

# Installation Instructions

## 300 A Current Sensor Kit for D1h/D3h/D5h/D6h Enclosure Sizes

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

#### 1.1 Description

The 300 A current sensor kit is designed for D1h/D3h/D5h/D6h enclosure sizes in the power ranges shown in *Table 1.1*. To identify the power rating, see *Illustration 1.1*.

Product group and series	Voltage rating	Power rating
VLT® HVAC Drive FC 102, VLT® Refrigeration Drive FC 103, VLT® AQUA Drive FC 202	(T4) 380–480 V	110–200 kW (150–300 hp)
	(T7) 525–690 V	75–315 kW (75–350 hp)
VLT® AutomationDrive FC 302	(T5) 380–500 V	90–160 kW (125–200 hp)
	(T7) 525–690 V	55–250 kW (75–350 hp)

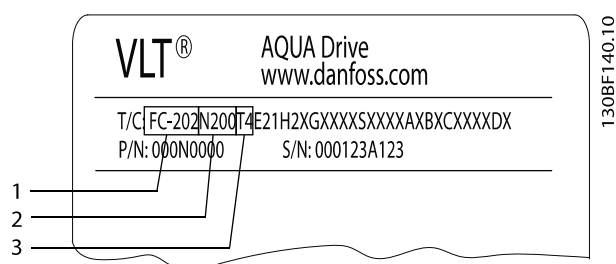
**Table 1.1 Applicable Power Range for 300 A Current Sensor Kit**

This 300 A current sensor kit contains all components required to upgrade the current sensors in D1h, D3h, D5h, or D6h enclosure sizes.

##### 1.1.1 Identifying the Power Rating

To find the frequency converter power rating, use the following steps.

1. Obtain the following information from the nameplate, which is on the frequency converter. Refer to *Illustration 1.1*.
  - 1a Product group and product series (characters 1–6)
  - 1b Power rating (characters 7–10)
  - 1c Voltage rating (phases and mains) (characters 11–12)
2. Determine if the power rating is in *Table 1.1*.



1	Product group and product series
2	Power rating
3	Voltage rating (phases and mains)

**Illustration 1.1 Nameplate for VLT® AQUA Drive FC 202, 200 kW**

#### 1.2 Kit Part Number

Part number	Kit description
176F6516	Current sensor kit for D1h/D3h/D5h/D6h

**Table 1.2 Part Number for 300 A Current Sensor Kit**

##### 1.2.1 Items Supplied

For the complete parts list of the 300 A current sensor kit, see *Illustration 1.4*.

### 1.3 Safety Instructions

#### **CAUTION**

##### TRAINING REQUIRED

Only certified technicians trained by Danfoss are allowed to replace the parts described in these installation instructions. Installation work done by non-qualified personnel can result in personal injury or equipment damage. Make sure to read and save these instructions.

#### **WARNING**

##### ELECTRICAL SHOCK HAZARD

VLT® frequency converters contain dangerous voltages when connected to mains voltage. Improper installation, and installing or servicing with power connected, can cause death, serious injury, or equipment failure.

To avoid death, serious injury, or equipment failure:

- Only use qualified electricians for the installation.
- Disconnect the frequency converter from all power sources before installation or service.
- Treat the frequency converter as live whenever the mains voltage is connected.
- Follow the guidelines in these instructions and local electrical safety codes.

#### **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 a minimum of 20 minutes after power is removed before performing service work can result in death or serious injury.

1. Stop the motor.
2. Disconnect AC mains and remote DC-link supplies, including battery back-ups, UPS, and DC-link connections to other frequency converters.
3. Disconnect or lock PM motor.
4. Wait 20 minutes for the capacitors to discharge.
5. To verify full discharge, measure the voltage level.

### 1.4 Disassembly Guidelines

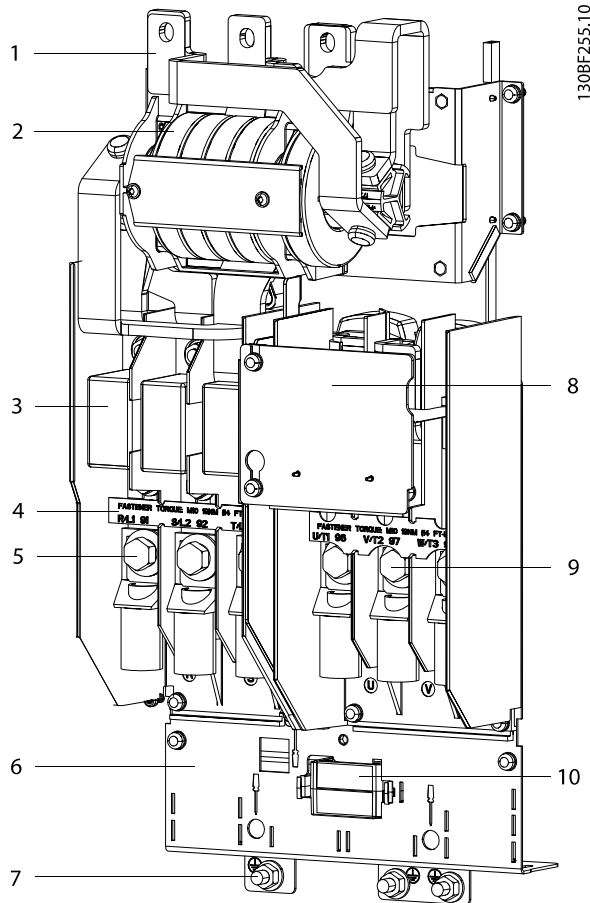
#### **NOTICE**

The current sensor kit includes an extra set of fasteners in case any fasteners are missing or unusable. To make the disassembly/reassembly process easier, use these general guidelines:

1. Follow the disassembly instructions for each component.
2. Place the component along with the removed fasteners together in one place.
3. Replace old component with the new component provided in the kit.
4. If any fasteners are stripped or lost, replace with similar fastener from the kit.
5. Follow the installation instructions for replacing and securing each component.

### 1.4.1 Removing AC Input Busbars

Optional components mounted on the input terminal plate can result in differing configurations. These options include an RFI filter and AC fuses. See *Illustration 1.2*. Use the appropriate procedure based on the options present in the unit.



1	Input busbar	6	Power terminal mounting plate
2	RFI filter (optional)	7	Retaining nut
3	AC fuse (optional)	8	EMC shield
4	Terminal label	9	Output motor terminal
5	Mains input terminal	10	Mixing fan

**Illustration 1.2 AC Input Busbars with Optional RFI Filter and AC Fuses**

#### No options

1. Remove the air baffle by removing 4 screws (T25), 1 from each corner.
2. Remove 3 nuts (13 mm) at the top of the input busbars, 1 per busbar.
3. Remove 6 nuts (13 mm) at the bottom of the input busbars, 2 per busbar.
4. Lift the input busbars from the unit.

#### AC fuses only

1. Remove the air baffle by removing 4 screws (T25), 1 from each corner.
2. Remove the 3 AC fuses by removing 6 nuts (13 mm), 1 at each end of each fuse.
3. Remove 3 nuts (13 mm) at the top of the busbars, 1 per phase.
4. Lift the input busbars from the unit.

#### RFI filter only

1. Remove the air baffle by removing 4 screws (T25), 1 from each corner.
2. Remove 3 nuts (13 mm) at the top of the RFI filter, 1 per bus phase.
3. Remove 6 nuts (13 mm) at the bottom of the RFI filter, 2 per phase.
4. Remove 4 mounting screws (T20) connecting the RFI filter to the side channels of the frequency converter.
5. Remove the RFI filter and unplug the RFI cable from the MK100 connector on the RFI card.

#### AC fuses and RFI filter

1. Remove the air baffle by removing 4 screws (T25), 1 from each corner.
2. Remove AC fuses by removing 6 nuts (13 mm), 1 at each end of each fuse.
3. Remove 3 nuts (13 mm) at the top of the RFI filter, 1 per phase.
4. Remove 4 screws (T20) connecting the RFI filter to the side channels of the frequency converter.
5. Remove the RFI filter and unplug the RFI cable from MK100 on the RFI card.

### 1.4.2 Removing Input Terminal Block

1. Disconnect the input power wiring.
2. Remove 2 screws (T25) at the bottom of the terminal block.
3. Remove 1 screw (T25) at the bottom of the EMC shield.
4. Release the current sensor wiring from retaining clips.
5. To remove the terminal, slide the terminal down to disengage it from the metal clips holding it in place.

### 1.4.3 Removing EMC Partition

1. Remove 1 screw (T25) at the top of the EMC shield.
2. Remove the EMC shield from the unit.

### 1.4.4 Removing Brake Terminal (optional)

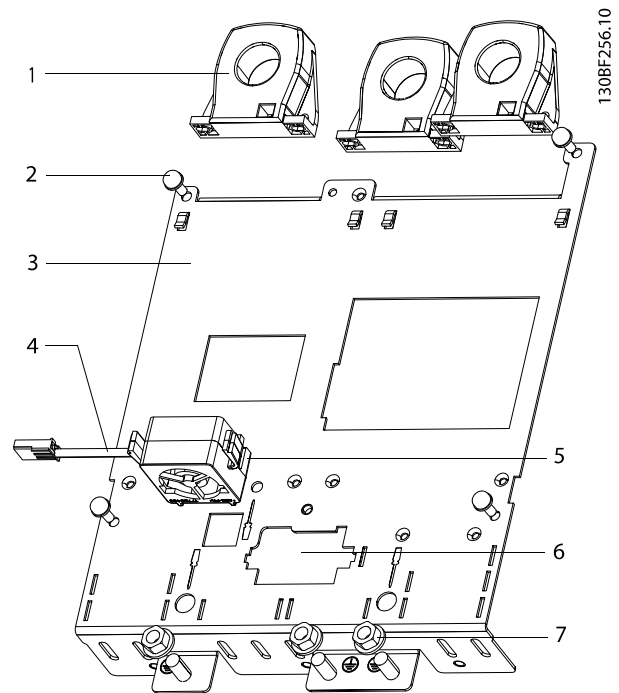
1. Disconnect the brake wiring, if any.
2. To detach the R (+) terminal, remove 1 screw (T25) at the terminal block, and 1 additional screw (T40).
3. To detach the R (-) terminal, remove 1 screw (T25) at the terminal block, and 1 additional nut (13 mm).
4. To detach the brake terminal block, remove 2 nuts (13 mm).

### 1.4.5 Removing Output Terminal Block

1. Disconnect motor wiring.
2. To detach the U output busbar, remove 1 screw (T25) from the busbar center and 1 bolt (T40) at the current sensor end.
3. To detach the V output busbar, remove 1 screw (T25) from the busbar center and 1 bolt (T40).
4. To detach the W output busbar, remove 1 screw (T25) from the busbar center and 1 bolt (T40).
5. Remove the 3 cylindrical busbars from the current sensors.
6. Remove the 2 screws (T25) at the bottom of the terminal block.
7. To remove the terminal, slide the terminal down to disengage it from the metal clips holding it in place.

### 1.4.6 Removing Power Terminal Mounting Plate

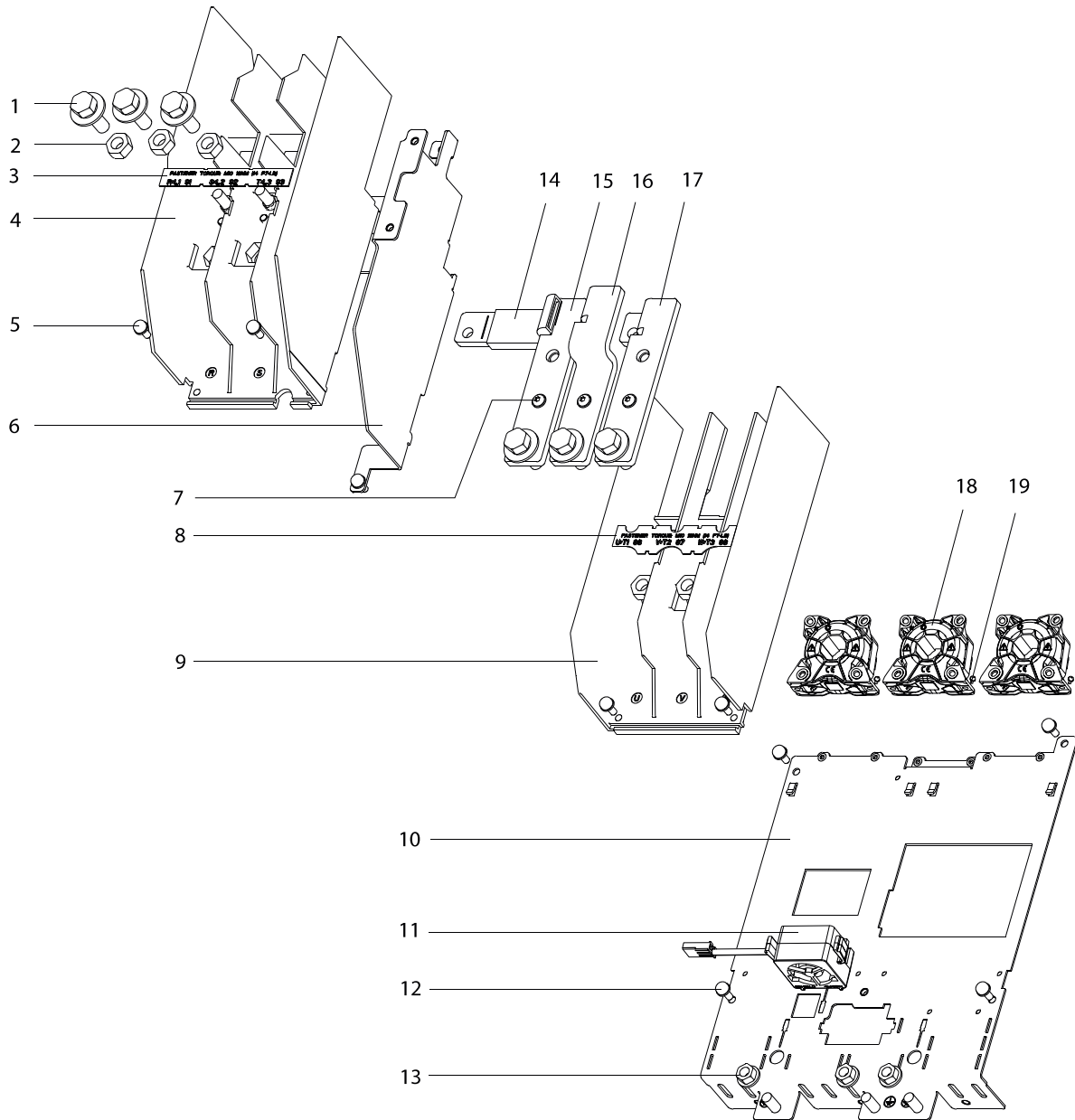
1. Remove the 4 retaining screws (T20) from the plate.
2. Remove the 3 nuts (M8) from the bottom edge of the plate.
3. Unplug the current sensor cables.
4. While pulling the plate up, unplug the mixing fan cable, located under the mounting plate. The mixing fan can remain in place in the mounting plate.



1	Current sensor	5	Mixing fan
2	Retaining screw (T20)	6	Mixing fan slot
3	Power terminal mounting plate	7	Nut (8 mm)
4	Mixing fan cable	-	-

Illustration 1.3 Power Terminal Mounting Plate

### 1.5 Reassembly Guidelines



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1	M10x30 hex screw with captive washer (Qty 6)	12	M5x11 thread-cutting screw (Qty 4)
2	M10 hex nut (Qty 6)	13	M8 hex nut with captive washer (Qty 3)
3	Input label	14	Busbar insulation sleeve
4	Input/mains terminal block	15	Motor busbar, U
5	M5x12 machine screw with captive washer (Qty 11)	16	Motor busbar, V
6	Partition	17	Motor busbar, W
7	M5x16 Torx screw (Qty 3)	18	300 A current sensor
8	Output label	19	M4x8 Torx screw (Qty 6)
9	Output/motor terminal block	-	M6x90 Torx screw (Qty 3) (not shown)
10	Input terminal mounting plate (Qty 2)	-	IGBT busbars, U,V,W (not shown)
11	Mixing fan	-	Wire harness (See <i>Illustration 1.6.</i> )

Illustration 1.4 Exploded View and Parts List of 300 A Current Sensor Kit

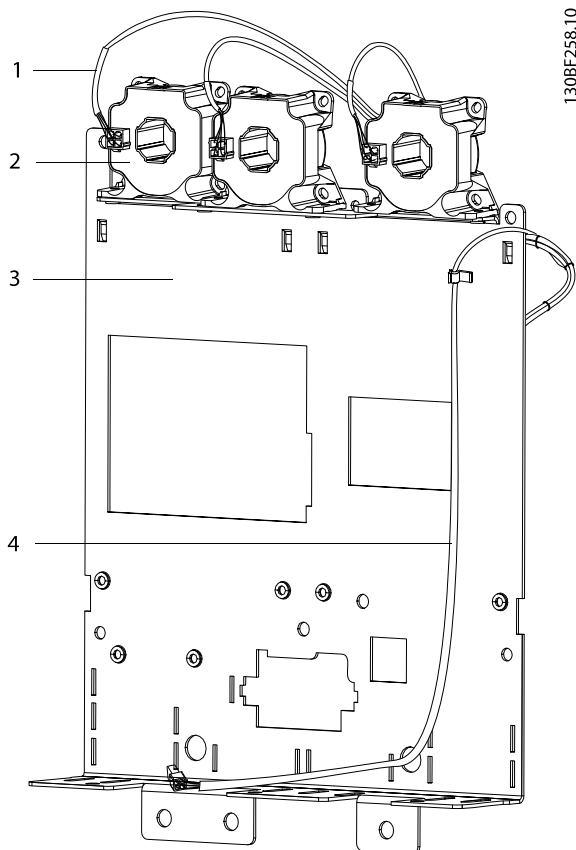
### 1.5.1 Installing Current Sensors

**NOTICE**

**TERMINAL MOUNTING PLATE**

There are 2 input terminal mounting plates included in the kit (1 for IP20 and 1 for IP21/IP54). Use the one that fits the enclosure size.

1. Align the current sensors so that the cable connectors face the back of the unit.
2. Attach each of the 3 new current sensors to the power terminal mounting plate using 2 screws (M4x8) per sensor. Torque to 2.8 Nm (24 in-lb).
3. Connect the wire harness to the current sensors.
4. Run the wire harness through the wire guides.

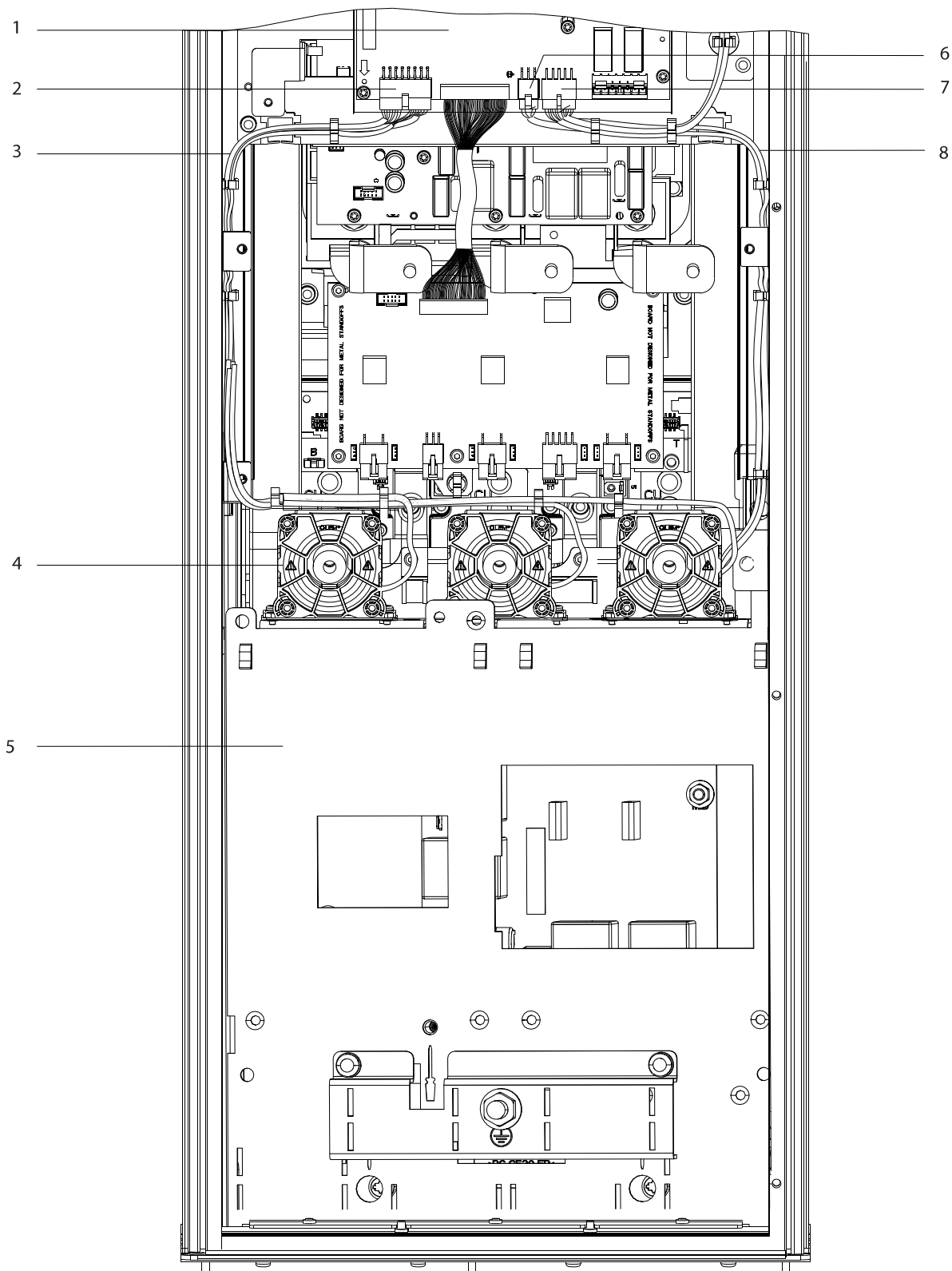


1	Wire harness (current sensor)
2	Current sensor
3	Power terminal mounting plate
4	Wire harness (fan)

Illustration 1.5 Wire Harness Attached to Current Sensors on Power Terminal Mounting Plate

### 1.5.2 Installing Power Terminal Mounting Plate

1. Unplug the old wire harness from the power card and discard the harness.
2. Insert the power terminal mounting plate into the unit. To ease installation, insert the bottom of the plate near the bottom of the frequency converter.
3. Secure the plate with 4 thread-cutting screws (M5x11). Torque to 1.7 Nm (15 in-lb).
4. Connect the top of the wire harness to the power card. See *Illustration 1.6*.
5. Connect the bottom of the wire harness to the mixing fan.
6. Insert the mixing fan into the fan housing, with the label facing the open side of the housing.
7. With the fan label facing up, snap the mixing fan assembly into the plate opening. When properly seated, the fan assembly is level with the plate.
8. Install 3 hex nuts with captive washer (M8) onto the power terminal mounting plate. Torque to 19 Nm (169 in-lb).



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1	Power card	5	Power terminal mounting plate
2	Power card connector to current sensor wire harness	6	Power card connector to RFI filter
3	Wire harness (current sensor)	7	Power card connector to fan wire harness
4	Current sensor	8	Wire harness (fan)

Illustration 1.6 Power Terminal Mounting Plate with Current Sensors and Wire Harness

### 1.5.3 Installing Output Terminal Block

1. Place the output terminal label in its original position above the terminal connections U (T1), V (T2), W (T3).
2. Push the output terminal block up against the metal clips on the power terminal mounting plate until they engage.
3. Secure with 2 machine screws (M5x12) at the bottom of the terminal block. Torque to 2.3 Nm (20 in-lb).
4. Roll up the insulator sheet and insert it into the middle of each current sensor.
5. Insert the cylindrical busbar inside the insulator sheet.
6. Slide the insulation sleeve over the U-phase busbar.
7. Secure each motor busbar with 1 Torx screw (M5x16) near the current sensor and 1 thread-forming screw in the busbar center. Torque the Torx screw to 2.3 Nm (20 in-lb) and the thread-forming screw to 4.0 Nm (35 in-lb).

### 1.5.4 Installing Brake Terminal (optional)

1. Install the optional brake terminal block using 2 nuts (M8). Torque to 9.6 Nm (85 in-lb).
2. Install the R (-) terminal using 1 thread-forming screw (M4x8) at the terminal block, and 1 nut (M8). Torque the thread-forming screw to 2.8 Nm (24 in-lb) and the nut to 9.6 Nm (85 in-lb).
3. Install the R (+) terminal using 1 thread-forming screw (M4x8) at the terminal block, and 1 screw (T40). Torque the thread-forming screw to 2.8 Nm (24 in-lb) and the T40 screw to 9.6 Nm (85 in-lb).
4. Connect the brake wiring.

### 1.5.5 Installing Partition with EMC Shield

1. Install the partition to the left of the motor terminal block.
2. Secure with 2 machine screws (M5x12). Torque to 2.3 Nm (20 in-lb).

### 1.5.6 Installing Input Terminal Block

1. Place the input terminal label in its original position above the terminal connections R (L1), S (L2), T (L3).
2. Push the input terminal block up against the metal clips on the power terminal mounting plate until they engage.
3. Secure with 2 machine screws (M5x12) at the bottom of the terminal block. Torque to 2.3 Nm (20 in-lb).

### 1.5.7 Installing AC Input Busbars

Optional components mounted on the input terminal plate can result in differing configurations. These options include an RFI filter and AC fuses. See *Illustration 1.2*. Use the appropriate procedure based on the options present in the unit.

#### No options

1. Attach the busbars.
2. Secure each busbar with 1 nut (M8) at the top of the busbar and 2 nuts (M8) at the bottom of the busbar. Torque to 9.6 Nm (85 in-lb).

#### AC fuses only

1. Secure each busbar at the top with 1 nut (M8). Torque to 9.6 Nm (85 in-lb).
2. Install the AC fuses using 6 nuts (M8), 1 at each end of each fuse. Torque to 9.6 Nm (85 in-lb).

#### RFI filter only

1. Connect the RFI filter cable from MK100 on the RFI card to the RFI filter.
2. Attach the RFI filter to the side channels of the frequency converter with 4 thread-cutting screws (T20). Torque to 5.7 Nm (50 in-lb).
3. Secure the top of the RFI filter using 3 nuts (M8), 1 per phase. Torque to 9.6 Nm (85 in-lb).
4. Secure the bottom of the RFI filter using 6 nuts (M8), 2 per phase. Torque to 9.6 Nm (85 in-lb).

#### AC fuses and RFI filter

1. Connect the RFI filter cable from MK100 on the RFI card to the RFI filter.
2. Attach the RFI filter to the side channels of the frequency converter with 4 thread-cutting screws (T20). Torque to 5.7 Nm (50 in-lb).
3. Secure the RFI filter using 3 nuts (M8) at the top of the RFI filter, 1 per phase. Torque to 9.6 Nm (85 in-lb).
4. Install AC fuses using 6 nuts (M8), 1 at each end of each fuse. Torque to 9.6 Nm (85 in-lb).

### 1.5.8 Reconnecting the Mains and Motor Wiring

1. Reconnect the motor wiring to the U, V, and W terminals.
2. If a brake terminal is present, reconnect the brake wiring.
3. Reconnect the mains wiring to the R, S, and T terminals.
4. Install the air baffle using 4 screws (T25) and 2 nuts (M8). Torque to 2.3 Nm (20 in-lb).





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