



Siemens Sinamics G150 Drive converter cabinet units



Siemens Sinamics G150 is series of cabinet units for industrial purpose. Such systems have been designed for vfd inverters in machine building and plant construction.

Main features of Siemens g150 drive systems are:

- Compact modular construction with easy service.
- The cabinet unit is simply installed and ready to work in a few moments.
- No difficult parameter alignment all software functions are easy to install and to control feedback via the control panel.
- Siemens Sinamics G150 is suitable for different pump types, fans or cooling systems, extruders, industrial mixers, compressors or mills etc.
- You can order it in various power types – from 380V to 690V and from 75kW to 800kW.
- Safety protection degree IP20, IP21, IP23 or IP54 available.

To find out stock ability and delivery time to your region, please contact our manager.



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SINAMICS G150

Drive converter cabinet units

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SINAMICS G150

Drive converter cabinet units

75 kW to 2700 kW

Overview



SINAMICS G150 drive converter cabinet units, versions A and C

With its SINAMICS G150 drive converter cabinet units, Siemens is offering a drive system on which all line-side and motor-side components as well as the Power Module are integrated extremely compactly into a specially designed cabinet enclosure. This approach minimizes the effort and expense required to configure and install them.

SINAMICS G150 has been specially tailored to meet the requirements of drives with quadratic and constant load characteristics, with medium performance requirements, and without regenerative feedback capability.

The control accuracy of the sensorless vector control is suitable for most applications, and additional actual speed value encoders are therefore superfluous.

SINAMICS G150 converters are optionally available with an encoder evaluation function in order to handle applications that require an encoder for plant-specific reasons.

SINAMICS G150 drive converter cabinet units offer an economic drive solution that can be matched to customer-specific requirements as a result of the wide range of available components and options.

There are two versions of the drive converter cabinet units:

■ Version A

All optionally available line connection components, such as the main switch, circuit breakers, line contactor, line fuses, line filter, motor-side components and additional monitoring devices, can be installed as required. This version is also available with power units connected in parallel.

■ Version C

This offers an extremely space-optimized structure without line-side components. This particularly narrow design can be used, for example, when line connection components are accommodated in a central low-voltage distribution panel (MCC) in the customer's plant or system.

SINAMICS G150 drive converter cabinet units are available for the following voltages and power ratings:

| Line voltage | Output range for single circuit (versions A and C) | Output range for parallel circuit (version A) |
|--------------------|---|--|
| 380 ... 480 V 3 AC | 110 ... 560 kW | 630 ... 900 kW |
| 500 ... 600 V 3 AC | 110 ... 560 kW | 630 ... 1000 kW |
| 660 ... 690 V 3 AC | 75 ... 800 kW | 1000 ... 2700 kW |

Degrees of protection are IP20 (standard), and as an option IP21, IP23, IP43 and IP54.

Benefits

- Particularly quiet and compact converters due to the use of state-of-the-art IGBT power semiconductors and an innovative cooling concept.
- Individual modules and power components can be replaced quickly and easily, which ensures a higher level of plant availability. The design of replaceable components is based on the principle that they must be quick and easy to change. In addition, the "SparesOnWeb" Internet tool makes it easy to view the spare parts that are available for the system components ordered.
- Can be easily integrated in automation solutions by means of a standard communications interface as well as a range of analog and digital interfaces.
- Easy commissioning and parameterization using interactive menus on the AOP30 Advanced Operator Panel with graphic LCD and plain-text display, or from a PC using the STARTER commissioning tool (→ Tools and configuration).
- Preset software functions make it easier to tailor the converter to the individual plant. For example, the key functions for controlling pumps are stored as a preprogrammed macro in the drive.
- Regarding EMC, the units are sub-divided into various zones, and as a consequence, they are extremely insensitive to disturbances and are very reliable in operation. With the help of simulated conditions, partitions have been designed to act as air guides and to help dissipate heat.
- Special measures used in the construction of the cabinets ensure that they remain mechanically durable throughout their entire life cycle. All components, from individual parts to the ready-to-connect cabinet, undergo rigorous testing throughout the entire production process. This guarantees a high level of functional reliability during installation and commissioning, as well as in operation.

Application

Variable-speed drives are ideal for all applications that involve moving, conveying, pumping or compressing solids, liquids or gases.

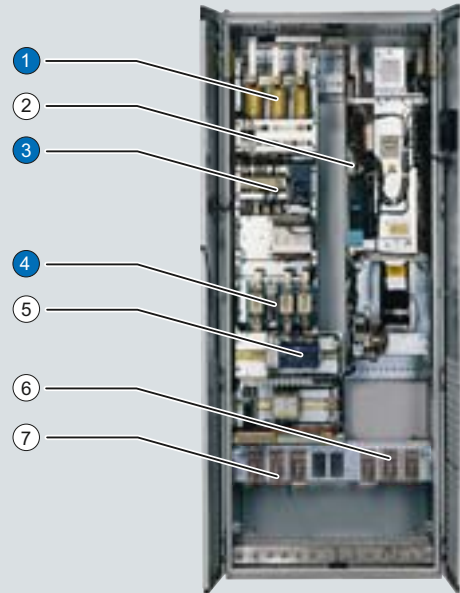
This means the following applications in particular:

- Pumps and fans
- Compressors
- Extruders and mixers
- Mills

Design

SINAMICS G150 drive converter cabinet units are characterized by their compact, modular, and service-friendly design.

A wide range of options is available depending on the cabinet version, which permits optimum adaptation of the drive system to the respective requirements (→ Options).



- ① Line reactor (≤ 500 kW standard) (Option L23)
 - ② PROFIBUS connection
 - ③ Line contactor (Option L13)
 - ④ Main control switch with fuses (Option L26)
 - ⑤ Customer Terminal Module
 - ⑥ Motor connection
 - ⑦ Line connection
- Standard version
● Options

Example of design of a SINAMICS G150 drive converter cabinet unit, version A with a CU320-2 DP Control Unit

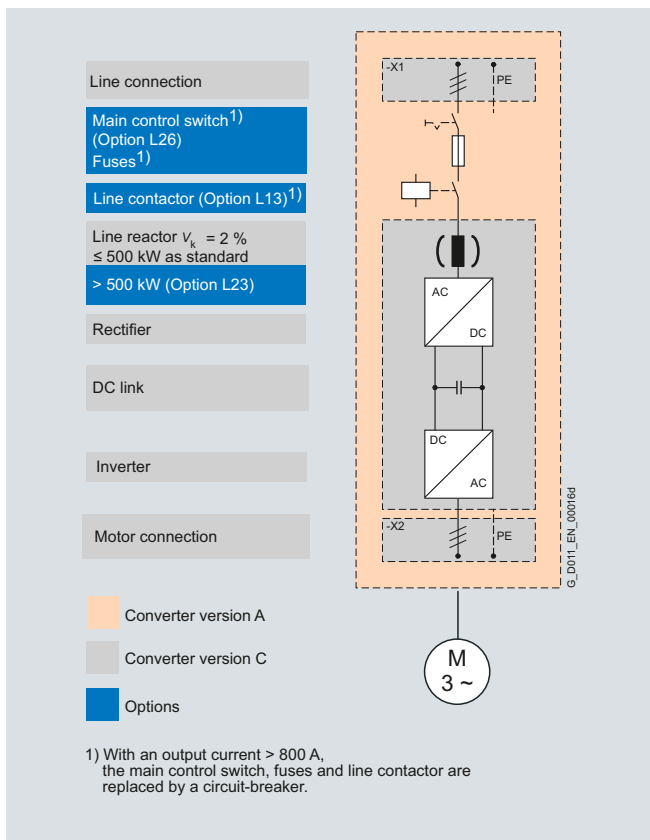
SINAMICS G150

Drive converter cabinet units

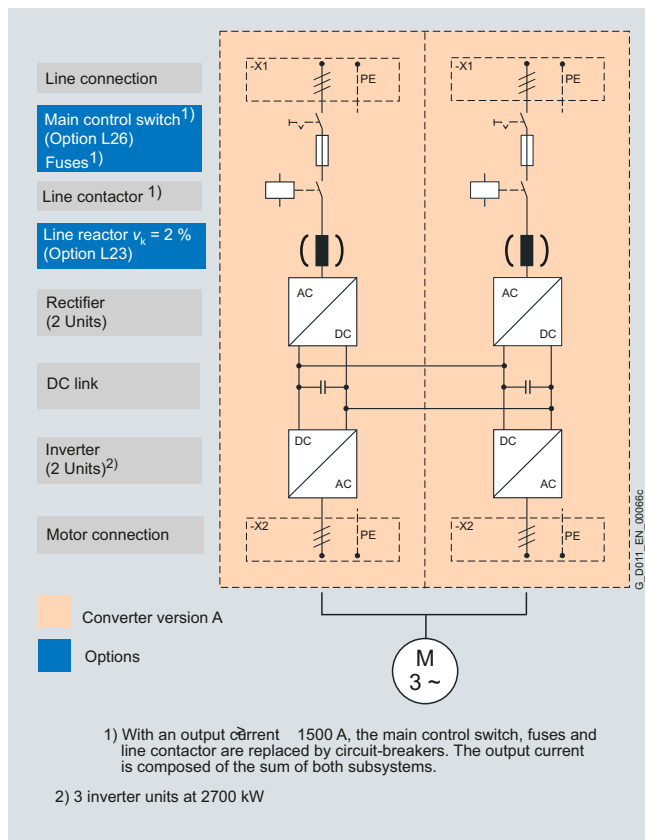
75 kW to 2700 kW

Design (continued)

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Basic design of a SINAMICS G150 drive converter cabinet unit with several essential options



Basic design of a SINAMICS G150 drive converter cabinet unit in a parallel circuit in order to increase the power rating with several essential options

Design (continued)

Varnished PCBs

The following converter components are equipped as standard with varnished PCBs:

- Power Modules
- Control Units
- Sensor Modules
- Terminal Modules
- Advanced Operator Panel (AOP30)

The coating on the modules protects the sensitive SMD components against corrosive gases, chemically active dust and moisture.

Nickel-plated busbars

All of the copper busbars used in the converter cabinet are nickel-plated in order to achieve the best possible immunity to environmental effects. Further, the bare copper connections do not have to be cleaned for customer connections.

Note:

For some options, for technical reasons, parts of the copper busbars are not nickel plated.

Degrees of protection of cabinet units

The EN 60529 standard covers the protection of electrical equipment by means of housings, covers or equivalent, and includes:

- Protection of persons against accidental contact with live or moving parts within the housing and protection of the equipment against the ingress of solid foreign matter (touch protection and protection against ingress of solid foreign bodies)
- Protection of the equipment against the ingress of water (water protection)
- Abbreviations for the internationally agreed degrees of protection.

The degrees of protection are specified by abbreviations comprising the code letters IP and two digits.

| Degrees of protection of the drive converter cabinet unit | First digit (touch protection and protection against ingress of foreign solid matter) | Second digit (protection of the equipment against the ingress of water) |
|---|--|---|
| IP20 (standard) | Protected against solid foreign bodies, diameter ≥ 12.5 mm. | No water protection |
| IP21 (option M21) | Protected against solid foreign bodies, diameter ≥ 12.5 mm. | Protected against drip water Vertically falling drip water shall not have a harmful effect. |
| IP23 (option M23) | Protected against solid foreign bodies, diameter ≥ 12.5 mm. | Protected against water spray Water sprayed on both sides of the vertical at an angle of up to 60° shall not have a harmful effect. |
| IP43 (option M43) | Protected against solid foreign bodies, diameter ≥ 1 mm. | Protected against water spray Water sprayed on both sides of the vertical at an angle of up to 60° shall not have a harmful effect. |
| IP54 (option M54) | Dust protected. Ingress of dust is not totally prevented, but dust must not be allowed to enter in such quantities that the functioning or safety of the equipment is impaired. | Protected against splash water Water splashing onto the enclosure from any direction shall not have a harmful effect. |

SINAMICS G150

Drive converter cabinet units

75 kW to 2700 kW

Selection and ordering data

Single circuit

| Type rating | | Rated output current | SINAMICS G150 converter cabinet units (Order No. supplement, see below) |
|-------------------------------|-------------------------------|----------------------|--|
| at 400 V 500 V or 690 V | at 60 Hz 460 V or 575 V | | |
| kW | hp | A | Order No. |
| 380 ... 480 V 3 AC | | | |
| 110 | 150 | 210 | 6SL3710-1GE32-1 A3 |
| 132 | 200 | 260 | 6SL3710-1GE32-6 A3 |
| 160 | 250 | 310 | 6SL3710-1GE33-1 A3 |
| 200 | 300 | 380 | 6SL3710-1GE33-8 A3 |
| 250 | 400 | 490 | 6SL3710-1GE35-0 A3 |
| 315 | 500 | 605 | 6SL3710-1GE36-1 A3 |
| 400 | 600 | 745 | 6SL3710-1GE37-5 A3 |
| 450 | 700 | 840 | 6SL3710-1GE38-4 A3 |
| 560 | 800 | 985 | 6SL3710-1GE41-0 A3 |
| 500 ... 600 V 3 AC | | | |
| 110 | 150 | 175 | 6SL3710-1GF31-8 A3 |
| 132 | 200 | 215 | 6SL3710-1GF32-2 A3 |
| 160 | 250 | 260 | 6SL3710-1GF32-6 A3 |
| 200 | 300 | 330 | 6SL3710-1GF33-3 A3 |
| 250 | 400 | 410 | 6SL3710-1GF34-1 A3 |
| 315 | 450 | 465 | 6SL3710-1GF34-7 A3 |
| 400 | 600 | 575 | 6SL3710-1GF35-8 A3 |
| 500 | 700 | 735 | 6SL3710-1GF37-4 A3 |
| 560 | 800 | 810 | 6SL3710-1GF38-1 A3 |
| 660 ... 690 V 3 AC | | | |
| 75 | | 85 | 6SL3710-1GH28-5 A3 |
| 90 | | 100 | 6SL3710-1GH31-0 A3 |
| 110 | | 120 | 6SL3710-1GH31-2 A3 |
| 132 | | 150 | 6SL3710-1GH31-5 A3 |
| 160 | | 175 | 6SL3710-1GH31-8 A3 |
| 200 | | 215 | 6SL3710-1GH32-2 A3 |
| 250 | | 260 | 6SL3710-1GH32-6 A3 |
| 315 | | 330 | 6SL3710-1GH33-3 A3 |
| 400 | | 410 | 6SL3710-1GH34-1 A3 |
| 450 | | 465 | 6SL3710-1GH34-7 A3 |
| 560 | | 575 | 6SL3710-1GH35-8 A3 |
| 710 | | 735 | 6SL3710-1GH37-4 A3 |
| 800 | | 810 | 6SL3710-1GH38-1 A3 |

Order No. supplement

Version A

All available line connection components can be installed as required

A

Version C

Especially space-saving design

C

Parallel circuit

| Type rating | | Rated output current | Converter cabinet units SINAMICS G150, version A |
|-------------------------------|-------------------------------|----------------------|---|
| at 400 V 500 V or 690 V | at 60 Hz 460 V or 575 V | | |
| kW | hp | A | Order No. |
| 380 ... 480 V 3 AC | | | |
| 630 | 900 | 1120 | 6SL3710-2GE41-1AA3 |
| 710 | 1000 | 1380 | 6SL3710-2GE41-4AA3 |
| 900 | 1250 | 1560 | 6SL3710-2GE41-6AA3 |
| 500 ... 600 V 3 AC | | | |
| 630 | 900 | 860 | 6SL3710-2GF38-6AA3 |
| 710 | 1000 | 1070 | 6SL3710-2GF41-1AA3 |
| 1000 | 1250 | 1360 | 6SL3710-2GF41-4AA3 |
| 660 ... 690 V 3 AC | | | |
| 1000 | | 1070 | 6SL3710-2GH41-1AA3 |
| 1350 | | 1360 | 6SL3710-2GH41-4AA3 |
| 1500 | | 1500 | 6SL3710-2GH41-5AA3 |
| 1750 | | 1729 | 6SL3710-2GH41-8EA3 |
| 1950 | | 1948 | 6SL3710-2GH42-0EA3 |
| 2150 | | 2158 | 6SL3710-2GH42-2EA3 |
| 2400 | | 2413 | 6SL3710-2GH42-4EA3 |
| 2700 | | 2752 | 6SL3710-2GH42-7EA3 |

Note: The power data in hp units are based on the NEC/CEC standards for the North American market.

Note: The power data in hp units are based on the NEC/CEC standards for the North American market.

Function

AOP30 Advanced Operator Panel



An AOP30 Advanced Operator Panel is located in the cabinet door of the converter for operation, monitoring and commissioning tasks.

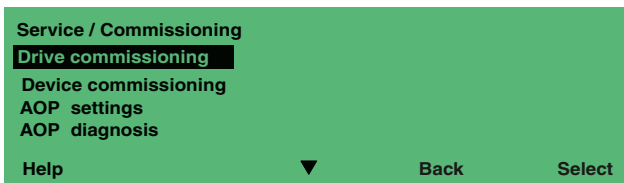
The AOP30's two-stage safety concept prevents unintentional or unauthorized changes to settings. Operation of the drive from the operator panel can be disabled by the keyboard lock so that only parameter values and process variables can be displayed on the operating panel. The OFF key is factory-set to active but can also be deactivated by the customer. A password can be used to prevent the unauthorized modification of converter parameters.

The user is guided by interactive menus through the drive-commissioning screens. When commissioning the drive for the first time, only 6 motor parameters (which can be found on a motor rating plate) have to be entered on the AOP30. The control is then optimized automatically to fine-tune the converter to the motor.

English, German, French, Italian, Spanish and **Chinese** are stored on the CU320-2 Control Unit's CompactFlash card as operator panel languages. The desired language must be downloaded to the AOP30 prior to commissioning. **Russian, Polish** and **Czech** are available in addition to these standard panel languages. These can be downloaded free of charge from the Internet under the following link:
<http://support.automation.siemens.com/>

Examples of plain-text displays at various phases of operation are shown below.

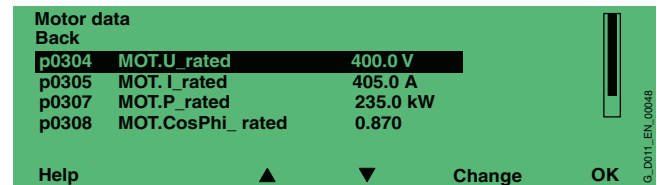
First commissioning is carried out using the operator panel.



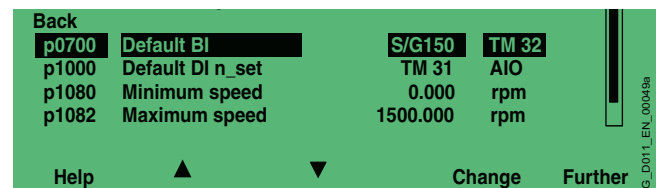
Only 6 motor parameters have to be entered:

Power, speed, current, cos phi, voltage and frequency of the motor.

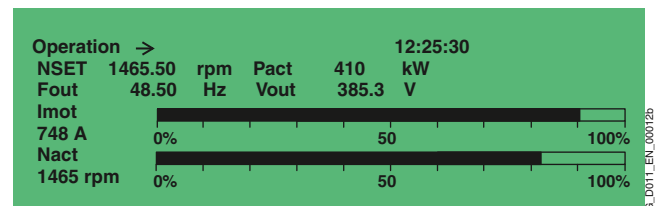
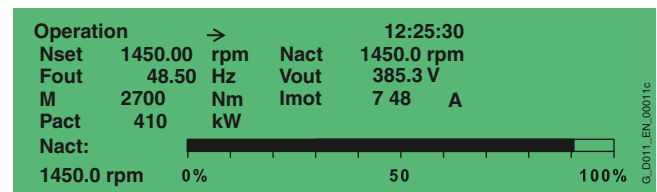
This information can be found on the motor rating plate, and must be entered into the screens on the display by following a short, menu-assisted procedure. The motor cooling method must also be specified.



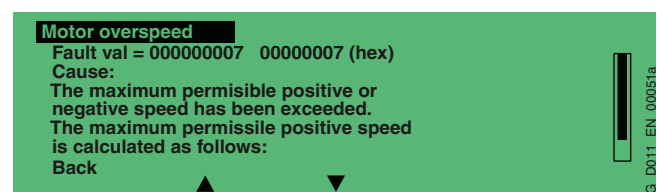
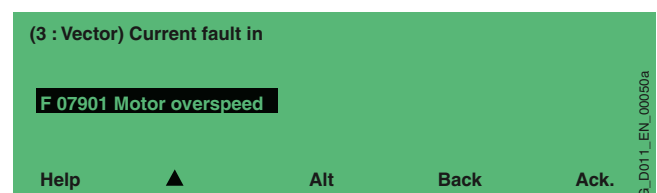
The next screen contains the parameter values that are used to automatically optimize the control.



During **operation**, actual data are output on the display as absolute values, such as setpoint and actual values, or it is possible to parameterize up to 3 process variables as a quasi-analog bar display.



Any **alarms** that occur are signaled by flashing of the yellow "ALARM" LED, **faults** by lighting up of the red "FAULT" LED. There is also an indication of the cause displayed in plain text on the display's status line.



Function (continued)

Communication with higher-level control and customer Terminal Module

A PROFIBUS interface on the CU320-2 DP Control Unit is provided as standard as the customer interface.

When using the Control Unit CU320-2 PN (PROFINET) (Option **K95**), communication is realized via PROFINET corresponding to the PROFIdrive profile.

The Control Unit can be connected to the higher-level control via its digital inputs and outputs to exchange digital signals.

The inputs and outputs available as standard can be optionally expanded using a TB30 Terminal Board (option **L62**) and/or up to 2 TM31 Terminal Modules (option **G60** or **G61**).

To simplify configuration and commissioning of the drive, the optional TM31 Terminal Module can be preset to a variety of factory settings.

The SINAMICS Low Voltage Engineering Manual contains additional information and is available as a PDF file on the CD-ROM included with Catalog D 11.

Open-loop and closed-loop control functions

The converter control contains a high-quality, sensorless vector control with speed and current controls as well as motor and converter protection.

Software and protective functions

The software functions available as standard are described below:

| Software and protective functions | Description |
|--|--|
| Setpoint input | The setpoint can be input both internally and externally. It is applied internally as a fixed setpoint, motorized potentiometer setpoint or jog setpoint and externally via the communications interface or an analog input on customer Terminal Module. The internal fixed setpoint and the motorized potentiometer setpoint can be switched over or adjusted using control commands via all interfaces. |
| Motor identification | The automatic motor identification function makes commissioning faster and easier and optimizes closed-loop control of the drive. |
| Ramp-function generator | A convenient ramp-function generator with separately adjustable ramping times, together with adjustable rounding times in the lower and upper speed ranges, allows the drive to be smoothly accelerated and braked. As a consequence, this avoids the drive train from being overloaded and reduces the stress on mechanical components. The down ramps can be parameterized separately for quick stop. |
| V_{dc max} controller | The V _{dc max} controller automatically prevents overvoltages in the DC link if the set down ramp is too short, for example. This may also extend the set ramp-down time. |
| Kinetic buffering (KIP) | For supply voltage dips, the kinetic energy of the rotating drive is used to buffer the DC link and therefore prevents fault trips. The drive converter remains operational as long as the drive can provide regenerative energy as a result of its motion and the DC link voltage does not drop below the trip threshold. When the line supply recovers within this time, the drive is again accelerated up to its setpoint speed. |
| Automatic restart¹⁾ | The automatic restart switches the drive on again when the power is restored after a power failure, and ramps up to the current speed setpoint. |
| Flying restart¹⁾ | The "Flying restart" function allows the converter to be switched to a motor that is still turning. |
| Technology controller | The "Technology controller" function module allows simple control functions to be implemented, e.g. level control or volumetric flow control. The technology controller is designed as a PID controller, whereby the differentiator can be switched to the control deviation channel or the actual value channel (factory setting). The P, I, and D components can be set separately. |
| Free function blocks | Using the freely programmable function blocks, it is easy to implement logic and arithmetic functions for controlling the SINAMICS G150 unit. The blocks can be programmed by means of an operator panel or the STARTER commissioning tool. |
| Drive Control Chart (DCC) | Drive Control Chart (DCC) is an additional tool for the easy configuration of process-oriented functions for the SINAMICS G150. The block library contains a large selection of control, arithmetic and logic blocks as well as extensive open-loop and closed-loop control functions. The user-friendly DCC editor enables easy graphical configuration and a clear representation of control loop structures as well as a high degree of reusability of existing diagrams. DCC is an add-on to the STARTER commissioning tool (→ Tools and configuration). |
| Pt detection for motor protection | A motor model stored in the converter software calculates the motor temperature based on the current speed and load. More exact sensing of the temperature, which also takes into account the influence of the ambient temperature, is possible by means of direct temperature sensing using KTY84 sensors in the motor winding. |
| Motor temperature evaluation | Motor protection by evaluating a KTY84, PTC or Pt100 temperature sensor. When a KTY84 sensor is connected, the limit values can be set for alarm or shutdown. When a PTC thermistor is connected, the system reaction to triggering of the thermistor (alarm or shutdown) can be defined. |
| Motor blocking protection | A blocked motor is recognized and protected against thermal overloading by shutting down. |

¹⁾ Factory setting: not activated (can be programmed)

Function (continued)

| Power unit protection | Description |
|--|---|
| Ground fault monitoring at output end | A ground fault on the output side is detected by an aggregate current monitor and results in shutdown in grounded-neutral systems. |
| Electronic short-circuit protection at output end | A short-circuit at the output (e.g. at the converter output terminals, in the motor cable or in the motor terminal box) is detected and the converter shuts down with "fault". |
| Thermal overload protection | An alarm is issued first when the overtemperature threshold responds. If the temperature rises further, the unit either shuts down or independently adjusts the pulse frequency or output current so that a reduction in the thermal load is achieved. Once the cause of the fault has been eliminated (e.g. cooling has been improved), the original operating values are automatically resumed. |

Safety Integrated functions

The integrated safety functions of SINAMICS provide highly-effective application-oriented protection for personnel and machinery.

SINAMICS G150 offers the following Safety Integrated functions as standard (terms as defined in IEC 61800-5-2):

- Safe Torque Off (STO)
- Safe Stop 1 (SS1)

The Safety Integrated functions are implemented electronically and therefore offer short response times in comparison to solutions with externally implemented monitoring functions.

Legal framework

Machine manufacturers and plant construction companies must ensure that their machines or plants cannot cause danger as a result of electric shock, heat or radiation or hazards caused by functional faults. In Europe, for example, compliance with the machinery directive is legally stipulated by the EU industrial safety directive.

In order to ensure compliance with this directive, it is recommended that the corresponding harmonized European standards are applied. This initiates the assumption of conformity and gives manufacturers and operators the legal security when complying with both national regulations and EU directives. The machine manufacturer uses the CE marking to document the compliance with all relevant directives and regulations in the free movement of goods.

Safety-related standards

Functional safety is specified in various standards. EN ISO 12100 and EN ISO 14121-1, for example, are concerned with the design and risk assessment of machines. Functional and safety-related requirements of control systems with relevance to safety are defined in EN 62061 (applicable only to electrical and electronic control systems) and EN ISO 13849-1. This will replace EN 954-1 – which is still being commonly used – at the end of 2011.

The above-mentioned standards define different safety requirements that the machine has to satisfy in accordance with the risk, frequency of a dangerous situation, probability of occurrence and the opportunities for recognizing impending danger.

- EN 954-1: Categories B, 1 ... 4
- EN ISO 13849-1: Performance Level PL a ... e
- EN 62061: Safety Integrity Level SIL 1 ... 3

Safety functions integrated in the drive with SINAMICS

The safety functions integrated in SINAMICS satisfy the requirements of:

- Category 3 according to EN 954-1 or EN ISO 13849-1
- Safety Integrity Level (SIL) 2 according to EN 61508
- Performance Level (PL) d according to EN ISO 13849-1

In addition, the Safety Integrated functions of SINAMICS are generally certified by independent institutes. An up-to-date list of certified components is available on request from your local Siemens office.

Basic Functions and Extended Functions

The Safety Integrated functions of the SINAMICS drive system are grouped into basic functions and extended functions.

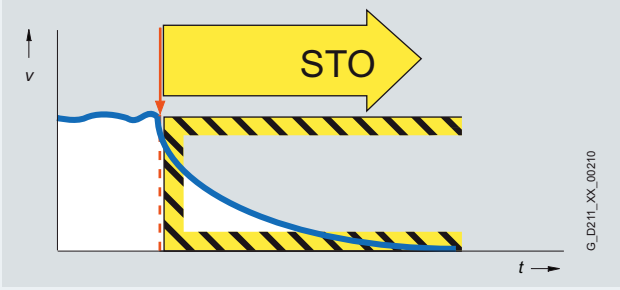
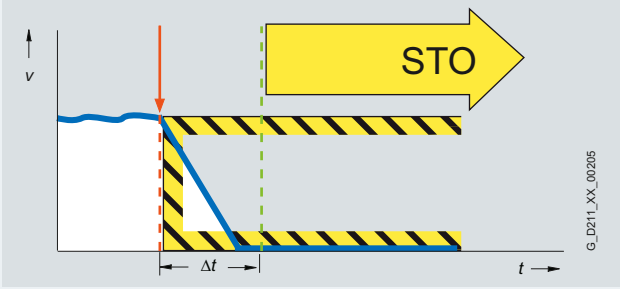
The above mentioned Basic Functions STO and SS1 are included in the standard scope of SINAMICS G150 and do not require a license. Extended Functions, which will require a license, are presently still not available for SINAMICS G150.

The Safety Integrated functions are either activated via a terminal at the Control Unit and at the power unit, or via PROFIBUS or PROFINET with the PROFIsafe profile.

An encoder is not required to use Basic Functions.

The Safety Integrated functions currently available in SINAMICS G150 are subsequently described in more detail (terms as defined in IEC 61800-5-2):

Function (continued)

| Safety Integrated | Description |
|--|--|
| <p>Safe Torque Off (STO)</p> | <p><u>Function description</u> This function is a mechanism that prevents the drive from restarting unexpectedly, in accordance with EN 60204-1, Section 5.4. Safe Torque Off disables the drive pulses and disconnects the power supply to the motor (corresponds to Stop Category 0 of EN 60204-1). The drive is reliably torque-free. This state is monitored internally in the drive.</p> <p><u>Application, customer benefits</u> STO has the immediate effect that the drive cannot supply any torque-generating energy. STO can be used wherever the drive will reach a standstill by itself due to the load torque or friction in a sufficiently short time or when "coasting down" of the drive will not have any relevance for safety.</p>  <p>The diagram shows velocity (v) on the y-axis and time (t) on the x-axis. A blue curve shows the drive's velocity decreasing over time. A vertical red dashed line marks the start of the STO function. A yellow arrow labeled 'STO' points to the right, indicating the duration of the safe state. A hatched area below the velocity curve indicates the period where the drive is safely stopped.</p> <p style="text-align: right;">G_D211_XX_00210</p> |
| <p>Safe Stop 1 (SS1)</p> | <p><u>Function description</u> The Safe Stop 1 function can safely stop the drive in accordance with EN 60204-1, Stop Category 1. When the SS1 function is selected, the drive independently brakes along a quick stop ramp (OFF3) and automatically activates Safe Torque Off when the parameterized safety delay time Δt has expired.</p> <p><u>Application, customer benefits</u> With this integrated self-braking function, complex external monitoring devices are not required. It is often possible to also eliminate mechanical brakes which wear – or to lessen the load on them, so that maintenance costs and the stresses on the machine can be reduced. Safe Stop 1 is employed for applications which require monitored braking, e.g. on centrifuges or conveyor vehicles.</p>  <p>The diagram shows velocity (v) on the y-axis and time (t) on the x-axis. A blue curve shows the drive's velocity decreasing over time. A vertical red dashed line marks the start of the SS1 function. The velocity decreases along a ramp (OFF3) until it reaches zero. A yellow arrow labeled 'STO' points to the right, indicating the duration of the safe state. A hatched area below the velocity curve indicates the period where the drive is safely stopped. A horizontal double-headed arrow labeled Δt indicates the safety delay time.</p> <p style="text-align: right;">G_D211_XX_00205</p> |
| <p>Terminal module for controlling STO and SS1 (option K82)</p> | <p>The terminal module is used to control the "Basic Safety Functions" over a wide voltage range from 24 V to 240 V DC/AC. This means that the "STO" and "SS1" safety functions can be flexibly controlled from the signal voltages in the plant.</p> <p>See → Description of the options (K82)</p> |

Technical data

The most important directives and standards are listed below. These are used as basis for the SINAMICS drive system and they must be carefully observed to achieve an EMC-compliant configuration that is safe both functionally and in operation.

European directives

| | |
|-------------|--|
| 2006/95/EC | Low-voltage directive: Legal guidelines of the EU member states concerning electrical equipment for use within specified voltage limits |
| 2004/108/EC | EMC directive: Legal guidelines of the EU member states for electromagnetic compatibility |

European Standards

| | |
|----------------|---|
| EN 954-1 | Safety of machinery – Safety-related parts of controls Part 1: General design principles |
| EN ISO 13849-1 | Safety of machinery – Safety-related parts of controls Part 1: General design principles (ISO 13849-1:2006) (replaced EN 954-1) |
| EN 60146-1-1 | Semiconductor converters – General requirements and line-commutated converters Part 1-1: Specification of basic requirements |
| EN 60204-1 | Electrical equipment of machines Part 1: General requirements |
| EN 60529 | Degrees of protection provided by enclosures (IP code) |
| EN 61508-1 | Functional safety of electrical/electronic/programmable electronic safety-related systems Part 1: General requirements |
| EN 61800-2 | Adjustable speed electrical power drive systems Part 2: General requirements – Rating specifications for low-voltage adjustable frequency AC power drive systems |
| EN 61800-3 | Adjustable speed electrical power drive systems Part 3: EMC requirements and specific test methods |
| EN 61800-5-1 | Adjustable speed electrical power drive systems Part 5: Safety requirements Main section 1: Electrical and thermal requirements |
| EN 61800-5-2 | Adjustable speed electrical power drive systems Part 5-2: Safety requirements – Functional safety (IEC 61800-5-2:2007) |

North American standards

| | |
|------------------|------------------------------|
| UL508A | Industrial Control Panels |
| UL508C | Power Conversion Equipment |
| CSA C22.2 No. 14 | Industrial Control Equipment |

Approvals

| | |
|--------------|---|
| cULus, cURus | Testing by UL (Underwriters Laboratories, http://www.ul.com) according to UL and CSA standards |
|--------------|---|

Test symbol:

(→ Appendix, Approvals)

SINAMICS G150

Drive converter cabinet units

75 kW to 2700 kW

Technical data (continued)

General technical data

| Electrical data | | Single circuit | Parallel circuit |
|---|--|--|--|
| Line voltages and output ranges | • 380 ... 480 V 3 AC, ±10 % (-15 % < 1 min) | 110 ... 560 kW | 630 ... 900 kW |
| | • 500 ... 600 V 3 AC, ±10 % (-15 % < 1 min) | 110 ... 560 kW | 630 ... 1000 kW |
| | • 660 ... 690 V 3 AC, ±10 % (-15 % < 1 min) | 75 ... 800 kW | 1000 ... 2700 kW |
| Types of supplies | Grounded TN/TT systems or ungrounded IT systems (a grounded phase conductor is not permiss. in 690 V syst.) | | |
| Line frequency | 47 ... 63 Hz | | |
| Output frequency | 0 ... 300 Hz | | |
| Power factor | | | |
| - Fundamental mode | > 0.96 | | |
| - Total | 0.75 ... 0.93 | | |
| Efficiency | > 98 % | | |
| Overvoltage category | III to EN 61800-5-1 | | |
| Control method | Vector control with and without encoder or V/f control | | |
| Fixed speeds | 15 fixed speeds plus 1 minimum speed, parameterizable (in the default setting, 3 fixed setpoints plus 1 minimum speed are selectable using terminal block/PROFIBUS) | | |
| Skipped speed ranges | 4, programmable | | |
| Setpoint resolution | 0.001 rpm digital 12 bit analog | | |
| Braking operation | Optional via braking unit | | |
| Mechanical data | | | |
| Degree of protection | IP20 (higher degrees of protection up to IP54 optional) | | |
| Protection class | I acc. to EN 61800-5-1 | | |
| Touch protection | EN 50274 / BGV A3 | | |
| Cabinet system | Rittal TS 8, doors with double-barb lock, three-section base plates for cable entry | | |
| Paint finish | RAL 7035 (indoor requirements) | | |
| Type of cooling | Forced air cooling AF acc. to EN 60146 | | |
| Ambient conditions | | | |
| | Storage | Transport | Operation |
| Ambient temperature | -25 ... +55 °C | -25 ... +70 °C from <u>-40 °C</u> for 24 hours | <u>0</u> ... +40 °C up to +50 °C see derating data |
| Relative humidity (condensation not permissible) | <u>5 ... 95 %</u> | 5 ... 95 % at 40 °C | <u>5 ... 95 %</u> |
| | Class 1K4 to EN 60721-3-1 | Class 2K3 to EN 60721-3-2 | Class 3K3 to EN 60721-3-3 |
| Environmental class/harmful chemical substances | Class 1C2 acc. to EN 60721-3-1 | Class 2C2 acc. to EN 60721-3-2 | Class 3C2 acc. to EN 60721-3-3 |
| Organic/biological influences | Class 1B1 acc. to EN 60721-3-1 | Class 2B1 acc. to EN 60721-3-2 | Class 3B1 acc. to EN 60721-3-3 |
| Pollution degree | 2 acc. to EN 61800-5-1 | | |
| Installation altitude | Up to 2000 m above sea level without derating, > 2000 m, see derating data | | |
| Mechanical stability | | | |
| | Storage | Transport | Operation |
| Vibratory load | | | |
| | - Deflection | 1.5 mm at <u>5</u> ... 9 Hz | <u>3.1 mm</u> at <u>5</u> ... 9 Hz |
| - Acceleration | 5 m/s ² at > 9 ... 200 Hz Class 1M2 to EN 60721-3-1 | 10 m/s ² at > 9 ... 200 Hz Class 2M2 to EN 60721-3-2 | 10 m/s ² at > 58 ... 200 Hz – |
| Shock load | | | |
| | - Acceleration | 40 m/s ² at 22 ms Class 1M2 to EN 60721-3-1 | 100 m/s ² at 11 ms Class 2M2 to EN 60721-3-2 |
| Compliance with standards | | | |
| CE Label | Acc. to EMC Directive No. 2004/108/EC and Low-Voltage Directive No. 2006/95/EC | | |
| Radio interference suppression | The SINAMICS G150 converter systems are not designed for connection to the public power network ("first environment"). RFI suppression is compliant with the EMC product standard for variable-speed drives EN 61800-3, "Second environment" (industrial networks). The equipment can cause electromagnetic interference when it is connected to the public network. However, if supplementary measures are taken (e.g. line filter, → Option L00) operation in the "first environment" is possible. ¹⁾ | | |
| Approvals | cULus | | |

Deviations from the specified classes are underlined.

¹⁾ Applies to motor cable lengths < 100 m.

Technical data (continued)

Technical data for single circuit

| Line voltage 380 ... 480 V 3 AC | | SINAMICS G150 converter cabinet units | | | | | | | | |
|--|-------------------|---------------------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| | | 6SL3710-1GE32-1.A3 | 6SL3710-1GE32-6.A3 | 6SL3710-1GE33-1.A3 | 6SL3710-1GE33-8.A3 | 6SL3710-1GE35-0.A3 | 6SL3710-1GE36-1.A3 | 6SL3710-1GE37-5.A3 | 6SL3710-1GE38-4.A3 | 6SL3710-1GE41-0.A3 |
| Type rating | | | | | | | | | | |
| • at I_L at 50 Hz 400 V ¹⁾ | kW | 110 | 132 | 160 | 200 | 250 | 315 | 400 | 450 | 560 |
| • at I_H at 50 Hz 400 V ¹⁾ | kW | 90 | 110 | 132 | 160 | 200 | 250 | 315 | 400 | 450 |
| • at I_L at 60 Hz 460 V ²⁾ | hp | 150 | 200 | 250 | 300 | 400 | 500 | 600 | 600 | 800 |
| • at I_H at 60 Hz 460 V ²⁾ | hp | 125 | 150 | 200 | 250 | 350 | 350 | 450 | 500 | 700 |
| Output current | | | | | | | | | | |
| • Rated current I_{rated} | A | 210 | 260 | 310 | 380 | 490 | 605 | 745 | 840 | 985 |
| • Base load current I_L ³⁾ | A | 205 | 250 | 302 | 370 | 477 | 590 | 725 | 820 | 960 |
| • Base load current I_H ⁴⁾ | A | 178 | 233 | 277 | 340 | 438 | 460 | 570 | 700 | 860 |
| Input current | | | | | | | | | | |
| • Rated input current ⁵⁾ | A | 229 | 284 | 338 | 395 | 509 | 629 | 775 | 873 | 1024 |
| • Input current, max. | A | 335 | 410 | 495 | 606 | 781 | 967 | 1188 | 1344 | 1573 |
| • Current requirement, 24 V DC auxiliary power supply ⁶⁾ | A | 1.1 | 1.1 | 1.35 | 1.35 | 1.35 | 1.4 | 1.4 | 1.4 | 1.5 |
| Power loss | kW | 2.9 | 3.8 | 4.4 | 5.3 | 6.4 | 8.2 | 9.6 | 10.1 | 14.4 |
| Cooling-air demand | m ³ /s | 0.17 | 0.23 | 0.36 | 0.36 | 0.36 | 0.78 | 0.78 | 0.78 | 1.48 |
| Sound pressure level L_{pA} (1 m) at 50/60 Hz | dB | 67/68 | 69/73 | 69/73 | 69/73 | 69/73 | 70/73 | 70/73 | 70/73 | 72/75 |
| Cable lengths between converter and motor ⁸⁾ | | | | | | | | | | |
| • shielded | m | 300 | 300 | 300 | 300 | 300 | 300 | 300 | 300 | 300 |
| • unshielded | m | 450 | 450 | 450 | 450 | 450 | 450 | 450 | 450 | 450 |
| Dimensions | | | | | | | | | | |
| • Width for version A/C | mm | 800/400 | 800/400 | 800/400 | 1000/400 | 1000/400 | 1200/600 | 1200/600 | 1200/600 | 1600/1000 |
| • Height ⁷⁾ | mm | 2000 | 2000 | 2000 | 2000 | 2000 | 2000 | 2000 | 2000 | 2000 |
| • Depth | mm | 600 | 600 | 600 | 600 | 600 | 600 | 600 | 600 | 600 |
| Weight (degree of protection IP20, without options) for version A/C, approx. | kg | 460/225 | 460/225 | 670/300 | 670/300 | 670/300 | 750/670 | 750/670 | 780/670 | 1100/880 |

Note: The power data in hp units are based on the NEC/CEC standards for the North American market.

Information on the line connection, motor connection and cabinet grounding is provided under **Cable cross-sections and connections**.

¹⁾ Rated power of a typ. 6-pole standard induction motor based on I_L or I_H at 50 Hz 400 V 3 AC

²⁾ Rated power of a typ. 6-pole standard induction motor based on I_L or I_H at 60 Hz 460 V 3 AC

³⁾ The base load current I_L is based on a duty cycle of 110 % for 60 s or 150 % for 10 s with a duty cycle duration of 300 s. See characteristic curves (→ Overload capability).

⁴⁾ The base load current I_H is based on a duty cycle of 150 % for 60 s or 160 % for 10 s with a duty cycle duration of 300 s. See characteristic curves (→ Overload capability).

⁵⁾ The current values given here are based on the rated output current.

⁶⁾ If the drive control is to remain active after a main infeed failure, the converter must be externally supplied with 24 V DC. The following should also be taken into account:

- CU320-2: 1 A
- TM31: 0.5 A
- AOP30: 0.2 A
- SMC: 0.6 A
- The current requirement of the digital inputs/outputs.

⁷⁾ Version A: The cabinet height increases by 250 mm for degree of protection IP21, 400 mm for degrees of protection IP23, IP43 and IP54, 405 mm for the options **M13** and **M78**.
Version C: The cabinet height increases by 250 mm for IP21 degree of protection, 400 mm for IP23, IP43 and IP54 degrees of protection.

⁸⁾ Longer cable lengths for specific configurations are available on request.

Technical data (continued)

| Line voltage 500 ... 600 V 3 AC | | SINAMICS G150 converter cabinet units | | | | | | | | |
|--|-------------------|---------------------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| | | 6SL3710-1GF31-8.A3 | 6SL3710-1GF32-2.A3 | 6SL3710-1GF32-6.A3 | 6SL3710-1GF33-3.A3 | 6SL3710-1GF34-1.A3 | 6SL3710-1GF34-7.A3 | 6SL3710-1GF35-8.A3 | 6SL3710-1GF37-4.A3 | 6SL3710-1GF38-1.A3 |
| Type rating | | | | | | | | | | |
| • at I_L at 50 Hz 500 V ¹⁾ | kW | 110 | 132 | 160 | 200 | 250 | 315 | 400 | 500 | 560 |
| • at I_H at 50 Hz 500 V ¹⁾ | kW | 90 | 110 | 132 | 160 | 200 | 250 | 315 | 450 | 500 |
| • at I_L at 60 Hz 575 V ²⁾ | hp | 150 | 200 | 250 | 300 | 400 | 450 | 600 | 700 | 800 |
| • at I_H at 60 Hz 575 V ²⁾ | hp | 150 | 200 | 200 | 250 | 350 | 450 | 500 | 700 | 700 |
| Output current | | | | | | | | | | |
| • Rated current I_{rated} | A | 175 | 215 | 260 | 330 | 410 | 465 | 575 | 735 | 810 |
| • Base load current I_L ³⁾ | A | 171 | 208 | 250 | 320 | 400 | 452 | 560 | 710 | 790 |
| • Base load current I_H ⁴⁾ | A | 157 | 192 | 233 | 280 | 367 | 416 | 514 | 657 | 724 |
| Input current | | | | | | | | | | |
| • Rated input current ⁵⁾ | A | 191 | 224 | 270 | 343 | 426 | 483 | 598 | 764 | 842 |
| • Input current, max. | A | 279 | 341 | 410 | 525 | 655 | 740 | 918 | 1164 | 1295 |
| • Current requirement, 24 V DC auxiliary power supply ⁶⁾ | A | 1.35 | 1.35 | 1.35 | 1.4 | 1.4 | 1.4 | 1.4 | 1.5 | 1.5 |
| Power loss | kW | 3.8 | 4.2 | 5.0 | 6.1 | 8.1 | 7.8 | 8.7 | 12.7 | 14.1 |
| Cooling-air demand | m ³ /s | 0.36 | 0.36 | 0.36 | 0.36 | 0.78 | 0.78 | 0.78 | 1.48 | 1.48 |
| Sound pressure level L_{pA} (1 m) at 50/60 Hz | dB | 69/73 | 69/73 | 69/73 | 69/73 | 72/75 | 72/75 | 72/75 | 72/75 | 72/75 |
| Cable lengths between converter and motor ³⁾ | | | | | | | | | | |
| • shielded | m | 300 | 300 | 300 | 300 | 300 | 300 | 300 | 300 | 300 |
| • unshielded | m | 450 | 450 | 450 | 450 | 450 | 450 | 450 | 450 | 450 |
| Dimensions | | | | | | | | | | |
| • Width for version A/C | mm | 800/400 | 800/400 | 800/400 | 800/400 | 1200/600 | 1200/600 | 1200/600 | 1600/1000 | 1600/1000 |
| • Height ⁷⁾ | mm | 2000 | 2000 | 2000 | 2000 | 2000 | 2000 | 2000 | 2000 | 2000 |
| • Depth | mm | 600 | 600 | 600 | 600 | 600 | 600 | 600 | 600 | 600 |
| Weight (degree of protection IP20, without options) for version A/C, approx. | kg | 460/300 | 460/300 | 460/300 | 460/300 | 750/670 | 750/670 | 860/670 | 1150/940 | 1150/960 |

Note: The power data in hp units are based on the NEC/CEC standards for the North American market.

Information on the line connection, motor connection and cabinet grounding is provided under

Cable cross-sections and connections.

¹⁾ Rated power of a typ. 6-pole standard induction motor based on I_L or I_H at 50 Hz 500 V 3 AC

²⁾ Rated power of a typ. 6-pole standard induction motor based on I_L or I_H at 60 Hz 575 V 3 AC

³⁾ The base load current I_L is based on a duty cycle of 110 % for 60 s or 150 % for 10 s with a duty cycle duration of 300 s. See characteristic curves (→ Overload capability).

⁴⁾ The base load current I_H is based on a duty cycle of 150 % for 60 s or 160 % for 10 s with a duty cycle duration of 300 s. See characteristic curves (→ Overload capability).

⁵⁾ The current values given here are based on the rated output current.

⁶⁾ If the drive control is to remain active after a main infeed failure, the converter must be externally supplied with 24 V DC.

The following should also be taken into account:

– CU320-2: 1 A

– TM31: 0.5 A

– AOP30: 0.2 A

– SMC: 0.6 A

– The current requirement of the digital inputs/outputs.

⁷⁾ Version A: The cabinet height increases by 250 mm for degree of protection IP21, 400 mm for degrees of protection IP23, IP43 and IP54, 405 mm for the options **M13** and **M78**.
Version C: The cabinet height increases by 250 mm for IP21 degree of protection, 400 mm for IP23, IP43 and IP54 degrees of protection.

⁸⁾ Longer cable lengths for specific configurations are available on request.

Technical data (continued)

| Line voltage 660 ... 690 V 3 AC | | SINAMICS G150 converter cabinet units | | | | | | |
|--|-------------------|---------------------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| | | 6SL3710-1GH28-5.A3 | 6SL3710-1GH31-0.A3 | 6SL3710-1GH31-2.A3 | 6SL3710-1GH31-5.A3 | 6SL3710-1GH31-8.A3 | 6SL3710-1GH32-2.A3 | 6SL3710-1GH32-6.A3 |
| Type rating | | | | | | | | |
| • at I_L at 50 Hz 690 V ¹⁾ | kW | 75 | 90 | 110 | 132 | 160 | 200 | 250 |
| • at I_H at 50 Hz 690 V ¹⁾ | kW | 55 | 75 | 90 | 110 | 132 | 160 | 200 |
| Output current | | | | | | | | |
| • Rated current I_{rated} | A | 85 | 100 | 120 | 150 | 175 | 215 | 260 |
| • Base load current I_L ³⁾ | A | 80 | 95 | 115 | 142 | 171 | 208 | 250 |
| • Base load current I_H ⁴⁾ | A | 76 | 89 | 107 | 134 | 157 | 192 | 233 |
| Input current | | | | | | | | |
| • Rated input current ⁵⁾ | A | 93 | 109 | 131 | 164 | 191 | 224 | 270 |
| • Input current, max. | A | 131 | 155 | 188 | 232 | 279 | 341 | 410 |
| • Current requirement, 24 V DC auxiliary power supply ⁶⁾ | A | 1.1 | 1.1 | 1.1 | 1.1 | 1.35 | 1.35 | 1.35 |
| Power loss | kW | 1.7 | 2.1 | 2.7 | 2.8 | 3.8 | 4.2 | 5.0 |
| Cooling-air demand | m ³ /s | 0.17 | 0.17 | 0.17 | 0.17 | 0.36 | 0.36 | 0.36 |
| Sound pressure level L_{pA} (1 m) at 50/60 Hz | dB | 67/68 | 67/68 | 67/68 | 67/68 | 67/73 | 67/73 | 67/73 |
| Cable lengths between converter and motor ⁸⁾ | | | | | | | | |
| • shielded | m | 300 | 300 | 300 | 300 | 300 | 300 | 300 |
| • unshielded | m | 450 | 450 | 450 | 450 | 450 | 450 | 450 |
| Dimensions | | | | | | | | |
| • Width for version A/C | mm | 800/400 | 800/400 | 800/400 | 800/400 | 800/400 | 800/400 | 800/400 |
| • Height ⁷⁾ | mm | 2000 | 2000 | 2000 | 2000 | 2000 | 2000 | 2000 |
| • Depth | mm | 600 | 600 | 600 | 600 | 600 | 600 | 600 |
| Weight (degree of protection IP20, without options) for version A/C, approx. | kg | 460/225 | 460/225 | 460/225 | 460/225 | 670/300 | 670/300 | 670/300 |

Note: The power data in hp units are based on the NEC/CEC standards for the North American market.

Information on the line connection, motor connection and cabinet grounding is provided under **Cable cross-sections and connections**.

¹⁾ Rated power of a typ. 6-pole standard induction motor based on I_L or I_H at 50 Hz 690 V 3 AC

³⁾ The base load current I_L is based on a duty cycle of 110 % for 60 s or 150 % for 10 s with a duty cycle duration of 300 s. See characteristic curves (→ Overload capability).

⁴⁾ The base load current I_H is based on a duty cycle of 150 % for 60 s or 160 % for 10 s with a duty cycle duration of 300 s. See characteristic curves (→ Overload capability).

⁵⁾ The current values given here are based on the rated output current.

⁶⁾ If the drive control is to remain active after a main infeed failure, the converter must be externally supplied with 24 V DC. The following should also be taken into account:

- CU320-2: 1 A
- TM31: 0.5 A
- AOP30: 0.2 A
- SMC: 0.6 A

– The current requirement of the digital inputs/outputs.

⁷⁾ Version A: The cabinet height increases by 250 mm for degree of protection IP21, 400 mm for degrees of protection IP23, IP43 and IP54, 405 mm for the options **M13** and **M78**.
Version C: The cabinet height increases by 250 mm for IP21 degree of protection, 400 mm for IP23, IP43 and IP54 degrees of protection.

⁸⁾ Longer cable lengths for specific configurations are available on request.

Technical data (continued)

| Line voltage 660 ... 690 V 3 AC | | SINAMICS G150 converter cabinet units | | | | | |
|--|-------------------|---------------------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| | | 6SL3710-1GH33-3.A3 | 6SL3710-1GH34-1.A3 | 6SL3710-1GH34-7.A3 | 6SL3710-1GH35-8.A3 | 6SL3710-1GH37-4.A3 | 6SL3710-1GH38-1.A3 |
| Type rating | | | | | | | |
| • at I_L at 50 Hz 690 V ¹⁾ | kW | 315 | 400 | 450 | 560 | 710 | 800 |
| • at I_H at 50 Hz 690 V ¹⁾ | kW | 250 | 315 | 400 | 450 | 560 | 710 |
| Output current | | | | | | | |
| • Rated current I_{rated} | A | 330 | 410 | 465 | 575 | 735 | 810 |
| • Base load current I_L ³⁾ | A | 320 | 400 | 452 | 560 | 710 | 790 |
| • Base load current I_H ⁴⁾ | A | 280 | 367 | 416 | 514 | 657 | 724 |
| Input current | | | | | | | |
| • Rated input current ⁵⁾ | A | 343 | 426 | 483 | 598 | 764 | 842 |
| • Input current, max. | A | 525 | 655 | 740 | 918 | 1164 | 1295 |
| • Current requirement, 24 V DC auxiliary power supply ⁶⁾ | A | 1.35 | 1.4 | 1.4 | 1.4 | 1.5 | 1.5 |
| Power loss | kW | 6.1 | 8.1 | 9.1 | 10.8 | 13.5 | 14.7 |
| Cooling-air demand | m ³ /s | 0.36 | 0.78 | 0.78 | 0.78 | 1.48 | 1.48 |
| Sound pressure level L_{pA} (1 m) at 50/60 Hz | dB | 67/73 | 72/75 | 72/75 | 72/75 | 72/75 | 72/75 |
| Cable lengths between converter and motor ⁸⁾ | | | | | | | |
| • shielded | m | 300 | 300 | 300 | 300 | 300 | 300 |
| • unshielded | m | 450 | 450 | 450 | 450 | 450 | 450 |
| Dimensions | | | | | | | |
| • Width for version A/C | mm | 800/400 | 1200/600 | 1200/600 | 1200/600 | 1600/1000 | 1600/1000 |
| • Height ⁷⁾ | mm | 2000 | 2000 | 2000 | 2000 | 2000 | 2000 |
| • Depth | mm | 600 | 600 | 600 | 600 | 600 | 600 |
| Weight (degree of protection IP20, without options) for version A/C, approx. | kg | 670/300 | 780/670 | 780/670 | 840/670 | 1320/940 | 1360/980 |

Note: The power data in hp units are based on the NEC/CEC standards for the North American market.

Information on the line connection, motor connection and cabinet grounding is provided under **Cable cross-sections and connections**.

¹⁾ Rated power of a typ. 6-pole standard induction motor based on I_L or I_H at 50 Hz 690 V 3 AC

³⁾ The base load current I_L is based on a duty cycle of 110 % for 60 s or 150 % for 10 s with a duty cycle duration of 300 s. See characteristic curves (→ Overload capability).

⁴⁾ The base load current I_H is based on a duty cycle of 150 % for 60 s or 160 % for 10 s with a duty cycle duration of 300 s. See characteristic curves (→ Overload capability).

⁵⁾ The current values given here are based on the rated output current.

⁶⁾ If the drive control is to remain active after a main infeed failure, the converter must be externally supplied with 24 V DC. The following should also be taken into account:

- CU320-2: 1 A
- TM31: 0.5 A
- AOP30: 0.2 A
- SMC: 0.6 A
- The current requirement of the digital inputs/outputs.

⁷⁾ Version A: The cabinet height increases by 250 mm for degree of protection IP21, 400 mm for degrees of protection IP23, IP43 and IP54, 405 mm for the options **M13** and **M78**.
Version C: The cabinet height increases by 250 mm for IP21 degree of protection, 400 mm for IP23, IP43 and IP54 degrees of protection.

⁸⁾ Longer cable lengths for specific configurations are available on request.

Technical data (continued)

Technical data for parallel circuit

| | | SINAMICS G150 converter cabinet units, version A | | | | | |
|--|-------------------|--|--------------------|--------------------|--------------------|--------------------|--------------------|
| | | 6SL3710-2GE41-1AA3 | 6SL3710-2GE41-4AA3 | 6SL3710-2GE41-6AA3 | 6SL3710-2GF38-6AA3 | 6SL3710-2GF41-1AA3 | 6SL3710-2GF41-4AA3 |
| Line voltage | | 380 ... 480 V 3 AC | | | 500 ... 600 V 3 AC | | |
| Type rating | | | | | | | |
| • with $I_L^{(1)}$ | kW | 630 | 710 | 900 | 630 | 710 | 1000 |
| • with $I_H^{(1)}$ | kW | 500 | 560 | 710 | 560 | 630 | 800 |
| • at I_L at 60 Hz 460 V or 575 V ²⁾ | hp | 900 | 1000 | 1250 | 900 | 1000 | 1250 |
| • at I_H at 60 Hz 460 V or 575 V ²⁾ | hp | 700 | 900 | 1000 | 800 | 900 | 1000 |
| Output current | | | | | | | |
| • Rated current $I_{rated}^{(8)}$ | A | 1120 | 1380 | 1560 | 860 | 1070 | 1360 |
| • Base load current $I_L^{(3)(8)}$ | A | 1092 | 1340 | 1516 | 836 | 1036 | 1314 |
| • Base load current $I_H^{(4)(8)}$ | A | 850 | 1054 | 1294 | 770 | 950 | 1216 |
| Input current | | | | | | | |
| • Rated input current ^{5) 8)} | A | 1174 | 1444 | 1624 | 904 | 1116 | 1424 |
| • Input current, max. | A | 1800 | 2215 | 2495 | 1388 | 1708 | 2186 |
| • Current requirement, 24 V DC auxiliary power supply ⁶⁾ | A | 2.8 | 2.8 | 3.0 | 2.8 | 2.8 | 3.0 |
| Power loss | kW | 16.2 | 19.0 | 19.9 | 15.4 | 17.2 | 23.8 |
| Cooling-air demand | m ³ /s | 1.56 | 1.56 | 1.56 | 1.56 | 1.56 | 2.96 |
| Sound pressure level L_{pA} (1 m) at 50/60 Hz | dB | 73/76 | 73/76 | 73/76 | 75/78 | 75/78 | 75/78 |
| Cable lengths between converter and motor ¹⁰⁾ | | | | | | | |
| • shielded | m | 300 | 300 | 300 | 300 | 300 | 300 |
| • unshielded | m | 450 | 450 | 450 | 450 | 450 | 450 |
| Dimensions | | | | | | | |
| • Width ⁹⁾ | mm | 2400 | 2400 | 2400 | 2400 | 2400 | 3200 |
| • Height ⁷⁾ | mm | 2000 | 2000 | 2000 | 2000 | 2000 | 2000 |
| • Depth | mm | 600 | 600 | 600 | 600 | 600 | 600 |
| Weight (degree of protection IP20, without options) for version A/C, approx. | kg | 1700 | 1710 | 2130 | 1700 | 1700 | 2620 |

Note: The power data in hp units are based on the NEC/CEC standards for the North American market.

Information on the line connection, motor connection and cabinet grounding is provided under

Cable cross-sections and connections.

- 1) Rated power of a typ. 6-pole standard induction motor based on I_L or I_H at 50 Hz 400 V, 500 V or 690 V 3 AC.
- 2) Rated power of a typ. 6-pole standard induction motor based on I_L or I_H at 60 Hz 460 V or 575 V 3 AC.
- 3) The base load current I_L is based on a duty cycle of 110 % for 60 s or 150 % for 10 s with a duty cycle duration of 300 s. See characteristic curves (→ Overload capability).
- 4) The base load current I_H is based on a duty cycle of 150 % for 60 s or 160 % for 10 s with a duty cycle duration of 300 s. See characteristic curves (→ Overload capability).
- 5) The current values given here are based on the rated output current.

- 6) If the drive control is to remain active after a main infeed failure, the converter must be externally supplied with 24 V DC. The following should also be taken into account:
 - CU320-2: 1 A
 - TM31: 0.5 A
 - AOP30: 0.2 A
 - SMC: 0.6 A
 - The current requirement of the digital inputs/outputs.
- 7) The cabinet height increases by 250 mm for degree of protection IP21, 400 mm for degrees of protection IP23, IP43 and IP54, 405 mm for options **M13** and **M78**.

- 8) The currents listed here represent the total current of both partial converters.

- 9) Power units connected in parallel are shipped as two transport units.

- 10) Longer cable lengths for specific configurations are available on request.

Technical data (continued)

Technical data for parallel circuit

| | | SINAMICS G150 converter cabinet units, version A | | | | | | | |
|--|-------------------|--|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| | | 6SL3710-2GH41-1AA3 | 6SL3710-2GH41-4AA3 | 6SL3710-2GH41-5AA3 | 6SL3710-2GH41-8EA3 | 6SL3710-2GH42-0EA3 | 6SL3710-2GH42-2EA3 | 6SL3710-2GH42-4EA3 | 6SL3710-2GH42-7EA3 |
| Line voltage | | 660 ... 690 V 3 AC | | | | | | | |
| Type rating | | | | | | | | | |
| • with I_L ¹⁾ | kW | 1000 | 1350 | 1500 | 1750 | 1950 | 2150 | 2400 | 2700 |
| • with I_H ¹⁾ | kW | 900 | 1200 | 1350 | 1500 | 1750 | 1950 | 2150 | 2400 |
| • at I_L at 60 Hz 460 V or 575 V ²⁾ | hp | – | – | – | – | – | – | – | – |
| • at I_H at 60 Hz 460 V or 575 V ²⁾ | hp | – | – | – | – | – | – | – | – |
| Output current | | | | | | | | | |
| • Rated current I_{rated} ⁸⁾ | A | 1070 | 1360 | 1500 | 1729 | 1948 | 2158 | 2413 | 2752 |
| • Base load current I_L ³⁾⁸⁾ | A | 1036 | 1314 | 1462 | 1720 | 1940 | 2150 | 2390 | 2685 |
| • Base load current I_H ⁴⁾⁸⁾ | A | 950 | 1216 | 1340 | 1547 | 1742 | 1930 | 2158 | 2463 |
| Input current | | | | | | | | | |
| • Rated input current ⁵⁾⁸⁾ | A | 1116 | 1424 | 1568 | 1800 | 2030 | 2245 | 2510 | 2865 |
| • Input current, max. | A | 1708 | 2186 | 2406 | 2765 | 3115 | 3450 | 3860 | 4400 |
| • Current requirement, 24 V DC auxiliary power supply ⁶⁾ | A | 2.8 | 2.8 | 3.0 | 4.7 | 4.7 | 4.7 | 4.7 | 6 |
| Power loss | kW | 21.3 | 26.6 | 29.0 | 35 | 38 | 40 | 46 | 52 |
| Cooling-air demand | m ³ /s | 1.56 | 2.96 | 2.96 | 3.67 | 3.67 | 3.67 | 3.67 | 5.15 |
| Sound pressure level L_{pA} (1 m) at 50/60 Hz | dB | 75/78 | 75/78 | 75/78 | 75/78 | 75/78 | 75/78 | 75/78 | 75/78 |
| Cable lengths between converter and motor ¹⁰⁾ | | | | | | | | | |
| • shielded | m | 300 | 300 | 300 | 300 | 300 | 300 | 300 | 300 |
| • unshielded | m | 450 | 450 | 450 | 450 | 450 | 450 | 450 | 450 |
| Dimensions | | | | | | | | | |
| • Width ⁹⁾ | mm | 2400 | 3200 | 3200 | 3600 | 3600 | 3600 | 3600 | 4400 |
| • Height ⁷⁾ | mm | 2000 | 2000 | 2000 | 2000 | 2000 | 2000 | 2000 | 2000 |
| • Depth | mm | 600 | 600 | 600 | 600 | 600 | 600 | 600 | 600 |
| Weight (degree of protection IP20, without options), approx. | kg | 1700 | 2620 | 2700 | 3010 | 3010 | 3070 | 3860 | 4580 |

Note: The power data in hp units are based on the NEC/CEC standards for the North American market.

Information on the line connection, motor connection and cabinet grounding is provided under **Cable cross-sections and connections**.

1) Rated power of a typ. 6-pole standard induction motor based on I_L or I_H at 50 Hz 400 V, 500 V or 690 V 3 AC.

2) Rated power of a typ. 6-pole standard induction motor based on I_L or I_H at 60 Hz 460 V or 575 V 3 AC.

3) The base load current I_L is based on a duty cycle of 110 % for 60 s or 150 % for 10 s with a duty cycle duration of 300 s. See characteristic curves (→ Overload capability).

4) The base load current I_H is based on a duty cycle of 150 % for 60 s or 160 % for 10 s with a duty cycle duration of 300 s. See characteristic curves (→ Overload capability).

5) The current values given here are based on the rated output current.

6) If the drive control is to remain active after a main infeed failure, the converter must be externally supplied with 24 V DC.

The following should also be taken into account:

- CU320-2: 1 A
- TM31: 0.5 A
- AOP30: 0.2 A
- SMC: 0.6 A

– The current requirement of the digital inputs/outputs.

7) The cabinet height increases by 250 mm for degree of protection IP21, 400 mm for degrees of protection IP23, IP43 and IP54, 405 mm for options **M13** and **M78**.

8) The currents listed here represent the total current of both partial converters.

9) Power units connected in parallel are shipped as two transport units.

10) Longer cable lengths for specific configurations are available on request.

Characteristic curves

Derating data

SINAMICS G150 converter cabinet units and the associated system components are rated for an ambient temperature of 40 °C and installation altitudes up to 2000 m above sea level.

For ambient temperatures > 40 °C the output current must be reduced. Ambient temperatures above 50 °C are not permissible.

At installation altitudes > 2000 m above sea level, it should be taken into consideration that with increasing height, the air pressure decreases and therefore the air density. As a consequence, the cooling efficiency and the insulation capacity of the air also decrease.

Due to the reduced cooling efficiency, it is necessary, on the one hand, to reduce the ambient temperature, and on the other hand, to lower heat loss in the converter cabinet unit by reducing the output current, whereby ambient temperatures lower than 40 °C may be offset to compensate.

The following table specifies the permissible output currents as a function of the installation altitude and ambient temperature for the various degrees of protection (the permissible compensation between installation altitude and the ambient temperatures < 40 °C – air intake temperature at the entry to the converter cabinet unit – has been taken into account in the specified values).

The values apply under the precondition that the cabinet layout ensures a cooling air flow through the units as stated in the technical data.

As additional measure for installation altitudes from 2000 m up to 5000 m, an isolating transformer is required in order to reduce transient overvoltages according to EN 60664-1. The SINAMICS Low Voltage Engineering Manual contains additional information on this topic and is available as a PDF file on the CD-ROM included with the catalog.

| Degree of protection | Installation altitude above sea level m | Current derating factor (as a % of the rated current) at an ambient/intake air temperature of | | | | | | | |
|------------------------------|--|--|--------|--------|--------|--------|--------|--------|--|
| | | 20 °C | 25 °C | 30 °C | 35 °C | 40 °C | 45 °C | 50 °C | |
| IP20, IP21, IP23 and IP43 | 0 ... 2000 | | | | | | 93.3 % | 86.7 % | |
| | 2001 ... 2500 | | | | | 96.3 % | | | |
| | 2501 ... 3000 | | 100 % | | 98.7 % | | | | |
| | 3001 ... 3500 | | | | | | | | |
| | 3501 ... 4000 | | | 96.3 % | | | | | |
| | 4001 ... 4500 | | 97.5 % | | | | | | |
| | 4501 ... 5000 | 98.2 % | | | | | | | |
| IP54 | 0 ... 2000 | | | | | 93.3 % | 86.7 % | 80.0 % | |
| | 2001 ... 2500 | | 100 % | | 96.3 % | 89.8 % | | | |
| | 2501 ... 3000 | | | | 98.7 % | 92.5 % | | | |
| | 3001 ... 3500 | | | 94.7 % | | | | | |
| | 3501 ... 4000 | | 96.3 % | 90.7 % | | | | | |
| | 4001 ... 4500 | 97.5 % | 92.1 % | | | | | | |
| | 4501 ... 5000 | 93.0 % | | | | | | | |

Current-derating factors for cabinet converter units as a function of the ambient/intake air temperature, the installation altitude and the degree of protection.

Characteristic curves (continued)

Current derating as a function of pulse frequency

To reduce motor noise or to increase output frequency, the pulse frequency can be increased relative to the factory setting. When the pulse frequency is increased, the derating factor of the output current must be taken into account. This derating factor must be applied to the currents specified in the technical data.

The SINAMICS Low Voltage Engineering Manual contains additional information and is available as a PDF file on the CD-ROM included with Catalog D 11.

| Order No. | Type rating | Output current at 2 kHz A | Derating factor at pulse frequency | |
|---------------------------|-------------|---------------------------------|------------------------------------|----------|
| | kW | | 2.5 kHz | at 4 kHz |
| 380 ... 480 V 3 AC | | | | |
| 6SL3710-1GE32-1.A3 | 110 | 210 | 95 % | 82 % |
| 6SL3710-1GE32-6.A3 | 132 | 260 | 95 % | 83 % |
| 6SL3710-1GE33-1.A3 | 160 | 310 | 97 % | 88 % |
| 6SL3710-1GE33-8.A3 | 200 | 380 | 96 % | 87 % |
| 6SL3710-1GE35-0.A3 | 250 | 490 | 94 % | 78 % |

Derating factor of the output current as a function of the pulse frequency for units with a rated pulse frequency of 2 kHz

| Order No. | Type rating | Output current at 1.25 kHz A | Derating factor at pulse frequency | | |
|---------------------------|-------------|------------------------------------|------------------------------------|---------|----------|
| | kW | | 2.0 kHz | 2.5 kHz | at 4 kHz |
| 380 ... 480 V 3 AC | | | | | |
| 6SL3710-1GE36-1.A3 | 315 | 605 | 83 % | 72 % | 64 % |
| 6SL3710-1GE37-5.A3 | 400 | 745 | 83 % | 72 % | 64 % |
| 6SL3710-1GE38-4.A3 | 450 | 840 | 87 % | 79 % | 64 % |
| 6SL3710-1GE41-0.A3 | 560 | 985 | 92 % | 87 % | 70 % |
| 6SL3710-2GE41-1AA3 | 630 | 1120 | 83 % | 72 % | 64 % |
| 6SL3710-2GE41-4AA3 | 710 | 1380 | 83 % | 72 % | 64 % |
| 6SL3710-2GE41-6AA3 | 900 | 1560 | 87 % | 79 % | 64 % |
| 500 ... 600 V 3 AC | | | | | |
| 6SL3710-1GF31-8.A3 | 110 | 175 | 92 % | 87 % | 70 % |
| 6SL3710-1GF32-2.A3 | 132 | 215 | 92 % | 87 % | 70 % |
| 6SL3710-1GF32-6.A3 | 160 | 260 | 92 % | 88 % | 71 % |
| 6SL3710-1GF33-3.A3 | 200 | 330 | 89 % | 82 % | 65 % |
| 6SL3710-1GF34-1.A3 | 250 | 410 | 89 % | 82 % | 65 % |
| 6SL3710-1GF34-7.A3 | 315 | 465 | 92 % | 87 % | 67 % |
| 6SL3710-1GF35-8.A3 | 400 | 575 | 91 % | 85 % | 64 % |
| 6SL3710-1GF37-4.A3 | 500 | 735 | 87 % | 79 % | 64 % |
| 6SL3710-1GF38-1.A3 | 560 | 810 | 83 % | 72 % | 61 % |
| 6SL3710-2GF38-6AA3 | 630 | 860 | 92 % | 87 % | 67 % |
| 6SL3710-2GF41-1AA3 | 710 | 1070 | 91 % | 85 % | 64 % |
| 6SL3710-2GF41-4AA3 | 1000 | 1360 | 87 % | 79 % | 64 % |

Derating factor of the output current as a function of the pulse frequency for units with a rated pulse frequency of 1.25 kHz

Characteristic curves (continued)

| Order No. | Type rating | Output current at 1.25 kHz A | Derating factor at pulse frequency | | |
|---------------------------|-------------|------------------------------------|------------------------------------|---------|----------|
| | kW | | 2.0 kHz | 2.5 kHz | at 4 kHz |
| 660 ... 690 V 3 AC | | | | | |
| 6SL3710-1GH28-5.A3 | 75 | 85 | 93 % | 89 % | 71 % |
| 6SL3710-1GH31-0.A3 | 90 | 100 | 92 % | 88 % | 71 % |
| 6SL3710-1GH31-2.A3 | 110 | 120 | 92 % | 88 % | 71 % |
| 6SL3710-1GH31-5.A3 | 132 | 150 | 90 % | 84 % | 66 % |
| 6SL3710-1GH31-8.A3 | 160 | 175 | 92 % | 87 % | 70 % |
| 6SL3710-1GH32-2.A3 | 200 | 215 | 92 % | 87 % | 70 % |
| 6SL3710-1GH32-6.A3 | 250 | 260 | 92 % | 88 % | 71 % |
| 6SL3710-1GH33-3.A3 | 315 | 330 | 89 % | 82 % | 65 % |
| 6SL3710-1GH34-1.A3 | 400 | 410 | 89 % | 82 % | 65 % |
| 6SL3710-1GH34-7.A3 | 450 | 465 | 92 % | 87 % | 67 % |
| 6SL3710-1GH35-8.A3 | 560 | 575 | 91 % | 85 % | 64 % |
| 6SL3710-1GH37-4.A3 | 710 | 735 | 87 % | 79 % | 64 % |
| 6SL3710-1GH38-1.A3 | 800 | 810 | 83 % | 72 % | 61 % |
| 6SL3710-2GH41-1AA3 | 1000 | 1070 | 91 % | 85 % | 64 % |
| 6SL3710-2GH41-4AA3 | 1350 | 1360 | 87 % | 79 % | 64 % |
| 6SL3710-2GH41-5AA3 | 1500 | 1500 | 83 % | 72 % | 61 % |
| 6SL3710-2GH41-8EA3 | 1750 | 1729 | 92 % | 87 % | 67 % |
| 6SL3710-2GH42-0EA3 | 1950 | 1948 | 91 % | 86 % | 64 % |
| 6SL3710-2GH42-2EA3 | 2150 | 2158 | 87 % | 79 % | 55 % |
| 6SL3710-2GH42-4EA3 | 2400 | 2413 | 87 % | 79 % | 55 % |
| 6SL3710-2GH42-7EA3 | 2700 | 2752 | 91 % | 86 % | 64 % |

Derating factor of the output current as a function of the pulse frequency for units with a rated pulse frequency of 1.25 kHz

Characteristic curves (continued)

Overload capability

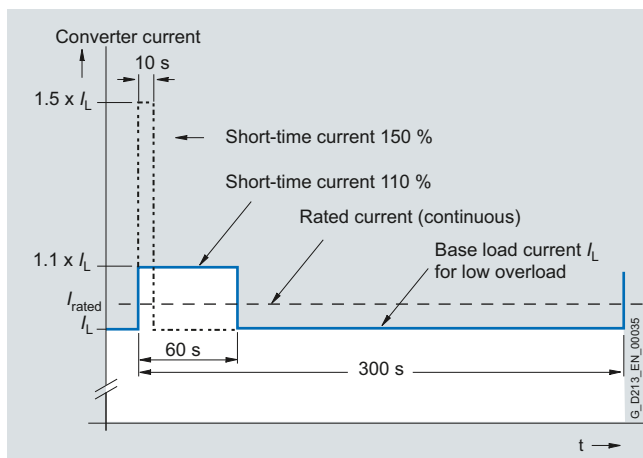
The SINAMICS G150 drive converter cabinet units are equipped with an overload reserve to deal with breakaway torques, for example. If larger surge loads occur, this must be taken into account when configuring. In the case of drives with overload requirements, the appropriate base load current must, therefore, be used as a basis for the required load.

The criterion for overload is that the drive is operated with its base-load current before and after the overload occurs on the basis of a duty cycle duration of 300 s.

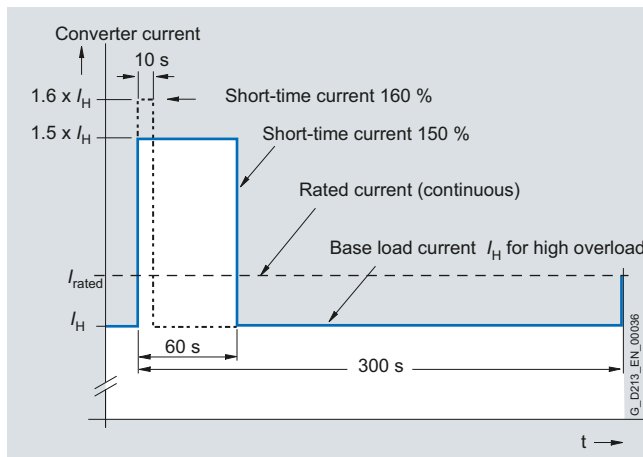
The base load current I_L for a small overload is based on a duty cycle of 110 % for 60 s or 150 % for 10 s.

The base load current for a high overload I_H is based on a duty cycle of 150 % for 60 s or 160 % for 10 s.

22



Low overload



High overload

Options

Note: To order options for a converter, add the suffix "-Z" after the order number of the converter and then state the order code(s) for the desired option(s) after the suffix.

Example:
6SL3710-1GE32-1CA3-Z
+M07+D60+...

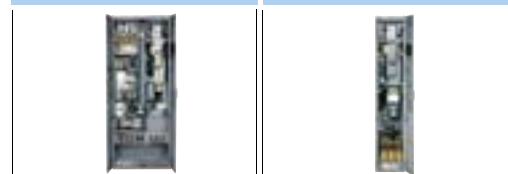
See also ordering examples.

| Available options | Order code | for version A | for version C |
|--|------------|---------------|---------------|
| Input-side options | | | |
| Use in the first environment to EN 61800-3 Category C2 (TN systems or TT systems with grounded star point) ⁴⁾ | L00 | ✓ | – |
| Clean Power version with integrated Line Harmonics Filter compact ³⁾ | L01 | ✓ | – |
| Line contactor (for currents ≤ 800 A for single circuit) | L13 | ✓ | – |
| Delivery without line reactor (for converters ≤ 500 kW) | L22 | ✓ | ✓ |
| Line reactor $v_k = 2\%$ (for converters > 500 kW) | L23 | ✓ | ✓ |
| Main switch incl. fuses/circuit breakers | L26 | ✓ | – |
| EMC shield busbar ¹⁾ (cable connection from below) | M70 | ✓ | ✓ |
| Load-side options | | | |
| dv/dt filter compact plus Voltage Peak Limiter | L07 | ✓ | – |
| Motor reactor | L08 | ✓ | – |
| dv/dt filter plus Voltage Peak Limiter ³⁾ | L10 | ✓ | – |
| Sine-wave filter (up to 250 kW at 380 ... 480 V, up to 132 kW at 500 ... 600 V) | L15 | ✓ | – |
| EMC shield busbar ¹⁾ (cable connection from below) | M70 | ✓ | ✓ |
| Motor protection and safety functions | | | |
| EMERGENCY OFF pushbutton, door mounted | L45 | ✓ | – |
| EMERGENCY OFF Category 0, 230 V AC or 24 V DC | L57 | ✓ | – |
| EMERGENCY STOP Category 1, 230 V AC ²⁾ | L59 | ✓ | – |
| EMERGENCY STOP Category 1, 24 V DC ²⁾ | L60 | ✓ | – |
| Thermistor motor protection unit (alarm) | L83 | ✓ | – |
| Thermistor motor protection unit (shutdown) | L84 | ✓ | – |
| PT100 evaluation unit | L86 | ✓ | – |
| Insulation monitoring | L87 | ✓ | – |
| Increase in degree of protection | | | |
| Degree of protection IP21 | M21 | ✓ | ✓ |
| Degree of protection IP23 | M23 | ✓ | ✓ |
| Degree of protection IP43 | M43 | ✓ | ✓ |
| Degree of protection IP54 | M54 | ✓ | ✓ |
| Mechanical options | | | |
| Base 100 mm high, RAL 7022 | M06 | ✓ | ✓ |
| Cable plinth 200 mm high, RAL 7035 | M07 | ✓ | ✓ |
| Top cable entry, line side ³⁾ | M13 | ✓ | – |
| Top cable entry, motor side ³⁾ | M78 | ✓ | – |
| Crane transport assembly (top-mounted) | M90 | ✓ | ✓ |

| | |
|---|--------------|
| ✓ | possible |
| – | not possible |

- This option is listed for the input- and load-side options, but is only required once.
- The stopping requirements must be taken into account with this option. Additional braking units may be required.
- Not available for converters > 1500 kW with power units connected in parallel.
- Applies to cable lengths < 100 m.

Please refer to the selection matrix for information about possible option combinations.



Converter version A

Converter version C

SINAMICS G150

Drive converter cabinet units

75 kW to 2700 kW

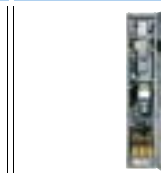
Options (continued)

| Available options | Order code | for version A | for version C |
|--|------------|---------------|---------------|
| Other options | | | |
| CBC10 Communication Board (CAN protocol) | G20 | ✓ | ✓ |
| CBE20 Communication Board (PROFINET) | G33 | ✓ | ✓ |
| TM31 customer Terminal Module | G60 | ✓ | ✓ |
| Additional TM31 customer Terminal Module | G61 | ✓ | – |
| TB30 Terminal Board | G62 | ✓ | ✓ |
| SMC30 Sensor Module Cabinet-Mounted | K50 | ✓ | ✓ |
| VSM10 Voltage Sensing Module Cabinet-Mounted | K51 | ✓ | – |
| Terminal interface for "Safe Torque Off" and "Safe Stop 1" safety functions | K82 | ✓ | – |
| Control Unit Kit CU320-2 PN (PROFINET) | K95 | ✓ | – |
| Connection for external auxiliary equipment | L19 | ✓ | – |
| Cabinet light with service socket | L50 | ✓ | – |
| Cabinet anti-condensation heating | L55 | ✓ | ✓ |
| Braking unit 25 kW (P_{20} power: 100 kW) | L61 | ✓ | – |
| Braking unit 50 kW (P_{20} power: 200 kW) | L62 | ✓ | – |
| Special cabinet paint finish ¹⁾ | Y09 | ✓ | ✓ |
| Documentation (standard: English/German) | | | |
| Customer documentation (circuit diagram, terminal diagram, layout diagram) in DXF format | D02 | ✓ | ✓ |
| Customer documentation in paper format | D04 | ✓ | ✓ |
| Preliminary copy of customer documentation | D14 | ✓ | ✓ |
| Documentation language: English/French | D58 | ✓ | ✓ |
| Documentation language: English/Spanish | D60 | ✓ | ✓ |
| Documentation language: English/Italian | D80 | ✓ | ✓ |
| Languages (standard: English/German) | | | |
| Rating plate data in English/French | T58 | ✓ | ✓ |
| Rating plate data in English/Spanish | T60 | ✓ | ✓ |
| Rating plate data in English/Italian | T80 | ✓ | ✓ |
| Options specific to the chemical industry | | | |
| NAMUR terminal block | B00 | ✓ | – |
| Safety isolated 24 V power supply (PELV) | B02 | ✓ | – |
| Separate output for external auxiliaries (uncontrolled) | B03 | ✓ | – |
| Options specific to the shipbuilding industry | | | |
| Marine version | M66 | ✓ | ✓ |
| Individual certificate from Germanische Lloyd (GL) | E11 | ✓ | ✓ |
| Individual certificate from Lloyds Register (LR) | E21 | ✓ | ✓ |
| Individual certificate from Bureau Veritas (BV) | E31 | ✓ | ✓ |
| Individual certificate from Det Norske Veritas (DNV) | E51 | ✓ | ✓ |
| Individual certificate from American Bureau of Shipping (ABS) | E61 | ✓ | ✓ |
| Individual certificate from Chinese Classification Society (CCS) | E71 | ✓ | ✓ |

✓ possible
– not possible



Converter version A



Converter version C

¹⁾ The order code Y.. requires data in plain text.


Please refer to the selection matrix for information about possible option combinations.

Options (continued)


| Available options | Order code | for version A | for version C |
|--|------------|---------------|---------------|
| Equipment acceptance in presence of customer | | | |
| Visual inspection | F03 | ✓ | ✓ |
| Function test without connected motor | F71 | ✓ | ✓ |
| Function test with test bay motor under no load conditions | F75 | ✓ | ✓ |
| Insulation test (in conjunction with option F71 or F75) | F77 | ✓ | ✓ |
| Customer-specific acceptance tests (on request) | F97 | ✓ | ✓ |

| | |
|---|--------------|
| ✓ | possible |
| – | not possible |

Please refer to the selection matrix for information about possible option combinations.



Converter version A



Converter version C

Option selection matrix

Certain options are mutually exclusive. The tables below only provide an overview. Please refer to the descriptions of the individual options for a precise description of options and other exclusions.

| | |
|---|--------------------------|
| ✓ | Possible combination |
| – | Combination not possible |

Electrical options

| | G20 | G33 | G62 | K50 | K51 | L00 | L01 | L13 | L22 | L23 | L26 | L57 | L59 | L60 | L61 | L62 | L87 |
|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| G20 | – | – | – | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| G33 | – | – | – | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| G62 | – | – | – | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| K50 | ✓ | ✓ | ✓ | – | – | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| K51 | ✓ | ✓ | ✓ | – | – | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| L00 | ✓ | ✓ | ✓ | ✓ | ✓ | – | – | ✓ | – | 1) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | – |
| L01 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | – | ✓ | – | – | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| L13 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | – | ✓ | ✓ | 2) | 3) | 3) | 3) | ✓ | ✓ | ✓ |
| L22 | ✓ | ✓ | ✓ | ✓ | ✓ | – | – | ✓ | – | – | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| L23 | ✓ | ✓ | ✓ | ✓ | ✓ | 1) | – | ✓ | – | – | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| L26 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 2) | ✓ | ✓ | – | 3) | 3) | 3) | ✓ | ✓ | ✓ |
| L57 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 3) | ✓ | ✓ | 3) | – | – | – | ✓ | ✓ | ✓ |
| L59 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 3) | ✓ | ✓ | 3) | – | – | – | ✓ | ✓ | ✓ |
| L60 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 3) | ✓ | ✓ | 3) | – | – | – | ✓ | ✓ | ✓ |
| L61 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | – | – | ✓ |
| L62 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | – | – | ✓ |
| L87 | ✓ | ✓ | ✓ | ✓ | ✓ | – | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | – |

1) For converters ≤ 500 kW / 700 hp, the line reactor (order code **L23**) is included in the scope of supply of the converter.
For converters > 500 kW / 700 hp, option **L23** must be additionally ordered, if

- the converters are operated on line supplies with a high short-circuit power ($R_{SC} > 20$), or
- when using a line filter (option **L00**).

2) Combination **L13/L26** only possible for currents < 800 A. From 800 A and higher, circuit breakers are used that also include the function of **L13** and **L26**.

3) The options **L57**, **L59** and **L60** always require electrical separation from the line supply, this means for converters in a single circuit, for converter currents ≤ 800 A, option **L13** and for converter currents > 800 A, option **L26**. For converters with power units connected in parallel, electrical separation from the line supply is included as standard.

SINAMICS G150

Drive converter cabinet units

75 kW to 2700 kW

Options (continued)

Mechanical options/electrical options

| | E11 | E21 | E31 | E51 | E61 | E71 | L00 | L01 | L07 | L08 | L10 | L15 | M06 | M07 | M13 | M21 | M23 | M43 | M54 | M66 | M70 | M78 | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|
| E11 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | – | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | – | 3) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| E21 | ✓ | – | ✓ | ✓ | ✓ | ✓ | ✓ | – | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | – | 3) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| E31 | ✓ | ✓ | – | ✓ | ✓ | ✓ | ✓ | – | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | – | 3) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| E51 | ✓ | ✓ | ✓ | – | ✓ | ✓ | ✓ | – | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | – | 3) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| E61 | ✓ | ✓ | ✓ | ✓ | – | ✓ | ✓ | – | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | – | 3) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| E71 | ✓ | ✓ | ✓ | ✓ | ✓ | – | ✓ | – | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | – | 3) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| L00 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | – | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 1) | ✓ |
| L01 | – | – | – | – | – | – | ✓ | – | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | – | ✓ |
| L07 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | – | – | – | – | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | – |
| L08 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | – | – | – | – | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | – |
| L10 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | – | – | – | – | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | – |
| L15 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | – | – | – | – | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | – |
| M06 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | – | – | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| M07 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | – | – | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| M13 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | – | – | ✓ | ✓ | ✓ | ✓ | ✓ | 2) | ✓ |
| M21 | – | – | – | – | – | – | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | – | – | – | – | – | – | – | ✓ | – |
| M23 | 3) | 3) | 3) | 3) | 3) | 3) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | – | – | – | – | – | 3) | ✓ | ✓ |
| M43 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | – | – | – | – | – | ✓ | ✓ | ✓ |
| M54 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | – | – | – | – | – | ✓ | ✓ | ✓ |
| M66 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | – | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | – | 3) | ✓ | ✓ | – | ✓ | ✓ | ✓ |
| M70 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 1) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 2) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | – | 2) |
| M78 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | – | – | – | – | ✓ | ✓ | ✓ | – | ✓ | ✓ | ✓ | ✓ | ✓ | 2) | – |

1) Option **L00** includes option **M70**.

2) If the line connection (option **M13**) and the motor connection (option **M78**) are from above, then the EMC shield busbar (option **M70**) and the PE busbar (option **M75**) are not required in the bottom section of the cabinet.

3) Option **M66** includes option **M23**.

Rating plate data

| | T58 | T60 | T80 |
|-----|-----|-----|-----|
| T58 | – | – | – |
| T60 | – | – | – |
| T80 | – | – | – |

Ordering examples

Example 1

Task:

A drive converter cabinet unit is needed to control the fan speed for a 380 kW fan drive connected to an existing 400 V MCC outgoing circuit. The rated speed of the fan is 975 rpm. Due to the prevailing ambient conditions, the converter must be mounted on a 100 mm cabinet base and have IP54 degree of protection. The installation altitude is <1000 m above sea level, the ambient temperature is 45 °C.

Solution:

Because an MCC outgoing circuit already exists, the line connection components, such as main switch, line contactor and line fuses, can be omitted and the space-saving version C can be selected. If we take into account the derating factors for IP54 degree of protection and the increased ambient temperature, a 450 kW, 400 V drive converter cabinet unit with options **M06** (cabinet base 100 mm) and **M54** (IP54 degree of protection) must be selected for this application.

The information to be stated on the order is therefore:

6SL3710-1GE38-4CA3-Z
+M06 +M54

Example 2

Task:

A 280 kW pump to control pressure compensation is to be supplied via a converter for a completely new district heating pumping station. A 690 V supply is available. The installation altitude is 350 m above sea level and the ambient temperature is 40 °C. The rated speed of the pump is 740 rpm. The pump unit and motor are located in an unmanned substation, so the winding temperature of the motor must be monitored by PT100 resistance thermometers and evaluated by the converter. The color of the drive converter cabinet units is to be RAL 3002.

Solution:

A converter cabinet unit with 315 kW, 690 V in the version A with the following options should be selected:

L26 (main switch including fuses),
L13 (line contactor),
L86 (PT100 evaluation unit) and
Y09 (special cabinet paint finish).

The ordering data are therefore:

6SL3710-1GH33-3AA3-Z
+L26 +L13 +L86 +Y09
cabinet color RAL 3002

Options (continued)

Description of options

The SINAMICS Low Voltage Engineering Manual contains additional information about the options and is saved as PDF file on the CD-ROM included with the catalog.

B00, B02, B03

Options compliant with NAMUR requirements

List of impermissible combinations with other options:

The following restrictions and exclusions applicable to the NAMUR terminal block **B00** in relation to other available options must be taken into account.

| Comment on the option | Reason |
|---------------------------|---|
| L45, L57, L59, L60 | A Category 0 EMERGENCY OFF is already provided in the NAMUR version. The forced power supply disconnection is accessed at terminals -A1-X2: 17, 18. |
| L83, L84 | The option B00 already provides a thermistor motor protection unit (shutdown) as standard. |
| L19 | The combination of option L19 and B00 is possible on request. |
| L87 | For space reasons, the insulation monitor cannot be installed in the cabinet and must therefore be provided on the plant side. |
| G60 | Option B00 already provides a customer Terminal Module TM31 as standard. |

With options such as **L50, L55, L86**, the connection is made as standard. These options are not wired to the NAMUR terminal block.

Notice: In addition to option **B00** for line separation, option **L13** for currents ≤ 800 A or option **L26** for currents > 800 A must be ordered. For converters with power units connected in parallel, electrical separation from the line supply is included as standard. Further, to evaluate the signals, option **G60** must be ordered.

B00

NAMUR terminal block

The terminal block has been designed and implemented in accordance with the requirements and guidelines of the Standards Working Group for Instrumentation and Control in the Chemical Industry (NAMUR Recommendation NE37), i.e. certain functions of the device are assigned to specified terminals. The inputs and outputs assigned to the terminals fulfill PELV requirements ("protective extra-low voltage and protective separation").

The terminal block and associated functions have been reduced to the necessary minimum. Unlike the NAMUR recommendation, optional terminals are not listed.

| Terminal -A1-X2: | Meaning | Default | Comment |
|------------------|-----------------|----------------------------------|--|
| 10 | DI | ON (dynamic)/ ON/OFF (static) | The effective mode can be encoded using a wire jumper at terminal -A1-400:9; 10. |
| 11 | DI | OFF (dynamic) | |
| 12 | DI | Faster | |
| 13 | DI | Slower | |
| 14 | DI | RESET | |
| 15 | DI | Interlock | |
| 16 | DI | Counterclockwise | "0" signal for CW rotating field "1" signal for CCW rotating field |
| 17, 18 | | Supply disconnection | EMERGENCY OFF circuit |
| 30, 31 | | Ready | Relay output (NO contact) |
| 32, 33 | | Motor is rotating | Relay output (NO contact) |
| 34 | DO (NO) | Fault | Relay output (changeover contact) |
| 35 | DO (COM) | | |
| 36 | DO (NC) | | |
| 50, 51 | AI 0/4-20 mA | Speed setpoint | |
| 60, 61 | AO 0/4-20 mA | Motor frequency | |
| 62, 63 | AO 0/4-20 mA | Motor current | Motor current is default setting; can be reparameterized for other variables |

The 24 V supply is provided on the plant side via terminals -A1-X2:1-3 (fused in the converter with 1 A). Compliance with the PELV safety requirements ("Protective extra-low voltage with protective separation") is essential.

| Terminal -A1-X2: | Meaning | |
|------------------|---------|--------------------------|
| 1 | M | Reference conductor |
| 2 | P24 | 24 V DC supply |
| 3 | P24 | 24 V DC outgoing circuit |

For temperature monitoring of explosion-proof motors, option **B00** includes a PTC thermistor tripping unit. Violation of the limit value leads to motor shutdown. The associated PTC sensor is connected to terminal -A1-X3:90, 91.

| Terminal -A1-X3: | Meaning | |
|------------------|---------|--------------------------|
| 90, 91 | AI | Connection of PTC sensor |

In parallel to operation via the NAMUR terminal block, there is also the option to operate the converter via the communications interface provided as standard on the CU320-2 Control Unit. The PROFIdrive profile "Process technology" employed in the chemical industry can be selected by macros.

Options (continued)

B02 *Safety isolated 24 V power supply (PELV)*

If no protective separation for 24 V supply (PELV) is available at the customer site, this option is used to fit a second power supply to guarantee compliance with PELV. (Terminal assignments as for option **B00**, no 24 V supply at terminals -A1-X1:1, 2, 3)

Notice: The option **B02** is only possible in combination with **B00**.

B03 *Separate output for external auxiliaries (uncontrolled)*

If, for example, a motor fan is to be supplied with power from the plant, option **B03** provides an external outgoing feeder with a 10 A fuse. As soon as the supply voltage is present at the converter input, a voltage corresponding to the converter input voltage ($V = V_{line}$) is also present at these terminals. This must be taken into consideration for the configuring of external fans.

| Terminal | Meaning |
|----------|---------|
| -A1-X1: | |

1, 2, 3, PE Outgoing circuit for external auxiliaries

Notice: Option **B03** is only possible in combination with **B00**.

D02 *Customer documentation (circuit diagram, terminal diagram, layout diagram) in the DXF format*

This option can be used to order documents such as circuit diagrams, terminal diagrams, layout diagrams, and dimension drawings in DXF format, in order to process them further in CAD systems, for example. They are supplied on the documentation CD in the desired language (standard is English/German, for other languages, see options **D58**, **D60**, **D80**).

D04 *Customer documentation in paper format*

Equipment documentation is supplied electronically on CD-ROM as standard. If the customer also requires a hard copy of the documentation and selects option **D04**, the following documents will be provided in a folder together with the drive converter:

- Operating instructions
- Circuit diagram
- Terminal diagram
- Layout diagram
- Dimension drawing
- Spare parts list
- Test certificate

Regardless of whether option **D04** is selected, a hard copy of the safety and transportation guidelines, a check list and a registration form is always supplied.

D14 *Preliminary copy of customer documentation*

If documents such as circuit diagrams, terminal diagrams, layout diagrams and dimension drawings are required in advance for system engineering, a preliminary copy of the relevant documentation can be ordered with the converter. These documents are then supplied electronically a few working days after the order has been recorded. The system-specific documentation is supplied to the customer via e-mail in the desired language (standard is English/German, for other languages, see options **D58**, **D60**, **D80**). The recipient's e-mail address must be provided with the order for this purpose. If option **D02** is selected at the same time, the documents are provided in the DXF format, otherwise they are sent in PDF format. In the e-mail, the recipient is also provided with a link for downloading general preliminary documentation such as operating instructions, manual and commissioning guide.

D58/D60/D80 *Documentation language*

| Order code | Language |
|------------|-----------------|
| D58 | English/French |
| D60 | English/Spanish |
| D80 | English/Italian |

E11 to E71 *Individual certification of the converter*

The individual certification of the converter by the relevant certification body contains the expansions described for option **M66**.

E11 Individual certificate from Germanische Lloyd (GL)

E21 Individual certificate from Lloyds Register (LR)

E31 Individual certificate from Bureau Veritas (BV)

E51 Individual certificate from Det Norske Veritas (DNV)

E61 Individual certificate from American Bureau of Shipping (ABS)

E71 Individual certificate from Chinese Classification Society (CCS)

Note: A combination of several individual certificates is not available.

Options (continued)

F03, F71, F75, F77, F97

Equipment acceptance in presence of customer

| Order code | Description | |
|------------|--|---|
| F03 | Visual inspection | <p>The acceptance scope includes:</p> <ul style="list-style-type: none"> • Checking the degree of protection • Checking the equipment (components) • Checking the equipment identifiers • Checking the clearance and creepage distances • Checking the cables • Checking the customer documentation • Submission of the acceptance report <p>All the above checks are performed with the converter isolated from the power supply.</p> |
| F71 | Function test without connected motor | <p>The acceptance scope includes:</p> <ul style="list-style-type: none"> • Visual inspection as described for option F03 • Checking the power supply • Checking the protective and monitoring devices (simulation) • Checking the fans • Precharging test • Function test without connected motor • Submission of the acceptance report <p>After the visual inspection with the converter switched off, the converter is connected to rated voltage. No current at the converter output end.</p> |
| F75 | Function test with test bay motor under no load conditions | <p>The acceptance scope includes:</p> <ul style="list-style-type: none"> • Visual inspection as described for option F03 • Checking the power supply • Checking the protective and monitoring devices (simulation) • Checking the fans • Precharging test • Function test with test bay motor (no load) • Submission of the acceptance report <p>After the visual inspection with the converter switched off, the converter is connected to rated voltage.</p> <p>A small current flows at the converter's output in order to operate the test bay motor (no load).</p> |
| F77 | Insulation test | <p>The acceptance scope includes:</p> <ul style="list-style-type: none"> • High-voltage test • Insulation resistance measurement |
| F97 | Customer-specific acceptance tests (on request) | <p>If acceptance tests are desired which are not covered by the options F03, F71, F75 or F77, customized acceptances/supplementary tests can be ordered using order code F97 on request and following technical clarification.</p> |

G20 CBC10 Communication Board

The CBC10 Communication Board is used to interface the CU320-2 Control Unit and thus the SINAMICS G150 to the CAN (Controller Area Network) protocol. The board's driver software fulfills the standards of the following CANopen specification of the CiA organization (CAN in Automation):

- Communication profiles in accordance with DS 301
- Drive profile in accordance with DSP 402 (in this case Profile Velocity Mode)

- EDS (Electronic Data Sheet) in accordance with DSP 306
- Operational status signaling in accordance with DSP 305

The CBC10 Communication Board plugs into the option slot on the CU320-2 Control Unit. Die CAN interface on the CBC10 has 2 SUB-D connections for input and output.

G33 CBE20 Communication Board

The CBE20 Communication Board is required, if

- a SINAMICS G130 or G150 converter, equipped with a Control Unit CU320-2 DP (PROFIBUS), is to be connected to a PROFINET-IO network,
- SINAMICS Link is to be used to directly exchange data between several Control Units CU320-2 DP (PROFIBUS) or CU320-2 PN (PROFINET) without using a higher-level control system.

With the CBE20 Communication Board, SINAMICS G130 or G150 then assumes the function of a PROFINET IO device in the sense of PROFINET and can perform the following functions:

- PROFINET IO device
- 100 Mbit/s full duplex
- Supports real-time classes of PROFINET IO:
 - RT (Real-Time)
 - IRT (Isochronous Real-Time), minimum send cycle 500 µs
- Connects to controls as a PROFINET IO device according to the PROFIdrive profile
- Standard TCP/IP communication for engineering processes using the STARTER commissioning tool
- Integrated 4-port switch with four RJ45-B sockets based on the PROFINET ASIC ERTEC400. The optimum topology (line, star, tree) can therefore be configured without additional external switches.

The CBE20 Communication Board plugs into the option slot on the CU320-2 Control Unit.

G60 TM31 customer Terminal Module

Terminal Module TM31 is used to extend the customer terminals on the CU320-2 Control Unit.

This provides the following additional interfaces:

- 8 digital inputs
- 4 bidirectional digital inputs/outputs
- 2 relay outputs with changeover contact
- 2 analog inputs
- 2 analog outputs
- 1 temperature sensor input (KTY84-130/PTC)
- 2 DRIVE-CLiQ sockets
- 1 connection for the electronics power supply via the 24 V DC supply connector
- 1 PE/protective conductor connection

To simplify configuration and commissioning of the drive, the optional TM31 Terminal Module can already be preset to a variety of factory settings, which can then be selected during commissioning.

The SINAMICS Low Voltage Engineering Manual contains additional information and is available as a PDF file on the CD-ROM included with Catalog D 11.

Options (continued)

G61

Additional TM31 customer Terminal Module

Using option **G61** the number of existing digital inputs/digital outputs, as well as the number of analog inputs/analog outputs within the drive system can be extended using a second TM31 Terminal Module (in addition to the TM31 Terminal Module that can be selected using option **G60**).

Note: Option **G61** requires option **G60**!

G62

TB30 Terminal Board

The TB30 Terminal Board is inserted into the option slot of the Control Unit and offers the possibility of expanding the Control Unit CU320-2 by 4 digital inputs/outputs as well as 2 analog inputs/outputs (see Chapter 2, "Supplementary system components").

Note: Option **G62** cannot be combined with options **G20** (CBC10 Communication Board) or **G33** (CBE20 Communication Board)!

K50

SMC30 Sensor Module Cabinet-Mounted

The SMC30 Sensor Module Cabinet-Mounted can be used to evaluate the encoders of motors without a DRIVE-CLiQ interface. External encoders can also be connected via the SMC30.

The following encoder signals can be evaluated:

- Incremental encoders TTL/HTL with and without open-circuit detection (open-circuit detection is only available with bipolar signals)
- SSI encoder with TTL/HTL incremental signals
- SSI encoder without incremental signals

The motor temperature can also be detected using KTY84-130, or PTC thermistors.

K51

VSM10 Voltage Sensing Module Cabinet-Mounted

The VSM10 Voltage Sensing Module is used to sense the voltage characteristic on the motor side so that the following function can be implemented:

- Operation of a permanent-magnet synchronous motor without encoder with the requirement to be able to connect to a motor that is already running ("Flying restart" function).

K82

Terminal interface for "Safe Torque Off" and "Safe Stop 1" safety functions

The terminal interface is used to control the "Basic Safety Functions" with isolation

- "Safe Torque Off" (STO) and
- "Safe Stop 1" (SS1) (time-controlled)

over a wide voltage range from DC/AC 24 V to 240 V (terminology according to Draft IEC 61800-5-2).

As a consequence, the "STO" and "SS1" safety functions can be flexibly controlled from the plant or system signal voltages.

The integrated safety functions, starting from the Safety Integrated (SI) input terminals of the components (Control Unit and Power Module), satisfy the requirements of EN 61800-5-2, EN 60204-1, DIN EN ISO 13849-1 Category 3 (formerly EN 954-1) for Performance Level (PL) d and IEC 61508 SIL 2.

With option **K82**, the requirements specified in EN 61800-5-2, EN 60204-1, DIN EN ISO 13849-1 Category 3 (formerly EN 954-1) for Performance Level (PL) d and IEC 61508 SIL 2 are fulfilled.

The Safety Integrated functions using option **K82** are only available in conjunction with certified components and software versions.

The Safety Integrated functions of SINAMICS are generally certified by independent institutes. An up-to-date list of certified components is available on request from your local Siemens office.

K95

Control Unit CU320-2 PN (PROFINET)

Instead of Control Unit CU320-2 DP (PROFIBUS) supplied as standard, the converter is supplied with a CU320-2 PN (PROFINET). Detailed information about this Control Unit (→ Converter chassis units).

L00

Use in the first environment to EN 61800-3 Category C2 (TN systems or TT systems with grounded star point)

To limit the **emitted interference**, the drive converters are equipped as standard with a radio interference suppression filter that conforms to the limits defined in Category C3. SINAMICS G150 converters equipped with the line filter also meet the limits for use in the first environment (Category C2) as specified in EN 61800-3. ¹⁾

The SINAMICS G150 units comply as standard with the **interference immunity** requirements defined in this standard for the first and second environments.

In conjunction with line reactors, line filters also limit the conducted interference emitted by the Power Modules to the limit values of Category C2 defined in product standard EN 61800-3. For converter power ratings > 500 kW, option **L23** must be additionally ordered (not required when option **L01** is selected).

To allow the power cable shield to be connected in conformance with EMC requirements, an additional EMC shield busbar (**M70** option) is factory fitted at the converter input and output. A separate order is not required in this case.

¹⁾ Applies to cable lengths < 100 m.

Options (continued)

L01 Clean Power version with integrated Line Harmonics Filter compact



Instead of the line reactor, an innovative LHF is integrated in the control cabinet; this minimizes the harmonics that occur due to the principle of operation. As a consequence, the unit fully complies with the limit values stipulated in standard IEEE 519-1992 without any exceptions (precondition: $v_k \leq 5\%$ or $RSC \geq 20$).

Option **L01** always requires electrical separation from the line supply, i.e. for converters in a single circuit for converter currents ≤ 800 A, option **L13** and for converter currents > 800 A, option **L26**. For converters with power units connected in parallel, electrical separation from the line supply is included as standard.

SINAMICS G150 Clean Power with integrated Line Harmonics Filter is available for power ratings up to 1500 kW in all available degrees of protection up to IP54 (→ Options **M21** to **M54**).

Notice: When using option **L01** on 60 Hz line supplies, then a restricted voltage tolerance of +8 % applies!

Note: Option **L01** cannot be combined with options **L22** (without line reactor), **L23** (line reactor $v_k = 2\%$) and **M66** (marine version).

Width and weight of the converter cabinet units
SINAMICS G150 Clean Power

| Order number | Type rating | Width | Weight |
|---------------------------|-------------|-------|--------|
| Z = +L01 | kW | mm | kg |
| 380 ... 480 V 3 AC | | | |
| 6SL3710-1GE32-1AA3-Z | 110 | 1200 | 540 |
| 6SL3710-1GE32-6AA3-Z | 132 | 1200 | 540 |
| 6SL3710-1GE33-1AA3-Z | 160 | 1200 | 640 |
| 6SL3710-1GE33-8AA3-Z | 200 | 1400 | 730 |
| 6SL3710-1GE35-0AA3-Z | 250 | 1400 | 770 |
| 6SL3710-1GE36-1AA3-Z | 315 | 1800 | 1300 |
| 6SL3710-1GE37-5AA3-Z | 400 | 1800 | 1345 |
| 6SL3710-1GE38-4AA3-Z | 450 | 1800 | 1555 |
| 6SL3710-1GE41-0AA3-Z | 560 | 2200 | 1840 |
| 6SL3710-1GE41-1AA3-Z | 630 | 3600 | 2580 |
| 6SL3710-1GE41-4AA3-Z | 710 | 3600 | 2670 |
| 6SL3710-1GE41-6AA3-Z | 900 | 3600 | 3090 |
| 500 ... 600 V 3 AC | | | |
| 6SL3710-1GF31-8AA3-Z | 110 | 1200 | 670 |
| 6SL3710-1GF32-2AA3-Z | 132 | 1200 | 670 |
| 6SL3710-1GF32-6AA3-Z | 160 | 1200 | 710 |
| 6SL3710-1GF33-3AA3-Z | 200 | 1200 | 710 |
| 6SL3710-1GF34-1AA3-Z | 250 | 1800 | 1340 |
| 6SL3710-1GF34-7AA3-Z | 315 | 1800 | 1340 |
| 6SL3710-1GF35-8AA3-Z | 400 | 1800 | 1340 |
| 6SL3710-1GF37-4AA3-Z | 500 | 2200 | 2000 |
| 6SL3710-1GF38-1AA3-Z | 560 | 2200 | 2040 |
| 6SL3710-1GF38-6AA3-Z | 630 | 3600 | 2660 |
| 6SL3710-1GF41-1AA3-Z | 710 | 3600 | 2660 |
| 6SL3710-1GF41-4AA3-Z | 1000 | 4400 | 3980 |
| 660 ... 690 V 3 AC | | | |
| 6SL3710-1GH28-5AA3-Z | 75 | 1200 | 550 |
| 6SL3710-1GH31-0AA3-Z | 90 | 1200 | 550 |
| 6SL3710-1GH31-2AA3-Z | 110 | 1200 | 550 |
| 6SL3710-1GH31-5AA3-Z | 132 | 1200 | 550 |
| 6SL3710-1GH31-8AA3-Z | 160 | 1200 | 670 |
| 6SL3710-1GH32-2AA3-Z | 200 | 1200 | 670 |
| 6SL3710-1GH32-6AA3-Z | 250 | 1200 | 710 |
| 6SL3710-1GH33-3AA3-Z | 315 | 1200 | 710 |
| 6SL3710-1GH34-1AA3-Z | 400 | 1800 | 1340 |
| 6SL3710-1GH34-7AA3-Z | 450 | 1800 | 1340 |
| 6SL3710-1GH35-8AA3-Z | 560 | 1800 | 1340 |
| 6SL3710-1GH37-4AA3-Z | 710 | 2200 | 2000 |
| 6SL3710-1GH38-1AA3-Z | 800 | 2200 | 2040 |
| 6SL3710-1GH41-1AA3-Z | 1000 | 3600 | 2660 |
| 6SL3710-1GH41-4AA3-Z | 1350 | 4400 | 3980 |
| 6SL3710-1GH41-5AA3-Z | 1500 | 4400 | 4060 |

Options (continued)

L07

dv/dt filter compact plus Voltage Peak Limiter

dv/dt filter plus VPL (Voltage Peak Limiter) limit the voltage rate-of-rise dv/dt to values < 1600 V/μs and the typical voltage peaks to the following values according to the limit value curve A to IEC 60034-25: 2007:

- < 1150 V at $V_{line} < 575$ V
- < 1400 V at 660 V < $V_{line} < 690$ V

The dv/dt filter compact plus VPL functionally consists of two components that are supplied as a compact mechanical unit, the dv/dt reactor and the voltage limiting network (VPL), which limits voltage peaks and feeds back the energy to the DC link. Its dimensions are so compact that it can be completely integrated in the cabinet – even for high power ratings. A supplementary cabinet is not required.

By using a dv/dt filter compact plus VPL, standard motors with a standard insulation and without insulated bearings with supply voltages of up to 690 V can be used for converter operation.

dv/dt filter compact plus VPL are designed for the following maximum motor cable lengths:

- Shielded cables 100 m (e.g. Protodur NYCWY)
- Unshielded cables 150 m (e.g. Protodur NYY)

For longer cable lengths (> 100 m shielded, > 150 m unshielded), the dv/dt filter plus VPL (option **L10**) should be used.

Notice:

- The max. permissible cable length between the dv/dt filter and Power Module is 5 m.
- Operation with output frequencies < 10 Hz is permissible for max. 5 min.
- Please observe the corresponding notes in the SINAMICS Low Voltage Engineering Manual (as PDF on the CD-ROM included with the catalog).

Note: Option **L07** cannot be combined with the following options:

- **L08** (motor reactor)
- **L10** (dv/dt filter plus VPL)
- **L15** (sine-wave filter)
- **M78** (top cable entry, motor side)

L08

Motor reactor

Motor reactors reduce the voltage load on the motor windings by reducing the voltage gradients on the motor terminals generated when the converter is used. At the same time, the capacitive charge/discharge currents that place an additional load on the converter output when long motor cables are used are reduced. The maximum permissible output frequency when a motor reactor is used is 150 Hz.

Max. connectable motor cable lengths:

- Shielded cables 300 m (e.g. Protodur NYCWY)
- Unshielded cables 450 m (e.g. Protodur NYY)

Note: Option **L08** is only available for version A and cannot be combined with the following options:

- **L07** (dv/dt filter compact plus VPL)
- **L10** (dv/dt filter plus VPL)
- **L15** (sine-wave filter)
- **M78** (top cable entry, motor side)

L10

dv/dt filter plus Voltage Peak Limiter

dv/dt filter plus VPL (Voltage Peak Limiter) limit the voltage rate-of-rise dv/dt to values < 500 V/μs and the typical voltage peaks to the following values according to the limit value curve to IEC/TS 60034-17: 2006:

- < 1000 V at $V_{line} < 575$ V
- < 1250 V at 660 V < $V_{line} < 690$ V

The dv/dt filter plus VPL functionally consists of two components, the dv/dt reactor and the voltage limiting network (VPL), which limits voltage peaks and feeds the energy back to the DC link.

Depending on the converter output rating, option **L10** can be accommodated in the drive converter cabinet unit or an additional cabinet of width 400 mm is required.

| Voltage range | Installation of the dv/dt filter plus VPL within the drive converter cabinet unit | Installation of the dv/dt filter plus VPL in a converter cabinet unit |
|---------------|---|---|
| V | kW | kW |
| 380 ... 480 | 110 ... 250 | 315 ... 560 |
| 500 ... 600 | 110 ... 200 | 250 ... 560 |
| 660 ... 690 | 75 ... 315 | 400 ... 800 |

The dv/dt filter plus VPL is available on request for drive converter cabinet units with power units connected in parallel up to and including 1500 kW.

By using a dv/dt filter plus VPL, standard motors with a standard insulation and without insulated bearings with supply voltages of up to 690 V can be used for converter operation.

dv/dt filter plus VPL are designed for the following maximum motor cable lengths:

- Shielded cables 300 m (e.g. Protodur NYCWY)
- Unshielded cables 450 m (e.g. Protodur NYY)

For cable lengths < 100 m shielded or < 150 m unshielded, the dv/dt filter compact plus VPL (Option **L07**) can be advantageously used.

Please observe the corresponding notes in the SINAMICS Low Voltage Engineering Manual (as PDF on the CD-ROM included with the catalog).

Note: Option **L10** is not available for converters > 1500 kW with power units connected in parallel and cannot be combined with the following options:

- **L07** (dv/dt filter compact plus VPL)
- **L08** (motor reactor)
- **L15** (sine-wave filter)
- **M78** (top cable entry, motor side)

Options (continued)

L13 Line contactor (for currents ≤ 800 A for single circuit)

SINAMICS G150 drive converter cabinet units in a single circuit do not have a line contactor as standard. Option **L13** is needed if a switching element is required for disconnecting the cabinet from the supply (required for EMERGENCY OFF). The contactor is controlled and powered inside the converter. For units with rated input currents > 800 A in a single circuit, the function of option **L13** is provided by option **L26**.

Note: For converters with power units connected in parallel, the line contactor is included as standard.

| Terminal -X50: | Meaning |
|----------------|---|
| 4 | Checkback contact (NO contact) Contactor closed |
| 5 | Checkback contact (NC contact) Contactor closed |
| 6 | Common root |

L15 Sine-wave filter

Sine-wave filters are available in the voltage range 380 V to 480 V up to a type rating of 250 kW and in the voltage range 500 V to 600 V, up to a type rating of 132 kW.

The sine-wave filter at the converter output delivers practically sinusoidal voltages to the motor so that standard motors can be used without special insulation and without insulated bearings. Further, the sine-wave filter reduces the converter-related supplementary motor noise. The maximum permitted motor feeder cable length is limited to 300 m.

Note: The pulse frequency of the converter must be increased when used in conjunction with the **L15** option. This reduces the power available at the drive converter output (for the derating factor, refer to the SINAMICS Low Voltage Engineering Manual). The modulation depth of the output voltage decreases to approx. 85 % (380 V to 480 V) or approx. 83 % (500 V to 600 V). The maximum output frequency is 150 Hz. It should be noted that the reduced voltage at the motor terminals compared to the rated motor voltage means that the motor switches to field weakening mode earlier.

L19 Connection for external auxiliary equipment

An outgoing, controlled circuit fused with max. 10 A for external auxiliary equipment (for example, separately driven motor fan).

The voltage is tapped at the drive converter input upstream of the line contactor/circuit breaker and, therefore, has the same level as the supply voltage.

The outgoing circuit can be controlled internally by the converter or externally.

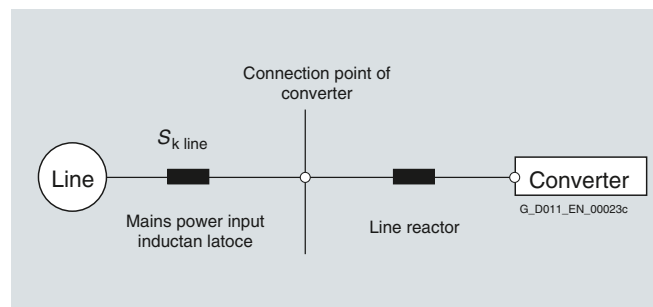
| Terminal -X155: | Meaning | Range |
|-----------------|---------------------------------|------------------------------------|
| 1 | L1 | 380 ... 690 V AC |
| 2 | L2 | 380 ... 690 V AC |
| 3 | L3 | 380 ... 690 V AC |
| 11 | Contactor control | 230 V AC |
| 12 | Contactor control | 230 V AC |
| 13 | Circuit breaker feedback signal | 230 V AC / 0.5 A; 24 V DC / 2 A |
| 14 | Circuit breaker feedback signal | 230 V AC / 0.5 A; 24 V DC / 2 A |
| 15 | Contactor feedback signal | 230 V AC / 6 A |
| 16 | Contactor feedback signal | 230 V AC / 6 A |
| PE | PE | |

L22 Delivery scope without line reactor (for converters ≤ 500 kW) L23 Line reactor $v_k = 2\%$ (for converters > 500 kW)

The line reactor is included as standard in the converter for converters up to 500 kW. For converter power ratings > 500 kW, including the parallel circuits, the line reactor ($v_k = 2\%$) is optionally available, as in this power range, the converter is often connected to the medium-voltage line supply via transformers that are adapted to the converter rating.

A line reactor is needed for high short-circuit power levels, partly to protect the actual converter against excessive harmonic currents, and thus against overload, and partly to limit line harmonics to the permitted values. The harmonic currents are limited by the complete inductance comprising the line reactor and mains supply cable inductance. Line reactors can be omitted if the line supply cable inductance is increased sufficiently, i.e. the value of RSC must be sufficiently small.

RSC = Relative Short-Circuit power: Ratio of short-circuit power $S_{k \text{ Line}}$ at the supply connection point to the fundamental apparent output S_{conv} of the connected converters (to EN 50178/VDE 0160).

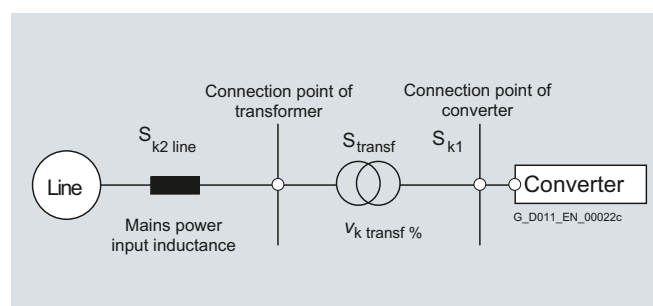


For SINAMICS G150 drive converter cabinet units the following applies:

| Type rating kW | Line reactor can be omitted | | Line reactor required | |
|-------------------|-----------------------------|---------------------|-----------------------|---------------------|
| | for RSC | Order code (option) | for RSC | Order code (option) |
| < 200 | ≤ 43 | L22 | > 43 | - |
| $200 \dots 500$ | ≤ 33 | L22 | > 33 | - |
| ≥ 500 | ≤ 20 | - | > 20 | L23 |

It is recommended that a line reactor is always connected on the line side of the converter, as in practice, it is often not known on which supply configuration individual converters are to be operated, i.e. which supply short-circuit power is present at the converter connection point.

The line reactor can only be omitted (option **L22**) if the values for RSC are lower than those shown in the table. This is the case, as shown in the following diagram, when the converter is connected to the line supply through a transformer with the appropriate rating.



Options (continued)

As high-rating converters are usually connected to medium-voltage supply systems via transformers to reduce their harmonic effects on the supply, cabinet units over 500 kW are not equipped with line reactors as standard.

A line reactor (option **L23**) is always required, however, if

- for cabinet units > 500 kW, the RSC ratio is > 20, or
- several converters are connected to the same line connection point.
- for cabinet units in a parallel circuit, the line supply is not fed-in through a three-winding transformer, or
- a line filter is used.

The SINAMICS Low Voltage Engineering Manual contains additional information on this topic (as PDF file on the CD-ROM included with the catalog).

Note: When option **L01** is selected, then a line reactor is not required (options **L22/L23** and **L01** cannot be combined).

L26

Main switch incl. fuses or circuit breakers

A switch disconnecter with fuses is available as the main switch for converters in a single circuit with ratings up to 800 A. Cabinets with an output current greater than 800 A are equipped with a circuit-breaker instead of a load disconnecter. The circuit breaker is controlled and supplied within the converter.

Option **L26** is included as standard for converters with parallel-connected power units and a rated input current of ≥ 1500 A. Circuit breakers are fitted in these units. For rated input currents < 1500 A, by selecting option **L26**, converters connected in parallel can be equipped with main switches including fuses in addition to the line contactor provided as standard.

L45

EMERGENCY OFF pushbutton, door mounted

The EMERGENCY OFF pushbutton with protective collar is installed in the converter cabinet door and its contacts are connected to the terminal block. The EMERGENCY OFF functions, Category 0 or 1, can be activated in conjunction with options **L57**, **L59** and **L60**.

Notice: By pressing the EMERGENCY OFF pushbutton, in compliance with IEC 60204-1 (VDE 0113), the motor is stopped – either uncontrolled or controlled depending on the selected Category 0 or 1 – and the converter isolated from the line supply. Auxiliary voltages, e.g. for a separately driven fan supply or anti-condensation heating, may still be present. Certain areas within the converter also remain live, e.g. the control or auxiliaries. If complete disconnection of all voltages is required, the EMERGENCY OFF pushbutton must be incorporated into a protective system to be implemented by the customer. For this purpose, an NC contact is provided at terminal –X120.

The EMERGENCY OFF pushbutton is preconfigured at the factory only when one of the options **L57** to **L60** is selected simultaneously. Other circuit arrangements must be implemented on the plant side.

L50

Cabinet light with service socket

One handheld lamp and a service socket is installed for each cabinet element.

The power supply (at terminal block -X390) for the cabinet light and the socket must be provided externally and fused with max. 10 A. The cabinet light is switched on manually using a switch.

| Terminal | Meaning |
|---------------|---------------|
| -X390: | |
| 1 | L1 (230 V AC) |
| 2 | N |
| 3 | PE |

L55

Cabinet anti-condensation heating

The cabinet anti-condensation heating is recommended at low ambient temperatures and high levels of humidity to prevent condensation. A 100 W electrical cabinet heater is installed for each cabinet element (two heating units are installed for each element for cabinet element widths from 800 mm to 1200 mm).

The power supply for the cabinet anti-condensation heating (110 V to 230 V AC, at terminal block -X240) must be provided externally and fused with max. 16 A.

| Terminal | Meaning |
|---------------|-----------------------|
| -X240: | |
| 1 | L1 (110 ... 230 V AC) |
| 2 | N |
| 3 | PE |

L57

EMERGENCY OFF Category 0, 230 V AC or 24 V DC

EMERGENCY OFF Category 0 for uncontrolled stopping in accordance with EN 60204-1.

The function includes interrupting the power feed for the converter via the line contactor and bypassing the microprocessor controller using a safety combination according to EN 60204-1. The motor then coasts down. When shipped, the pushbutton circuit is preset to 230 V AC. Jumpers must be appropriately set when using 24 V DC.

Notice: Option **L57** always requires electrical separation from the line supply, i.e. for converters in a single circuit for converter currents ≤ 800 A, option **L13** and for converter currents > 800 A, option **L26**. For converters with power units connected in parallel, electrical separation from the line supply is included as standard.

| Terminal | Meaning |
|---------------|---|
| -X120: | |
| 7 | Looping in EMERGENCY OFF pushbutton from the customer side (plant side); remove jumper 7-8! |
| 8 | Looping in EMERGENCY OFF pushbutton from the customer side (plant side); remove jumper 7-8! |
| 15 | "On" for monitored start; remove jumper 15-16! |
| 16 | "On" for monitored start; remove jumper 15-16! |
| 17 | Feedback signal "safety combination tripped" |
| 18 | Feedback signal "safety combination tripped" |

Options (continued)

L59 EMERGENCY STOP Category 1, 230 V AC

EMERGENCY STOP Category 1 for controlled stopping in accordance with EN 60204-1.

The function includes shutting down the drive via a fast stop along a deceleration ramp to be parameterized by the user. The power feed to the converter is then interrupted as described for EMERGENCY OFF Category 0.

A braking unit may be necessary to achieve the required shut-down times.

Notice: Option **L59** always requires electrical separation from the line supply, i.e. for converters in a single circuit for converter currents ≤ 800 A, option **L13** and for converter currents > 800 A, option **L26**. For converters with power units connected in parallel, electrical separation from the line supply is included as standard.

| Terminal -X120: | Meaning |
|-----------------|---|
| 7 | Looping in EMERGENCY OFF pushbutton from the customer side (plant side); remove jumper 7-8! |
| 8 | Looping in EMERGENCY OFF pushbutton from the customer side (plant side); remove jumper 7-8! |
| 15 | "On" for manual start; remove jumper 15-16! |
| 16 | "On" for manual start; remove jumper 15-16! |
| 17 | Feedback signal "safety combination tripped" |
| 18 | Feedback signal "safety combination tripped" |

L60 EMERGENCY STOP Category 1, 24 V DC

EMERGENCY STOP Category 1 for controlled stopping in accordance with EN 60204-1.

The function includes shutting down the drive via a fast stop along a deceleration ramp to be parameterized by the user. The power feed to the converter is then interrupted as described for EMERGENCY OFF Category 0.

A braking unit may be necessary to achieve the required shut-down times.

Notice: Option **L60** always requires electrical separation from the line supply, i.e. for converters in a single circuit for converter currents ≤ 800 A, option **L13** and for converter currents > 800 A, option **L26**. For converters with power units connected in parallel, electrical separation from the line supply is included as standard.

| Terminal -X120: | Meaning |
|-----------------|---|
| 7 | Looping in EMERGENCY OFF pushbutton from the customer side (plant side); remove jumper 7-8! |
| 8 | Looping in EMERGENCY OFF pushbutton from the customer side (plant side); remove jumper 7-8! |
| 15 | "On" for manual start; remove jumper 15-16! |
| 16 | "On" for manual start; remove jumper 15-16! |
| 17 | Feedback signal "safety combination tripped" |
| 18 | Feedback signal "safety combination tripped" |

L61, L62 Braking units

It may be necessary to use braking units for drives that can operate in generator mode.

The braking unit comprises two components:

- A Braking Module that is installed in the converter cabinet, and
- A braking resistor to be installed externally (IP20 degree of protection).

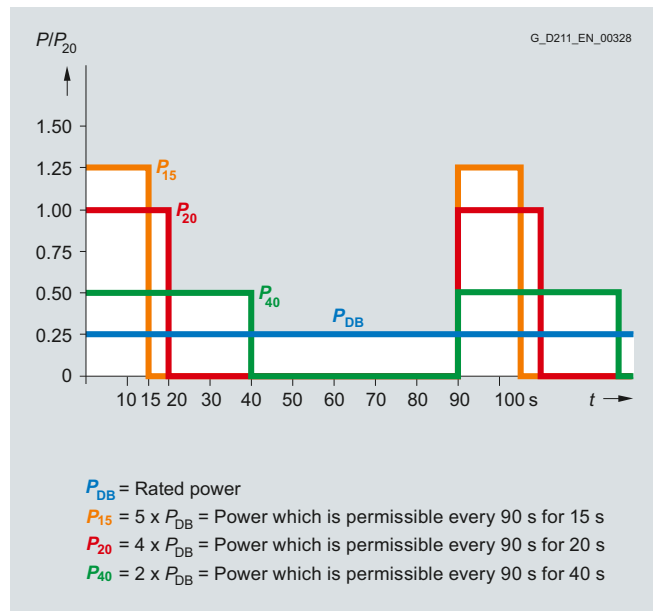
The braking unit functions as an autonomous unit, and does not require an external power supply. The braking energy is converted into heat in the braking resistor that must be mounted externally.

A maximum cable length of 100 m is permissible between the Braking Module and the braking resistor. This allows the braking resistor to be mounted externally so that heat losses can be dissipated outside the converter enclosure.

The braking resistor is connected to terminal block -X5 on the drive converter cabinet unit:

| Terminal -X5: | Meaning |
|---------------|-----------------------------|
| 1 | Braking resistor connection |
| 2 | Braking resistor connection |

Characteristic curves



Load diagram for Braking Modules and braking resistors

Information on possible load cycles of the braking units as well as additional project guidelines are provided in the SINAMICS Low Voltage Engineering Manual, which is available as PDF on the CD-ROM included with Catalog D 11.

Options (continued)

The following braking units are available for the SINAMICS G150 converters and must be selected according to the converter rating:

| Option | SINAMICS G150 converter cabinet units Type rating kW | Braking Module | | | | Braking resistance R_B Ohm |
|---------------------------|--|----------------|----------------|----------------|----------------|---------------------------------|
| | | P_{DB} kW | P_{40} kW | P_{20} kW | P_{15} kW | |
| 380 ... 480 V 3 AC | | | | | | |
| L61 | 110 ... 132 | 25 | 50 | 100 | 125 | 4.4 ±7.5 % |
| L62 | 160 ... 900 | 50 | 100 | 200 | 250 | 2.2 ±7.5 % |
| 500 ... 600 V 3 AC | | | | | | |
| L62 | 110 ... 1000 | 50 | 100 | 200 | 250 | 3.4 ±7.5 % |
| 660 ... 690 V 3 AC | | | | | | |
| L61 | 75 ... 132 | 25 | 50 | 100 | 125 | 9.8 ±7.5 % |
| L62 | 160 ... 2700 | 50 | 100 | 200 | 250 | 4.9 ±7.5 % |

P_{DB} : Rated power (continuous braking power)

P_{40} : 40 s power referred to a braking interval of 90 s

P_{20} : 20 s power referred to a braking interval of 90 s

P_{15} : 15 s power referred to a braking interval of 90 s

A second 50 kW braking unit can be installed in converters with parallel-connected power units in order to increase the braking power. In this case, one Braking Module is assigned to each braking resistor. You can order a second braking unit by selecting option **L62** twice.

If more braking power is required than provided by the braking units listed here, then braking units may be connected in parallel for higher converter outputs (on request).

Notes on this topic are also provided in the SINAMICS Low Voltage Engineering Manual.

L83

Thermistor motor protection unit (alarm)

Thermistor motor protection unit for PTC temperature thermistors (PTC resistors, type A) for alarm. The thermistor motor protection unit is supplied with power and evaluated internally in the converter.

| Terminal | Meaning |
|---------------|------------------------|
| -F127: | |
| T1 | Sensor loop connection |
| T2 | Sensor loop connection |

L84

Thermistor motor protection unit (shutdown)

Thermistor motor protection unit for PTC temperature thermistors (PTC resistors, type A) for shutdown (tripping). The thermistor motor protection unit is supplied with power and evaluated internally in the converter.

| Terminal | Meaning |
|---------------|------------------------|
| -F125: | |
| T1 | Sensor loop connection |
| T2 | Sensor loop connection |

L86

PT100 evaluation unit

The PT100 evaluation unit can monitor up to 6 sensors. The sensors can be connected in a two or three-wire system. The limit values can be freely programmed for each channel.

In the factory setting, the measurement channels are divided into two groups of 3 channels. For motors, for example, this means that three PT100s in the stator windings and two PT100s in the motor bearings can be monitored. Unused channels can be suppressed by parameter settings.

The output relays are integrated into the internal fault and shutdown sequence of the converter.

L87

Insulation monitoring

An insulation monitor must be used if the converter is operated on an ungrounded system. The device monitors the entire galvanically coupled circuit for insulation faults.

An alarm is output in the event of a fault.

Notice: Only **one** insulation monitor can be used in each electrically coupled line supply.

As there are different response strategies when a ground fault occurs in an ungrounded system, output relays of the insulation monitor are provided for integration in a plant-side control. There is also the possibility of integrating the outputs in the plant in the converter monitoring.

| Terminal | Meaning |
|------------------|--|
| -A1-A101: | |
| 11 | Signaling relay ALARM 1 |
| 12 | Signaling relay ALARM 1 |
| 14 | Signaling relay ALARM 1 |
| 21 | Signaling relay ALARM 2 |
| 22 | Signaling relay ALARM 2 |
| 24 | Signaling relay ALARM 2 |
| M+ | External kΩ display 0 μA to 400 μA |
| M- | External kΩ display 0 μA to 400 μA |
| R1 | External reset button (NC contact or wire jumper, otherwise the error message is not stored) |
| R2 | External reset button (NC contact or wire jumper) |
| T1 | External test button |
| T2 | External test button |

Insulation monitoring can be supplied on request for drive converter cabinet units with power units connected in parallel.

M06

Base 100 mm high, RAL 7022

The additional cabinet base allows larger bending radii for cables (cable inlet from below) and enables them to be routed within the cabinet base.

The cabinet base is supplied in RAL 7022 in all cases. A special paint finish is not available for the base. It is delivered completely assembled with the cabinet. The mounting height of the operator panel changes accordingly.

Options (continued)

M07

Cable plinth 200 mm high, RAL 7035

The cable wiring compartment is made of strong sheet steel and allows cables to be connected more flexibly (entry from below). It also allows routing of cables within the cable wiring compartment. It is delivered completely assembled with the cabinet. The mounting height of the operator panel changes accordingly.

Notice: The cable wiring compartment is painted as standard with RAL 7035. If a special color is requested for the cabinet (order code **Y09**), the cable wiring compartment is also painted in this color.

M13

Top cable entry, line side

The control cabinet is provided with an additional hood to allow a top cable entry, line side. The connecting lugs for the power cables, the clamping bar for mechanically securing the cables, an EMC shield busbar, and a PE busbar are located inside the hood.

The cabinet height is therefore increased by 405 mm. The busbars for connection from above are fully mounted and installed when the cabinet is delivered. For transport reasons, the hoods are delivered separately and must be fitted by the customer. Crane transport assemblies (option **M90**) can still be used.

However, they must be removed on site before the hoods can be installed. The use of rope spreaders must be taken into consideration in the case of low crane hook heights.

An undrilled aluminum mounting plate (5 mm thick) is provided in the roof section for feeding in the cables. Depending on the number of cables and the cross-sections used, holes for attaching cable glands for feeding in the cables must be drilled in this mounting plate on-site.

Note: The control cables are still connected from below. When option **M13** is selected, the standard line connection from below is not provided.

The degree of protection of the hoods is IP21. When combined with options **M23**, **M43** and **M54**, additional plastic ventilation grilles and filter elements are provided.

Notice: The hoods have a RAL 7035 color as standard. If a special color is requested for the cabinet (order code **Y09**), the hoods are also painted in this color. Ventilation grilles provided for IP23, IP43 and IP54 degrees of protection have a RAL 7035 color and cannot be painted.

Option **M13** cannot be combined with option **L50** (cabinet light with service socket) for drive converter cabinet units with power units connected in parallel.

M21

Degree of protection IP21

Cabinet version in IP20, but with additional top cover or canopy. This increases the cabinet height by 250 mm.

For transport reasons, the top covers or canopies are delivered separately and must be fitted on site.

Notice: The top covers or canopies are painted in RAL 7035 as standard. If a special color is requested for the cabinet (order code **Y09**), the top covers or canopies will also be painted this color.

M23/M43/M54

Degree of protection IP23/IP43/IP54

When selecting **M23**, **M43** or **M54** then the converter is equipped with a hood. This increases the cabinet height by 400 mm.

For transport reasons, the hoods are delivered separately and must be fitted by the customer.

Notice: The hoods have a RAL 7035 color as standard. If a special color is requested for the cabinet (order code **Y09**), the hoods are also painted in this color. The molded plastic parts (e.g. ventilation grilles) have a RAL 7035 color and cannot be painted.

M66

Marine version

For compliance with the requirements of the classification institutes:

- Lloyds Register
- American Bureau of Shipping
- Germanischer Lloyd
- Bureau Veritas
- Det Norske Veritas
- Chinese Classification Society

This option includes a strengthened mechanical version of the cabinet, handles (handrail) below the operator panel and mechanical locking of the cabinet doors. The cabinet has degree of protection IP23 (**M23** option) and includes a cabinet anti-condensation heater (**L55** option). To attach the drive converter to a ship's deck, a welding frame (5 mm high) is supplied separately.

Option **M66** is not available for converters > 1500 kW with power units connected in parallel.

Note: Options **M21**, **M23** and **L01** or **L55** cannot be combined. If the converter is used for a safety-relevant drive on a ship, then individual certification is also required (see options **E11** to **E71**) – these include option **M66**.

M70

EMC shield busbar (cable connection from below)

The EMC shield busbar is used to connect shielded power cables for line supply and motor feeder lines. The EMC shield busbar is included as standard with option **L00** (RFI suppression filter).

Options (continued)

M78

Top cable entry, motor side

The control cabinet is provided with an additional hood for a top cable entry, motor side. The connecting lugs for the power cables, the clamping bar for mechanically securing the cables, an EMC shield busbar, and a PE busbar are located inside the hood.

The cabinet height is therefore increased by 405 mm. The busbars for connection from above are fully mounted and installed when the cabinet is delivered. For transport reasons, the hoods are delivered separately and must be fitted by the customer. Crane transport assemblies (option **M90**) can still be used. However, they must be removed on site before the hoods can be installed.

An undrilled aluminum mounting plate (5 mm thick) is provided in the roof section for feeding in the cables. Depending on the number of cables and the cross-sections used, holes for attaching cable glands for feeding in the cables must be drilled in this mounting plate on-site.

Note: The control cables are still connected from below. When option **M78** is selected, the standard motor connection from below is not provided. A combination with motor-side options **L07**, **L08**, **L10** and **L15** is not possible. If option **M78** and option **L61** or **L62** are simultaneously selected, then the braking resistor should also be connected from above.

The degree of protection of the hoods is IP21. When combined with options **M23**, **M43** and **M54**, additional plastic ventilation grilles and filter elements are provided.

Notice: The hoods have a RAL 7035 color as standard. If a special color is requested for the cabinet (order code **Y09**), the hoods are also painted in this color. Ventilation grilles provided for IP23, IP43 and IP54 degrees of protection have a RAL 7035 color and cannot be painted.

M90

Crane transport assembly (top-mounted)

In the case of single cabinets up to a width of 600 mm, transport eyebolts are provided to transport the unit by crane. For cabinet widths of 800 mm and wider, transport rails are used.

Rope spreaders should be used for low crane hook heights.

T58, T60, T80

Rating plate data

As standard, the rating plate is in English/German.

A rating plate in another language can be selected by specifying the following option order codes.

| Order code | Rating plate language |
|------------|-----------------------|
| T58 | English/French |
| T60 | English/Spanish |
| T80 | English/Italian |

Y09

Special cabinet paint finish

The converter cabinet units are painted with RAL 7035 as standard. The special paint finish must be stated in plain text in the order. All RAL colors which are available as powder coatings can be selected.

Notice: If options such as cable plinth (order code **M07**), top covers or canopies (order code **M21**), hoods (order codes **M23/M43/M54**) or cable connection from above (order codes **M13/M78**) are ordered for the drive converter cabinet units, they will also be supplied in the special paint finish. The molded plastic parts (e.g. ventilation grilles) have a RAL 7035 color and cannot be painted.

Overview

The fuses specified below are the recommended types for protecting the unit on the low-voltage distribution panel. If option **L26** (main switch or circuit breaker) has been selected, the converter has integrated semiconductor protection. In this case, a fuse of type 3NA can be used on the low-voltage distribution panel.

If option **L26** has not been selected, we strongly advise that 3NE fuses are used ¹⁾.

Additional information on the fuses is provided in Catalog LV 10.1

Single circuit

| Type rating | | SINAMICS G150 converter | Fuse when fuse switch disconnecter (option L26) is installed | Rated current | Frame size acc. to IEC 60269-2 | Fuse (incl. semiconductor protection) without fuse switch disconnecter | Rated current | Frame size acc. to IEC 60269-2 |
|----------------------------|----------------------------|-------------------------|--|---------------|--------------------------------|--|---------------|--------------------------------|
| (at 400 V, 500 V or 690 V) | (at 60 Hz, 460 V or 575 V) | | Type | A | | Type | A | |
| kW | hp | | | | | | | |
| 380 ... 480 V 3 AC | | | | | | | | |
| 110 | 150 | 6SL3710-1GE32-1 . A3 | 3NA3144 | 250 | 2 | 3NE1230-2 | 315 | 1 |
| 132 | 200 | 6SL3710-1GE32-6 . A3 | 3NA3250 | 300 | 2 | 3NE1331-2 | 350 | 2 |
| 160 | 250 | 6SL3710-1GE33-1 . A3 | 3NA3254 | 355 | 3 | 3NE1334-2 | 500 | 2 |
| 200 | 300 | 6SL3710-1GE33-8 . A3 | 3NA3260 | 400 | 3 | 3NE1334-2 | 500 | 2 |
| 250 | 400 | 6SL3710-1GE35-0 . A3 | 3NA3372 | 630 | 3 | 3NE1436-2 | 630 | 3 |
| 315 | 500 | 6SL3710-1GE36-1 . A3 | 3NA3475 | 800 | 4 | 3NE1438-2 | 800 | 3 |
| 400 | 600 | 6SL3710-1GE37-5 . A3 | 3NA3475 | 800 | 4 | 3NE1448-2 | 850 | 3 |
| 450 | 600 | 6SL3710-1GE38-4 . A3 | 3NA3365 | 2 x 500 | 3 | 3NE1436-2 | 2 x 630 | 3 |
| 560 | 800 | 6SL3710-1GE41-0 . A3 | 3NA3472 | 2 x 630 | 3 | 3NE1437-2 | 2 x 710 | 3 |
| 500 ... 600 V 3 AC | | | | | | | | |
| 110 | 150 | 6SL3710-1GF31-8 . A3 | 3NA3244-6 | 250 | 2 | 3NE1227-2 | 250 | 1 |
| 132 | 200 | 6SL3710-1GF32-2 . A3 | 3NA3252-6 | 315 | 2 | 3NE1230-2 | 315 | 1 |
| 160 | 250 | 6SL3710-1GF32-6 . A3 | 3NA3354-6 | 355 | 3 | 3NE1331-2 | 350 | 2 |
| 200 | 300 | 6SL3710-1GF33-3 . A3 | 3NA3365-6 | 500 | 3 | 3NE1334-2 | 500 | 2 |
| 250 | 400 | 6SL3710-1GF34-1 . A3 | 3NA3365-6 | 500 | 3 | 3NE1334-2 | 500 | 2 |
| 315 | 450 | 6SL3710-1GF34-7 . A3 | 3NA3352-6 | 2 x 315 | 3 | 3NE1435-2 | 560 | 3 |
| 400 | 500 | 6SL3710-1GF35-8 . A3 | 3NA3354-6 | 2 x 355 | 3 | 3NE1447-2 | 670 | 3 |
| 500 | 700 | 6SL3710-1GF37-4 . A3 | 3NA3365-6 | 2 x 500 | 3 | 3NE1448-2 | 850 | 3 |
| 560 | 800 | 6SL3710-1GF38-1 . A3 | 3NA3365-6 | 2 x 500 | 3 | 3NE1334-2 | 2 x 500 | 2 |
| 660 ... 690 V 3 AC | | | | | | | | |
| 75 | | 6SL3710-1GH28-5 . A3 | 3NA3132-6 | 125 | 1 | 3NE1022-2 | 125 | 00 |
| 90 | | 6SL3710-1GH31-0 . A3 | 3NA3132-6 | 125 | 1 | 3NE1022-2 | 125 | 00 |
| 110 | | 6SL3710-1GH31-2 . A3 | 3NA3136-6 | 160 | 1 | 3NE1224-2 | 160 | 1 |
| 132 | | 6SL3710-1GH31-5 . A3 | 3NA3240-6 | 200 | 2 | 3NE1225-2 | 200 | 1 |
| 160 | | 6SL3710-1GH31-8 . A3 | 3NA3244-6 | 250 | 2 | 3NE1227-2 | 250 | 1 |
| 200 | | 6SL3710-1GH32-2 . A3 | 3NA3252-6 | 315 | 2 | 3NE1230-2 | 315 | 1 |
| 250 | | 6SL3710-1GH32-6 . A3 | 3NA3354-6 | 355 | 3 | 3NE1331-2 | 350 | 2 |
| 315 | | 6SL3710-1GH33-3 . A3 | 3NA3365-6 | 500 | 3 | 3NE1334-2 | 500 | 2 |
| 400 | | 6SL3710-1GH34-1 . A3 | 3NA3365-6 | 500 | 3 | 3NE1334-2 | 500 | 2 |
| 450 | | 6SL3710-1GH34-7 . A3 | 3NA3352-6 | 2 x 315 | 3 | 3NE1435-2 | 560 | 3 |
| 560 | | 6SL3710-1GH35-8 . A3 | 3NA3354-6 | 2 x 355 | 3 | 3NE1447-2 | 670 | 3 |
| 710 | | 6SL3710-1GH37-4 . A3 | 3NA3365-6 | 2 x 500 | 3 | 3NE1448-2 | 850 | 3 |
| 800 | | 6SL3710-1GH38-1 . A3 | 3NA3365-6 | 2 x 500 | 3 | 3NE1334-2 | 2 x 500 | 2 |

Note: The power data in hp units are based on the NEC/CEC standards for the North American market.

¹⁾ The combined fuses (3NE1.), gS operating class for cable and semiconductor protection are recommended to protect the converter. These fuses are specially adapted to the requirements of the semiconductors in the input rectifier.

- Superfast
- Adapted to the limit current integral of the semiconductor
- Low arc voltage
- improved current limiting.

SINAMICS G150

Drive converter cabinet units

Line-side power components Recommended fuses

Overview (continued)

Parallel circuit (data per converter subsystem)

| Type rating | | SINAMICS G150 converter | Fuse when fuse switch disconnecter (option L26) is installed | Rated current | Frame size acc. to IEC 60269-2 | Fuse (incl. semiconductor protection) without fuse switch disconnecter | Rated current | Frame size acc. to IEC 60269-2 |
|----------------------------|----------------------------|-------------------------|--|---------------|--------------------------------|--|---------------|--------------------------------|
| (at 400 V, 500 V or 690 V) | (at 60 Hz, 460 V or 575 V) | | Type | A | | Type | A | |
| kW | hp | | | | | | | |
| 380 ... 480 V 3 AC | | | | | | | | |
| 630 | 900 | 6SL3710-2GE41-1AA3 | 3NA3475 | 800 | 4 | 3NE1438-2 | 800 | 3 |
| 710 | 1200 | 6SL3710-2GE41-4AA3 | 3NA3475 | 800 | 4 | 3NE1448-2 | 850 | 3 |
| 900 | 1200 | 6SL3710-2GE41-6AA3 | 3NA3365 | 2 x 500 | 3 | 3NE1436-2 | 2 x 630 | 3 |
| 500 ... 600 V 3 AC | | | | | | | | |
| 630 | 900 | 6SL3710-2GF38-6AA3 | 3NA3352-6 | 2 x 315 | 3 | 3NE1435-2 | 560 | 3 |
| 710 | 1000 | 6SL3710-2GF41-1AA3 | 3NA3365-6 | 2 x 500 | 3 | 3NE1447-2 | 670 | 3 |
| 1000 | 1600 | 6SL3710-2GF41-4AA3 | 3NA3365-6 | 2 x 500 | 3 | 3NE1448-2 | 850 | 3 |
| 660 ... 690 V 3 AC | | | | | | | | |
| 1000 | | 6SL3710-2GH41-1AA3 | 3NA3354-6 | 2 x 355 | 3 | 3NE1447-2 | 670 | 3 |
| 1350 | | 6SL3710-2GH41-4AA3 | 3NA3365-6 | 2 x 500 | 3 | 3NE1448-2 | 850 | 3 |
| 1500 | | 6SL3710-2GH41-5AA3 | 3NA3365-6 | 2 x 500 | 3 | 3NE1334-2 | 2 x 500 | 2 |
| 1750 | | 6SL3710-2GH41-8EA3 | 3NA3365-6 | 2 x 500 | 3 | 3NE1435-2 | 2 x 560 | 3 |
| 1950 | | 6SL3710-2GH42-0EA3 | 3NA3362-6 | 3 x 425 | 3 | 3NE1436-3 | 2 x 630 | 3 |
| 2150 | | 6SL3710-2GH42-2EA3 | 3NA3365-6 | 3 x 500 | 3 | 3NE1334-2 | 3 x 500 | 2 |
| 2400 | | 6SL3710-2GH42-4EA3 | 3NA3365-6 | 3 x 500 | 3 | 3NE1334-2 | 3 x 500 | 2 |
| 2700 | | 6SL3710-2GH42-7EA3 | 3NA3372 | 3 x 630 | 3 | 3NE1436-3 | 3 x 630 | 3 |

Note: The power data in hp units are based on the NEC/CEC standards for the North American market.

Overview

The following tables list the recommended and maximum possible cable connections at the line and motor ends for a single circuit connection (versions A and C) and a parallel circuit (version A).

The recommended cross-sections are based on the specified fuses. They are applicable for 3-wire cables manufactured out of copper with PVC insulation, routed horizontally in air and a permissible wire temperature of 70 °C (e.g. Protodur NYY or

NYCWY) for an ambient temperature of 40 °C and individual routing.

When the conditions differ from those specified above (cable routing, cable grouping, ambient temperature), the appropriate correction factors according to IEC 60364-5-52 must be taken into account.

The SINAMICS Low Voltage Engineering Manual contains additional information and is available as a PDF file on the CD-ROM included with Catalog D 11.

Single circuit

| Type rating | Converter SINAMICS G150 Version A | Line connection | | | Motor connection | | | Cabinet grounding | |
|---------------------------|---|---|---|------------------------|---|---|------------------------|------------------------|-----------|
| | | Recom- mended cross- section ¹⁾ | Maximum conductor cross- section | M12 fixing screw | Recom- mended cross- section ¹⁾ | Maximum conductor cross- section | M12 fixing screw | M12 fixing screw | Comment |
| kW | | IEC mm ² | IEC mm ² | (Number of holes) | IEC mm ² | IEC mm ² | (Number of holes) | (Number of holes) | |
| 380 ... 480 V 3 AC | | | | | | | | | |
| 110 | 6SL3710-1GE32-1AA3 | 2 x 70 | 4 x 240 | (2) | 2 x 50 | 2 x 150 | (2) | (2) | |
| 132 | 6SL3710-1GE32-6AA3 | 2 x 95 | 4 x 240 | (2) | 2 x 70 | 2 x 150 | (2) | (2) | |
| 160 | 6SL3710-1GE33-1AA3 | 2 x 120 | 4 x 240 | (2) | 2 x 95 | 2 x 150 | (2) | (2) | |
| 200 | 6SL3710-1GE33-8AA3 | 2 x 120 | 4 x 240 | (2) | 2 x 95 | 2 x 150 | (2) | (2) | |
| 250 | 6SL3710-1GE35-0AA3 | 2 x 185 | 4 x 240 | (2) | 2 x 150 | 2 x 240 | (2) | (2) | |
| 315 | 6SL3710-1GE36-1AA3 | 2 x 240 | 4 x 240 | (2) | 2 x 185 | 4 x 240 | (2) | (2) | |
| 400 | 6SL3710-1GE37-5AA3 | 3 x 185 | 4 x 240 | (2) | 2 x 240 | 4 x 240 | (2) | (10) | Cu busbar |
| 450 | 6SL3710-1GE38-4AA3 | 4 x 150 | 8 x 240 | (4) | 3 x 185 | 4 x 240 | (2) | (16) | Cu busbar |
| 560 | 6SL3710-1GE41-0AA3 | 4 x 185 | 8 x 240 | (4) | 4 x 185 | 6 x 240 | (3) | (18) | Cu busbar |
| 500 ... 600 V 3 AC | | | | | | | | | |
| 110 | 6SL3710-1GF31-8AA3 | 120 | 4 x 240 | (2) | 95 | 2 x 150 | (2) | (2) | |
| 132 | 6SL3710-1GF32-2AA3 | 2 x 70 | 4 x 240 | (2) | 120 | 2 x 150 | (2) | (2) | |
| 160 | 6SL3710-1GF32-6AA3 | 2 x 95 | 4 x 240 | (2) | 2 x 70 | 2 x 185 | (2) | (2) | |
| 200 | 6SL3710-1GF33-3AA3 | 2 x 120 | 4 x 240 | (2) | 2 x 95 | 2 x 240 | (2) | (2) | |
| 250 | 6SL3710-1GF34-1AA3 | 2 x 185 | 4 x 240 | (2) | 2 x 120 | 4 x 240 | (2) | (2) | |
| 315 | 6SL3710-1GF34-7AA3 | 2 x 185 | 4 x 240 | (2) | 2 x 150 | 4 x 240 | (2) | (2) | |
| 400 | 6SL3710-1GF35-8AA3 | 2 x 240 | 4 x 240 | (2) | 2 x 185 | 4 x 240 | (2) | (2) | |
| 500 | 6SL3710-1GF37-4AA3 | 3 x 185 | 8 x 240 | (4) | 2 x 240 | 6 x 240 | (3) | (18) | Cu busbar |
| 560 | 6SL3710-1GF38-1AA3 | 4 x 150 | 8 x 240 | (4) | 3 x 185 | 6 x 240 | (3) | (18) | Cu busbar |
| 660 ... 690 V 3 AC | | | | | | | | | |
| 75 | 6SL3710-1GH28-5AA3 | 50 | 4 x 240 | (2) | 35 | 2 x 70 | (2) | (2) | |
| 90 | 6SL3710-1GH31-0AA3 | 50 | 4 x 240 | (2) | 50 | 2 x 150 | (2) | (2) | |
| 110 | 6SL3710-1GH31-2AA3 | 70 | 4 x 240 | (2) | 70 | 2 x 150 | (2) | (2) | |
| 132 | 6SL3710-1GH31-5AA3 | 95 | 4 x 240 | (2) | 70 | 2 x 150 | (2) | (2) | |
| 160 | 6SL3710-1GH31-8AA3 | 120 | 4 x 240 | (2) | 95 | 2 x 150 | (2) | (2) | |
| 200 | 6SL3710-1GH32-2AA3 | 2 x 70 | 4 x 240 | (2) | 120 | 2 x 150 | (2) | (2) | |
| 250 | 6SL3710-1GH32-6AA3 | 2 x 95 | 4 x 240 | (2) | 2 x 70 | 2 x 185 | (2) | (2) | |
| 315 | 6SL3710-1GH33-3AA3 | 2 x 120 | 4 x 240 | (2) | 2 x 95 | 2 x 240 | (2) | (2) | |
| 400 | 6SL3710-1GH34-1AA3 | 2 x 185 | 4 x 240 | (2) | 2 x 120 | 4 x 240 | (2) | (2) | |
| 450 | 6SL3710-1GH34-7AA3 | 2 x 185 | 4 x 240 | (2) | 2 x 150 | 4 x 240 | (2) | (2) | |
| 560 | 6SL3710-1GH35-8AA3 | 2 x 240 | 4 x 240 | (2) | 2 x 185 | 4 x 240 | (2) | (2) | |
| 710 | 6SL3710-1GH37-4AA3 | 3 x 185 | 8 x 240 | (4) | 3 x 150 | 6 x 240 | (3) | (18) | Cu busbar |
| 800 | 6SL3710-1GH38-1AA3 | 4 x 150 | 8 x 240 | (4) | 3 x 185 | 6 x 240 | (3) | (18) | Cu busbar |

¹⁾ The recommendations for the North American market in AWG or MCM must be taken from the appropriate NEC (National Electrical Code) and/or CEC (Canadian Electrical Code) standards.

SINAMICS G150

Drive converter cabinet units

Conductor cross-sections and terminals

Overview (continued)

Single circuit

| Type rating | Converter SINAMICS G150 Version C | Line connection | | | Motor connection | | | Cabinet grounding | |
|---------------------------|---|---|---|------------------------|---|---|------------------------|------------------------|-----------|
| | | Recom- mended cross- section ¹⁾ | Maximum conductor cross- section | M12 fixing screw | Recom- mended cross- section ¹⁾ | Maximum conductor cross- section | M12 fixing screw | M12 fixing screw | Comment |
| kW | | IEC mm ² | IEC mm ² | (Number of holes) | IEC mm ² | IEC mm ² | (Number of holes) | (Number of holes) | |
| 380 ... 480 V 3 AC | | | | | | | | | |
| 110 | 6SL3710-1GE32-1CA3 | 2 x 70 | 2 x 240 | (1) | 2 x 50 | 2 x 150 | (1) | (2) | |
| 132 | 6SL3710-1GE32-6CA3 | 2 x 95 | 2 x 240 | (1) | 2 x 70 | 2 x 150 | (1) | (2) | |
| 160 | 6SL3710-1GE33-1CA3 | 2 x 120 | 2 x 240 | (1) | 2 x 95 | 2 x 150 | (1) | (2) | |
| 200 | 6SL3710-1GE33-8CA3 | 2 x 120 | 2 x 240 | (1) | 2 x 95 | 2 x 150 | (1) | (2) | |
| 250 | 6SL3710-1GE35-0CA3 | 2 x 185 | 2 x 240 | (1) | 2 x 150 | 2 x 240 | (1) | (2) | |
| 315 | 6SL3710-1GE36-1CA3 | 2 x 240 | 4 x 240 | (2) | 2 x 185 | 4 x 240 | (2) | (2) | |
| 400 | 6SL3710-1GE37-5CA3 | 3 x 185 | 4 x 240 | (2) | 2 x 240 | 4 x 240 | (2) | (8) | Cu busbar |
| 450 | 6SL3710-1GE38-4CA3 | 4 x 150 | 8 x 240 | (4) | 3 x 185 | 4 x 240 | (2) | (8) | Cu busbar |
| 560 | 6SL3710-1GE41-0CA3 | 4 x 185 | 8 x 240 | (4) | 4 x 185 | 6 x 240 | (3) | (10) | Cu busbar |
| 500 ... 600 V 3 AC | | | | | | | | | |
| 110 | 6SL3710-1GF31-8CA3 | 120 | 2 x 240 | (1) | 95 | 2 x 150 | (1) | (2) | |
| 132 | 6SL3710-1GF32-2CA3 | 2 x 70 | 2 x 240 | (1) | 120 | 2 x 150 | (1) | (2) | |
| 160 | 6SL3710-1GF32-6CA3 | 2 x 95 | 2 x 240 | (1) | 2 x 70 | 2 x 185 | (1) | (2) | |
| 200 | 6SL3710-1GF33-3CA3 | 2 x 120 | 2 x 240 | (1) | 2 x 95 | 2 x 240 | (1) | (2) | |
| 250 | 6SL3710-1GF34-1CA3 | 2 x 185 | 4 x 240 | (2) | 2 x 120 | 4 x 240 | (2) | (2) | |
| 315 | 6SL3710-1GF34-7CA3 | 2 x 185 | 4 x 240 | (2) | 2 x 150 | 4 x 240 | (2) | (2) | |
| 400 | 6SL3710-1GF35-8CA3 | 2 x 240 | 4 x 240 | (2) | 2 x 185 | 4 x 240 | (2) | (2) | |
| 500 | 6SL3710-1GF37-4CA3 | 3 x 185 | 8 x 240 | (4) | 2 x 240 | 6 x 240 | (3) | (18) | Cu busbar |
| 560 | 6SL3710-1GF38-1CA3 | 4 x 150 | 8 x 240 | (4) | 3 x 185 | 6 x 240 | (3) | (18) | Cu busbar |
| 660 ... 690 V 3 AC | | | | | | | | | |
| 75 | 6SL3710-1GH28-5CA3 | 50 | 2 x 240 | (1) | 35 | 2 x 70 | (1) | (2) | |
| 90 | 6SL3710-1GH31-0CA3 | 50 | 2 x 240 | (1) | 50 | 2 x 150 | (1) | (2) | |
| 110 | 6SL3710-1GH31-2CA3 | 70 | 2 x 240 | (1) | 70 | 2 x 150 | (1) | (2) | |
| 132 | 6SL3710-1GH31-5CA3 | 95 | 2 x 240 | (1) | 70 | 2 x 150 | (1) | (2) | |
| 160 | 6SL3710-1GH31-8CA3 | 120 | 2 x 240 | (1) | 95 | 2 x 150 | (1) | (2) | |
| 200 | 6SL3710-1GH32-2CA3 | 2 x 70 | 2 x 240 | (1) | 120 | 2 x 150 | (1) | (2) | |
| 250 | 6SL3710-1GH32-6CA3 | 2 x 95 | 2 x 240 | (1) | 2 x 70 | 2 x 185 | (1) | (2) | |
| 315 | 6SL3710-1GH33-3CA3 | 2 x 120 | 2 x 240 | (1) | 2 x 95 | 2 x 240 | (1) | (2) | |
| 400 | 6SL3710-1GH34-1CA3 | 2 x 185 | 4 x 240 | (2) | 2 x 120 | 4 x 240 | (2) | (2) | |
| 450 | 6SL3710-1GH34-7CA3 | 2 x 185 | 4 x 240 | (2) | 2 x 150 | 4 x 240 | (2) | (2) | |
| 560 | 6SL3710-1GH35-8CA3 | 2 x 240 | 4 x 240 | (2) | 2 x 185 | 4 x 240 | (2) | (2) | |
| 710 | 6SL3710-1GH37-4CA3 | 3 x 185 | 8 x 240 | (4) | 3 x 150 | 6 x 240 | (3) | (18) | Cu busbar |
| 800 | 6SL3710-1GH38-1CA3 | 4 x 150 | 8 x 240 | (4) | 3 x 185 | 6 x 240 | (3) | (18) | Cu busbar |

¹⁾ The recommendations for the North American market in AWG or MCM must be taken from the appropriate NEC (National Electrical Code) and/or CEC (Canadian Electrical Code) standards.

Overview (continued)

Parallel circuit

| Type rating | Converter SINAMICS G150 Version A | Line connection | | | Motor connection | | | Cabinet grounding | |
|---------------------------|---|---|---|------------------------|---|---|------------------------|------------------------|-----------|
| | | Recom- mended cross- section ¹⁾ | Maximum conductor cross- section | M12 fixing screw | Recom- mended cross- section ¹⁾ | Maximum conductor cross- section | M12 fixing screw | M12 fixing screw | Comment |
| kW | | IEC mm ² | IEC mm ² | (Number of holes) | IEC mm ² | IEC mm ² | (Number of holes) | (Number of holes) | |
| 380 ... 480 V 3 AC | | | | | | | | | |
| 630 | 6SL3710-2GE41-1AA3 | 2 x 240 | 4 x 240 | (2) | 2 x 185 | 4 x 240 | (2) | (2) | |
| 710 | 6SL3710-2GE41-4AA3 | 3 x 185 | 4 x 240 | (2) | 2 x 240 | 4 x 240 | (2) | (10) | Cu busbar |
| 900 | 6SL3710-2GE41-6AA3 | 4 x 150 | 8 x 240 | (4) | 2 x 240 | 4 x 240 | (2) | (16) | Cu busbar |
| 500 ... 600 V 3 AC | | | | | | | | | |
| 630 | 6SL3710-2GF38-6AA3 | 2 x 185 | 4 x 240 | (2) | 2 x 150 | 4 x 240 | (2) | (2) | |
| 710 | 6SL3710-2GF41-1AA3 | 2 x 240 | 4 x 240 | (2) | 2 x 185 | 4 x 240 | (2) | (2) | |
| 1000 | 6SL3710-2GF41-4AA3 | 3 x 185 | 8 x 240 | (4) | 2 x 240 | 6 x 240 | (3) | (18) | Cu busbar |
| 660 ... 690 V 3 AC | | | | | | | | | |
| 1000 | 6SL3710-2GH41-1AA3 | 2 x 240 | 4 x 240 | (2) | 2 x 185 | 4 x 240 | (2) | (2) | |
| 1350 | 6SL3710-2GH41-4AA3 | 3 x 185 | 8 x 240 | (4) | 3 x 150 | 6 x 240 | (3) | (18) | Cu busbar |
| 1500 | 6SL3710-2GH41-5AA3 | 4 x 150 | 8 x 240 | (4) | 3 x 185 | 6 x 240 | (3) | (18) | Cu busbar |
| 1750 | 6SL3710-2GH41-8EA3 | 2 x 4 x 150 | 2 x 8 x 240 | (4) | 2 x 3 x 185 | 2 x 6 x 240 | (3) | (18) | Cu busbar |
| 1950 | 6SL3710-2GH42-0EA3 | 2 x 4 x 150 | 2 x 8 x 240 | (4) | 2 x 3 x 185 | 2 x 6 x 240 | (3) | (18) | Cu busbar |
| 2150 | 6SL3710-2GH42-2EA3 | 2 x 4 x 150 | 2 x 8 x 240 | (4) | 2 x 3 x 185 | 2 x 6 x 240 | (3) | (18) | Cu busbar |
| 2400 | 6SL3710-2GH42-4EA3 | 2 x 4 x 150 | 2 x 8 x 240 | (4) | 2 x 3 x 185 | 2 x 6 x 240 | (3) | (18) | Cu busbar |
| 2700 ²⁾ | 6SL3710-2GH42-7EA3 | 2 x 4 x 150 | 2 x 8 x 240 | (4) | 3 x 3 x 185 | 3 x 6 x 240 | (3) | (18) | Cu busbar |

Note: The recommended and maximum conductor cross-sections refer to one of the two partial converters in the parallel circuit.

Minimum motor cable lengths for operation with power units connected in parallel

When using power units connected in parallel, the following motor cable lengths must be observed if a motor is connected with only one winding system and no motor-side reactors or filters are used:

| Type rating | SINAMICS G150 drive converter cabinet unit, version A | Minimum cable length |
|---------------------------|--|-------------------------|
| kW | | m |
| 380 ... 480 V 3 AC | | |
| 630 | 6SL3710-2GE41 1AA3 | 13 |
| 710 | 6SL3710-2GE41 4AA3 | 10 |
| 900 | 6SL3710-2GE41 6AA3 | 9 |
| 500 ... 600 V 3 AC | | |
| 630 | 6SL3710-2GF38 6AA3 | 18 |
| 710 | 6SL3710-2GF41 1AA3 | 15 |
| 1000 | 6SL3710-2GF41 4AA3 | 13 |
| 660 ... 690 V 3 AC | | |
| 1000 | 6SL3710-2GH41 1AA3 | 20 |
| 1350 | 6SL3710-2GH41 4AA3 | 18 |
| 1500 | 6SL3710-2GH41 5AA3 | 15 |
| 1750 | 6SL3710-2GH41-8EA3 | 12 |
| 1950 | 6SL3710-2GH42-0EA3 | 10 |
| 2150 | 6SL3710-2GH42-2EA3 | 8 |
| 2400 | 6SL3710-2GH42-4EA3 | 8 |
| 2700 | 6SL3710-2GH42-7EA3 | 8 |

¹⁾ The recommendations for the North American market in AWG or MCM must be taken from the appropriate NEC (National Electrical Code) and/or CEC (Canadian Electrical Code) standards.

²⁾ The motor-side inverter comprises three Motor Modules connected in parallel.

Overview (continued)

Required cable cross-sections for line and motor connections

It is always advisable to use shielded cables between the converter and motor and, in the case of drives in the higher output power range, symmetrical 3-wire, three-phase cables, and to connect several cables of this type in parallel where necessary. There are basically two reasons for this recommendation:

This is the only way in which the high IP55 degree of protection can be achieved for the motor terminal box without problems because the cables enter the terminal box via glands and the number of possible glands is limited by the geometry of the terminal box. Therefore single cables are less suitable.

With symmetrical, 3-wire, three-phase cables, the summed ampere-turns over the cable outer diameter are equal to zero and they can be routed in conductive, metal cable ducts or racks without any significant currents (ground current or leakage current) being induced in these conductive, metal connections. The danger of induced leakage currents and thus of increased cable-shield losses increases with single-wire cables.

The required cable cross-section depends on the amperage which flows through the cable. The permissible current loading of cables is defined, for example, in IEC 60364-5-52. It depends on ambient conditions such as the temperature, but also on the routing method. An important factor to consider is whether cables are routed singly and are therefore relatively well ventilated, or whether groups of cables are routed together. In the latter instance, the cables are much less well ventilated and might therefore heat one another to a greater degree. For the relevant correction factors applicable to these boundary conditions, please refer to IEC 60364-5-52.

The table below provides a guide to the recommended cross-sections (based on IEC 60364-5-52) for PVC-insulated, 3-wire copper and aluminum cables, a permissible conductor temperature of 70°C (e.g. Protodur NYY or NYCWY) and an ambient temperature of 40°C.

Current carrying capacity according to IEC 60364-5-52 at 40 °C

| Cross-section 3-wire cable mm ² | Copper cable | | Aluminum cable | |
|---|----------------|---|----------------|---|
| | Single routing | Groups of cables routed in parallel ¹⁾ | Single routing | Groups of cables routed in parallel ¹⁾ |
| 3 x 2.5 | 22 | 17 | 17 | 13 |
| 3 x 4.0 | 30 | 23 | 23 | 18 |
| 3 x 6.0 | 37 | 29 | 29 | 22 |
| 3 x 10 | 52 | 41 | 40 | 31 |
| 3 x 16 | 70 | 54 | 53 | 41 |
| 3 x 25 | 88 | 69 | 68 | 53 |
| 3 x 35 | 110 | 86 | 84 | 65 |
| 3 x 50 | 133 | 104 | 102 | 79 |
| 3 x 70 | 171 | 133 | 131 | 102 |
| 3 x 95 | 207 | 162 | 159 | 124 |
| 3 x 120 | 240 | 187 | 184 | 144 |
| 3 x 150 | 278 | 216 | 213 | 166 |
| 3 x 185 | 317 | 247 | 244 | 190 |
| 3 x 240 | 374 | 292 | 287 | 224 |

¹⁾ Maximum 9 cables routed horizontally in direct contact with one another on a cable rack

With higher amperages, cables must be connected in parallel.

Note:

The recommendations for the North American market in AWG or MCM must be taken from the appropriate NEC (National Electrical Code)/CEC (Canadian Electrical Code) standards.

Grounding and PE conductor cross-section

The PE conductor must be dimensioned to meet the following requirements:

- In the case of a ground fault, no impermissibly high contact voltages resulting from voltage drops on the PE conductor caused by the ground fault current may occur (< 50 V AC or < 120 V DC, IEC 61800-5-1, IEC 60 364, IEC 60 543).
- The PE conductor should not be excessively loaded by any ground fault current it carries.
- If it is possible for continuous currents to flow through the PE conductor when a fault occurs, the PE conductor cross-section must be dimensioned for this continuous current.
- The PE conductor cross-section should be selected according to EN 60 204-1, EN 60 439-1, IEC 60 364.

| Cross-section of the phase conductor mm ² | Minimum cross-section of external PE conductor mm ² |
|---|---|
| Up to 16 | Minimum phase conductor cross-section |
| 16 ... 35 | 16 |
| 35 and above | Minimum half the phase conductor cross-section |

Note:

The recommendations for the North American market in AWG or MCM must be taken from the appropriate NEC (National Electrical Code)/CEC (Canadian Electrical Code) standards.

- Switchgear and motors are usually grounded via separate local ground connections. When this grounding arrangement is used, the current caused by a ground fault flows through the parallel ground connections and is divided. Despite the use of the relatively small PE conductor cross-sections specified in the table above, no impermissible contact voltages can develop with this grounding system.

Based on experience with different grounding configurations, however, we recommend that the ground wire from the motor should be routed directly back to the converter. For EMC reasons and to prevent bearing currents, symmetrical 3-wire three-phase cables should be used where possible instead of 4-wire cables, especially on drives in the higher power range. The protective or PE conductor must be routed separately when 3-wire cables are used or must be arranged symmetrically in the motor cable. The symmetry of the PE conductor is achieved using a conductor surrounding all phase conductors or using a cable with a symmetrical arrangement of the three phase conductors and three ground conductors. The SINAMICS Low Voltage Engineering Manual contains more detailed information on this topic and is available as a PDF file on the CD-ROM included with Catalog D 11.

- Through their controllers, the converters limit the load current (motor and ground fault currents) to an rms value corresponding to the rated current. We therefore recommend the use of a PE conductor cross-section analogous to the phase conductor cross-section for grounding the converter cabinet.

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