-3-1	 100 m/s² at 11 ms 2M2 to EN 60721-3-2	 100 m/s² at 11 ms 3M4 to EN 60721-3-3

Deviations from the specified classes are shown in *italics*.

[1] The EN standards specified are the European editions of the international IEC standards with the same designations.

[2] In transport packaging

Detailed technical data

Table 5- 2 Technical data for sine-wave filters, 3 AC 380 V ... 480 V

Article number	6SL3000-	2CE32-3AA0	2CE32-3AA0	2CE32-8AA0	2CE33-3AA0	2CE34-1AA0
Suitable for Power Module	6SL3310-	1GE32-1AA3	1GE32-6AA3	1GE33-1AA3	1GE33-8AA3	1GE35-0AA3
Rated current (unit rating) of the Power Module at a 4 kHz pulse frequency		170 A (90 kW)	215 A (110 kW)	270 A (132 kW)	330 A (160 kW)	380 A (200 kW)
Output current at a 4 kHz pulse frequency	A	225	225	276	333	408
Power loss - at 50 Hz - at 150 Hz	 kW kW	 0.35 0.6	 0.35 0.6	 0.4 0.69	 0.245 0.53	 0.38 0.7
Connections - to the Power Module - load - PE		 M10 M10 M10	 M10 M10 M10	 M10 M10 M10	 M10 M10 M10	 M10 M10 M10
Max. permissible cable length between sine-wave filter and motor	m	300 (shielded) 450 (unshielded)				
Degree of protection		IP00	IP00	IP00	IP00	IP00
Dimensions Width Height Depth	 mm mm mm	 620 300 320	 620 300 320	 620 300 320	 620 370 360	 620 370 360
Weight	kg	124	124	127	136	198

Table 5- 3 Technical data for sine-wave filters, 3 AC 500 V ... 600 V

Article number	**6SL3000-**	**2CF31-7AA0**	**2CF31-7AA0**			
Suitable for Power Module	6SL3310-	1GF31-8AA3	1GF32-2AA3			
Rated current (unit rating) of the Power Module at a 2.5 kHz pulse frequency		152 A (90 kW)	187 A (110 kW)			
Output current at a 2.5 kHz pulse frequency	A	188	188			
Power loss - at 50 Hz - at 115 Hz	 kW kW	 0.364 0.8	 0.364 0.8			
Connections - to the Power Module - load - PE		 M10 M10 M10	 M10 M10 M10			
Max. permissible cable length between sine-wave filter and motor	m	300 (shielded) 450 (unshielded)				
Degree of protection		IP00	IP00			
Dimensions Width Height Depth	 mm mm mm	 620 370 360	 620 370 360			
Weight	kg	210	210			

Additional information

Siemens:
www.siemens.com

Industry Online Support (service and support):
www.siemens.com/online-support

IndustryMall:
www.siemens.com/industrymall

Siemens AG
Process Industries and Drives
Large Drives
Postbox 4743
90025 Nuremberg
Germany

Scan the QR-Code for product information