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A5E01171966B AA
Safety Guidelines

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 device/system may only be set up and used in conjunction with this documentation. Commissioning and operation of a device/system may only be performed by qualified personnel. Within the context of the safety notes in this documentation qualified persons are defined as persons who are authorized to commission, ground and label devices, systems and circuits in accordance with established safety practices and standards.

Prescribed Usage

Note the following:

⚠️ WARNING
This device may only be used for the applications described in the catalog or the technical description and only in connection with devices or components from other manufacturers which have been approved or recommended by Siemens. Correct, reliable operation of the product requires proper transport, storage, positioning and assembly as well as careful operation and maintenance.

Trademarks

All names identified by © are registered trademarks of the 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.
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Introduction

1.1 Documents for the Inverter

Available technical documentation
Comprehensive information and support tools are available from the Service and Support internet site
- http://support.automation.siemens.com
You find there the following types of documentation:
- Getting Started
- Operating Instructions
- Hardware Installation Manual
- Function Manual
- Parameter Manual
- Product Information

Further internet addresses
You can download the respective documents for your inverter under the following links:
- SINAMICS G110
- SINAMICS G120
- SINAMICS G120D
  http://www.siemens.com/sinamics-g120d
- SIMATIC ET 200S FC
- SIMATIC ET 200pro FC
# Introduction

## 1.1 Documents for the Inverter

### Application examples

You find various application examples to the inverters under the following link:


### Overview about the documents, available for the specific inverter components

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<th>Description</th>
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<tr>
<td></td>
<td>Product Information: SINAMICS G120 Control Units CU240S, Power Modules PM250 / PM260</td>
</tr>
<tr>
<td><strong>Hardware Installation Manual</strong></td>
<td>Hardware Installation Manual: Power Module PM260</td>
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<td>Hardware Installation Manual: Power Module PM250</td>
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<td>Hardware Installation Manual: Power Module PM240</td>
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<tr>
<td><strong>Operating Instructions</strong></td>
<td>Operating Instructions: Control Unit CU240S, CU240S DP, CU240S DP-F Software version 2.0</td>
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<td>Operating Instructions (Compact): Control Unit CU240S, CU240S DP, CU240S DP-F Software version 2.0</td>
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<td></td>
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</tr>
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<td>Operating Instructions: Control Unit CU240S, CU240S DP, CU240S DP-F, CU240S PN Software version 3.0</td>
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<td>Operating Instructions: SINAMICS G110</td>
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<td>Operating Instructions (Compact): SINAMICS G110</td>
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<td><strong>Parameter Manual</strong></td>
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<td><strong>Installation Instructions</strong></td>
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<td></td>
<td>SINAMICS G120 Screen Termination Kit PM240 Power Modules</td>
</tr>
<tr>
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<td>SINAMICS G120 DIN Rail Fitting Instructions</td>
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<td>SINAMICS G120 fan replacement frame sizes A to F</td>
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<td></td>
<td>SINAMICS G120 Nema 1 Installation Instructions PM 240 Power Modules</td>
</tr>
<tr>
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<td>SINAMICS G120 Input Choke Installation Instructions FS A-C</td>
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<tr>
<td></td>
<td>Braking Resistors for SINAMICS G120 Frame Size B (FSB) Instruction Sheet</td>
</tr>
<tr>
<td></td>
<td>SINAMICS G120 Brake Module Instructions Relay Brake Module, Safe Brake Module</td>
</tr>
</tbody>
</table>
Safety notes

Safety Instructions

The following Warnings, Cautions and Notes are provided for your safety and as a means of preventing damage to the product or components in the connected machines. This section lists Warnings, Cautions and Notes, which apply generally when handling the inverter, classified as General, Transport and Storage, Commissioning, Operation, Repair and Dismantling and Disposal.

Specific Warnings, Cautions and Notes that apply to particular activities are listed at the beginning of the relevant sections in this manual and are repeated or supplemented at critical points throughout these sections.

Please read the information carefully, since it is provided for your personal safety and will also help prolong the service life of your inverter and the equipment to which it is connected.

Common Instructions

It has to be ensured by the machine manufacturer, that the line-side overcurrent protection equipment interrupts within 5 s (immovable equipment and modules in immovable equipment) in the case of minimum fault current (current on complete insulation failure to accessible conductive parts that are not live during operation and maximum current loop resistance).

It has to be ensured by the machine manufacturer, that the voltage drop between the beginning of the load system and the power drive system during operation with rated values does not exceed 4 %.
General

**WARNING**

This equipment contains dangerous voltages and controls potentially dangerous rotating mechanical parts. Non-compliance with the warnings or failure to follow the instructions contained in this manual can result in loss of life, severe personal injury or serious damage to property.

Protection in case of direct contact by means of SELV / PELV is only permissible in areas with equipotential bonding and in dry indoor rooms. If these conditions are not fulfilled, other protective measures against electric shock must be applied e.g. protective insulation.

Only suitably qualified personnel should work on this equipment, and only after becoming familiar with all safety notices, installation, operation and maintenance procedures contained in this manual. The successful and safe operation of this equipment is dependent upon its proper handling, installation, operation and maintenance.

As the earth leakage for this product can be greater than 3.5mA a.c., a fixed earth connection is required and the minimum size of the protective earth conductor shall comply with the local safety regulations for high leakage current equipment.

If an RCD (also referred to as an ELCB or a RCCB) is fitted, the SINAMICS G120D Power Module will operate without nuisance tripping provided that:

- A type B RCD is used.
- The trip limit of the RCD is 300 mA.
- The neutral of the supply is grounded.
- Only one SINAMICS G120D power module is supplied from each RCD.
- The output cables are less than 15 m screened or 30 m unscreened.

The power supply, DC and motor terminals, the brake and thermistor cables can carry dangerous voltages even if the inverter is inoperative. Wait at least five minutes to allow the unit to discharge after switching off the line supply before carrying out any installation work.

It is strictly prohibited for any mains disconnection to be performed on the motor-side of the system; any disconnection of the mains must be performed on the mains-side of the Inverter.

When connecting the line supply to the Inverter, make sure that the terminal case of the motor is closed.

When changing from the ON to OFF-state of an operation if an LED or other similar display is not lit or active; this does not indicate that the unit is switched-off or powered-down.

The inverter must always be grounded.

Isolate the line supply before making or changing connections to the unit.

Ensure that the inverter is configured for the correct supply voltage. The inverter must not be connected to a higher voltage supply.

Static discharges on surfaces or interfaces that are not generally accessible (e.g. terminal or connector pins) can cause malfunctions or defects. Therefore, when working with inverters or inverter components, ESD protective measures should be observed.
Take particular notice of the general and regional installation and safety regulations regarding work on dangerous voltage installations (e.g. EN 50178) as well as the relevant regulations regarding the correct use of tools and personal protective equipment (PPE).

⚠️ **CAUTION**

Children and the general public must be prevented from accessing or approaching the equipment!

This equipment may only be used for the purpose specified by the manufacturer. Unauthorized modifications and the use of spare parts and accessories that are not sold or recommended by the manufacturer of the equipment can cause fires, electric shocks and injuries.

**NOTICE**

Keep this manual within easy reach of the equipment and make it available to all users.

Whenever measuring or testing has to be performed on live equipment, the regulations of Safety Code BGV A2 must be observed, in particular § 8 "Permissible Deviations when Working on Live Parts". Suitable electronic tools should be used.

Before installing and commissioning, please read these safety instructions and warnings carefully and all the warning labels attached to the equipment. Make sure that the warning labels are kept in a legible condition and replace missing or damaged labels.

---

**Transport and storage**

⚠️ **WARNING**

Correct transport, storage as well as careful operation and maintenance are essential for the proper and safe operation of the equipment.

⚠️ **CAUTION**

Protect the equipment against physical shocks and vibration during transport and storage. It is important that the equipment is protected from water (rainfall) and excessive temperatures.
Safety notes

Commissioning

<table>
<thead>
<tr>
<th>WARNING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working on the equipment by unqualified personnel or failure to comply with warnings can result in severe personal injury or serious damage to material. Only suitably qualified personnel trained in the setup, installation, commissioning and operation of the product should carry out work on the equipment.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CAUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable connection</td>
</tr>
<tr>
<td>The control cables must be laid separately from the power cables. Carry out the connections as shown in the installation section in this manual, to prevent inductive and capacitive interference from affecting the correct function of the system.</td>
</tr>
</tbody>
</table>

Power and motor connections

<table>
<thead>
<tr>
<th>WARNING</th>
</tr>
</thead>
<tbody>
<tr>
<td>The inverter must always be grounded. Isolate the line supply before making or changing connections to the unit. Ensure that the inverter is configured for the correct supply voltage. The inverter must not be connected to a higher voltage supply.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CAUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>After connecting the power and motor cables to the proper terminals, make sure that all covers have been returned to the closed position and are snapped shut, before supplying power to the inverter!</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>NOTICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ensure that the appropriate circuit-breakers/fuses with the specified current rating are connected between the power supply and the inverter.</td>
</tr>
</tbody>
</table>
Mechanical installation

⚠️ WARNING
To ensure the safe operation of the equipment, it must be installed and commissioned by qualified personnel in full compliance with the warnings laid down in this manual.
Take particular note of the general and regional installation and safety regulations regarding work on dangerous voltage installation (e.g. EN 61800-5-1) as well as the relevant regulations regarding the correct use of tools and personal protective equipment (PPE).

Electrical installation

⚠️ WARNING
Power and motor connections
- The inverter must be grounded from the supply side and the motor side. If it is not grounded correctly, extremely dangerous conditions may arise which could prove potentially fatal.
- Isolate the mains electrical supply before making or changing connections to the unit.
- The terminals of the Inverter can carry dangerous voltages even if the inverter is inoperative. Wait at least 5 minutes to allow the unit to discharge after switching off the line supply before carrying out any installation work.
- When connecting the line supply to the inverter, make sure that the terminal case of the motor is closed.
- When changing from the ON to OFF-state of an operation if an LED or other similar display is not lit or active; this does not indicate that the unit is switched-off or powered-down.
- Ensure that the inverter is configured for the correct supply voltage – it must not be connected to a higher voltage supply.
- The voltage of each power line conductor against earth must not exceed 600 V.
Operation

WARNING

The inverter operates at high voltages. When operating electrical devices, it is impossible to avoid applying hazardous voltages to certain parts of the equipment.

The power supply and motor terminals can carry dangerous voltages even if the inverter is inoperative. Wait five minutes to allow the unit to discharge after switching off the line supply before carrying out any installation work.

Emergency Stop facilities according to EN 60204, IEC 204 (VDE 0113) must remain operative in all operating modes of the control equipment. Any disengagement of the Emergency Stop facility must not lead to an uncontrolled or an undefined restart of the equipment.

Wherever faults occurring in the control equipment can lead to substantial material damage or even grievous bodily injury (that is, potentially dangerous faults), additional external precautions must be taken or facilities provided to ensure or enforce safe operation, even when a fault occurs (e.g. independent limit switches, mechanical interlocks, etc.).

Certain parameter settings may cause the inverter to restart automatically after an input power failure, for example, the automatic restart function.

Motor parameters must be accurately configured for motor overload protection to operate correctly.

This equipment is suitable for use in a circuit capable of delivering not more than 10,000 symmetrical amperes (rms), for a maximum voltage of 690 V + 10 % when protected by an H, J or K type fuse, a circuit breaker or self-protected combination motor controller.

The power modules are components with a high leakage current!

Use of mobile radio device (e.g. telephones, walky-talkies) with a transmission power > 1 W in the immediate vicinity of the devices (< 1.5 m) can interfere with the functioning of the equipment!

CAUTION

The line filter 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 filter.

Furthermore, the following measures must be taken according to EN 61800-5-1: Either protective ground conductor cross-sections ≥ 10 mm² (8 AWG) Cu or installation of a second protective ground conductor of the same cross-section as the first one.
Safety notes

Repair

⚠️ WARNING
Repairs on equipment may only be carried out by Siemens Service, by repair centers authorized by Siemens or by authorized personnel who are thoroughly acquainted with all the warnings and operating procedures contained in this manual.
Any defective parts or components must be replaced using parts contained in the relevant spare parts list.
Disconnect the power supply before opening the equipment for access.

Dismantling and disposal

⚠️ CAUTION
The packaging of the inverter is re-usable. Retain the packaging for future use.
Easy-to-release screw and snap connectors allow you to break the unit down into its component parts. You can recycle these component parts, dispose of them in accordance with local requirements or return them to the manufacturer.
Description

The SINAMICS G120 range

The SINAMICS G120 inverter has been designed for the accurate and efficient control of the speed and torque for three-phase motors. The SINAMICS G120 system comprises two basic modules, the Control Unit (CU) and the Power Module (PM).

The Control Units are divided into the following:

- Standard CUs (CUs without fail-safe functions)
  - CU240S
  - CU240S DP like CU 240S plus PROFIBUS DP interface (PROFIdrive Profile 4.0)
  - CU240S PN like CU 240S plus PROFINET interface (PROFIdrive Profile 4.0)

- CUs with fail-safe functions
  - CU240S DP-F like CU240S DP plus integrated fail-safe functions

The Power Modules are divided as follows:

- PM240 Power Module with dc braking functions, supply voltage 3 AC 400 V
- PM250 Power Module with regenerative mode, supply voltage 3 AC 400 V
- PM260 Power Module with regenerative mode, supply voltage 3 AC 690 V

Control Units and Power Modules are allowed to be combined in any possible configuration. See the respective manual for specific functions and features.
Description

3.1 Power module PM260

Overview

The power modules contain an integrated sinewave output filter for sinusoidal output voltage. They are available with protection level IP 20 according to EN 60529, with or without integrated Class A filter in the following frame sizes and power ranges:

- Frame size D, 7.5 kW … 15 kW
- Frame size F, 22 kW … 37 kW

The power modules have regenerative capability, where the regeneration limit is the maximum nominal power (high overload) of the power module.

The PM260 power modules can be used together with G120 standard control units or with G120 fail-safe control units.

⚠️ CAUTION

The PM260 power modules can be used for three phase asynchronous motors, synchronous motors are not allowed.

3.2 Accessories for the PM260

Description of accessories or spare parts

A description how to use the individual options or spare parts is part of the option package itself.

Ordering information and a brief functional description is given in the SINAMICS G120 catalog.

Power Module PM260 accessories

- Screen termination kit
- Brake relay and safe brake relay.

Power Module spare parts

- Fan.
3.3 Block diagram

Block diagram

Figure 3-1 Power module
General rules for the environmental protection of the power modules

To ensure that the power module is installed in the correct environmental conditions, please ensure that you adhere to the following guidelines:

- The power module is designed for IP20 protection, this means:
  - It is protected from the ingress of solid foreign objects ≥ 12.5 mm (≥ 0.49 inches).
  - It is not protected against the ingress of water.
  - It is designed to be installed in an electrical cabinet.

- Keep the power module free from dust and dirt.
- Keep the power module away from water, solvents and chemicals.
- Keep the power module within the maximum and minimum operating temperatures.
- Ensure that the correct level of ventilation and air flow is provided.
- Ensure that good earthing/grounding practices are followed for each power module and the cabinet.
4.1 Mechanical Installation

Overview

This section contains information about

- distances to other equipment,
- drill patterns,
- dimensions and tightening torques
- environmental conditions

⚠️ WARNING

To ensure the safe operation of the equipment, it must be installed and commissioned by qualified personnel in full compliance with the warnings laid down in this manual.

Take particular note of the general and regional installation and safety regulations regarding work on dangerous voltage installation (e.g. EN 61800-5-1) as well as the relevant regulations regarding the correct use of tools and personal protective equipment (PPE).

Distances to other equipment

The power modules can be mounted without any clearance at either side. When mounting one above the other, the specified environmental conditions must not be exceeded.

Independent of this, the following distances above and below must be observed:

- Frame Size D: above and below 300 mm (11.81 inches)
- Frame Size F: above and below 350 mm (13.77 inches).

Dimensions

To allow the preliminary installation work to be undertaken, dimensions and drill patterns for the power modules are shown below.
4.1 Mechanical Installation

Power Modules PM260

Hardware Installation Manual, 06/2007, A5E01171966B AA

Figure 4-1  Dimensions and drill patterns for the power modules
4.2 Electrical Installation

Overview

This section gives information about

- power distribution systems,
- connecting the motor,
- screening methods
- motor connection star/delta

⚠️ WARNING

Power and motor connections

- The inverter must be grounded from the supply side and the motor side. If the inverter is not grounded correctly, extremely dangerous conditions may arise which could prove potentially fatal.
- Isolate the mains electrical supply before making or changing connections to the unit.
- The terminals of the Inverter can carry dangerous voltages even if the inverter is inoperative. Wait at least 5 minutes to allow the unit to discharge after switching off the line supply before carrying out any installation work.
- When connecting the line supply to the inverter, make sure that the terminal case of the motor is closed.
- When changing from the ON to OFF-state of an operation if an LED or other similar display is not lit or active; this does not indicate that the unit is switched-off or powered-down. Input chokes must not be used.
- RSCE of the power supply must be at least 100.
- Ensure that the inverter is configured for the correct supply voltage – the inverter must not be connected to a higher voltage supply.
- If a residual-current device is used on the supply side of this electronic equipment for protection in case of direct or indirect contact, only Type B is permitted! Otherwise a different protective measure must be employed, such as separation of the electronic equipment from the environment by double or reinforced insulation, or from the supply by a transformer!

⚠️ CAUTION

The control cables must be laid separately from the power cables. The connection must be carried out as shown in the installation section in this manual, to prevent inductive and capacitive interference from affecting the correct function of the system.

Note

Ensure that the appropriate circuit-breakers/fuses with the specified current rating (see technical data) are connected between the power supply and the inverter.
### 4.2.1 Power distribution systems

#### Power Distribution Systems

The power distribution systems described below, as defined in EN 60950, have been considered in the design of the inverter. In the next figures three phase systems are outlined. The three phase inverter must be connected to L1, L2 and L3. PE must always be connected. The inverter will operate with most supply systems.

**Table 4-1 Power distribution systems**

|-------------------|---------------------|-------------------|----------------|----------------|

A TN-S power system has separate neutral and protective ground conductors throughout the system. It is the standard distribution system in the UK.

In a TN-C-S power system, the neutral and protective functions are combined in a single part of the system.

In a TN-C power system, the neutral and protective functions are combined in a single conductor throughout the system.

A TT power system has one point directly grounded, the exposed conductive parts of the installation being connected to a ground, which is electrically independent of the ground of the power system.

An IT power system has no direct connection to ground - instead the exposed parts of the electrical installation are grounded.

#### Note

TT-/IT power systems can only be used with EMC unfiltered drives.
4.2 Electrical Installation

4.2.2 Permissible Cable Length

Motor cables

The use of unshielded motor cables is possible. However to meet C2 EMI class, shielded cables with appropriate EMI installation is required.

The inverters will operate at full specification with cable lengths as follows:

- 300 m (984 ft) with unscreened cables
- 200 m (656 ft) with screened cables

Cable cross section

**FSD**

- 7,5 kW: 2,5 mm² ... 16 mm² 14 AWG ... 6 AWG
- 11 kW: 4 mm² ... 16 mm² 12 AWG ... 6 AWG
- 15 kW: 6 mm² ... 16 mm² 10 AWG ... 6 AWG

Tightening Torques: 1,5 Nm / 14 lbf.in

**FSF**

- 22 kW: 10 mm² ... 35 mm² 8 AWG ... 2 AWG
- 30 kW: 16 mm² ... 35 mm² 6 AWG ... 2 AWG
- 37 kW: 25 mm² ... 35 mm² 4 AWG ... 2 AWG

Tightening Torques: 6 Nm / 53 lbf.in

⚠️ CAUTION

The cable cross section for earthing must be the same as the motor cables but at least 10 mm² (Cu) or 16 mm² (Al).
4.2.3 Access to power and motor terminals

Access to power and motor terminals

Frame size D has terminal blocks for power and motor connection. The terminal blocks can be removed after releasing 2 fixing screws. Thus a power module can be exchanged easily by removing the terminal blocks from the old one and plugging it onto the new one without new cabling. Once the change has been performed, the fixing screws of the terminal block must be tightened again.

![Diagram of power terminals Frame Size D](image1)

Frame sizes F terminals can be accessed by releasing the latches on the left and right side of the terminal covers with a suitable flat-bladed screwdriver. The cover then can be turned upwards so that the terminals can be accessed. After connecting the cables the covers must be locked again.

![Diagram of power terminals Frame Size F](image2)
4.2.4 Motor and power connections

Power and motor terminal layout

The figures below shows the layout of the power and motor terminals of the PM260 Frame Sizes D and F.

Figure 4-3 Power terminals Frame Size F

Figure 4-4 Power Connection PM260 FSD
Avoiding Electromagnetic Interference (EMI)

The inverters are designed to operate in an industrial environment where a high level of EMI can be expected. Most installations do not give problems. However, it is good engineering practice to conform to the following guidelines - this will reduce the likelihood of problems during operation.

Actions to take

- Ensure that all equipment in the cubicle is well grounded using short, thick grounding cable connected to a common star point or busbar.
- Make sure that any control equipment (such as a PLC) connected to the inverter is connected to the same ground or star point as the inverter using a short thick link.
- Connect the return ground from the motors directly to the ground connection (PE) on the associated inverter.
- Flat conductors are preferred as they have lower impedance at higher frequencies.
- Terminate the ends of the cable neatly, ensuring that unscreened wires are as short as possible.
- Separate the control cables from the power cables as much as possible, using separate trunking, if the cables cross they should cross at 90° to each other.
- Whenever possible, use screened leads for the connections to the control circuitry.
- Ensure that the contactors in the cubicle are suppressed, either with R-C suppressors for AC contactors or 'flywheel' diodes for DC contactors fitted to the coils. Varistor suppressors are also effective. This is important when the contactors are controlled from the inverter relay.
• Use screened or armored cables for the motor connections and ground the screen at both ends using the cable clamps.

WARNING
Safety regulations must not be compromised when installing inverters!

Screening methods
For all frame sizes the Screen Termination Kit is supplied as an optional extra. It allows easy and efficient connection of the necessary screening. For further details on the Screen Termination Kit, please refer to the SINAMICS G120 catalog.

Screening without a Screen Termination Kit
Should a Screen Termination Kit not be available, then the inverter can be screened using the methodology shown in the figure below. This diagram shows both methodologies of screening.

Note
The EMI illustration below is not to scale.
Figure 4-6  Example of wiring to minimize the effect of EMI

Table 4-2  Legend to the drawing

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mains power input</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>Motor cable</td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>Metal back plate</td>
<td>7</td>
</tr>
<tr>
<td>4</td>
<td>Use suitable clips to fix motor and</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>power cable screen securely to metal back plate</td>
<td></td>
</tr>
</tbody>
</table>
4.2.5 Motor circuit

Motor Circuit

In order to ensure a straightforward, successful commissioning, it is important that the circuit connection in the motor terminal box matches the rated motor voltage entered in P0304 or the rated motor current P0305.

IEC Motor

![Motor connection diagram](image)

Figure 4-7  Motor connection - IEC motors 400 V delta connection, 690 V Star connection

Note

690 V / 400 V Standard motors must always be connected in star configuration.

The following must be noted when entering the rating plate data or the ECD data:

- The outer conductor voltage/phase-to-phase voltage (voltage U12 between outer conductors L1, L2) and the outer conductor current (phase current) I1 are always specified on the rating plate.

- The rated motor voltage and the rated motor current must always be entered according to the motor circuit configuration (either delta/star circuit configuration).

- If rated motor data that are available are not consistent with the motor circuit configuration, then an appropriate conversion should be made which is then entered.

- If equivalent circuit diagram data is available, then these should be entered according to the motor circuit configuration. If there is no consistency between the motor circuit configuration and equivalent circuit diagram data, then the equivalent circuit diagram data should be converted and entered corresponding to the data on the rating plate.
4.2 Electrical Installation

Figure 4-8 Star/Delta configuration

\[
I_1 = I_2 = I_3 \\
U_{12} = U_{23} = U_{31} = \sqrt{3} \cdot U_{IN} \\
\frac{U_{12}}{I_1} = \sqrt{3} \cdot Z \\
Z_{\Delta} = 3 \cdot Z_Y
\]

\[
I_{12} = I_{23} = I_{31} = \frac{1}{\sqrt{3}} \cdot I_1 \\
U_{12} = U_{23} = U_{31} \\
\frac{U_{12}}{I_1} = \frac{1}{\sqrt{3}} \cdot Z
\]

**Note**

The precise equivalent circuit diagram data is of extreme importance regarding the stability of the closed-loop vector control and for the voltage boost applied to the V/f characteristic. Equivalent circuit diagram data can only be estimated from the rating plate data; this is the reason that equivalent circuit diagram data is either determined

- using the motor data identification, or
- is entered from a motor data sheet that may be available.

**Description**

The Control Unit is snapped on to the Power Module as shown in the figure below. To disconnect the CU push the release button on top of the PM.

The process of fitting the Control Unit to the Power Module is the same technique independent from the type of G120 control unit or G120 power module.
24 V power supply

Normally the CU is supplied with 24 V from Power Module. But it is also possible to use an external DC 24 V supply (20.4 V … 28.8 V, 0.5 A). It must be connected to the Control Unit terminals 31 (+24 V In) and 32 (0 V In). Some reasons for using an external 24 V power supply are:

- The PROFIBUS DP interface is required to communicate with the Control Unit when the Power Module mains power is not present
- Supply for 24 V encoder

**CAUTION**

Care must be taken to ensure that the 24 V DC power is connected correctly or damage to the Control Unit may occur.

Max. cable length on 24 V DC supply and I/O cables connected to CU must not exceed 10 m.

Use of unscreened cables is possible, however we recommend the use of screened cables, in order to fulfill the EMC requirements for the CE marking and fail-safe products (CU240S DP-F).

**Note**

If the CU is externally powered with 24 V DC but the power module is disconnected from the mains supply, the faults F0001 … F0028 are not generated.
5.1 Regeneration

Description

The power modules, described in this manual, are able to continuously feed back regenerative power to mains supply network.

The regenerative power capability depends on the motor speed and on current or voltage limiting parameters. The maximum regenerative power is limited to 100 % of the nominal power (high overload) of the power module.

Regeneration in case of V/f control

The regenerative power can be limited via P0640. If the regenerative power exceeds the limit for more than 5 s the inverter will trip with F0028.

Regeneration in case of vector control

The regenerative power can be limited via P1531. If the regenerative power exceeds the limit the drive will not be able to hold its setpoint.

The following graph shows the limiting parameters.
5.1 Regeneration

Figure 5-1 Regenerative capability
5.2 Swap Behavior of the Inverter

Overview

This section describes the possibilities to exchange inverter components, power modules or control units, and the necessary actions, depending on the swap type.

The following swaps are allowed:

- CU swap (neither PM nor CU powered)
- PM swap (neither PM nor CU powered)
- PM swap (CU externally powered)

Note

A swap is indicated by a F00395. A download fault during swap will be indicated by F00061 or F00063.

If F00061 or F00063 occurs during startup it cannot be cleared except via a power cycle.

CU swap, PM swap (whether PM nor CU powered)

Constraints: MMC with valid Parameter set plugged

- Swap after power on detected, Parameter MMC -> RAM/EEPROM, inverter runs into F00395
- Confirmation for standard CU or acceptance test in case of fail-safe CU required

Constraints: no MMC

- Swap after power on detected, Parameter EEPROM -> RAM, inverter runs into F00395
- Commissioning recommended - otherwise inverter runs with parameter settings from EEPROM
- Confirmation for standard CU or acceptance test in case of fail-safe CU required

PM swap (CU externally powered)

Constraints: MMC with valid Parameter set plugged

- Swap detected, Parameter MMC -> RAM/EEPROM, inverter runs into F00395
- Confirmation for standard CU or acceptance test in case of fail-safe CU required

Constraints: no MMC

- Swap detected, Parameter EEPROM -> RAM, inverter runs into F00395
- If the parameters, already held in the EEPROM are ok there is no commissioning necessary.
- Confirmation for standard CU or acceptance test in case of fail-safe CU required

Note

After a PM swap without MMC the parameter settings only stored in RAM will be lost.
**Successful swap**

After a successful swap, F00395 will be displayed.

- In case of a standard CU a confirmation is necessary.
- In the case of CUs with fail-safe functions, an acceptance test must be performed.

**Confirmation**

On standard CUs the current parameter set needs to be checked and its correctness confirmed by clearing F00395. This can be done via:

- Digital input or PLC signal (depends on the settings of P0700)
- Setting P7844 = 0.
- Via the key \[fn\] on the BOP

<table>
<thead>
<tr>
<th>WARNING</th>
</tr>
</thead>
<tbody>
<tr>
<td>The user is responsible for ensuring that the parameters held in the CU are the correct parameters for their application.</td>
</tr>
</tbody>
</table>

**Acceptance test**

On CUs with fail-safe functions it is necessary to do an acceptance test (refer to the "Fail-safe functions" section in this manual). To clear F00395 on CUs with fail-safe functions the following procedure has to be followed:

- P0010 = 30
- P9761 = safety password
- P7844 = 0
- Carry out acceptance test
Swap fault

A swap fault is indicated if the automatic download fails. In this case, the CU will return to the parameter set previously held in the EEPROM and F00395 as well as one of F00061, F00062 and F00063 will be generated.

On standard CUs the current parameter set needs to be checked and its correctness confirmed by clearing F00395. This can be done via:

- Digital input or PLC signal (depends on the settings of P0700)
- Setting P7844 = 0.
- Via the key on the BOP

In the next step F00061 / F00062 or F00063 has to be cleared via power cycle.

**Note**

F00395 cannot be cleared via power cycle. F00061, F00062 and F00063 can only be cleared via power cycle.

In case of a swap fault check, whether the MMC is defective or a parameter set clone00.bin is available or the parameter set is valid.

A valid parameter set means, it is not from a different type (e.g. CU240S DP and CU240S or fail-safe and standard CUs)

Rules regarding swap and hot swap

There are a number of scenarios where a swap or hot swap can take place, each with their own unique set of conditions that must be observed.

**DANGER**

**Do not attempt to hot swap a power module (PM)**

Before attempting to swap a PM it must be fully powered-down. Any attempt to swap-out a PM when power is still applied could result in death of personnel and severe damage to property and equipment.

**WARNING**

**Swap restrictions**

Before performing a swap take care of the following:

- It is the responsibility of the user to ensure that only CUs of the same type are swapped
- It is the responsibility of the user to ensure that the MMC contains the correct parameter set
- It is the responsibility of the user to ensure that only PMs of the same type and power rating are swapped.
- It is the responsibility of the user to ensure that the application is in a safe state before any swap of equipment is performed.
5.2 Swap Behavior of the Inverter

Swapping a CU

The following procedure is given as a guide to perform a swap of a CU.

<table>
<thead>
<tr>
<th>CAUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Data set compatibility</strong></td>
</tr>
<tr>
<td>To ensure complete data set compatibility, it is recommended to perform an upload of the parameter set from the CU to a new MMC prior to swapping the CU.</td>
</tr>
</tbody>
</table>

Before performing a CU swap take care of the following:

1. The PM is powered-down and disconnected.
2. Wait 5 minutes to allow the unit to discharge after switching off the line supply.
3. Remove the two-part terminals that are actually wired on the CU.
4. Remove the MMC.
5. Remove the CU from the PM.

Before switching on power supply to the inverter take care of that:

1. Fit the new CU to the PM.
2. Reconnect the two-part terminals to the CU.
3. Insert the MMC into the MMC-slot of the CU.

Swapping the PM

<table>
<thead>
<tr>
<th>CAUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>To ensure complete data set compatibility, make sure that all parameters are stored in the EEPROM of the Control Unit (see P0014 or P0971) prior to swapping the PM.</td>
</tr>
</tbody>
</table>

Before performing a PM swap take care of the following:

1. The PM is powered-down and disconnected.
2. Wait 5 minutes to allow the unit to discharge after switching off the line supply.

Before switching on Power supply take care of that:

1. The new PM is properly installed and connected.
2. The CU is fitted back on the PM.
### Technical data

#### 6.1 Performance Ratings

**SINAMICS G120 Power Module**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
</table>
| Line operating voltage & power ranges| 3 AC 660 V ... 690 V ± 10 %  
The power modules can be operated with a minimum voltage of 500 V ± 10 %. In this case the output voltage will be reduced accordingly.  
High Overload: 7.5 kW ... 37 kW (10 hp ... 50.0 hp)  
Light Overload: 11 kW ... 55 kW (15.0 hp ... 74.0 hp) |
| Input frequency                      | 47 Hz ... 63 Hz |
| Output frequency                     | 0 Hz ... 200 Hz |
| \( \cos \varphi \)                   | 0.95          |
| Inverter efficiency                  | 95 % ... 97 %  |
| Overload capability (HO)             | 1.5 x Nominal output current (150 % overload) for 57 s every 300 s  
2 x Nominal output current (200 % overload) for 3 s every 300 s, 20,000 cycles |
| Overload capability (LO)             | 1.1 x Nominal output current (110 % overload) for 57 s every 300 s  
1.4 x Nominal output current (140 % overload) for 3 s every 300 s, 70,000 cycles |
| Inrush current                       | Less than rated input current |
| Pulse frequency                      | 16 kHz        |
| Electromagnetic compatibility        | Integrated Class A filters for filtered units |
| Braking                              | Regeneration (up to 100 % high overload output rating) |
| Protection level                     | IP20 according to EN 60529 |
| Storage temperature                  | -40 °C ... +70 °C (-40 °F ... 158 °F) |
| Humidity                             | < 95% RH - non-condensing |
| Operational altitude                 | Up to 1000 m (3280 ft) above sea level without derating |
| Protection features                  | Undervoltage, Overvoltage, Overload, Ground faults, Short circuit, Stall prevention, Motor blocking protection, Motor overtemperature, Power Module overtemperature, Parameter interlock |
| Standards                            | CE, C-tick |
6.2 Specifications

Power Module PM260 Specifications

<table>
<thead>
<tr>
<th>CAUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Overload (HO) and Light Overload (LO) input currents</td>
</tr>
<tr>
<td>The input current depends on the motor load and the line impedance. The given values apply for a load representing the rated power (based on high overload current) for a line impedance of $V_k = 1%$.</td>
</tr>
</tbody>
</table>

Table 6-2 PM260 Frame Sizes D - 3 AC 660 … 690 V, ± 10 %

<table>
<thead>
<tr>
<th>Order No.</th>
<th>Filtered</th>
<th>6SL3225-</th>
<th>0BH27-5AA0</th>
<th>0BH31-1AA0</th>
<th>0BH31-5AA0</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>unfiltered</td>
<td>6SL3225-</td>
<td>0BH27-5UA0</td>
<td>0BH31-1UA0</td>
<td>0BH31-5UA0</td>
</tr>
<tr>
<td>Output Rating (HO)</td>
<td>[kW]</td>
<td>7.5</td>
<td>11.0</td>
<td>15.0</td>
<td>20.0</td>
</tr>
<tr>
<td></td>
<td>[hp]</td>
<td>10.0</td>
<td>15.0</td>
<td>20.0</td>
<td></td>
</tr>
<tr>
<td>Output Power</td>
<td>[kVA]</td>
<td>14.0</td>
<td>19.8</td>
<td>24.4</td>
<td></td>
</tr>
<tr>
<td>Rated Input Current (LO)</td>
<td>[A]</td>
<td>13</td>
<td>18</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>HO Output Current</td>
<td>[A]</td>
<td>10</td>
<td>14</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>LO Output Current</td>
<td>[A]</td>
<td>14</td>
<td>19</td>
<td>23</td>
<td></td>
</tr>
<tr>
<td>Fuse</td>
<td>[A]</td>
<td>20</td>
<td>20</td>
<td>32</td>
<td></td>
</tr>
<tr>
<td>Required cooling air flow</td>
<td>l/s</td>
<td>22</td>
<td>22</td>
<td>39</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CFM</td>
<td>47</td>
<td>47</td>
<td>83</td>
<td></td>
</tr>
<tr>
<td>Input Cable /</td>
<td>[mm²]</td>
<td>2.5 … 16</td>
<td>4 … 16</td>
<td>6 … 16</td>
<td></td>
</tr>
<tr>
<td>Output Cable</td>
<td>[awg]</td>
<td>14 … 6</td>
<td>12 … 6</td>
<td>10 … 6</td>
<td></td>
</tr>
<tr>
<td>Weight filtered / unfiltered</td>
<td>[kg]</td>
<td>19.6 / 20.8</td>
<td>19.6 / 20.8</td>
<td>19.6 / 20.8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>[lbs]</td>
<td>41.9 / 44.1</td>
<td>41.9 / 44.1</td>
<td>41.9 / 44.1</td>
<td></td>
</tr>
<tr>
<td>Noise pressure</td>
<td>dB(A)</td>
<td>&lt; 64</td>
<td>&lt; 64</td>
<td>&lt; 64</td>
<td></td>
</tr>
</tbody>
</table>
### Table 6-3  PM260 Frame Sizes F - 3 AC 660 … 690 V, ±10 %

<table>
<thead>
<tr>
<th>Order No.</th>
<th>6SL3225-6SL3225-0BH32-2UA0</th>
<th>0BH32-2AA0</th>
<th>0BH33-0AA0</th>
<th>0BH33-7AA0</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>filtered</td>
<td>unfiltered</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output Rating (HO)</td>
<td>[kW] 22.0 30.0 37.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>[hp] 30.0 40.0 50.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output Power</td>
<td>[kVA] 34.3 47.3 57.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated Input Current (LO)</td>
<td>[A] 34 41 60</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HO Output Current</td>
<td>[A] 26 35 42</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LO Output Current</td>
<td>[A] 35 42 62</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fuse</td>
<td>[A] 50 50 80</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Required cooling air flow</td>
<td>l/s 94 94 117</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CFM</td>
<td>199 199 248</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input Cable / Output Cable</td>
<td>[mm²] 10 … 35 16 … 35 25 … 35</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>[awg] 8 … 2 6 … 2 4 … 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>filtered</td>
<td>[kg] 48 48 48</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>[lbs] 105.8 105.8 105.8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>unfiltered</td>
<td>[kg] 46 46 46</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>[lbs] 101.4 101.4 101.4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Noise pressure</td>
<td>dB(A) &lt; 70 &lt; 70 &lt; 70</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
6.3 Environmental conditions

Temperature

The operating temperature range is shown diagramatically in the figure below:

![Graph showing power derating for temperature](image)

Humidity range

Relative air humidity for the SINAMICS G120 is ≤ 95 % non-condensing.

In areas of high relative humidity, measures should be taken to ensure that condensation does not form within or around the SINAMICS G120. Anti-condensation heaters are commonly used to prevent the formation of condensation.

Pollution

The units are designed to be used in areas according pollution degree level 2
Altitude

If the SINAMICS G120 is to be installed at an altitude > 1000 m (> 3280 ft) derating will be required. The figures below show the derating required according to altitude.

Figure 6-2  Derating for altitude

Shock and vibration

Do not drop the SINAMICS G120 or expose to sudden shock. Do not install the SINAMICS G120 in an area where it is likely to be exposed to constant vibration.

Electromagnetic radiation

Do not install the SINAMICS G120 near sources of electromagnetic radiation.

Atmospheric pollution

Do not install the SINAMICS G120 in an environment which contains atmospheric pollutants such as dust and/or corrosive gases.

Water

Take care to site the SINAMICS G120 away from potential water hazards, for example, do not install the SINAMICS G120 beneath pipes that are subject to condensation. Avoid installing the SINAMICS G120 where excessive humidity and condensation may occur.
Installation and cooling

CAUTION

The SINAMICS G120 Power Module MUST NOT be mounted horizontally.

When mounting SINAMICS G120 Power Modules one above the other, the specified environmental conditions and clearance must not be exceeded (see Dimension Drawings).

No equipment that could have a negative effect on the flow of cooling air should be installed in this area. Make sure that the cooling vents in the SINAMICS G120 Power Module are positioned correctly to allow the free movement of air.

Make sure that there is an adequate airflow through the cubicle as follows:

1. Using the formula below, calculate the airflow required:
   \[
   \text{Airflow (m}^3/\text{hr}) = (\text{Dissipated Watts} / \Delta T) \times 3.1
   \]

2. If necessary, install cubicle cooling fans.

Note

Dissipation (Watts) = 3 % to 5 % of the SINAMICS G120 Power Module rating.

\[\Delta T = \text{Allowable temperature rise within the cubicle in } ^\circ\text{C}.\]

\[3.1 = \text{Specific heat of air at sea level.}\]
Dimensional drawings

Power Module PM260

The dimensional drawings for the power modules PM260 are shown in the figures below.

Figure 7-1  Dimensional drawing PM260 Frame size D
Figure 7-2  Dimensional drawing PM260 Frame size F
Screen termination kit

The screen termination kit has been designed to allow the termination of control, mains and power cables to ensure the correct electrical grounding to the inverter.

Brake modules

The brake modules are designed to provide the interface between the power module of the inverter and the brake solenoid of a motor. The brake modules can be panel mounted, wall mounted or mounted on the screen termination kits.

The following versions are available:

- Brake module – this provides the basic braking control function.
- Safe brake module – this provides for the braking control function within a safety integrated system.

To adhere to the requirements of a safety integrated system, the safe brake module has been designed to allow a variable voltage to be given to the safe brake module to allow the system to determine if the brake module is functioning correctly without actually activating the braking function.
8.1 Cooling Fan

Replacing a Cooling Fan

The power modules have been designed to allow the cooling fans to be replaced. The procedure how to replace a fan is described in the following. Furthermore an illustrated description is part of the fan package.

1. Power-down the inverter.
2. Remove the Control Unit from the inverter.
3. Disconnect all the cables from the Power Module.
4. Remove the fan cover.
5. Release the fan cable connectors.
6. Slide the cooling fan out from the inverter.
7. Fit the new cooling fan into the fan housing area (make sure that the arrow on the fan is pointing upwards).
8. Re-attach the fan cable connector(s).
9. Replace the fan cover.
10. Reconnect all the cables to the Power Module.
11. Reattach the Control Unit.
12. Check that the installation is correct and safely installed.
13. Apply power the system.
14. Check that the cooling fan(s) are running correctly.
8.2 Brake Control Relays

Overview

There are two types of brake control relays:

- Brake Module (Relay Brake Module)
- Safe Brake Module (Safe Brake Module)

The Safe Brake Module and the Brake Module are different variants of the same device (for details see option description "Brake Module Instructions").

Connections of Brake Module and Safe Brake Relay:

![Brake Relay Diagram](image)

Figure 8-1 Brake Relay

![Wiring of Brake Relay Diagram](image)

Figure 8-2 Wiring of Brake Relay
With the Safe Brake Module 24 V motor brakes up to a current consumption of 2 A can be operated. Necessary is an external controlled power supply for 2.5 A and an output voltage which can be adjusted at a voltage of 26 V, e.g. SITOP modular. The higher voltage is required to compensate the voltage drop across the cables to the coil of the brake.

**Note**

On fail-safe reasons it is not allowed to take the 24 V supply of the Control Unit. The power supply for the Safe Brake Module must be a separate additional power supply.

During power ON for the drive it is necessary to supply the Safe Brake Module first, so that the Control Unit is able to check its function, otherwise the fault F1601 will occur.

The Safe Brake Module is designed to react to a stepped voltage input, which allows the braking mechanism to be tested. The Brake Module does not have this functionality.

**Note**

During forced dynamisation all connections of the Safe Brake Module are checked but in operation the connection between Safe Brake Module and brake coil is not monitored.
Spare parts/Accessories
8.2 Brake Control Relays

Triggering the Brake Control with Standard Control Units
The motor brake function can be activated or deactivated via P1215. It controls a brake relay, connected to the power module. This Brake Module controls an electro-mechanical brake, which is always closed when powered down.

P1215 = 0
(motor brake not active - factory setting), that means, if a brake is available, it will be closed to prevent the motor against unintended moves, e.g. after a parameter download.

P1215 = 1
(motor brake active) the brake will be controlled via terminals A and B on the power module.

Triggering the Brake Control with Control Units with fail-safe functions
Prerequisite: P1215 = 1

WARNING
The brake can be triggered via both, a Brake Module and a Safe Brake Relay.
Triggering via a Brake Module is not fail-safe!

For a fail-safe triggering of a Safe Brake Module the following parameters must be set:
P9602 = P9802 = 1 (factory setting is 0). If P9602 ≠ P9802 a fault will be generated.

In case of P9602 = P9802 = 1 a test signal regarding the signal to the Safe Brake Control is generated and monitored.

This test signal does not interfere with the normal function of the mechanical brake. If the mechanical brake is fitted and the test fails, a fault condition will be indicated by the inverter.

If the Safe Brake Control is deactivated by setting P9602 = P9802 = 0 the Safe Brake Module will still work as intended but will not be monitored in a safe way.
Appendix

A.1 Electromagnetic Compatibility

Electromagnetic compatibility

All manufacturers/assemblers of electrical apparatus which "performs a complete intrinsic function and is placed on the market as a single unit intended for the end user" must comply with the EMC directive EC/89/336.

There are three routes for the manufacturer/assembler to demonstrate compliance:

Self-certification

This is a manufacturer's declaration that the European standards applicable to the electrical environment for which the apparatus is intended have been met. Only standards that have been officially published in the Official Journal of the European Community can be cited in the manufacturer's declaration.

Technical construction file

A technical construction file can be prepared for the apparatus describing its EMC characteristics. This file must be approved by a ‘Competent Body’ appointed by the appropriate European government organization. This approach allows the use of standards that are still in preparation.

EMC Standards

The SINAMICS G120 drives have been tested in accordance with the EMC Product Standard EN 61800-3:2004.

Interference Resistance

The interference resistance is in accordance with the given values of the standard.
A.2 Definition of the EMC Environment and Categories

Classification of EMC performance

The EMC environment and categories are defined within the EMC Product Standard EN 61800-3, as follows:

First Environment

An environment that includes domestic premises and establishments that are connected directly to a public low-voltage power supply network without the use of an intermediate transformer.

Note
For example: houses, apartments, commercial premises or offices in a residential building.

Second Environment

An environment that includes industrial premises and establishments that are not connected directly to a public low-voltage power supply network.

Note
For example: industrial and technical areas of buildings fed from a dedicated transformer.

Category C1

Power Drive System (PDS) of rated voltage less than 1000 V intended for use in the First (Domestic) Environment.

Category C2

Power Drive System (PDS) of rated voltage less than 1000 V, which is neither a plug in device nor a movable device, and when used in the First (Domestic) Environment, is only intended to be installed and commissioned by a professional.

Note
A professional is a person or an organization having necessary skills in installing and/or commissioning a Power Drive System (PDS), including their EMC aspects.
Appendix
A.2 Definition of the EMC Environment and Categories

Category C3

Power Drive System (PDS) of rated voltage less than 1000 V intended for use in the Second (Industrial) Environment and not intended for use within the First (Domestic) Environment.

Table A-1 Compliance Table

<table>
<thead>
<tr>
<th>Model</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category C1 - First Environment</td>
<td></td>
</tr>
<tr>
<td>--</td>
<td>The inverters are not intended for use within the Category C1 Environment.</td>
</tr>
<tr>
<td>Category C2 - First Environment - Professional Use</td>
<td></td>
</tr>
<tr>
<td>Filtered Variants</td>
<td>6SL3225-0BH**-**AA0 (integrated class A filter)</td>
</tr>
<tr>
<td></td>
<td>200 m screened cable type CY</td>
</tr>
<tr>
<td></td>
<td>When used in the First (Domestic) Environment this product may cause radio interference in which case mitigation measures may be required.</td>
</tr>
<tr>
<td></td>
<td>Units installed within the Category C2 (Domestic) Environment require supply authority acceptance for connection to the public low-voltage power supply network. Please contact your local supply network provider.</td>
</tr>
<tr>
<td>Category C3 - Second Environment</td>
<td></td>
</tr>
<tr>
<td>Unfiltered Variants</td>
<td>6SL3225-0BH**-**UA0</td>
</tr>
<tr>
<td></td>
<td>The use of unfiltered drives within an industrial installation is only possible if it forms part of a system which includes additional power-line filtering at the &quot;system level&quot; or, alternatively, the use of filtered variants.</td>
</tr>
</tbody>
</table>

Note

All drives should be installed and commissioned in accordance with the manufacturer’s guidelines and in accordance with good EMC practices.

For further information refer to SIEMENS application note "EMC Design Guidelines".
A.3 Standards

**European Low Voltage Directive**
The SINAMICS G120 product range complies with the requirements of the Low Voltage Directive 73/23/EEC as amended by Directive 98/68/EEC. The units are certified for compliance with the following standards:

- EN 61800-5-1 — Semiconductor inverters –General requirements and line commutated inverters
- EN 60204-1 — Safety of machinery –Electrical equipment of machines

**European Machinery Directive**
The SINAMICS G120 inverter series does not fall under the scope of the Machinery Directive. However, the products have been fully evaluated for compliance with the essential Health & Safety requirements of the directive when used in a typical machine application. A Declaration of Incorporation is available on request.

**European EMC Directive**
When installed according to the recommendations described in this manual, the SINAMICS G120 fulfils all requirements of the EMC Directive as defined by the EMC Product Standard for Power Drive Systems EN 61800-3

**ISO 9001**
Siemens plc operates a quality management system, which complies with the requirements of ISO 9001. Certificates can be downloaded from the internet under the following link:
http://support.automation.siemens.com/WW/view/de/22339653/134200
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<td></td>
</tr>
<tr>
<td>AC</td>
<td>Alternating Current</td>
</tr>
<tr>
<td>A/D</td>
<td>Analog digital converter</td>
</tr>
<tr>
<td>ADR</td>
<td>Address</td>
</tr>
<tr>
<td>AFM</td>
<td>Additional frequency modification</td>
</tr>
<tr>
<td>AG</td>
<td>Automation Unit</td>
</tr>
<tr>
<td>AI</td>
<td>Analog input</td>
</tr>
<tr>
<td>AK</td>
<td>Request Identifier</td>
</tr>
<tr>
<td>AO</td>
<td>Analog output</td>
</tr>
<tr>
<td>AOP</td>
<td>Advanced operation panel</td>
</tr>
<tr>
<td>ASIC</td>
<td>Application-specific integrated circuit</td>
</tr>
<tr>
<td>ASP</td>
<td>Analog setpoint</td>
</tr>
<tr>
<td>ASVM</td>
<td>Asymmetric space vector modulation</td>
</tr>
<tr>
<td>B</td>
<td></td>
</tr>
<tr>
<td>BCC</td>
<td>Block check character</td>
</tr>
<tr>
<td>BCD</td>
<td>Binary-coded decimal code</td>
</tr>
<tr>
<td>BI</td>
<td>Binector input</td>
</tr>
<tr>
<td>BIA</td>
<td>Berufgenossenschaftliches Institut für Arbeitssicherheit</td>
</tr>
<tr>
<td>BICO</td>
<td>Binector/connector</td>
</tr>
<tr>
<td>BO</td>
<td>Binector output</td>
</tr>
<tr>
<td>BOP</td>
<td>Basic Operator Panel</td>
</tr>
<tr>
<td>C</td>
<td>Commissioning</td>
</tr>
<tr>
<td>CB</td>
<td>Communication board</td>
</tr>
<tr>
<td>CCW</td>
<td>Counter-clockwise</td>
</tr>
<tr>
<td>CDS</td>
<td>Command data set</td>
</tr>
<tr>
<td>CE</td>
<td>Communauté Européenne</td>
</tr>
<tr>
<td>CI</td>
<td>Connector input</td>
</tr>
</tbody>
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<th>State</th>
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</thead>
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<td>CM</td>
<td>Configuration management</td>
</tr>
<tr>
<td>CMD</td>
<td>Command</td>
</tr>
<tr>
<td>CO</td>
<td>Connector output</td>
</tr>
<tr>
<td>CO/BO</td>
<td>Connector output/Binector output</td>
</tr>
<tr>
<td>COM</td>
<td>Common (terminal is connected to NO or NC)</td>
</tr>
<tr>
<td>CT</td>
<td>Commissioning, ready to run</td>
</tr>
<tr>
<td>CU</td>
<td>Control Unit</td>
</tr>
<tr>
<td>CUT</td>
<td>Commissioning, run, ready to run</td>
</tr>
<tr>
<td>CW</td>
<td>Clockwise</td>
</tr>
<tr>
<td>D</td>
<td>Device Access Point</td>
</tr>
<tr>
<td>DAP</td>
<td>Digital analog converter</td>
</tr>
<tr>
<td>D/A</td>
<td>Direct current</td>
</tr>
<tr>
<td>DC</td>
<td>Drive data set</td>
</tr>
<tr>
<td>DDS</td>
<td>Digital input</td>
</tr>
<tr>
<td>DI</td>
<td>DIP switch</td>
</tr>
<tr>
<td>DO</td>
<td>Digital output</td>
</tr>
<tr>
<td>DP</td>
<td>Distributed I/Os</td>
</tr>
<tr>
<td>DP-V1</td>
<td>Acyclic data transfer (extended PROFIBUS function)</td>
</tr>
<tr>
<td>DS</td>
<td>Drive state</td>
</tr>
<tr>
<td>D</td>
<td>Equivalent circuit diagram</td>
</tr>
<tr>
<td>ECD</td>
<td>European Economic Community</td>
</tr>
<tr>
<td>EEC</td>
<td>Electrical erasable programmable read-only memory</td>
</tr>
<tr>
<td>EEPROM</td>
<td>Earth leakage circuit breaker</td>
</tr>
<tr>
<td>ELCB</td>
<td>Electromagnetic compatibility</td>
</tr>
<tr>
<td>EMC</td>
<td>Electromagnetic force</td>
</tr>
<tr>
<td>EMF</td>
<td>Engineering System</td>
</tr>
<tr>
<td>ES</td>
<td>Frequently asked question</td>
</tr>
<tr>
<td>F</td>
<td>Fast freely programmable function blocks</td>
</tr>
<tr>
<td>FFB</td>
<td>Function block</td>
</tr>
<tr>
<td>FCC</td>
<td>Flux current control</td>
</tr>
<tr>
<td>FCL</td>
<td>Fast current limiting</td>
</tr>
<tr>
<td>FF</td>
<td>Fixed frequency</td>
</tr>
<tr>
<td>FFB</td>
<td>Freely programmable function blocks</td>
</tr>
<tr>
<td>FOC</td>
<td>Field orientated control</td>
</tr>
<tr>
<td>FREQ</td>
<td>Frequency</td>
</tr>
<tr>
<td>FSA</td>
<td>Frame size A</td>
</tr>
<tr>
<td>FSB</td>
<td>Frame size B</td>
</tr>
<tr>
<td>FSC</td>
<td>Frame size C</td>
</tr>
<tr>
<td>FSD</td>
<td>Frame size D</td>
</tr>
</tbody>
</table>
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**B.1 Abbreviations**

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<thead>
<tr>
<th>Abbreviations</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td>FSE</td>
<td>Frame size E</td>
</tr>
<tr>
<td>FSF</td>
<td>Frame size F</td>
</tr>
<tr>
<td>G</td>
<td></td>
</tr>
<tr>
<td>GSD</td>
<td>Device Data File (Geräte Stamm Datei)</td>
</tr>
<tr>
<td>GSG</td>
<td>Getting Started Guide</td>
</tr>
<tr>
<td>GUI ID</td>
<td>Global unique identifier</td>
</tr>
<tr>
<td>H</td>
<td>Main actual value</td>
</tr>
<tr>
<td>HMI</td>
<td>Human machine interface</td>
</tr>
<tr>
<td>HO</td>
<td>High Overload (Constant Torque)</td>
</tr>
<tr>
<td>HSW</td>
<td>Main setpoint</td>
</tr>
<tr>
<td>HTL</td>
<td>High-voltage transistor logic</td>
</tr>
<tr>
<td>I/O</td>
<td>In-/output</td>
</tr>
<tr>
<td>IBN</td>
<td>Commissioning</td>
</tr>
<tr>
<td>IGBT</td>
<td>Insulated gate bipolar transistor</td>
</tr>
<tr>
<td>IND</td>
<td>Sub-index</td>
</tr>
<tr>
<td>J</td>
<td>JOG JOG</td>
</tr>
<tr>
<td>K</td>
<td>Kinetic buffering</td>
</tr>
<tr>
<td>L</td>
<td>Liquid crystal display</td>
</tr>
<tr>
<td>LED</td>
<td>Light emitting diode</td>
</tr>
<tr>
<td>LGE</td>
<td>Length</td>
</tr>
<tr>
<td>LO</td>
<td>Light Overload (Variable Torque)</td>
</tr>
<tr>
<td>LWL</td>
<td>Fiber Optic conductor</td>
</tr>
<tr>
<td>M</td>
<td>Motor holding brake</td>
</tr>
<tr>
<td>MLP</td>
<td>Multi-Language Pack</td>
</tr>
<tr>
<td>MOP</td>
<td>Motor operated potentiometer</td>
</tr>
<tr>
<td>MMC</td>
<td>Micro Memory Card</td>
</tr>
<tr>
<td>N</td>
<td>Normally closed</td>
</tr>
<tr>
<td>NEMA</td>
<td>National Electrical Manufacturers Association</td>
</tr>
<tr>
<td>NO</td>
<td>Normally open</td>
</tr>
<tr>
<td>O</td>
<td>Operating Instructions</td>
</tr>
<tr>
<td>OLM</td>
<td>Optical Link Module</td>
</tr>
<tr>
<td>OLP</td>
<td>Optical Link Plug</td>
</tr>
<tr>
<td>OM</td>
<td>Object Manager</td>
</tr>
<tr>
<td>P</td>
<td></td>
</tr>
</tbody>
</table>
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**B.1 Abbreviations**

<table>
<thead>
<tr>
<th>Abbreviations</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td>PAP</td>
<td>Parameter Access Point</td>
</tr>
<tr>
<td>PID</td>
<td>Proportional, integral, derivative controller</td>
</tr>
<tr>
<td>PKE</td>
<td>Parameter ID</td>
</tr>
<tr>
<td>PKW</td>
<td>Parameter channel (Parameter/Kennung/Wert)</td>
</tr>
<tr>
<td>PLC</td>
<td>Programmable logic control</td>
</tr>
<tr>
<td>PM</td>
<td>Power module</td>
</tr>
<tr>
<td>PM-IF</td>
<td>Power module interface</td>
</tr>
<tr>
<td>PNU</td>
<td>Parameter Number</td>
</tr>
<tr>
<td>PNO</td>
<td>PROFIBUS Nutzerorganisation</td>
</tr>
<tr>
<td>PPO</td>
<td>Parameter process data object</td>
</tr>
<tr>
<td>PTC</td>
<td>Positive temperature coefficient</td>
</tr>
<tr>
<td>PWE</td>
<td>Parameter value</td>
</tr>
<tr>
<td>PWM</td>
<td>Pulse-width modulation</td>
</tr>
<tr>
<td>Pxxxx</td>
<td>Write parameter</td>
</tr>
<tr>
<td>PZD</td>
<td>Process data area (Prozeßdaten)</td>
</tr>
<tr>
<td>Q</td>
<td>Quick commissioning</td>
</tr>
<tr>
<td>QC</td>
<td>Quick commissioning</td>
</tr>
<tr>
<td>RAM</td>
<td>Random-access memory</td>
</tr>
<tr>
<td>RCCB</td>
<td>Residual current circuit breaker</td>
</tr>
<tr>
<td>RCD</td>
<td>Residual current device</td>
</tr>
<tr>
<td>RFG</td>
<td>Ramp-function generator</td>
</tr>
<tr>
<td>RFI</td>
<td>Radio frequency interference</td>
</tr>
<tr>
<td>ROM</td>
<td>Read-only memory</td>
</tr>
<tr>
<td>RPM</td>
<td>Revolutions per minute</td>
</tr>
<tr>
<td>rxxxx</td>
<td>read-only parameters of analogue signals</td>
</tr>
<tr>
<td>S</td>
<td>Safe Break Control</td>
</tr>
<tr>
<td>SBC</td>
<td>Sensorless vector control</td>
</tr>
<tr>
<td>SLS</td>
<td>Safe-Limited Speed</td>
</tr>
<tr>
<td>SOL</td>
<td>Serial option link</td>
</tr>
<tr>
<td>SS1</td>
<td>Safe Stop 1</td>
</tr>
<tr>
<td>STO</td>
<td>Safe Torque Off</td>
</tr>
<tr>
<td>STW</td>
<td>Control word</td>
</tr>
<tr>
<td>STX</td>
<td>Start of text</td>
</tr>
<tr>
<td>SVM</td>
<td>Space vector modulation</td>
</tr>
<tr>
<td>T</td>
<td>Transistor-transistor logic</td>
</tr>
<tr>
<td>TTL</td>
<td>Transistor-transistor logic</td>
</tr>
<tr>
<td>USS</td>
<td>Universal serial interface</td>
</tr>
<tr>
<td>V</td>
<td>Voltage/frequency</td>
</tr>
</tbody>
</table>
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<th>Abbreviations</th>
<th>State</th>
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</thead>
<tbody>
<tr>
<td>VC</td>
<td>Vector control</td>
</tr>
<tr>
<td>VT</td>
<td>Variable torque</td>
</tr>
<tr>
<td>W</td>
<td></td>
</tr>
<tr>
<td>WEA</td>
<td>Automatic restart</td>
</tr>
<tr>
<td>Z</td>
<td></td>
</tr>
<tr>
<td>ZSW</td>
<td>Status word</td>
</tr>
<tr>
<td>ZUSW</td>
<td>Additional setpoint</td>
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