SINAMICS G130

Line filter

Operating Instructions · 05/2010

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Operating Instructions

Control version V4.3 SP2

05/2010
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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
with a safety alert symbol, indicates that minor personal injury can result if proper precautions are not taken.

CAUTION
without a safety alert symbol, indicates that property damage can result if proper precautions are not taken.

NOTICE
indicates that an unintended result or situation can occur if the corresponding information is not taken into account.

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 for the specific task, 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 adhered to. The information in the relevant documentation must be observed.

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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
Industry Sector
Postfach 48 48
90026 NÜRNBERG
GERMANY

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Safety information

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1.1 Warnings

⚠ WARNING

Hazardous voltages are present when electrical equipment is in operation.
Severe personal injury or substantial material damage may result if these warnings are not observed.
Only qualified personnel are permitted to work on or around the equipment.
This personnel must be thoroughly familiar with all the warnings and maintenance procedures described in these operating instructions.
The successful and safe operation of this device is dependent on correct transport, proper storage and installation, as well as careful operation and maintenance.
National safety guidelines must be observed.

⚠ DANGER

Five safety rules

When carrying out any kind of work on electrical devices, the "five safety rules" defined in EN 50110 must always be observed:

1. Disconnect the system.
2. Protect against reconnection.
3. Make sure that the equipment is de-energized.
4. Ground and short-circuit.
5. Cover or enclose adjacent components that are still live.

NOTICE

For a UL-approved system use 60/75°C copper conductors only.

1.2 Safety and operating instructions

⚠ DANGER

This equipment is used in industrial high-voltage installations. During operation, this equipment contains rotating and live, bare parts. For this reason, they could cause severe injury or significant material damage if the required covers are removed, if they are used or operated incorrectly, or have not been properly maintained.
When the machines are used in non-industrial areas, the installation location must be protected against unauthorized access (protective fencing, appropriate signs).

Prerequisites

Those responsible for protecting the plant must ensure the following:

- The basic planning work for the plant and the transport, assembly, installation, commissioning, maintenance, and repair work is carried out by qualified personnel and/or checked by experts responsible.
- The operating manual and machine documentation are always available.
- The technical specifications regarding the applicable installation, connection, environmental, and operating conditions are always observed.
- The plant-specific assembly and safety guidelines are observed and personal protection equipment is used.
- Unqualified personnel are forbidden from using these machines and working near them.

This operating manual is intended for qualified personnel and only contain information and notes relating to the intended purpose of the machines.

The operating manual and machine documentation are written in different languages as specified in the delivery contracts.

Note

We recommend engaging the support and services of your local Siemens service center for all planning, installation, commissioning and maintenance work.

1.3 Components that can be destroyed by electrostatic discharge (ESD)

⚠ CAUTION

The board contains components that can be destroyed by electrostatic discharge. These components can be easily destroyed if not handled properly. If you do have to use electronic boards, however, please observe the following:

- You should only touch electronic boards if absolutely necessary.
- When you touch boards, however, your body must be electrically discharged beforehand.
- Boards must not come into contact with highly insulating materials (such as plastic parts, insulated desktops, articles of clothing manufactured from man-made fibers).
- Boards must only be placed on conductive surfaces.
- Boards and components should only be stored and transported in conductive packaging (such as metalized plastic boxes or metal containers).
- If the packaging material is not conductive, the boards must be wrapped with a conductive packaging material (such as conductive foam rubber or household aluminum foil).

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

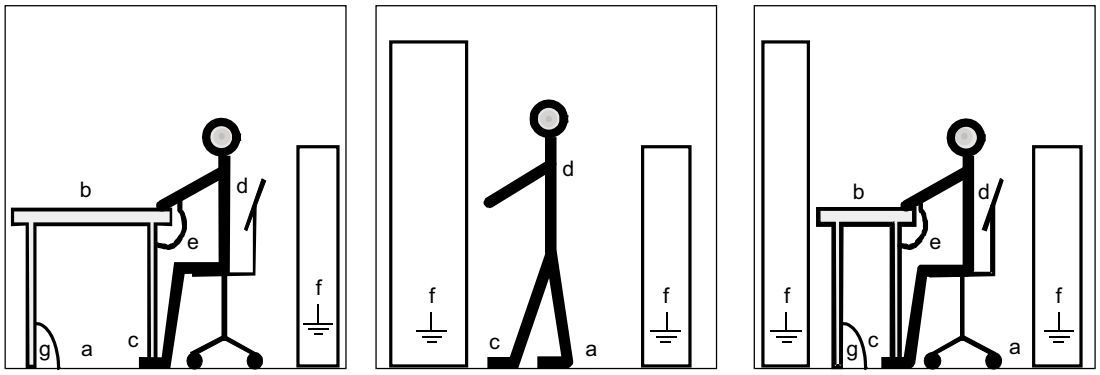

Figure 1-1 ESD protective measures

General

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Description

The line filters limit the conducted interference emitted by the converter units to permissible values.

To reduce emissions, the Power Modules are equipped as standard with a line filter in accordance with the limit values defined in category C3 (environment 2). The additional line filters described here can be fitted for use in environment 1 (category C2).

In conjunction with line reactors, line filters limit the conducted interference emitted by the Power Modules to the limit values defined in product standard EN 61800-3. Provided that the system has been set up in accordance with the EMC installation guidelines, the limit values at the installation location will be in accordance with the requirements for environment 1.

⚠ CAUTION

Line filters are only suitable for direct connection to TN systems.

CAUTION

A ventilation clearance of 100 mm above and below the component must be observed to prevent thermal overloading of the filter.

CAUTION

The connections must not be interchanged:
connect the incoming line cable to LINE/NETZ L1, L2, and L3 and the outgoing cable to the line reactor to LOAD/LAST L1', L2', L3'.
If this is not observed, the line filter may be damaged.

If you are carrying out work on the line filter, you must wait for the discharge time to elapse (approx. 5 mins). The line filter must not be short-circuited to reduce the discharge time.

CAUTION

The line filters listed conduct a high leakage current via the PE conductor. A permanent PE connection for the line filter or control cabinet is required due to the high leakage current of the line filters.

According to EN 61800-5-1, Section 6.3.6.7, the minimum cross-section of the protective ground conductor must conform to the local safety regulations for protective ground conductors for equipment with a high leakage current.

Note

If a high-voltage test is conducted with alternating voltage in the system, the line filter must be disconnected to obtain correct measurement results.

CAUTION

Using line filters not approved by SIEMENS for SINAMICS can lead to line-side harmonics that can interfere with or damage other loads powered from the network.

CAUTION

Provisions for component cooling must be made at the installation site. Power loss data are given in the technical specifications.

Assignment of line filter and Power Module

Table 2- 1 Assignment of line filter and Power Module

Power Module	Unit rating of the Power Module	Suitable line filter
Line voltage 380 – 480 V 3 AC		
6SL3310-1GE32-1AAx	110 kW	6SL3000-0BE32-5AA0
6SL3310-1GE32-6AAx	132 kW	6SL3000-0BE34-4AA0
6SL3310-1GE33-1AAx	160 kW	6SL3000-0BE34-4AA0
6SL3310-1GE33-8AAx	200 kW	6SL3000-0BE34-4AA0
6SL3310-1GE35-0AAx	250 kW	6SL3000-0BE36-0AA0
6SL3310-1GE36-1AAx	315 kW	6SL3000-0BE41-2AA0
6SL3310-1GE37-5AAx	400 kW	6SL3000-0BE41-2AA0
6SL3310-1GE38-4AAx	450 kW	6SL3000-0BE41-2AA0
6SL3310-1GE41-0AAx	560 kW	6SL3000-0BE41-2AA0
Line voltage 500 – 600 V 3 AC		
6SL3310-1GF31-8AAx	110 kW	6SL3000-0BG32-5AA0
6SL3310-1GF32-2AAx	132 kW	6SL3000-0BG32-5AA0
6SL3310-1GF32-6AAx	160 kW	6SL3000-0BG34-4AA0
6SL3310-1GF33-3AAx	200 kW	6SL3000-0BG34-4AA0
6SL3310-1GF34-1AAx	250 kW	6SL3000-0BG34-4AA0
6SL3310-1GF34-7AAx	315 kW	6SL3000-0BG36-0AA0
6SL3310-1GF35-8AAx	400 kW	6SL3000-0BG41-2AA0
6SL3310-1GF37-4AAx	500 kW	6SL3000-0BG41-2AA0
6SL3310-1GF38-1AAx	560 kW	6SL3000-0BG41-2AA0
Line voltage 660 – 690 V 3 AC		
6SL3310-1GH28-5AAx	75 kW	6SL3000-0BG32-5AA0
6SL3310-1GH31-0AAx	90 kW	6SL3000-0BG32-5AA0
6SL3310-1GH31-2AAx	110 kW	6SL3000-0BG32-5AA0
6SL3310-1GH31-5AAx	132 kW	6SL3000-0BG32-5AA0
6SL3310-1GH31-8AAx	160 kW	6SL3000-0BG32-5AA0
6SL3310-1GH32-2AAx	200 kW	6SL3000-0BG32-5AA0
6SL3310-1GH32-6AAx	250 kW	6SL3000-0BG34-4AA0
6SL3310-1GH33-3AAx	315 kW	6SL3000-0BG34-4AA0
6SL3310-1GH34-1AAx	400 kW	6SL3000-0BG34-4AA0
6SL3310-1GH34-7AAx	450 kW	6SL3000-0BG36-0AA0
6SL3310-1GH35-8AAx	560 kW	6SL3000-0BG41-2AA0
6SL3310-1GH37-4AAx	710 kW	6SL3000-0BG41-2AA0
6SL3310-1GH38-1AAx	800 kW	6SL3000-0BG41-2AA0

Mechanical installation

3

When the line filter is installed in a cabinet, it must be positioned directly beside the Power Module.

The line reactor must be positioned between the line filter and Power Module. Cabling must be kept as short as possible.

To prevent interference being injected into the interference-suppressed line cable (this can, in some cases, nullify the effects of the line filter), the line cable to the line filter must be routed separately from other cables.

The housing of the Power Module and line filter must be connected with low resistance for high-frequency interference currents. This can be achieved by installing the Power Module and line filter on the same mounting plate. The Power Module and line filter must be connected to the mounting plate with the greatest possible surface area. The best solution here is to use a metallic, bright, oil-free mounting plate (e.g., made of stainless steel or galvanized sheet-steel) because the entire contact surface establishes the electrical contact.

If a painted mounting plate is used, the screw positions for the Power Module and line filter must free of paint to ensure electrical contact with the mounting plate.

The motor must always be connected using a shielded cable. The shield must be applied to the motor and Power Module with the greatest possible surface area.

The ground wire for the motor must be fed directly back to the Power Module.

Dimension drawing

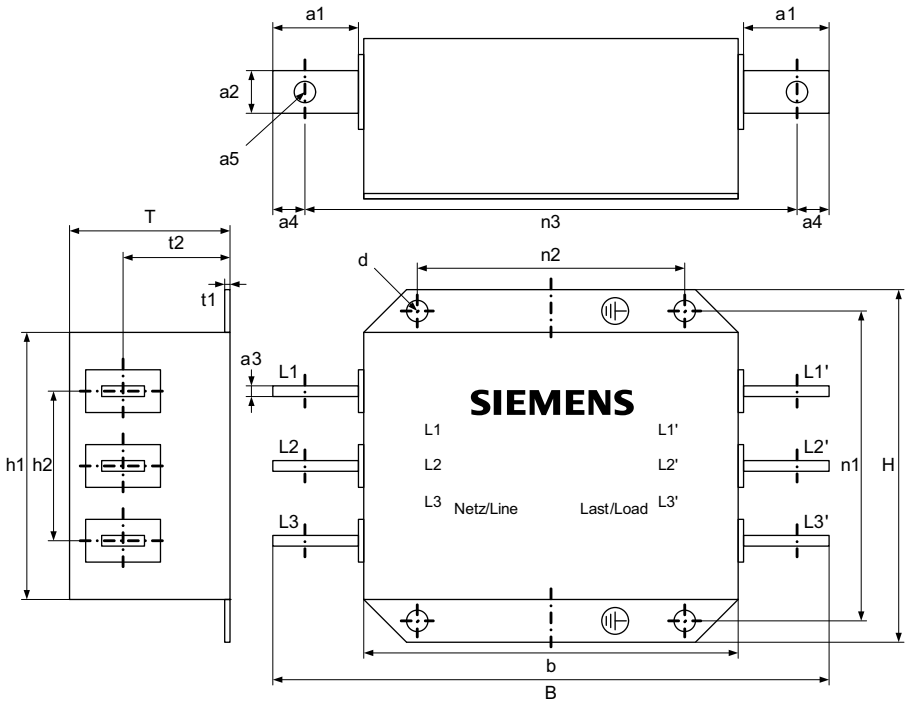

Figure 3-1 Dimension drawing, line filter

Table 3- 1 Dimensions of the line filter (all data in mm)

6SL3000-	0BE32-5AA0 0BG32-5AA0	0BE34-4AA0 0BG34-4AA0	0BE36-0AA0 0BG36-0AA0	0BE41-2AA0 0BG41-2AA0
W	360	360	400	425
H	240	240	265	265
D	116	116	140	145
a1	40	40	40	50
a2	25	25	25	50
a3	5	5	8	10
a4	15	15	15	20
a5	11	11	11	14
b	270	270	310	300
h1	200	200	215	215
h2	100	100	120	142
t1	2	2	3	2.5
t2	78.2	78.2	90	91
n1 [1)]	220	220	240	240
n2 [1)]	210	210	250	255
n3	330	330	370	385
d	9	9	12	12
[1)] Lengths n1 and n2 correspond to the distance between holes				

Electrical installation 4

Important safety precautions

⚠ WARNING

The devices are operated with high voltages.
All connection procedures must be carried out when the cabinet is de-energized.
All work on the device must be carried out by trained personnel only.
Death, serious injury, or substantial material damage can result if these warnings are not taken into account.

Work on an open device must be carried out with extreme caution because external supply voltages may be present. The power and control terminals may be live even when the motor is not running.
Dangerously high voltage levels are still present in the cabinet up to five minutes after it has been disconnected due to the DC link capacitors on the Power Module. For this reason, the cabinet should not be opened until a reasonable period of time has elapsed.

The operator is responsible for ensuring that the line reactor and other components are installed and connected in accordance with the recognized technical rules in the country of installation and applicable regional guidelines. Special attention should be paid to cable dimensioning, fuses, grounding, shutdown, disconnection, and overcurrent protection.

If an item of protective gear trips in a branch circuit, a leakage current may have been disconnected. To reduce the risk of fire or an electric shock, the current-carrying parts and other components in the cabinet unit should be inspected and damaged parts replaced. When an item of protective gear trips, the cause of the trip must be identified and rectified.

Connection

When connecting the line filter and line reactor, you must take into account the following conditions to ensure that they function correctly:

- Use shielded control cables. The shield must be connected at both ends.
- 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.
- 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.

Connection overview

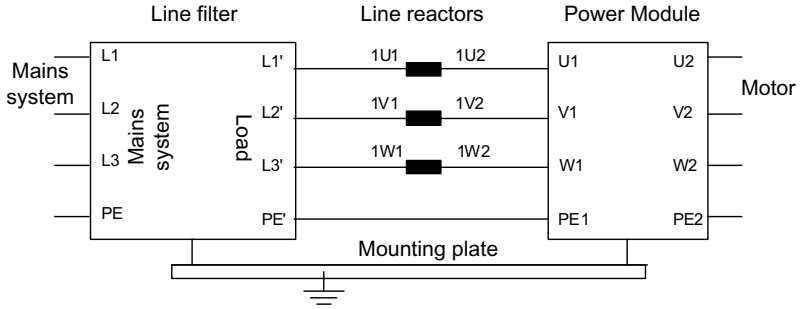

Figure 4-1 Connecting the line filter, line reactor, and Power Module

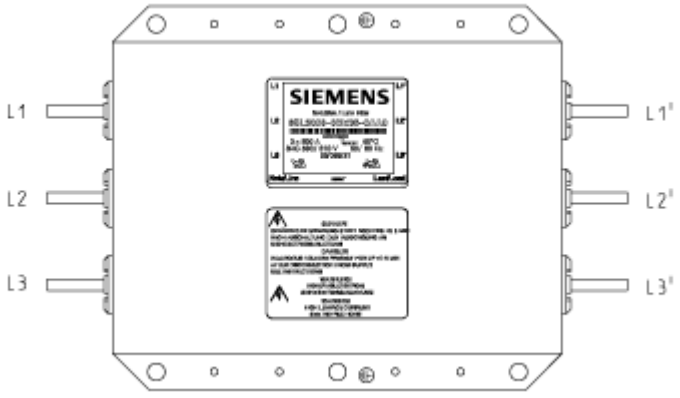

Figure 4-2 Connection overview of the line filter

Technical specifications

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General technical specifications

Table 5- 1 General technical specifications

Line frequency	47 ... 63 Hz		
Product standard	EN 61800-5-1		
Overload capacity	1.60 x I_R for 3 s followed by 1.36 x I_R for 60 s followed by 1.00 x I_R for 240 s		
Ambient conditions	Storage	Transport	Operation
Ambient temperature	-25 ... +70 °C	-25 ... +70 °C	0 ... +50 °C
Relative humidity (non-condensing), corresponds to class:	5 ... 95 % 1K4 to EN 60721-3-1	5 ... 95% at 40 °C 2K3 to EN 60721-3-2	5 ... 95 % 3K3 to EN 60721-3-3
Mechanical stability	Storage	Transport	Operation
Vibrational load: - Displacement - Acceleration	 1.5 mm at 5 ... 9 Hz 5 m/s² at >9 ... 200 Hz	 3.5 mm at 5 ... 9 Hz 10 m/s² at >9 ... 200 Hz	 0.075 mm at 10 ... 58 Hz 10 m/s² at >58 ... 200 Hz
Shock load: - Acceleration	 40 m/s² at 22 ms	 100 m/s² at 11 ms	 100 m/s² at 11 ms

Detailed technical specifications

Table 5- 2 Technical specifications of line filter 380 V – 480 V 3 AC

Order number	6SL3000-	0BE32-5AA0	0BE34-4AA0	0BE36-0AA0	0BE41-2AA0
Rated voltage	V	380 V 3 AC –10 % to 480 V 3 AC +10% (-15 % < 1 min)			
Rated current I_R	A	250	440	600	1200
Power loss	kW	0.049	0.049	0.055	0.137
Line/load connection		M10 connecting lugs	M10 connecting lugs	M10 connecting lugs	M12 connecting lugs
PE connection		M8 bolts	M8 bolts	M10 bolts	M10 bolts
Degree of protection		IP00	IP00	IP00	IP00
Dimensions Width Height Depth	 mm mm mm	 360 240 116	 360 240 116	 400 265 140	 425 265 145
Weight	kg	12.3	12.3	19.0	25.8

Table 5- 3 Technical specifications of line filter 500 V – 600 V 3 AC

Order number	6SL3000-	0BG32-5AA0	0BG34-4AA0	0BG36-0AA0	0BG41-2AA0
Rated voltage	V	500 V 3 AC –10 % to 600 V 3 AC +10% (-15 % < 1 min)			
Rated current I_R	A	250	440	600	1200
Power loss	kW	0.049	0.049	0.055	0.137
Line/load connection		M10 connecting lugs	M10 connecting lugs	M10 connecting lugs	M12 connecting lugs
PE connection		M8 bolts	M8 bolts	M10 bolts	M10 bolts
Degree of protection		IP00	IP00	IP00	IP00
Dimensions Width Height Depth	 mm mm mm	 360 240 116	 360 240 116	 400 265 140	 425 265 145
Weight	kg	12.3	12.3	19.0	25.2

Table 5- 4 Technical specifications of line filter 660 V – 690 V 3 AC

Order number	6SL3000-	0BG32-5AA0	0BG34-4AA0	0BG36-0AA0	0BG41-2AA0
Rated voltage	V	660 V 3 AC –10 % to 690 V 3 AC +10% (-15 % < 1 min)			
Rated current I_R	A	250	440	600	1200
Power loss	kW	0.049	0.049	0.055	0.137
Line/load connection		M10 connecting lugs	M10 connecting lugs	M10 connecting lugs	M12 connecting lugs
PE connection		M8 bolts	M8 bolts	M10 bolts	M10 bolts
Degree of protection		IP00	IP00	IP00	IP00
Dimensions Width Height Depth	 mm mm mm	 360 240 116	 360 240 116	 400 265 140	 425 265 145
Weight	kg	12.3	12.3	19.0	25.2

Siemens AG
Industry Sector
Drive Technologies
Large Drives
Postfach 4743
90025 NUREMBERG
GERMANY

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