

# In-bottom/Out-top Cooling Kit for FA11-FA12

## iC7 Series Frequency Converters

### 1 Overview

#### 1.1 Description

The in-bottom/out-top cooling kit fits FA11 and FA12 frequency converters mounted in Rittal TS8 cabinets with widths of 600 mm (24 in) or 800 mm (32 in). When the kit is installed, air flows into the bottom duct and out through the top duct of the frequency converter. See [Illustration 1](#).

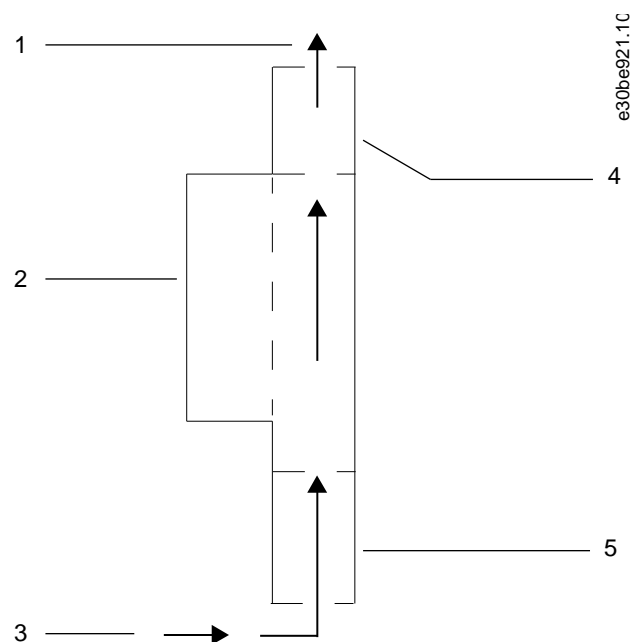


Illustration 1: Direction of Airflow with Kit Installed

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
176F4047	In-bottom/out-top cooling kit for FA11 in 600 mm (24 in) cabinet
176F4192	In-bottom/out-top cooling kit for FA11 in 800 mm (32 in) cabinet
176F4048	In-bottom/out-top cooling kit for FA12 in 800 mm (32 in) cabinet

#### 1.3 Items Supplied

The following parts are contained in the kit.

Table 2: Items Supplied in In-bottom/Out-top Cooling Kit

Item	Quantity
Duct support bracket	1
Duct support gasket	1
Enclosure base plate	1
Top duct assembly	1
Bottom duct assembly	1
Ribbed EPDM rubber seal	1
M5x18 screw	4
M5x14 screw	10
M5 hex nut	12

## 2 Installation

### 2.1 Safety Information

#### NOTICE

##### QUALIFIED PERSONNEL

Only qualified, Danfoss authorized 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 service guide.
- Use the standard fastener torque values from the service guide, unless the torque value is specified in these instructions.

#### ⚠ WARNING ⚠

##### DISCHARGE TIME (40 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 LED indicator lights are off. Failure to wait 40 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 and remote DC-link power supplies, including battery back-ups, UPS, and DC-link connections to other frequency converters.
- Disconnect or lock the motor.
- Disconnect any brake option.
- Disconnect any DC connector option.
- Wait 40 minutes for the DC-link capacitors to discharge fully.
- Before performing any service or repair work, measure the voltage level to verify that the capacitors are fully discharged.

#### ⚠ 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 codes.

#### NOTICE

##### ELECTROSTATIC DISCHARGE

Electrostatic discharge can damage components.

- Ensure electrostatic 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.

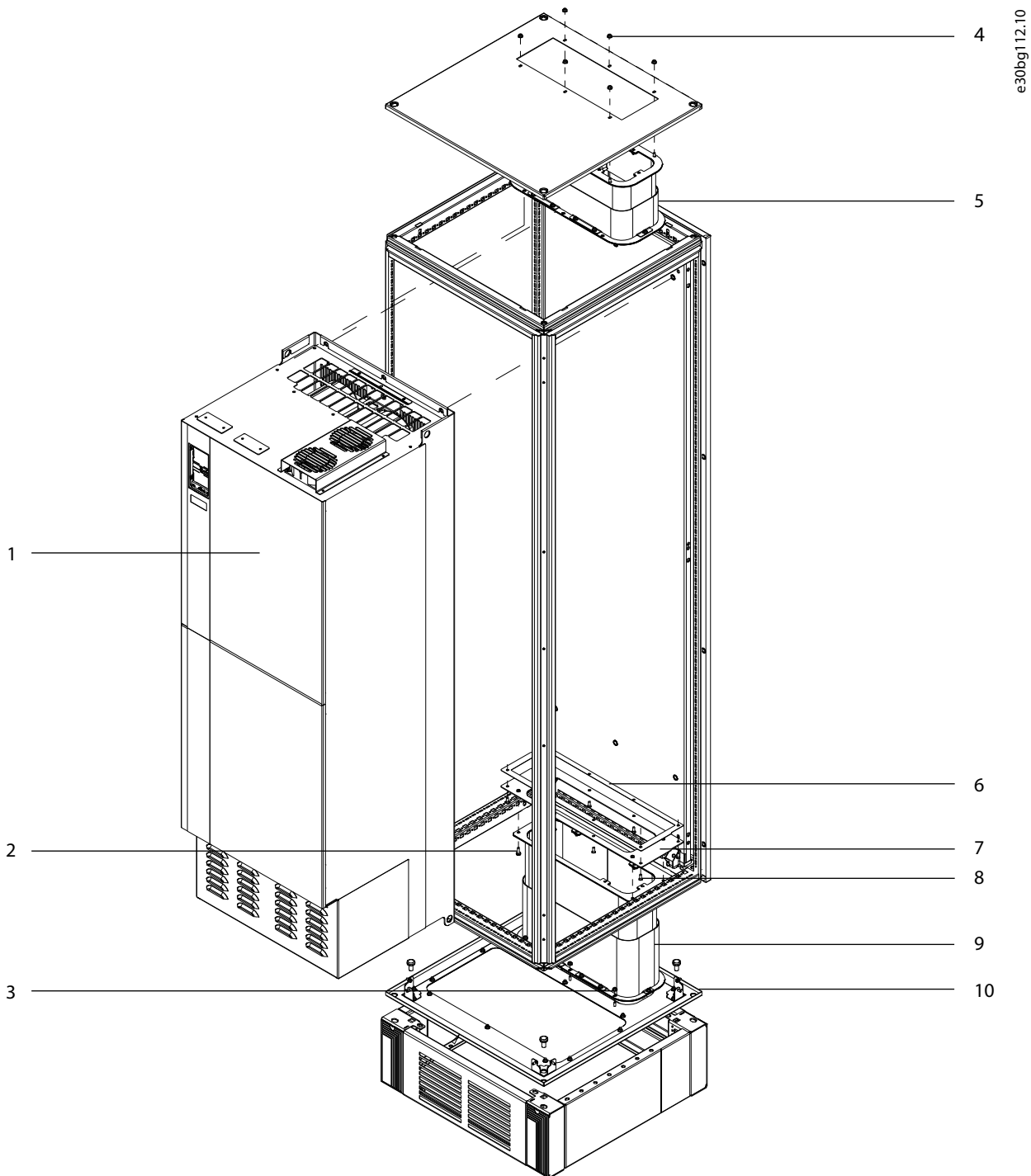


Illustration 2: Overview of In-bottom/Out-top Cooling Kit

1	Frequency converter	6	Duct support gasket
2	M5x18 screw	7	Duct support bracket
3	M5 hex nut	8	M5x14 screw
4	M5 hex nut	9	Bottom duct assembly
5	Top duct assembly	10	Base plate

### 2.3 Preparing the Mounting Plate

To create holes in the mounting plate, use the following steps. Use the dimensions in [Illustration 3](#) for 600 mm (24 in) cabinets, and in [Illustration 4](#) for 800 mm (32 in) cabinets.

**Procedure**

1. Drill 6 holes in the mounting plate using the dimensions in the template.

The holes must match the holes in the frequency converter.

2. Insert 6 M10 pem self-clinching nuts (not supplied) in the mounting holes.

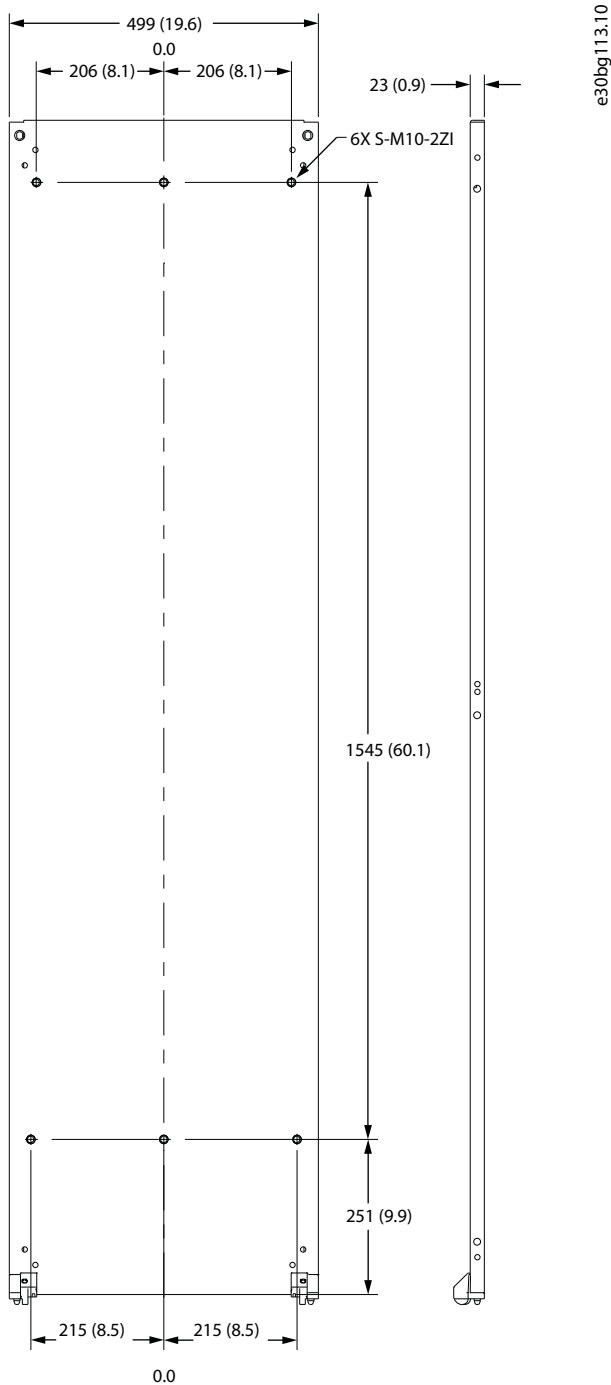


Illustration 3: Mounting Plate in 600 mm (24 in) Cabinet

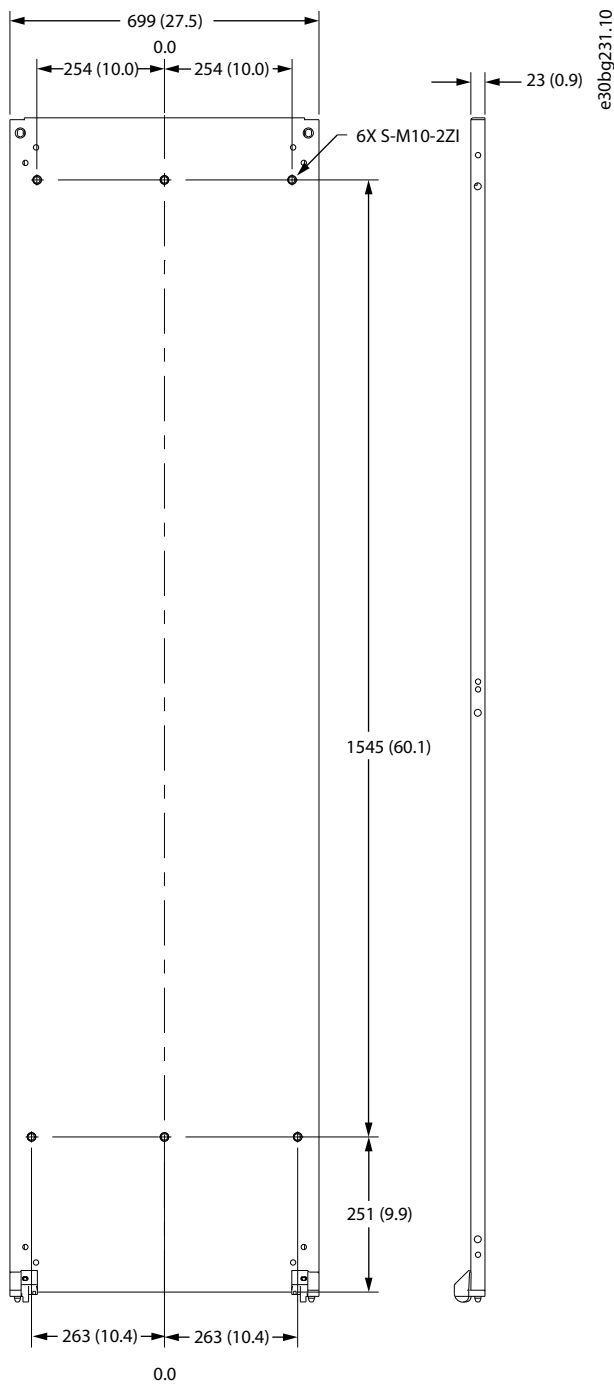


Illustration 4: Mounting Plate in 800 mm (32 in) Cabinet

## 2.4 Creating a Vent Opening in the Top Plate

To create a vent opening in the cabinet top plate, use the following steps. Refer to [Illustration 5](#) and [Illustration 6](#).

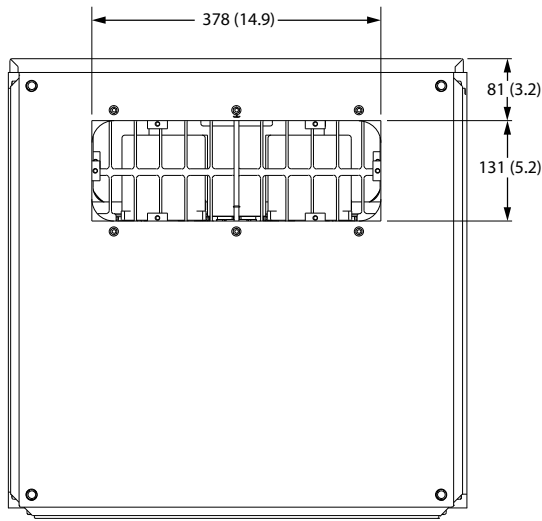
### Procedure

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

The opening must match the frequency converter vent opening.

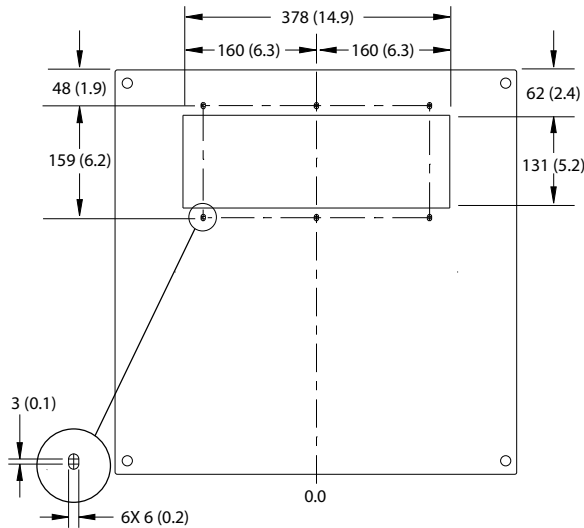
2. Drill 6 screw holes (6 mm) around the vent opening using the dimensions in the template.

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



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Illustration 5: Dimensions of Vent in Top of Frequency Converter



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Illustration 6: Dimensions for Opening in Cabinet Top Plate

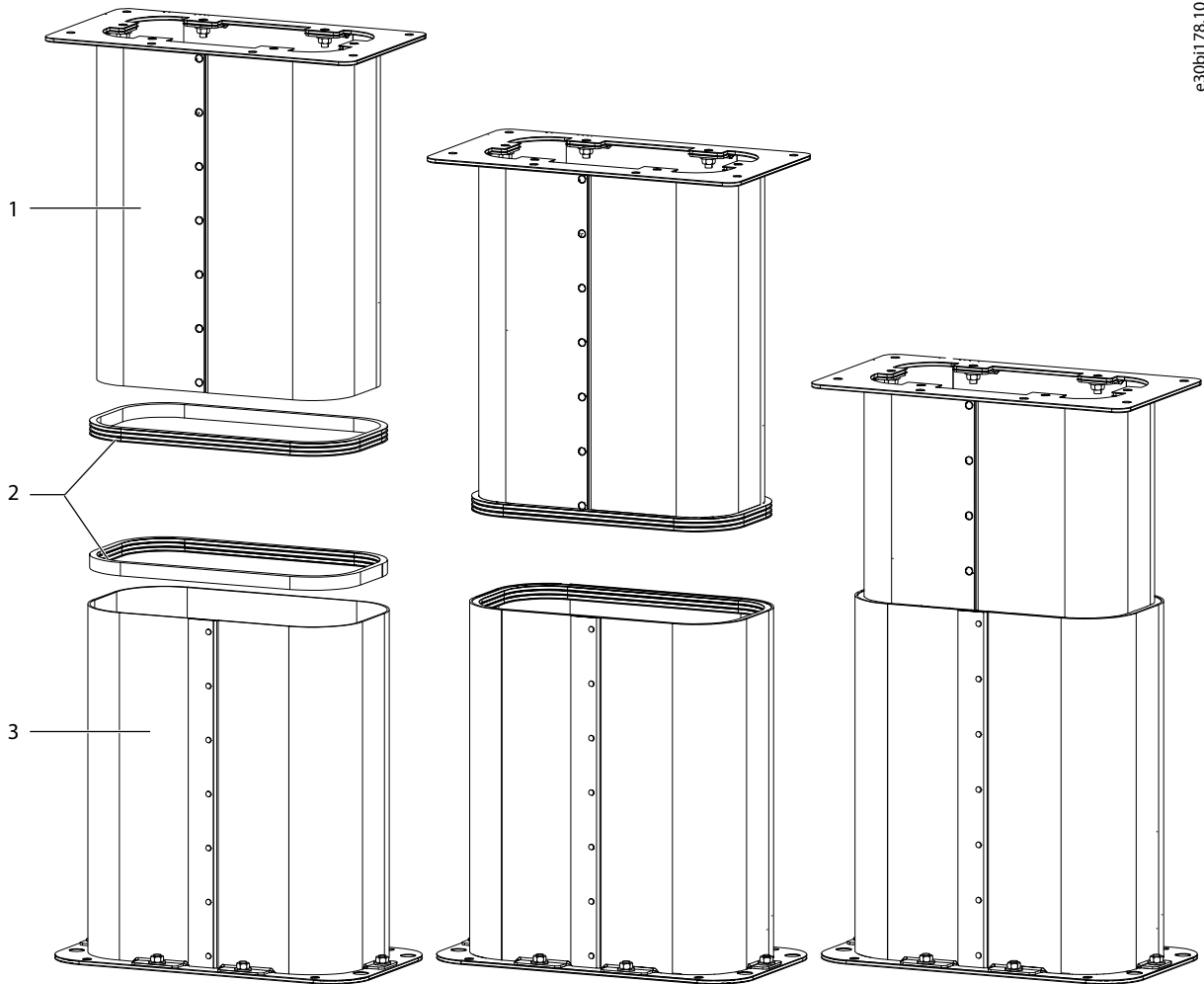
## 2.5 Assembling the Ducts

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 7](#).

### Procedure

1. Cut the strip of ribbed EPDM rubber seal into 4 pieces. Cut 2 strips of 1027 mm (40.4 in) for the top duct, and 2 strips of 990 mm (39.0 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.

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



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Illustration 7: Assembly of Telescopic Ducts

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

## 2.6 Installing the Top Duct Over the Top Vent

To attach the top duct over the top vent of the frequency converter, use the following steps. See [Illustration 8](#).

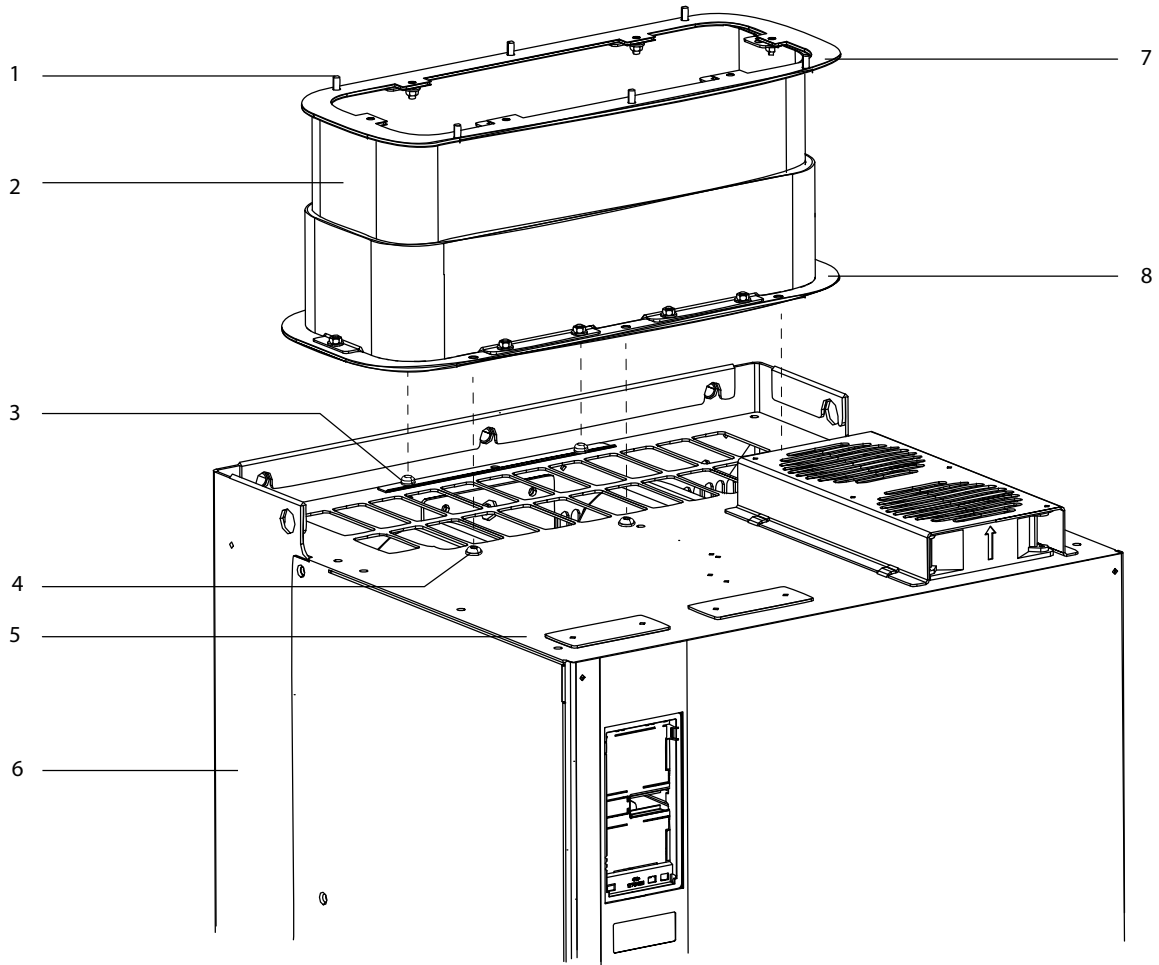
### Procedure

- Remove 2 M5x14 screws (T25) at the back of the top vent, and retain the screws.
- Remove 3 M5x12 screws (T25) at the front of the top vent, and retain the screws.
- Position the top duct over the vent in the top of the frequency converter.
- Line up the holes in the lower flange with the screw holes in the frequency converter.
- Secure the lower flange to the frequency converter with 5 screws (T25) previously removed.

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



6. Collapse the duct until installation of the cabinet top plate.



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Illustration 8: Installation of the Top Duct Over the Top Vent

1	Threaded stud	5	Top of frequency converter
2	Top duct	6	Cooling back channel
3	M5x14 screw	7	Upper flange of duct
4	M5x12 screw	8	Lower flange of duct

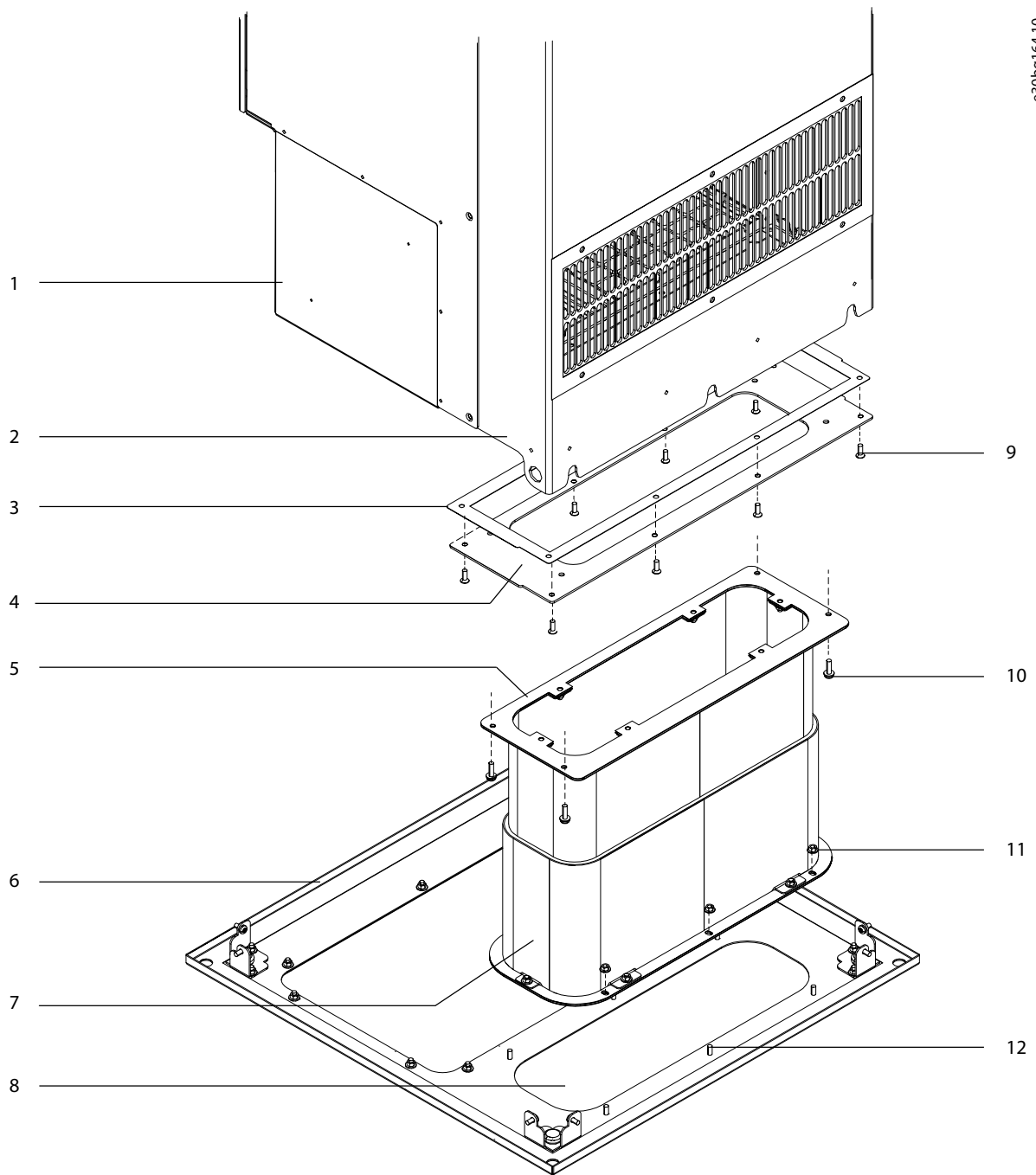
## 2.7 Installing the Duct Support Bracket

The duct support bracket attaches the bottom duct to the lower end of the cooling back channel. To install the bracket, use the following steps. Refer to [Illustration 9](#).

### Procedure

1. Remove the paper backing from the duct support gasket.
2. Adhere the gasket to the upper surface of the duct support bracket.
3. Position the bracket at the lower end of the cooling back channel.
4. Secure the bracket to the back channel of the frequency converter using 8 M5x14 screws (T25) from the kit.

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



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Illustration 9: Installation of the Duct Support Bracket

1	Frequency converter	7	Bottom duct assembly
2	Back channel	8	Opening for duct
3	Duct support gasket	9	M5x14 screw
4	Duct support bracket	10	M5x18 screw
5	Upper flange of duct	11	M5 hex nut
6	Cabinet base plate	12	Threaded stud

## 2.8 Installing the Base Plate and Bottom Duct

To attach the bottom duct to the base plate of the cabinet, use the following steps. Refer to [Illustration 10](#).

### Procedure

1. Remove the base plate from the Rittal cabinet and replace it with the base plate from the kit, which has a vent opening for the bottom duct.
2. Position the bottom duct over the vent opening in the base plate.
3. Place the holes in the lower flange of the duct over the 6 threaded studs surrounding the opening in the base plate.
4. Fasten 6 M5 hex nuts (T25) to the threaded studs.
5. Collapse the duct and install the base plate between the pedestal and the cabinet frame using the existing fasteners.

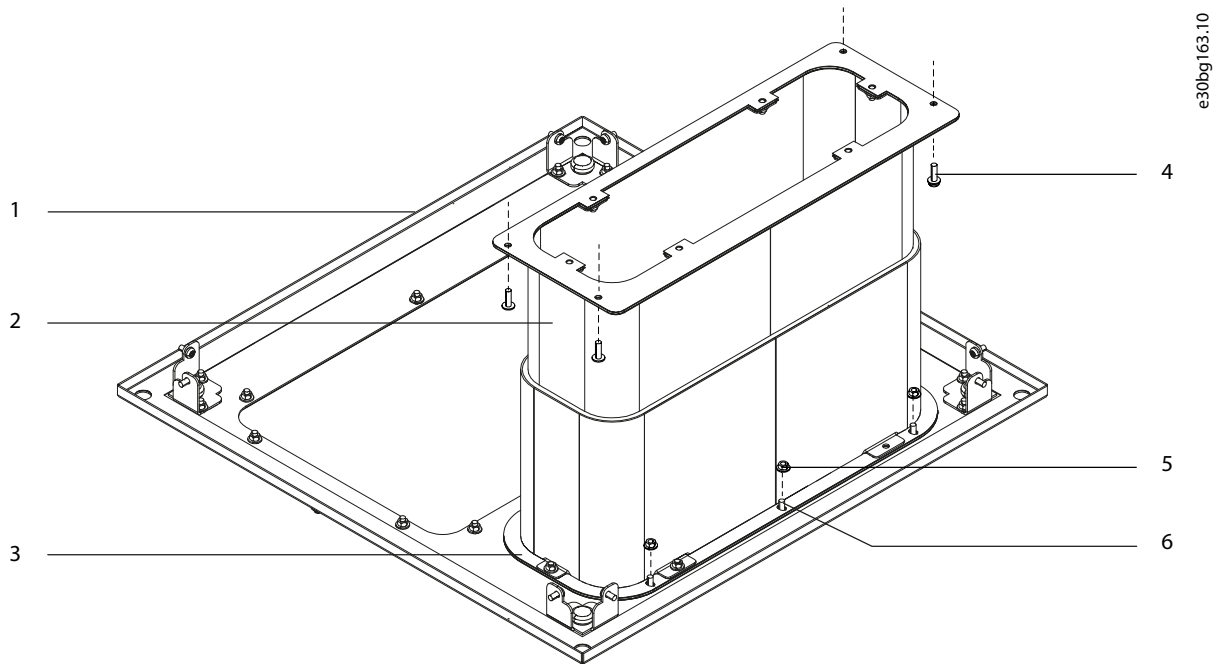


Illustration 10: Installation of the Bottom Duct on the Base Plate

1	Base plate (with opening for duct)	4	M5x18 screw
2	Bottom duct assembly	5	M5 hex nut
3	Lower flange of duct	6	Threaded stud

## 2.9 Mounting the Frequency Converter

To install the mounting plate and frequency converter in the cabinet, use the following steps. Refer to [Illustration 11](#).

### Procedure

1. Attach the mounting plate to the cabinet rails, making sure that the pem nuts face the back of the cabinet.
2. Loosely fasten 3 M10 screws (not supplied) 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 these screws.

3. Slightly lean the top of the frequency converter forward and set the cutouts in the base onto the 3 screws.
4. Slowly push the top of the frequency converter back against the mounting plate until the top 3 pem nuts line up with the holes in the frequency converter.
5. Secure the top of the frequency converter using 3 M10 screws.

Torque the 6 M10 screws to 19 Nm (170 in-lb).

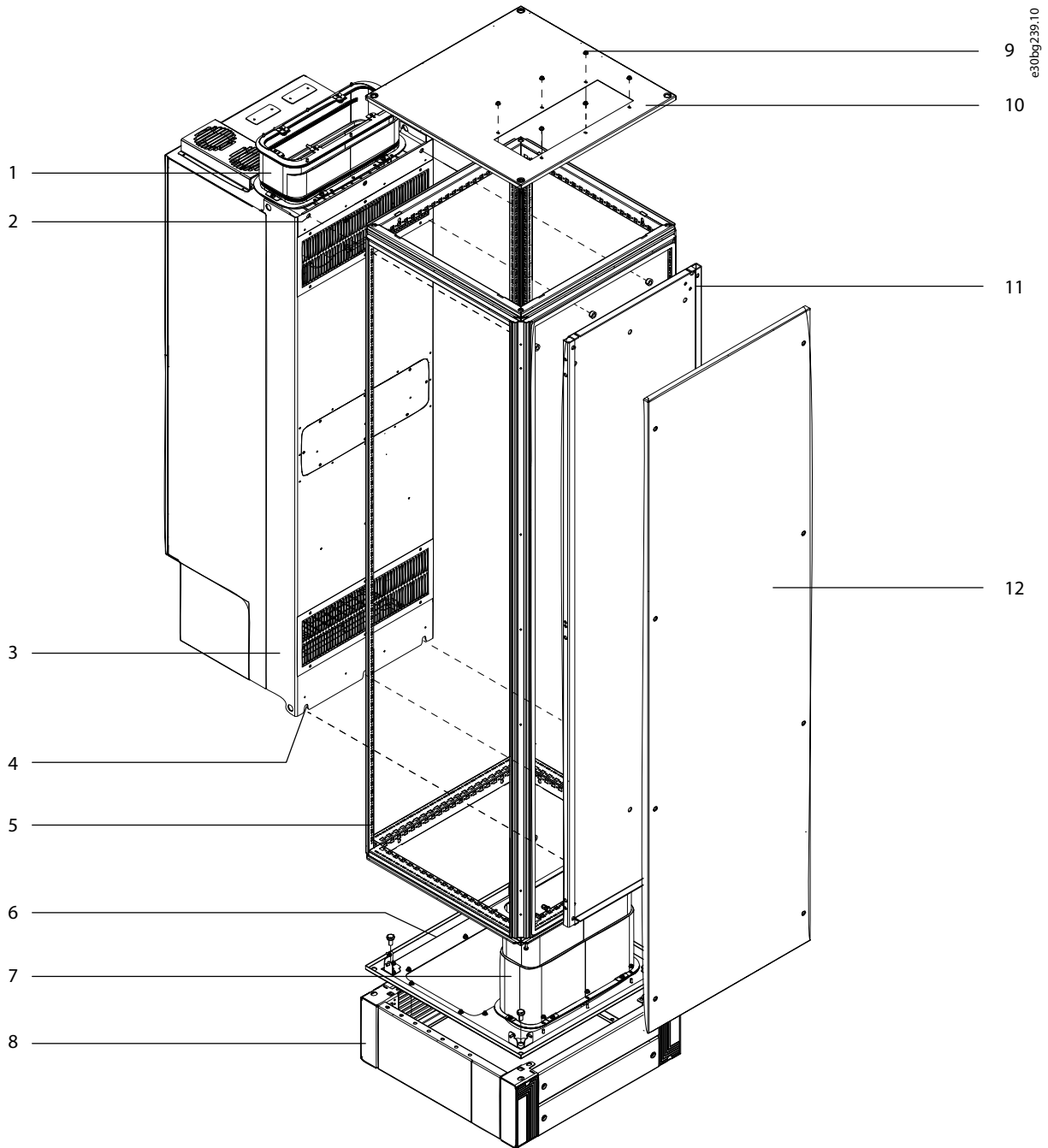


Illustration 11: Installation of the Frequency Converter, Mounting Plate, Backplate, and Top Plate

1	Top duct assembly	7	Bottom duct assembly
2	Upper mounting holes	8	Pedestal
3	Cooling back channel	9	M5 hex nut
4	Cutouts for mounting	10	Cabinet top plate
5	Cabinet rails	11	Mounting plate
6	Cabinet bottom plate	12	Cabinet backplate

## 2.10 Attaching the Bottom Duct to the Duct Support Bracket

After the frequency converter is installed on the mounting plate, attach the telescopic bottom duct to the duct support bracket using the following steps.

### Procedure

1. Extend the telescopic bottom duct upward until the upper flange of the duct is positioned against the duct support bracket.
2. Secure the duct to the bracket with 4 M5x18 screws (T25).

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

## 2.11 Attaching the Top Duct to the Top Plate

After the frequency converter is installed on the mounting plate, attach the top duct to the cabinet top plate using the following steps.

### Procedure

1. Extend the telescopic top duct upward until the upper flange of the duct is positioned against the underside of the cabinet top plate.
2. Secure the duct to the top plate with 6 M5 hex nuts (T25).

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

## 2.12 Installing the Backplate

To attach the backplate of the Rittal cabinet, use the following steps.

### Procedure

1. Position the backplate on the back rails of the cabinet behind the mounting plate.
2. Secure the backplate to the rails behind the mounting plate using the existing fasteners.

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