

# Installation Instructions

## Bus Bar Kit for 12-pulse, 2-drive System

### VLT<sup>®</sup> Series FC 102, FC 202, and FC 302

#### Description

The bus bar kit is designed for the specific VLT<sup>®</sup> HVAC Drive FC 102, VLT<sup>®</sup> AQUA Drive FC 202, and VLT<sup>®</sup> AutomationDrive FC 302 D4h-size VLT<sup>®</sup> Parallel Drive Modules mounted in a Rittal TS8 enclosure. The bus bars in this kit link 2 drive modules in parallel.

#### Kit Part Number

Part number	Kit description
176F6489	Bus bar kit for the VLT <sup>®</sup> Parallel Drive Modules (12-pulse, 2-drive system)

**Table 1.1 Part Number for the VLT<sup>®</sup> Parallel Drive Modules Bus Bar Kit**

#### Items Supplied

The kit contains the following parts:

##### Bus bar assembly

- Nut with integrated washer, M5 (10)
- Nut with integrated washer, M8 (10)
- Nut with integrated washer, M10 (6)
- Screw, M5 x 12 mm (40)
- Screw with integrated washer, M10 x 30 (6)
- Stand-off, M5 x 25 (15)
- Ground bus bar, 800 mm (1)
- Ground plate (1)
- Ground jumper plate (2)
- Ground jumper bus bar (2)
- Ground clamp (1)
- EMI/EMC bracket, left (2)
- EMI/EMC bracket, right (2)
- EMI/EMC bracket, front (2)
- EMI/EMC shield, lower (1)

##### DC bus assembly

- L-brackets (2)
- DC-link jumper bus bar (-) (2)
- Jumper bus bar (+) (2)
- DC bus support plate (1)
- DC-link bus bar (2)

##### AC bus bar assembly

- Brake terminal, left (2)
- Brake terminal, right (2)
- Brake terminal bracket (2)
- Solid AC bus bar, (6)
- AC bus bar assembly bracket (1)
- S-bracket (1)
- Flexible AC bus bars (6)
- AC support bracket (1)
- Side support (2)

#### Safety

### **⚠ WARNING**

#### DISCHARGE TIME

The frequency converter contains DC-link capacitors, which can remain charged even when the unit is off. 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, could result in death or serious injury.

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

#### Installation

### **NOTICE**

If both a bus bar kit and a back-channel cooling kit are being installed in the cabinet, install the back-channel cooling kit first.

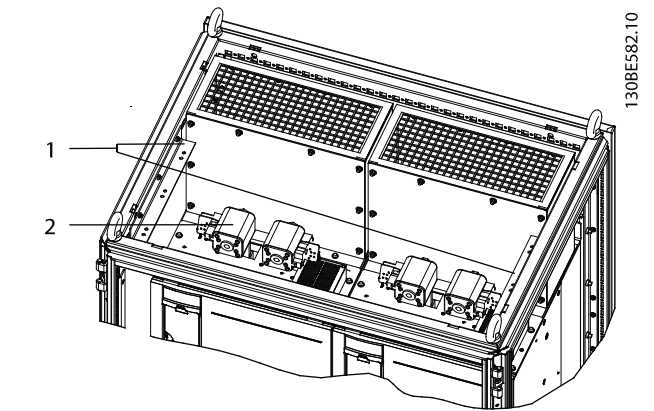
**NOTICE**

**APPROVALS AND CERTIFICATIONS**

This VLT® Parallel Drive Modules bus bar kit is UL 508C compliant. These installation instructions describe how to install Danfoss-supplied bus bars which, if followed, meet specific agency approvals and certifications. Seek agency approvals or certifications apart from Danfoss if designing and building other configurations.

**Installing DC-link Bus Bars**

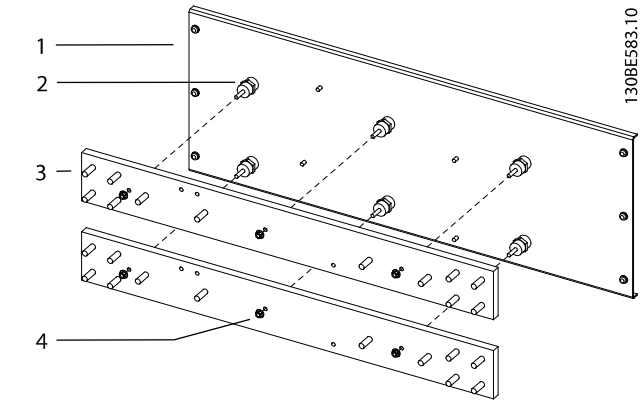
1. Install 1 L-bracket inside the top of the enclosure on each side. Secure each bracket with 3 M5 nuts and torque to 2.3 N · m (20 in-lb). See *Illustration 1.1*.



1	L-brackets	2	DC fuse with microswitch
---	------------	---	--------------------------

**Illustration 1.1** Installation of DC Bus Bar L-brackets above the DC Fuses

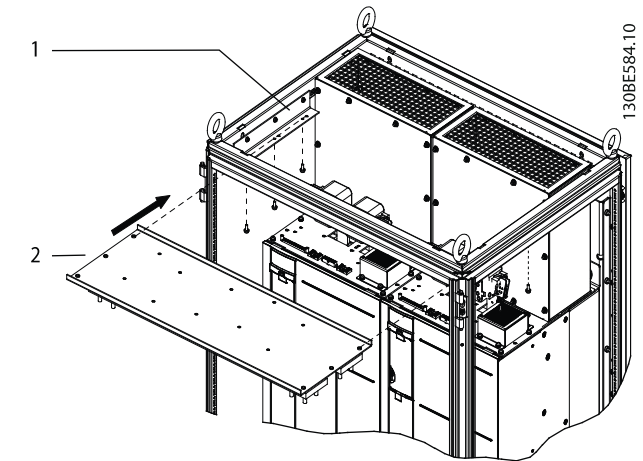
2. Install the 6 stand-offs onto the support plate. Torque to 2.3 N · m (20 in-lb). Refer to *Illustration 1.2*.
3. Install the 2 DC-link bus bars onto the support plate using 3 M5 nuts per bus bar. Torque to 2.3 N · m (20 in-lb).



1	Support plate	3	DC-link bus bars
2	Stand-offs	4	M5 nut

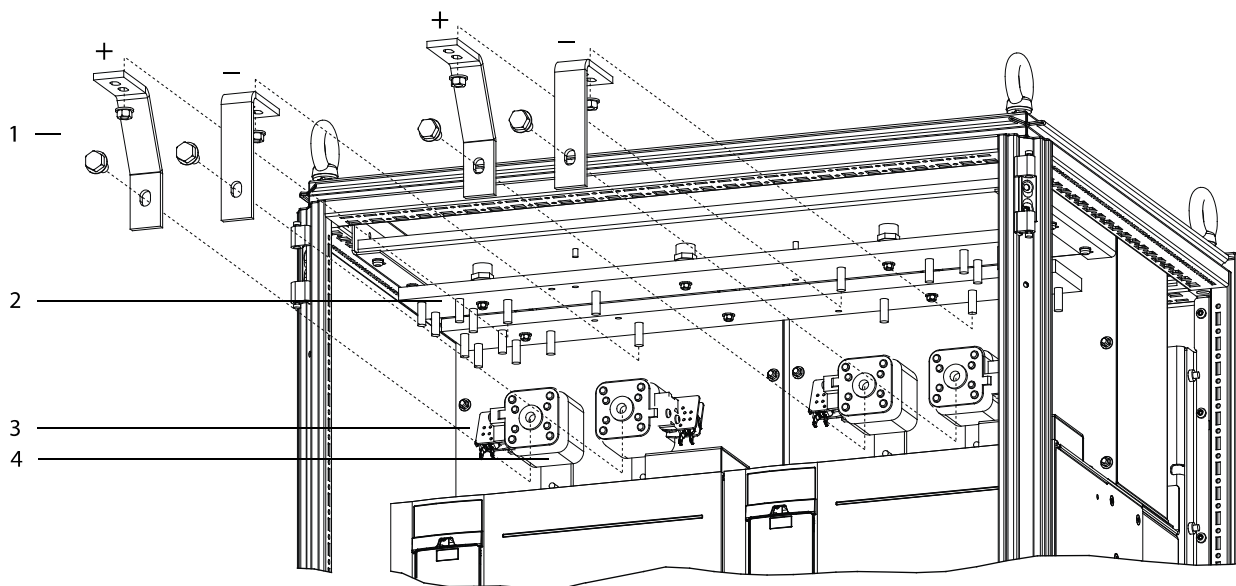
**Illustration 1.2** Installing DC-link Bus Bars onto Support Plate

4. With the DC-link bus bars facing downward, slide the support plate onto the L-brackets. Secure the support plate with 6 M5 screws and torque to 2.3 N · m (20 in-lb). Refer to *Illustration 1.3*.
5. Install the DC+ and DC- jumper bus bars between the DC fuses and the DC bus bars. Refer to *Illustration 1.4*.



1	L-brackets
2	DC-link bus bar assembly (support plate and bus bars)

**Illustration 1.3** Installation of DC Bus Bars onto L-brackets



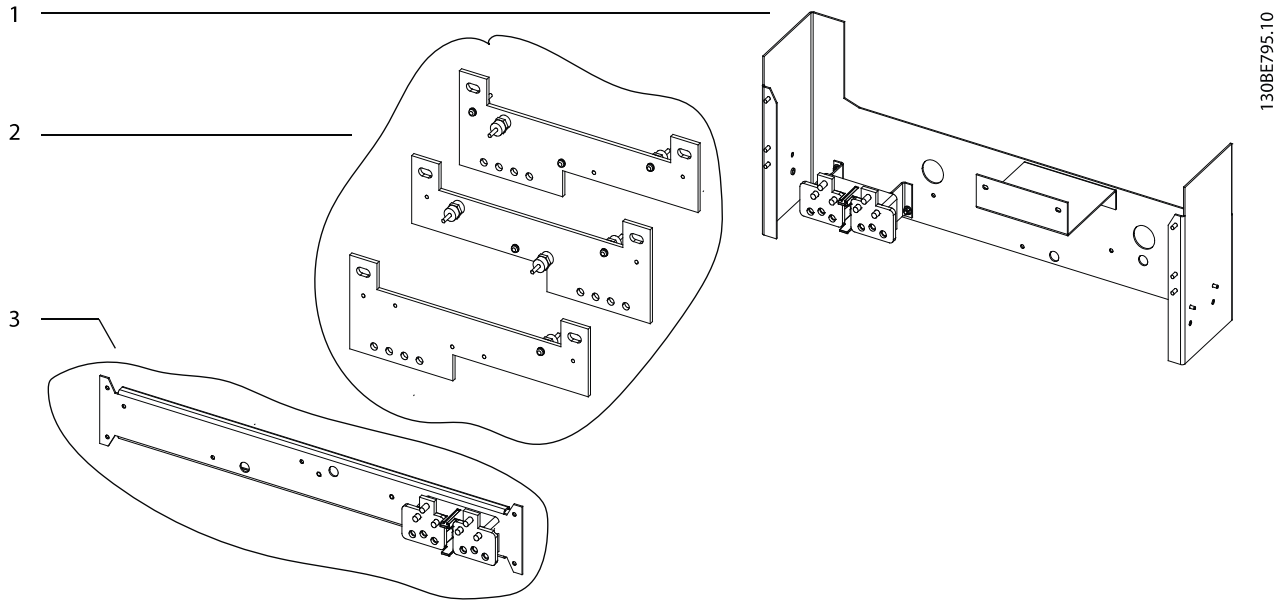
130BE585.10

1	DC-link jumper bus bars (+/- indicated in drawing)	3	Microswitch
2	DC-link bus bar	4	DC fuse

Illustration 1.4 Installation of DC Jumper Bus Bars

## Assembling the AC Bus Bar Subassemblies

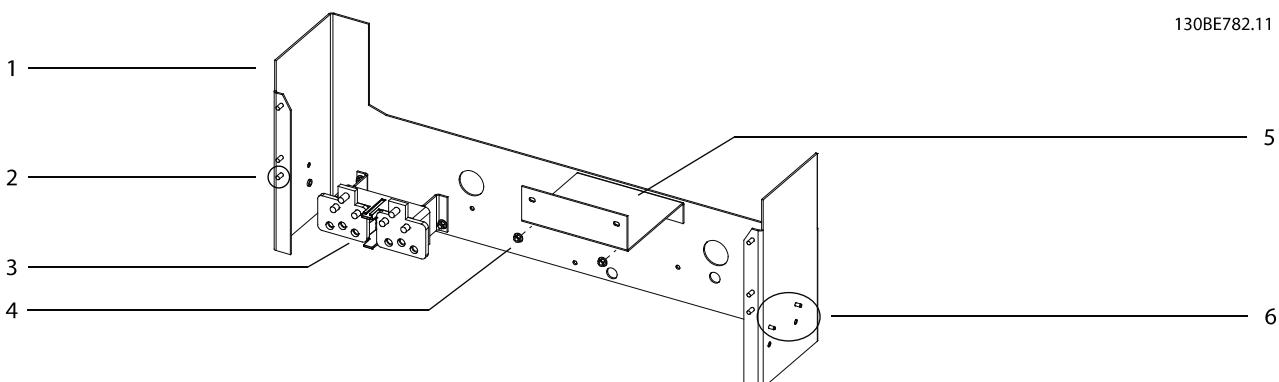
The AC bus bar assembly consists of the following 3 subassemblies, as shown in *Illustration 1.5*.



1	AC bus bar assembly bracket	3	AC support bracket with drive module 2 brake terminal assembly
2	Motor bus bar subassembly	-	-

**Illustration 1.5 Exploded View of the AC Bus Bar Assembly**

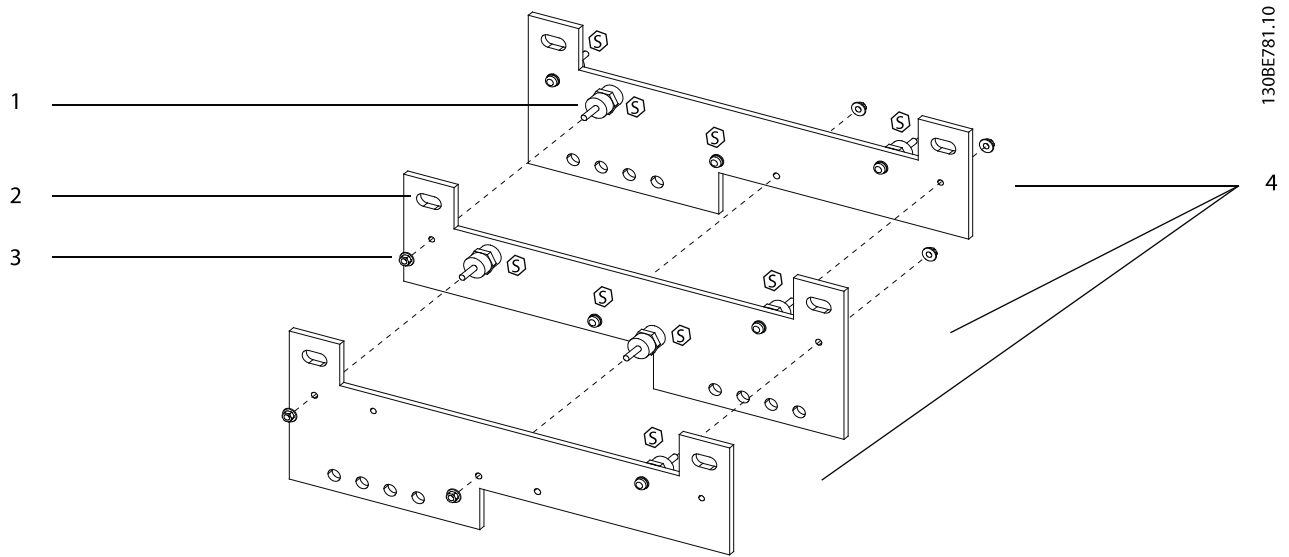
1. Install the left and right brake terminals onto the brake terminal bracket using 4 M5 nuts. Torque to 2.3 Nm (20 in-lb).
2. Secure the brake terminal assembly to the AC bus bar assembly bracket with 2 M8 nuts. Torque to 9.6 Nm (85 in-lb). Refer to *Illustration 1.6*.
3. Install the S-bracket to the AC bus bar assembly bracket using 2 M5 nuts. Torque to 2.3 Nm (20 in-lb).



1	AC bus bar assembly support bracket	4	M5 nut
2	Mounting point for lower EMI/EMC shield	5	S-bracket
3	Brake terminal assembly (terminals and bracket)	6	Studs that insert into the side support bracket

**Illustration 1.6 Assembling the AC Bus Bar Assembly Bracket**

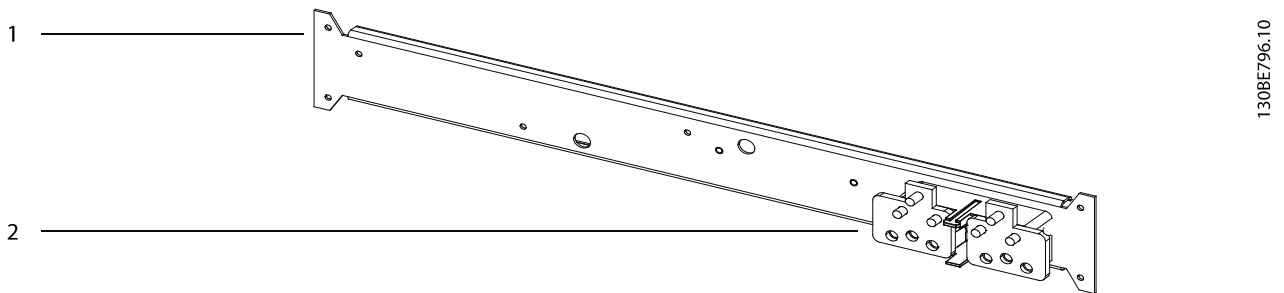
- Assemble the motor bus bar subassembly using 9 stand-offs and 9 M5 nuts. Torque to 2.3 Nm (20 in-lb). Refer to *Illustration 1.7*.



1	Slotted opening for M10 screw	3	M5 nut
2	Stand-offs (front and back side of bus bar), indicated by an S in the drawing	4	Solid motor bus bars

**Illustration 1.7 Assembling the Motor Bus Bar Subassembly**

- Install the left and right brake terminals onto the brake terminal bracket using 4 M5 nuts. Torque to 2.3 Nm (20 in-lb).
- Secure the brake terminal assembly to the AC support bracket with 2 M8 nuts. Torque to 9.6 Nm (85 in-lb). Refer to *Illustration 1.8*.

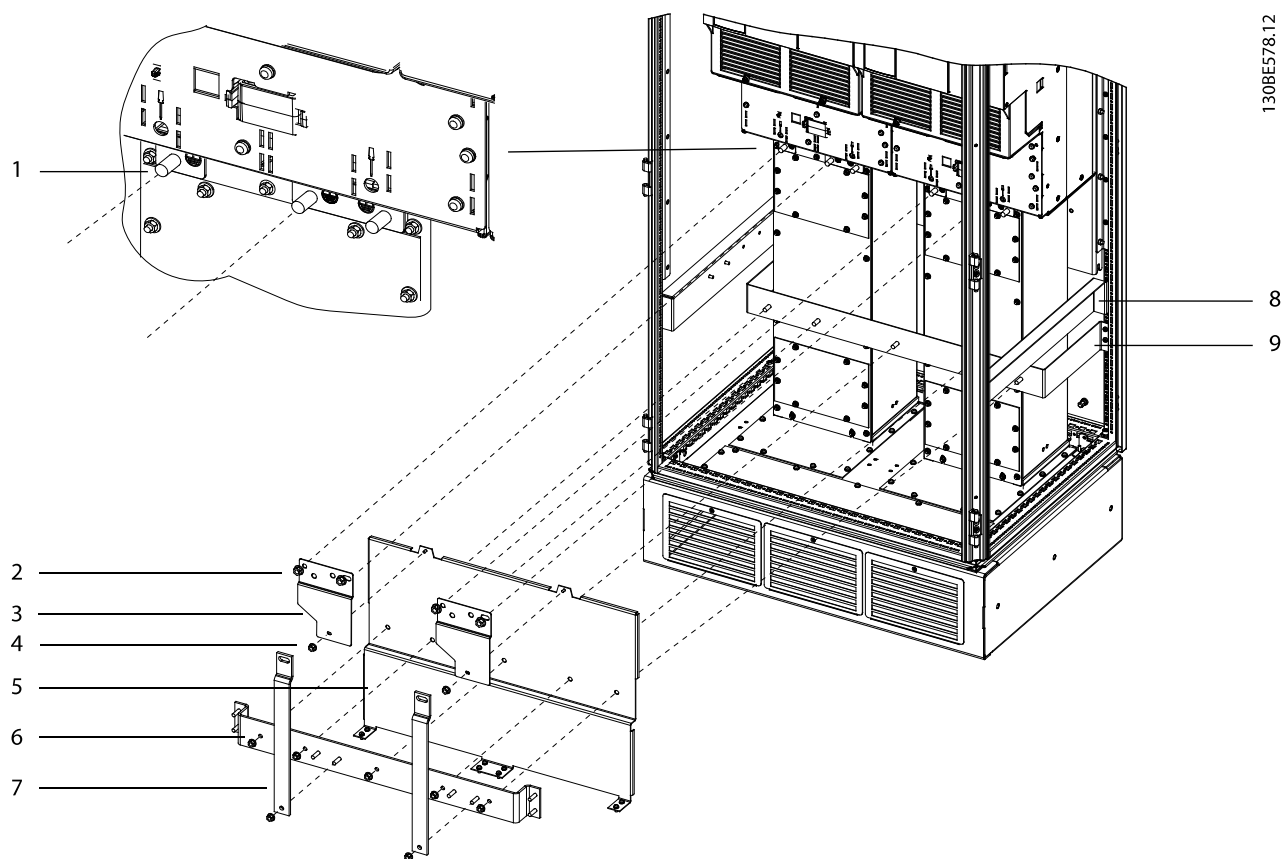


1	AC support bracket	2	Brake terminal assembly (terminals and bracket)
---	--------------------	---	---

**Illustration 1.8 Assembling the AC Support Bracket with the Drive Module 2 Brake Terminal Assembly**

## Installing the AC Bus Bar Assembly

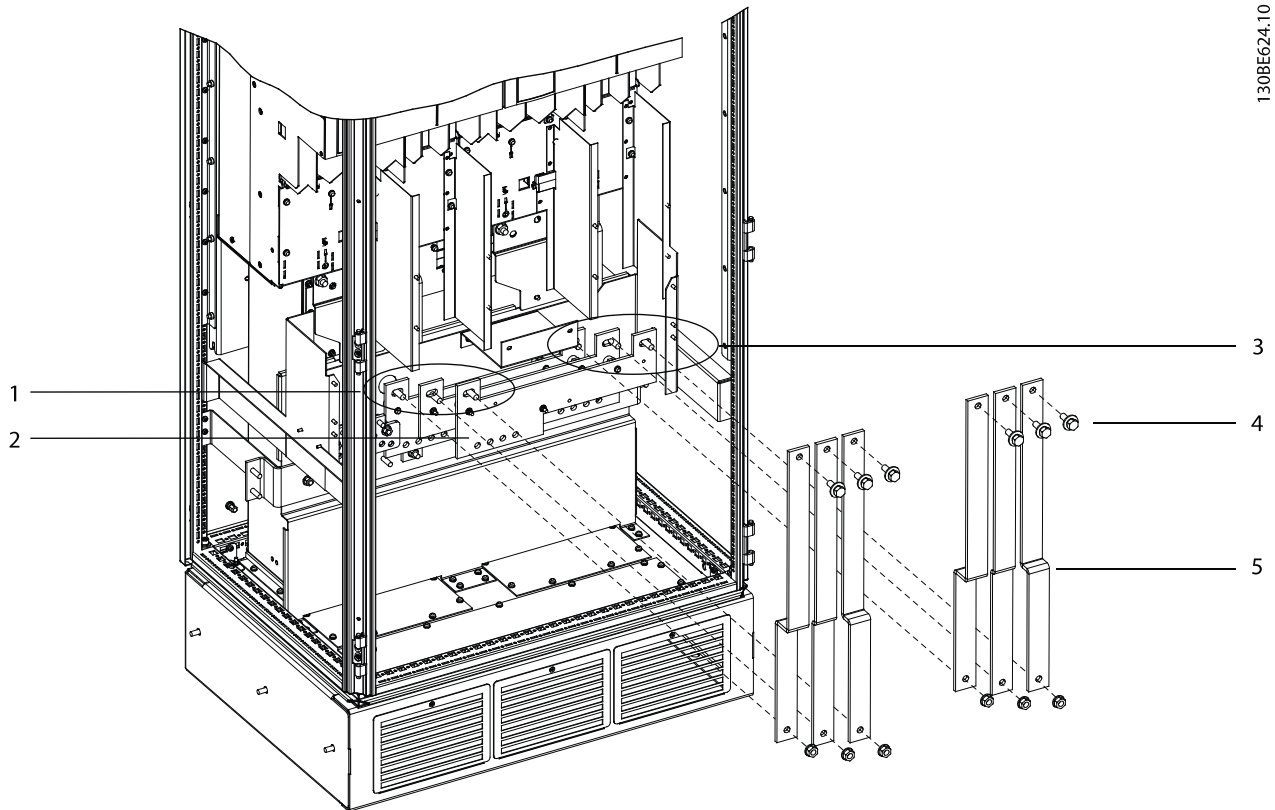
1. Install 1 side support bracket inside the enclosure on each side. Secure each side support bracket with 4 M5 screws and torque to 2.3 Nm (20 in-lb). See *Illustration 1.9*.
2. Install ground plate assembly. See *Illustration 1.9*.
  - 2a Attach the ground support bracket to the inside of the enclosure. Secure with 4 M5 screws and torque to 2.3 Nm (20 in-lb).
  - 2b Install the ground plate onto the 5 studs on the ground support bar.
  - 2c Secure the bottom of the ground plate to the enclosure using 8 M5 screws. Torque to 2.3 Nm (20 in-lb).
  - 2d Install the ground bus bar onto the ground plate. Secure with 5 M8 nuts and torque to 9.6 Nm (85 in-lb).
  - 2e Install the 1 ground jumper plate per drive module. Secure the bottom of the ground jumper plate to the top of the ground plate using 1 M5 nut. Torque to 2.3 Nm (20 in-lb).
  - 2f Secure the top of the ground jumper plate to the bottom of the drive module reusing the 2 existing M10 nuts. Torque to 19 Nm (169 in-lb).
3. Install the ground jumper bus bars. Perform this step for each drive module.
  - 3a Secure the bottom of the ground jumper bus bar to the ground bus bar using 1 M5 nut. Torque to 2.3 Nm (20 in-lb). See *Illustration 1.9* for the mounting attachment points on the ground bus bar.
  - 3b Secure the other end of the ground jumper bus bar to the drive module ground terminal using 1 M5 nut. Torque to 2.3 Nm (20 in-lb).
4. Secure the motor bus bar subassembly to the AC bus bar assembly bracket using 3 M5 nuts. Torque to 2.3 Nm (20 in-lb). Refer to *Illustration 1.5*.
5. Install the AC bus bar bracket/motor bus bar subassembly to the side support brackets. Secure each side with 2 M5 nuts and torque to 2.3 Nm (20 in-lb).
6. Shape the flexible bus bars to fit.
7. Install the motor flexible bus bars for each drive module. Refer to *Illustration 1.10*.
  - 7a Insert 1 M10 screw into each of the slotted holes in the motor bus bar subassembly, with the screw shaft facing the front.
  - 7b Install 3 flexible motor bus bars per drive module, securing 1 end to the screw and the other end to the drive module terminal. Secure with 2 M10 nuts per bus bar. Torque to 19 Nm (169 in-lb).
  - 7c Verify that the proper U, V, W connections are made. Refer to the *Terminal Dimensions* section in the *VLT® Parallel Drive Modules Installation Guide*.
8. Assemble the front EMI/EMC bracket assembly.
  - 8a Attach the left EMI/EMC bracket to the front EMI/EMC bracket using 3 M5 screws. Torque to 2.3 Nm (20 in-lb).
  - 8b Attach the right EMI/EMC bracket to the front EMI/EMC bracket using 3 M5 screws. Torque to 2.3 Nm (20 in-lb).
9. Install the front EMI/EMC bracket assembly over each set of flexible motor bus bars. Secure with 4 M5 nuts and torque to 2.3 Nm (20 in-lb). Refer to *Illustration 1.11*.
10. Install the lower EMI/EMC shield to the AC bus bar subassembly bracket. Secure with 2 M5 nuts. Torque to 2.3 Nm (20 in-lb). See *Illustration 1.12*.
11. Run the mains cables up to the drive module mains terminals. Secure with the M10 nut that is already provided on the terminal, and torque to 19 Nm (169 in-lb).
12. Verify that the proper R, S, T connections are made. Refer to the *Terminal Dimensions* section in the *VLT® Parallel Drive Modules Installation Guide*.



1308E578.12

1	Screw at the bottom of the drive module that connects to the top of the ground jumper plate	6	Ground bus bar
2	M10 nut	7	Ground jumper bus bar
3	Ground jumper plate	8	Side support bracket
4	M5 nut	9	Ground support bracket
5	Ground plate	-	-

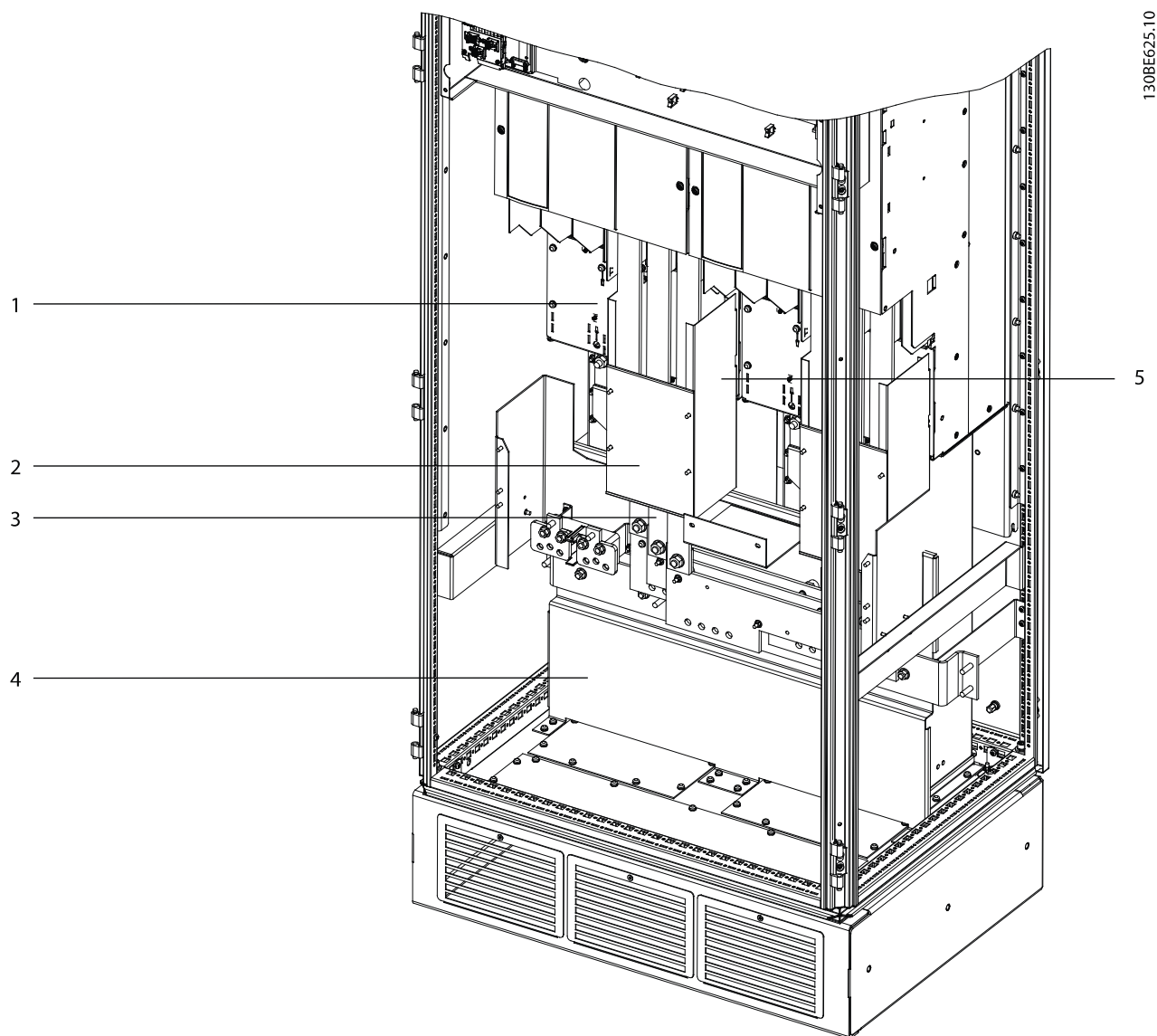
Illustration 1.9 Installation of Side Support Brackets and Ground Bus Bar Assembly



1	Motor bus bar screws for drive module 1	4	M10 nuts
2	Motor bus bar subassembly	5	Flexible motor bus bars
3	Motor bus bar screws for drive module 2	-	-

Illustration 1.10 Installation of Flexible Motor Bus Bars



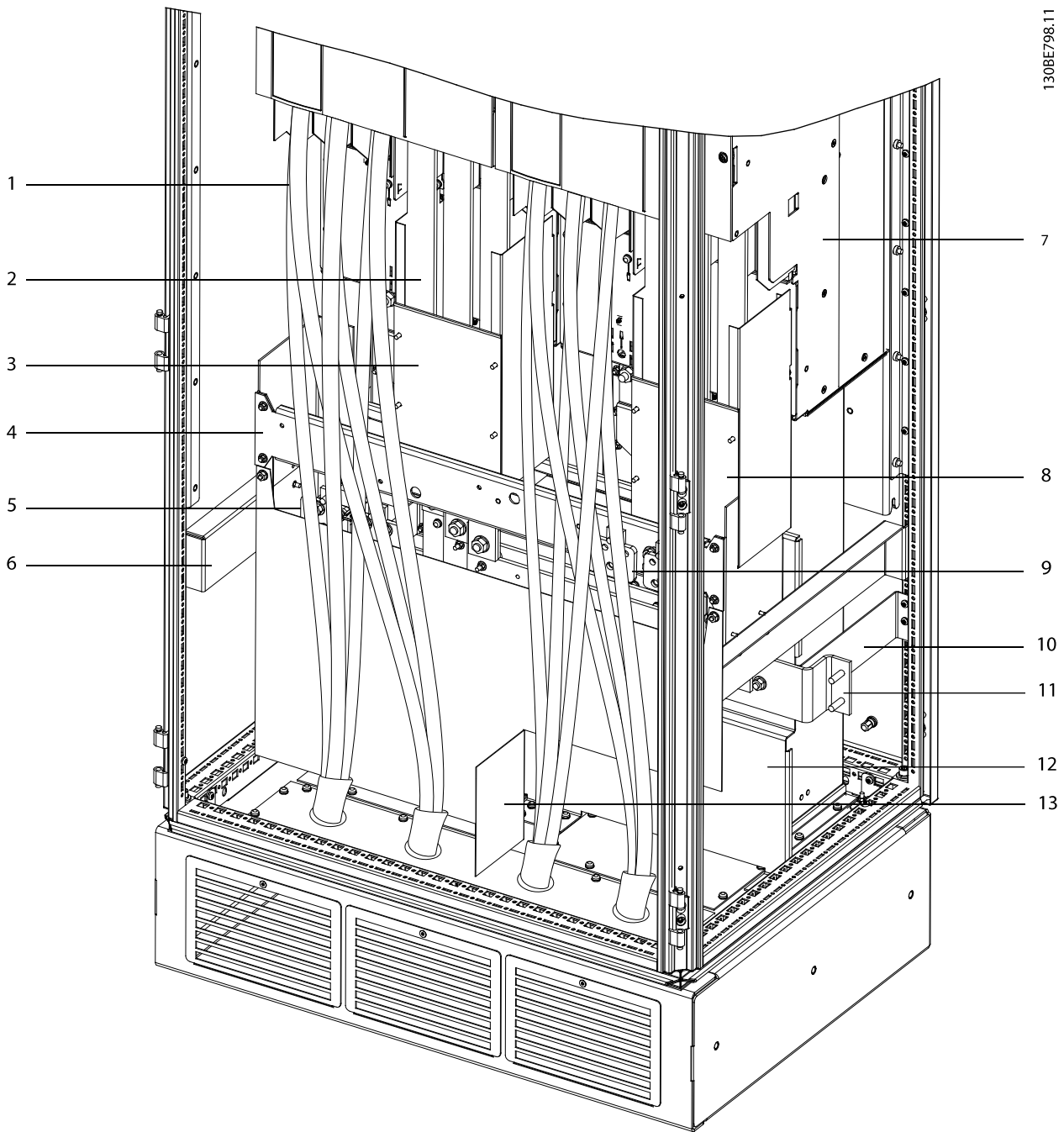


1308E625.10

1	Left EMI/EMC bracket (shown on drive module 1)	4	Ground plate
2	Front EMI/EMC bracket (shown on drive module 1)	5	Right EMI/EMC bracket (shown on drive module 1)
3	Flexible motor bus bars	-	-

Illustration 1.11 Installation of Front EMI/EMC Bracket Assembly

1308E798.11



1	Mains cable for drive module 1	8	Front EMI/EMC bracket assembly for drive module 2
2	Flexible bus bars for drive module 1 motor terminals	9	Brake terminal assembly for drive module 2
3	Front EMI/EMC bracket assembly for drive module 1	10	Ground bar support bracket
4	AC support bracket	11	Ground bar
5	Brake terminal assembly for drive module 1	12	Ground plate
6	Side support bracket	13	Lower EMI/EMC shield
7	Drive module 2		

Illustration 1.12 Installation of Mains Cables



.....  
Danfoss can accept no responsibility for possible errors in catalogues, brochures and other printed material. Danfoss reserves the right to alter its products without notice. This also applies to products already on order provided that such alterations can be made without subsequential changes being necessary in specifications already agreed. All trademarks in this material are property of the respective companies. Danfoss and the Danfoss logotype are trademarks of Danfoss A/S. All rights reserved.  
.....

Danfoss A/S  
Ulsnaes 1  
DK-6300 Graasten  
[vlt-drives.danfoss.com](http://vlt-drives.danfoss.com)

