

# Multiwire and Related Kits for D1h-D4h Drives

## VLT® FC Series FC 102, FC 103, FC 202, FC 302

### 1 Overview

#### 1.1 Description of Multiwire Kits and Related Kits

The multiwire kits are designed for VLT® FC series drives in D1h–D4h enclosure sizes for the following products.

- VLT HVAC Drive FC 102
- VLT Refrigeration Drive FC 103
- VLT AQUA Drive FC 202
- VLT AutomationDrive FC 302

The D1h multiwire kit and D2h multiwire kit include the kit as well as an extended options cabinet that can be installed below the drive to contain the kit parts. For D3h and D4h drives, the multiwire L-shaped mains busbars and L-shaped motor busbars can be ordered as separate kits. Optional common-mode filter kits are available also.

#### 1.2 Kit Numbers

Table 1: Numbers for Multiwire Kits and Related Options

Kit number	Kit description
176F3817	Kit, Multi Wire, D1h
176F3818	Kit, Multi Wire, D2h
176F3812	Kit, Multi Wire, Motor Busbar, D1h/D3h
176F3810	Kit, Multi Wire, Motor Busbar, D2h/D4h
176F3854	Kit, Multi Wire, Mains Busbar, D1h/D3h
176F3855	Kit, Multi Wire, Mains Busbar, D2h/D4h
176F6770	Kit, Common Mode, T5/50m
176F3811	Kit, Common Mode, T5/100m or T7

#### 1.3 Items Supplied in Multiwire and Related Kits

Table 2: Contents of D1h Multiwire Kit (176F3817)

Item	Quantity
Extended options cabinet assembly	1
Cable clamp	5
Adapter plate	1

Item	Quantity
Adapter plate gasket A	1
Adapter plate gasket B	1
Tie plate	2
Lifting eyebolt	2
L-shaped motor busbar	3
Ground bar	1
Left ground bar bracket	1
Right ground bar bracket	1
Edge protector	1
EMC shield	1
M5 nut	3
M8 nut/washer	9
Torx screw	6
Screw+washer assembly	13

**Table 3: Contents of D2h Multiwire Kit (176F3818)**

Item	Quantity
Extended options cabinet assembly	1
Cable clamp 60 mm	2
Cable clamp	4
Adapter plate	1
Adapter plate gasket A	1
Adapter plate gasket B	1
Tie plate	2
L-shaped motor busbar	3
Ground bar	1
Left ground bar bracket	1
Right ground bar bracket	1
Edge protector	1
EMC shield	1
M5 nut	3
M8 nut/washer	12
Torx screw	6
Screw+washer assembly	14
Lifting eyebolt	2

**Table 4: Contents of D1h/D3h L-shaped Motor Busbar Kit (176F3812)**

Item	Quantity
L-shaped motor busbar, D1h/D3h	3
M8 nut/washer	9

**Table 5: Contents of D2h/D4h L-shaped Motor Busbar Kit (176F3810)**

Item	Quantity
L-shaped motor busbar, D2h/D4h	3
M8 nut/washer	12

**Table 6: Contents of D1h/D3h L-shaped Mains Busbar Kit (176F3854)**

Item	Quantity
L-shaped mains busbar	3
M8 nut/washer	9

**Table 7: Contents of D2h/D4h L-shaped Mains Busbar Kit (176F3855)**

Item	Quantity
L-shaped mains busbar	3
M8 nut/washer	12

**Table 8: Contents of Common-mode Filter T5/50m (176F6770)**

Item	Quantity
Common-mode filter	1

**Table 9: Contents of Common-mode Filter T5/100m or T7 (176F3811)**

Item	Quantity
Common-mode filter	2

## 2 Installation

### 2.1 Safety Information

#### NOTICE

##### QUALIFIED PERSONNEL

Correct and reliable transport, storage, installation, operation, and maintenance are required for the trouble-free and safe operation of the drive.

- Only qualified personnel are allowed to install or operate this equipment. Qualified personnel are defined as trained staff, who are qualified to install, commission, and maintain equipment, systems, and circuits in accordance with pertinent laws and regulations. Also, qualified personnel must be familiar with the instructions and safety measures described in this manual.
- Only authorized personnel are allowed to service and repair this equipment. Authorized personnel are qualified personnel, trained by Danfoss to service Danfoss products.

#### ⚠ WARNING ⚠

##### HIGH VOLTAGE

AC drives contain high voltage when connected to AC mains input, DC supply, or load sharing. Failure to perform installation, start-up, and maintenance by qualified personnel can result in death or serious injury.

- Only qualified personnel must perform installation, start-up, and maintenance.

#### ⚠ WARNING ⚠

##### DISCHARGE TIME (20 MINUTES)

The drive contains DC-link capacitors, which can remain charged even when the drive is not powered. High voltage can be present even when the warning indicator lights are off.

Failure to wait 20 minutes after power has been removed before performing service or repair work can result in death or serious injury.

- Stop the motor.
- Disconnect AC mains, permanent magnet type motors, and remote DC-link supplies, including battery back-ups, UPS, and DC-link connections to other drives.
- Wait 20 minutes for the capacitors to discharge fully before performing any service or repair work.
- Measure the voltage level to verify full discharge.

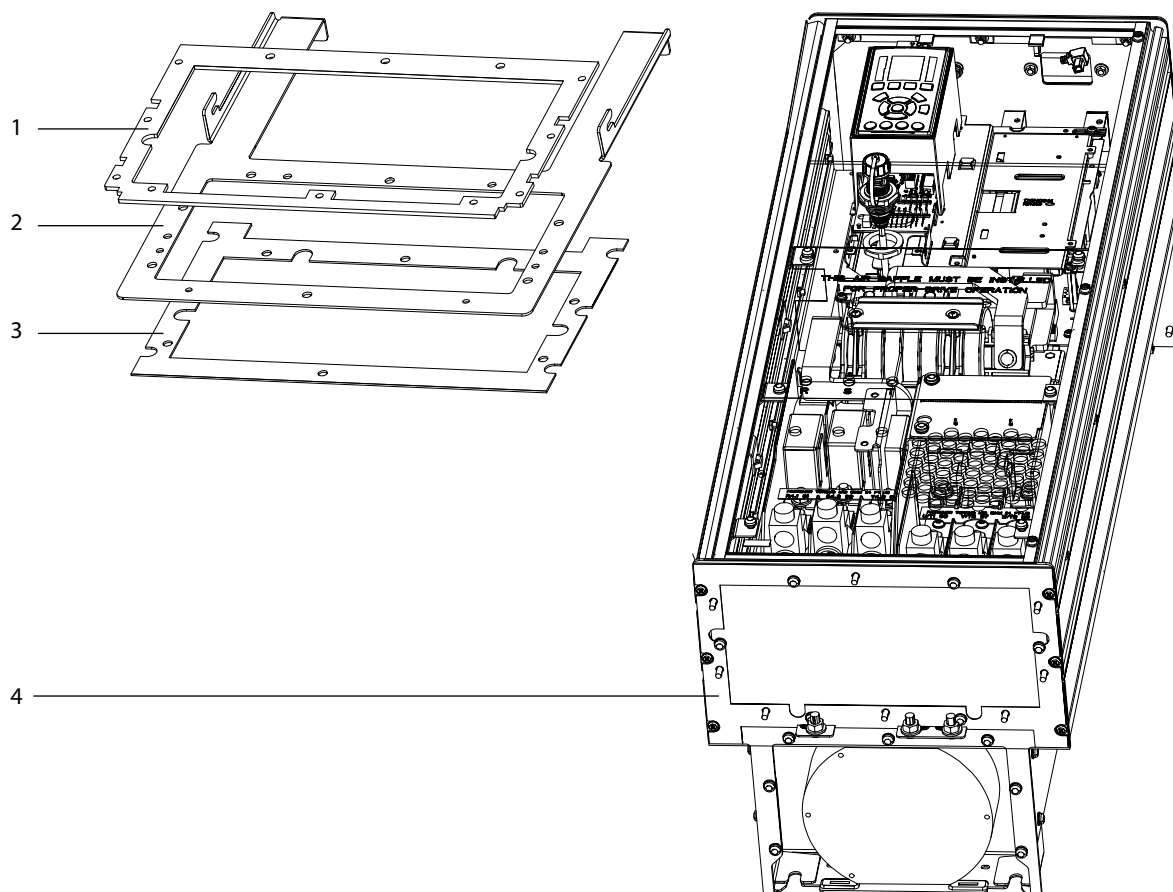
### 2.2 Attaching the Adapter Plate

#### Context:

Before lifting the D1h/D2h drive onto the extended options cabinet, use the following steps to replace the base plate of the drive with the adapter plate from the kit.

**Procedure**

1. Remove all the customer wiring from the mains and motor terminals.
2. Remove the base plate from the drive by unfastening 6 torque screws (T25), 3 from each side of the plate.
3. Peel the paper off the 2 self-adhesive gaskets included in the kit.
4. Attach gasket A to the top side of the adapter plate and gasket B to the underside of the adapter plate.
5. Fasten the adapter plate to the bottom of the drive using 6 Torx screws (T25).



1 Gasket A	2 Adapter plate
3 Gasket B	4 Adapter plate installed

Illustration 1: Adapter Plate Installation

### 2.3 Attaching the Drive to the Extended Options Cabinet

**Context:**

To attach a D1h or D2h drive to the extended options cabinet, use the following steps.

 **WARNING** 

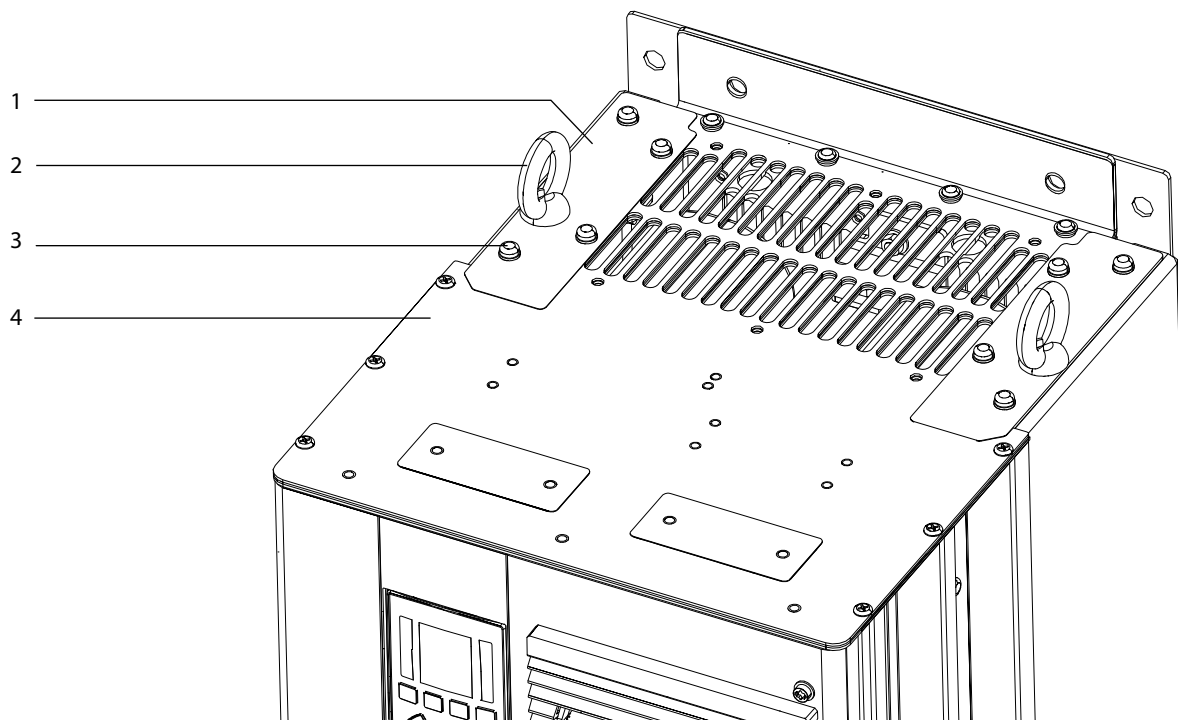
**HEAVY WEIGHT**

The weight of the drive is heavy. Failure to follow local safety regulations for lifting heavy weights may cause death, personal injury, or property damage.

- Ensure that the lifting equipment is in proper working condition.
- Check the weight of the drive and verify that the lifting equipment can safely lift the weight.
- Ensure that the angle from the top of the drive to the lifting cable is 65° or greater.
- Test lift the drive approximately 610 mm (24 in) to verify the proper center of gravity lift point. Reposition the lifting point if the unit is not level.
- Never walk under suspended loads.

**Procedure**

1. Remove the eyebolts at the top of the drive, if present.
2. Remove 4 screws (T25) from the top of the drive, 2 each from the left and right edges. For the D2h drive, remove 6 screws.
3. Position 2 tie plates on top of the drive, and fasten each tie plate with 4 screws (T25). For the D2h drive, fasten 6 screws.



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1 Tie plate	2 Eyebolt
3 Screw (T25)	4 Drive top plate

**Illustration 2: Tie Plate and Eye Bolt Installation**

4. Fasten 2 eye bolts from the kit into the top of the drive.
5. Lift the drive onto the extended options cabinet using the eyebolts, as shown.

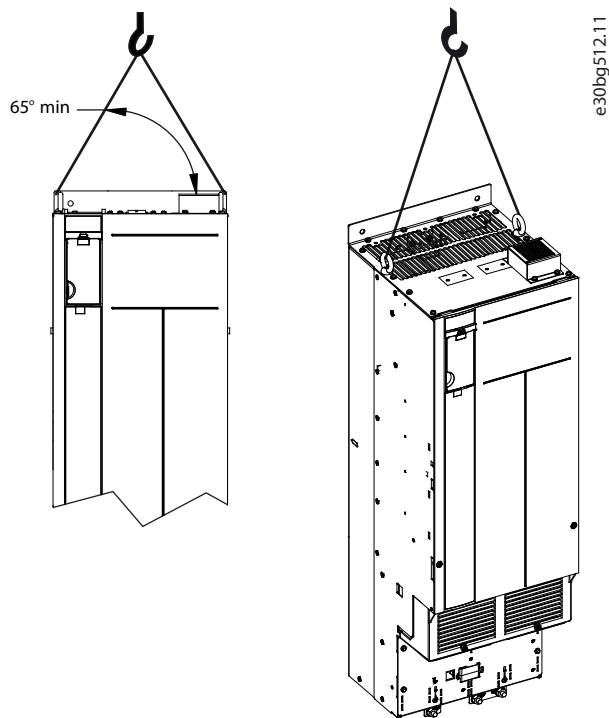


Illustration 3: Recommended Lifting Method

6. To secure the drive enclosure to the extended options cabinet, fasten 8 nuts (8 mm).

## 2.4 Installing the Multiwire Hardware

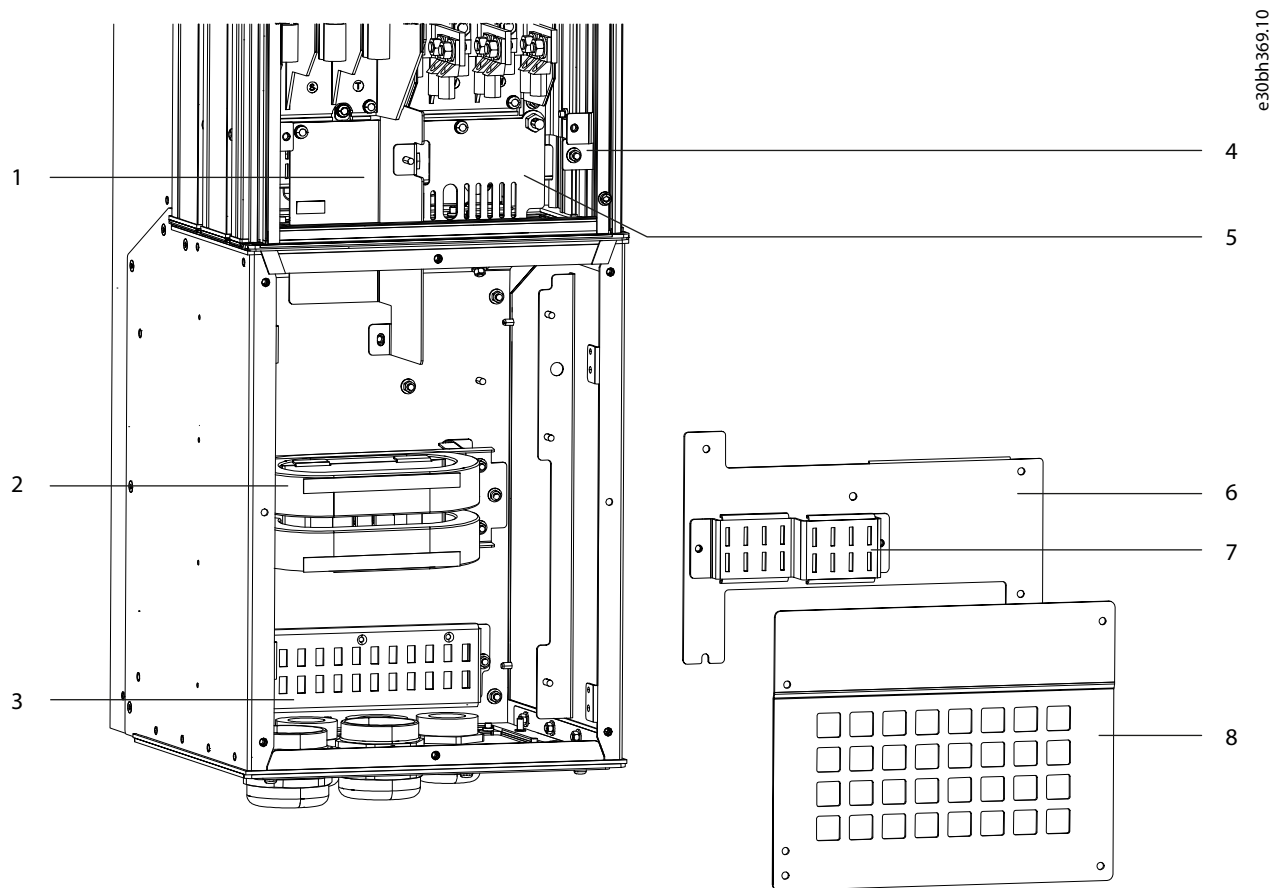
**Context:**

To install the multiwire hardware, use the following steps.



### Procedure

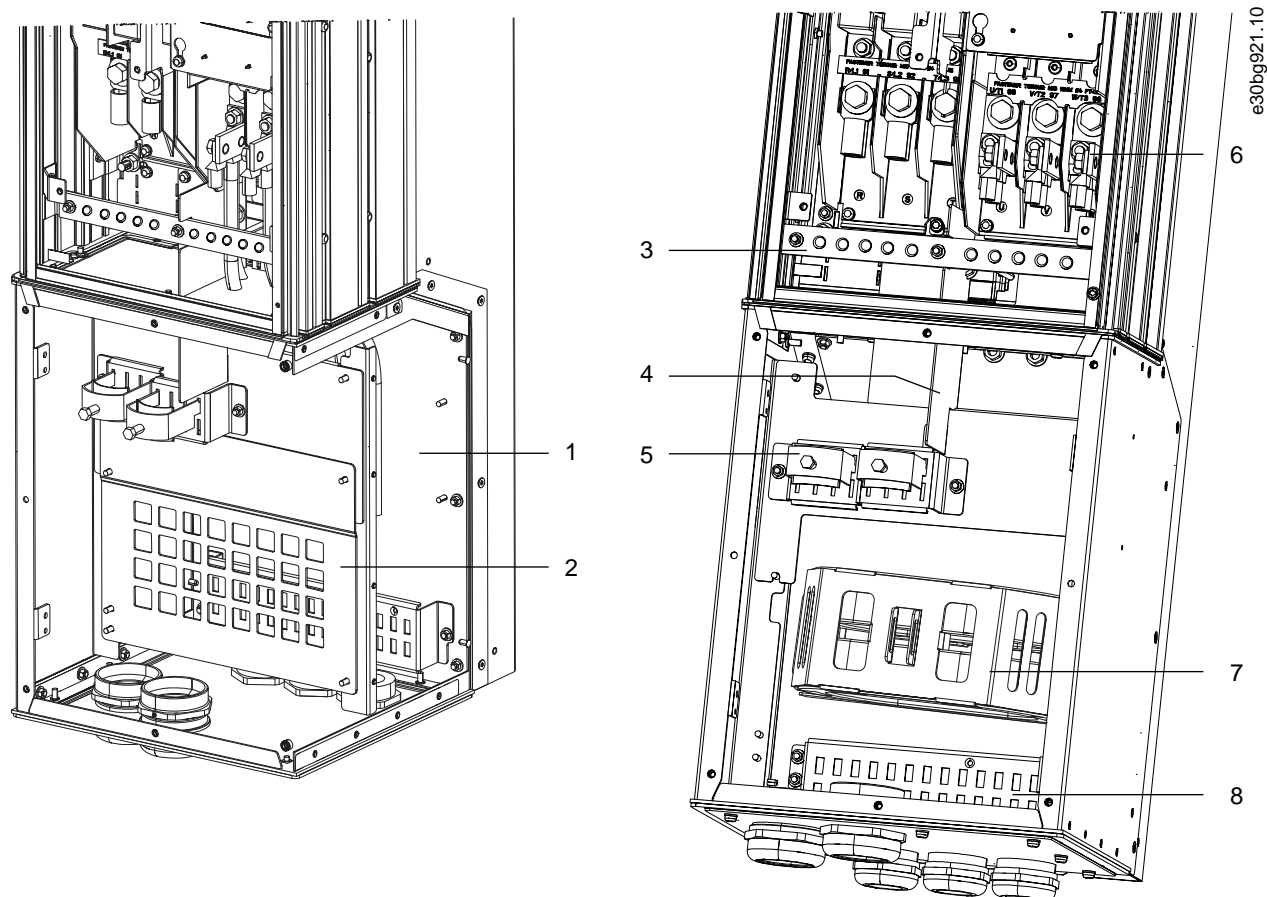
1. Ensure that all customer wiring has been removed.
2. Remove 2 existing brackets, 1 from each side of the drive and replace with the left and right ground bar brackets from the kit. Do not install the ground bar yet.



1 EMC Shield	2 Common-mode filter (optional)
3 Motor cable clamp bracket	4 Ground bar bracket (right)
5 Edge protector	6 Mains plate
7 Mains cable clamp bracket	8 Vented access plate

**Illustration 4: Multiwire Parts Installation**

3. Position the EMC shield between the mains terminals and motor terminals. Secure with 2 M5 screws (T25).
4. Position the edge protector to the right of the EMC shield, and fasten with 2 screws (T25).
5. Remove the vented access plate from the extended options cabinet by removing 5 nuts (8 mm).
6. Remove the mains plate by removing 4 nuts (8 mm), 1 from each corner of the plate.
7. Attach the common-mode filter (optional) to the motor section backplate with 2 screws (T25).



1 Motor section	2 Mains section
3 Ground bar	4 EMC shield
5 Mains cable clamps	6 L-shaped motor busbar
7 Common-mode filter (optional)	8 Motor cable clamp bracket

Illustration 5: Multiwire Kit Hardware

## 2.5 Connecting the Motor Multiwire Cables

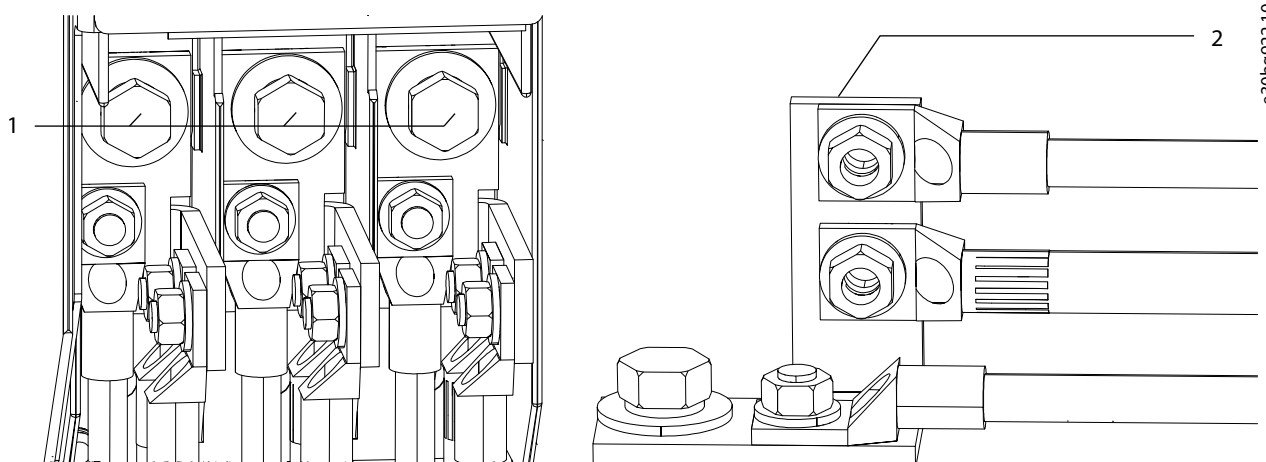
### Context:

To connect the L-shaped mains busbars and multiwire cables, use the following steps. The D1h/D3h drive uses a maximum cable size of 50 mm<sup>2</sup> (1/0 AWG) with 3 wires per phase. The D2h/D4h uses a maximum cable size of 70 mm<sup>2</sup> (2/0 AWG) with up to 4 wires per phase.

**Procedure**

1. Remove the gland plate from the extended options cabinet.
2. Add conduits to the gland plate, and reinstall it. Use conduits appropriate for the wire size.
3. Attach 1 L-shaped busbar to each of the 3 motor terminals (U/V/W). See [illustration 6](#).

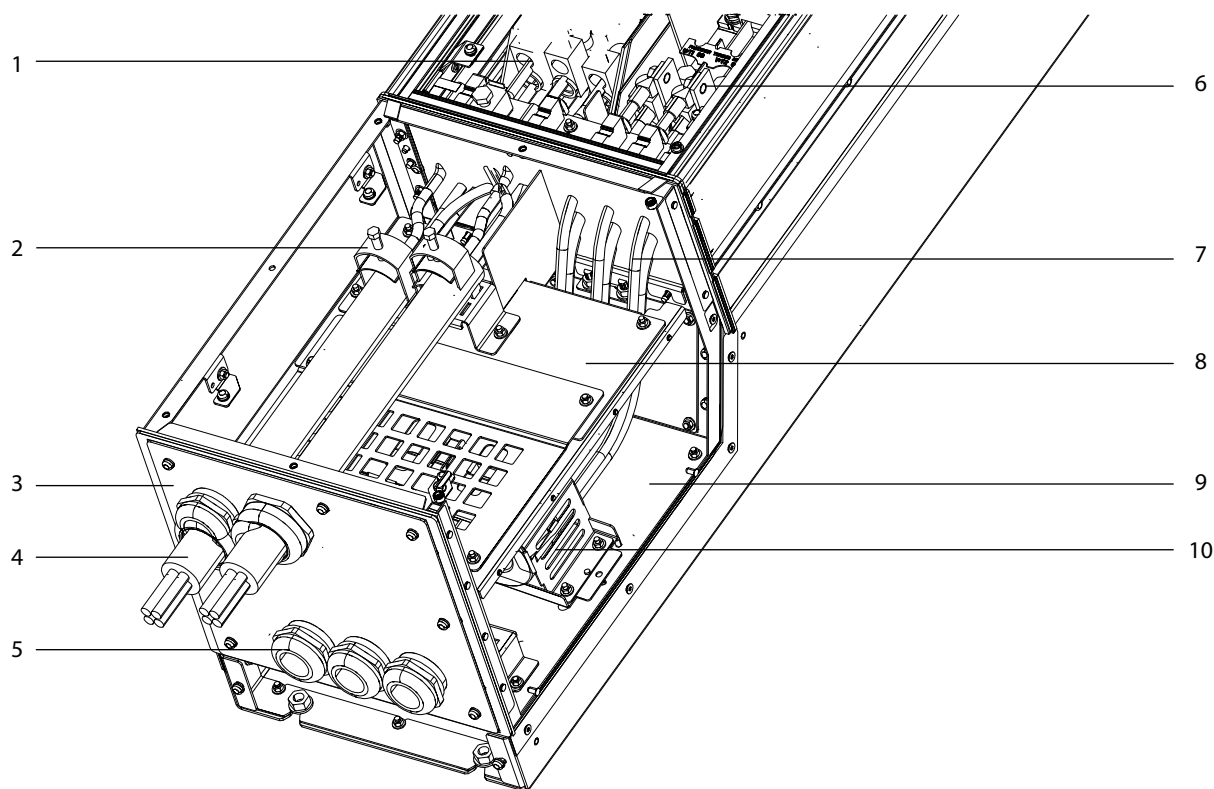
**Illustration 6: L-shaped Busbar Installation (Front and Side Views)**



1 Front view of terminals with L-shaped busbars attached

2 Side view of L-shaped busbar with multiwire cable

4. Thread 1 clamp over each motor cable. Thread the cables through any optional common-mode filters, and hook the clamps into the motor cable clamp bracket.
5. Route the multiwire cables to each of the terminals. See [illustration 7](#).



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1 Mains terminals	2 Mains cable clamp
3 Gland plate	4 Mains multiwire cables
5 Conduit	6 L-shaped motor busbars
7 Motor multiwire cables	8 Mains section
9 Motor section	10 Common-mode filter (optional)

Illustration 7: Multiwire Cable Installation

- Attach 1 multiwire cable to each L-shaped busbar and fasten with 3–4 nuts (13 mm), 1 nut for each wire end. The D1h/D3h drive uses 3 wires per phase. The D2h/D4h uses up to 4 wires per phase.

## 2.6 Connecting the Mains Multiwire Cables

### Context:

To connect the mains multiwire cables, use the following steps. The D1h/D3h drive uses a maximum cable size of 50 mm<sup>2</sup> (1/0 AWG) with 3 wires per phase. The D2h/D4h uses a maximum cable size of 70 mm<sup>2</sup> (2/0 AWG) with up to 4 wires per phase.

**Procedure**

1. Replace the mains plate in the extended option cabinet and secure with 4 nuts (8 mm), 1 in each corner of the plate.
2. Position the vented access plate in the extended options cabinet and secure with 5 nuts (8 mm).
3. Attach 1 L-shaped busbar to each of the 3 mains terminals (R/S/T).
4. Thread 1 clamp over each cable, and hook the clamps into the mains cable clamp bracket.
5. Run multiwire cables to each of the mains terminals. Attach 1 multiwire cable to each L-shaped busbar and fasten with 2 nuts (17 mm), 1 nut for each cable end.
6. Position the ground bar across the front of the cabinet and fasten 2 screws (T25), 1 in each end of the ground bar.
7. Attach the ground wires to the ground bar.

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