

iC7 Series Air-cooled dU/dt Filter OF7U1

1 Overview

1.1 dU/dt Filter

The dU/dt Filter is used to limit the voltage rise time and maximum voltage seen by the motor. This can be necessary to protect motor insulations and guarantee a long lifetime. The motor terminal phase-to-phase voltage remains pulse shaped, but the dU/dt and maximum values are reduced.

There are 2 electrical sizes of the filter: 590 A and 880 A.

1.2 Contents of the Delivery

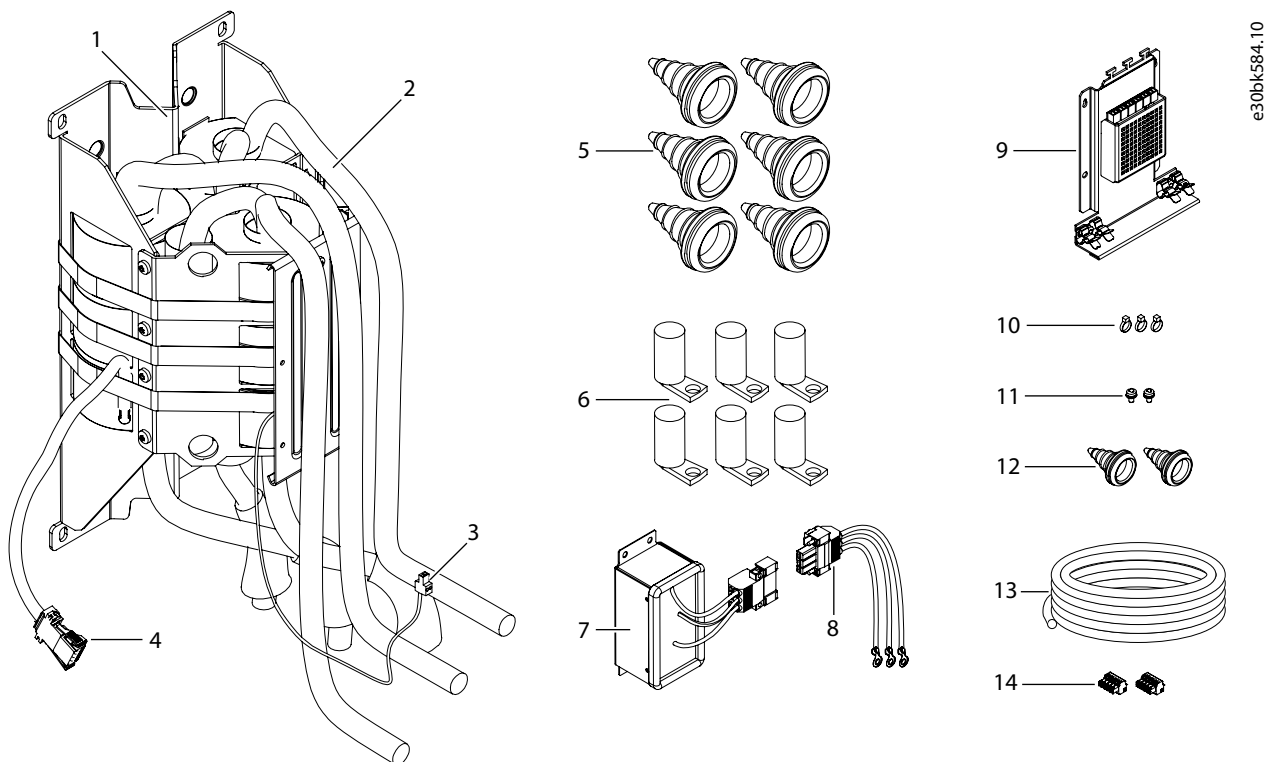


Illustration 1: Items Included in the Delivery

1	dU/dt Filter inductor, 590 or 880 A	9	AuxBus temperature measurement board assembly
2	Power cables, 1.5 m (4.9 ft) at each side, assembled	10	Cable ties, 3 pcs
3	AuxBus temperature measurement wire, 1.5 m (4.9 ft), assembled	11	M5x10 screws, 2 pcs
4	Thermal relay wire, 1.0 m (3.3 ft), assembled	12	Grommet, Ø25.3 mm (Ø1 in), 2 pcs
5	Grommet M50, 6 pcs	13	AuxBus cable, 3 m (9.8 ft)
6	Tubular cable lug 90° angle, 120 or 150 mm ² , 6 pcs	14	AuxBus terminals, 2 pcs
7	dU/dt Filter capacitor assembly, 590 or 880 A	15	Heat shrinkable tubing, 32 mm (1.26 in), 1 m (3.3 ft), not shown in illustration
8	dU/dt Filter capacitor wire harness		

2 Mechanical Installation

2.1 Safety Information

⚠ WARNING ⚠

SHOCK HAZARD FROM THE COMPONENTS

The components of the drive are live when the drive is connected to mains.

- Do not make changes in the AC drive when it is connected to mains.

⚠ CAUTION ⚠

BURN HAZARD

The filter is hot during operation.

- Do not install the filter on a combustible surface.
- Do not touch the filter when hot.

Only qualified personnel are allowed to perform the installation described in this guide.

Follow the instructions in this guide and relevant local regulations.

Also read the instructions and safety information in the operating guide for the iC7 Series System Modules.

2.2 Installation Requirements

The products that are described in this guide have the protection rating IP00/UL Open Type. Install them in a cabinet or other enclosure that has a correct level of protection against the ambient conditions in the installation area. Make sure that the cabinet gives protection against water, humidity, dust, and other contaminations.

The cabinet must also be sufficiently strong for the weight of the system modules and other devices.

The protection rating of the cabinet must be at least IP21/UL Type 1. When preparing the installation, obey the local regulations.

2.3 Installing the dU/dt Filter into the Cabinet

See the installation dimension in [2.5 Dimensions of the dU/dt Filter](#).

1. Attach the dU/dt Filter inductor to the cabinet with 4 screws.

Mount the inductor vertically, with the temperature measurement sensor at the top (assuming that the direction of the cooling air flow is upwards). In IP54 installations, mount the inductor in the IP54 section.

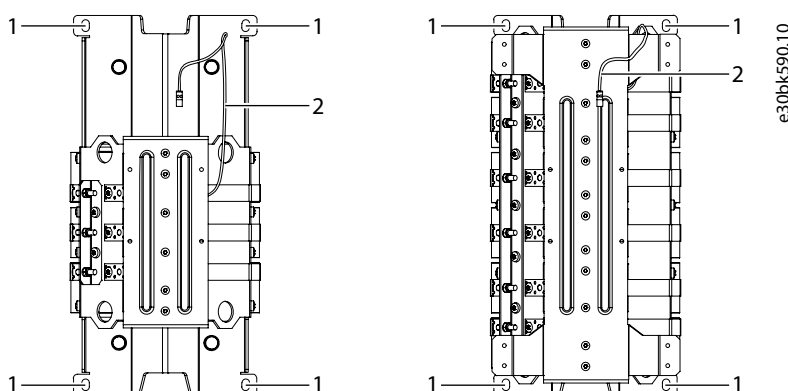


Illustration 2: Mounting Holes of the dU/dt Filter Inductor

1 Mounting holes

2	Temperature measurement wire
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2. Attach the inductor from the mounting holes on the front support plate to an air channel or other cover plate.

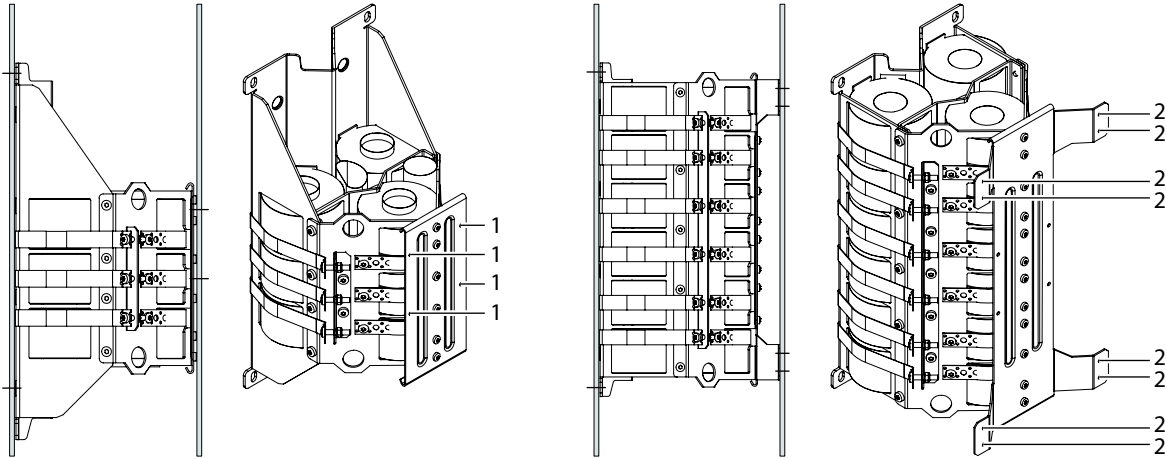


Illustration 3: Mounting Holes on the Front Support Plate of the Inductor

1	Mounting holes on 590 A inductor
2	Mounting holes on 880 A inductor

3. Mount the dU/dt Filter capacitor assembly to the cabinet with 4 screws.

In IP54 installations, mount the capacitor assembly outside the IP54 section.

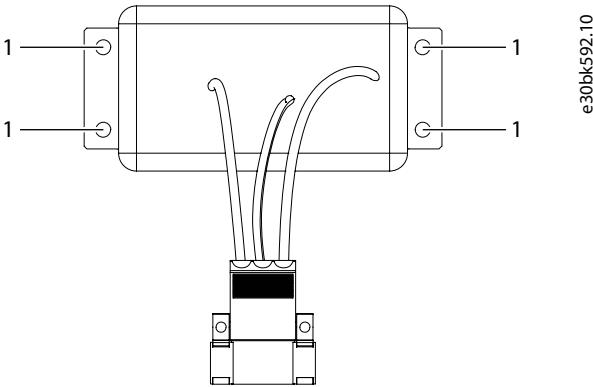


Illustration 4: Mounting Holes of the Capacitor Assembly

1	Mounting holes
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4. Mount the assembly plate of the AuxBus temperature measurement board to the cabinet with 4 screws.

In IP54 installations, mount the assembly plate outside the IP54 section.

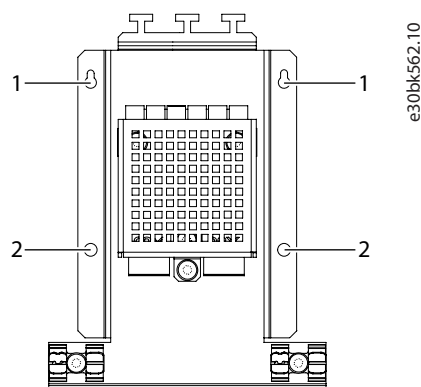


Illustration 5: Mounting Holes of the Assembly Plate

- | | |
|---|--|
| 1 | Mounting holes with keyholes, $\varnothing 5/3$ mm ($\varnothing 0.20/0.12$ in) |
| 2 | Mounting holes, $\varnothing 5.5$ mm ($\varnothing 0.22$ in) |

2.4 Cooling Requirements

The maximum ambient operating temperature of the dU/dt Filter is 40 °C (104 °F), with derating up to 55 °C (131 °F).

The product requires forced air cooling. Make sure that the cooling air flow through the filter is sufficient. The minimum air flow is 3 m/s (10 ft/s).

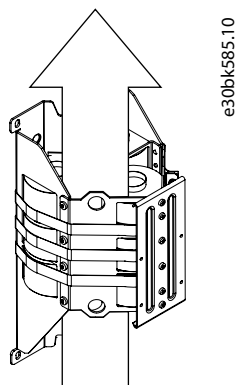


Illustration 6: Air Flow Through the Filter

2.5 Dimensions of the dU/dt Filter

The dimensional drawings for the dU/dt Filters do not show the pre-installed cables.

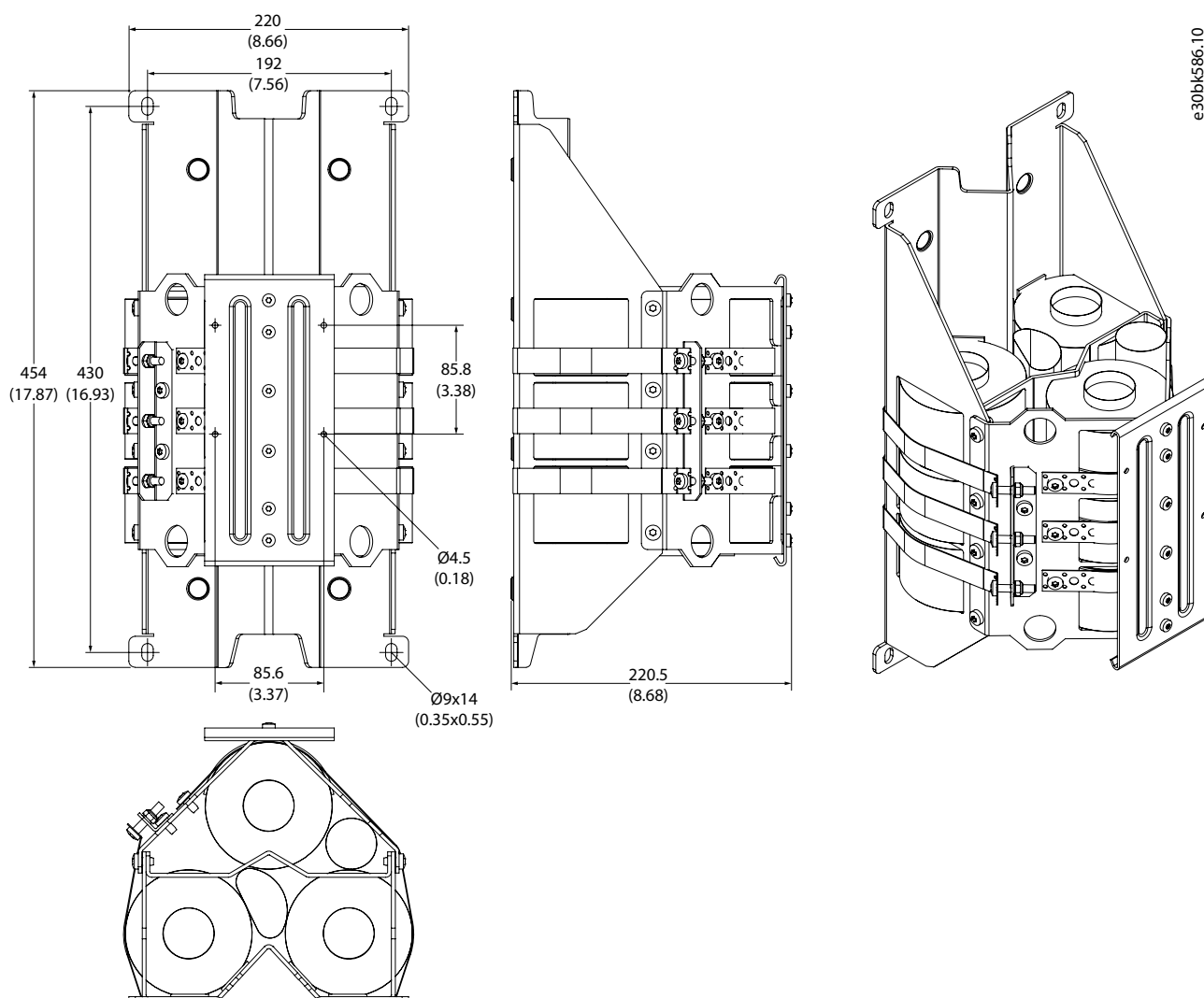


Illustration 7: Dimensions of the dU/dt Filter 590 A Inductor in mm (in)

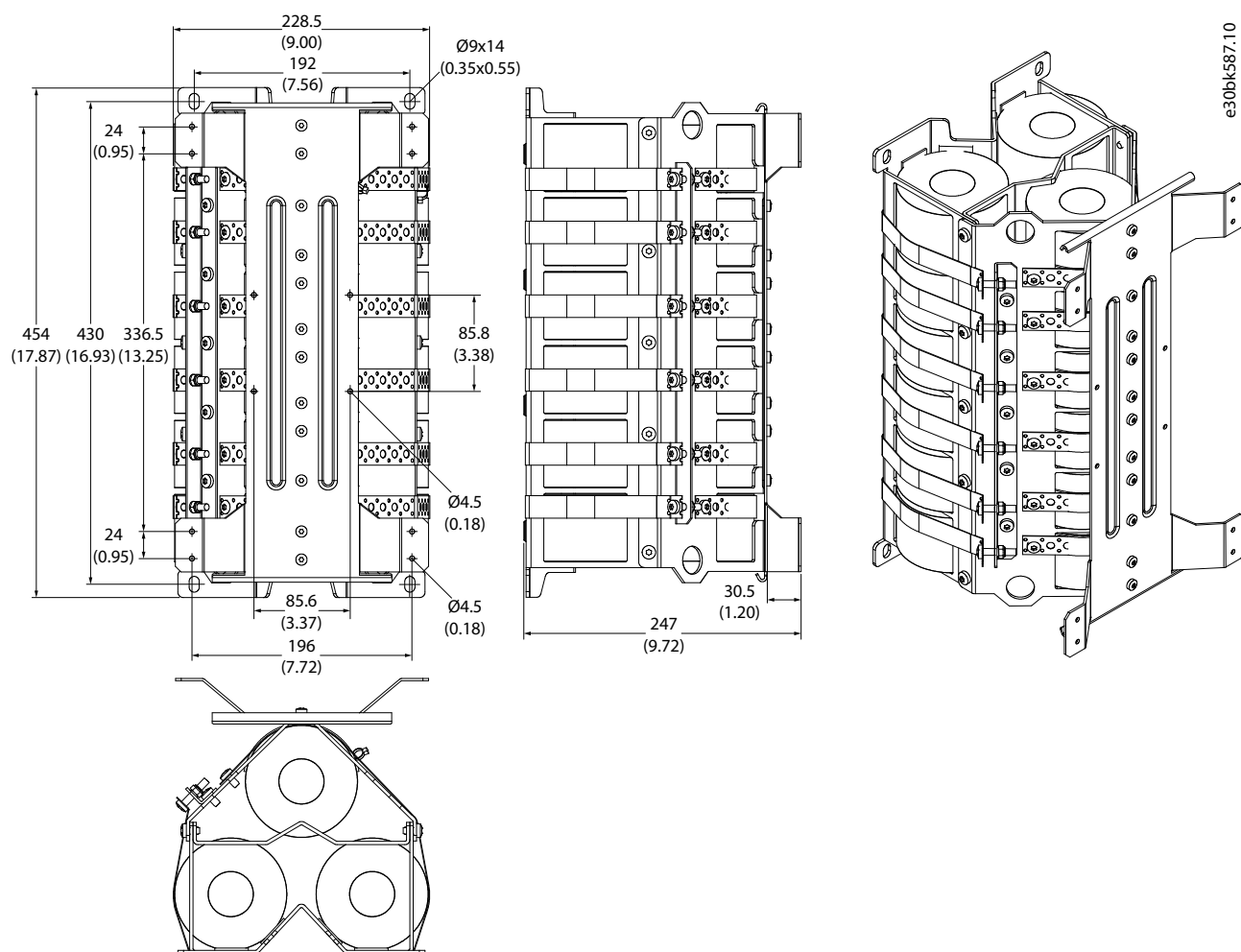


Illustration 8: Dimensions of the dU/dt Filter 880 A Inductor in mm (in)

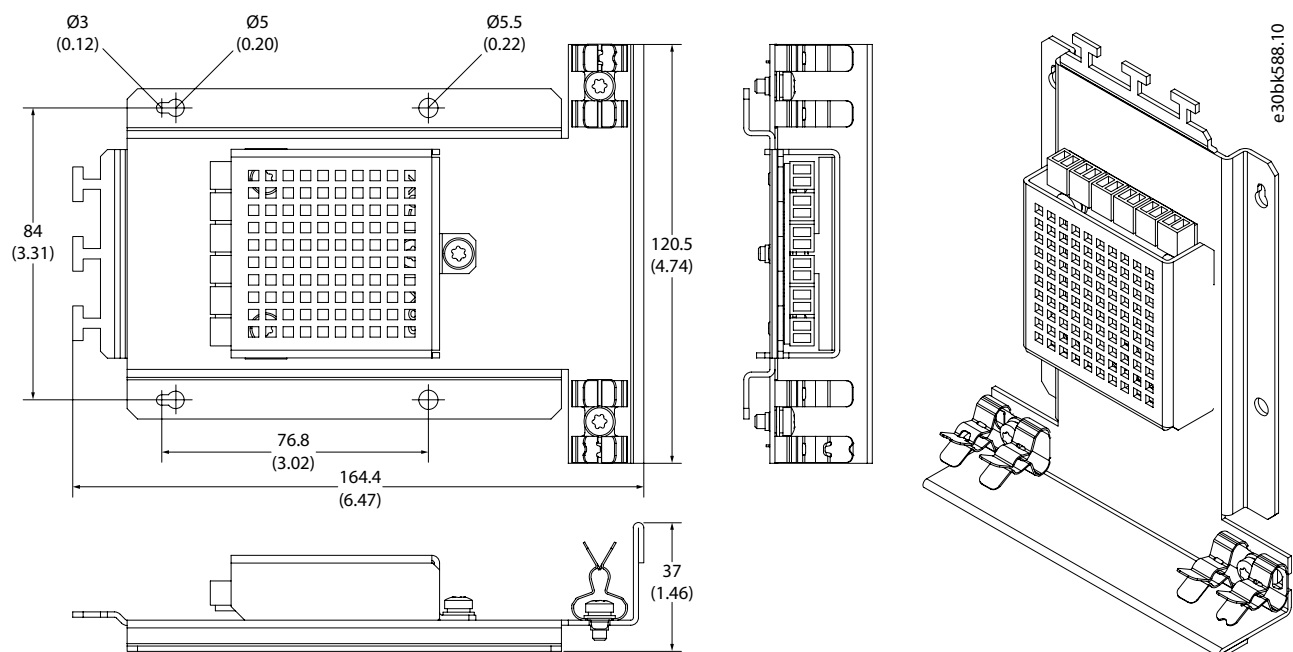


Illustration 9: Dimensions of the AuxBus Temperature Measurement Board Assembly in mm (in)

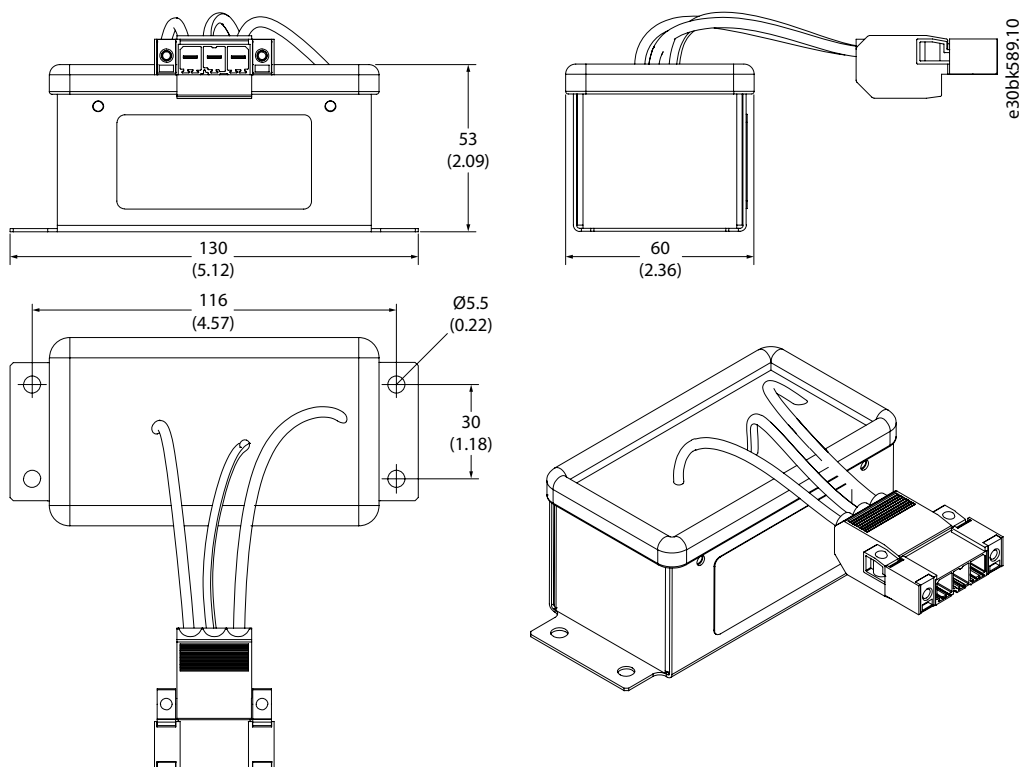


Illustration 10: Dimensions of the dU/dt Filter Capacitor Assembly in mm (in)

3 Electrical Installation

3.1 Installing the Filter

Install the dU/dt Filter at the inverter output. If the inverter has parallel power units, install a separate dU/dt Filter at the output of each power unit.

The dU/dt Filter can be installed as the only output filter, or it can be used with a Common-mode Filter. If a Common-mode Filter is installed, install the dU/dt Filter between the inverter output and the Common-mode Filter.

See [3.5 Wiring Diagrams](#).

3.2 Installing the Cables

1. Prepare the power cables of the dU/dt Filter.

- a. If necessary, cut the cables to the correct length. The length of the cables is 1.5 m (4.9 ft) at both sides of the filter.

Use hot cutting for the mesh type mechanical protection sleeve to avoid fraying.

The copper cable ends have tapes to keep the strands together. If possible, also use tape around the cutting point to avoid fraying.

In general, keep the length between the drive output and the filter input as short as possible. The recommended maximum value is 3 m (9.8 ft).

- b. If the filter is installed in a separate IP54 section, route the cables through the M50 grommets included in the delivery.

Cut the grommets tight to the cable and use the provided heat shrink tube to seal the grommet to the cable.

- c. Attach the provided cable lugs to the ends of the cables.

Remove the possible tapes from the cable ends.

Do not place the silicone sleeve and mesh type mechanical protection sleeve on top of the cable lug.

Use the provided heat shrink tube to seal the connection. The recommended tube length is 70 mm (2.8 in).

2. Connect the power cables from the dU/dt Filter to the busbars. Use M12 bolts with plain washers and spring washers.

3. Use the provided dU/dt Filter capacitor wire harness to connect the capacitor assembly to the busbars.

- a. Connect the connector on the wire harness to the connector of the capacitor assembly.
- b. Connect the harness wires to the busbars on the motor side of the inductor. Use M4 bolts with plain washers and spring washers.

Do not extend the capacitor wire harness.

4. Connect the temperature measurement wire from the filter inductor to terminal X206 on the AuxBus temperature measurement board.

- a. If necessary, the wire can be cut shorter. The length of the wire is 1.5 m (4.9 ft).
- b. If the filter inductor is installed in a separate IP54 section, route the wire through the grommet included in the delivery.
- c. Attach the wire to the assembly plate with a cable tie.

5. If AuxBus is not available, connect the thermal relay wire to the I/O terminal of a temperature monitoring device.

- a. If necessary, the wire can be cut shorter. The length of the wire is 1.0 m (3.3 ft).
- b. If the filter inductor is installed in a separate IP54 section, route the wire through the grommet included in the delivery.

6. Bundle up the unused temperature measurement or thermal relay wire and attach it safely close to the inductor.

Example

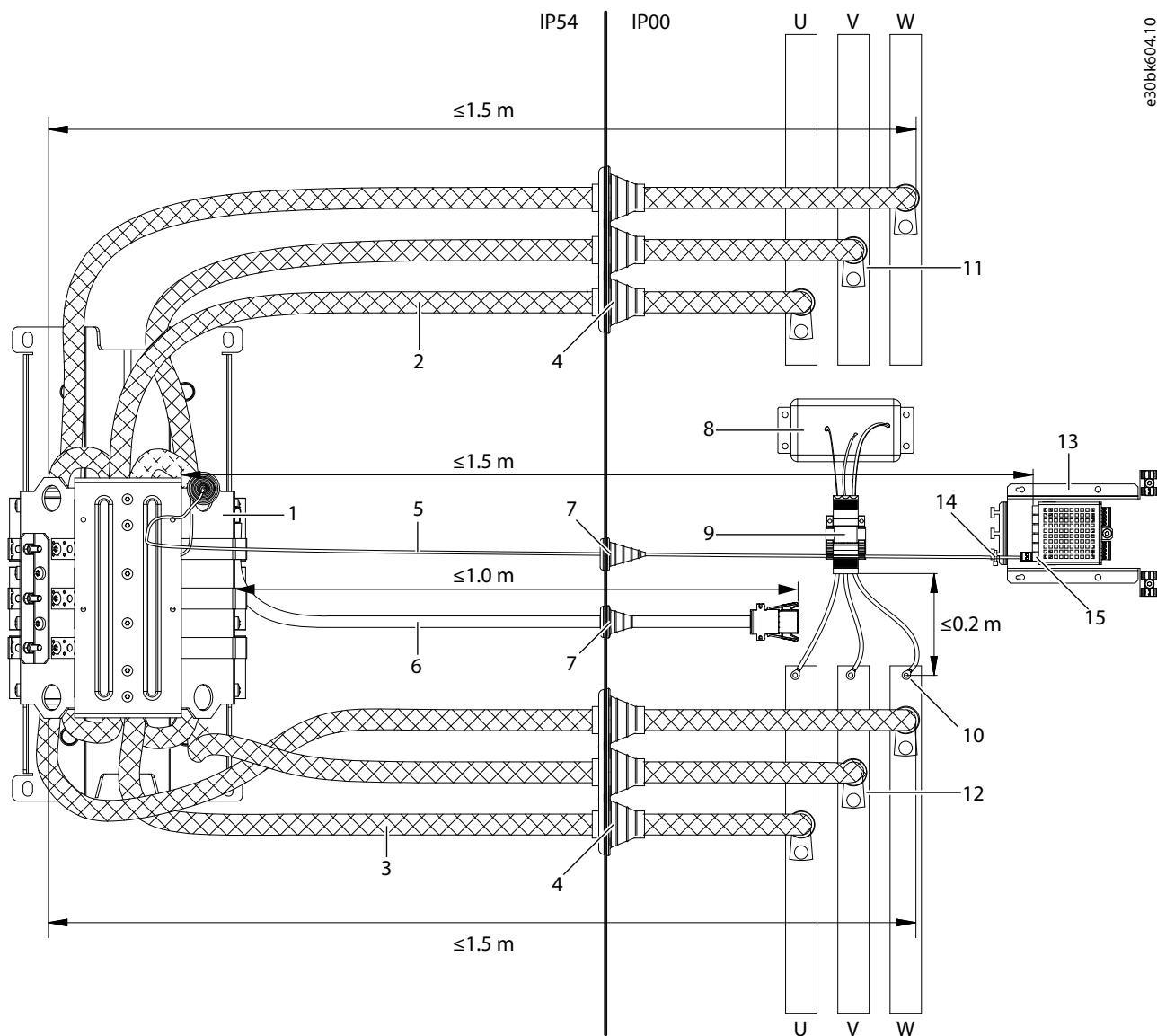


Illustration 11: dU/dt Filter Cable Connections

1	Inductor	9	Connector of dU/dt Filter capacitor wire harness
2	Power cables, drive side, 1.5 m (4.9 ft)	10	dU/dt Filter capacitor wire harness connection to busbars, motor side
3	Power cables, motor side, 1.5 m (4.9 ft)	11	Power cable connections to busbars, drive side
4	M50 grommets, IP54 only	12	Power cable connections to busbars, motor side
5	AuxBus temperature measurement wire, 1.5 m (4.9 ft)	13	AuxBus temperature measurement assembly
6	Thermal relay wire, 1.0 m (3.3 ft)	14	Cable tie
7	Grommet, Ø25.3 mm (Ø1 in), IP54 only	15	Terminal X206
8	dU/dt Filter capacitor assembly		

3.3 Preparing the AuxBus Cable

- 1. Cut the cable to the required length.
- 2. To reveal the wires, strip the cable at both ends.
- 3. At 1 end of the cable, remove approximately 15 mm (0.59 in) of the insulation of the cable.
- 4. Strip the wires 7 mm (0.28 in).
- 5. Connect the wires to the terminals included in the delivery. Use the tightening torque 0.22–0.25 Nm (1.9–2.2 in-lb).

Table 1: Wiring of the AuxBus Terminals

Pin	Wire color	Signal
1	White	+24 V
2	Brown	GND
3	Green	CAN_H
4	Yellow	CAN_L
5	Grey	+24 V

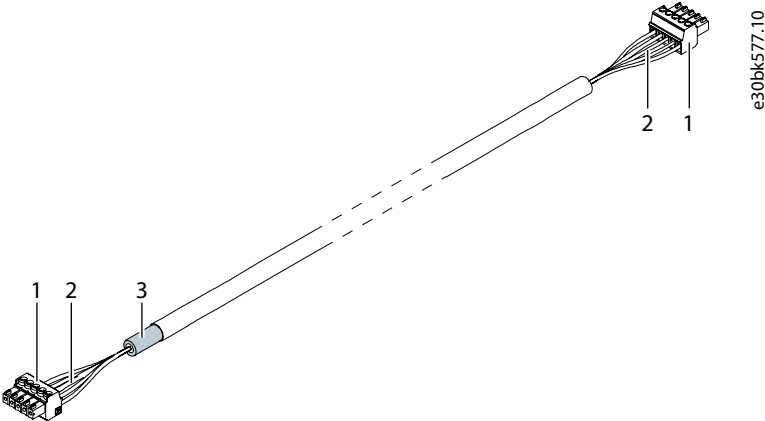


Illustration 12: The Ready AuxBus Cable

1	Terminals	3	Shield removed
2	Wires		

3.4 AuxBus Connections

NOTICE

For the drive to be able to protect the filters, AuxBus must be connected.

For more information about AuxBus, see the iC7 Series System Module operating guides.

- 1. Connect the AuxBus cable between the filter and the power unit. If there are several power units and filters, connect each filter to the power units individually.
 - a. Connect the end of the AuxBus cable where the insulation was removed to terminal X25 on the power unit.
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b. Connect the other end of the AuxBus cable to terminal X86 on the AuxBus temperature measurement board.

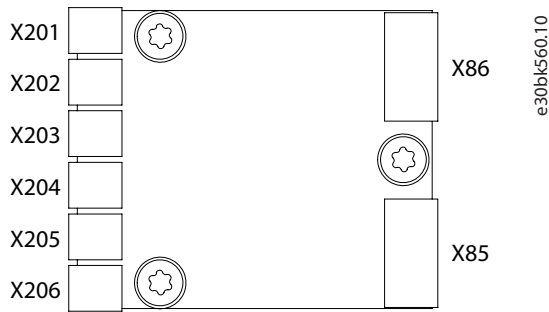


Illustration 13: Terminals on the AuxBus Temperature Measurement Board

X20_	Temperature measurement input	X86	AuxBus out
X85	AuxBus in		

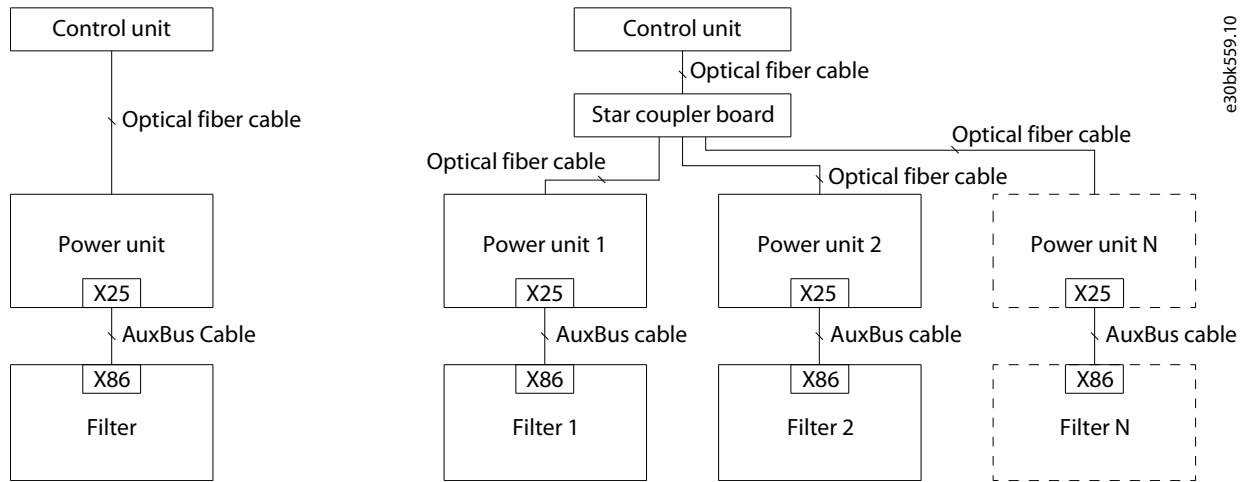


Illustration 14: AuxBus Topology

2. Route the cable so that there is no risk of getting in touch with bare busbars or terminals.
3. Ground each AuxBus cable at 1 end, at the X25 terminal. To make the grounding connection, attach the shield of the cable to the frame with a cable clamp.

The lower part of the cable clamp fixes the cable to the plate and provides strain relief. The upper part provides ~360° grounding for the cable shield.

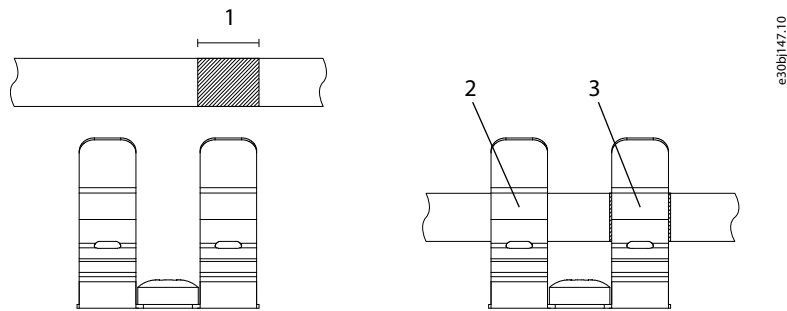


Illustration 15: Using the Cable Clamps

1	Stripping length, 15 mm (0.59 in)	3	Grounding
2	Strain relief		

4. At the terminal X86 end of the cable, place the cable in a cable clamp for strain relief.

3.5 Wiring Diagrams

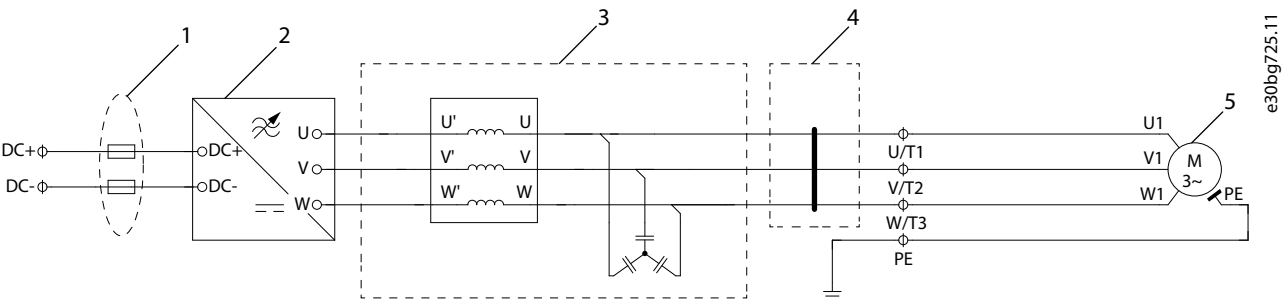


Illustration 16: Wiring Diagram for Inverter and dU/dt Filter

1	DC fuses	4	Common-mode Filter (optional)
2	Inverter module	5	Motor
3	dU/dt Filter		

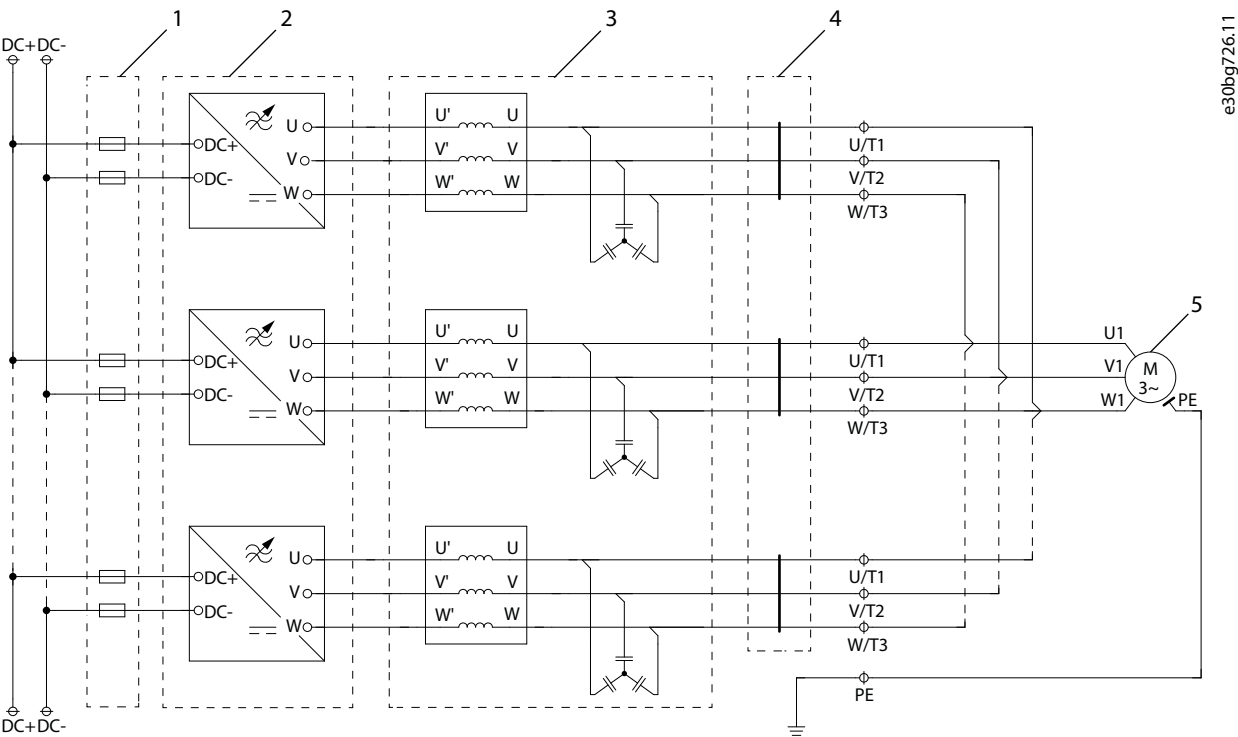


Illustration 17: Wiring Diagram for Inverter with Parallel Power Units and dU/dt Filters

1	DC fuses	4	Common-mode Filters (optional)
2	Inverter modules	5	Motor
3	dU/dt Filters		

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