Single Drive Converter Cabinet Units

55KW~500KW

Catalog D11.5 · 2008

sinamics v50

www.ad.siemens.com.cn

SIEMENS

SINAMICS V50

Single Drive Converter Cabinet Units

Catalog

D11.5 · 2008

V1.0

The products and system described in this catalog are produced / distributed in accordance with the requirements of a quality management system which has been certified to DIN EN ISO 9001.

The certificate is recognized in all EQ Net countries.

Overview 1
Application
Benefits
Design
Functions
Options overview
Technical data

Selection and ordering data 2
Cabinet units
Options

Dimension drawings 3
55KW~90KW
110KW~250KW
315KW~500KW

Engineering information 4
Customer terminal block
Technical data
Line-side components
Load-side components
Max. connectable cable length
Conductor cross-section and connection
Grounding
Motors

Appendix 5
Environment, resources and recycling
ISO 9001, ISO 14001

SINAMICS V50

Overview

1/2 Application

Benefits

Design

1/5 Functions

1/8 Options overview

1/9 Technical data

1

Overview

Application

SINAMICS V50 are suitable for single drive application with quadratic load, ($M \sim n^2$) , Linear torgue and constant power. Typical applications:

• Fan

• Pump

SINAMICS V50 have been optimized to the requirements of various application, such as power, water, wasted water, oil, gas, chemical, cement, mining, metallurgy and shipping.

SINAMICS V50 single drive converter cabinet units offer an economical drive solution that can be matched to customer's specific requirements by adding from the wide range of available components and options.

SINAMICS V50 single drive converter cabinet units are available for the following voltages and power ranges.

Input voltage 3AC	Output power
380V~415V	55KW~500KW

SINAMICS V50 converter drive cabinet

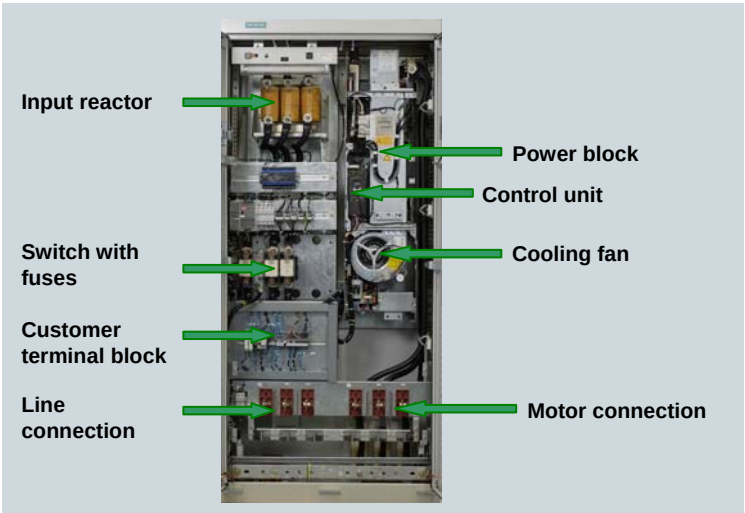
Benefits

- Particularly quiet and compact converters due to the use of state-of-the-art IGBT power semiconductors and an innovative cooling concept.
- All unit modules are easily accessible, making them extremely service-friendly.
- Can be easily integrated into automation solutions due to PROFIBUS interface supplied as standard and various analog and digital interfaces.
- Increase in plant availability since individual modules and power components can be replaced quickly and easily.

Design

SINAMICS V50 single drive converter cabinet units are characterized by their compact, modular and service-friendly design.
A wide range of options is available which permit optimum adaptation of the drive system to the respective requirements.

Design

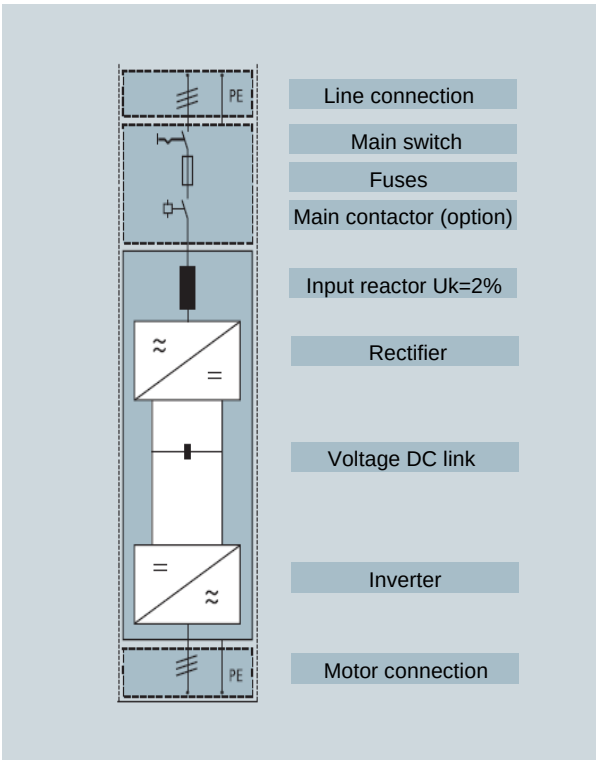


SINAMICS V50 structure

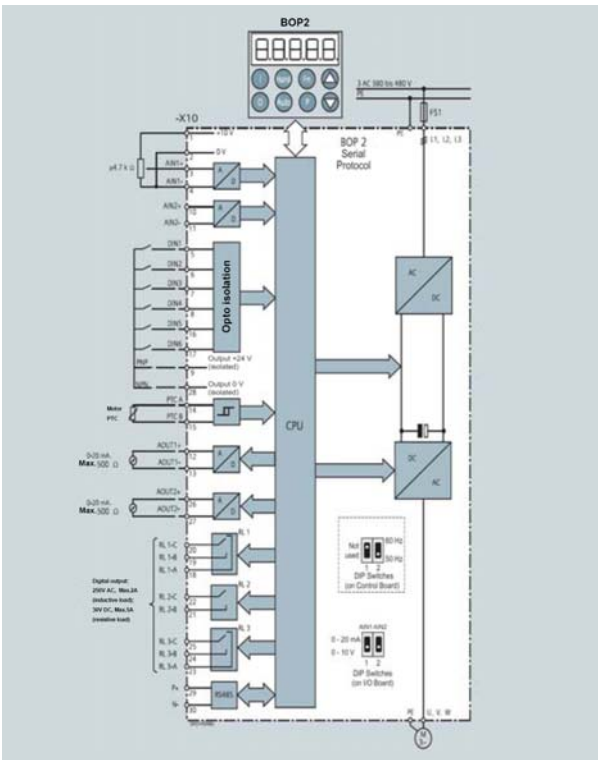
More standard configuration

- 8MF cabinet
- Degree of protection IP20 as standard
- Operation panel BOP2 as standard
- Input line connection terminal
- Output motor connection terminal
- Standard main switch with fuses
- Input reactor as standard
- EMC filter (2nd class)
- Power block
- cooling fan
- control board
- RS485 interface
- Analog/digital terminal interface block
- Protection cover

SINAMICS V50 standard configuration



SINAMICS V50 basic design



SINAMICS V50 connection diagram

Overview

Design

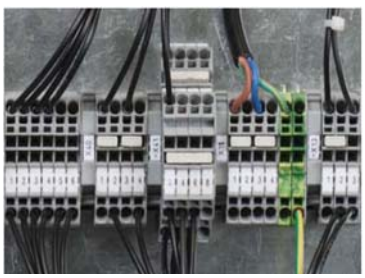
Cabinet units

Components

Switch with fuses

Main contactor

Input reactor



Terminal block

Fuses

Fuses with holders

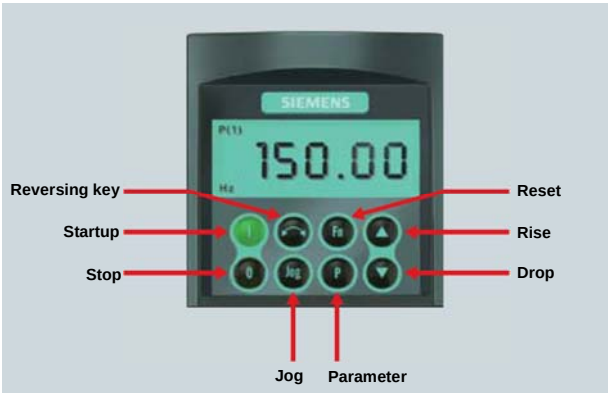
Overview

Function

BOP operator panel

A BOP operator panel is located in the front door of cabinet, For:

- Quick commissioning
- Operation
- Monitoring

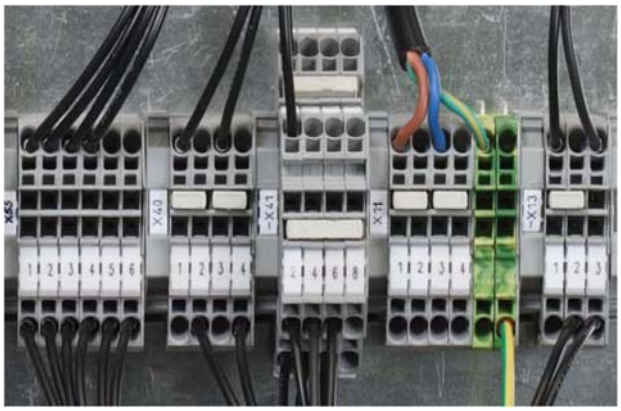


Customer terminal block

You can use this customer terminal block to connect the system to the high-level controller using analog and digital signals, or to connect additional units.

Customer terminal block includes:

- 6 digital inputs
- 2 analog inputs
- 3 digital output, relay
- 2 analog outputs
- KTY84
- RS485



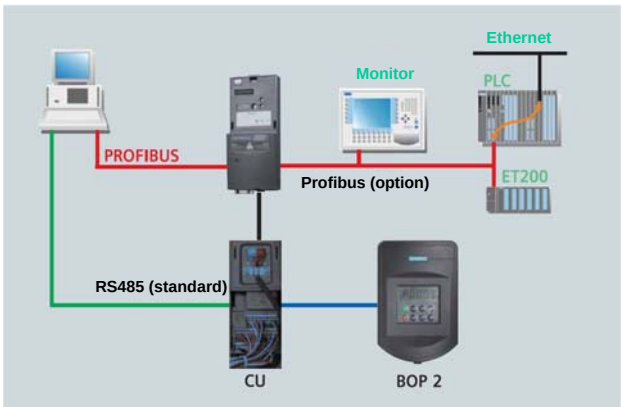
Communication

SINAMICS V50 provides several communication methods:

• Peer to peer, for the communication between control board and BOP

• RS485 interface, for the communication between SINAMICS V50 and PC

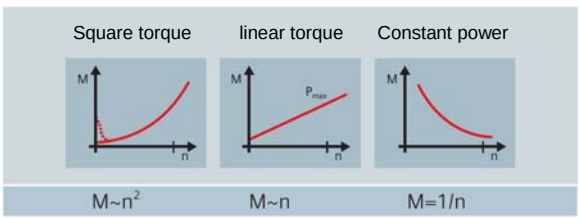
• PROFIBUS interface (option), for PROFIBUS communication to high-level controller.



Overview

Function (continued)

Control methods



Various control modes:

•V/F curved control

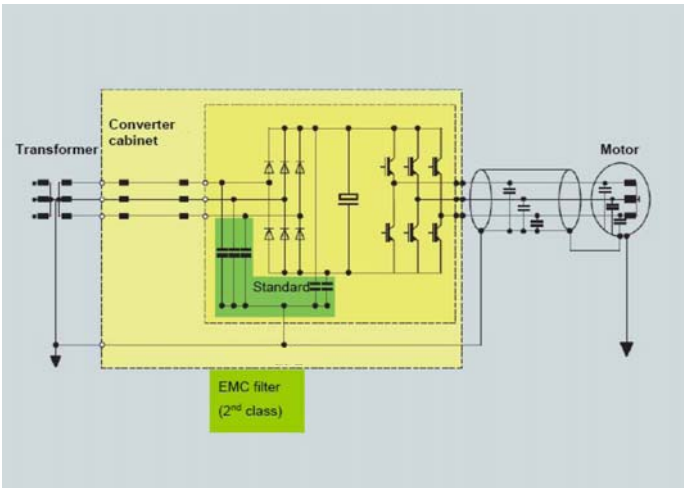
• V^2/F

• Multiple-point V/F

• FCC

EMC filter as standard

SINAMICS V50 are equipped as standard with a EMC filter in accordance with the limit values specified in category C3, and passed the tests in accordance with EN61800-3 category C3.



Function (continued)

Software and protection functions

Software functions available as standard are described below:

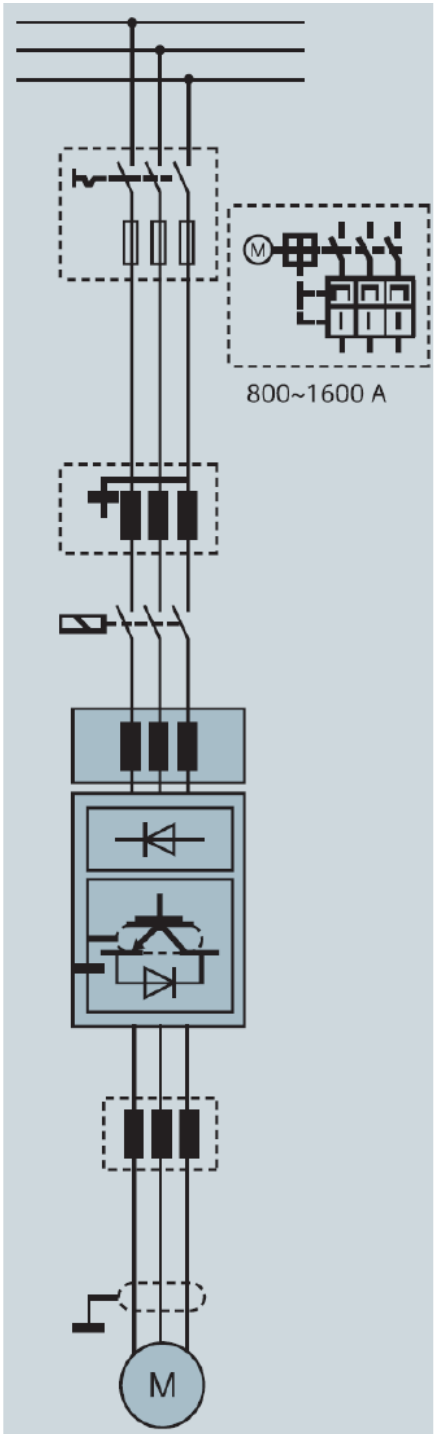
Setpoint input	The setpoint can be defined internally and externally, internally as fixed or motorized potentiometer or jog setpoints, externally via the communications interface or an analog input on the customer's terminal block. The internal fixed setpoint and the motorized potentiometer setpoint can be switched over or adjusted using control commands via all interfaces.
Motor identification	Automatic motor identification permits fast and simple commissioning and optimization of the drive control.
Ramp-function generator	A user-friendly ramp-function generator with separately adjustable ramp-up and ramp-down times, together with adjustable rounding times in the lower and upper speed ranges, improves the control response and therefore prevents mechanical overloading of the drive train. The ramp-down ramps can be parameterized separately for emergency stop.
$V_{dc\ max}$ controller	The $V_{dc\ max}$ controller automatically prevents overvoltages in the DC link if the set ramp-down ramp is too short, for example. This may also extend the set ramp-down time.
Flying restart	The flying restart permits bumpless connection of the converter to a rotating motor.
Automatic restart	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.
Technology controller	The technology controller is designed as a PID controller. The P, I, and D components can be set separately.
***I2t* detection for motor protection**	The motor temperature is calculated in a motor model stored in the converter software. The Motor protection is possible by means of connecting KTY84 or PTC sensors in the motor winding to converter.
Motor blocking prote	A blocked motor is recognized and protected against thermal overloading by shutting down.

Power unit protection

Ground fault monitoring	Power unit protection
Electronic short-circuit	Power unit protection
Thermal overload protection	Power unit protection
Over current protection	Power unit protection
Over voltage protection	Power unit protection
Low voltage protection	Power unit protection
Phase loss protection	Power unit protection

Overview

Options overview



Line-side options

Main contactor

Line-side options:

External auxiliary power supply

Cabinet illumination

Anti-condensation heating

Motor protection:

Emergency stop

Thermistor or PT100

Insulation monitor

Additional shock-hazard protection

Degree of protection:

IP21

IP23

Mechanical options:

Base

Cable plinth

Line connection from above

Motor connection from above

Load-side options

Output reactor

dv/dt filter

Technical data

Electrical data			
Line Voltage and power ranges	380V~415V 3AC，±10%（-15%<1 min）55kW~500kW		
Input frequency	47~63Hz		
Output frequency	0Hz~100Hz		
Power factor **-Fundamental mode** **-Total**	 >0.98 0.93 - 0.96		
Converter efficiency	>98%		
Control method	V/f characteristic		
Skipped speed ranges	4, parameterizable		
Setpoint resolution	0.001 rpm digital (via BOP) 12 bit analog		
Mechanical data			
Degree of protection	IP20 (higher degrees of protection up to IP23 optional)		
Cooling method	Forced air ventilation (refer to dimension diagram)		
Sound pressure level L_{pa} (1m)	≤72 dB at 50 Hz line frequency		
Shock protection	BGV A3		
Cabinet system	8MF		
Paint finish	RAL 7035 (indoor requirements)		
Compliance with standard			
Standards	GB/T 12668.2（IEC 61800-2）；GB/T 12668.3（IEC 61800-3）；GB 4208（IEC 60529）		
	IEC 61800-5-1；IEC 60721-3；IEC 60068-2-6；IEC 60664-1；BS EN 50178；DIN 0106 part 100		
CE marking	In accordance with EMC directive No. 89/336/EC and low-voltage directive No. 73/23/EC		
RI suppression	In accordance with EMC product standard for variable-speed drivesnEN61800-3		
	Operation	**Storage**	**Transport**
Ambient conditions			
Ambient temperature	0ºC~+40ºC	-25ºC~+55ºC	-25ºC~+70ºC
Relative humidity (non-condensing)	5%~95% Class 3K3 to EN 60721-3-3	5%~95% Class 1K4 to EN 60721-3-1	5%~95%，40° C Class 2K3 to EN 60721-3-2
Environmental class/harmful chemical substances	Class 3C2 to EN 60721-3-3	Class 1C2 to EN 60721-3-1	Class 2C2 to EN 60721-3-2
Biological influence	Class 3B1 to EN 60721-3-3	Class 1B1 to EN 60721-3-1	Class 2B1 to EN 60721-3-2
Installation altitude	Up to 1000 m (55KW~90KW)/2000 m (110KW~500KW) above sea level without derating		
Strain resistance			
Vibratory load **-Deflection** **-Acceleration**	0.075 mm, 10Hz~58Hz 9.8m/s², > 58Hz~200 Hz	1.5 mm, 5Hz~9Hz 5m/s², > 9Hz~200 Hz	3.1 mm, 5Hz~9Hz 10m/s², > 9Hz~200 Hz
		Class 1M2 to EN 60721-3-1	Class 2M2 to EN 60721-3-2
Shock load **-Acceleration**	100 m/s² at 11 ms Class 3M4 to EN 60721-3-3	40 m/s² at 22 ms Class 1M2 to EN 60721-3-1	100 m/s² at 11 ms Class 2M2 to EN 60721-3-2

Note: Value differences from the standard is underlined.

Overview

1

Technical data (continued)

Current derating data

Compensation of current derating as a function of installation altitude/ambient temperature.

If the converters are operated at an installation altitude>1000m or 2000m above sea level, the maximum permissible output current can be calculated using the following tables in accordance with the degree of protection selected for the cabinet unit. The specified values already include a permitted correction between installation altitude and ambient temperature(incoming air temperature at the inlet to the drive converter cabinet unit).

Table 1 for 55~90KW (IP20/IP21)

Installation altitude	Ambient temperature						
	20	25	30	35	40	45	50
0~1000	100%	100%	100%	100%	100%	85.0%	70.0%
< 2000	90.0%	90.0%	90.0%	90.0%	90.0%	76.5%	63.0%
< 3000	80.0%	80.0%	80.0%	80.0%	80.0%	68.0%	56.0%
< 4000	70.0%	70.0%	70.0%	70.0%	70.0%	59.5%	49.0%

Table 2 for 110~500KW (IP20/IP21)

Installation altitude	Ambient temperature						
	20	25	30	35	40	45	50
0~2000	100%					95.0%	87.0%
< 2500					96.3%	91.4%	83.7%
< 3000				96.2%	92.5%	87.9%	80.5%
< 3500			96.7%	92.3%	88.8%	84.3%	77.3%
< 4000		97.8%	92.7%	88.4%	85.0%	80.8%	74.0%

Voltage derating data

In addition to the current derating, the voltage derating must be considered in accordance with the following tables with installation altitude>1000m or 2000m above sea level.

Table 3 for 55~90KW (IP20/IP21)

Installation altitude	380V	400V	415V
<3000	100%	100%	100%
<3500	97%	92%	89%
<4000	84%	80%	77%

Table 2 for 110~500KW (IP20/IP21)

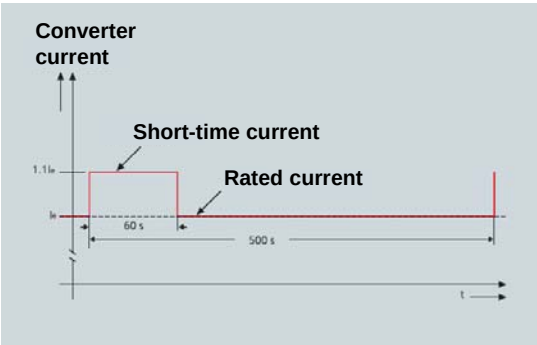
Installation altitude	380V	400V	415V
0~2000	100%		
<2250			
<2500			
<2750			
<3000			
<3250			98%
<3500		98%	94%
<3750		95%	92%
<4000	96%	92%	88%

Technical data

Overload capacity

The overload capacity of SINAMICS V50 is defined as follows:

Using 500s as duty cycle, overload can be 110% of rated current Ie for 60s.



EMC guidelines

The electromagnetic compatibility describes – in accordance with the definition of the EMC directive – “the capability of a device to work satisfactorily in the electromagnetic environment without itself causing electromagnetic interference which are unacceptable for other devices present in the environment”. To guarantee that the appropriate EMC directives are observed, the devices must demonstrate a sufficiently high noise immunity, and also the emitted interference must be limited to acceptable values.

The EMC requirements for “Variable-speed drive system” are described in the product standard EN61800-3. A variable-speed drive system (or power drive system, PDS) consists of the drive converter and the electric motor including cables. The driven machine is not part of the drive system.

EN61800-3 defines different limits depending on the location of the drive system, referred to as the first and second environment.

The first environment:
Living accommodation or locations where the drive system is directly connected to the public low-voltage network without an intermediate transformer.

The second environment:
All locations outside living area. These are basically industrial areas which are powered from the medium-voltage network via their own transformers.

Four difference categories are defined in EN61800-3 Ed.2 depending on the location and the power of the drive:

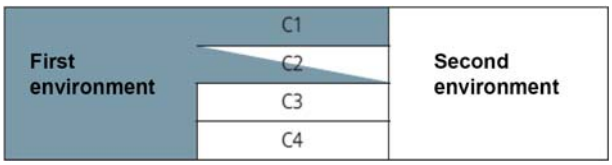
Category 1: Drive systems for rated voltages<1000V for unlimited use in the first environment.

Category 2: Stationary systems for rated voltages<1000V for use in the second environment. Use in first environment is possible if the system is installed and used by qualified personnel. The warning and installation information supplied by the manufacturer must be observed.

Category 3: Drive systems for rated voltages<1000V for exclusive use in the second environment.

Category 4: Drive systems for rated voltages≥1000V or rated current ≥400A for use in complex systems in the second environment.

The following graphic shows the assignment of the four categories to the first and second environment.



SINAMICS V50 drive converter cabinet units fulfill the requirements for noise immunity defined in EN 61800-3 for the second environment.

SINAMICS V50

Selection and ordering data

2

2/2 Cabinet units

2/5 Options

Selection and ordering data

SINAMICS V50 converter cabinet selection data

SINAMICS V50 Converter cabinet	Rated input current A	Rated output current A	Rated Power KW	Power loss KW	Cooling air Requirement m^3/s	Sound pressure level at 50/60Hz dB (A)
Line voltage 3AC 380~415V						
6SL3710-1BD31-0AA0	110	108	55	1.6	0.15	67/68
6SL3710-1BD31-5AA0	147	147	75	2.1	0.15	67/68
6SL3710-1BD31-7AA0	175	175	90	2.5	0.15	67/68
6SL3710-1BD32-1AA0	233	211	110	2.9	0.17	69/73
6SL3710-1BD32-5AA0	277	252	132	3.8	0.23	69/73
6SL3710-1BD33-0AA0	334	302	160	4.4	0.36	69/73
6SL3710-1BD33-8AA0	396	377	200	5.3	0.36	69/73
6SL3710-1BD34-5AA0	468	446	250	6.4	0.36	69/73
6SL3710-1BD35-7AA0	596	567	315	8.2	0.36	70/73
6SL3710-1BD36-4AA0	676	641	355	8.9	0.78	70/73
6SL3710-1BD37-2AA0	761	725	400	9.6	0.78	70/73
6SL3710-1BD41-0AA0	936	893	500	13.1	1.48	70/73

Technical data is applicable to standard unit without options.

SINAMICS V50 converter cabinet units selection data

SINAMICS V50 Converter cabinet	Rated power KW	Weight Kg	Dimension of cabinet W×H×D mm	Frame size
Line voltage 3AC 380V~415V				
6SL3710-1BD31-0AA0	55	240	600 x 2000 x 600	1 ~ 4
6SL3710-1BD31-5AA0	75	240	600 x 2000 x 600	1 ~ 4
6SL3710-1BD31-7AA0	90	240	600 x 2000 x 600	1 ~ 4
6SL3710-1BD32-1AA0	110	320	900 x 2000 x 600	5 ~ 8
6SL3710-1BD32-5AA0	132	320	900 x 2000 x 600	5 ~ 8
6SL3710-1BD33-0AA0	160	390	900 x 2000 x 600	5 ~ 8
6SL3710-1BD33-8AA0	200	390	900 x 2000 x 600	5 ~ 8
6SL3710-1BD34-5AA0	250	390	900 x 2000 x 600	5 ~ 8
6SL3710-1BD35-7AA0	315	860	1200 x 2000 x 600	9 ~ 12
6SL3710-1BD36-4AA0	355	860	1200 x 2000 x 600	9 ~ 12
6SL3710-1BD37-2AA0	400	860	1200 x 2000 x 600	13 ~ 16
6SL3710-1BD41-0AA0	500	1000	1600 x 2000 x 600	17 ~ 20

Technical data is applicable to standard unit without options.

SINAMICS V50 converter cabinet selection data

The table below show the recommended or maximum possible cable connection on the line and motor sides. The recommended cross-sections are based on the listed fuses and single routing of the three-wire cables at an ambition temperature of 40℃.

In the case of different conditions (cable routing, cable grouding, ambition temperature), the configuration instructions for routing the cables must be taken into account.

Power KW	Line connection			Motor connection			Cabinet grouding	
	Recommended cross-section DIN VDE	Maximum conductor cross-section DIN VDE	Mounting screw M12 (No. of holes)	Recommended cross-section DIN VDE	Maximum conductor cross-section DIN VDE	Mounting screw M12 (No. of holes)	Mounting screw M12 (No. of holes)	Comment
Line voltage 3AC 380V~415V								
55	70	4x240	(2)	70	2x150	(2)	(2)	
75	95	4x240	(2)	95	2x150	(2)	(2)	
90	120	4x240	(2)	120	2x150	(2)	(2)	
110	120	4x240	(2)	2x50	2x150	(2)	(2)	
132	2x95	4x240	(2)	2x70	2x150	(2)	(2)	
160	2x120	4x240	(2)	2x95	2x150	(2)	(2)	
200	2x120	4x240	(2)	2x95	2x150	(2)	(2)	
250	2x185	4x240	(2)	2x150	2x240	(2)	(2)	
315	2x240		(2)	2x185	4x240	(2)	(2)	
355	2x300		(2)	3x150	4x240	(2)	(2)	
400	2x300		(2)	3x150	4x240	(2)	(2)	
500	4x185		(4)	4x185	6x240	(4)	(4)	

Selection and ordering data

Options

When ordering a converter with options, add ”-Z” to the order number of the converter, followed by the order code (S) for the desired option (S).

Available options	Ordering code	Additional necessary options
Analog input 1 isolation amplifier	E88	K73 (can not combine with K26)
Analog input 2 isolation amplifier	E89	K73
Analog output 1 quantity buffer amplifier	E90	K73
Analog output 2 quantity buffer amplifier	E91	K73
PROFIBUS module	G91	
Start/ stop indicated light	K19	-
Analog display instrument (speed, current)	K23	K73
Start/ Stop button with light indication	K25	K73
Speed adjustment potentiometer	K26	Can not combine with E88
Local/ remote control switch	K35	-
DC 24V auxiliary power	K73 2)	External AC 230V or K74
AC 230V auxiliary power	K74 2)	-
motor reactor	L08	-
dv/dt filter	L10	
Main contactor	L13 1)	K73+external AC230V or K74, (55KW~90KW need G91)
EMERGENCY STOP button	L45	L13
Cabinet illumination with service socket	L50	External AC 230V
Cabinet anti-condensation heating	L55	External AC 230V+K73 (recommended)
EMERGENCY STOP category 0	L57	230V AC or 24V DC
PT100 evaluation unit	L86	K74
Base 100 mm high, RAL 7035	M06	-
Cable plinth 200 mm high, RAL7035	M07	-
Line connection from above	M13	-
IP21 degree of protection	M21	-
IP23 degree of protection	M23	-
Protection cover	M60	-
EMC shield bus	M70	-
PE busbar	M75	-
Motor connection from above (cable connection)	M78	-
Special cabinet paint coating	Y09	-
Special option package for power plant	P01	

1) For converter >700A, the main contactor is supplied with converter as standard.

2) For converter >700A, the auxiliary power supply AC230v and DC 24V are supplied with converter as standard.

Options

Option selection Matrix

	L08	L10	L13[1)]	L57[1)]	E88	E90	E91	K19	K25	K26	K35	M06	M07	M13	M21	M23	M78
L08		×	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	×
L10	×		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	×
L13[1)]	✓	✓		×	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
L57[1)]	✓	✓	×		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
E88	✓	✓	✓	✓		✓	✓	✓	✓	×	✓	✓	✓	✓	✓	✓	✓
E90	✓	✓	✓	✓	✓		✓	✓	✓	✓	×	✓	✓	✓	✓	✓	✓
E91	✓	✓	✓	✓	✓	✓		✓	✓	✓	×	✓	✓	✓	✓	✓	✓
K19	✓	✓	✓	✓	✓	✓	✓		×	✓	✓	✓	✓	✓	✓	✓	✓
K25	✓	✓	✓	✓	✓	✓	✓	×		✓	✓	✓	✓	✓	✓	✓	✓
K26	✓	✓	✓	✓	×	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
K35	✓	✓	✓	✓	✓	×	×	✓	✓	✓		✓	✓	✓	✓	✓	✓
M06	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		×	✓	✓	✓	✓
M07	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	×		✓	✓	✓	✓
M13	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		×	×	✓
M21	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	×		×	×
M23	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	×	×		✓
M78	×	×	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	×	✓	

× **Not supported**

✓ **Possible combinations**

1) For converter >700A, L13 need to be selected.

E

E88~91 Analog input/output isolation amplifier

Isolation amplifiers for analog inputs/outputs isolate the different reference potentials of the signals between the unit electronics and the higher-level controller and also increase electrical immunity to interference.

If this option is chosen, the option K73 has to be chosen as well.

E88 Analog input 1 isolation amplifier

Input: 0 (4) mA~20mA, or 0V~10V

Output: 0 (4) mA~20mA, or 0V~10V

E89 Analog input 2 isolation amplifier

Input: 0 (4) mA~20mA, or 0V~10V

Output: 0 (4) mA~20mA, or 0V~10V

E90 Analog output 1 isolation amplifier

Input: 0V~10V, or 0 (4) mA~20mA

Output: 0V~10V, or 0 (4) mA~20mA

E91 Analog output 2 isolation amplifier

Input: 0V~10V, or 0 (4) mA~20mA

Output: 0V~10V, or 0 (4) mA~20mA

G

G91 PROFIBUS module

For a complete PROFIBUS connection with up to 12 Mbaud. Remote control of the inverter is possible with the PROFIBUS module. Remote control and operation at the inverter can be combined using an operator panel plugged onto the PROFIBUS module. The PROFIBUS module can be supplied by an external 24 V DC power supply and is thus also active when the inverter is disconnected from the power supply. Connection by means of a 9-pin Sub-D connector (available as an option).

K

K19 Start/ Stop indicated light

Start (green) and Stop (red) are mounted in the cabinet front door.

K23 Analog display instrument (speed, current)

Analog meters for speed and current are mounted in the cabinet front door.

Selection and ordering data

K

K25 Start/ Stop button with light indication

Start (green) and Stop (red) button are mounted in the cabinet front door. These two button can be the local On/Off command source.

K26 Speed adjustment potentiometer

Speed adjustment potentiometer is mounted in the cabinet front door. It can be used as analog speed setpoint.

K35 Local/ remote control switch

Local/ remote control switch switches control mode between local and remote.

K73 DC 24V auxiliary power

The auxiliary power supply provides 24 V DC power for the electronics and inverter options. The auxiliary power supply is fed via the external AC 230V or K74.
For converter 400KW~500KW, option K73 is supplied with converter as standard.

K74 AC 230V auxiliary power

The auxiliary power supply is via the mains supply by means of a control transformer.
For converter 400KW~500KW, option K73 is supplied with converter as standard.

L

L08 motor reactor

motor reactors limit the capacitive charge/discharge currents of motor supply cables, thus enabling the operation of motors connected via long cable lengths. With motor reactor, the Maximum output frequency is 100Hz.

Notice: L08 can not be used combine with M78 (Motor connection from above).

Cable length should be determined according to the line voltage, the table shows the maximum connectable motor cable lengths, with or without motor reactor.

Power	Rated Voltage	Max. cable length			
		Without reactor		With reactor	
		Shielded cable	Unshielded cable	Shielded cable	Unshielded cable
55kW	380V~415V	50m	100m	200m	300m
75kW	380V~415V	50m	100m	200m	300m
90kW	380V~415V	50m	100m	200m	300m
110kW	380V~415V	100m	150m	200m	300m
132kW	380V~415V	100m	150m	200m	300m
160kW	380V~415V	100m	150m	200m	300m
200kW	380V~415V	100m	150m	200m	300m
250kW	380V~415V	100m	150m	200m	300m
315kW	380V~415V	100m	150m	200m	300m
355kW	380V~415V	100m	150m	200m	300m
400kW	380V~415V	100m	150m	200m	300m
500kW	380V~415V	100m	150m	200m	300m

L

L10 dv/dt filter

Voltage limiting filters can be provided to protect the motor insulation systems, preferably in the case of inadequate, or unknown insulation systems of non-Siemens motors.

L13 Main contactor

Option L13 is need if a switch element is required for disconnecting the cabinet from the supply (needed for Emergency stop). The contactor is energized and powered by option K73 and option K74 or external AC 230V.

L45 EMERGENCY STOP pushbutton

The EMERGENCY OFF button with protective collar is fitted in the converter cabinet door and its contacts are connected to the terminal block. The EMERGENCY OFF functions of Category 0 can be activated in conjunction with options **L57**.

L50 Cabinet illumination with service socket

One universal lamp with an integrated service socket is installed for each cabinet panel. The power supply for the cabinet illumination with service socket must be provided externally. The lamp is switched on manually via a switch in the lamp.

L55 Cabinet anti-condensation heating

The anti-condensation heating is recommended at low ambient temperatures and high levels of humidity to prevent condensation forming.100W heating unit is installed for each cabinet panel. (one for widths 600mm cabinet, two for widths from ⩾900m cabinet)
The power supply to the anti-condensation heating (110VAC~240VAC) must be provided externally.

L57 EMERGENCY STOP category 0

EMERGENCY STOP category 0 for uncontrolled stop in accordance with EN60204-1.
The function includes voltage disconnection of the converter via the line contactor with bypassing of the microprocessor controller by means of a safety combination in accordance with EN 60204-1.The motor coasts in the process. When delivered, the button circuit is preset to 230V AC. Jumpers must be set when using 24V DC.
Attention: Option L57 always assumes that the converter can be electrically isolated from the supply.

L86 PT100 evaluation unit

The PT100 evaluation unit can monitor up to 6 sensors. The sensors can be connected using a two-wire or three-wire system. The limited values can be programmed by the user for each channel.

M

M06 Base 100mm high, RAL 7035

The additional cabinet base allows greater bending radii for cable (inlet from below) and the routing of them within the cabinet base.
If the option Y09 (Special cabinet paint finish) is chosen, the special color of the base should be specified when ordering. It is delivered completely fitted the with the cabinet. The height of the operator panel changes accordingly.

M07 Cable plinth 200 mm high, RAL7035

The cable wiring compartment is made of stable sheet steel and increase the flexible for the cable connection (inlet from below) and allows routing of cables within the wiring compartment.
If the option Y09 (Special cabinet paint finish) is chosen, the special color of the wiring compartment should be specified when ordering. It is delivered completely fitted the with the cabinet. The height of the operator panel changes accordingly.

Selection and ordering data

M

M13 Line connection from above

The control cabinet is provided with an additional hood in the case of a line connection from above.

M21 IP21 degree of protection

cabinet version in IP20, but with additional top cover or canopy. The cabinet height is then increased by 250mm.
For transport reason, the top cover or canopy are delivered separately and must be fitted on site.

M23 IP23 degree of protection

Drive converter cabinet units with degree of protection IP23 are supplied with additional hoods and plastic ventilation grilles in the air inlet and outlet. The cabinet height is increased by 400mm.
For transport reason, the top cover or canopy are delivered separately and must be fitted on site.

M60 Protection cover

Option M60 provides the protection covers for hazardous voltage area and power block.

M70 EMC shield bus

The EMC shield bus is used to connect shielded power cables for line and motor infeed cable.

M75 PE busbar

The PE busbar is used to run the PE conductor for the supply and motor infeed cables.

M78 Motor connection from above

The control cabinet is provided with an additional hood in the case of a motor connection from above. Within the hood, there are the connection lugs for the power cable and the cable-clamping bar for the mechanical attachment of the cable, an EMC shield bus and a PE busbar.

P

P01 Special option package for power plant

Specially for power plant application includes:

Lamp, button and switch
- Start/ stop indicated light
- Power supply indicated light
- Fault indicated light
- Start/ Stop button with light
- Testing light button with light
- Fault reset button with light
- EMERGENCY STOP pushbutton
- Local/Remote control switch
- Speed reverse switch
- Speed adjustment potentiometer

Project
- Line connection from above
- External power supply AC 230 V
- motor reactor
- Output switch (motor connection)

Special design
- SINAMICS V50 label

Y

Y09 Special cabinet paint coating

The drive converter cabinet units are colored RAL 7035 as standard. The special color must be specified in plain text when ordering. All RAL colors can be selected which are available as powdered coatings. If options such as cable compartment (M06 or M07), top covers or canopies (M21), hoods (M23) are required for the cabinet, these are provided in the ordered cabinet color.
The molded plastic parts (such as ventilation grille) can not be painted.

Dimension drawing

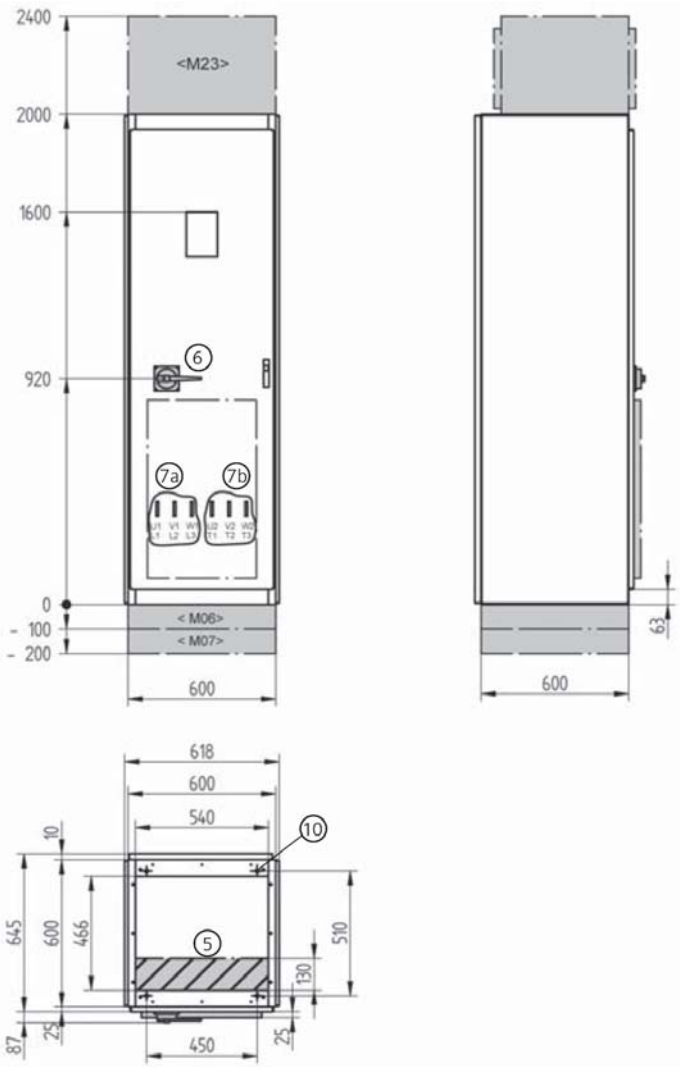
3/2	55KW~90KW
3/6	110KW~250KW
3/10	315KW~500KW

Dimension drawing

Converter cabinet units

Dimension drawing 1: 380v~415V 55KW~90KW

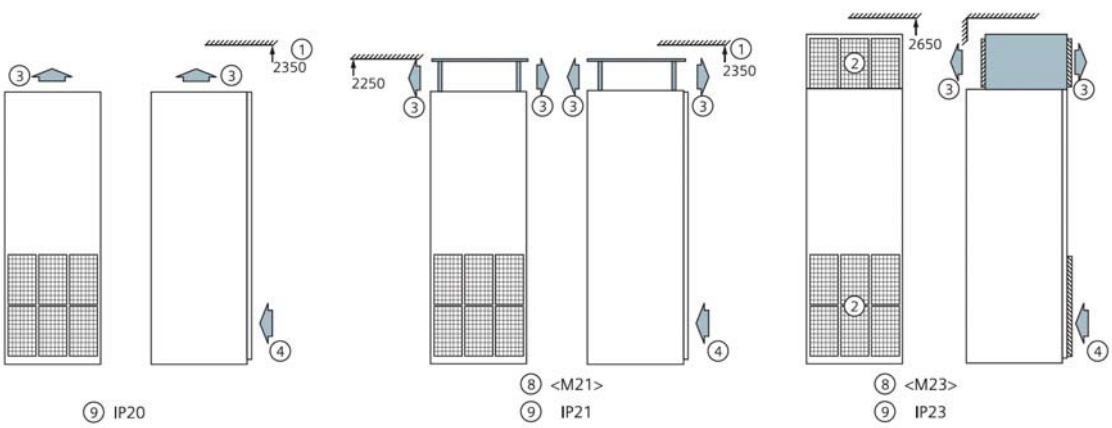
Line and motor connection from below



1) The minimum height of the installation room
2) Ventilation grille
3) Air outlet
4) Air inlet
5) Cable routes within the shaded area
6) Main switch, can be locked with normal lock
7a) Line connection terminal
7b) Motor connection terminal
8) Options, degree of protection
9) Degree of protection
   IP20
   IP21
   Option M21
   IP23
   Option M23
10) Transport parts

***** Options are shown in gray.

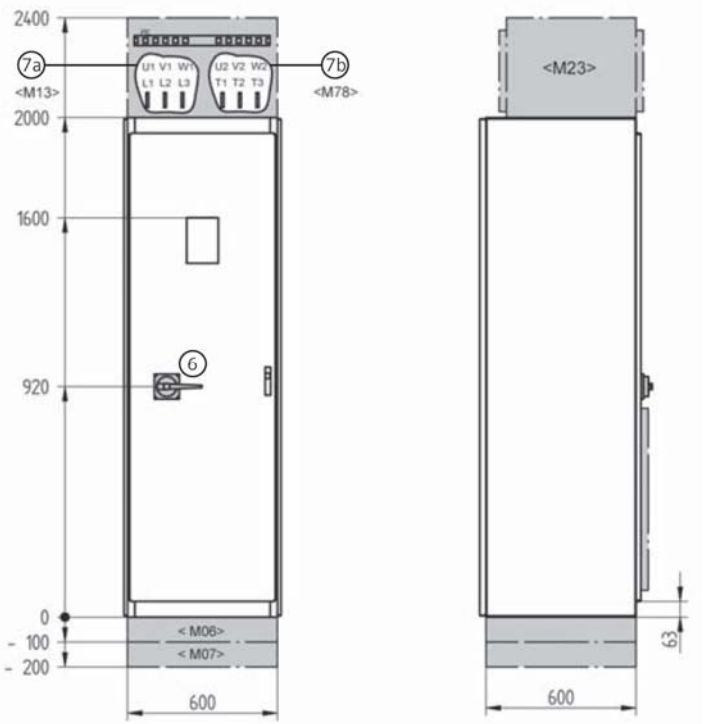
Degree of protection

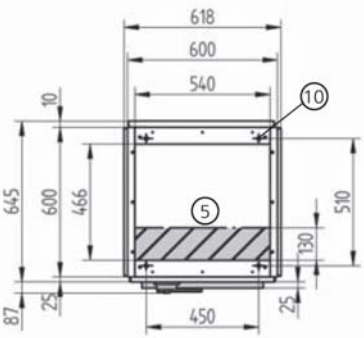


Converter cabinet units (continued)

Dimension drawing 2: 380v~415V 55KW~90KW

Line and motor connection from below

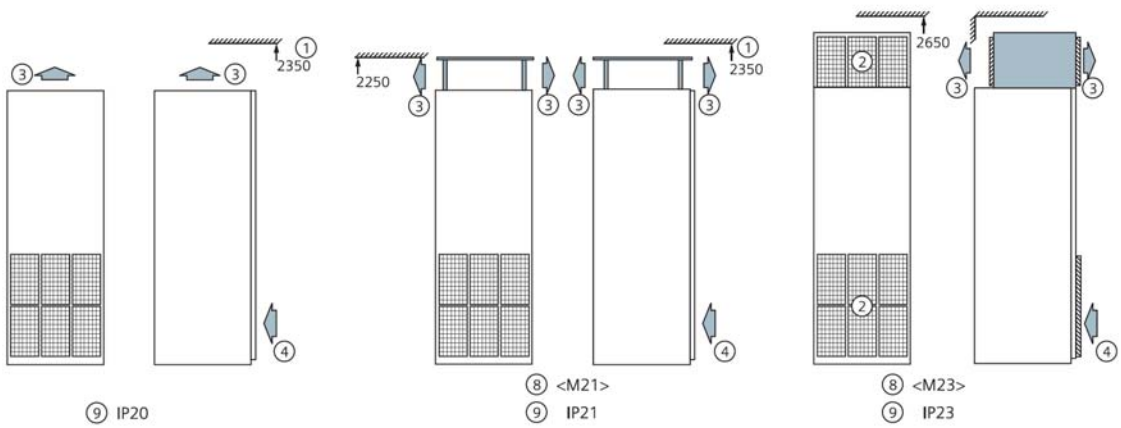




1) The minimum height of the installation room
2) Ventilation grille
3) Air outlet
4) Air inlet
5) Cable routes within the shaded area
6) Main switch, can be locked with normal lock
7a) Line connection terminal
7b) Motor connection terminal
8) Options, degree of protection
9) Degree of protection
   IP20
   IP21
   Option M21
   IP23
   Option M23
10) Transport parts

***** Options are shown in gray.

Degree of protection

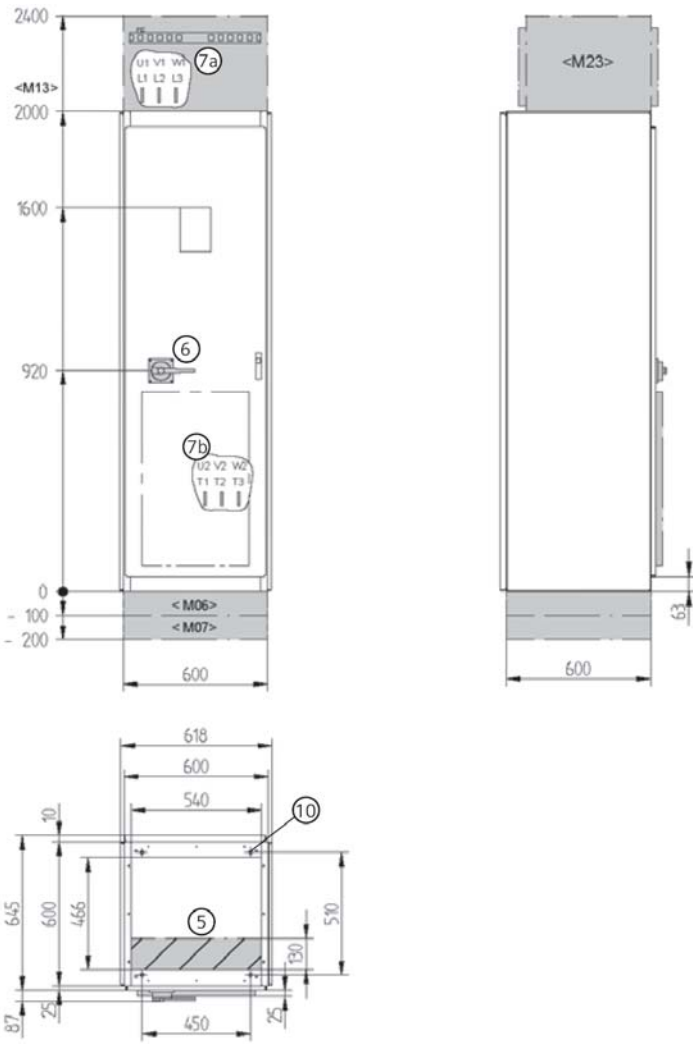


Dimension drawing

Converter cabinet units (continued)

Dimension drawing 3: 380v~415V 55KW~90KW

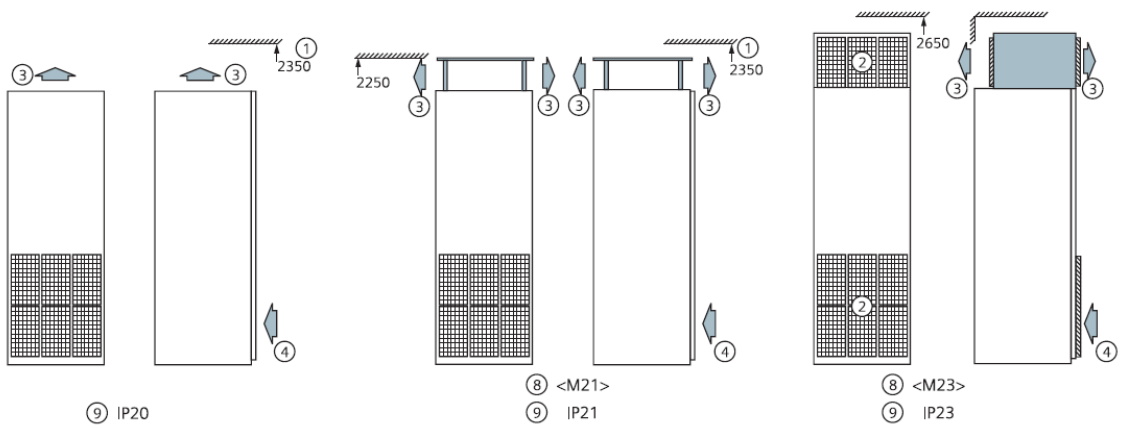
Line and motor connection from below



1) The minimum height of the installation room
2) Ventilation grille
3) Air outlet
4) Air inlet
5) Cable routes within the shaded area
6) Main switch, can be locked with normal lock
7a) Line connection terminal
7b) Motor connection terminal
8) Options, degree of protection
9) Degree of protection
   IP20
   IP21
   Option M21
   IP23
   Option M23
10) Transport parts

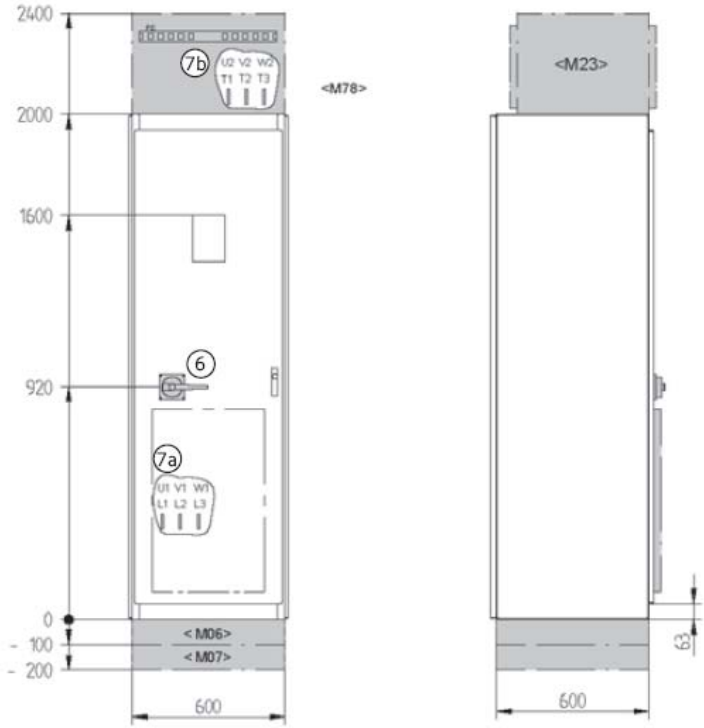
***** Options are shown in gray.

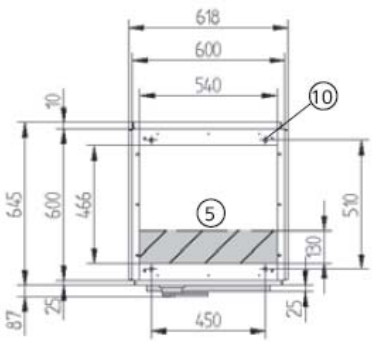
Degree of protection



Converter cabinet units (continued)

Dimension drawing 4: 380v~415V 55KW~90KW

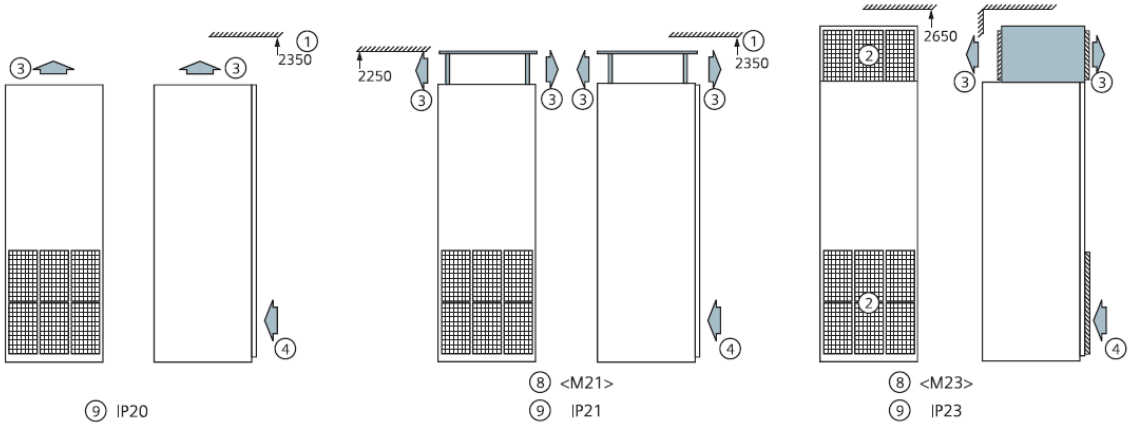




1) The minimum height of the installation room
2) Ventilation grille
3) Air outlet
4) Air inlet
5) Cable routes within the shaded area
6) Main switch, can be locked with normal lock
7a) Line connection terminal
7b) Motor connection terminal
8) Options, degree of protection
9) Degree of protection
   IP20
   IP21
   Option M21
   IP23
   Option M23
10) Transport parts

***** Options are shown in gray.

Degree of protection

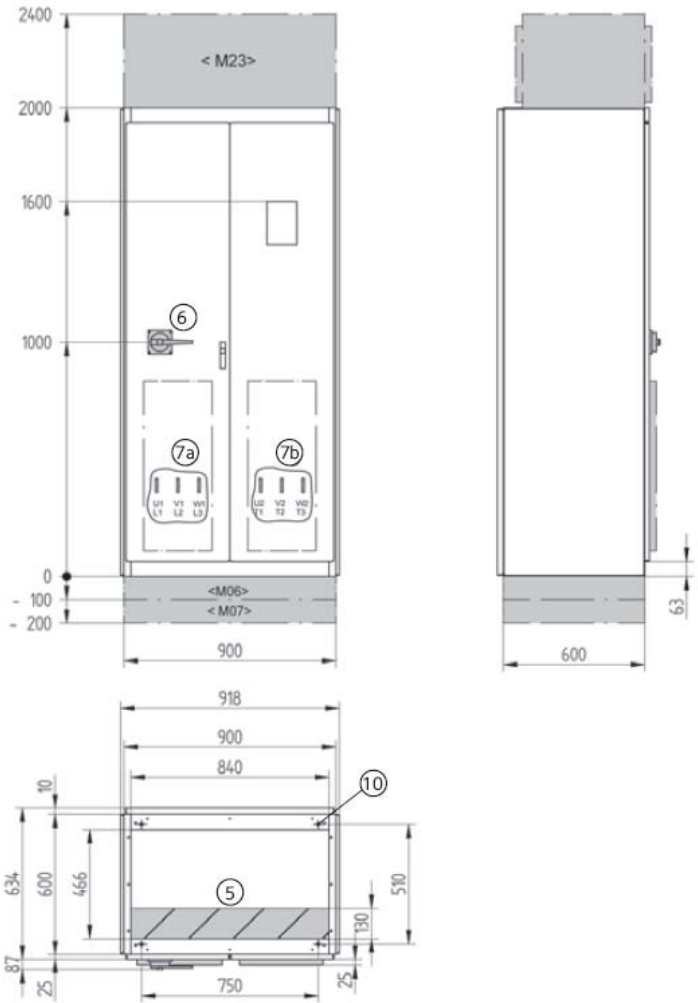


Dimension drawing

Converter cabinet units (continued)

Dimension drawing 5: 380v~415V 110KW~250KW

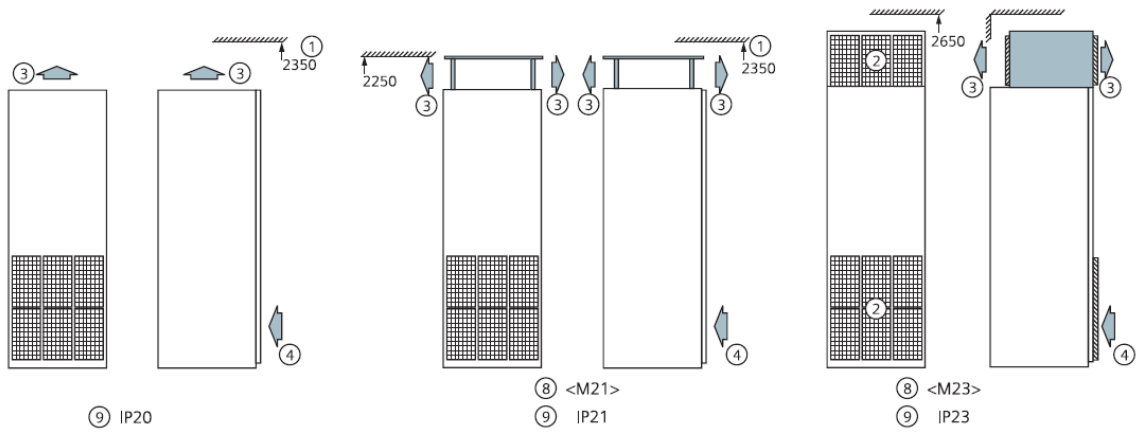
Line and motor connection from below



1) The minimum height of the installation room
2) Ventilation grille
3) Air outlet
4) Air inlet
5) Cable routes within the shaded area
6) Main switch, can be locked with normal lock
7a) Line connection terminal
7b) Motor connection terminal
8) Options, degree of protection
9) Degree of protection
   IP20
   IP21
   Option M21
   IP23
   Option M23
10) Transport parts

***** Options are shown in gray.

Degree of protection

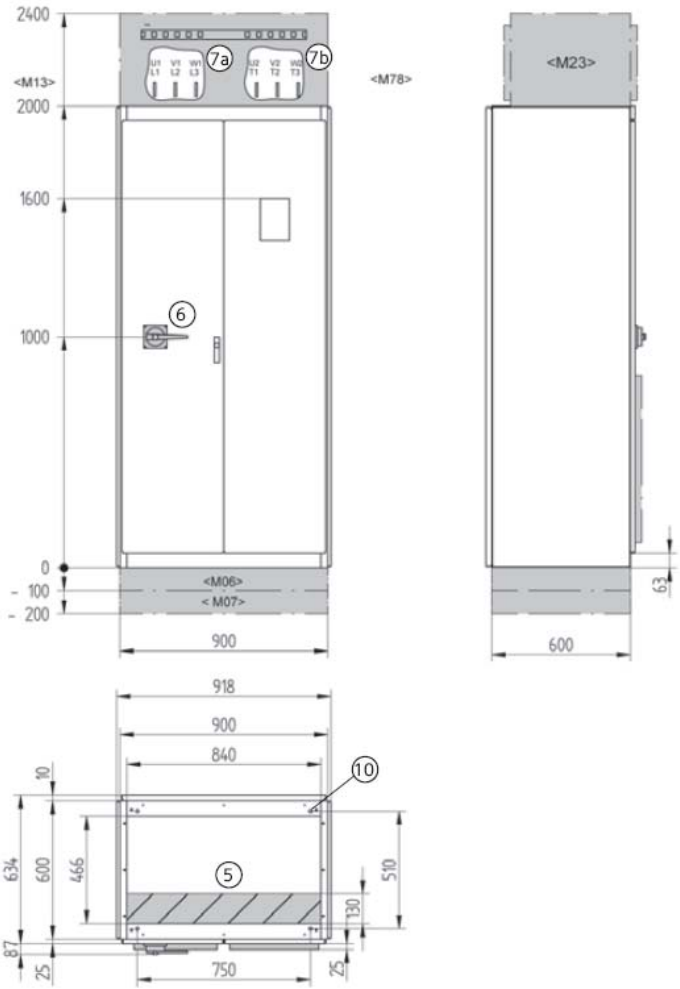


Dimension drawing

Converter cabinet units (continued)

Dimension drawing 6: 380v~415V 110KW~250KW

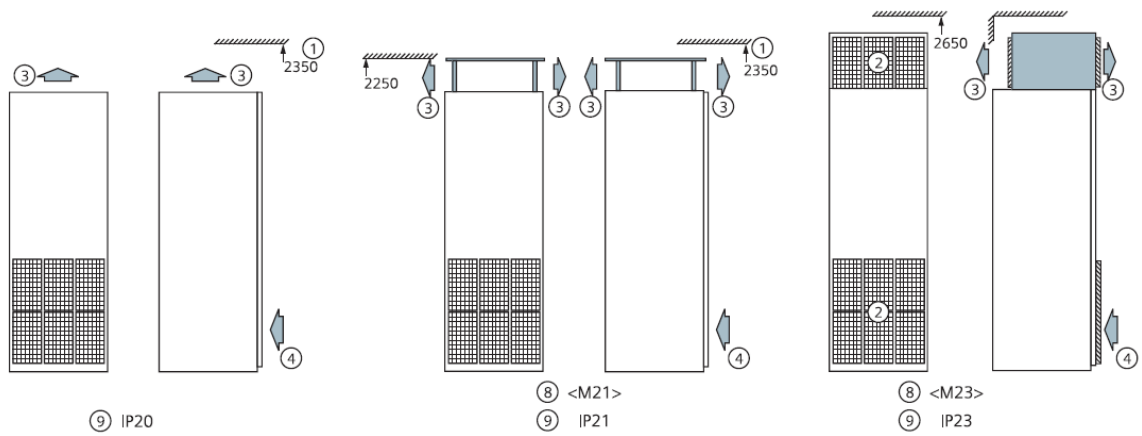
Line and motor connection from below



1) The minimum height of the installation room
2) Ventilation grille
3) Air outlet
4) Air inlet
5) Cable routes within the shaded area
6) Main switch, can be locked with normal lock
7a) Line connection terminal
7b) Motor connection terminal
8) Options, degree of protection
9) Degree of protection
   IP20
   IP21
   Option M21
   IP23
   Option M23
10) Transport parts

***** Options are shown in gray.

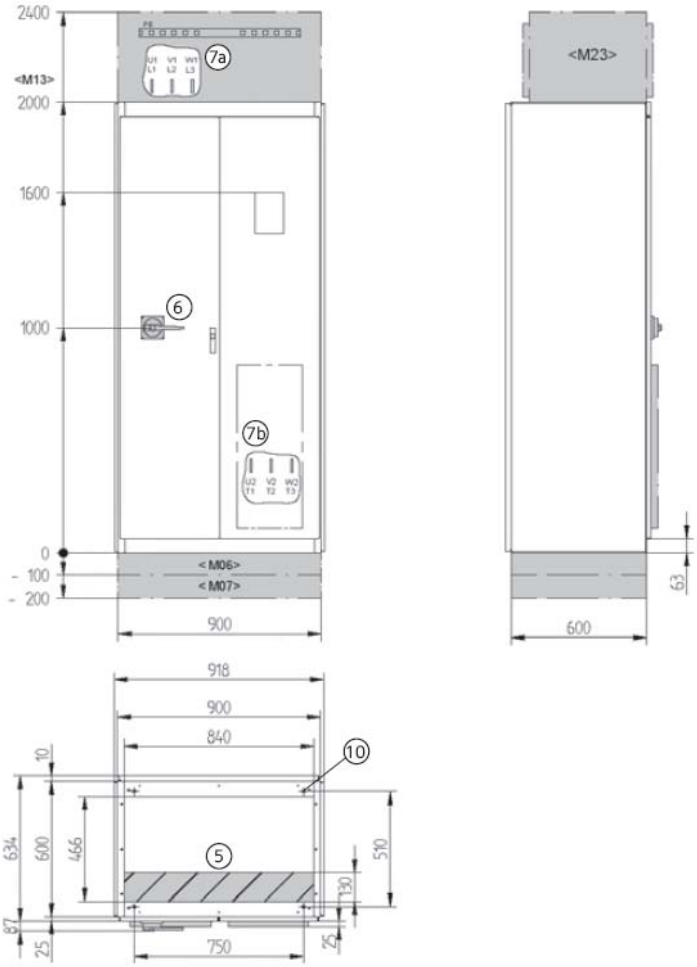
Degree of protection



Converter cabinet units (continued)

Dimension drawing 7: 380v~415V 110KW~250KW

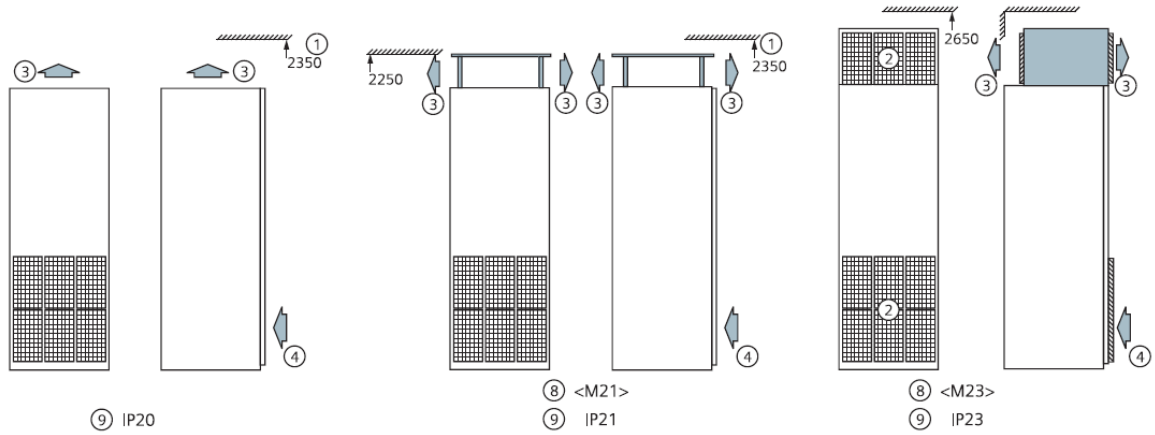
Line and motor connection from below



1) The minimum height of the installation room
2) Ventilation grille
3) Air outlet
4) Air inlet
5) Cable routes within the shaded area
6) Main switch, can be locked with normal lock
7a) Line connection terminal
7b) Motor connection terminal
8) Options, degree of protection
9) Degree of protection
   IP20
   IP21
   Option M21
   IP23
   Option M23
10) Transport parts

***** Options are shown in gray.

Degree of protection

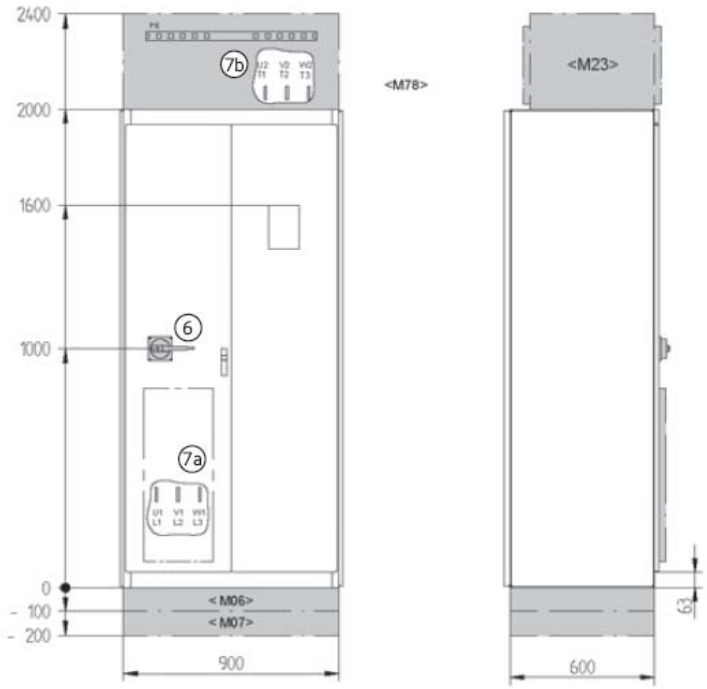


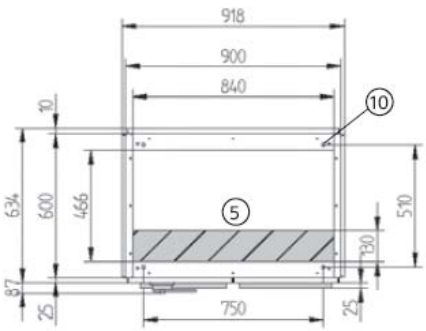
Dimension drawing

Converter cabinet units (continued)

Dimension drawing 8: 380v~415V 110KW~250KW

Line and motor connection from below

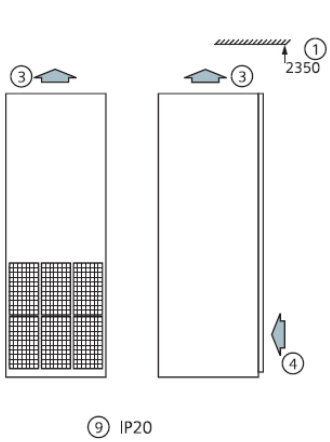


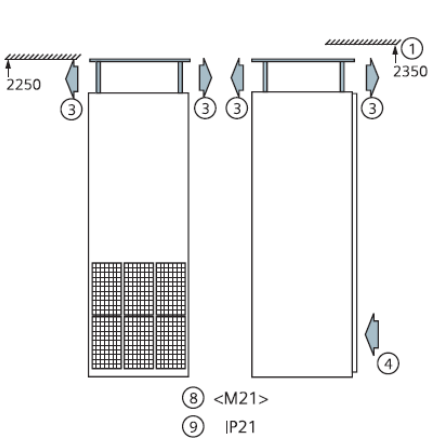


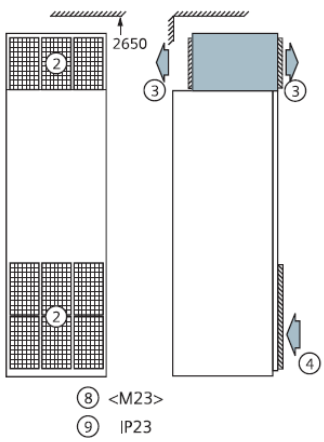
1) The minimum height of the installation room
2) Ventilation grille
3) Air outlet
4) Air inlet
5) Cable routes within the shaded area
6) Main switch, can be locked with normal lock
7a) Line connection terminal
7b) Motor connection terminal
8) Options, degree of protection
9) Degree of protection
   IP20
   IP21
   Option M21
   IP23
   Option M23
10) Transport parts

***** Options are shown in gray.

Degree of protection



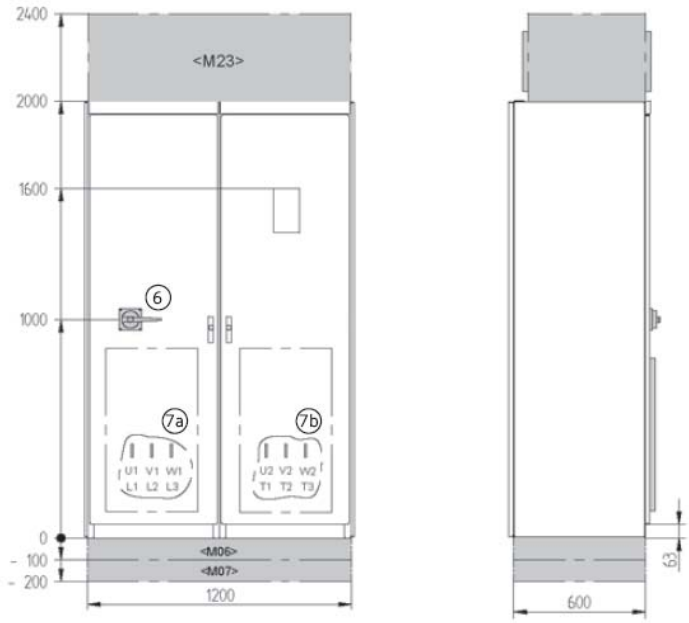


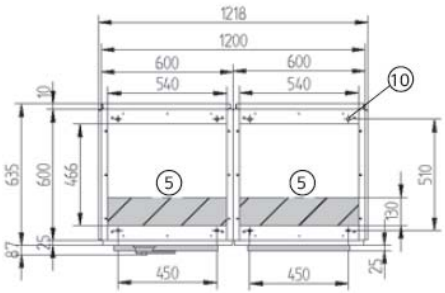


Converter cabinet units (continued)

Dimension drawing 9: 380v~415V 315KW~355KW

Line and motor connection from below

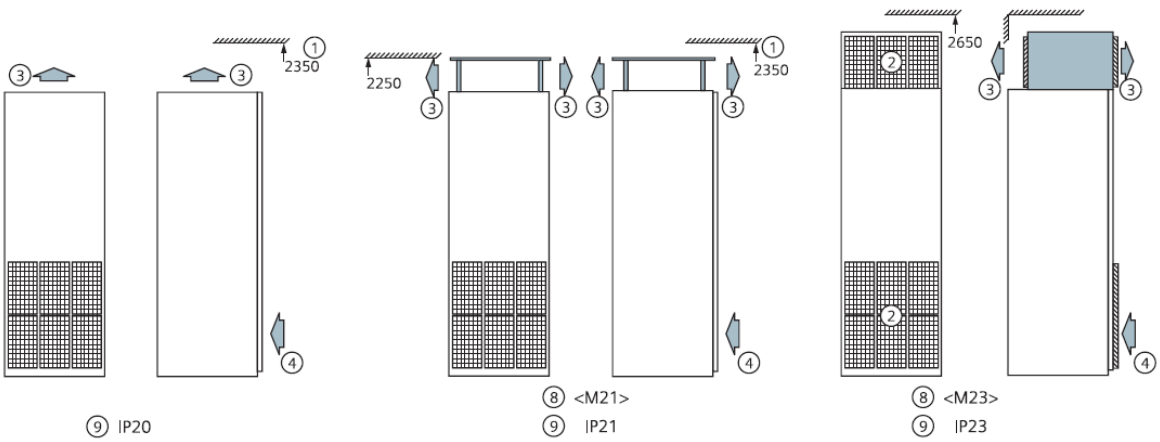




1) The minimum height of the installation room
2) Ventilation grille
3) Air outlet
4) Air inlet
5) Cable routes within the shaded area
6) Main switch, can be locked with normal lock
7a) Line connection terminal
7b) Motor connection terminal
8) Options, degree of protection
9) Degree of protection
   IP20
   IP21
   Option M21
   IP23
   Option M23
10) Transport parts

***** Options are shown in gray.

Degree of protection

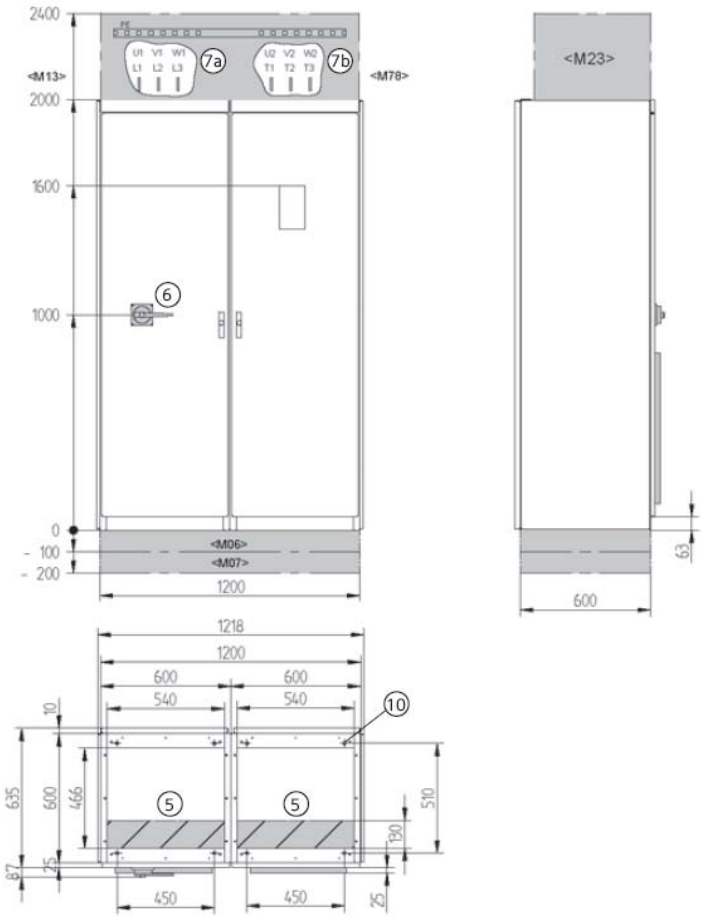


Dimension drawing

Converter cabinet units (continued)

Dimension drawing 10: 380v~415V 315KW~355KW

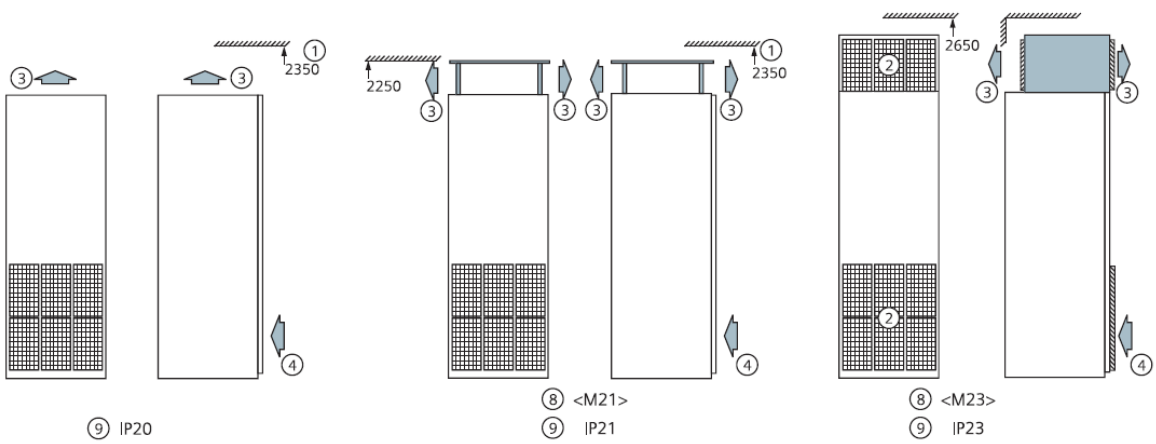
Line and motor connection from below



1) The minimum height of the installation room
2) Ventilation grille
3) Air outlet
4) Air inlet
5) Cable routes within the shaded area
6) Main switch, can be locked with normal lock
7a) Line connection terminal
7b) Motor connection terminal
8) Options, degree of protection
9) Degree of protection
   IP20
   IP21
   Option M21
   IP23
   Option M23
10) Transport parts

***** Options are shown in gray.

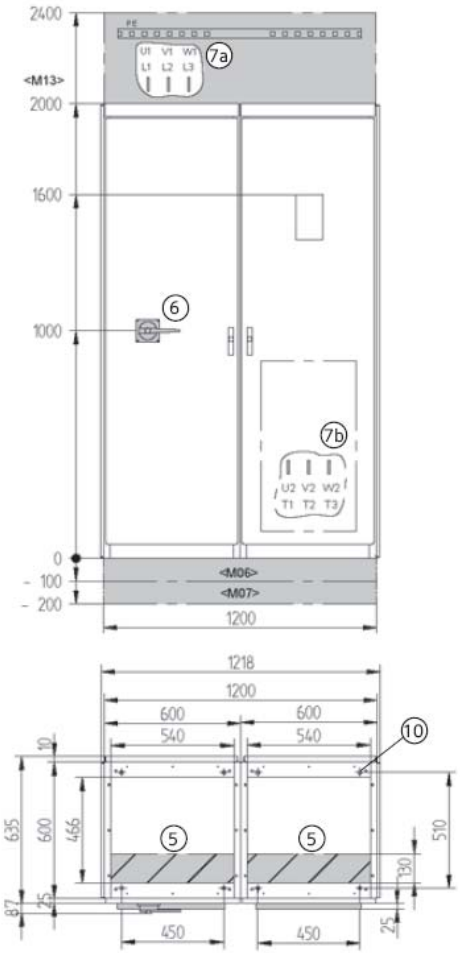
Degree of protection



Converter cabinet units (continued)

Dimension drawing 11: 380v~415V 315KW~355KW

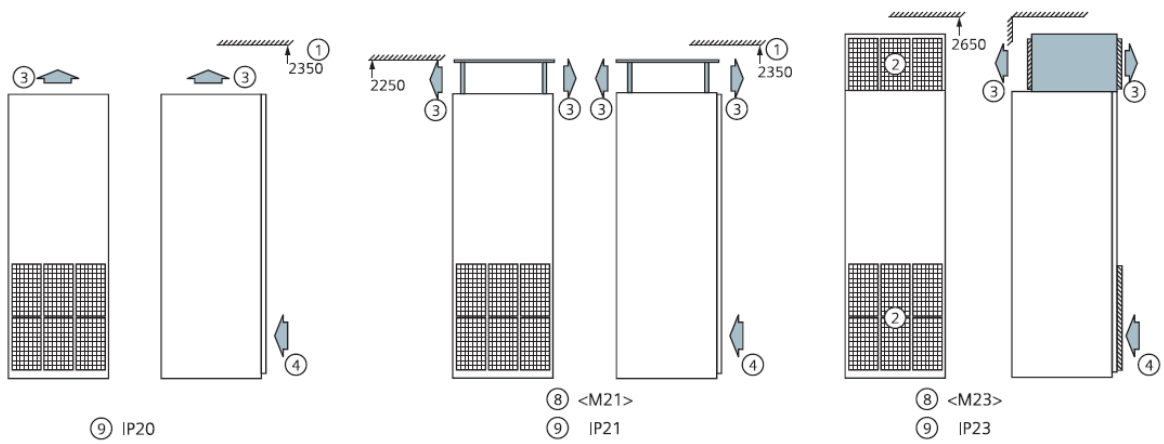
Line and motor connection from below



1) The minimum height of the installation room
2) Ventilation grille
3) Air outlet
4) Air inlet
5) Cable routes within the shaded area
6) Main switch, can be locked with normal lock
7a) Line connection terminal
7b) Motor connection terminal
8) Options, degree of protection
9) Degree of protection
   IP20
   IP21
   Option M21
   IP23
   Option M23
10) Transport parts

***** Options are shown in gray.

Degree of protection

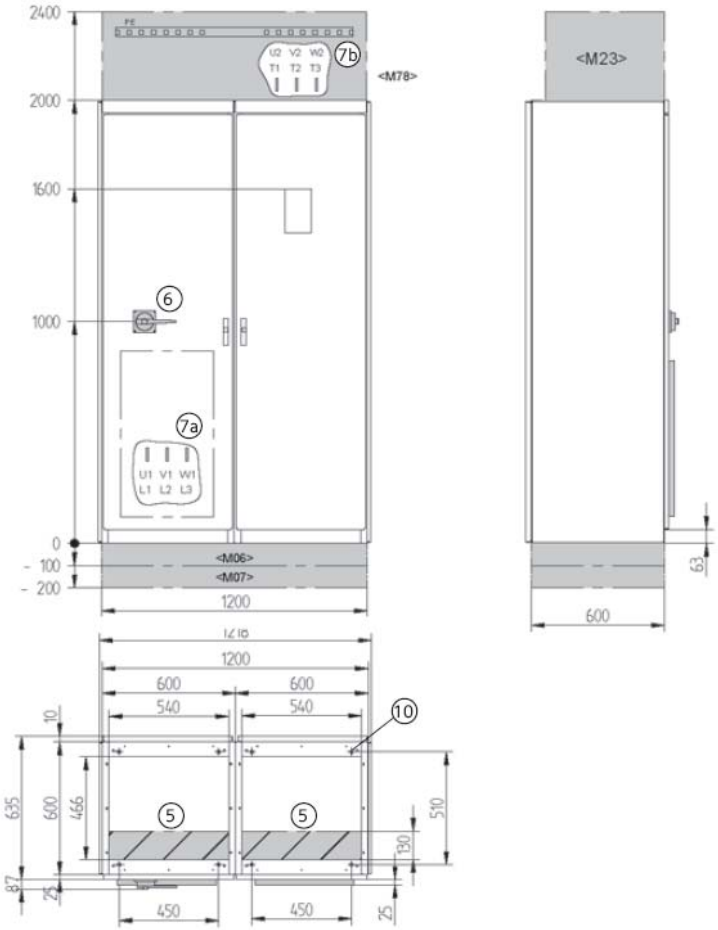


Dimension drawing

Converter cabinet units (continued)

Dimension drawing 12: 380v~415V 315KW~355KW

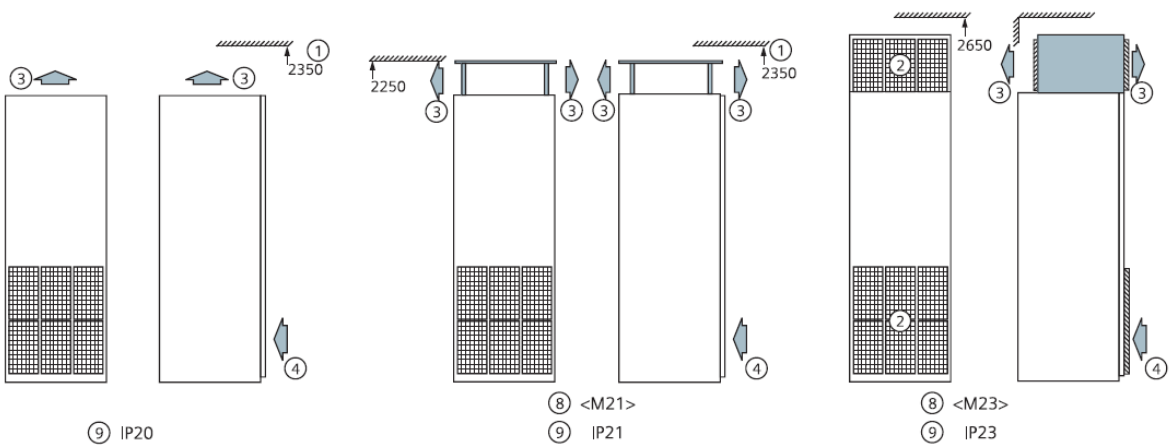
Line and motor connection from below



1) The minimum height of the installation room
2) Ventilation grille
3) Air outlet
4) Air inlet
5) Cable routes within the shaded area
6) Main switch, can be locked with normal lock
7a) Line connection terminal
7b) Motor connection terminal
8) Options, degree of protection
9) Degree of protection
   IP20
   IP21
   Option M21
   IP23
   Option M23
10) Transport parts

***** Options are shown in gray.

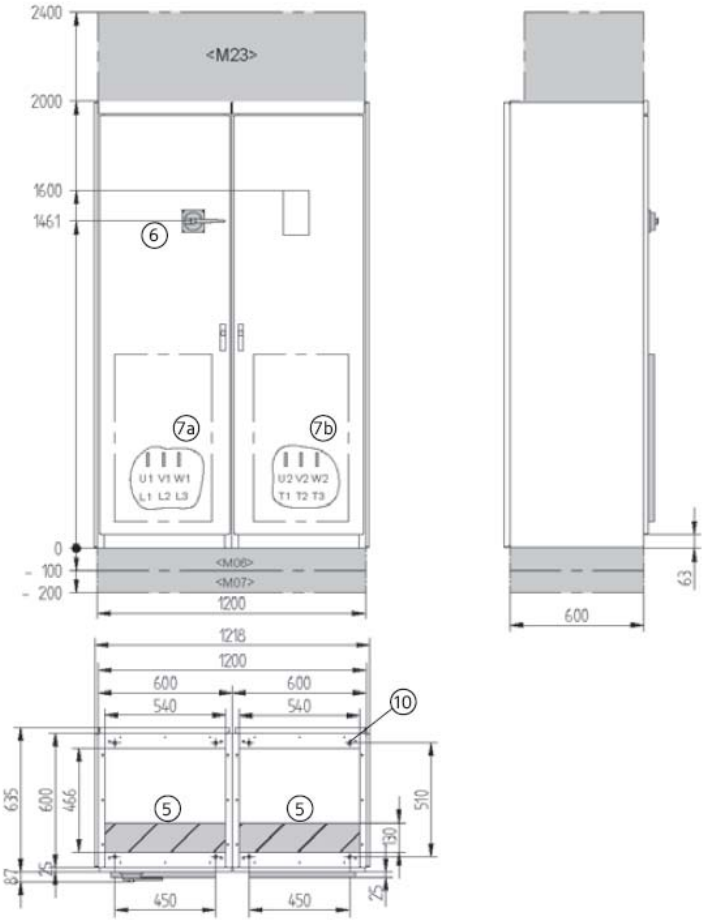
Degree of protection



Converter cabinet units (continued)

Dimension drawing 13: 380v~415V 400KW

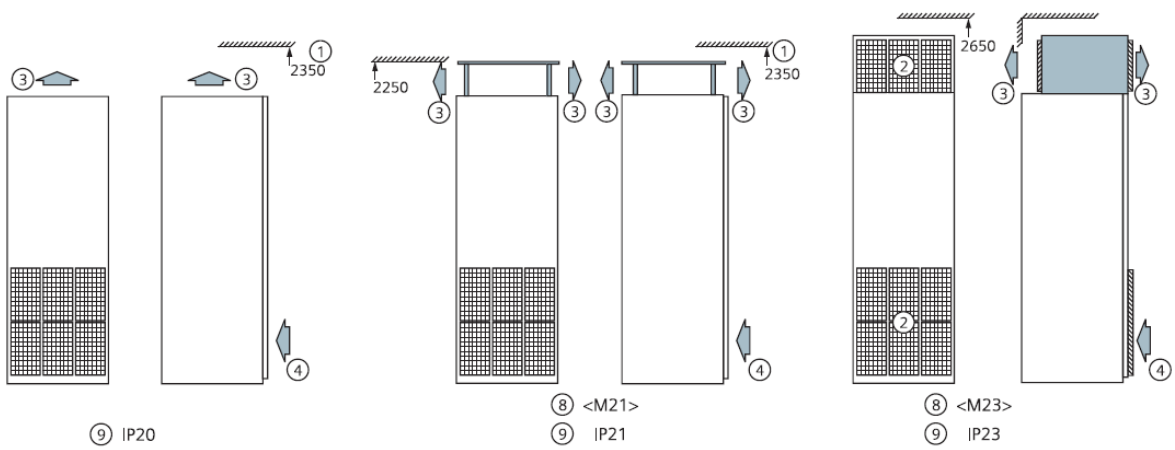
Line and motor connection from below



1) The minimum height of the installation room
2) Ventilation grille
3) Air outlet
4) Air inlet
5) Cable routes within the shaded area
6) Main switch, can be locked with normal lock
7a) Line connection terminal
7b) Motor connection terminal
8) Options, degree of protection
9) Degree of protection
   IP20
   IP21
   Option M21
   IP23
   Option M23
10) Transport parts

***** Options are shown in gray.

Degree of protection

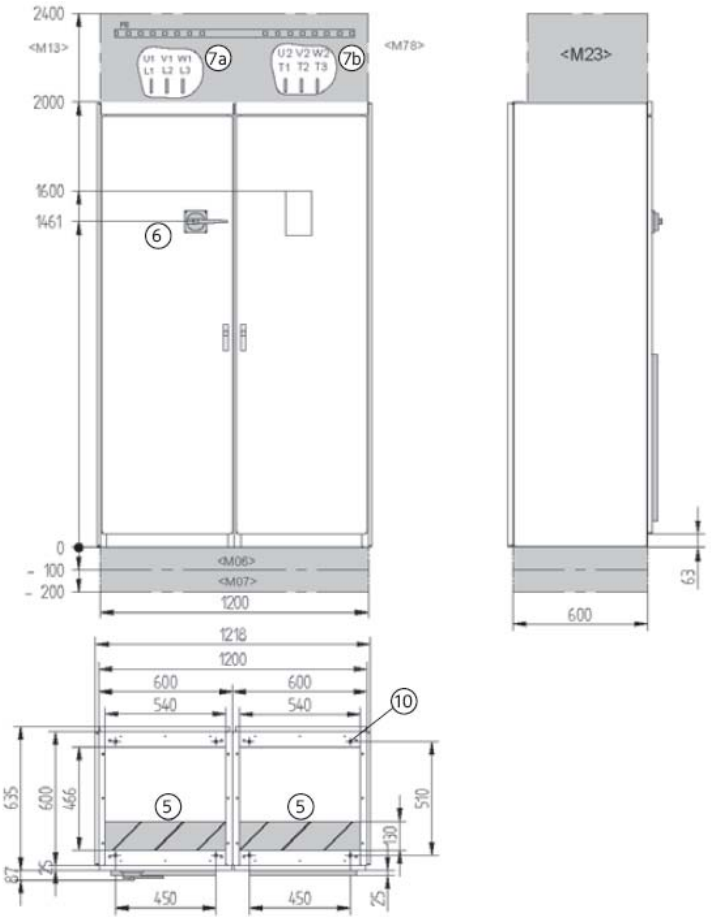


Dimension drawing

Converter cabinet units (continued)

Dimension drawing 14: 380v~415V 400KW

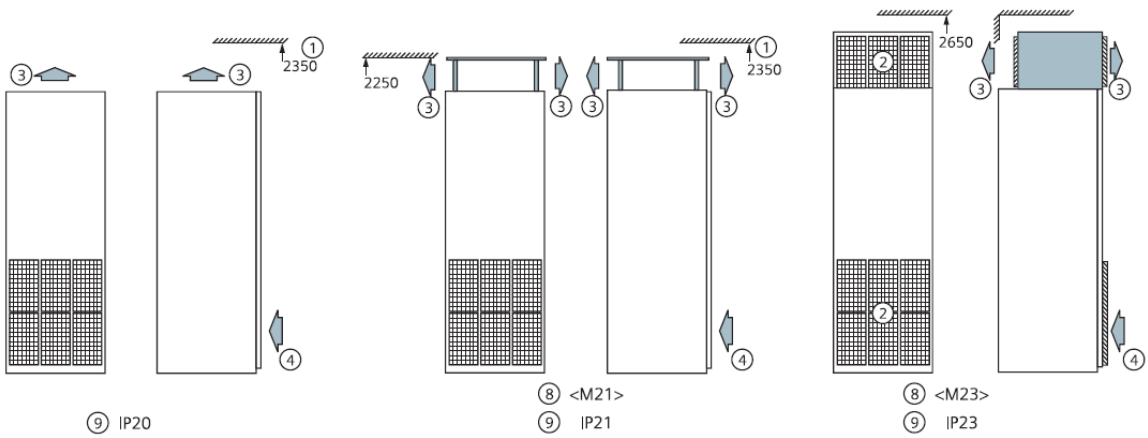
Line and motor connection from below



1) The minimum height of the installation room
2) Ventilation grille
3) Air outlet
4) Air inlet
5) Cable routes within the shaded area
6) Main switch, can be locked with normal lock
7a) Line connection terminal
7b) Motor connection terminal
8) Options, degree of protection
9) Degree of protection
   IP20
   IP21
   Option M21
   IP23
   Option M23
10) Transport parts

***** Options are shown in gray.

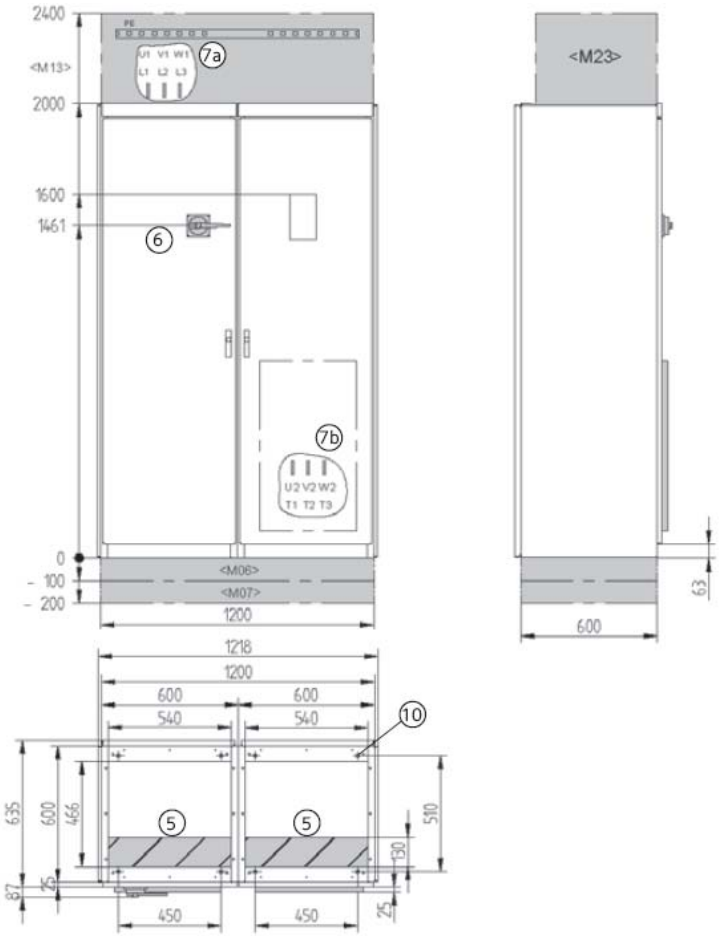
Degree of protection



Converter cabinet units (continued)

Dimension drawing 15: 380v~415V 400KW

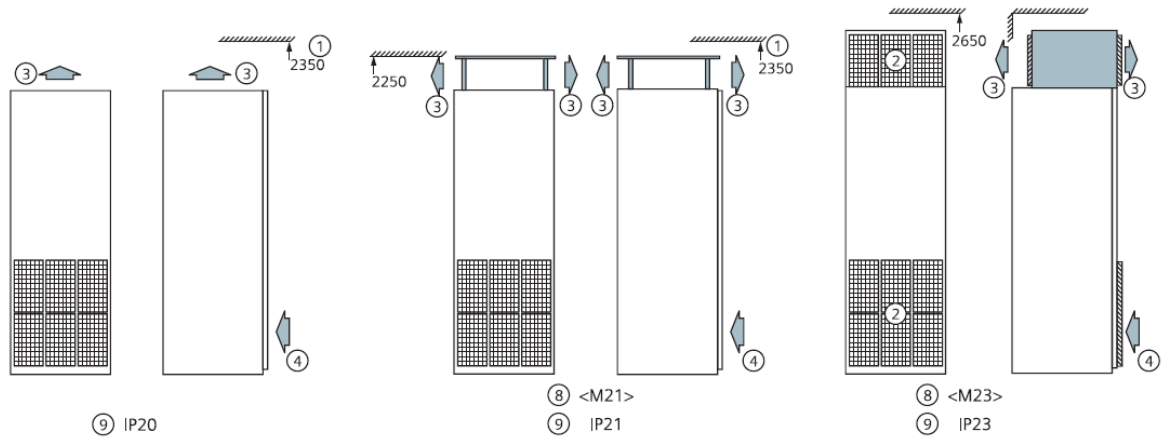
Line and motor connection from below



1) The minimum height of the installation room
2) Ventilation grille
3) Air outlet
4) Air inlet
5) Cable routes within the shaded area
6) Main switch, can be locked with normal lock
7a) Line connection terminal
7b) Motor connection terminal
8) Options, degree of protection
9) Degree of protection
   IP20
   IP21
   Option M21
   IP23
   Option M23
10) Transport parts

***** Options are shown in gray.

Degree of protection

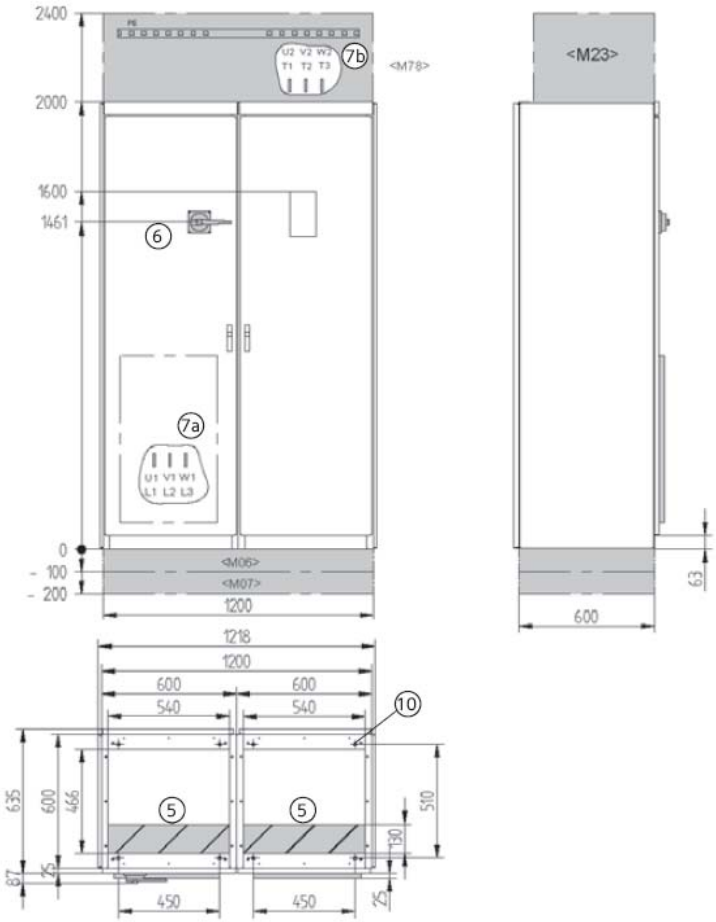


Dimension drawing

Converter cabinet units (continued)

Dimension drawing 16: 380v~415V 400KW

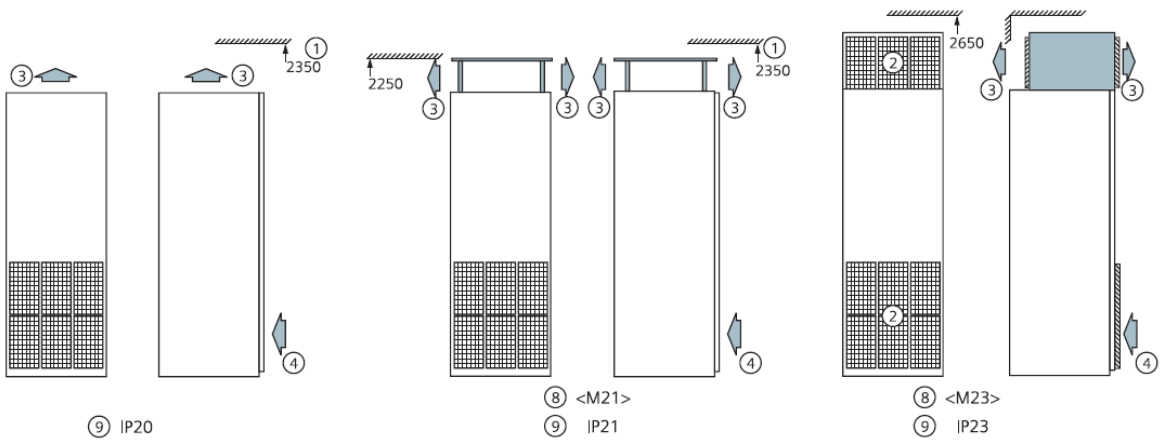
Line and motor connection from below



1) The minimum height of the installation room
2) Ventilation grille
3) Air outlet
4) Air inlet
5) Cable routes within the shaded area
6) Main switch, can be locked with normal lock
7a) Line connection terminal\
7b) Motor connection terminal
8) Options, degree of protection
9) Degree of protection
   IP20
   IP21
   Option M21
   IP23
   Option M23
10) Transport parts

***** Options are shown in gray.

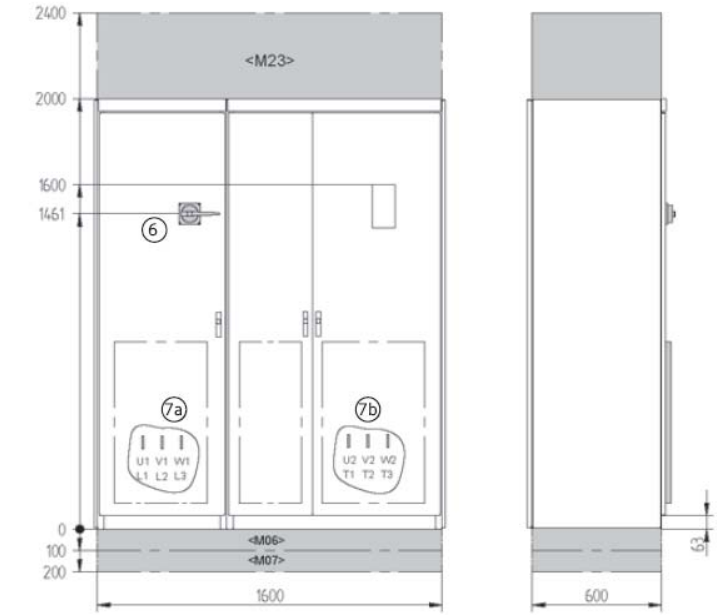
Degree of protection

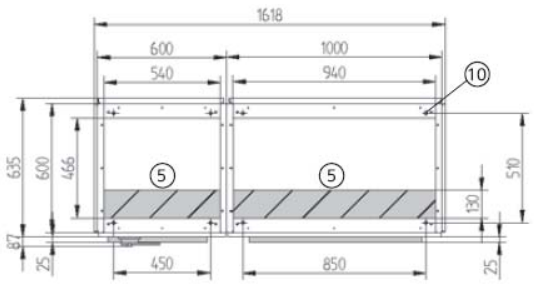


Converter cabinet units (continued)

Dimension drawing 17: 380v~415V 500KW

Line and motor connection from below

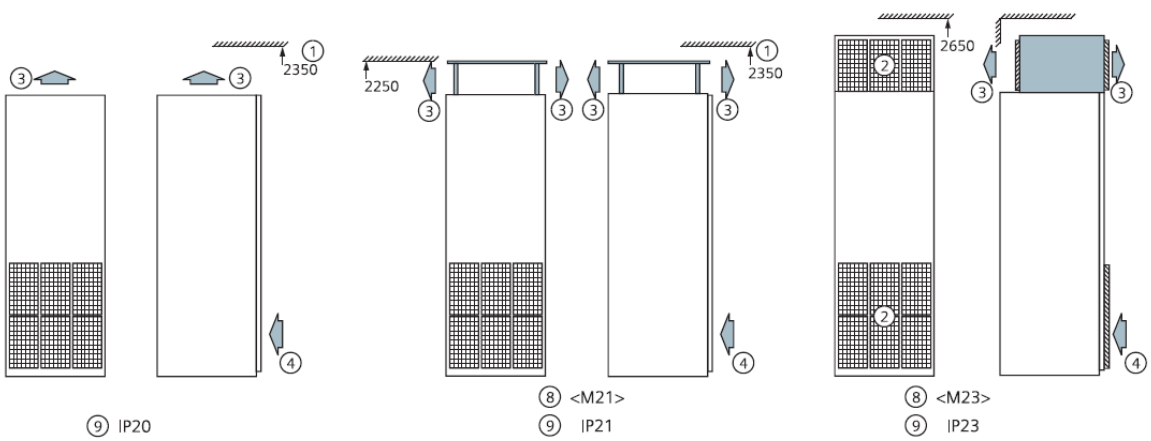




1) The minimum height of the installation room
2) Ventilation grille
3) Air outlet
4) Air inlet
5) Cable routes within the shaded area
6) Main switch, can be locked with normal lock
7a) Line connection terminal
7b) Motor connection terminal
8) Options, degree of protection
9) Degree of protection
   IP20
   IP21
   Option M21
   IP23
   Option M23
10) Transport parts

***** Options are shown in gray.

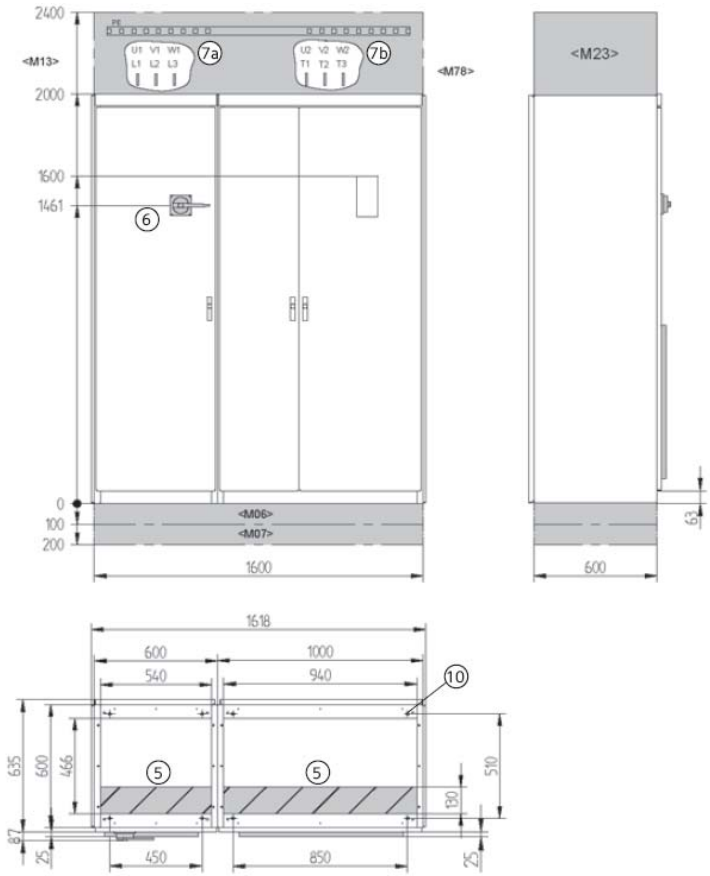
Degree of protection



Converter cabinet units (continued)

Dimension drawing 18: 380v~415V 500KW

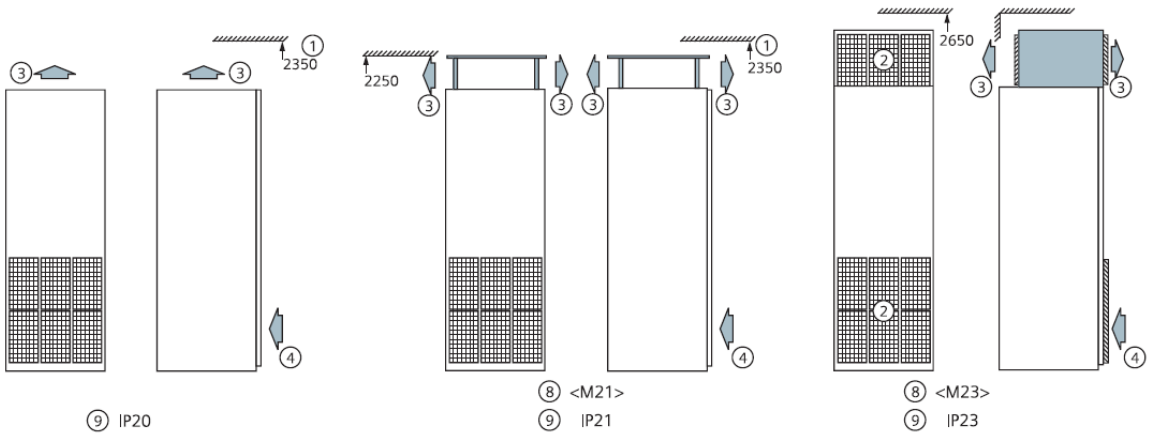
Line and motor connection from below



1) The minimum height of the installation room
2) Ventilation grille
3) Air outlet
4) Air inlet
5) Cable routes within the shaded area
6) Main switch, can be locked with normal lock
7a) Line connection terminal
7b) Motor connection terminal
8) Options, degree of protection
9) Degree of protection
   IP20
   IP21
   Option M21
   IP23
   Option M23
10) Transport parts

***** Options are shown in gray.

Degree of protection

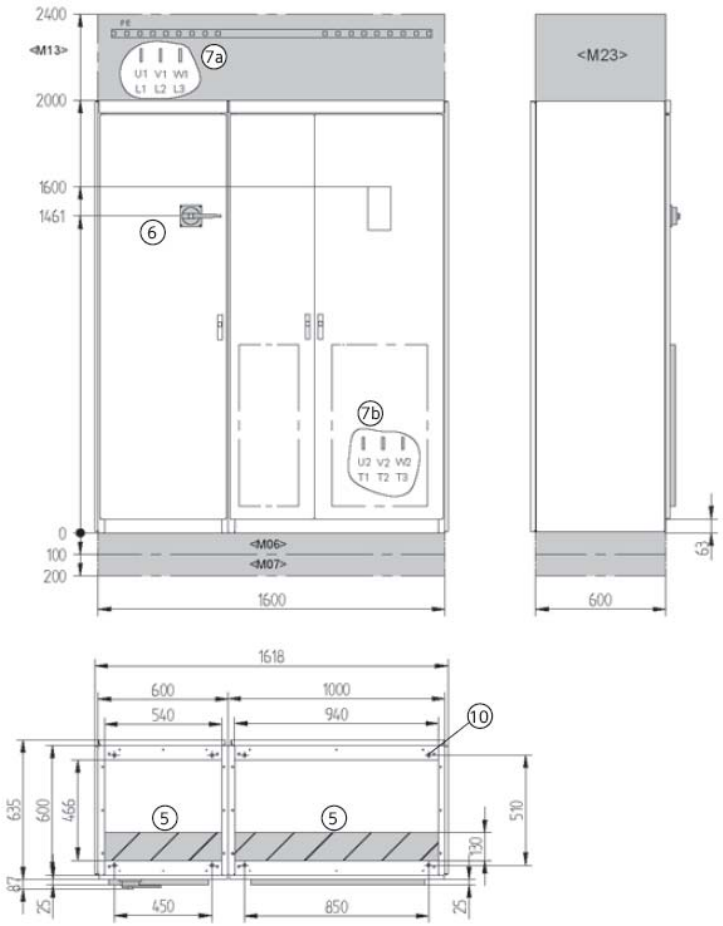


Dimension drawing

Converter cabinet units (continued)

Dimension drawing 19: 380v~415V 500KW

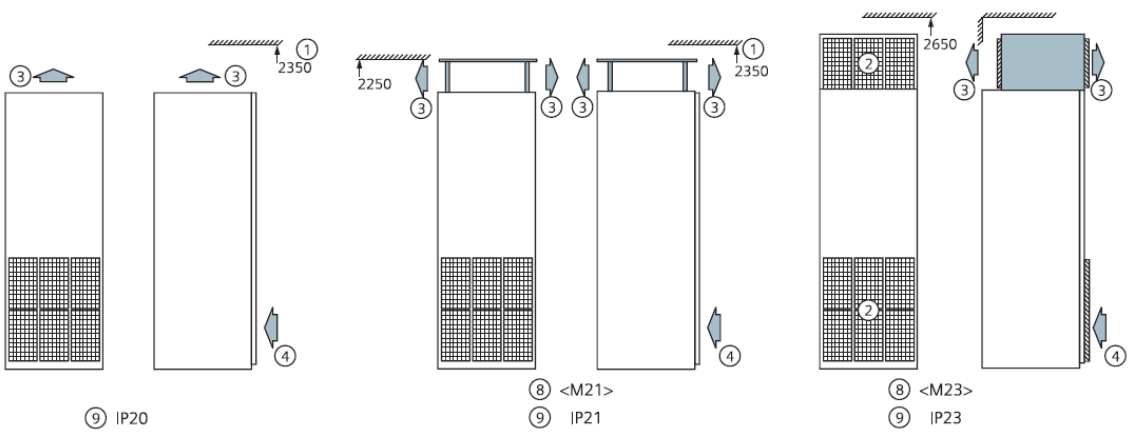
Line and motor connection from below



1) The minimum height of the installation room
2) Ventilation grille
3) Air outlet
4) Air inlet
5) Cable routes within the shaded area
6) Main switch, can be locked with normal lock
7a) Line connection terminal
7b) Motor connection terminal
8) Options, degree of protection
9) Degree of protection
   IP20
   IP21
   Option M21
   IP23
   Option M23
10) Transport parts

***** Options are shown in gray.

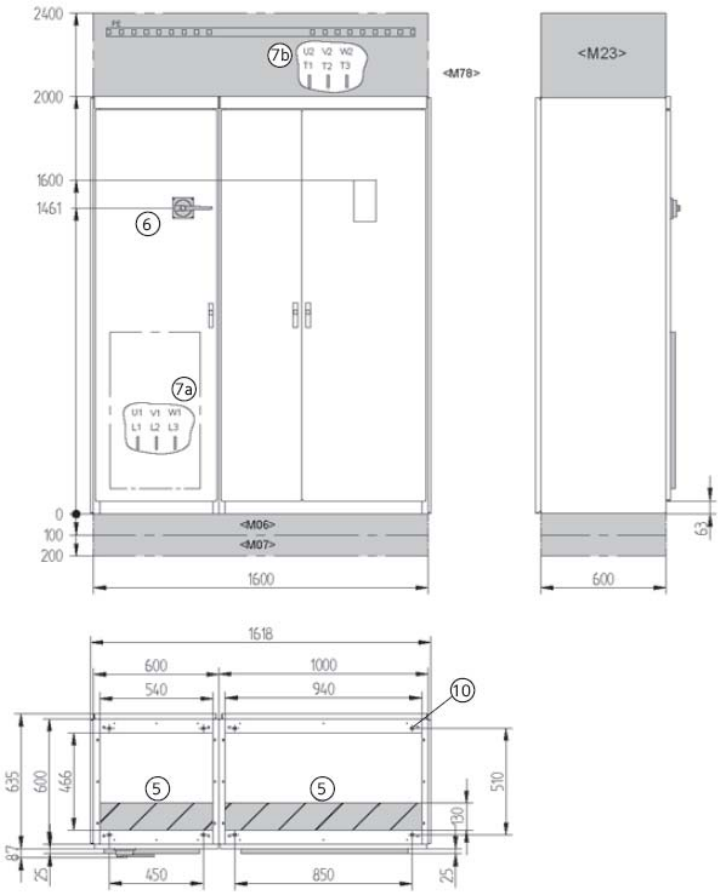
Degree of protection



Converter cabinet units (continued)

Dimension drawing 20: 380v~415V 500KW

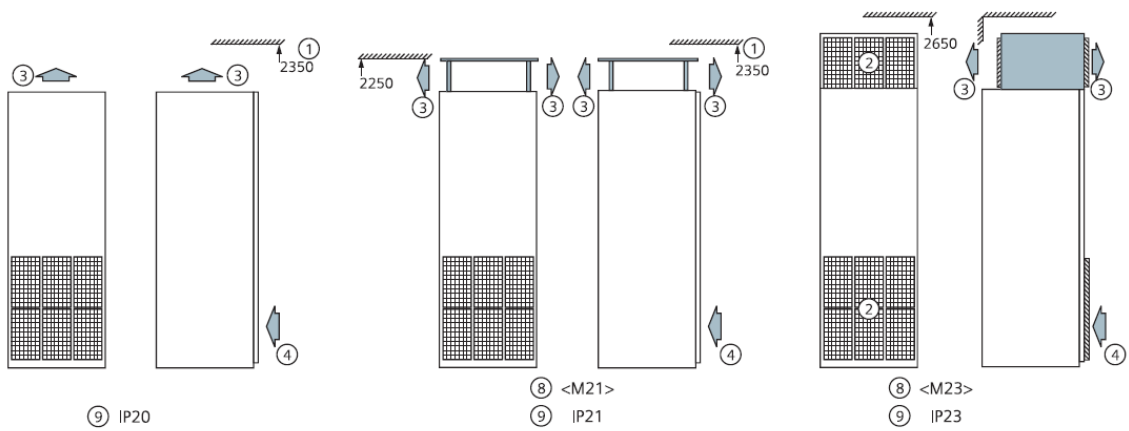
Line and motor connection from below



1) The minimum height of the installation room
2) Ventilation grille
3) Air outlet
4) Air inlet
5) Cable routes within the shaded area
6) Main switch, can be locked with normal locked
7a) Line connection terminal
7b) Motor connection terminal
8) Options, degree of protection
9) Degree of protection
   IP20
   IP21
   Option M21
   IP23
   Option M23
10) Transport parts

***** Options are shown in gray.

Degree of protection



SINAMICS V50

Engineering information

4

4/2 Customer’s terminal block

4/5 EMERGENCY STOP functions

4/6 Conductor cross-section and connection

Grounding

4/7 Line-side components

Load-side components

Max. connectable cable length

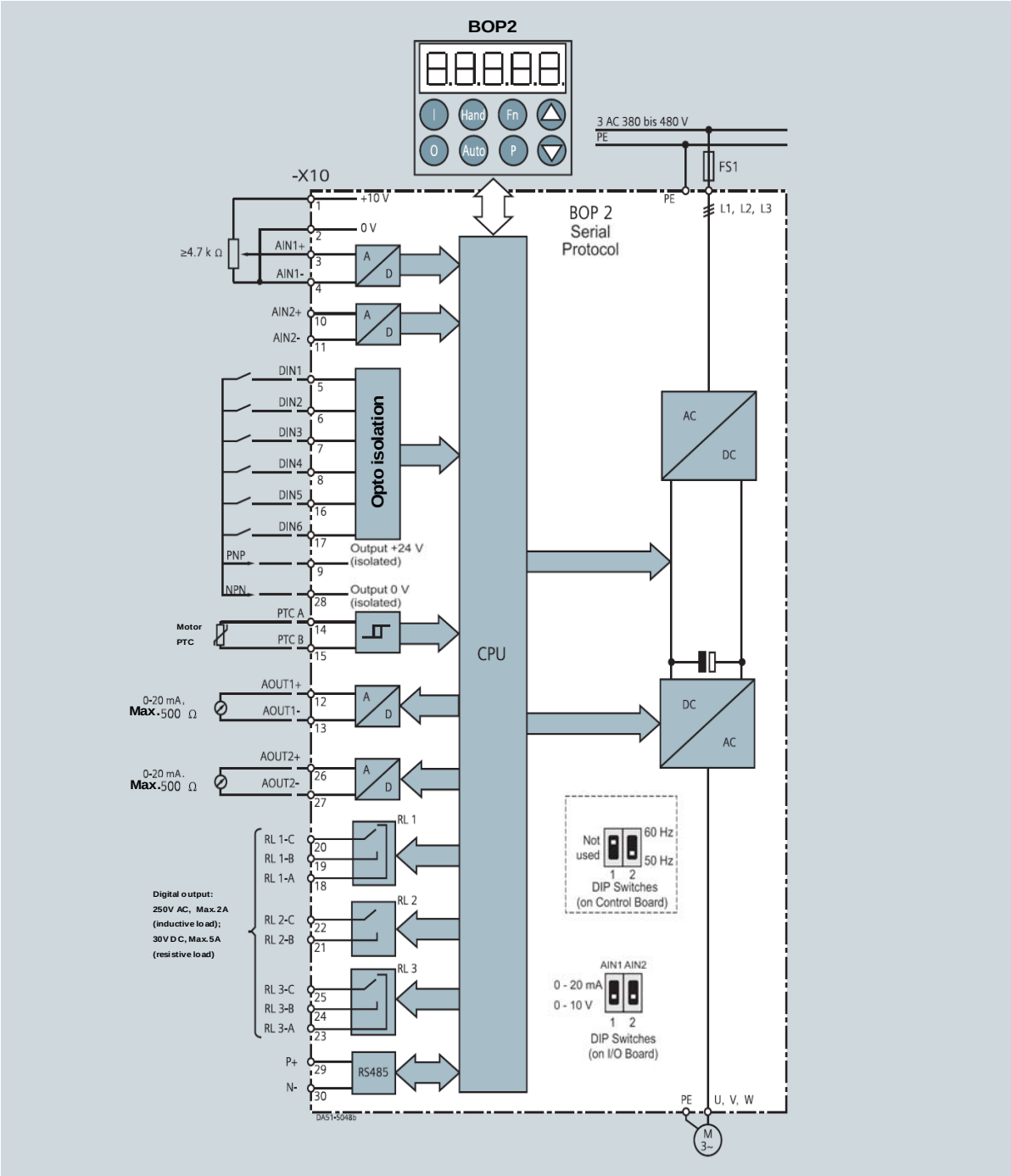
4/8 Dimensioning drives

4/9 Motors

Engineering information

Customer's terminal block

The factory default setting and the description for the terminal block can be found in the circuit diagram.

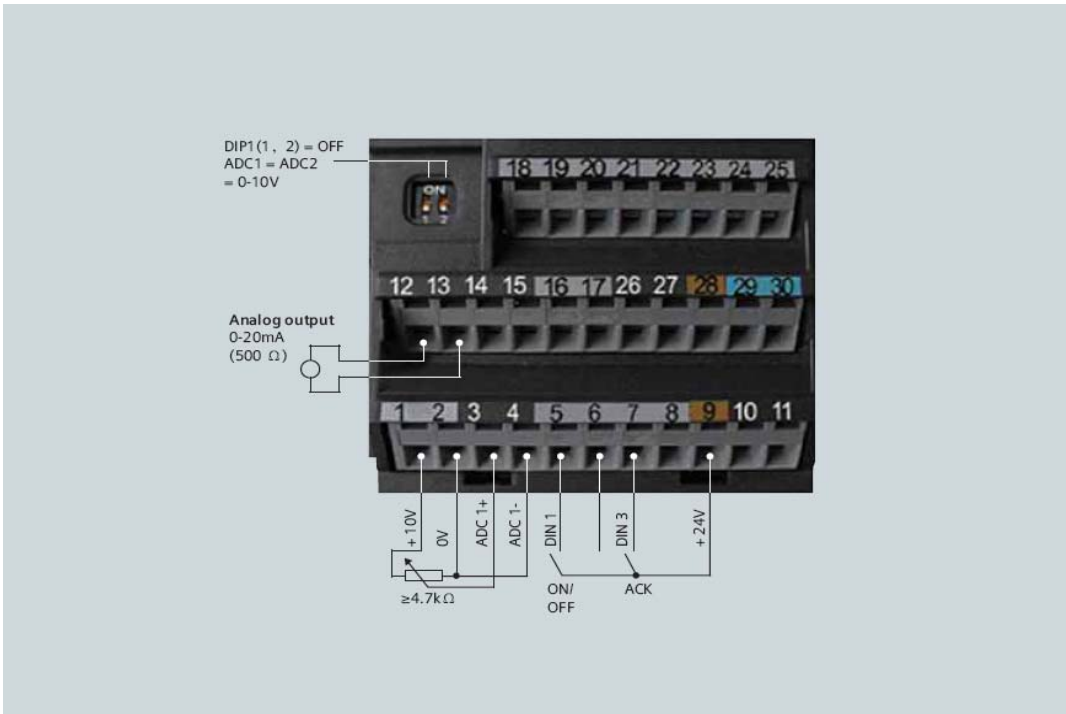


customer's terminal block – X10

Notes: the analog inputs can be used as digital input (DIN7 and DIN8).

Engineering information

Customer's terminal block (continued)

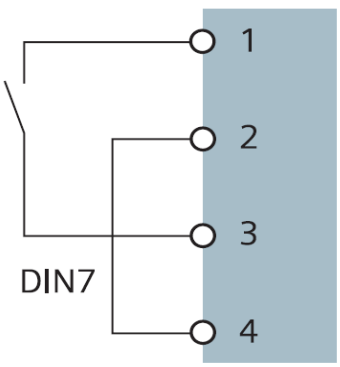


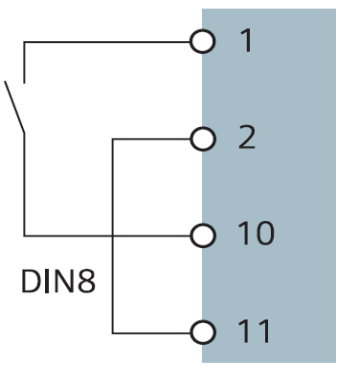
The analog inputs can be used as digital input (DIN7 and DIN8).

When an analog input is configured as a digital input, the threshold value are as follows:

1.75V DC = off

3.7V DC = on





Engineering information

customer's terminal block (continued)

Terminal	Meaning	Comments
-X10:1	10V	Direct current 10V output
-X10:2	0V	Generated voltage zero potential reference point
-X10:3	ADC1+	Analog input 1“+”
-X10:4	ADC1-	Analog input 1“-”
-X10:5	DIN1	Digital input 1
-X10:6	DIN2	Digital input 2
-X10:7	DIN3	Digital input 3
-X10:8	DIN4	Digital input 4
-X10:9	24V	Isolate potential DC24V input /Imax=100 mA)
-X10:10	ADC2+	Analog input 2“+”
-X10:11	ADC2-	Analog input 2“-”
-X10:12	DAC1+	Analog output 1“+”
-X10:13	DAC1-	Analog output 1“-”
-X10:14	PTCA	Motive temperature sensor KTY84 joint point
-X10:15	PTCB	Motive temperature sensor KTY84 joint point
-X10:16	DIN5	Digital input 5
-X10:17	DIN6	Digital input 6
-X10:18	DOUT1/NC	Digital output 1/normally-closed contact
-X10:19	DOUT1/NO	Digital output 1/normally-open contact
-X10:20	DOUT1/COM	Digital output 1/mid-position contact
-X10:21	DOUT2/NO	Digital output 2/normally-open contact
-X10:22	DOUT2/COM	Digital output 2/ 1/mid-position contact
-X10:23	DOUT3/NC	Digital output 3/normally-closed contact
-X10:24	DOUT3/NO	Digital output 3/normally-open contact
-X10:25	DOUT3/COM	Digital output 3/ 1/mid-position contact
-X10:26	DAC2+	Analog output 2“+”/input signal range 0~10V, 0~20mA
-X10:27	DAC2-	Analog output 2“-”
-X10:28	0V	Isolate potential DC zero potential reference point
-X10:29	P+	RS485 interface
-X10:30	N-	RS485 interface

Engineering information

EMERGENCY STOP functions

EMERGENCY STOP functions may be essential for certain drive applications. In accordance with EN 60204, an EMERGENCY STOP must be designed as a category 0 or category 1 stop.

Stop of category 0:

Uncontrolled shutdown by immediately switching off the power supply. Motor coasts. This corresponds to immediate stopping of the inverter, in association with intrinsically-safe disconnection of the main contactors or – for greater power ranges – of the circuit breaker.

Stop of category 1:

Controlled shutdown, where the power supply is retained until standstill is reached. This can be implemented by means of a rapid stop in association with intrinsically-safe disconnection of the main contactors or the circuit breaker.

Comment:
Only a category 0 stop is sensible for converters that do not have braking facilities. An EMERGENCY STOP with a category 1 stop generally requires a braking facilities (braking unit or converter with regenerative feedback).

The category selection must be based on the risk evaluation of the drive unit.

To achieve this, the drives can be roughly divided into the following group.

Case A:

Drives that are quickly braked to zero speed by the connected load when they are shut down.

Typical example: **pumps**

For these, an EMERGENCY STOP with category 0 is sufficient.

Case B:

Drives with larger rotating masses that are braked to zero seed by the connected load when they are shut down.

Typical example: **fans**

For these, an EMERGENCY STOP with category o is sufficient if the coasting time can be tolerated. If, however, a shutdown within a specific time is required for the EMERGENCY STOP case, a category 1 EMERGENCY STOP may be required. In certain circumstances this can require a braking facility, even when this is not required for the actual drive application.

Notes:

For SINAMICS V50, a EMERGENCY STOP with category 0 is sufficient.

Engineering information

Required cable cross-sections for line and motor connections

It is always recommendable to use 3-wire three-phase cables or to connect several cables of this type in parallel. There are two main reasons for this:

•In this manner, the high IP54 degree of protection can be achieved for the motor terminal box without any problems because the cables are introduced into the terminal box via screwed glands and the number of possible glands is limited by the geometry of the terminal box. Single cables are less suitable.

•With three-phase cables, the summed ampere-turns over the cable outer diameter is equal to zero and they can be routed in (conductive, metal) cable ducts or racks without any noticeable currents (ground current or leakage current) being induced in these conductive, metal connections. The danger of induced leakage currents and thus of increased cable sheath losses is greater for single cables.

The cable cross-section required depends on the current transmitted in the cable. The permissible current loading of cables is defined e.g. in DIN VDE 0298 part 2/DIN VDE 0276-1000. It depends partly on the ambient conditions such as temperature and partly on the type of routing. When laid singly, the cables are cooled relatively well. Where there are several cables routed together, they can heat each other up, and thus receive much poorer ventilation. Reference should be made to the corresponding reduction factors for such condition as specified in DIN VDE 0298 Part 2/DIN VDE 0276-1000. With an ambient temperature of 40℃, the cross-sections of copper cables can be based on the following table.

Current loading in accordance with DIN VDE 0298 Part 2 at 40℃

Cross-section of 3-wire cable	With single routing	With several cables on a common cable rack
50mm²	138A	95A
70mm²	176A	121A
95mm²	212A	146A
120mm²	245A	169A
150mm²	282A	194A
185mm²	323A	222A
240mm²	380A	261A
300mm²	418A	289A

With higher currents, cables must be connected in parallel.

Grounding

Required PE conductor cross-sections:

The PE conductor must be dimensioned taking in to account the following data:

•In the event of a ground fault caused by voltage losses of the ground fault current on the PE conductor, no impermissible high contact voltages may occur (<50V AC or 120V DC, EN50178 Subsection 5.3.2.2, IEC 60364, IEC 60543).

•The ground fault current flowing in the PE conductor in the event of a ground fault must not place an impermissible load on the PE conductor.

•If it is possible for continuous currents to flow through the PE conductor when a fault occurs in accordance with EN 50178 subsection 8.3.3.4, the PE conductor cross-section must be dimensioned for this continuous current.

The PE conductor cross-section should be selected in accordance with EN 60204-1, EN60439-1, IEC 60364.

Cross-section of outer conductor	Minimum cross-section of external PE conductor
<16mm²	Minimum cross-section of outer conductor
16mm²~35mm²	16mm²
>35mm²	At least half the cross-section of outer conductor

•Switchgear and motors are usually grounded separately with a local ground electrode. With this constellation, the ground fault current flows via the parallel ground connections and is divided. With this grounding, no impermissible contact voltages can occur, despite the PE conductor cross-sections used in the above table.

•Through their fast control, the converters limit the load current (motor and ground fault currents) to a rms value corresponding to the rated current. Because of this, we recommend the use of a PE conductor cross-section that is analogous to the outer conductor cross-section for grounding the control cabinet.

Engineering information

Line-side components

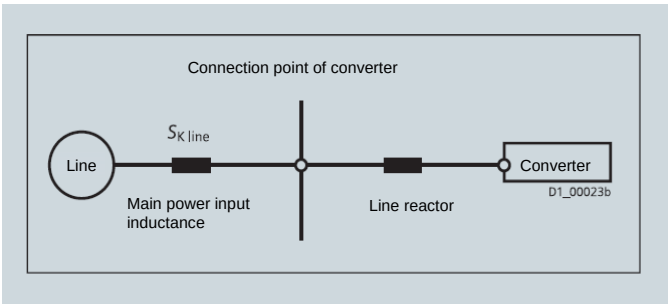
Line fuses

In SINAMICS V50, the SIEMENS fuses (3NA3) are installed as standard for protecting the line side of the converter.

•Superfast

•Low arc voltage

•Improved current limiting



Line reactor

A line reactor is required for high system short-circuit power, partly to protect the converter against excessive harmonic currents, and thus against overload, and partly to limit the harmonic effects on the system to the permissible values. The harmonic current are limited by the complete inductance comprising the line reactor and main power input inductance.

The SINAMICS V50 cabinet units are equipped with a 2% line reactor as standard.

Load-side components

motor reactor (L08)

IGBT-converter switching frequencies result in high voltage rises dv/dt at the converter output. If long motor cables are used, this leads to an additional current load on the converter due to capacitive charge/discharge currents.

In addition to, the high voltage rises, and the resulting voltage peaks at the motor terminals, cause the motor's electrical winding load to increase in comparison to direct on-line operation.

The motor reactor (L08) can limit the voltage rise dv/dt and the voltage peak at the motor terminal.

dv/dt filter plus VPL (L10)

The dv/dt filter plus VPL is used for the non-SIEMEN motors which the voltage endurance of the insulation system is unknown or insufficient.

The dv/dt filter plus VPL limit the rate of voltage rise to <500V/µs and the typical voltage peaks at rated line voltages to the the value <1000V.

Max. connectable motor cable length

Refer to page 2/6

Engineering information

Dimensioning drives

Drives with quadratic load torque

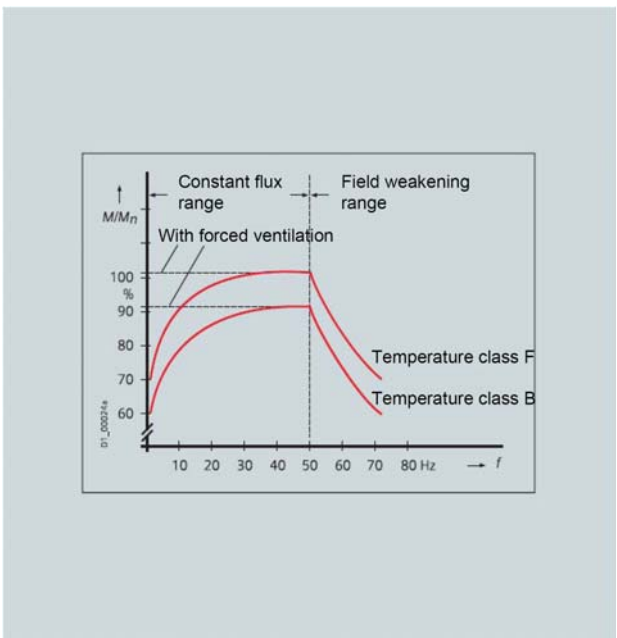
Drives with a quadratic load toque($M \sim n^2$), such as drives for pumps and fans, require the full torque at the rated speed.

Increased starting torques or high load surges do not usually occur. It is therefore unnecessary to provide a higher overload capability for the converter.

The following applies to selection of a suitable converter for drives with a quadratic load torque:

The rated current of the converter must be at least as large as the motor current at full torque in the required load point.

When using standard 1LG4/1LG6 and 1LA8 motors, these motors can also be loaded with the full rated power even in converter mode. They are then utilized to full advantage in accordance with temperature class F. However, if the motors may only be utilized to full advantage in accordance with temperature class B, the motor power must be reduced by 10%.



Typical curve of the permisible torque with self-ventilated motors (e.g. 1LA) with a rated frequency of 50Hz

Rated current-permissible and non-permissible motor/converter combinations

Drives with a quadratic load torque($M \sim n^2$),such as drives for pumps and fans, require the full torque at the rated speed. The rated current of the converter must be at least as large as the motor current at full torque in the required load point.

Motor rated current greater than converter rated current

If a motor is used whose rated current is greater than the rated converter current, this means that the motor can only be operated at partial load. The following limit must be observed.

The maximum possible converter current (overload current) should be greater than or equal to the rated current of the connected motor.

If this dimensioning is not observed, current peaks which can either lead to switching-off or can cause a continuous reduction in power by the internal protection circuit can occur as a result of the low leakage inductance of larger motors.

Rated motor current much smaller than converter rated current

The rated motor current for the sensorless Vector Control used must be at least ¼ of the rated converter current. With smaller motor currents, operation using the V/f control mode is possible.

Engineering information

Motors

1LA and 1LG motor

It is generally recommendable to use the standard Siemens motors 1LA and 1LG.
With regard to the voltage stress, the standard insulation of the motors is designed such that operation on the converter is possible without limitation at voltages V≤500V.
For detailed data about motor types, please refer to catalog M11.

Self-ventilated, IP55 (1LG4/1LG6 and 1LA8)

1LG4/1LG6 motors

1LA8 motors

The 1LG4/1LG6 and 1LA8 motors are self-ventilated motors with IP55 degree of protection. Both the internal and external fans (which are fitted in each motor) have a fixed connection to the shaft.
The cooling effect is therefore directly dependent on the motor speed.

Other motors

In addition to the 1LA and 1LG motors, the 1PH7/1PL6 compact asynchronous motors can also be used. These are recommended for:
Large speed range with high maximum speeds.
Limited mounting space.
1PH7/1PL6 motors are on average 1 to 2 shaft heights smaller than comparable standard asynchronous motors with the same rated output.

Line voltages>500V for 1LA/1LG motors

The standard insulation of the 1LA and 1LG motors is designed such that operation without limitation is only possible on the converter at line voltages of 500V+10%.
At higher voltages, the motor require greater insulation resistance.
1LA8/1PQ8 and 1LG6 motors are also available with a higher insulation resistance for converter-fed operation with voltages up to 690V;no filters are required in the case. These motors are identified by an “M” as the 10th digit of the Order No.(e.g.1LA8315-2PM).
With the reinforced insulation system, there is less space in the grooves for the same number of windings compared to the normal version, which slightly reduces the rated output of these motors.

Motor protection

A motor protection function can be implemented using the I^2t detection present in the converter software.
If precise motor protection is required, this can be afforded by direct temperature measurement using KTY84 sensors or PTC thermistors in the motor winding.
When using the KTY84 sensors, motor option **A23** must be specified when ordering 1LA8 and 1LG4/1LG6 motors. With 1PH7 and 1PL6 motors, the sensors are fitted as standard.
If PTC thermistors are required, motor option **A11** or **A12** must be specified when ordering 1LG4/1LG6 motors. With 1LA8/1PQ8 motors, the sensors are fitted as standard.
The KTY84 sensor and PTC thermistor can be evaluated by connecting.

- to the customer's terminal block in the converter (SINAMICS G150)
- to the –X41 terminal of the Power Module (SINAMICS G130)

Engineering information

Motors (continued)

PT100 temperature sensors (resistance thermometers) are alternatively possible for the 1LA8 and 1LG4/1LG6 motors for monitoring the motor winding temperature. When ordering the motor, either option **A60**(3×PT100) or **A61**(6×PT100) must be selected.
A separate evaluation unit is available (option **L86**) for evaluation of the PT100 temperature sensors in the SINAMICS G150 drive converter cabinet unit.

Bearing currents

In order to apply currents to the motor which are sinusoidal as far as possible (smooth running, oscillation torques stray losses), a high clock frequency is required for the converter's output voltage. The rated (Very steep) switching edges of the converter output voltage (and also, therefore, of the common-mode voltage) cause correspondingly high capacitive currents and voltages on the machine's internal capacitances.
This physical effect, which occurs in isolated cases, has mostly been observed in connection with large motors.

The most important measures for reducing bearing currents:

- Insulated motor bearing at the non-drive end. The insulated bearing is standard for all 1LA8 motors designated for converter operation.
- Use of motor reactors (option **L08**)

Operation of motors with type of protection "d"

1MJ asynchronous motors can be connected as explosion-proof motors with flameproof enclosure EEx de llC both to the line and the converter.
In accordance with the test guidelines, the motors of the 1MJ series must be equipped with PTC thermistors.
If 1MJ motors are connected to converters, their maximum permissible torque must be reduced, depending on the load characteristic, when utilized in accordance with temperature class B, just like the motors of the 1LA series with the same power.
1MJ motors have a terminal box with increased safety EEx ell as standard. No.(e.g.1LA8315-2PM).

SINAMICS V50

Appendix

5

5/2 Environment, resources and recycling

5/3 ISO 9001, ISO 14001

Appendix

Environment, resources and recycling

Siemens AG feels a responsibility to play a role in protecting our environment and saving our valuable natural resources. This is true for both our production and our products. Even during development, we consider any possible environmental impact of future products/systems. Our aim is to prevent harmful environmental effects or at least to reduce them to an absolute minimum – beyond present regulations and legislation.

The most important activities for protecting our environment are as follows:

- We are constantly endeavoring to reduce the environmental impact of our products as well as their consumption of energy and resources over and above the statutory environmental protection regulations.

- We take every possible step to prevent damage to the environment.

- Environmental impact is assessed and considered at the earliest possible stage of product and process planning.

- Our optimized environmental management strategy ensures that our environmental policy is put into practice effectively. The necessary technical and organizational procedures are reviewed at regular intervals and continuously updated.

- An awareness for environmental problems is expected of all our employees. Establishing and furthering a sense of responsibility for the environment on all levels represents a permanent challenge for the corporate management.

- We urge our business partners to act according to the same environmental principles as ourselves. We cooperate with the responsible public authorities.

- We inform interested members of the public about the consequences of our corporate policies for the environment as well as our achievements to the benefit of the environment.

- Our complete documentation is printed on chlorinefree bleached paper.

Appendix

ISO 9001, ISO 14001

CERTIFICATE

DQS GmbH
Deutsche Gesellschaft zur Zertifizierung von Managementsystemen

hereby certifies that the company

Siemens Electrical Drives Ltd.
SIEMENS

No. 1, Haitaichuangxin 5th Road (Outside Outer Ring Road),
Huayuan Industry Development Area, Tianjin Hi-Tech Industry Park
300384, Tianjin
P.R. China

for the scope

Manufacturing, Delivery and Service of
Adjustable Speed Electrical Power Drives and Electrical Machine

has implemented and maintains a

Quality Management System.

An audit, documented in a report, has verified that this
quality management system fulfils the requirements
of the following standard:

DIN EN ISO 9001: 2000
December 2000 edition

This certificate is valid until 2010-12-18
Certificate Registration No.: 302235 QM
Frankfurt am Main 2007-12-19

Ass. iur. M. Drechsel
Dipl.-Ing. S. Heinloth
MANAGING DIRECTORS

D-60433 Frankfurt am Main, August-Schanz-Straße 21

CERTIFICATE

DQS GmbH
Deutsche Gesellschaft zur Zertifizierung von Managementsystemen

hereby certifies that the company

Siemens Electrical Drives Ltd.
SIEMENS

No. 1, Haitaichuangxin 5th Road (Outside Outer Ring Road),
Huayuan Industry Development Area, Tianjin Hi-Tech Industry Park
300384, Tianjin
P.R. China

for the scope

Manufacturing, Delivery and Service of
Adjustable Speed Electrical Power Drives and Electrical Machine

has implemented and maintains an

Environmental Management System.

An audit, documented in a report, has verified that this
environmental management system fulfils the requirements
of the following standard:

EN ISO 14001 : 2004
November 2004 edition

This certificate is valid until 2010-12-20
Certificate Registration No. 302235 UM
Frankfurt am Main 2007-12-21

Ass. iur. M. Drechsel
Dipl.-Ing. S. Heinloth
MANAGING DIRECTORS

D-60433 Frankfurt am Main, August-Schanz-Straße 21

Asia-Pacific Sales Offices

ASEAN/ANZ
3 Anson Road
#20-01 Springleaf Tower
Singapore, 79909
65 6333 8998 (v)
65 6239 1188 (f)

China
No. 1 Guang Hua Road
North Office Tower, Unit 1007-1016
Chao Yang District, Beijing 100020
86 10 85299888 (v)
86 10 85299777 (f)

No. 86, Section 1, Ren Min Nan Road
City Tower, Unit C, D 21F
Chengdu, 610015
86 28 8619 8816 (v)
86 28 8619 8629 (f)

International Chamber of Commerce Tower
Fuhua Rd. 3, Room 2801
Futian District, Shenzhen 518048
86 755 8246 1838 (v)
86 755 8246 1868 (f)

No. 1366 Nanjing Road West
II Plaza 66, 30F
Shanghai, 200040
86 021-2208 6688 (v)
86 021-2208 6699 (f)

1018 Changning Road
Cloud-9 Office Tower, 15/F
Shanghai, 200042
86 21 2208 7000 (v)
86 21 5298 5960 (f)

Room 313, Shun Hing Square
Di Wang Commercial Centre, 5002
Shennan Road East
Shenzhen, 518008
86 755 8246 1838 (v)
86 755 8246 1868 (f)

18 Harbour Road
68/F Central Plaza, Suites 6804-8
Wan Chai,
852 2230 3333 (v)
852 2230 3210 (f)

India
No.11 Palace Road
Ground Floor, Niton Building
Bangalore, 560052
91 80 22250423 (v)
91 80 22280196 (f)

Mehrauli-Gurgaon Road
Global Business Park, Tower D, 16th Floor
Gurgaon, Haryana 122002
91 124 509 2244 (v)
91 124 509 2211 (f)

Survey No. 372/2-4+5+6/B North Main Rd.
White House, Koregaon Park
Pune, 411001
90 20 30512600 (v)
91 20 26137254 (f)

Japan
Atsugi Axt Main Tower, 14F
3050 Okada, Atsugi-Shi
Atsugi, Kanagawa 246-0021
81 46 226 7850 (v)
81 46 229 1067 (f)

Hiroshima East Building, 7F
1-3-53 Danbara-Minami
Minami-Ku, Hiroshima 732-0814
81 82568 7440 (v)
81 82 261 7660 (f)

15F Main Building, Nagoya Mitsui Building
1-24-30 Meieki Minami, Nakamura-
Nagoya, Aichi 450-0003
81 52 581 7037 (v)
81 52 588 2671 (f)

Odakyu Southern Tower, 9F
2-2-1 Yoyogi
Shibuya-ku, Tokyo 151-8583
81 3 5354 6700 (v)
81 3 5354 6780 (f)

South Korea
7/F, Suhyup Chungang Bldg.
77-1, Sangnam Dong
Changwon, 641-010
82 55 264 8150 (v)

17F, Haesung-2 Bldg.
942-10 Daechi-Dong
Kangnam-ku, Seoul 135-725
82 2 3016 2000 (v)
82 2 579 0574 (f)

KSCF Building, 3F
116-1 Dal-Dong
Nam-Gu, Ulsan 680-020
82 52 256 6151-2 (v)

Taiwan
9/F, No. 63, Chou-Tze Street
Neihu, Taipei
886 2 265 70000 (v)
886 2 265 76677 (f)