

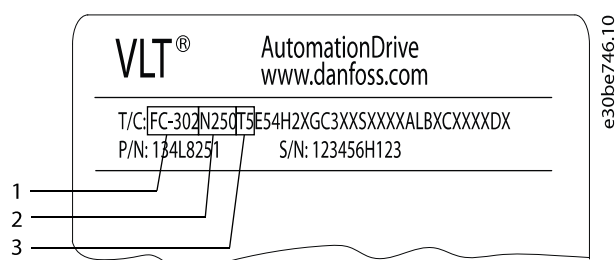
Installation Instructions

300 A Current Sensor Kit for D1h/D3h/D5h/D6h Drives

VLT[®] FC Series FC 102, FC 103, FC 202, FC 302

1.1 Description

The 300 A current sensor kit contains all components required to upgrade the current sensor assembly in D1h/D3h/D5h/D6h drives. The kit is compatible with the power ratings shown in *Table 1.1*. To identify the power rating, see *chapter 1.1.1 Identifying the Power Rating*.



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

Table 1.1 Applicable Power Range for 300 A Current Sensor Kit

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

Illustration 1.1 Example Nameplate

1.1.1 Identifying the Power Rating

To find the drive power rating, use the following steps:

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

1.1.2 Kit Ordering Number

Kit number	Kit description
176F6516	300 A Current Sensor Conversion Kit for D1h/D3h/D5h/D6h

Table 1.2 Number for 300 A Current Sensor Kit

1.1.3 Items Supplied

Table 1.3 provides a list of items included in the 300 A current sensor kit. Refer also to *Illustration 1.5*.

Description	Quantity
R/S/T terminal label	1
M10x30 screw	6
M10 nut	6
Mains input terminal block	1
M5x12 screw	11
EMC shield	1
U/V/W terminal label	1
Motor terminal block	1
Power terminal mounting plate (IP21/IP54)	1
Power terminal mounting plate (IP20/Chassis)	1
M8 nut	3
Mixing fan	1
Mixing fan housing	1
Insulator sleeve	1
Motor busbar (U)	1
Motor busbar (V)	1
Motor busbar (W)	1
M5x16 screw	3
M6x90 screw	3
Cylinder busbar	3
Nomex tubes	3
300 A current sensor	3
M4x10 thread-forming screw	6
Wire harness (current sensor cables)	1
M5x11 thread-forming screw	4

Table 1.3 Items Supplied in 300 A Current Sensor Kit

1.2 Safety Information

Only qualified, Danfoss-authorized personnel are allowed to install the parts described in these installation instructions. Handling of the drive and its parts must be done in accordance with the corresponding *operating guide*.

⚠ WARNING

ELECTRICAL SHOCK HAZARD

VLT® FC series drives 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 drive from all power sources before installation or service.
- Treat the drive as live whenever the mains voltage is connected.
- Follow the guidelines in these instructions and local electrical safety codes.

⚠ WARNING

DISCHARGE TIME

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 LED indicator lights are off. Failure to wait the specified time after power has been removed before performing service or repair work can result in death or serious injury.

- Stop the motor.
- Disconnect AC mains and remote DC-link power supplies, including battery back-ups, UPS, and DC-link connections to other drives.
- Disconnect or lock PM motor.
- Wait for the capacitors to discharge fully. The minimum waiting time is 20 minutes.
- Before performing any service or repair work, use an appropriate voltage measuring device to make sure that the capacitors are fully discharged.

NOTICE

ELECTROSTATIC DISCHARGE

Follow proper ESD precautions to prevent damage to sensitive components.

1.3 Disassembly Instructions

NOTICE

To make the disassembly/reassembly process easier, use these general guidelines:

1. Follow the disassembly instructions for each component.
2. Place the component together with the removed fasteners.
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 assembly instructions to replace and secure each component.

1.3.1 General Torque Tightening Values

Use a torque wrench to ensure that correct torque is applied. Incorrect torque can cause electrical connection problems. For fastening hardware described in this instruction, use the values listed in *Table 1.4* to *Table 1.6* except where noted in the procedures.

Shaft size	Torx/hex drives size	Class A Nm (in-lb)	Class B Nm (in-lb)
M4	T20/7 mm	1.2 (10)	0.8 (7)
M5	T25/8 mm	2.3 (20)	1.2 (10)
M6	T30/10 mm	3.9 (35)	2.3 (20)
M8	T40/13 mm	9.6 (85)	3.9 (35)
M10	T50/17 mm	19.1 (169)	9.6 (85)
M12	-/18 mm or 19 mm	37.9 (335)	-

Table 1.4 Torque Values Standard Thread

Shaft size	Torx drives size	Class A Nm (in-lb)	Class B Nm (in-lb)
M4.8	T25	5.7 (50)	3.1 (27)
M5	T25	1.7 (15)	1.7 (15)

Table 1.5 Torque Values for Thread Cutting into Metal

Shaft size	Torx drives size	Class A Nm (in-lb)	Class B Nm (in-lb)
M4	T20	2.8 (24)	2.8 (24)
M5	T25	5.1 (45)	4.0 (35)

Table 1.6 Torque Values for Thread Forming into Plastic

Class A: Clamping metal

Class B: Clamping PCA or plastic

1.3.2 Removing AC Input Busbars

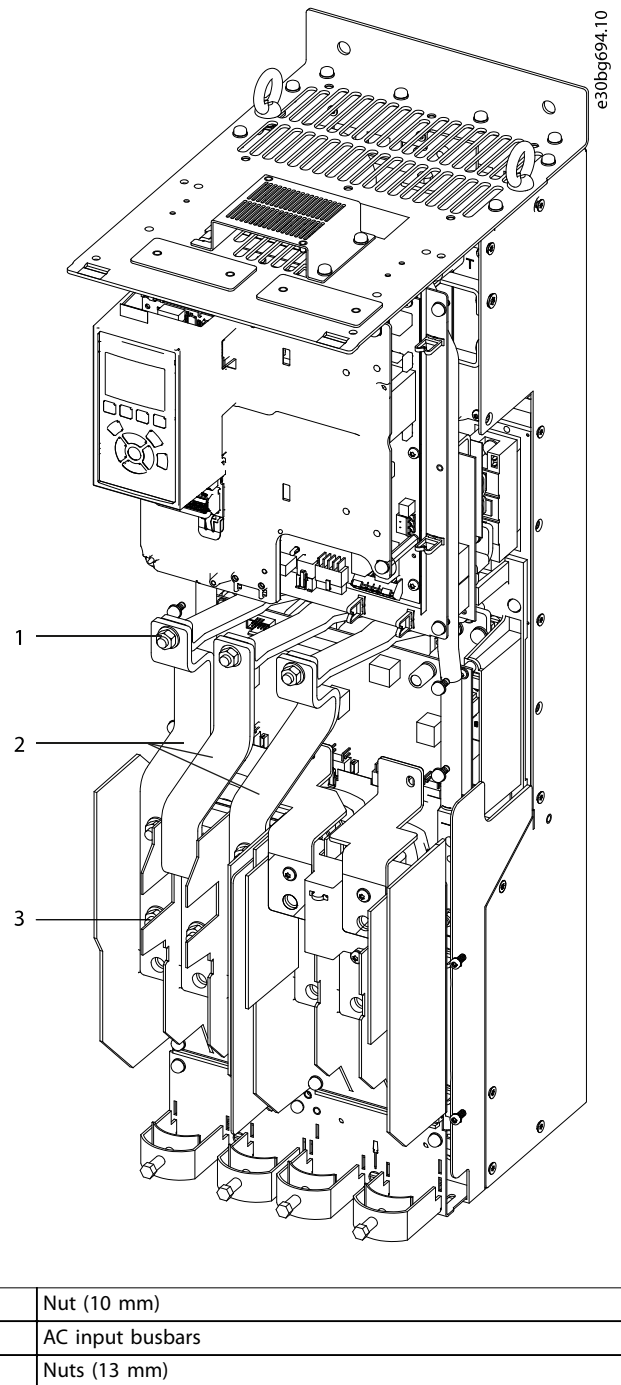


Illustration 1.2 AC Input Busbars

To remove the AC input busbars, use the following steps. The AC input busbars can look different when the drive includes extra input options, such as an RFI filter or mains fuses. *Illustration 1.2* shows the AC input busbars with no input options. *Illustration 1.3* shows the AC input busbars with optional RFI filter and mains fuses.

1. Remove the air baffle by removing 4 screws (T25) and 2 lower screws (T40). If the brake option is present, there are no lower screws.
2. The next step differs based on the input options present in the drive. Select the appropriate procedure for the drive:
 - No options
 - Mains fuses only
 - RFI filter only
 - Mains fuses and RFI filter

3. Remove 1 nut (13 mm) from the center busbar.
4. Remove the busbars from the drive.

1.3.2.2 Mains Fuses Only

1. Remove mains fuses by removing 6 nuts (13 mm), 1 at each end of the 3 fuses.
2. Remove the mains fuses from the drive.
3. Remove 3 nuts (10 mm) at the top of the AC input busbars, 1 per phase.
4. Remove the AC input busbars.

1.3.2.3 RFI Filter Only

1. Remove 3 nuts (10 mm) at the top of the RFI filter, 1 per phase.
2. Remove 6 nuts (13 mm) at the bottom of the RFI filter, 2 per phase.
3. Remove 4 mounting screws (T20) connecting the RFI filter to the side channels of the drive.
4. Remove the RFI filter and unplug the RFI cable from MK100 on the RFI filter card.

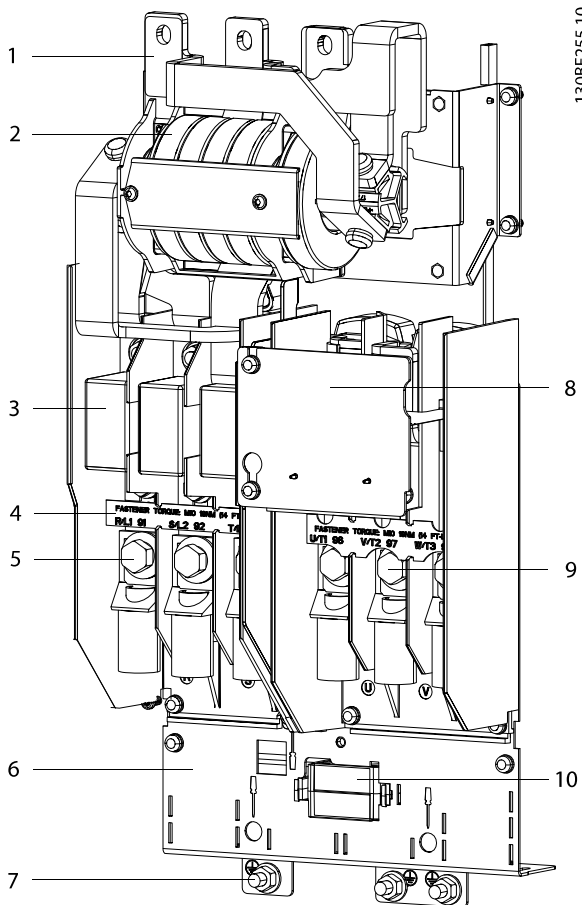
1.3.2.4 Mains Fuses and RFI Filter

1. Remove the mains fuses by removing 6 nuts (13 mm), 1 at each end of the 3 mains fuses.
2. Remove 3 nuts (10 mm) at the top of the RFI filter, 1 per phase.
3. Remove 4 screws (T20) connecting the RFI filter to the side channels of the drive.
4. Remove the RFI filter and unplug the RFI cable from MK100 on the RFI card.

1.3.3 Removing Mains Input Terminal Block

To remove the mains input terminal block, use the following steps. Refer to *Illustration 1.5*.

1. Disconnect any customer input power wiring, and remove the R/S/T terminal label.
2. Remove 2 screws (T25) at the bottom of the terminal block.
3. Slide the mains input terminal block down to release it from the 2 metal retaining clips on the mounting plate. It can be necessary to remove 1 screw (T25) from the EMC shield when removing the terminal block.



1	AC input busbar	6	Power terminal mounting plate
2	RFI filter (optional)	7	M8 nut
3	Mains fuse (optional)	8	EMC shield
4	R/S/T terminal label	9	Motor terminal
5	Mains input terminal	10	Mixing fan

Illustration 1.3 AC Input Busbars with RFI Filter and Mains Fuses

1.3.2.1 No Options

1. Remove 3 nuts (13 mm) at the top of the AC input busbars, 1 per phase.
2. Remove 3 nuts (13 mm) at the bottom of the AC input busbars, 1 per phase.

1.3.4 Removing Brake Terminal Block (optional)

If the drive includes an optional brake, remove the brake terminal block using the following steps.

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

1.3.5 Removing Motor Terminal Block

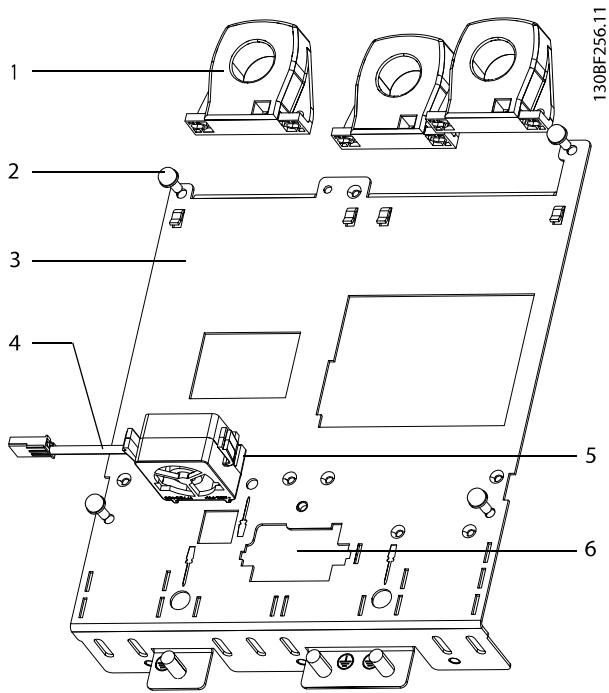
To remove the motor terminal block, use the following steps. Refer to *Illustration 1.5*.

1. Disconnect wiring to the motor, and remove the U/V/W terminal label.
2. Remove the EMC shield:
 - 2a Remove 2 screws (T25).
 - 2b Release the current sensor wiring from the cable guides on the EMC shield.
 - 2c Lift the EMC shield from the drive.
3. Remove the U motor busbar:
 - 3a Remove 1 thread-forming screw (T25) from the middle of the busbar.
 - 3b Unfasten 1 screw (T30) at the current sensor end of the busbar.
4. Remove the V motor busbar:
 - 4a Remove 1 thread-forming screw (T25) from the middle of the busbar.
 - 4b Unfasten 1 screw (T30) at the current sensor end of the busbar. Note that the V screw is shorter than the U and W screws.
5. Remove the W motor busbar:
 - 5a Remove 1 thread-forming screw (T25) from the middle of the busbar.
 - 5b Unfasten 1 screw (T30) at the current sensor end of the busbar.
6. Remove 2 screws (T25) at the bottom of the motor terminal block.
7. Remove the motor terminal block by sliding it down to release it from the 2 metal retaining clips.
8. Remove the 3 cylinder busbars, 1 from the center of each current sensor and discard the busbars.

1.3.6 Removing Power Terminal Mounting Plate

To remove the power terminal mounting plate, use the following steps. Refer to *Illustration 1.4*.

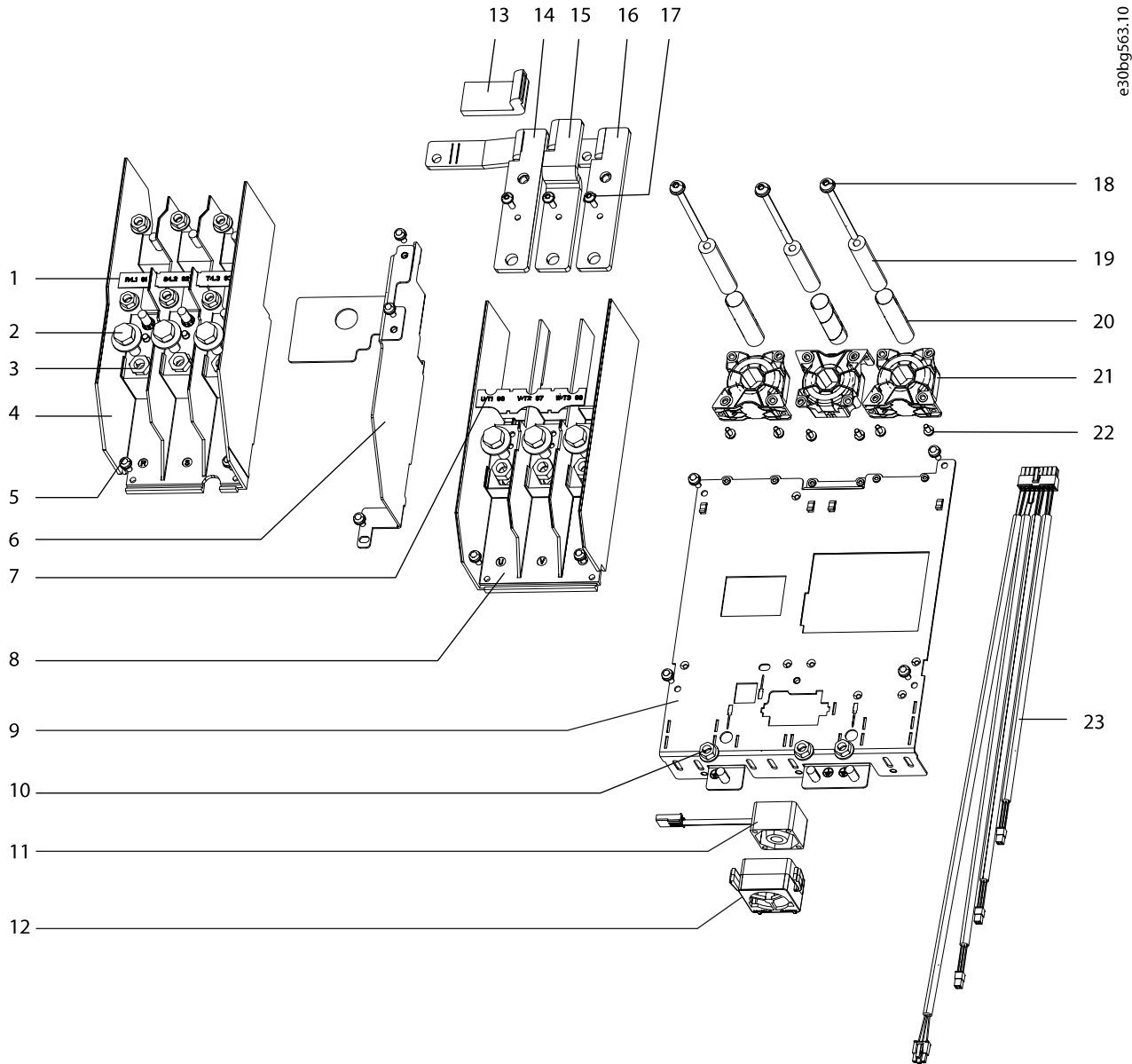
1. Remove the mixing fan from the slot in the power terminal mounting plate:
 - 1a Place the end of a screwdriver under each of the mixing fan release tabs.
 - 1b Lift to free the fan and housing from the power terminal mounting plate.
 - 1c Unplug the mixing fan in-line cable connector.
2. Remove 4 thread-cutting screws (T20), 2 from each side of the power terminal mounting plate.
3. For IP21/Type 1 and IP54/Type 12 enclosures only, loosen 3 screws (T25) at the bottom of the drive.
4. For IP20/Chassis enclosures only, remove 3 nuts (10 mm) from the bottom edge of the plate.
5. Unplug 3 current sensor cables, 1 from the back of each current sensor. Unplug the 16-pin connector from MK101 on the power card. Discard the current sensor wire harness.
6. Remove the power terminal mounting plate with the old current sensors attached, and discard it.



1	Current sensor	4	Mixing fan cable
2	Thread-cutting screw (T20)	5	Mixing fan
3	Power terminal mounting plate	6	Mixing fan slot

Illustration 1.4 Power Terminal Mounting Plate

1.4 Assembly Guidelines



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1	R/S/T terminal label	13	Insulator sleeve
2	M10x30 screw	14	U busbar
3	M10 nut	15	V busbar
4	Mains input terminal block	16	W busbar
5	M5x12 screw	17	M5x16 screw
6	EMC shield	18	M6x90 screw
7	U/V/W terminal label	19	Cylinder busbar
8	Motor terminal block	20	Nomex tube
9	Power terminal mounting plate (IP21/IP54)	21	Current sensor
10	M8 nut	22	M4x10 thread-forming screw
11	Mixing fan	23	Wire harness (current sensor cables)
12	Mixing fan housing	–	Power terminal mounting plate, not shown (IP20/Chassis)

Illustration 1.5 Exploded View of 300 A Current Sensor Kit

1.4.1 Installing Current Sensors

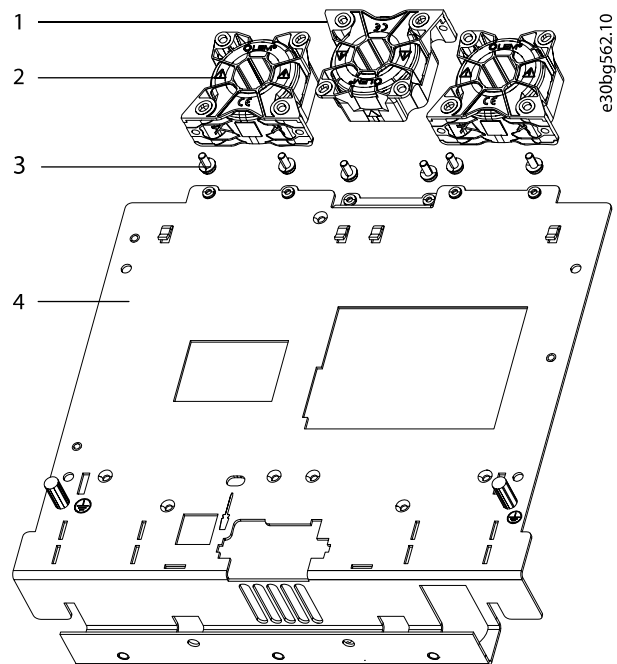
NOTICE

MOUNTING PLATE SELECTION

The 300 A current sensor kit includes 2 power terminal mounting plates, select the correct plate for the enclosure. *Illustration 1.5* shows the plate for IP21/Type 1 and IP54/Type 12 enclosures. *Illustration 1.6* shows the plate for IP20/Chassis enclosures.

To install the new current sensors on the power terminal mounting plate, use the following steps. Refer to *Illustration 1.6*.

1. Position the outer 2 current sensors at the top of the power terminal mounting plate with the base against the plate.
2. Invert the middle current sensor so that the base is at the top.
3. Align the current sensors so that the cable connectors face the back of the unit, and the arrows on the sensors point outward.
4. Attach the 3 current sensors to the power terminal mounting plate by fastening 6 thread-forming screws (T20), 2 per sensor. Torque screws to 2.0 Nm (17.7 in-lb).
5. Connect the wire harness by attaching 3 current sensor cable connectors to the back of the current sensors, 1 per current sensor.
6. Attach the 16-pin connector to MK101 on the power card.
7. Route the current sensor cables through the cable guides on the power terminal mounting plate.



1	Middle current sensor (inverted position)
2	Outer current sensor (upright position)
3	Thread-forming screw (T20)
4	Power terminal mounting plate (IP20/Chassis)

Illustration 1.6 Current Sensor Mounting Position

1.4.2 Installing Power Terminal Mounting Plate

To install the power terminal mounting plate, use the following steps. Refer to *Illustration 1.5*.

1. Position the power terminal mounting plate in the drive.
2. Fasten 4 thread-cutting screws (T20), 2 screws in each side of the plate.
3. Attach the mixing fan cable in-line connector.
4. Insert the mixing fan into the fan housing with the label facing the open side of the housing.
5. With the mixing fan label facing up, snap the mixing fan assembly into the slot in the power terminal mounting plate.
6. For IP21/Type 1 and IP54/Type 12 enclosures only, fasten 3 screws (T25) at the bottom of the drive.
7. For IP20/Chassis enclosures only, fasten 3 M8 nuts.

1.4.3 Installing Motor Terminal Block

To install the motor terminal block, use the following steps. Refer to *Illustration 1.5*.

1. Position the motor terminal block by sliding it upward under the 2 metal retaining clips.
2. Fasten 2 screws (T25) at the lower end of the motor terminal block.
3. Place 3 Nomex tubes in the drive, 1 in the center of each current sensor. Place the shorter tube (marked with a red line) through the middle current sensor.
4. Place 3 cylinder busbars in the drive, 1 inside each Nomex tube. Place the shorter busbar through the middle Nomex tube.
5. Replace the U motor busbar:
 - 5a Slide the insulator sleeve over the U busbar.
 - 5b Fasten 1 screw (T30) in the current sensor end of the busbar.
 - 5c Fasten 1 thread-forming screw (T25) in the middle of the busbar.
6. Replace the V motor busbar:
 - 6a Fasten 1 screw (T30) in the current sensor end of the busbar. Note that the V bolt is shorter than the U/W bolts.
 - 6b Fasten 1 thread-forming screw (T25) in the middle of the busbar.
7. Replace the W motor busbar:
 - 7a Fasten 1 screw (T30) in the current sensor end of the busbar.
 - 7b Fasten 1 thread-forming screw (T25) in the middle of the busbar.
8. Position the EMC shield between the mains input terminal block and motor terminal block and secure with 2 screws (T25).
9. Reconnect wiring to motor terminals, and replace the U/V/W terminal label.

1.4.4 Installing Brake Terminal Block (optional)

If the optional brake is present, reinstall the brake terminal block using the following steps.

1. Position the optional brake terminal block in the drive.
2. Secure 2 M8 nuts (T40) in the terminal block.
3. Fasten the R (-) terminal using 1 M4x8 thread-forming screw (T20) at the terminal block, and 1 M8 nut (T40).
4. Fasten the R (+) terminal using 1 M4x8 thread-forming screw (T20) at the terminal block, and 1 screw (T40).
5. Reconnect the brake wiring.

1.4.5 Installing Mains Input Terminal Block

To install the mains input terminal block, use the following steps. Refer to *Illustration 1.5*.

1. Place the mains input terminal block in position by sliding it under the 2 metal retaining clips.
2. Secure 2 screws (T25) at the bottom of the mains input terminal block.
3. Reconnect any customer input wiring, and replace the R/S/T terminal label.

1.4.6 Installing AC Input Busbars

To install the AC input busbars, use the following steps. The AC input busbars can look different when the drive includes extra input options, such as an RFI filter or mains fuses. *Illustration 1.2* shows the drive with no input options. *Illustration 1.3*

The next procedure differs based on options present in the drive. Select the appropriate procedure for the drive:

- No options
- Mains fuses only
- RFI filter only
- Mains fuses and RFI filter

1.4.6.1 No Options

1. Position the 3 AC input busbars in the drive.
2. Fasten 1 nut (13 mm) in the center of the middle busbar.
3. Secure 6 nuts (13 mm) at the bottom of the AC input busbars, 1 per phase.
4. Fasten 3 nuts (13 mm) at the top of the AC input busbars, 1 per phase.
5. Position the air baffle in the drive, and fasten with 4 screws (T25).

1.4.6.2 Mains Fuses Only

1. Position the AC input busbars in the drive.
2. Fasten 3 nuts (13 mm) at the top of the AC input busbars, 1 per phase.
3. Position the 3 mains fuses in the drive.
4. Fasten 6 nuts (13 mm), 1 at each end of the 3 fuses.
5. Position the air baffle in the drive, and fasten with 4 screws (T25).

1.4.6.3 RFI Filter Only

1. Connect the RFI cable to MK100 on the RFI filter card.
2. Position the RFI filter in the drive.
3. Fasten 4 thread-cutting screws (T20), connecting the RFI filter to the side channels of the drive.
4. Secure 6 nuts (13 mm) at the bottom of the RFI filter, 2 per phase.
5. Secure 3 nuts (13 mm) at the top of the RFI filter, 1 per phase.
6. Position the air baffle in the drive, and fasten with 4 screws (T25).

1.4.6.4 Mains Fuses and RFI Filter

1. Connect the RFI cable to MK100 on the RFI card.
2. Position the RFI filter in the drive.
3. Fasten 4 thread-cutting screws (T20), connecting the RFI filter to the side channels of the drive.
4. Secure 3 nuts (13 mm) at the top of the RFI filter, 1 per phase.
5. Secure the 3 mains fuses by fastening 6 nuts (13 mm), 1 at each end of the fuses.
6. Position the air baffle in the drive, and fasten with 4 screws (T25).

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