Installation Guide

In-bottom/Out-top Cooling Kit for FA09-FA10

iC7 Series Frequency Converters

1 Overview

1.1 Description

The in-bottom/out-top cooling kit fits FA09 and FA10 frequency converters in Rittal TS8 and VX25 cabinets of 2000 mm (79 in) in height, and 600 mm (24 in) or 800 mm (31 in) wide. When the kit is installed, air flows into the bottom duct and out through the top duct of the frequency converter. See Illustration 1.

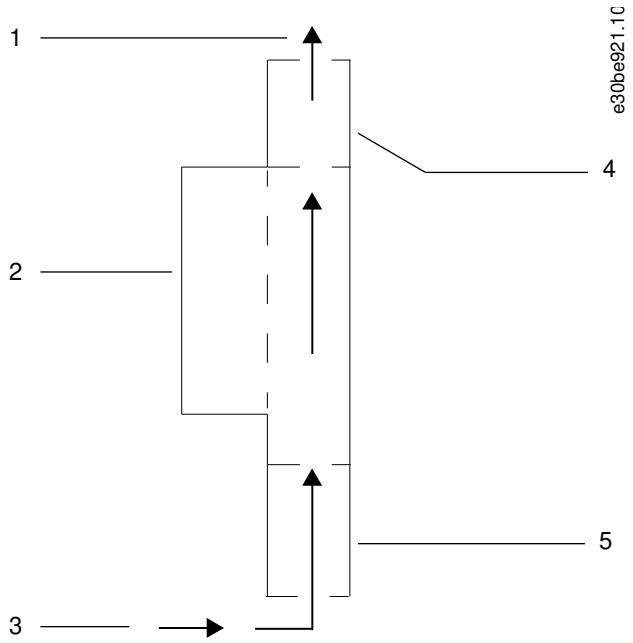

Illustration 1: Direction of Airflow with Kit Installed

1	Back channel airflow (exhaust)	4	Top duct assembly
2	Frequency converter	5	Bottom duct assembly
3	Back channel airflow (intake)		

1.2 Kit Numbers

Use these instructions with the following kits.

Table 1: In-bottom/Out-top Cooling Kits

Number	Kit description
176F4038	In-bottom/out-top cooling kit for FA09 frequency converter
176F4039	In-bottom/out-top cooing kit for FA10 frequency converter

1.3 Items Supplied

The kit contains the following parts:

Table 2: Contents of In-bottom/Out-top Cooling Kit

Item	Quantity
Telescopic top duct assembly	1
Telescopic bottom duct assembly	1
Cutout gasket	1
Ribbed EPDM rubber seal	1
Strip gasket	1
Seal plate gasket	2
Seal plate	2
Duct support plate	1
Duct support plate gasket	1
M10x30 screws	4
M5x16 countersunk screw	7
M5x18 screw	4-5
M5x10 screw	10-11
M5 hex nut	6

2 Installation

2.1 Safety Information

NOTICE

QUALIFIED PERSONNEL

Only qualified personnel are allowed to install the parts described in these installation instructions.

- Disassembly and reassembly of the frequency converter must be done in accordance with the corresponding service guide.
- Use the standard fastener torque values from the service guide, unless the torque value is specified in these instructions.

⚠ WARNING ⚠

ELECTRICAL SHOCK HAZARD

The frequency converter contains dangerous voltages when connected to mains voltage. Improper installation, and installing or servicing with power connected, can cause 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 regulations.

⚠ WARNING ⚠

DISCHARGE TIME (20 MINUTES)

The frequency converter contains DC-link capacitors, which can remain charged even when the frequency converter 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 backups, 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.
- To verify full discharge, measure the voltage level.

NOTICE

ELECTROSTATIC DISCHARGE

Electrostatic discharge can damage components.

- Ensure discharge before touching internal frequency converter components, for example by touching a grounded, conductive surface or by wearing a grounded armband.

2.2 Installation Overview

NOTICE

APPLYING GASKETS

This kit contains self-adhesive gaskets to ensure a proper seal between metal parts.

- Before affixing a gasket, check that the part matches the gasket and that no holes are covered.

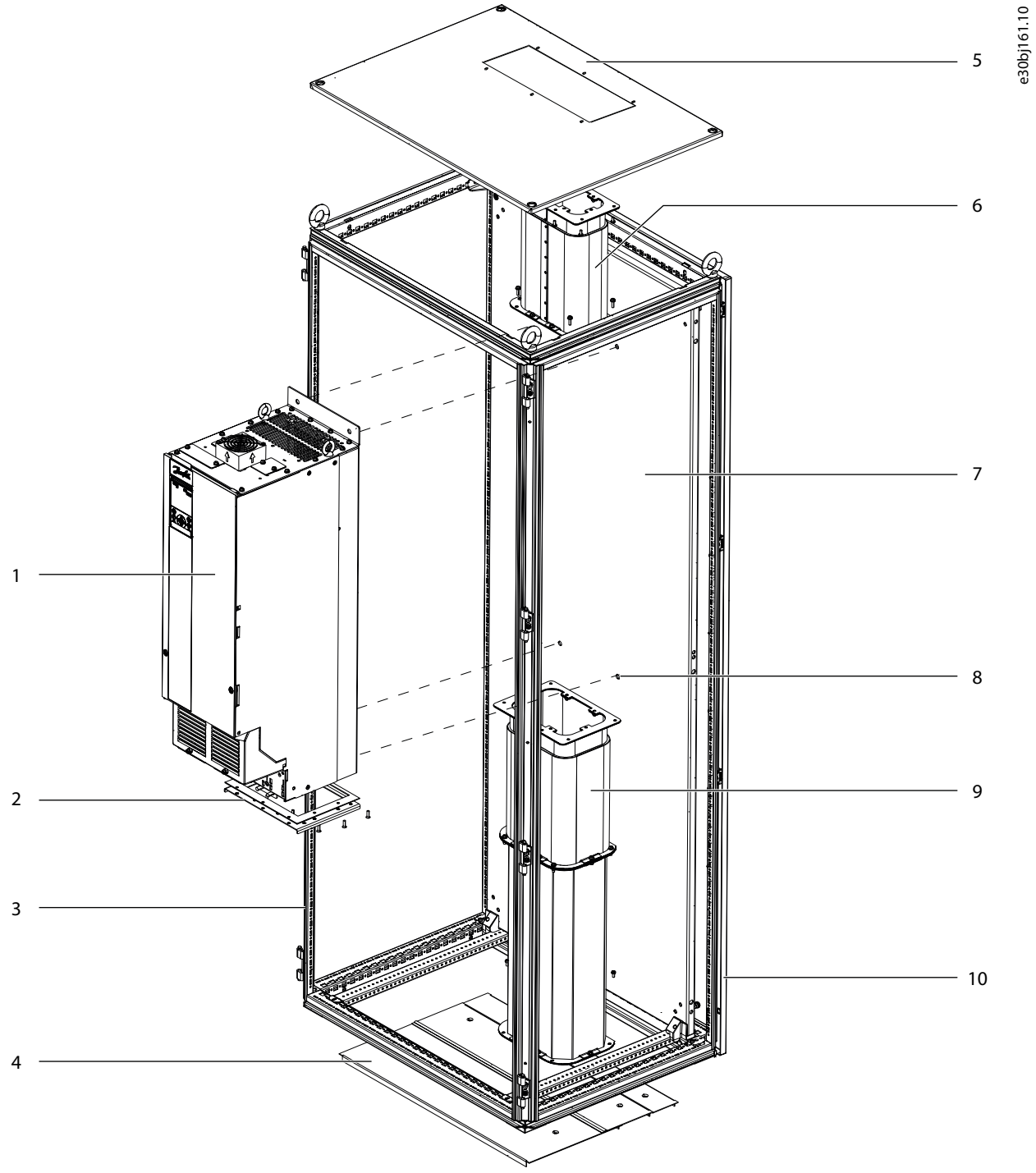

Illustration 2: Overview of In-bottom/Out-top Cooling Kit

1	Frequency converters	6	Top duct assembly
2	Duct support plate	7	Mounting plate
3	Rittal cabinet	8	Mounting holes
4	Base plate	9	Bottom duct assembly
5	Top plate	10	Back plate

2.3 Creating a Vent Opening in the Top Plate

To create a vent opening in the cabinet top plate, use the following steps. Use the dimensions in Illustration 3 for the FA09 top plate, and Illustration 4 for the FA10 top plate.

Procedure

1. Cut out the vent opening in the Rittal cabinet top plate using the dimensions in the template.

   The opening must match the top duct opening.

2. Drill 6 screw holes (4 mm) around the vent opening using the dimensions in the template.

   The holes must match the holes in the upper flange of the top duct.

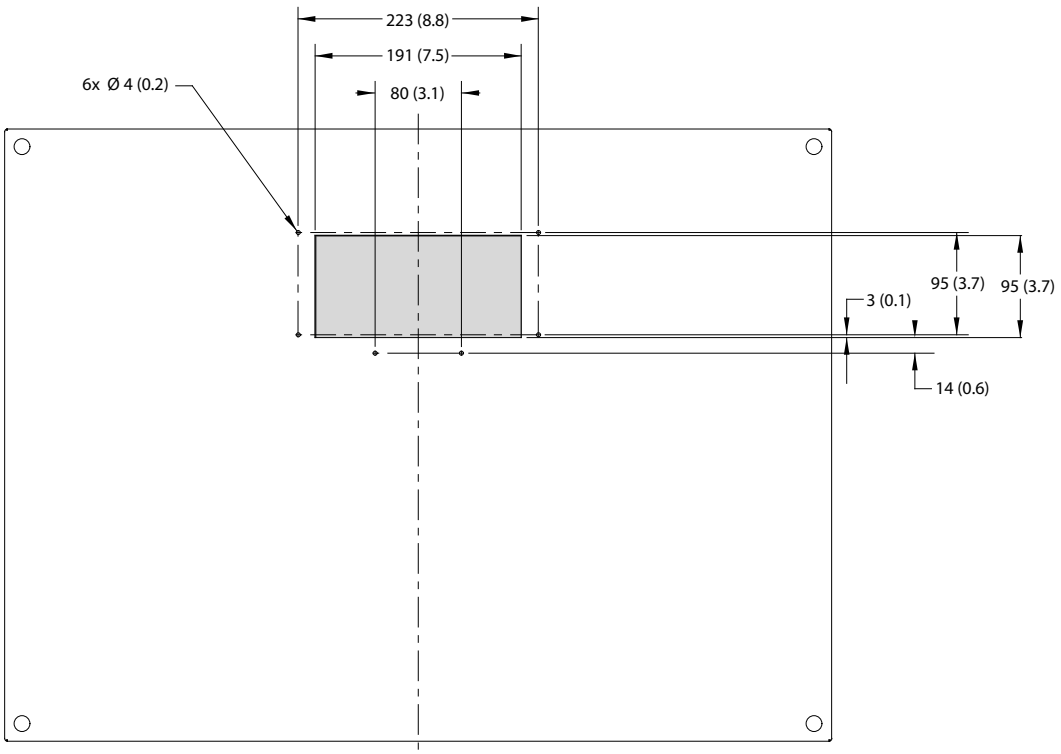

Illustration 3: FA09 Rittal Cabinet Top Plate Template

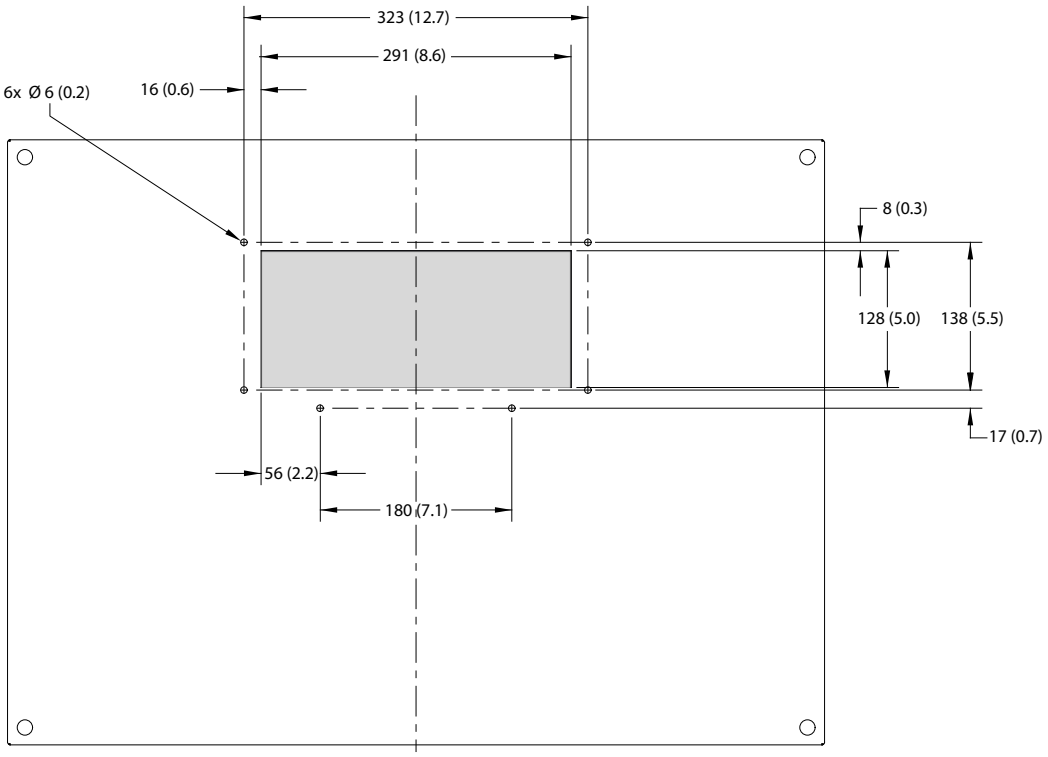

Illustration 4: FA10 Rittal Cabinet Top Plate Template

2.4 Creating a Vent Opening in the Base Plate

To create a vent opening in the base plate for the bottom duct, use the following steps. Use the dimensions in Illustration 5 for FA09 frequency converters, and Illustration 6 for FA10 frequency converters.

Procedure

1. Cut out the vent opening in the cabinet base plate using the dimensions in the template.
2. Drill 6 screw holes (4 mm) around the vent opening using the dimensions in the template.

   The holes must match the holes in the lower flange of the bottom duct.

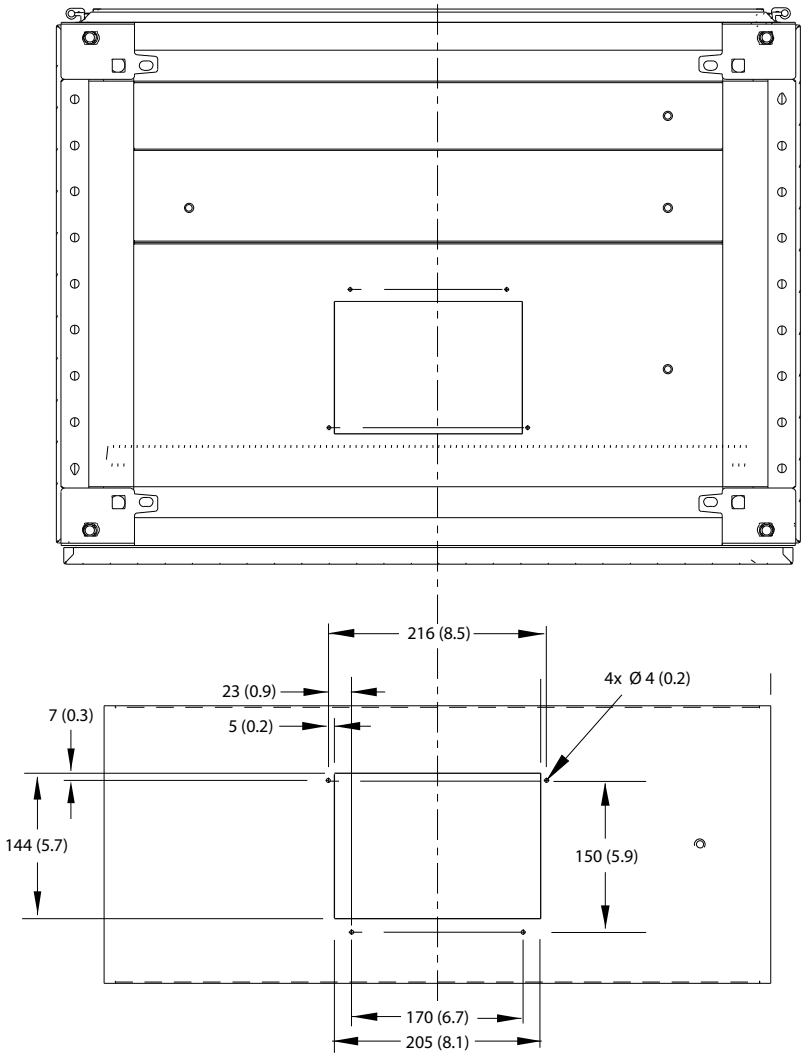

Illustration 5: FA09 Base Plate Template

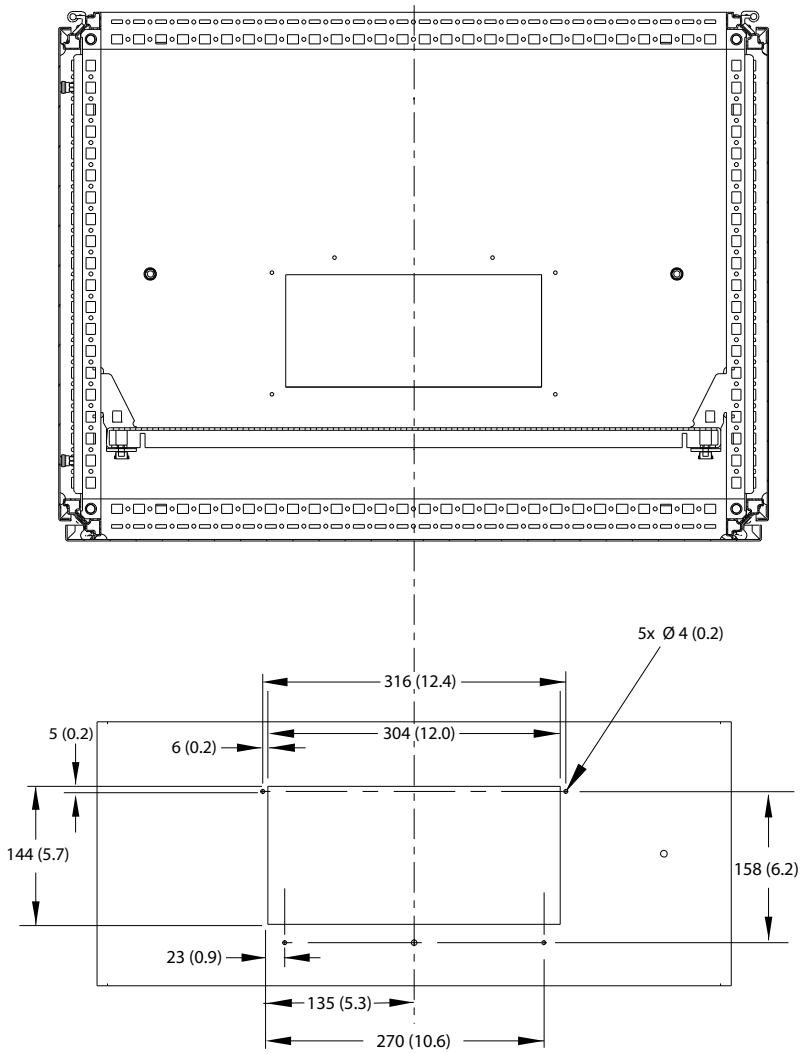

Illustration 6: FA10 Base Plate Template

2.5 Preparing the Mounting Plate

To create holes in the mounting plate, use the following steps. Use the dimensions in Illustration 7 for FA09 frequency converters, and in Illustration 8 for FA10 frequency converters.

Procedure

1. Drill 4 holes in the mounting plate using the dimensions in the template.

   The mounting holes must match the holes in the frequency converter.

2. Insert 4 M10 pem self-clinching nuts (not supplied) in the mounting holes.

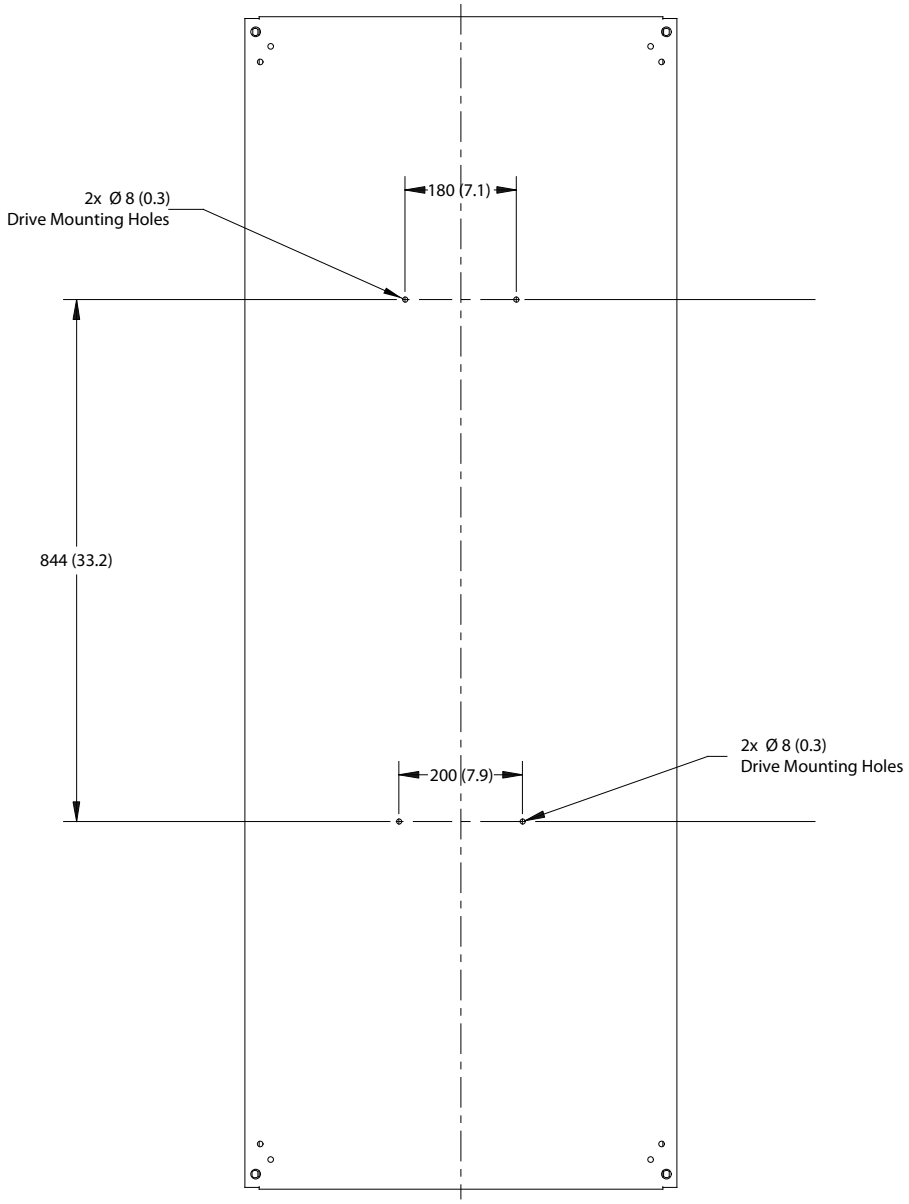

Illustration 7: FA09 Mounting Plate Template

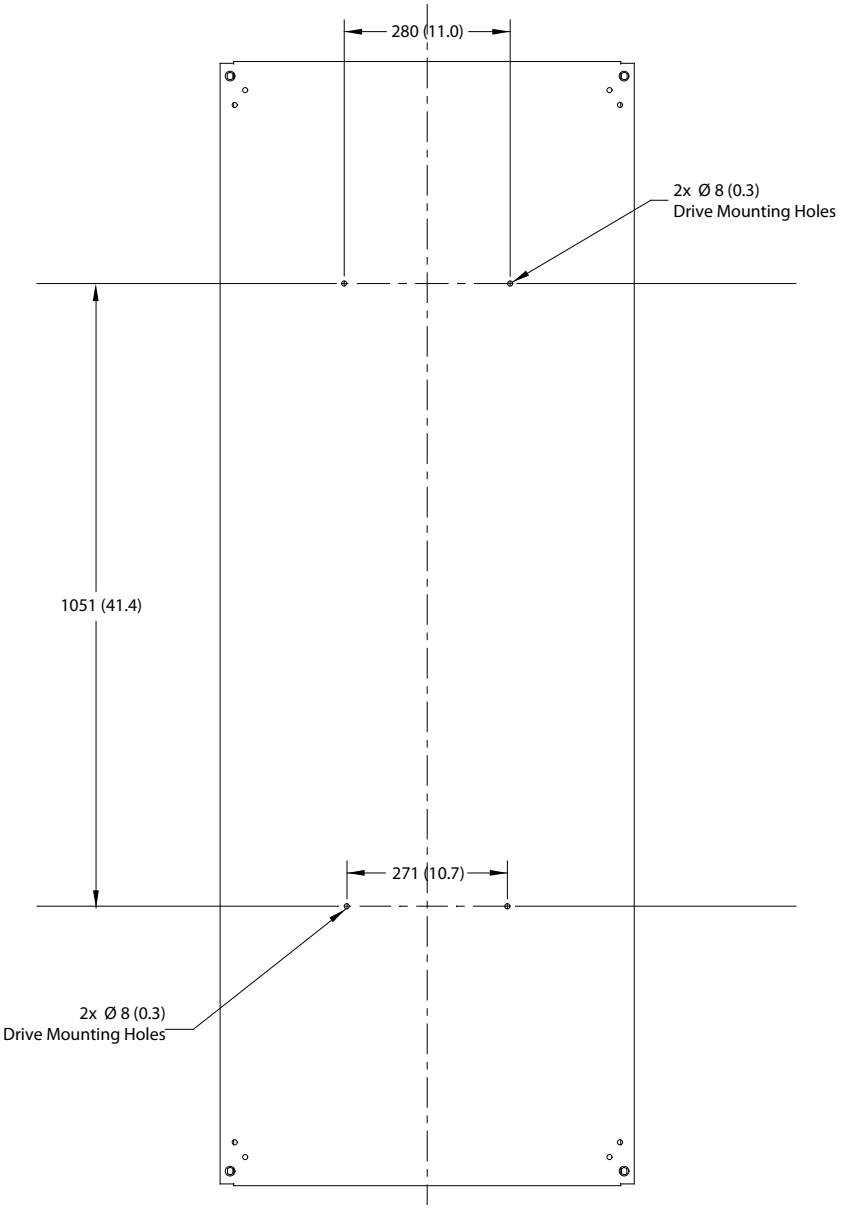

Illustration 8: FA10 Mounting Plate Template

2.6 Assembling the Ducts

The top and bottom ducts are telescopic ducts that collapse to simplify installation. To assemble the ducts before installation, use the following steps. Refer to Illustration 9.

Procedure

1. Cut the strip of ribbed EPDM rubber seal into 4 pieces. Use the following measurements:
   - **a.** For FA09 frequency converters, cut 2 strips of 581 mm (22.9 in) for the top duct, and 2 strips of 682 mm (26.9 in) for the bottom duct.
   - **b.** For FA10 frequency converters, cut 2 strips of 849 mm (33.4 in) for the top duct, and 2 strips of 877 mm (34.5 in) for the bottom duct.
2. Peel the paper off the self-adhesive seals. Place 1 strip on the outside bottom edge of the inner sleeve of each duct, and 1 strip on the upper inside edge of the outer sleeve of each duct.

3. With the rubber seal in place, carefully slide the inner sleeve of each duct into the outer sleeve.

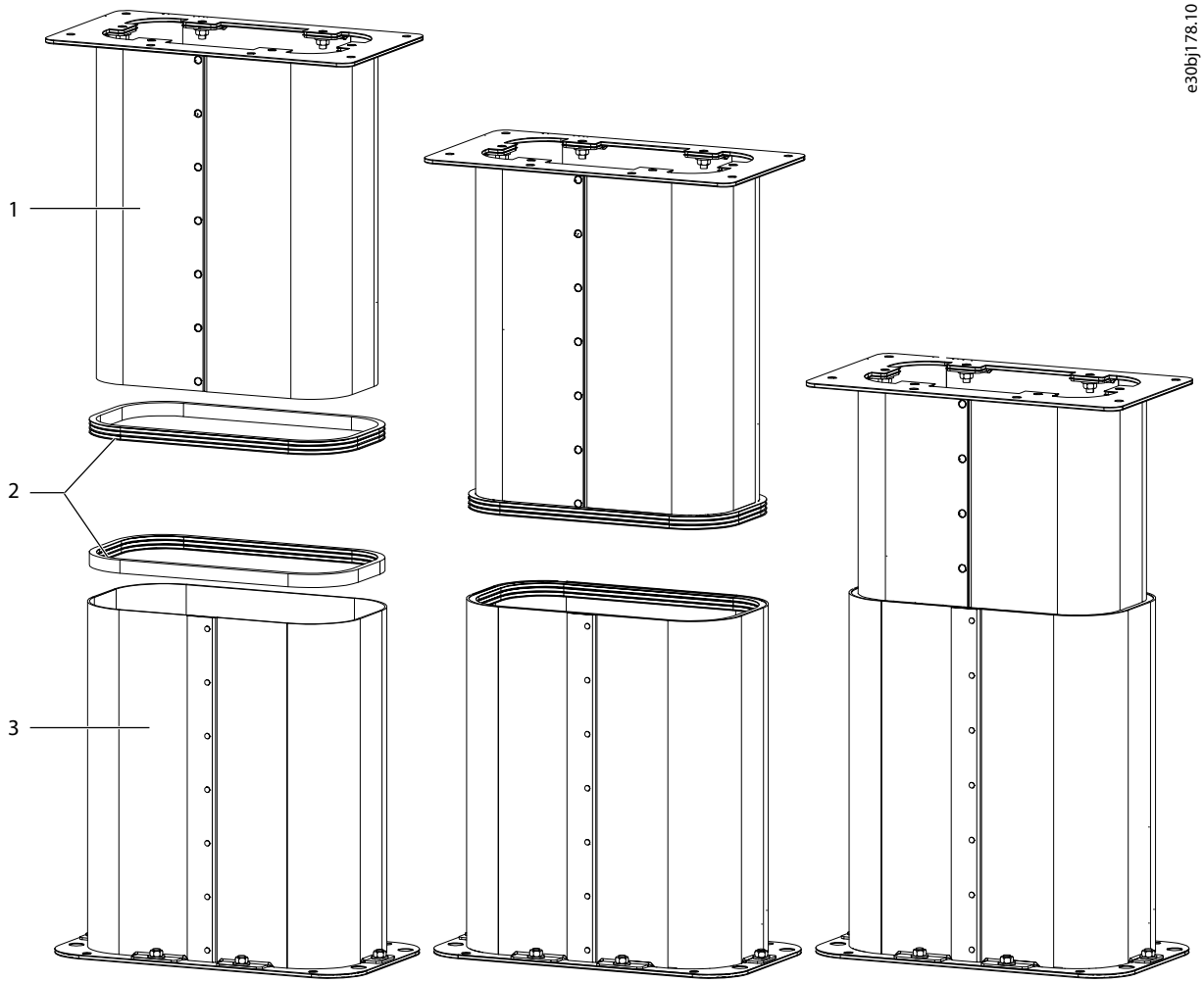

Illustration 9: Assembly of Telescopic Ducts

1	Inner sleeve of duct	3	Outer sleeve of duct
2	Ribbed EPDM rubber seal		

2.7 Mounting the Frequency Converter

To install the mounting plate and frequency converter in the Rittal cabinet, use the following steps. Refer to Illustration 10.

Procedure

1. Attach the mounting plate to the cabinet rails, making sure that the pem nuts face the back of the cabinet.
2. Remove the backing paper from the self adhesive on the cutout gasket.
3. Affix the gasket over the duct opening in the mounting plate.
4. Remove the backing paper from the self adhesive on the strip gasket.
5. Affix the gasket over the lower 2 pem nuts in the mounting plate.
6. Remove the backing paper from the 2 seal plate gaskets, and affix the gaskets to the seal plates, 1 per plate.
7. Fasten 2 M10x30 screws through the seal plates, 1 per plate, and into the pem nuts at the lower end of the mounting plate.

   Make sure that the screws are secure. The base of the frequency converter rests on the screws.

8. Slightly lean the top of the frequency converter forward and set the cutouts in the base onto the 2 screws.
9. Slowly push the top of the frequency converter back against the mounting plate until the top 2 pem nuts line up with the holes in the frequency converter.

10. Secure the top of the frequency converter using 2 M10x30 screws.

Torque all M10x30 screws to 19 Nm (170 in-lb).

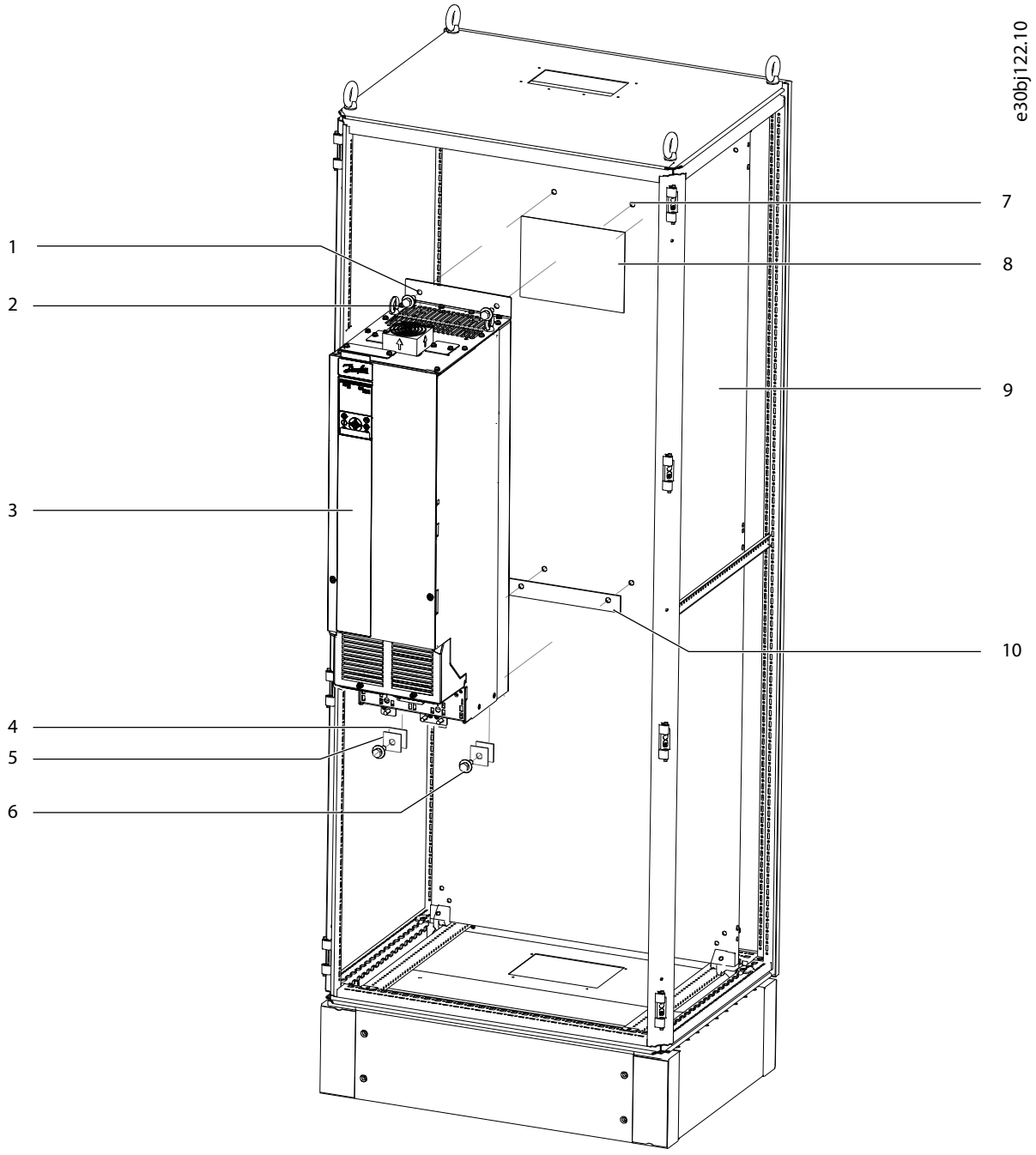

Illustration 10: Installation of the Frequency Converter in the Cabinet

1	Mounting holes	6	M10x30 screw
2	M10x30 screw	7	Pem nuts
3	Frequency converter	8	Cutout gasket
4	Seal plate gasket	9	Mounting plate
5	Seal plate	10	Strip gasket

2.8 Installing the Duct Support Plate

The duct support plate attaches the bottom duct to the lower end of the frequency converter. To install the duct support plate, use the following steps. Refer to Illustration 11.

Procedure

1. Remove the paper backing from the duct support plate gasket.
2. Adhere the gasket to the upper surface of the duct support plate.
3. Position the duct support plate at the lower end of the frequency converter.
4. Secure the duct support plate to the frequency converter using 7 M5x16 countersunk screws (T25).

Torque fasteners to 2.3 Nm (20 in-lb).

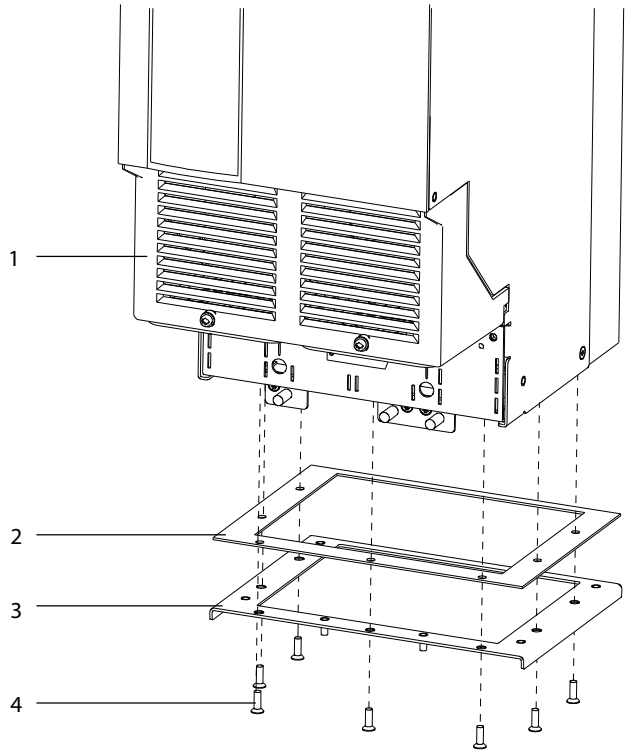

Illustration 11: Installation of the Duct Support Plate

1	Frequency converter	3	Duct support plate
2	Duct support plate gasket	4	M5x16 countersunk screw

2.9 Installing the Bottom Duct

To attach the bottom duct to the base plate of the cabinet, use the following steps. Refer to Illustration 12.

Procedure

1. Install the base plate in the Rittal cabinet using the existing fasteners.
2. Collapse the bottom duct and position it over the vent cutout in the base plate.
3. Place the holes in the lower flange of the duct over the holes surrounding the opening in the plate.
4. Fasten 4 M5x10 screws (T25) through the holes in the lower flange of the duct, securing it to the base plate.

5. Extend the duct upward and fasten with 6 M5 hex nuts, securing it to the duct support plate.

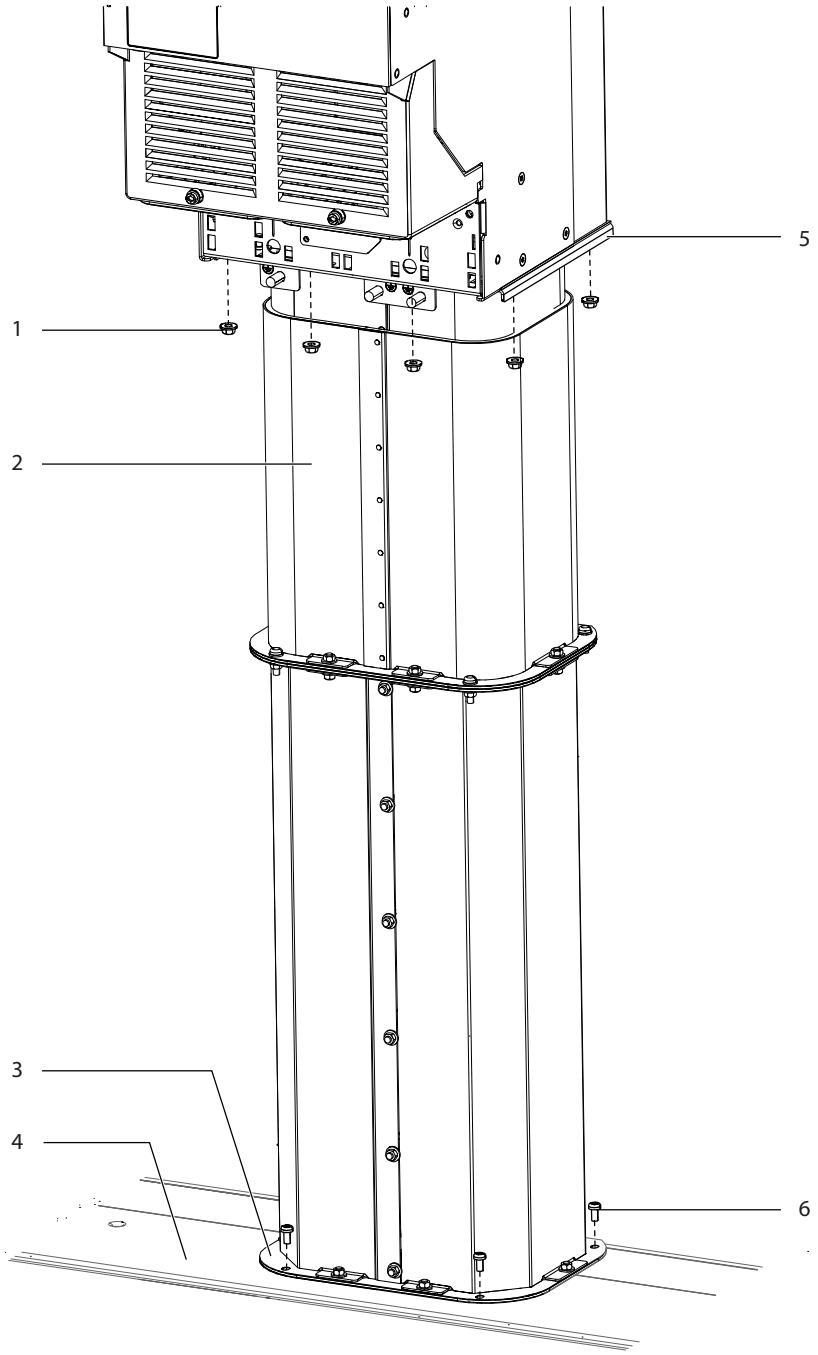

Illustration 12: Installation of the Bottom Duct

1	M5 hex nut	4	Base plate
2	Bottom telescopic duct	5	Duct support plate
3	M5x16 screw	6	Lower flange of duct

2.10 Installing the Top Duct

Attach the top telescopic duct between the top of the frequency converter and the cabinet using the following steps. Refer to .Illustration 13 (The top plate of the cabinet is removed from the illustration for visibility of parts).

Procedure

1. Collapse the top duct and position it over the vent in the top of the frequency converter.
2. Secure the duct to the top of the frequency converter with 4 M5x18 screws.
3. Extend the telescopic duct upward until the upper flange of the duct is positioned against the underside of the cabinet top plate.
4. Secure the duct to the top plate with 6 M5x10 screws (T25) through the upper flange of the duct.

Torque fasteners to 2.3 Nm (20 in-lb).

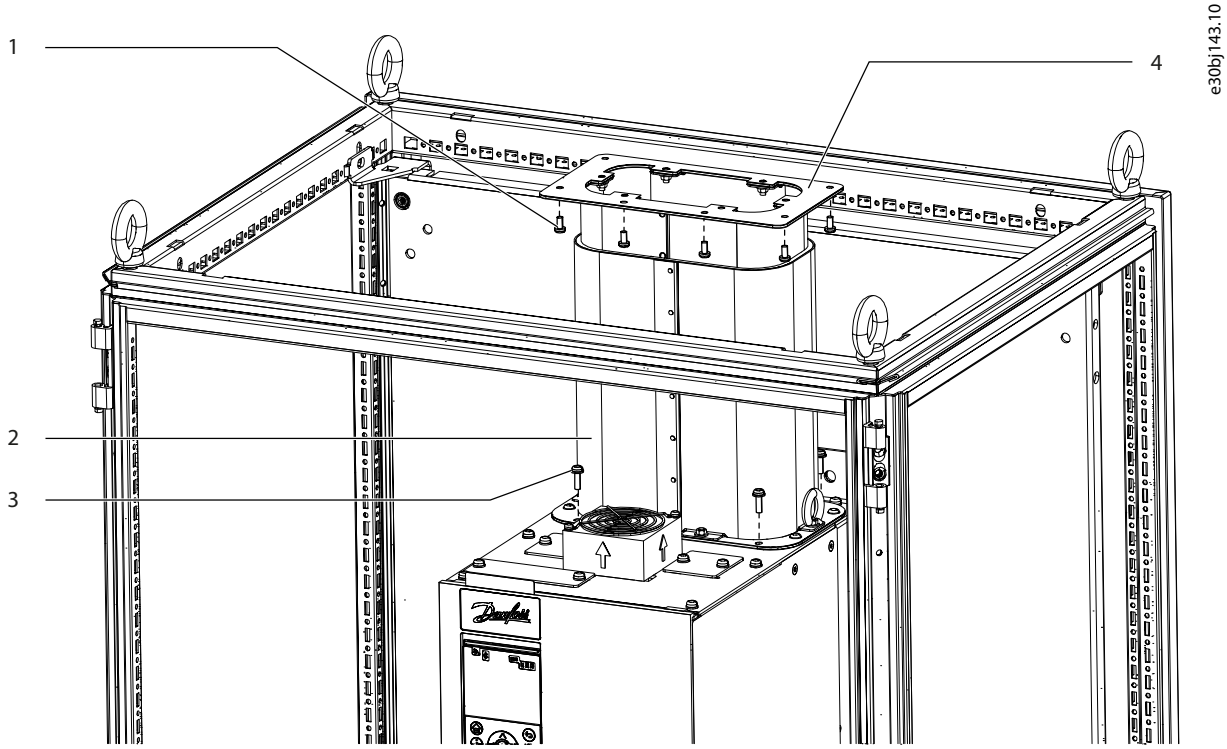

Illustration 13: Installation of the Top Duct

1	M5x10 screw	3	M5x18 screw
2	Telescopic top duct	4	Upper flange of duct

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