

## 4.6 Connecting the SINAMICS V70 servo system

### 4.6.1 Connecting the drive to motor

#### ⚠ CAUTION

##### Risk of injury due to improper cable connection

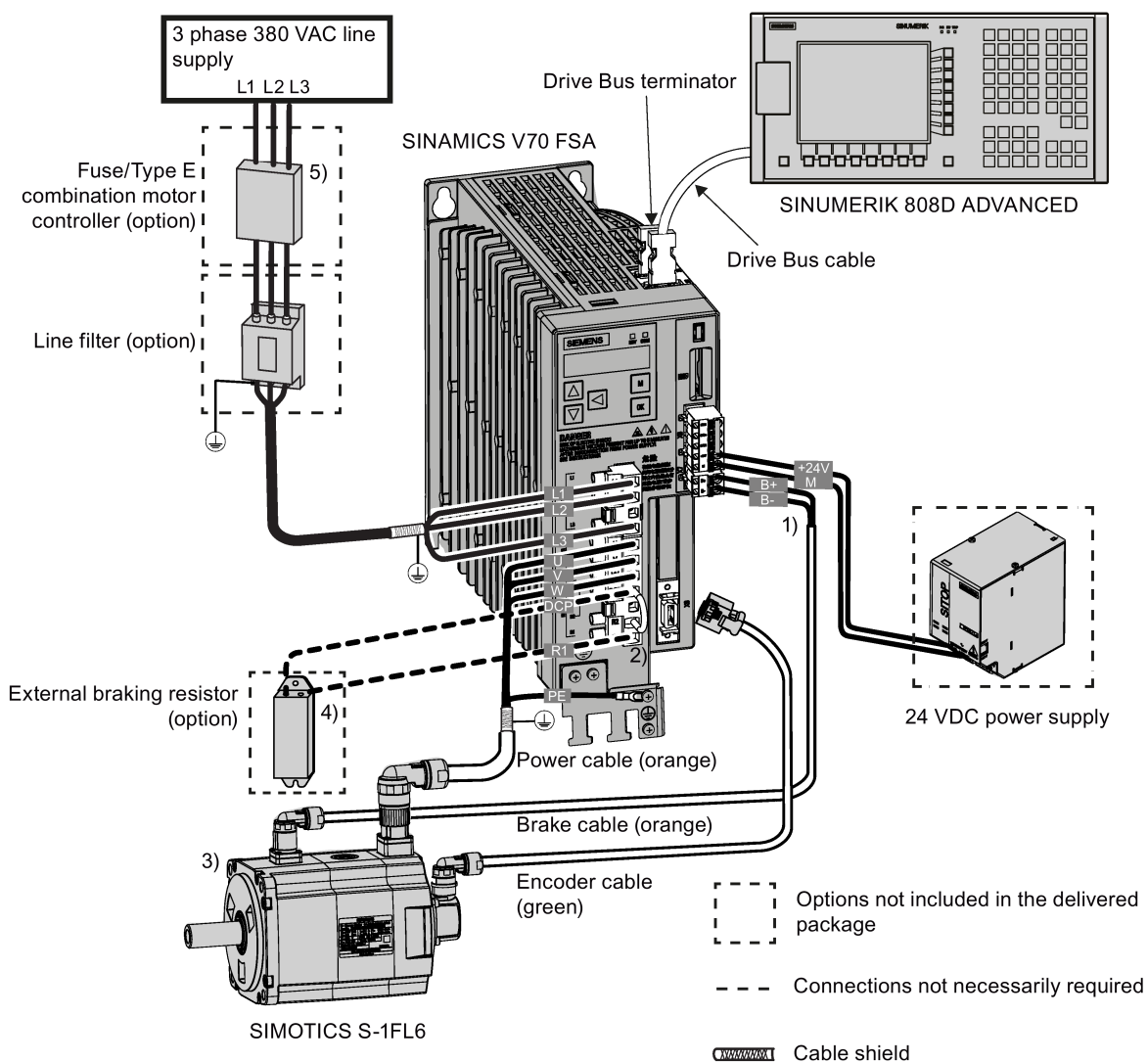
When connecting cables to the drive interfaces with detachable connectors, fixing the cables directly to the connectors which have not been fitted onto the drive may result in finger injury.

- First fit the connectors onto the drive, and then fix the cables to the connectors.

#### Connecting the SINAMICS V70 FSA/FSB/FSC servo system

##### Note

The connection illustration below uses V70 FSA as an example, which is also applicable to V70 feed/spindle drives FSB and FSC.



1) The holding brake function is available only with the feed drive.

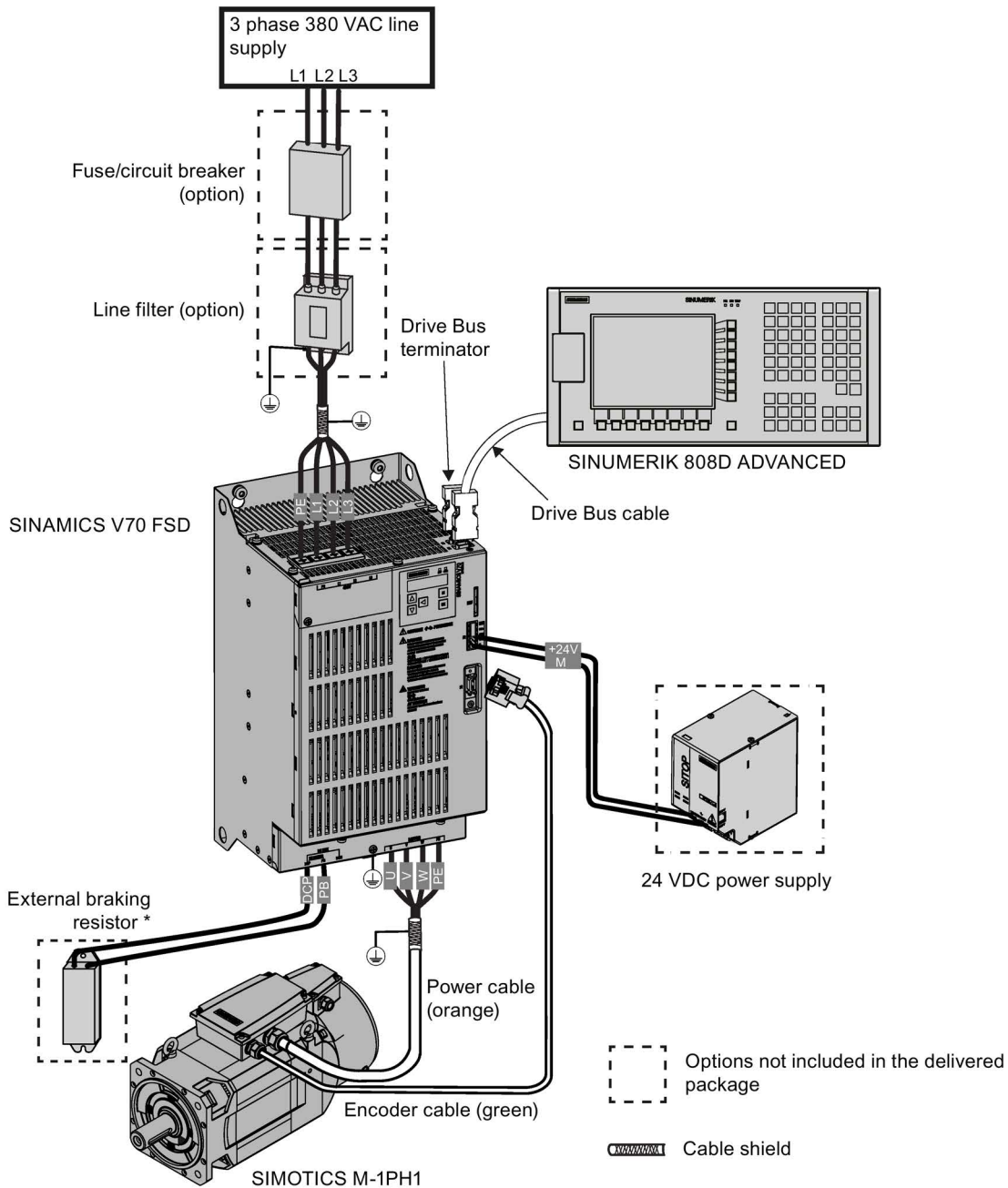
2) The short-circuit stick is available only with the feed drive for the use of an internal braking resistor.

3) For the V70 spindle drive, the SIMOTICS M-1PH1 main motor is connected.

4) An external braking resistor can be used to absorb excess regenerative energy in the DC link when the capacity of the internal braking resistor is insufficient. Note that no internal braking resistor is available in the V70 spindle drive, and you must select an external braking resistor as specified in Section "Braking resistors (Page 30)".

5) For V70 spindle drives FSC, circuit breakers are used instead of Type E combination motor controllers.

### 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 30)".

#### 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 121)".
- For more information about the connection of the STO terminals, see Section "Connecting the 24 V power supply/STO - X6 (Page 114)".



## ⚠ WARNING

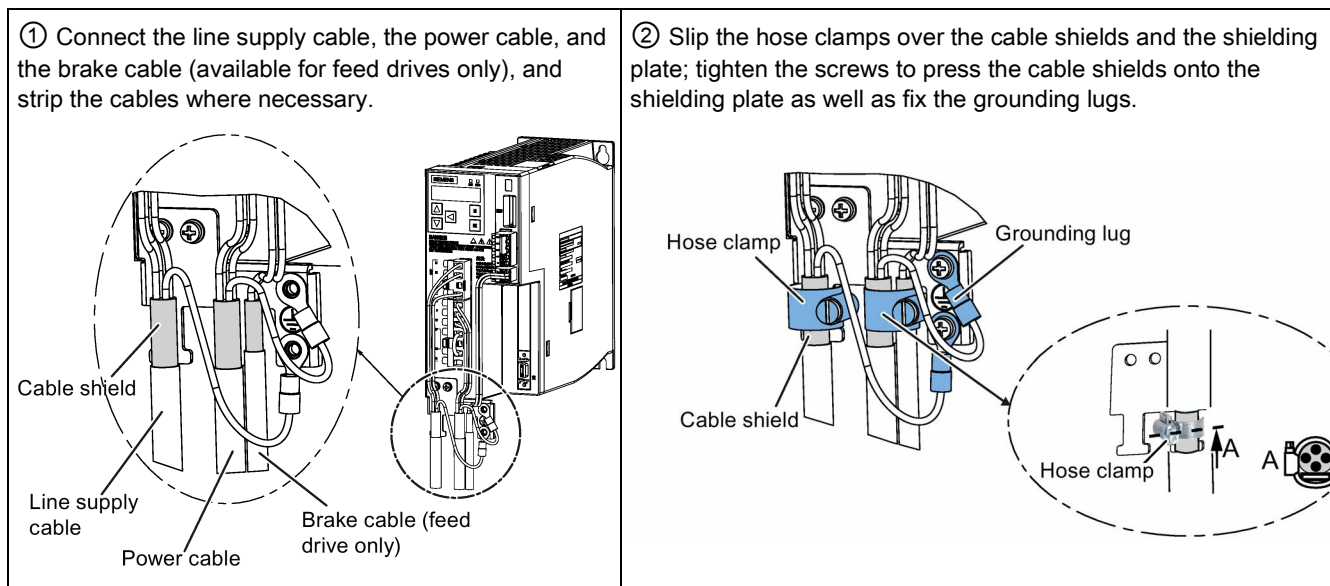
### Personal injury and damage to property from improper connections

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.

### Connecting the cable shields with the shielding plate

To achieve EMC-compliant installation of the drive, use a shielding plate to connect the cable shields. See the following example for steps to connect cable shields with the shielding plate:



### Note

The connection diagram above takes the V70 feed drive FSA as an example. It is applicable also to the V70 feed/spindle drive FSB and FSC. For the V70 spindle drive FSD, the shielding plate is available as an option only. For more information, see Section "Shielding plate (Page 30)".



## ⚠ 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**

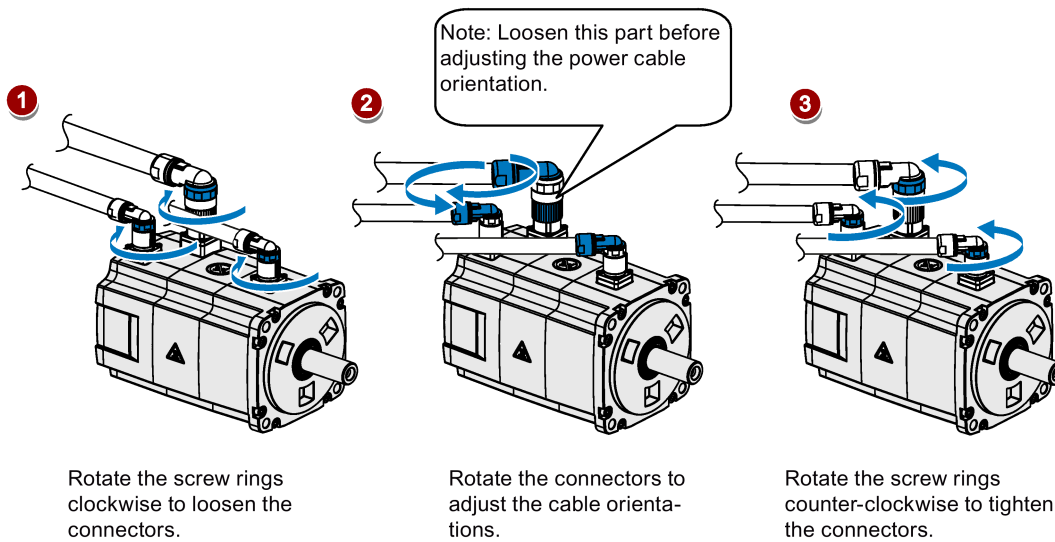
The earth leakage current for the drive can be greater than AC 3.5 mA, which may cause death or severe personal injury due to electrical shock.

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**

**1FL6 motor:**

From the motor side, you can adjust the orientation of the power cable, encoder cable, and brake cable to facilitate cable connection.



**Note**

**Rotating the connectors**

All the three motor-side connectors can be rotated only within 360°.

**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 130)".

## 4.6.2 Connecting the terminal boxes of the 1PH1 motor

### CAUTION

#### Use of appropriate connecting cables

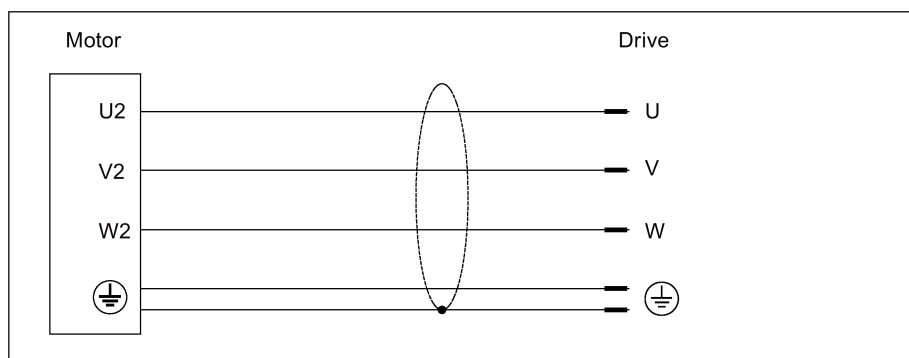
To reduce the risk of cable overheating and even overburning, appropriate cables are necessary for connecting the terminal box.

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.

### NOTICE

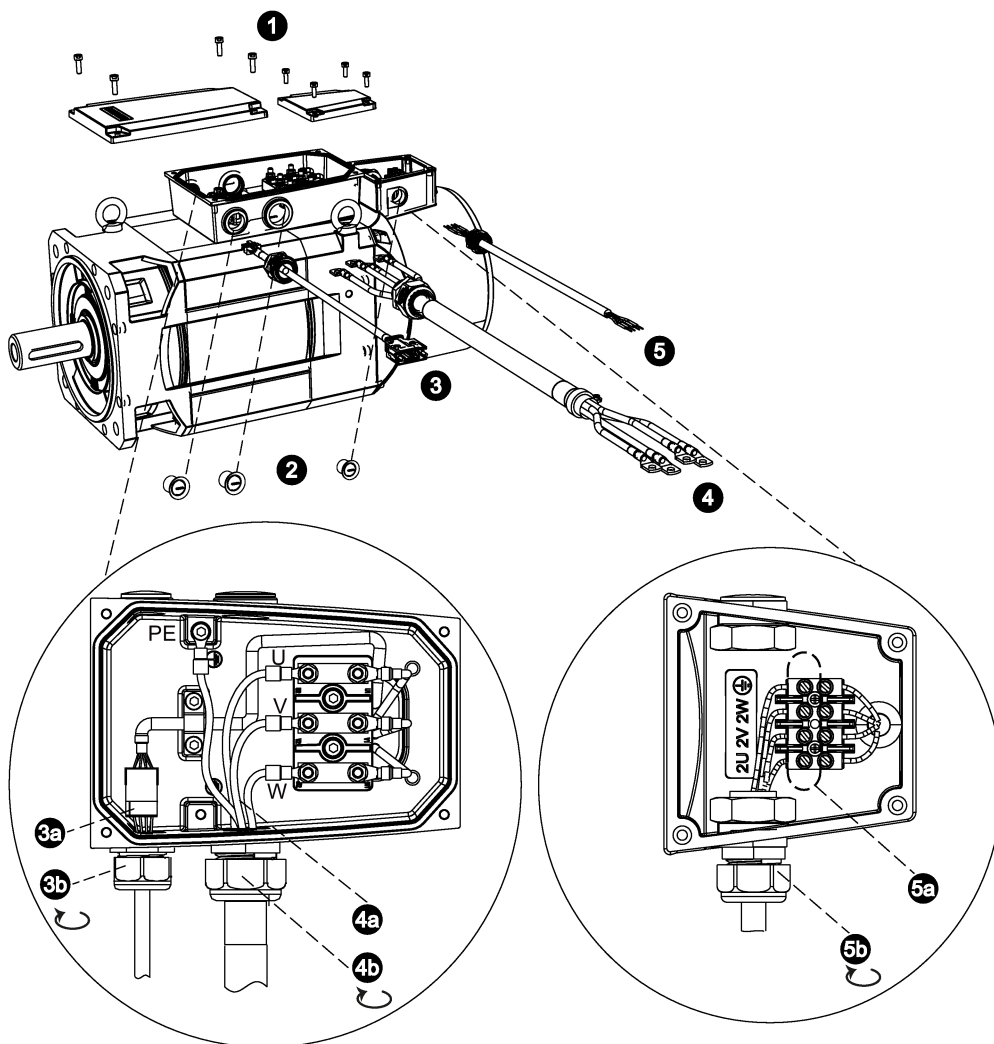
#### Damage to cables or connectors

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



### 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.



1. Loosen the screws on the top of both the motor terminal box and the fan terminal box to remove the terminal box covers.
2. Remove the three screw plugs on one side of the two terminal boxes.
3. Loosen the cable gland pre-assembled on the encoder cable. Pass the encoder cable through the first threaded hole in the motor terminal box housing. Follow the steps below to connect the encoder cable to the motor terminal box:
  - 3a. Insert the male connector of the encoder cable into the female connector in the motor terminal box.
  - 3b. Tighten the cable gland of the encoder cable onto the threaded hole.
4. Pass the power cable through the cable gland, and then through the second threaded hole in the motor terminal box housing. Follow the steps below to connect the power cable to the motor terminal box:
  - 4a. Remove from the terminal box the three binding post nuts that correspond to the power cable terminals U, V, and W. Place the three terminal lugs at the end of the power cable conductors onto the corresponding binding posts. Fasten the cable conductors with the nuts. Remove the grounding screw for power terminal PE. Place the terminal lug of the PE conductor on the grounding screw, and then tighten the screw for the PE terminal.
  - 4b. Tighten the cable gland of the power cable onto the threaded hole.
5. Pass your own fan cable (recommended cable outer diameter: 4 mm to 8 mm) through the cable gland, and then through the threaded hole in the fan terminal box housing. Follow the steps below to connect the fan cable to the fan terminal box:
  - 5a. Loosen the four screws that correspond to the fan cable terminals U, V, W and PE. Insert the terminal lugs at the end of fan cable conductors into the corresponding sockets under the binding posts, and then fasten the cable conductors with the screws.
  - 5b. Tighten the cable gland of the fan cable onto the threaded hole.