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1 Scope of delivery

1.1 System overview

The SINUMERIK 808D ADVANCED control system is an economic numerical control system for milling or turning machines. The SINUMERIK 808D ADVANCED controller, coupled with the high performance SINAMICS V70 feed/spindle drive, SIMOTICS S-1FL6 feed motor, and SIMOTICS M-1PH1 main motor, is able to control up to five axes including analog/digital spindles.

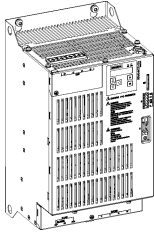

Control system versions

| Control system | | SINUMERIK 808D ADVANCED T | | SINUMERIK 808D ADVANCED M | |
|-----------------------------|---|---------------------------------|-------------------------|---------------------------------|-------------------------|
| Applicable machine tools | | Turning machines | | Milling machines | |
| PPU | PPU variants | PPU161.3 | PPU160.2 | PPU161.3 | PPU160.2 |
| | Applicable software version | V4.7.1 | V4.6.2 | V4.7.1 | V4.6.2 |
| | Panel layout | Horizontal | Vertical | Horizontal | Vertical |
| | Operator panel with English keys | √ | √ | √ | √ |
| | Operator panel with Chinese keys | √ | √ | √ | √ |
| MCP | Configurable MCPs are available in the following versions: <ul style="list-style-type: none"> • Horizontal MCP, with English keys and override switches • Horizontal MCP, with Chinese keys and override switches • Vertical MCP, with English keys and a reserved slot for the handwheel • Vertical MCP, with Chinese keys and a reserved slot for the handwheel • Vertical MCP, with English keys and an override switch for the spindle • Vertical MCP, with Chinese keys and an override switch for the spindle | | | | |
| Number of configurable axes | Total | Up to 5 | | Up to 5 | |
| | Standard axes | 3 | 3 | 4 | 4 |
| | Additional axes (license required) | 2 | 2 | 1 | 1 |
| Communication with drive | | Drive Bus interface | | Drive Bus interface | |
| Configurable drives | | SINAMICS V70 feed/spindle drive | SINAMICS V70 feed drive | SINAMICS V70 feed/spindle drive | SINAMICS V70 feed drive |
| Configurable motors | | SIMOTICS S-1FL6/SIMOTICS M-1PH1 | SIMOTICS S-1FL6 | SIMOTICS S-1FL6/SIMOTICS M-1PH1 | SIMOTICS S-1FL6 |

√: available

1.2 Drives and motors





Components in the SINAMICS V70 spindle drive package

| Component | Quantity (pieces) | Illustration | Outline dimension (Width x Height x Depth, mm) | Frame size | Rated output current (A) | Order number |
|----------------------------|-------------------|---|--|------------|--------------------------|--------------------|
| SINAMICS V70 spindle drive | 1 |  | 190 x 350 x 185 | FSD | 29.8 | 6SL3210-5DE23-0UA0 |
| Connector | 1 |  | STO/24 V power supply connector | | | |
| User documentation | 1 | Safety Instructions | | | | |

SINAMICS V70 spindle drive rating plate

SIEMENS

- Drive name —● SINAMICS V70 SPINDLE
- Mains input —● INPUT: 3AC 380-480V 13.2A 50/60Hz
- Motor output —● OUTPUT: 3AC 0-input V 10.5A 0-400Hz
- Rated motor power and IP protection class —● IP CLASS: IP20 MOTOR: 3.7kW_1500rpm FS: 01
- Order number —● 1P 6SL3210-5DE21-1UA0
- Product serial number —● S ZVXXXXXXXXXX
- Part number —● SNC-A5E36061591

Refer to user manual Made in China

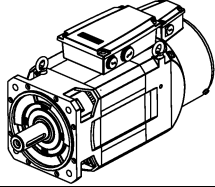
Siemens Numerical Control Ltd., Nanjing

No. 18 Siemens Rd, Jiangning Dev. Zone, Nanjing, 211100, P.R.C

Explanation of SINAMICS V70 spindle drive order numbers

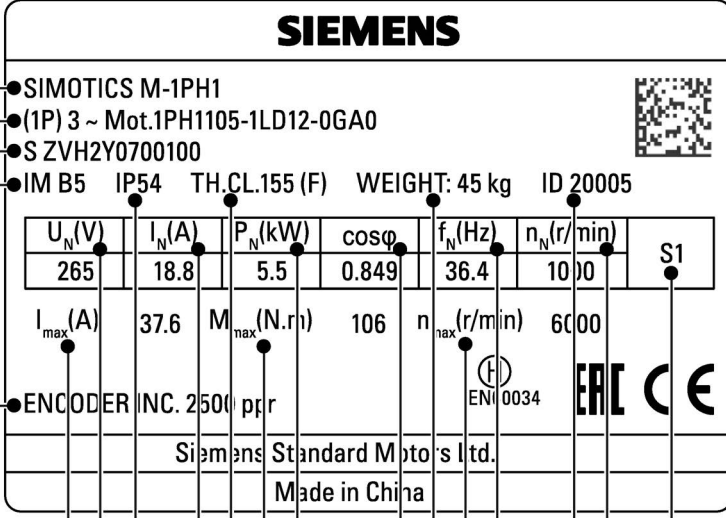
| Data position of the order number | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | | |
|------------------------------------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|---|---|
| Order number | 6 | S | L | 3 | 2 | 1 | 0 | - | 5 | D | • | □ | □ | - | □ | U | A | 0 |
| Mains voltage: 3 AC 380 V to 480 V | | | | | | | | | | E | | | | | | | | |
| Frame size | | | | | | | | | | | | | | | | | | |
| Motor output power | | | | | | | | | | | | | | | | | | |
| FSD | | | | | | | | | | | | 2 | 3 | | 0 | | | |

Components in the SIMOTICS M-1PH1 main motor package

| Component | Illustration | Shaft height (mm) | Rated power (kW) | Rated speed (rpm) | Order number ¹⁾ |
|----------------------------|---|-------------------|------------------|-------------------|----------------------------|
| SIMOTICS M-1PH1 main motor |  | 132 | 7.5 | 1000 | 1PH1131-1□D1□-□GA0 |
| | | | 11 | 1500 | 1PH1131-1□F1□-□GA0 |
| User documentation | SIMOTICS M-1PH1 Main Motor Installation Guide | | | | |

¹⁾ For more information about the order numbers, see the motor order number explanation described later in this section.

SIMOTICS M-1PH1 main motor rating plate



SIEMENS

① ● SIMOTICS M-1PH1
 ② ● (1P) 3 ~ Mot.1PH1105-1LD12-0GA0
 ③ ● S ZVH2Y0700100
 ④ ● IM B5 IP54 TH.CL.155 (F) WEIGHT: 45 kg ID 20005

| U _N (V) | I _N (A) | P _N (kW) | cosφ | f _N (Hz) | n _N (r/min) | S1 |
|--------------------|--------------------|---------------------|-------|---------------------|------------------------|----|
| 265 | 18.8 | 5.5 | 0.849 | 36.4 | 1000 | |

I_{max}(A) 37.6 M_{max}(N.m) 106 n_{max}(r/min) 6000

⑤ ● ENCODER INC. 2500 ppr

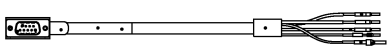
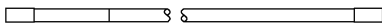

Siemens Standard Motors Ltd.
Made in China

⑥ ⑦ ⑧ ⑨ ⑩ ⑪ ⑫ ⑬ ⑭ ⑮ ⑯ ⑰ ⑱

- ① Motor type
- ② Order number
- ③ Serial number
- ④ Mounting orientation
- ⑤ Encoder type and resolution
- ⑥ Maximum current
- ⑦ Rated voltage
- ⑧ Degree of protection
- ⑨ Rated current
- ⑩ Thermal class
- ⑪ Maximum torque
- ⑫ Rated power
- ⑬ Motor power factor
- ⑭ Weight
- ⑮ Maximum speed
- ⑯ Rated frequency
- ⑰ Motor ID
- ⑱ Rated speed
- ⑲ Motor operating mode

Explanation of the SIMOTICS M-1PH1 main motor order numbers










| Data position of the order number | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | | |
|--------------------------------------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|---|---|
| Order number | 1 | P | H | 1 | □ | □ | □ | - | • | □ | □ | • | □ | - | □ | • | • | • |
| Shaft height | | | | | | | | | | | | | | | | | | |
| 132 mm | | | | | 1 | 3 | | | | | | | | | | | | |
| Rated power and speed (SH132) | | | | | | | | | | | | | | | | | | |
| 7.5 kW, 1000 rpm; 11 kW, 1500 rpm | | | | | | | 1 | | | | | | | | | | | |
| Asynchronous variant | | | | | | | | 1 | | | | | | | | | | |

| Component | Illustration | Order number | Length (m) |
|---|---|--------------------|------------|
| PPU (analog spindle interface) to Siemens inverter or third-party drive (with analog input) | | | |
| Spindle setpoint cable |  | 6FC5548-0BA05-1AD0 | 3 |
| | | 6FC5548-0BA05-1AE0 | 4 |
| | | 6FC5548-0BA05-1AF0 | 5 |
| | | 6FC5548-0BA05-1AH0 | 7 |
| | | 6FC5548-0BA05-1BA0 | 10 |
| | | 6FC5548-0BA05-1BF0 | 15 |
| | | 6FC5548-0BA05-1CA0 | 20 |
| SINAMICS V70 spindle drive to 1PH1 motor | | | |
| MOTION-CONNECT 500 power cable (4 x 4 mm ² , raw cable), for 1PH1 5.5 kW to 7.5 kW motor |  | 6FX5008-1BB31-1DA0 | 30 |
| MOTION-CONNECT 500 power cable (4 x 10 mm ² , raw cable), for 1PH1 11 kW motor | | 6FX5008-1BB51-1DA0 | |
| MOTION-CONNECT 300 incremental encoder cable |  | 6FX3002-2CT30-1AD0 | 3 |
| | | 6FX3002-2CT30-1AF0 | 5 |
| | | 6FX3002-2CT30-1AH0 | 7 |
| | | 6FX3002-2CT30-1BA0 | 10 |
| | | 6FX3002-2CT30-1BF0 | 15 |
| | | 6FX3002-2CT30-1CA0 | 20 |

Note

- The MOTION-CONNECT 300 cables, MOTION-CONNECT 500 cables, and spindle setpoint cables given above are suitable for use in drag chains.
- No additional MOTION-CONNECT 300 power cables are available for 1PH1 motors. The 30 m MOTION-CONNECT 500 power cables (raw cables) listed above could be selected for using with 1PH1 motors. You must assemble the power cable with connectors by yourself. For more information about how to assemble the power cable, see Section "Assembling the power cable for the 1PH1 motor (Page 31)".

Recommended connectors for 1PH1 motor power cables

| Power cable | Motor side | | | | | Drive side | | | | |
|------------------------|------------|--------------|---|-------------------|----------|------------|--------------|---|-------------------|-----------------|
| | Supplier | Order number | Picture | Quantity (pieces) | Used for | Supplier | Order number | Picture | Quantity (pieces) | Used for |
| 4 x 4 mm ² | KST | RNYL 5-5 |  | 3 | U/V/W | KST | SNYL5-5 |  | 3 | U/V/W |
| | KST | RNY 5-6 |  | 1 | PE | KST | RNY 5-5 |  | 1 | PE |
| | - | - | - | - | - | IDEAL | 6204 |  | 1 | Cable shielding |
| 4 x 10 mm ² | KST | TLK 10-5 |  | 3 | U/V/W | KST | TLK 10-5 |  | 4 | U/V/W/PE |
| | KST | TLK 10-6 |  | 1 | PE | - | - | - | - | - |
| | - | - | - | - | - | IDEAL | 62P08 |  | 1 | Cable shielding |

1.4 Options

1.4.1 External 24 VDC power supply

A 24 VDC power supply is used to supply the 808D ADVANCED and V70 servo drive. Consider the following technical specification requirements when selecting a 24 VDC power supply:

- 24 VDC supplying the SINUMERIK 808D ADVANCED:
 - Rated input voltage: 24 V
 - Max. input voltage: 28.8 V
 - Min. input voltage without output derating: 20.4 V
 - Rated input current: 2.25 A
- 24 VDC supplying the SINAMICS V70 drive:

| Without a holding brake | | With a holding brake | |
|-------------------------|---------------------|---------------------------------|---------------------|
| Rated voltage (V) | Maximum current (A) | Rated voltage (V) | Maximum current (A) |
| 24 (-15% to +20%) | 1 | 24 (-10% to +10%) ¹⁾ | 3 |

¹⁾ The minimum voltage of 24 VDC -10% must be available at the connector on the motor side in order to guarantee that the brake reliably opens. If the maximum voltage of 24 VDC +10% is exceeded, then the brake could re-close. The voltage drop along the brake feeder cable must be taken into consideration. The voltage drop ΔU for copper cables can be approximately calculated as follows:

$$\Delta U [V] = 0.042 \cdot (l/q) \cdot I_{\text{Brake}}$$

Where: l = Cable length [m], q = Brake core cross section [mm²], I_{Brake} = DC current of brake [A]


1.4.2 Fuse/circuit breaker

The fuse/circuit breaker is used to protect the control system.

| SINAMICS V70 | | Standard fuse | | Circuit breaker | | |
|--------------|--------------------|-------------------|--------------|-------------------|---------------------|--------------------|
| Frame size | Order number | Rated current (A) | Order number | Rated current (A) | Rated voltage (VAC) | Order number |
| FSD | 6SL3210-5DE23-0UA0 | 63 | 3NA3822 | 60 | 600 | 3VL1106-1KM30-0AA0 |

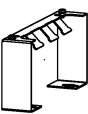
1.4.3 Braking resistors

A braking resistor is used for the SINAMICS V70 drive. For the feed drive, when the internal braking resistor cannot meet the braking requirements, an external braking resistor can be used to "dump" the regenerative energy produced by the motor, thus giving greatly improved braking and deceleration capabilities. For the spindle drive, an external braking resistor must be configured. Select a standard braking resistor according to the table below:

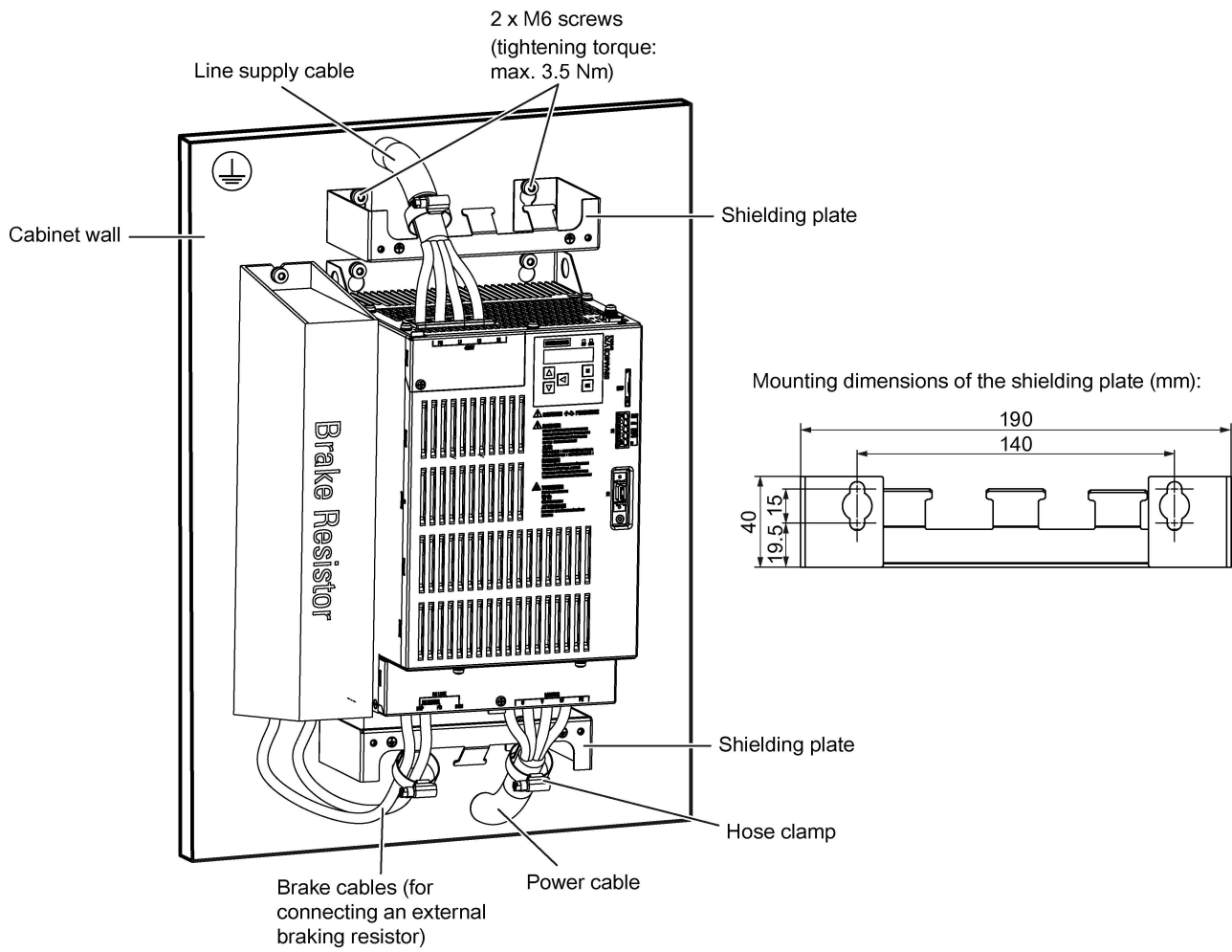
| Drive frame size | Braking resistor | | | | |
|------------------|---|----------------|-----------------|-----------------|------------------|
| | Illustration | Resistance (Ω) | Max. power (kW) | Rated power (W) | Max. energy (kJ) |
| FSD |  | 18 | 37.4 | 1870 | 299.2 |

1.4.4 Shielding plate

To achieve EMC-compliant installation of the drive, use a shielding plate to connect the cable shields. The shielding plate for V70 spindle drive FSD is provided as an option. While for V70 drives of other frame sizes, the shielding plates are provided at delivery.

| Drive frame size | Shielding plate illustration | Order number |
|------------------|---|--------------------|
| FSD |  | 6SL3266-1ED00-0VA0 |

Connecting



1.4.5 Line filters

Siemens recommends you to use a filter to protect the system from high frequency noise.

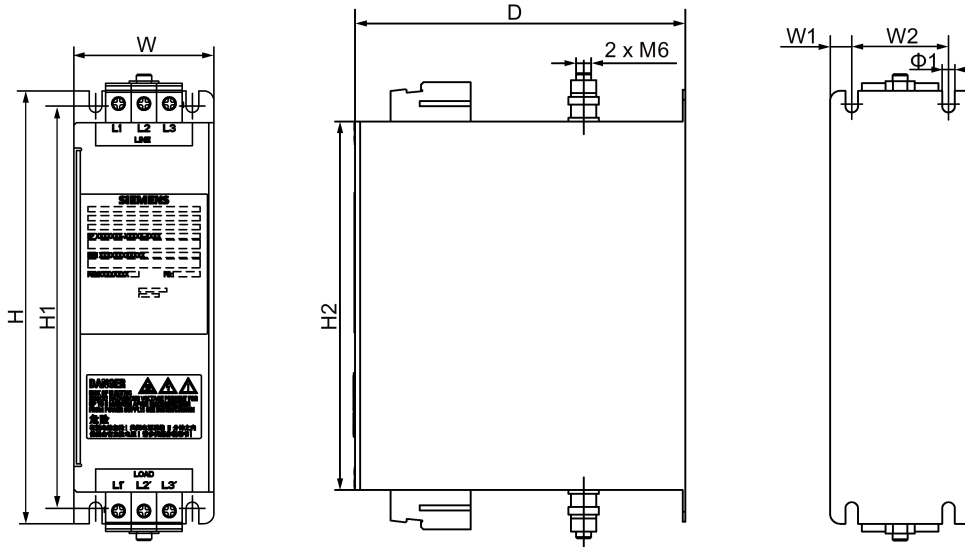
The table below lists all the filters recommended by Siemens:

| SINAMICS V70 | | Recommended filter | | |
|---------------|--------------|--------------------|------------------|--------------------|
| Drive variant | Frame size | Rated current (A) | Protection class | Order number |
| Spindle drive | FSD (29.8 A) | 36 | IP20 | 6SL3000-0BE21-6DA0 |

Basic technical data

| | |
|------------------|---|
| Rated voltage | 3-phase 380 VAC to 480 VAC (-15% to +10%) |
| Line frequency | 50/60 Hz (-10% to +10%) |
| Product standard | IEC 61800-5-1 |

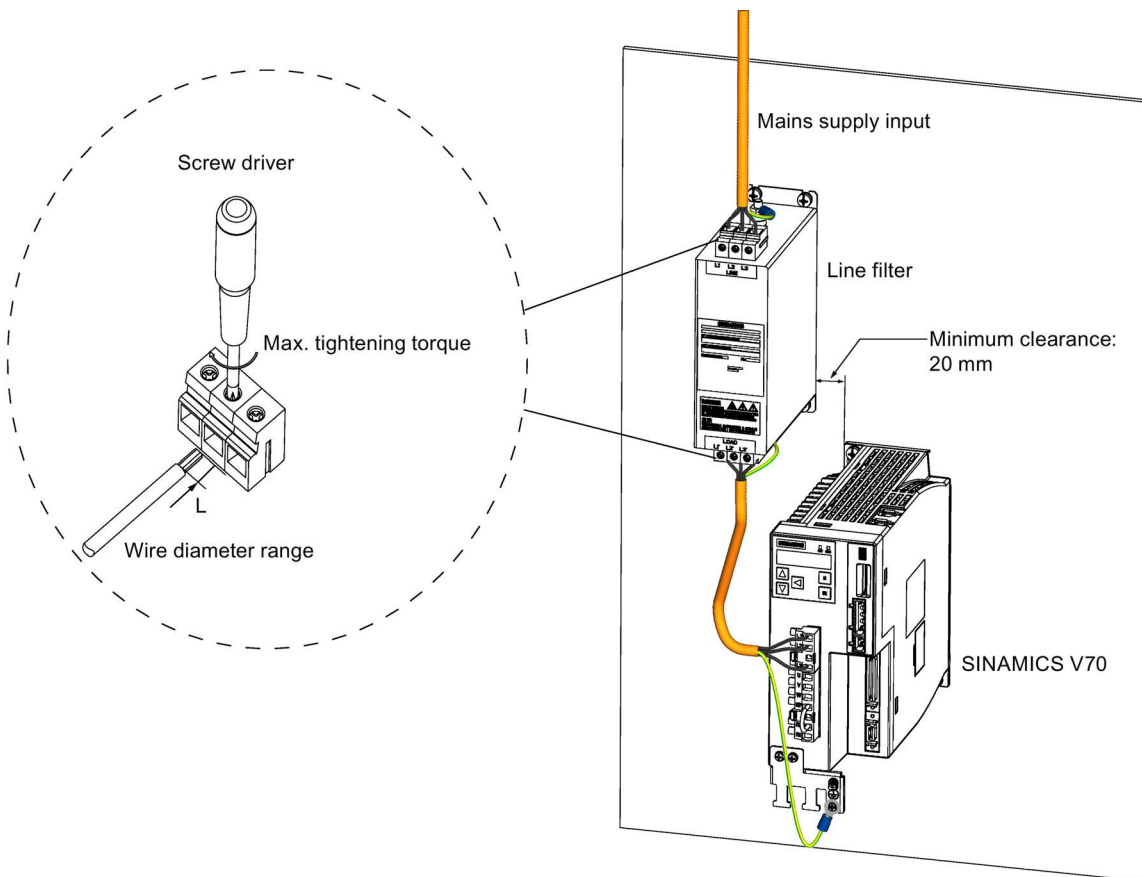
Outline dimensions (unit: mm)



| Rated current (A) | W | D | W2 | H1 | H | H2 | W1 | Ø1 |
|-------------------|----|-----|----|-----|-----|-----|------|-----|
| 36 | 50 | 226 | 25 | 395 | 415 | 380 | 12.5 | 6.5 |

Connecting


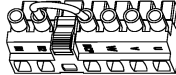

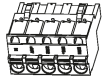

The figure below provides a connection example. It shows how to connect a line filter to a SINAMICS V70 drive.



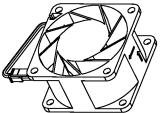
| Rated current (A) | Screw driver | Max. tightening torque (Nm) | Wire diameter range (AWG) | Stripping length L (mm) |
|-------------------|----------------------|-----------------------------|---------------------------|-------------------------|
| 36 | Slot head (M4 screw) | 2.4 | 6 to 24 | 11 |

1.5 Spare parts

Connectors for V70 drives

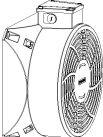
| Order number | Components | Quantity | Illustration | Applicable for |
|--------------------|---|----------|--|----------------------------|
| 6SL3200-0WT01-0AA0 | Line supply connector | 1 |  | V70 feed drive FSA |
| | Motor power/braking resistor connector (with a short-circuit stick pre-assembled) | 1 |  | |
| | Holding brake connector | 1 |  | V70 feed drive FSA/FSB/FSC |
| | STO/24 V power supply connector | 1 |  | All V70 drives |
| | STO short-circuit stick | 1 |  | |

Replacement fans for V70 drives

| Drive frame size | Fan components | |
|------------------|---|--------------------|
| | Illustration | Order number |
| FSD |  | 6SL3200-0WF03-0AA0 |

For more information about fan replacement, see Section "Replacing the fan for the V70 drive (Page 30)".

Replacement fans for 1PH1 motors

| Motor shaft height | Fan components | |
|--------------------|---|--------------------|
| | Illustration | Order number |
| SH132 |  | 1PH1902-0AC00-0AA0 |

For more information about fan replacement, see Section "Replacing the fan for the 1PH1 motor (Page 31)".

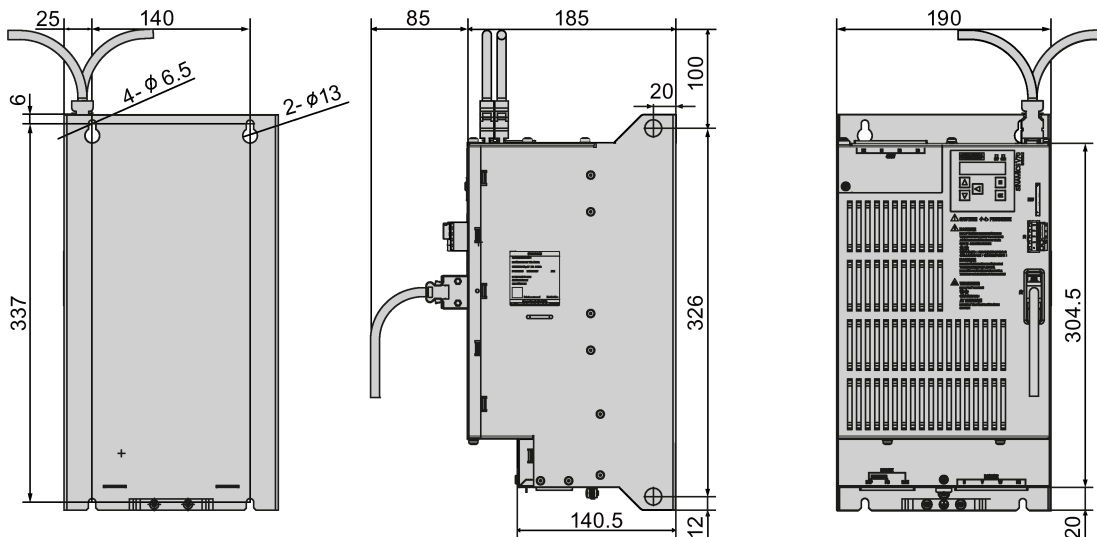
2 Mounting

2.1 Mounting the drive

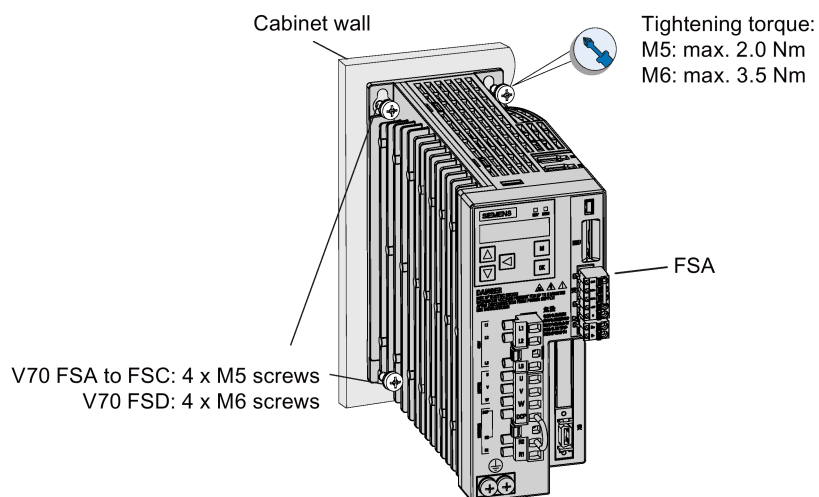
2.1.1 Drill patterns and outline dimensions

All dimensional data is specified in millimeters.

SINAMICS V70 spindle drive (FSD)



2.1.2 Mounting the drive



Note

EMC instructions

- The SINAMICS V70 drives have been tested in accordance with the emission requirements of the category of C2 (residential) environment for FSA/FSB/FSC, and C3 (industrial) environment for FSD. The conducted emissions and radiated emissions are in compliance with the standard of EN 55011 and reached Class A for FSA/FSB/FSC and Class A2 for FSD.
- In a residential environment, this product can cause high-frequency interferences that may necessitate suppression measures.
- For a radiated emission test, an external AC filter (between the 380 VAC power supply and the drive) will be used to meet the EMC requirement and the drive will be installed inside the shielded metallic chamber, other parts of the motion control system (including the PLC, DC power supply, spindle drive, motor) will be put inside the shielded chamber.
- For a conductive emission test, an external AC filter (between the 380 VAC power supply and the drive) will be used to meet the EMC requirement.
- For the radiated emission and conductive emission test, the length of the line supply cable between the line filter and the drive must be shorter than 1 m.

Note

Screw tightening

After the drive installation is complete, make sure that you tighten the screw on the terminal door of the drive.

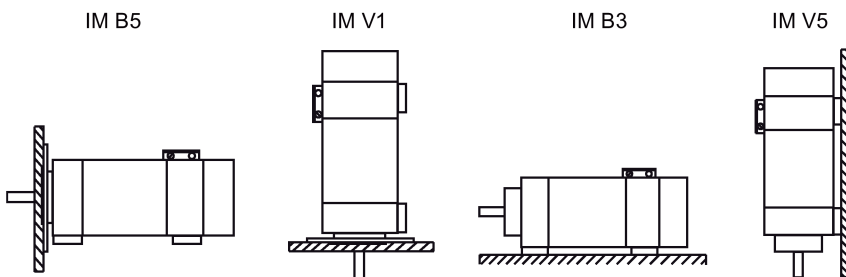
2.2 Mounting the motor

2.2.1 Mounting orientation and outline dimensions

Mounting orientation

The SIMOTICS M-1PH1 main motor supports flange mounting and foot mounting as shown below:

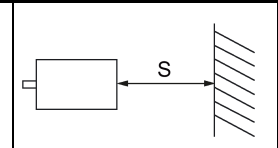
| Mounting method | Standard type of construction | Rotated type of construction |
|-----------------|-------------------------------|------------------------------|
| Foot mounting | IM B3 | IM V5 |
| Flange mounting | IM B5 | IM V1 |



Minimum clearance between a fan and parts/components mounted by the customer

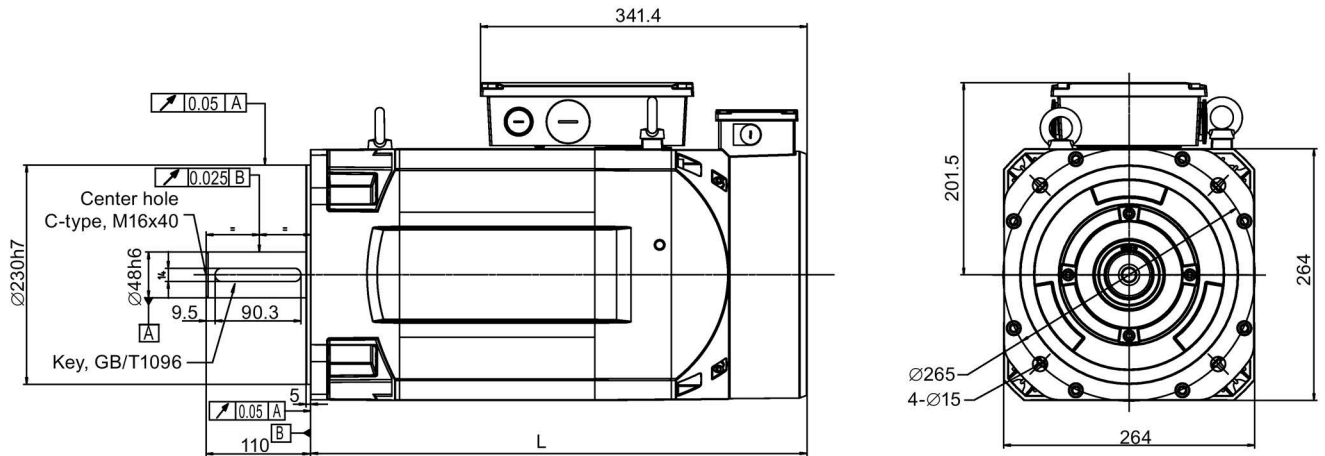
The minimum clearance between a fan and parts/components mounted by the customer or the air discharge opening, and the minimum clearance S between the air intake/air discharge opening and adjacent components must be maintained.

| Shaft height (mm) | Fan mounting | Minimum clearance between a fan and parts/components (mm) | Minimum clearance S (mm) |
|-------------------|---|---|--------------------------|
| 132 | Non-drive end radial, can be ordered differently from the mounting type | 60 | 60 |



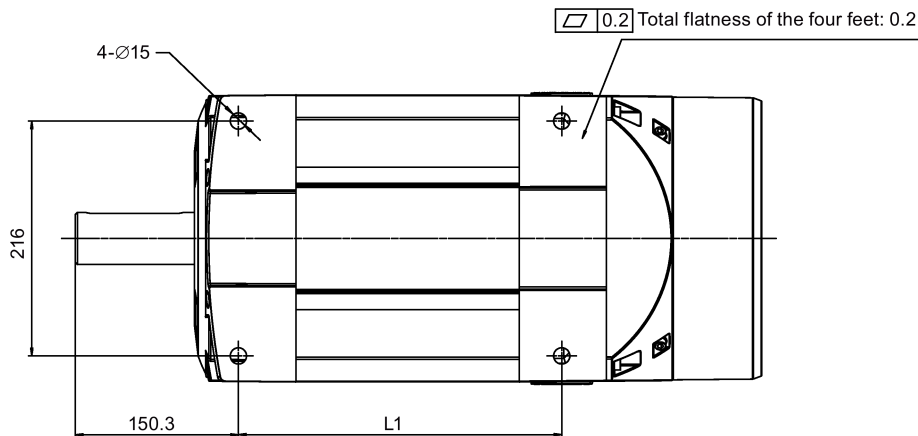
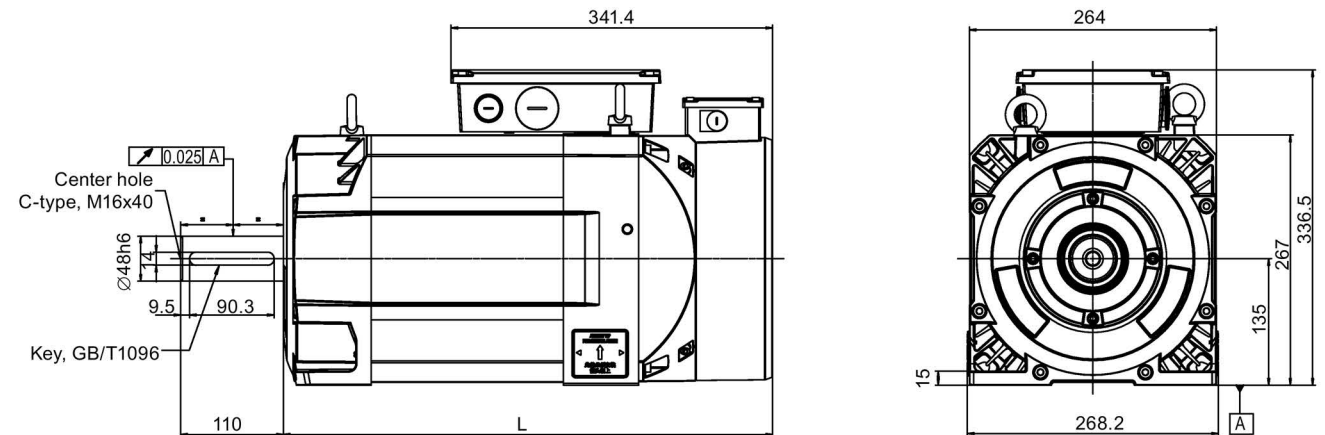
Motor dimensions

Shaft height 132 mm: flange mounting (unit: mm)



| Motor | L |
|--------------------|-----|
| 1PH1131-1□F12-□GA0 | 475 |
| 1PH1131-1□D12-□GA0 | 465 |

Shaft height 132 mm: foot mounting (unit: mm)



| Motor | L | L1 |
|--------------------|-----|-------|
| 1PH1131-1□F10-□GA0 | 475 | 251.8 |
| 1PH1131-1□D10-□GA0 | 465 | 241.8 |

2.2.2 Mounting the motor

In order to ensure smooth, vibration-free motor operation, a stable foundation design is required, the motor must be precisely aligned, and the components that are to be mounted on the shaft extension must be correctly balanced.

The following mounting instructions must be carefully observed:

- For high-speed machines, the complete unit should be dynamically balanced after couplings or belt pulleys have been mounted.
- Use suitable equipment when mounting drive elements. Use the thread at the shaft extension.
- Do not apply any shocks or axial pressure to the shaft extension.
- Especially for high-speed motors with flange mounting, it is important that the mounting is stiff in order to locate any natural frequency as high as possible so that it remains above the maximum rotational frequency.
- Thin sheets (shims) can be placed under the motor mounting feet to align the motor and to avoid mechanically stressing the motor. The number of shims used should be kept to a minimum.
- In order to securely mount the motors and reliably and safely transfer the drive torque, bolts with strength class 8.8 according to ISO 898-1 should be used.

Note

All flange-mounted motors must have a stable motor suspension assembly and for high field weakening speeds must be supported using the appropriate feet at the bearing end shield. For more information on foot/flange mounting, see Section "Mounting orientation and outline dimensions (Page 12)".

Support using feet at the bearing end shield is not required if the following conditions are maintained:

- For flange-mounted motors, there is a stable motor suspension design.
- The permissible vibration values according to DIN ISO 10816 are maintained.
- The maximum speed is limited (see Section "SIMOTICS M-1PH1 main motors (Page 25)").

Motors that are mounted, as a result of their type of construction, to the wall using the motor feet, must be fixed in place through the use of an adequately dimensioned positive form fit (for example, studs or mounting rails).

When commissioning the motors, it must be ensured that the permissible vibration values according to DIN ISO 10816 are maintained.

Note

Using the eyebolts

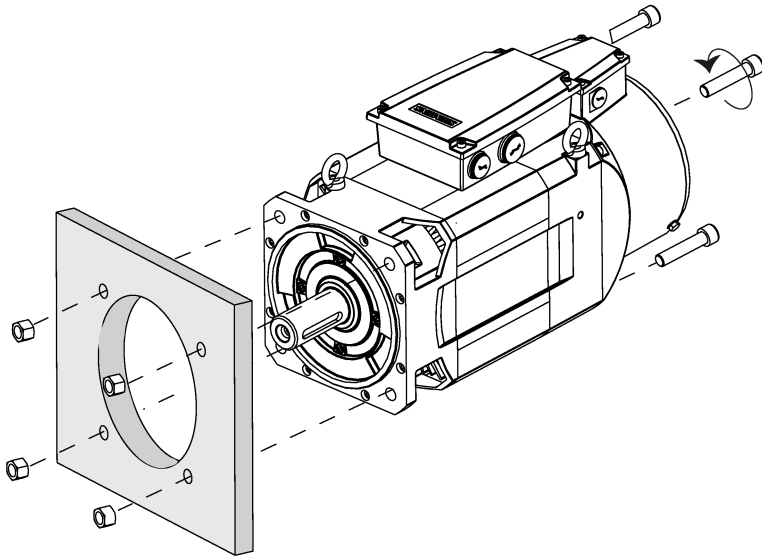
Lift the 1PH1 motor only at the eyebolts.

Note

Mount the motor so that the cooling air can enter and be discharged without any restrictions.

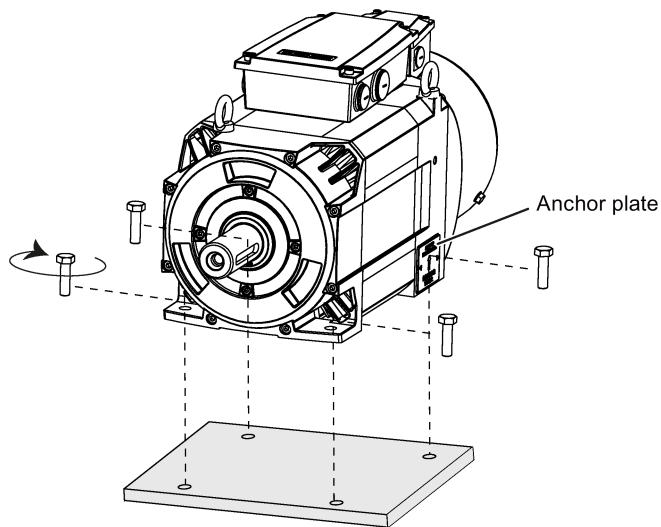
Flange mounting

Mount the motor through a mounting steel flange. Use four M12 screws with a tightening torque of 84 Nm.



Foot mounting

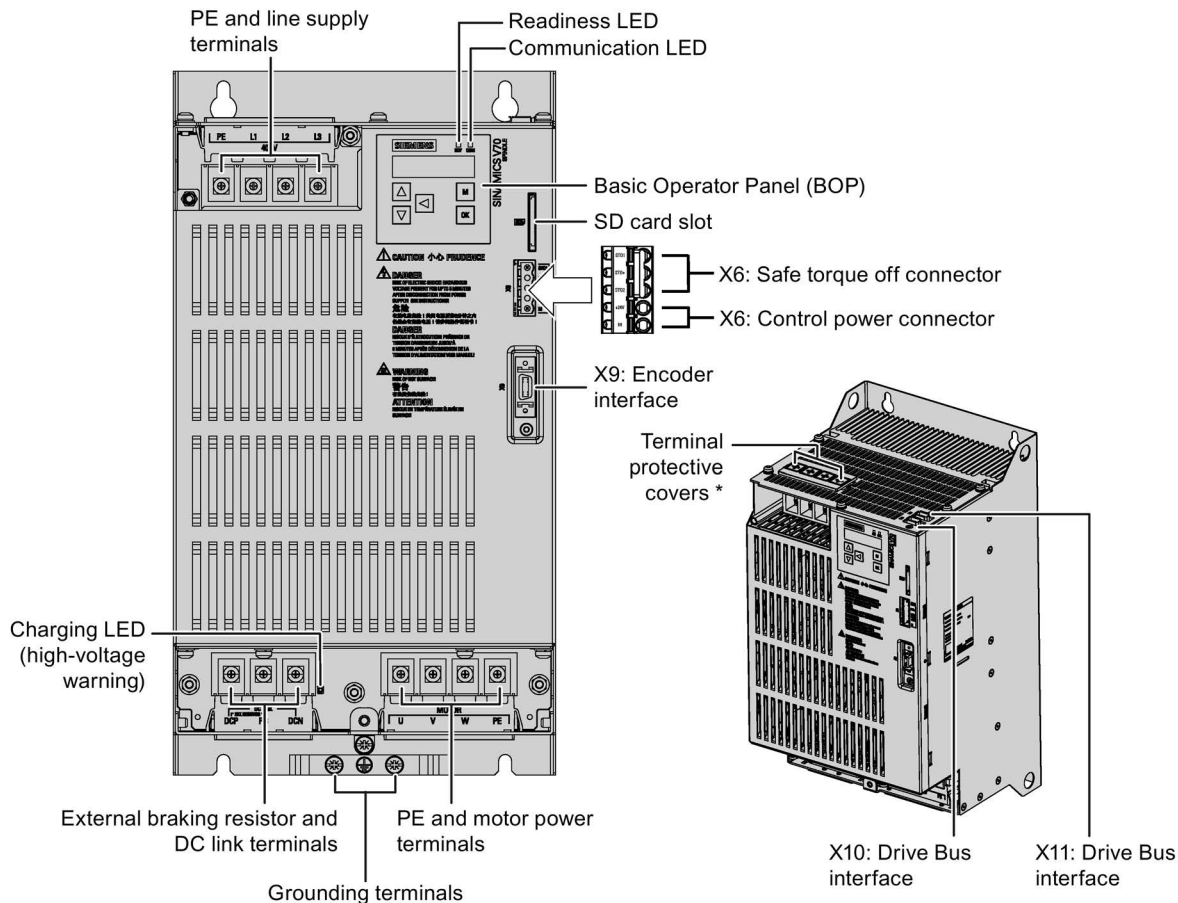
Remove the anchor plates with a wrench, tighten the screws to fix the motor to the mounting plate, and then reinstall the anchor plates. Use four M10 screws with a tightening torque of 39 Nm.



3 Connecting

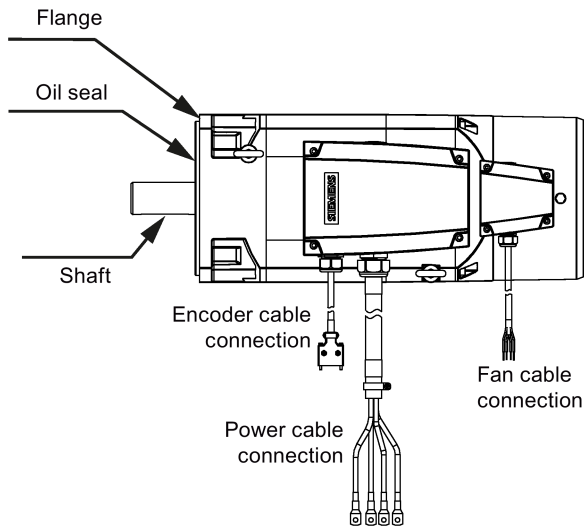
3.1 Interface overview

SINAMICS V70 FSD



* The protective covers are available for the PE, line supply, motor power, external braking resistor, and DC link terminals. Before connecting these terminals, remove the plastic covers first with a slot/cross head screw driver.

SIMOTICS M-1PH1 main motor



3.2 Main circuit interfaces

Main circuit interfaces (drive side)

| Type | Illustration | Signal | Description |
|-------------------------------------|--------------|--|---|
| Line supply input interface | | Line phase L1 Line phase L2 Line phase L3 PE (protective earth) | For connecting to the 3 phase 380 VAC to 480 VAC power supply |
| Motor power interface | | Motor phase U Motor phase V Motor phase W PE | For connecting to the SIMOTICS M-1PH1 main motor |
| External braking resistor interface | | DCP PB (power brake) DCN (DC negative) | For connecting to an external braking resistor |
| Grounding connector | | - | For connecting the power supply grounding connector and the servo motor grounding connector |

Maximum cable cross-section: 2.5 mm²

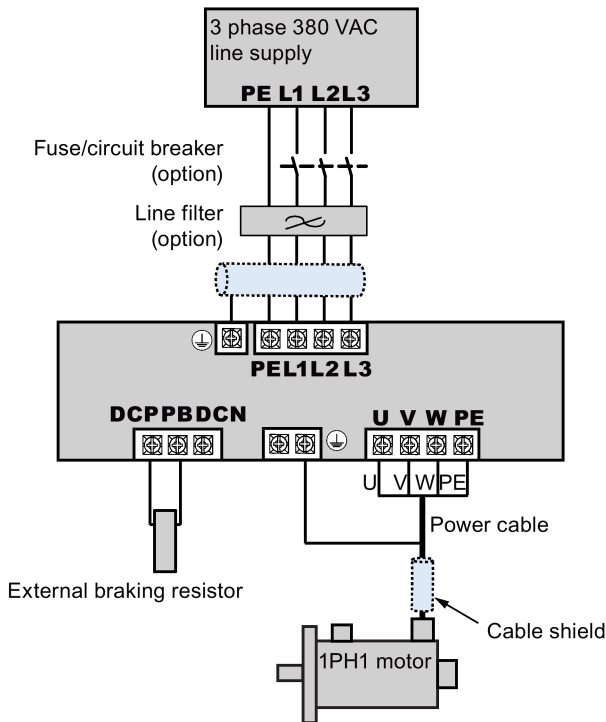
Screw types and recommended tightening torques: M5 screws (2.35 Nm)

Main circuit interface (motor side)

| Type | Illustration | Signal | Description |
|-----------------|--------------|--------|------------------|
| Power connector | | 1: U | Phase U |
| | | 2: V | Phase V |
| | | 3: W | Phase W |
| | | 4: PE | Protective earth |

3.3 Main circuit wiring

Wiring diagram for the SINAMICS V70 main circuit (FSD):



Note

For more information about the wiring of the external braking resistor, see Section "Connecting an external braking resistor (Page 19)".

Note

Filter

A line filter is required so that the system can pass the CE certification (radiated emission test or conducted emission test).

Circuit breaker

You can install a circuit breaker to protect the system.

For more information about the order number of Siemens recommended filters and circuit breakers, see Sections "Line filters (Page 8)" and "Fuse/circuit breaker (Page 7)".

3.4 Connecting the encoder - X9

Encoder connector - motor side

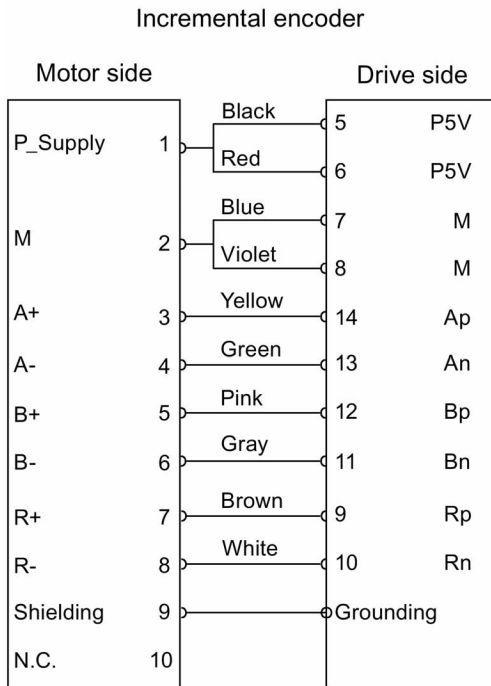
10-pin connector for the incremental encoder, used for the 1PH1 motor:

| Illustration | Pin No. | Incremental encoder | |
|--------------------------|---------|---------------------|------------------|
| | | Signal | Description |
| Incremental encoder: | 1 | P_Supply | Power supply 5 V |
| | 2 | M | Power supply 0 V |
| | 3 | A+ | Phase A+ |
| | 4 | A- | Phase A- |
| | 5 | B+ | Phase B+ |
| | 6 | B- | Phase B- |
| | 7 | R+ | Phase R+ |

| Illustration | Pin No. | Incremental encoder | |
|--------------|---------|---------------------|---------------|
| | | Signal | Description |
| | 8 | R- | Phase R- |
| | 9 | Shielding | Grounding |
| | 10 | n.c. | Not connected |

Wiring

SINAMICS V70 spindle servo system

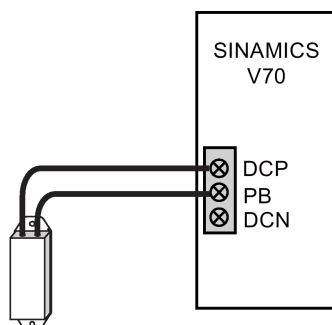


3.5 Connecting an external braking resistor

The SINAMICS V70 feed drive has been designed with an internal braking resistor to absorb regenerative energy from the motor. When the internal braking resistor cannot meet the braking requirements, you can connect an external braking resistor. For the SINAMICS V70 spindle drive, however, no internal braking resistor is available and an external braking resistor must be configured. For more information about the selection of braking resistors, see Section "Braking resistors (Page 7)".

Connecting an external braking resistor

FSD

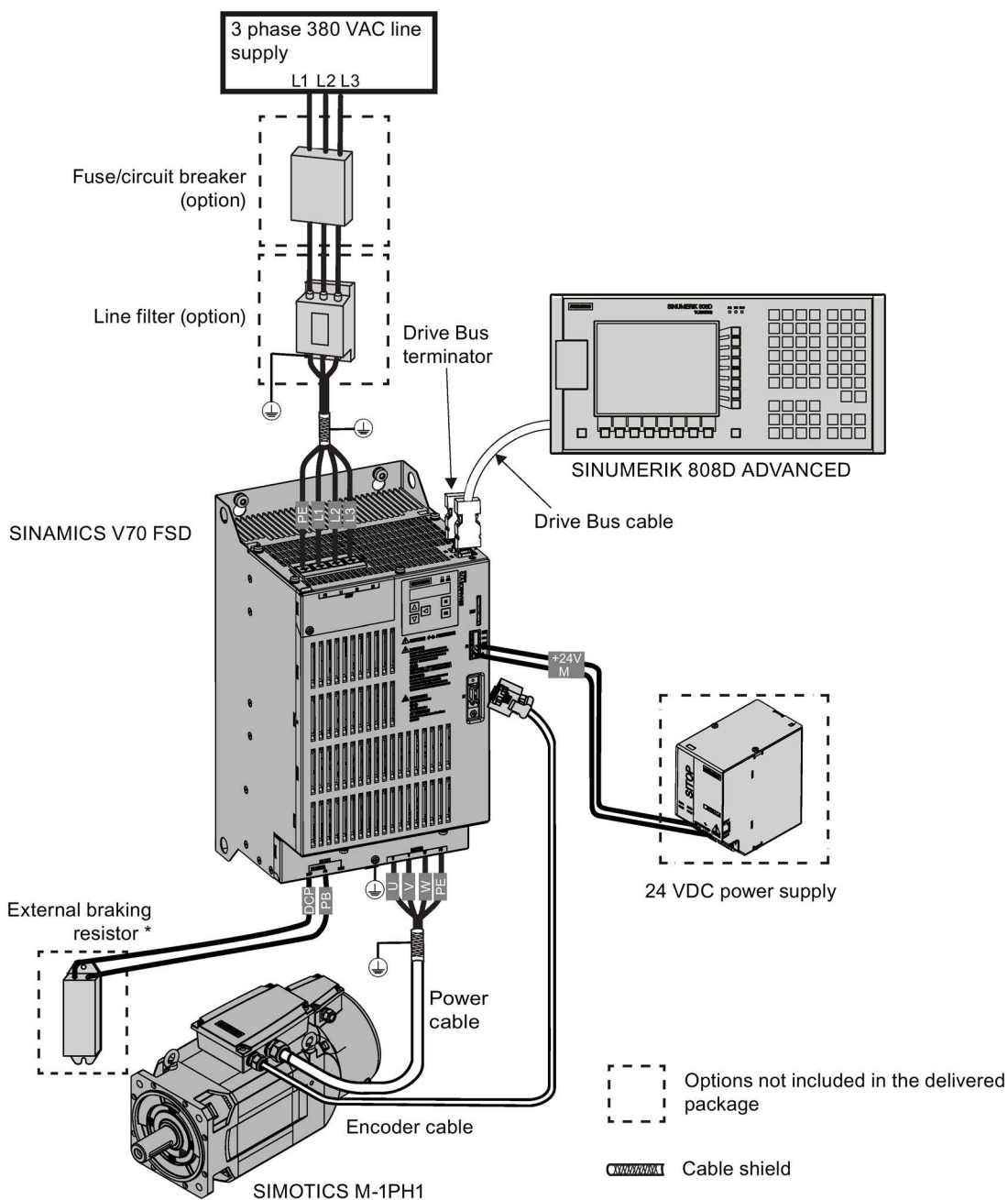


External braking resistor

3.6 Connecting the drive to motor

The connection illustrations below show you system connection examples where the SINUMERIK 808D ADVANCED controls one drive.

Connecting the SINAMICS V70 FSD servo system



* No internal braking resistor is available with the V70 spindle drive, and you must select an external braking resistor as specified in Section "Braking resistors (Page 7)".

Note

- The maximum length for all cables must be shorter than 30 m.
- For more information about the connection of the external braking resistor, see Section "Connecting an external braking resistor (Page 19)".



! WARNING

Personal injury and damage to property from improper connections

Improper connections have high risks of electrical shock and short circuit, which will jeopardize personal safety and equipment.

- The drive must be directly connected with the motor. It is not permissible to connect a capacitor, inductor or filter between them.
- The line supply voltage must be within the allowable range (refer to the drive rating plate). Never connect the line supply cable to the motor terminals U, V, W or connect the motor power cable to the line input terminals L1, L2, L3.
- Never wire up the U, V, W terminals in an interchanged phase sequence.
- If the CE marking for cables is mandatory in some cases, the motor power cable, line supply cable and brake cable used must all be shielded cables.
- For terminal box connection, make sure that the clearances between non-insulated live parts are at least 5.5 mm.
- Route signal cables and power cables separately in different cable conduits. The signal cables shall be at least 10 cm away from the power cables.
- Cables connected may not come into contact with rotating mechanical parts.



! WARNING

Danger to life due to fire or electric shock when using unsuitable residual current protection devices

The drive can cause a current to flow in the protective conductor.

This current can cause the residual current device (RCD) or residual current monitoring (RCM) to incorrectly trip (nuisance trip).

In the case of a fault (ground fault), the fault current can contain a DC component, which prevents the RCD/RCM from tripping, with the risk of subsequent fault or electric shock.

Use only the type B RCD in the supply system for the SINAMICS V70 drive.



! DANGER

Death or severe personal injury from electrical shock

The earth leakage current for the drive can be greater than AC 3.5 mA, which may cause death or severe personal injury due to electrical shock.

A fixed earth connection is required to eliminate the dangerous leakage current. In addition, the minimum size of the protective earth conductor shall comply with the local safety regulations for high leakage current equipment.

Adjusting cable orientations from the motor side

1PH1 motor:

There are holes through which you pass cables on both sides of the terminal box of 1PH1 motor. You can connect the cables through the holes on any of the both sides. For more information about how to adjust cable orientations, see Section "Connecting the terminal boxes of the 1PH1 motor (Page 22)".

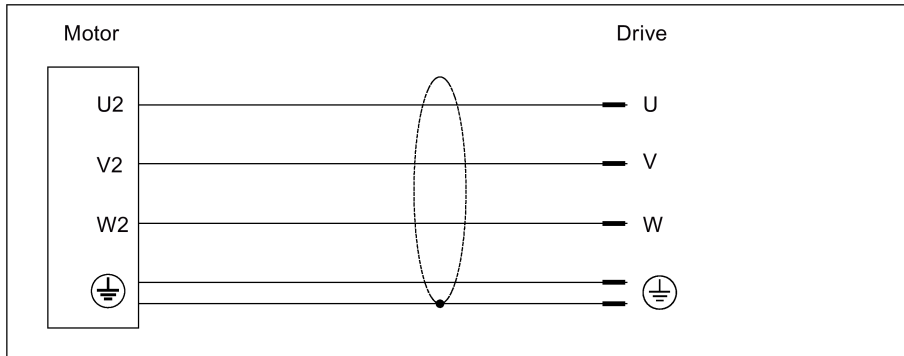
3.7 Connecting the terminal boxes of the 1PH1 motor

CAUTION

Use of appropriate connecting cables

To reduce the risk of cable overheating and even overburning, appropriate cables are necessary for connecting the terminal box.

Carefully observe the current which the motor draws for your particular application. Adequately dimension the connecting cables according to IEC 60204-1 or IEC 60364-5-52.



Connecting the cables to the terminal boxes of the 1PH1 motor

NOTICE

Damage to cables or connectors

Do not put much stress upon cables or connectors while wiring.

NOTICE

Damage to the motor

After you start the motor, make sure the fan rotates in the correct direction as indicated by the arrows marked on the fan; otherwise, the motor may be damaged due to overheat.


Note

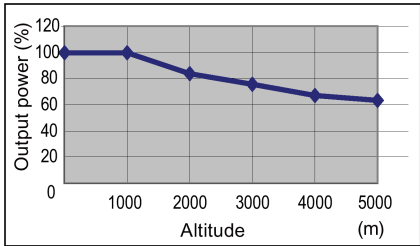
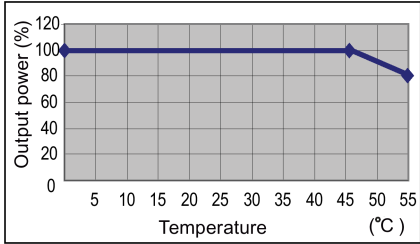
- The recommended sequence for cable connections is as follows: encoder cable first, power cable next, and then the fan cable.
- There are threaded holes available on both sides of the terminal box housing for you to pass the cables through. You can select to connect the individual cables to the terminal boxes from the threaded holes on the desired side.
- No fan cable is provided at delivery. When connecting your own fan cable, make sure you connect the fan terminals U, V, and W correspondingly to the line supply terminals L1, L2, and L3 of the machine tool using appropriate cable connectors.

4 Technical data

4.1 SINAMICS V70 spindle drives

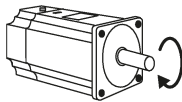

| Frame size | | FSB | FSC | | FSD |
|----------------------------|--|---|----------|----------|----------|
| Order No. | 6SL3210-5DE... | 21-1UA0 | 21-3UA0 | 22-0UA0 | 23-0UA0 |
| Rated output current | | 10.5 A | 12.9 A | 19.6 A | 29.8 A |
| Max. output current | | 21 A | 24.6 A | 39.2 A | 59.6 A |
| Max. supported motor power | | 3.7 kW | 3.7 kW | 7.5 kW | 11 kW |
| Output frequency | | 0 Hz to 400 Hz | | | |
| Power supply | Voltage/frequency | 3 phase 380 VAC to 480 VAC, 50/60 Hz | | | |
| | Permissible voltage fluctuation | -15% to +10% | | | |
| | | Output current [%] | | | |
| | Permissible frequency fluctuation | -10% to +10% | | | |
| | Rated input current | 13.2 A | 16.2 A | 24.5 A | 37.3 A |
| | Power supply capacity | 8.7 kVA | 10.7 kVA | 16.1 kVA | 24.5 kVA |
| | Inrush current | 4 A | 2.5 A | 2.5 A | 2.5 A |
| 24 VDC power supply | Voltage | 24 V (-15% to +20%) | | | |
| | Maximum current | 3 A | | | |
| Overload capability | | <p>Note: The overload capability is 150% by default. It can be set up to 200% via p0640, but the corresponding overload duration might be reduced under the circumstances.</p> | | | |
| Control system | Servo control | | | | |
| Braking resistor | External | | | | |
| Protective functions | Earthing fault protection, output short-cut protection, overvoltage/undervoltage protection, I ² t detection, IGBT overtemperature protection | | | | |
| Cooling method | Fan-cooled | | | | |

| Frame size | | | FSB | FSC | FSD |
|------------------------------------|-----------------------------|---|--|-----------------|-----------------|
| Environmental conditions | Surrounding air temperature | Operation | 0 °C to 45 °C: without power derating 45 °C to 55 °C: with power derating | | |
| | | Storage | -40 °C to +70 °C | | |
| | Ambient humidity | Operation | < 90% (non-condensing) | | |
| | | Storage | 90% (non-condensing) | | |
| | Operating environment | | Indoor (without direct sunlight), free from corrosive gas, combustible gas, oil gas, or dust | | |
| | Altitude | | < 1000 m (without derating) | | |
| | Degree of protection | | IP20 | | |
| | Degree of pollution | | Class 2 | | |
| | Shock | Operation | Operational area: II Ambient classification: 3M2 Peak acceleration: 5 g + 15 g Duration: 30 ms + 11 ms Quantity of shocks: 3 Summed shocks: 18 Cycle time: 1 s | | |
| | | Transport & storage | Covered by vibration test | | |
| Vibration | Operation | Operational area II/3M2 10 Hz to 58 Hz: 0.075 mm deflection 58 Hz to 200 Hz: 1g vibration | | | |
| | Transport & storage | 5 Hz to 9 Hz: 3.5 mm deflection 9 Hz to 200 Hz: 1 g vibration Ambient Classification: 1M2 | | | |
| Certification | |  | | | |
| Outline dimensions (W x H x D, mm) | | | 100 x 180 x 220 | 140 x 260 x 240 | 190 x 350 x 185 |
| Net weight | | | 2.35 kg | 5.05 kg | 8.05 kg |



4.2 SIMOTICS M-1PH1 main motors

General technical data

| Parameter | Description |
|-------------------------------|---|
| Type of motor | Asynchronous motor |
| Cooling method | Fan-cooled |
| Operating temperature | -15 °C to 40 °C (without power derating) |
| Storage temperature | -20 °C to 65 °C |
| Relative humidity (storage) | ≤ 95% |
| Relative humidity (operating) | ≤ 90% |
| Installation altitude | ≤ 1000 m (without power derating) |
| Maximum noise level | 72 dB |
| Thermal class | F |
| Vibration severity grade | 1PH11□□-1□F: Grade B is maintained up to 1800 rpm; Grade S is maintained from 1800 rpm to 10000 rpm 1PH11□□-1□D: Grade B is maintained up to 1800 rpm; Grade R is maintained from 1800 rpm to 6000 rpm |
| Shock resistance | 20 m/s ² (continuous in axial direction); 50 m/s ² (continuous in radial direction); 250 m/s ² (in a short time of 6 ms) |
| Static bearing lifetime | > 20000 h ¹⁾ |
| Oil seal lifetime | > 20000 h |
| Encoder lifetime | > 20000 h |
| Motor lifetime | 20000 h |
| Paint finish | Anthracite |
| Degree of protection | IP54 (dust-tight and splash-proof during motor operation) |
| Type of construction | IM B5, IM B3, IM V1, and IM V5 |
| Positive rotation |  Clockwise (default setting in SINAMICS V70 spindle drives) |
| Certification |  |

¹⁾ This lifetime is only for reference. When a motor keeps running at rated speed under rated load, replace its bearing after 20,000 hours to 30,000 hours of service time. Even if the time is not reached, the bearing must be replaced when unusual noise, vibration, or faults are found.

Specific technical data - SH132

| Order No. | 1PH113... | 1-1□F | 1-1□D |
|--|-----------|-------|----------|
| Insulation class | F | | |
| Rated power | 11 kW | | 7.5 kW |
| Rated torque | 70 Nm | | 71.6 Nm |
| Maximum torque for 30 s | 140 Nm | | 143 Nm |
| Overload torque (S6-25% (1.5 P _n)) | 105 Nm | | 107 Nm |
| Rated speed | 1500 rpm | | 1000 rpm |

| Order No. | 1PH113... | 1-1□F | 1-1□D |
|---|-----------|-------------------------|-------------------------|
| Maximum speed | | 8000 rpm | 6000 rpm |
| Rated frequency | | 51.5 Hz | 35.2 Hz |
| Rated voltage [phase/phase] | | 295 V | 220 V |
| Motor maximum voltage | | 355 V | |
| Rated current | | 28.8 A | 26.6 A |
| Maximum current (for maximum torque) | | 57.6 A | 53.2 A |
| Winding resistance/stator phase resistance (20°C) | | 0.1977 Ω | 0.2645 Ω |
| Winding inductance/motor magnetizing inductance | | 45.55 mH | 52.5 mH |
| Moment of inertia | | 0.0547 kgm ² | 0.0504 kgm ² |
| Motor weight | | 73 kg | 70 kg |

Power deratings at different installation altitudes and surrounding air temperatures

Operation: T = -15 °C to +40 °C (without restriction)

Under conditions other than those specified above (surrounding air temperature > 40 °C or installation altitude > 1000 m above sea level), the permissible torque/power must be determined from the following table. Surrounding air temperatures and installation altitudes are rounded off to 5 °C or 500 m respectively.

| Installation altitude above sea level (m) | Power deratings (kW) | | | | |
|---|----------------------|----------------|-------|-------|---------------------|
| | < 30 °C | 30 °C to 40 °C | 45 °C | 50 °C | 55 °C ¹⁾ |
| 1000 | 1.07 | 1.00 | 0.96 | 0.92 | 0.87 |
| 1500 | 1.04 | 0.97 | 0.93 | 0.89 | 0.84 |
| 2000 | 1.00 | 0.94 | 0.90 | 0.86 | 0.82 |
| 2500 | 0.96 | 0.90 | 0.86 | 0.83 | 0.78 |
| 3000 | 0.92 | 0.86 | 0.82 | 0.79 | 0.75 |
| 3500 | 0.88 | 0.82 | 0.79 | 0.75 | 0.71 |
| 4000 | 0.82 | 0.77 | 0.74 | 0.71 | 0.67 |

¹⁾ Only permitted for the non-drive end to drive end direction of air flow

NOTICE

Damage to the motors

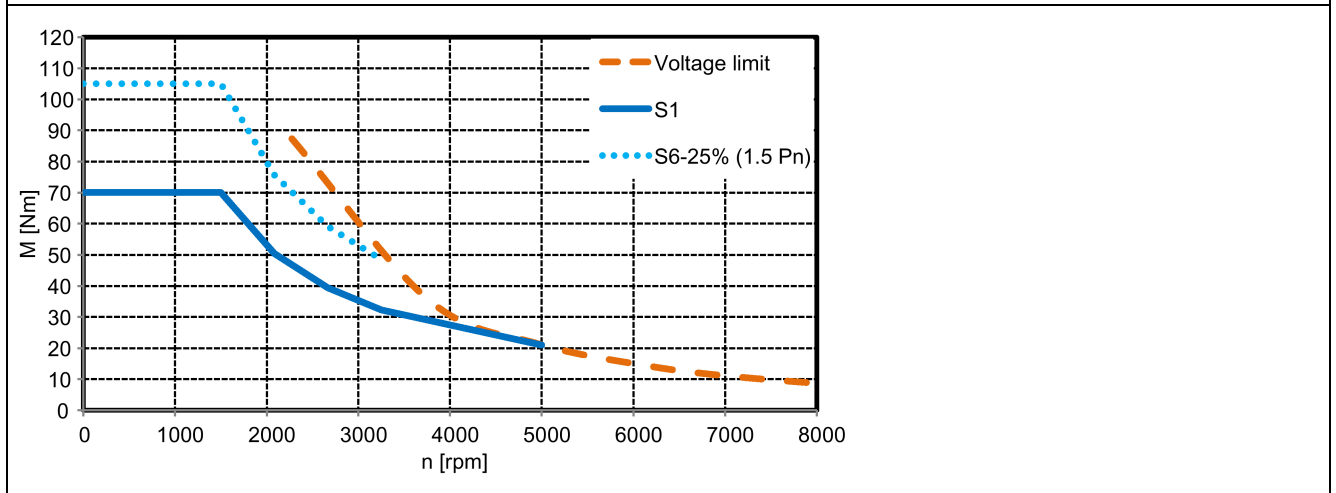
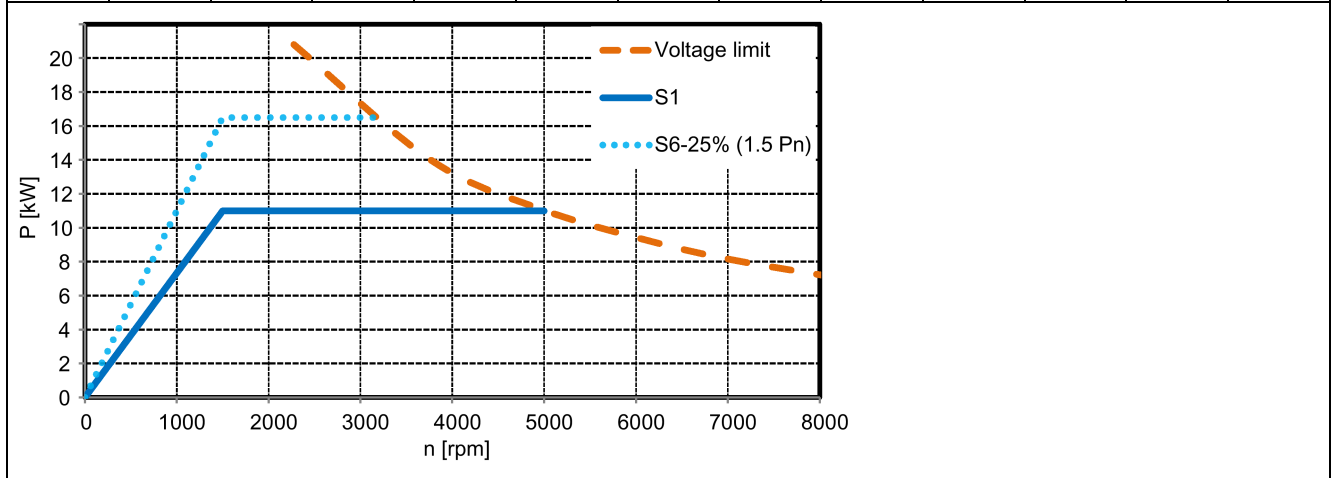
For surrounding air temperatures > 55 °C, please contact your local Siemens office.

The standard motors are not suitable for use in corrosive atmospheres, atmospheres with a high salt content, or in outdoor applications; otherwise, the motors may be damaged.

Torque-speed/power-speed characteristics - SH132

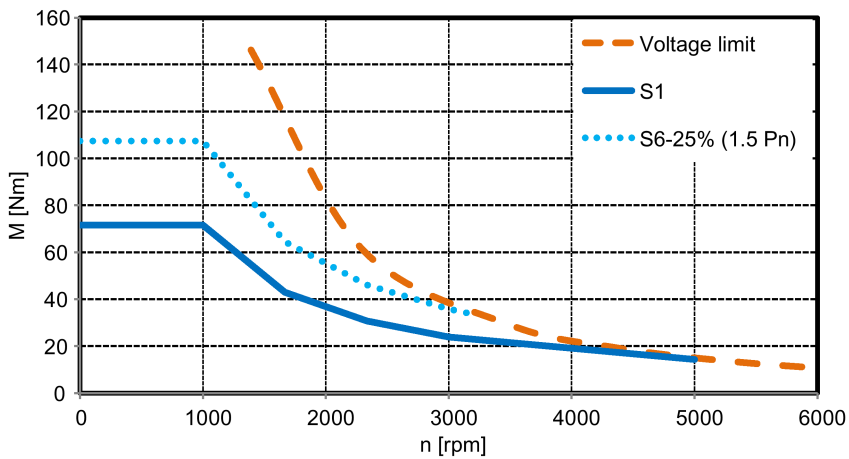
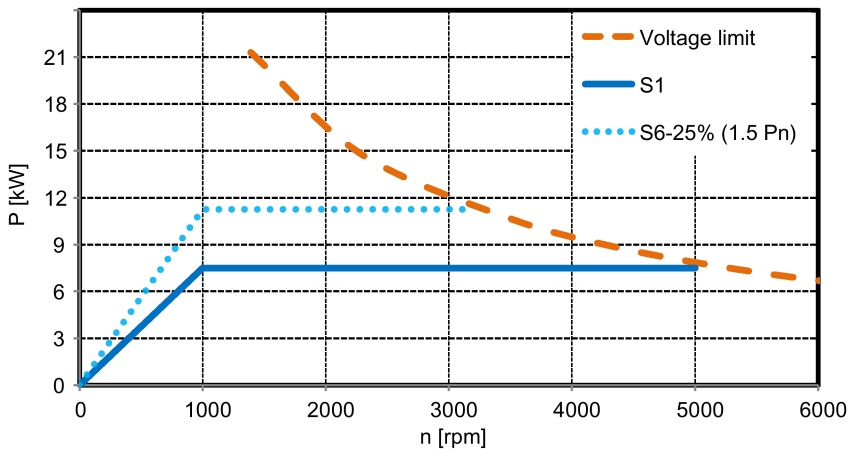
1PH1131-1QFQ:

| n_N | P_N | M_N | I_N | U_N | f_N | U_{max} | n_2 | n_{max} | $P_{s6-25\%}$ | $M_{s6-25\%}$ | $I_{s6-25\%}$ | I_{max} |
|-------|-------|-------|-------|-------|-------|-----------|-------|-----------|---------------|---------------|---------------|-----------|
| [rpm] | [kW] | [Nm] | [A] | [V] | [Hz] | [V] | [rpm] | [rpm] | [kW] | [Nm] | [A] | [A] |
| 1500 | 11 | 70 | 28.8 | 295 | 51.5 | 355 | 5000 | 8000 | 16.5 | 105 | 41 | 57.5 |

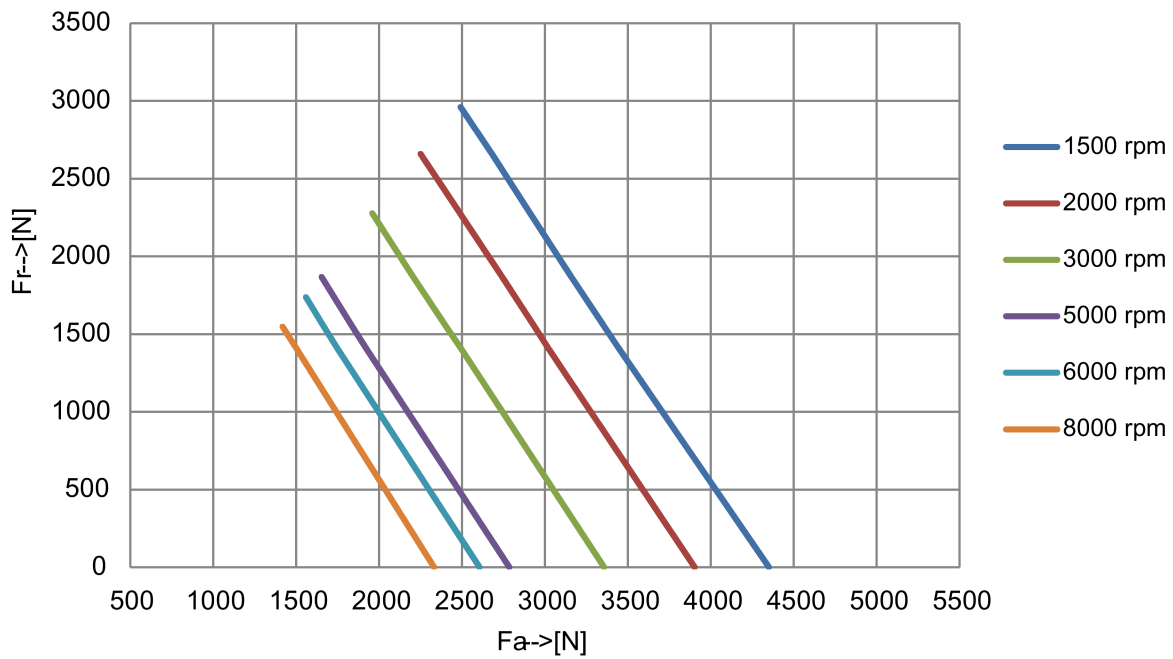
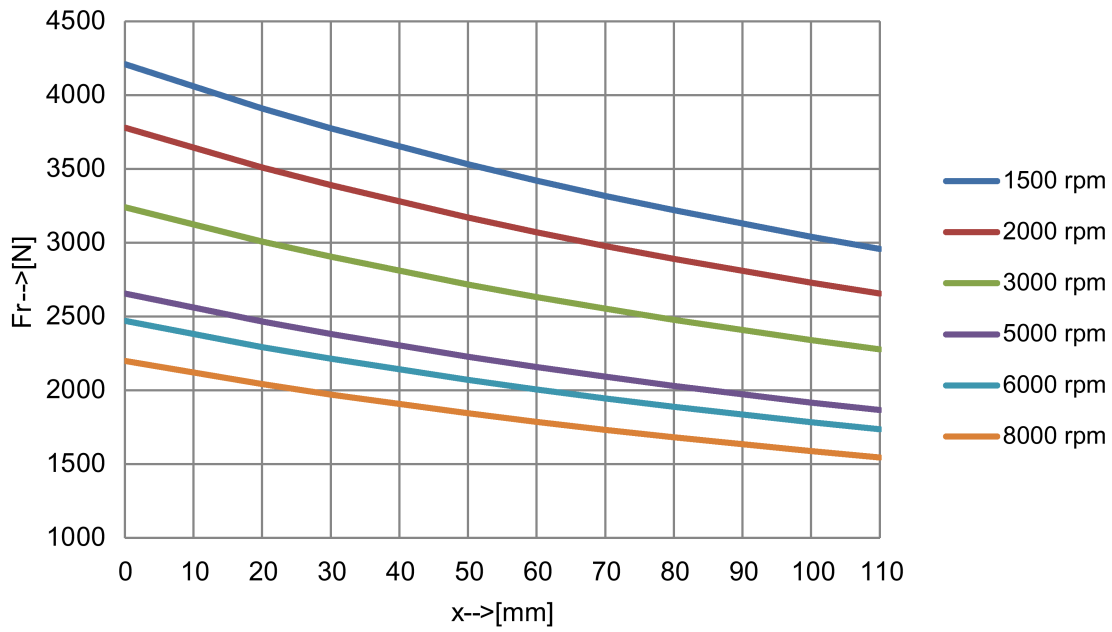


1PH1131-1QDQ:

| n_N | P_N | M_N | I_N | U_N | f_N | U_{max} | n_2 | n_{max} | $P_{s6-25\%}$ | $M_{s6-25\%}$ | $I_{s6-25\%}$ | I_{max} |
|-------|-------|-------|-------|-------|-------|-----------|-------|-----------|---------------|---------------|---------------|-----------|
| [rpm] | [kW] | [Nm] | [A] | [V] | [Hz] | [V] | [rpm] | [rpm] | [kW] | [Nm] | [A] | [A] |
| 1000 | 7.5 | 71.6 | 26.6 | 220 | 35.2 | 355 | 5000 | 6000 | 11.25 | 107 | 38 | 53.2 |



Permissible radial and axial forces - SH132

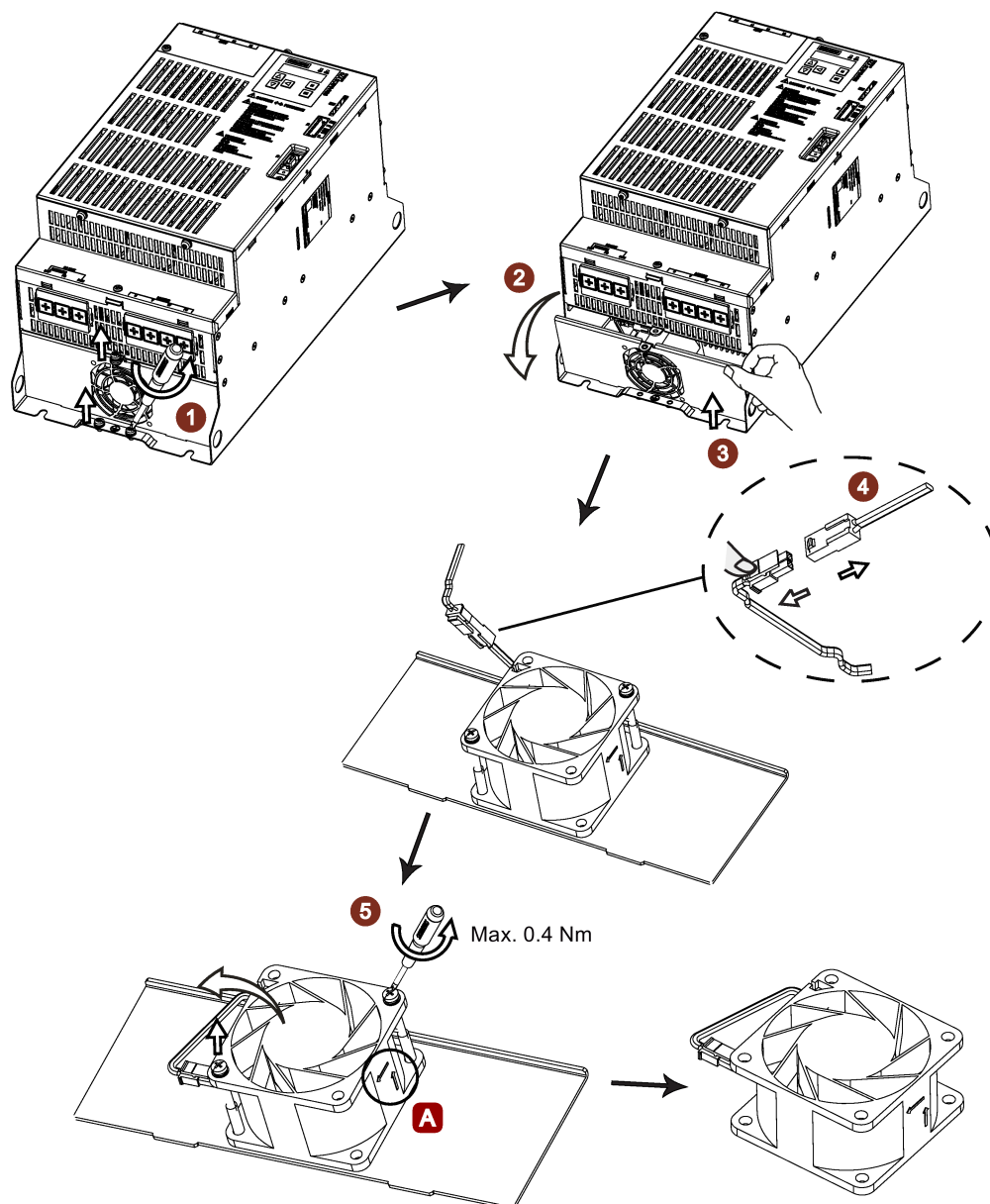


A Appendix

A.1 Replacing the fan for the V70 drive

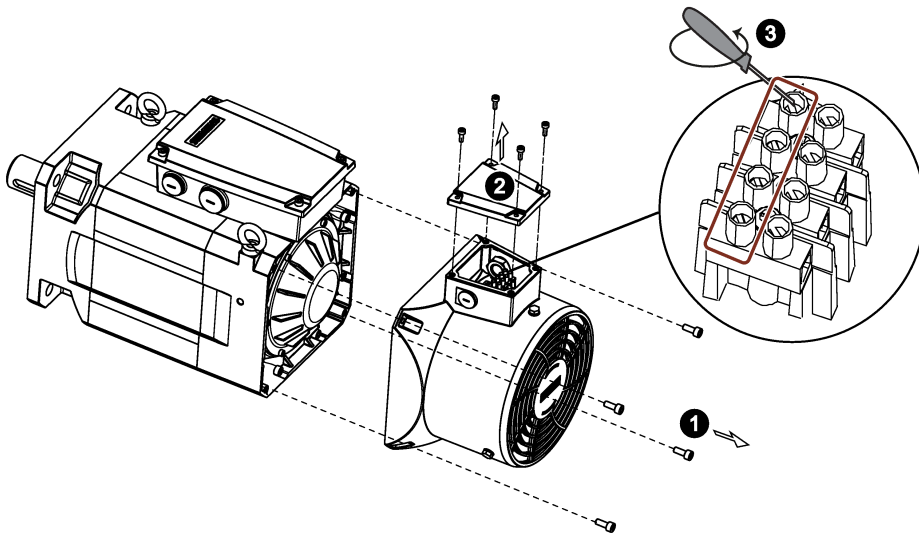
Proceed as illustrated below to remove the fan from the drive. To re-assemble the fan, proceed in reverse order. When re-assembling the fan, make sure that the arrow symbol ("A" in the illustration) on the fan points to the drive rather than the fan housing.

Replacing the fan for V70 FSD



A.2 Replacing the fan for the 1PH1 motor

Proceed through the steps as illustrated below to remove the fan from the motor. To reassemble the fan, proceed in reverse order.



A.3 Assembling the power cable for the 1PH1 motor

