

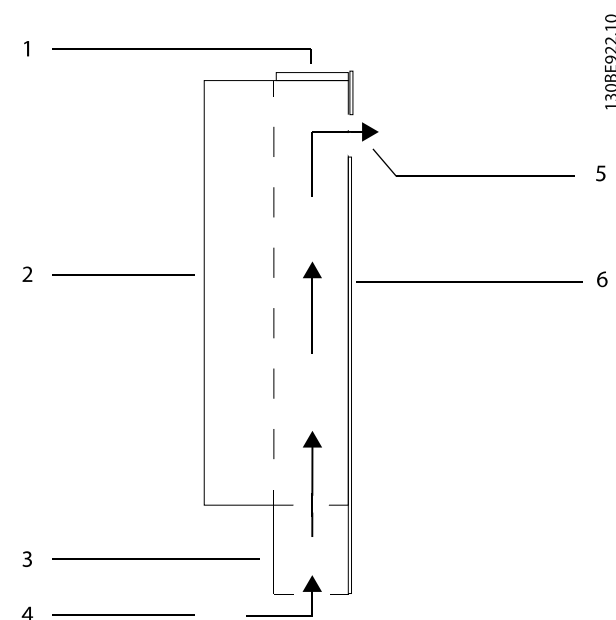
# Installation Instructions

## In-bottom/Out-back Cooling Kit for VLT® Parallel Drive Modules

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

#### Description

The in-bottom/out-back cooling kit is designed for the specific VLT® HVAC Drive FC 102, VLT® AQUA Drive FC 202, and VLT® AutomationDrive FC 302 D4h-size VLT® Parallel Drive Modules mounted in a Rittal TS8 enclosure. The kit directs air in from the bottom of the unit and out through the back of the unit. See *Illustration 1.1*.



1	Top plate
2	Drive module
3	Lower duct assembly
4	Back-channel airflow (intake)
5	Back-channel airflow (exhaust)
6	Mounting backplate

Illustration 1.1 Direction of Airflow with the Kit Installed

#### Kit Part Number

Part number	Kit description
176F6492	In-bottom/Out-back Cooling Kit for the VLT® Parallel Drive Modules (2-drive system)

Table 1.1 Part Number for the VLT® Parallel Drive Modules In-bottom/Out-back Cooling Kit

#### Items Supplied

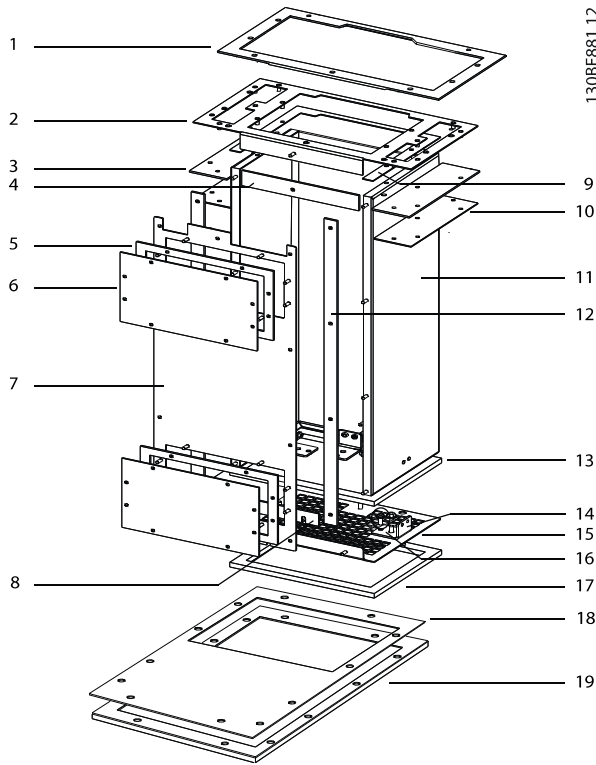
##### Top plate assembly

- Top cover (1)
- Gasket, top cover (1)
- Gasket, cut out (1)
- Screws, M5x12 (11)

##### Enclosure mounting assembly

- Base mounting plate, 38 mm (1.5 in.) (2)
- Gasket, base mounting plate (2)
- Gasket, frequency converter exhaust vent (1)
- Screws, M5x12 (8)
- Nuts, M5 (6)
- Gasket, enclosure exhaust vent (1)
- Torx screws, M5x12 (14)

Lower duct assembly



1	Gasket between the top plate and the module (1)
2	Top plate between module and lower duct (1)
3	Gasket, top side plate (2)
4	Gasket, upper strip on front side of duct enclosure (1)
5	Gasket between front plate and access plate (2)
6	Access plate (2)
7	Front plate (1)
8	Gasket, lower strip on front side of duct enclosure (1)
9	Gasket between top plate and lower duct enclosure (1)
10	Top side plate (2)
11	Duct enclosure (1)
12	Gasket, side rail on front side of duct (2)
13	Gasket between grill and lower duct enclosure (1)
14	Bracket (3)
15	Grill (1)
16	Screw/washer assembly for bracket (3)
17	Gasket between grill and gland plate (1)
18	Base cover plate (2)
19	Gasket between the base cover plate and the base plate (2)
-	Nuts, M5 (47) and M6 (3)

Illustration 1.2 Lower Duct Assembly for 1 Drive Module

Safety

**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 20 minutes after power has been removed before performing service or repair work, could result in death or serious injury.

- Stop the motor.
- Disconnect the AC mains, permanent magnet type motors, and remote DC-link supplies, including battery back-ups, 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.
- Measure the voltage level to verify full discharge.

Installation

**NOTICE**

If both a bus bar kit and a back-channel cooling kit are being installed in the cabinet, install the back-channel cooling kit first.

**NOTICE**

**APPROVALS AND CERTIFICATIONS**

This VLT® Parallel Drive Modules back-channel cooling kit is UL 508C compliant. These installation instructions describe how to install the back-channel cooling kit which, if followed, meet specific agency approvals and certifications. Seek agency approvals or certifications apart from Danfoss if designing and building other configurations.

**NOTICE**

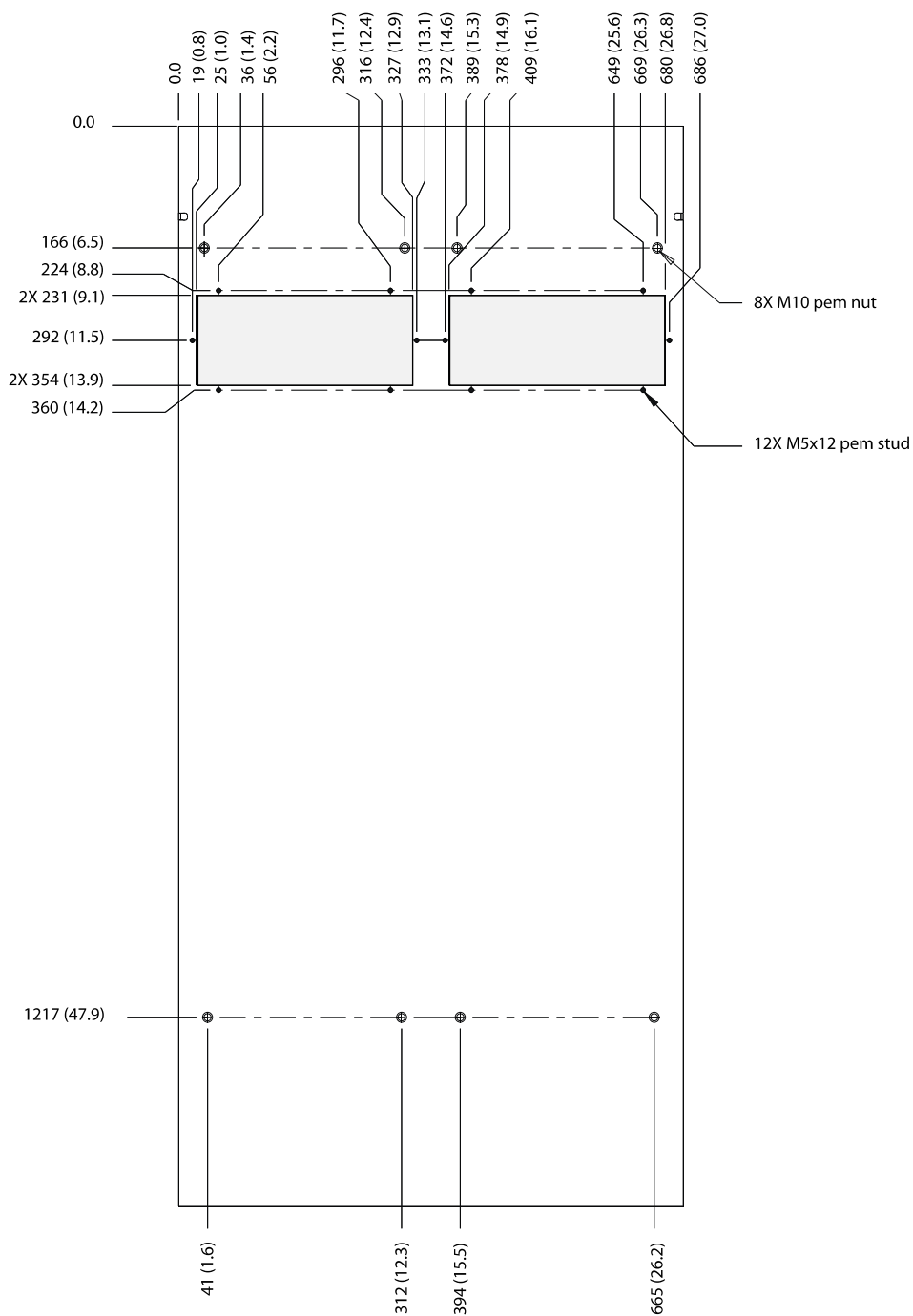
**APPLYING GASKETS**

This kit contains gaskets to ensure a proper seal between metal parts. Before adhering a gasket to a part, check that the part matches the gasket and that no holes are covered. Remove paper backing and place the sticky side on the part.

### Creating Exhaust Vent Openings in the Mounting Backplate

Refer to *Illustration 1.3* for these steps.

1. Cut out the exhaust openings in the mounting backplate. The openings must match the drive module vent openings.
2. Drill the 12 screw holes around the exhaust (top) vent openings and insert the 12 M5 X 12 pem studs.
3. Drill the 8 mounting holes and insert the 8 M10 pem nuts.



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Illustration 1.3 Exhaust Vent Dimensions for Mounting Plate

## Assembling the Lower Duct Enclosure

1. Position the duct enclosure (11) as shown in *Illustration 1.4*.
2. Install the top plate assembly.
  - 2a Place the U-shaped gasket (9) along the top edge of the duct enclosure.
  - 2b Apply the gasket (1) to the top side of the top plate (2). Leave the paper backing on the adhesive until the duct is ready to install on the drive module.
  - 2c Install the top plate, with the studs facing down, onto the top of the duct enclosure. Secure with 4 M5 nuts and torque to 5.1 N · m (45 in-lb).
  - 2d Install the top side plate gaskets (3) to the underside of the top plate (2).
  - 2e Install both top side plates (10) over the top side plate gaskets. Secure each top side plate with 5 M5 nuts and torque to 5.1 N · m (45 in-lb).
  - 2f Apply the upper strip gasket (4) to the top plate flange along the front of the duct enclosure.
3. Install the grill assembly to the base of the duct enclosure.
  - 3a Apply the gasket (13) to the base of the duct enclosure.
  - 3b Apply the gasket (17) to the base of the grill plate.
  - 3c Install the grill (15) with the flange facing upward onto the duct enclosure base.
  - 3d Apply the lower strip gasket (8) to the grill plate flange.
  - 3e Fasten the grill to the duct enclosure using the 3 brackets (14). Each bracket is placed over a stud on the grill and lines up with 2 studs in the duct enclosure.
  - 3f Secure each bracket to the duct enclosure with 2 M5 nuts. Torque to 5.1 N · m (45 in-lb).
  - 3g Secure the grill to each bracket using 1 M6 nut. Torque to 6.0 N · m (53 in-lb).
4. Assemble the backplate.
  - 4a Apply 1 gasket (5) onto the studs along the edge of each opening on the front plate.
  - 4b Install the access plates (6) over the gaskets and openings in the front plate.
  - 4c Secure each access plate with 8 M5 nuts and torque to 5.1 N · m (45 in-lb).
5. Apply gaskets (12) to each side rail on the duct enclosure.
6. Install the front plate (7) and secure with 11 M5 nuts. Torque to 5.1 N · m (45 in-lb).

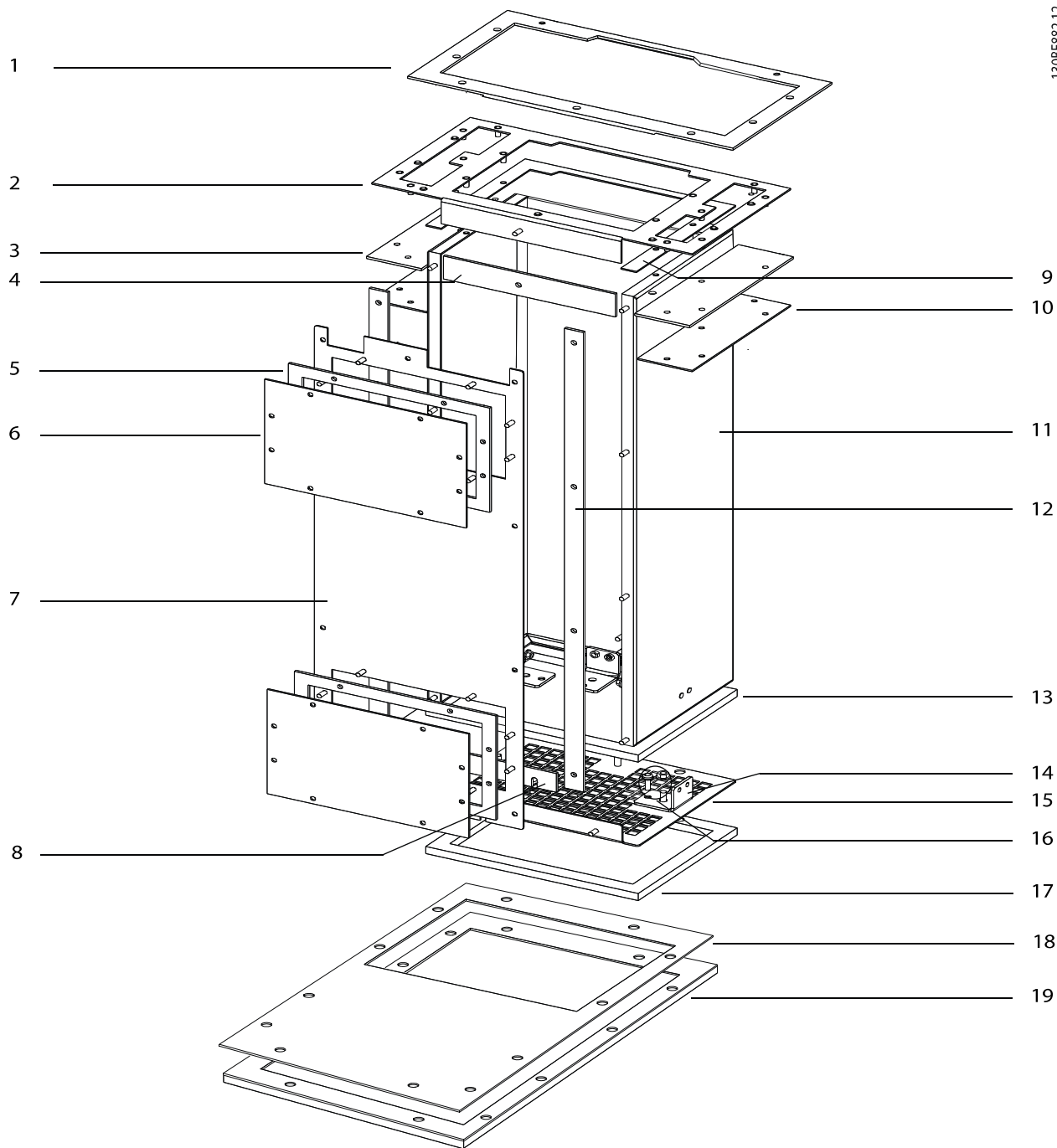
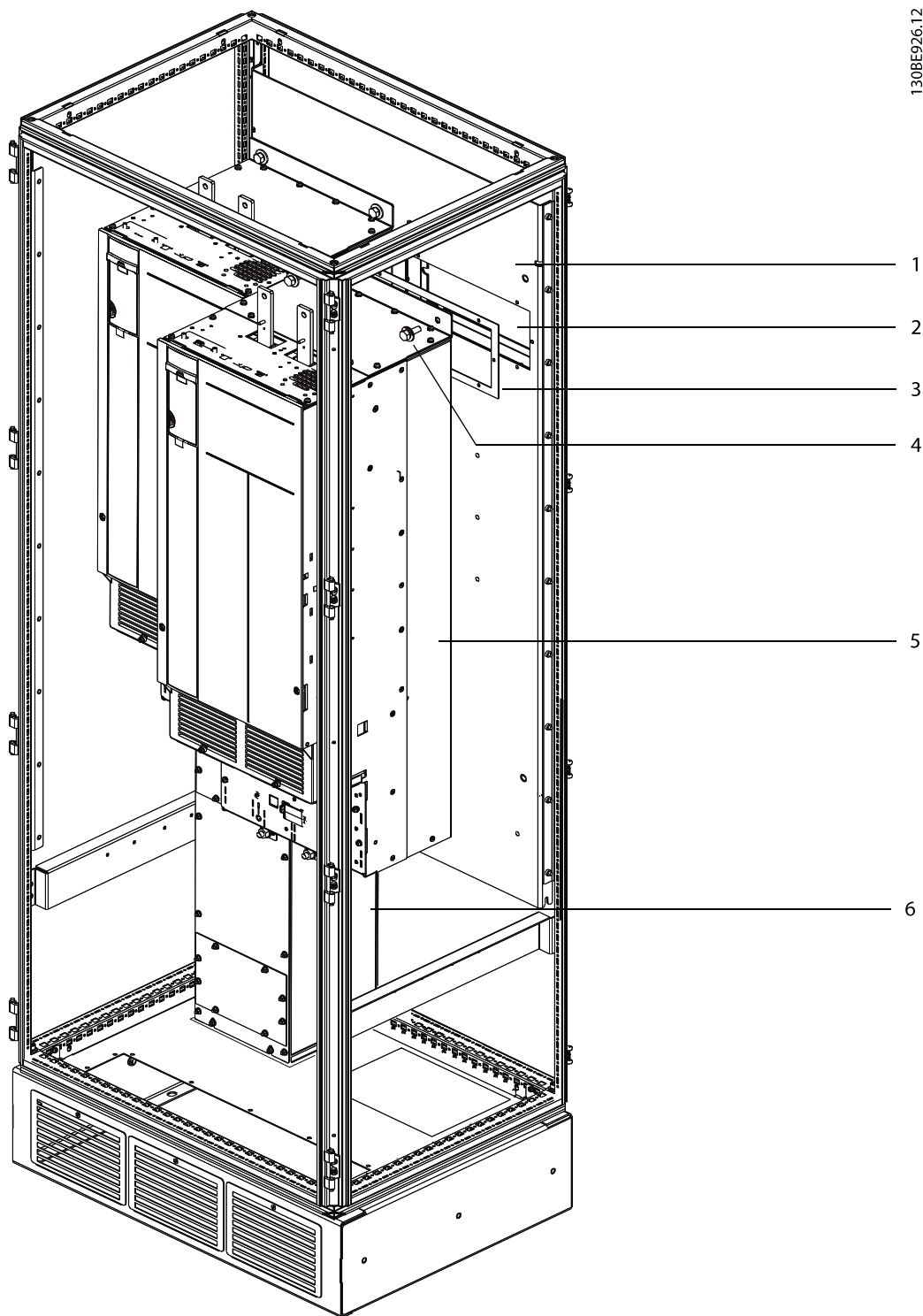


Illustration 1.4 Assembling the Lower Duct Enclosure

1	Gasket between the top plate and the module	11	Duct enclosure
2	Top plate between module and lower duct	12	Gasket, side rail on back side of duct
3	Gasket, top side plate	13	Gasket between grill and duct enclosure
4	Gasket, upper strip on back side of duct	14	Bracket
5	Gasket between front plate and access plate	15	Grill
6	Access plate	16	Screw/washer assembly for bracket
7	Front plate	17	Gasket between grill and gland plate
8	Gasket, lower strip on back side of duct	18	Base cover plate
9	U-shaped gasket	19	Gasket between base cover plate and base plate
10	Top side plate	-	-

## Mounting the Drive Modules

1. Install the mounting backplate to the cabinet rails, making sure that the pem studs/nuts face the back of the enclosure.
2. Install both exhaust vent gaskets (3) to the back side of the drive module. Refer to *Illustration 1.5*.
3. Align the slot gasket (2) with the lower mounting holes in the drive module and install the gasket onto the drive module. See *Illustration 1.6*.
4. Assemble the 2 base mounting plates by attaching the gasket (4) onto the base mounting plate (5). Refer to *Illustration 1.6*.
5. Insert an M10 screw through the base mounting plate/gasket assembly and loosely fasten into the mounting backplate. Perform this step again for the other base mounting plate/gasket assembly. Make sure that the screws are secure since the base of the drive module rests on these screws.
6. Slightly lean the top of the drive module forward and set the cutouts in the base of the module onto the lower 2 M10 screws in the mounting backplate.
7. Slowly push the top of the drive module back against the mounting backplate until the top 2 holes on the module line up with the 2 mounting holes in the mounting backplate. Secure the top of the drive module using 2 M10 screws (4) and torque to 19 N · m (170 in-lb). See *Illustration 1.5*.
8. Torque the M10 screws securing the base of the module to 19 N · m (170 in-lb).
9. Install the top plate assembly. Refer to *Illustration 1.10*.
  - 9a Place the gasket (8) over the grill opening on the top of the unit.
  - 9b Place the top plate (2) over the gasket. Secure it with the 11 M5x12 screws included in the kit. Torque to 5.1 N · m (45 in-lb).
10. Install the next drive module to the mounting backplate.



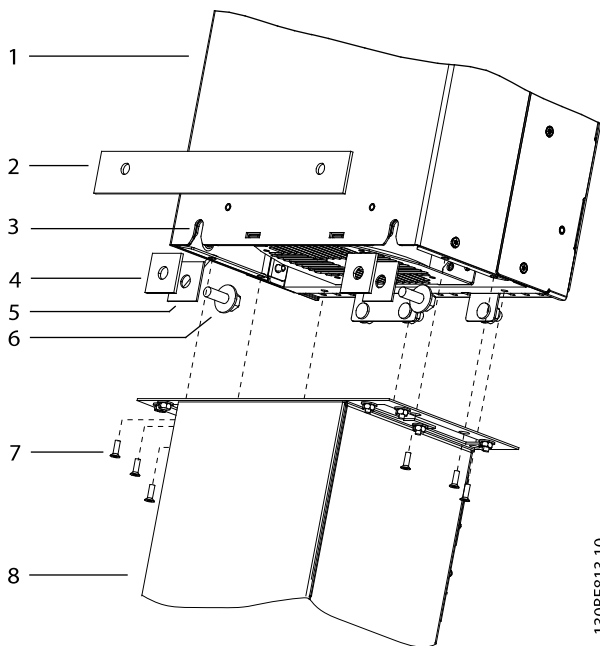
1	Mounting backplate	4	M10 screw
2	Exhaust vent opening	5	Drive module
3	Gasket between back exhaust and mounting backplate	6	Lower duct assembly

Illustration 1.5 Installing the Drive Modules onto the Mounting Backplate

### Installing the Lower Duct Assembly

Refer to *Illustration 1.6* for the following steps.

1. Remove the paper backing from the top plate gasket.
2. Place the lower duct assembly up against the drive module base, making sure that the mounting holes align.
3. Secure the lower duct assembly to the base of the drive module using 7 M5x16 screws. Torque to 5.1 N · m (45 in-lb).
4. Install the lower duct assembly on the next drive module.



1	Drive module
2	Slot gasket
3	Cutout in drive module base that rests on the M10 screw
4	Gasket, base mounting plate, 38 mm (1.5 in)
5	Base mounting plate, 38 mm (1.5 in)
6	M10 screw
7	M5x16 screw
8	Lower duct assembly

Illustration 1.6 Installing the Lower Duct Assembly

### Installing the Base Cover Plate

1. Cut out 2 vent openings in the base plate. Refer to the shaded area dimensions in *Illustration 1.7*.
2. Create openings for the cables. Refer to the area marked with diagonal lines. Seal the cable entry once the cables are connected.
3. Drill 24 screw holes around the vent openings and install 24 M5 pem nuts. Refer to *Illustration 1.8*.
4. Secure the base plate to the enclosure, pem nuts facing the floor.
5. Install a gasket (19) around each of the vent openings on the base cover plate. When installed, this gasket faces the base plate. Refer to *Illustration 1.4*.
6. For each lower duct assembly, slip the base cover plate (18) between the duct assembly and the base plate. Align the opening on the base cover plate with the gasket (17) on the lower duct assembly.
7. Secure each lower duct assembly to the base cover plate.
  - 7a Install 1 screw/washer assembly (16) per bracket (14). Loosely fasten the screw/washer assembly.
  - 7b Loosen, but do not remove, the M6 nut on the bracket.
  - 7c Torque the screw/washer assembly to 5.1 N · m (45 in-lb).
  - 7d Torque the M6 nut to 3.0 N · m (27 in-lb).
8. Secure each base cover plate to the base plate using 12 M5 screws. Torque to 5.1 N · m (45 in-lb).
9. Secure the back panel cover to the frame.

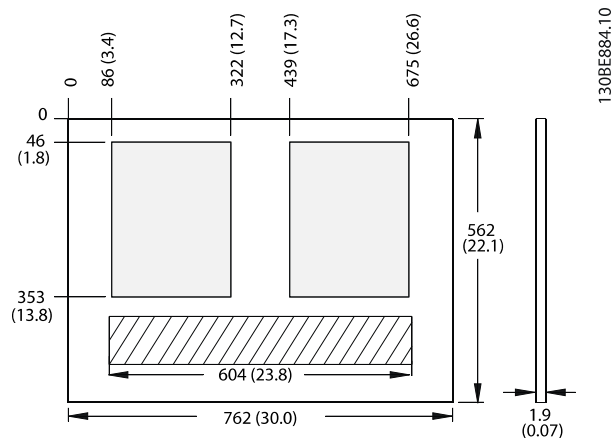
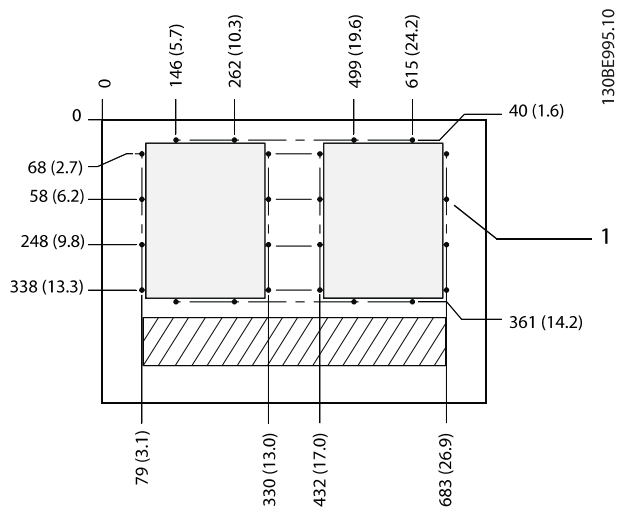


Illustration 1.7 Vent Opening Dimensions for the Base Plate





1	M5 pem nut (24 total on base plate)
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Illustration 1.8 M5 Pem Nut Dimensions on the Base Plate

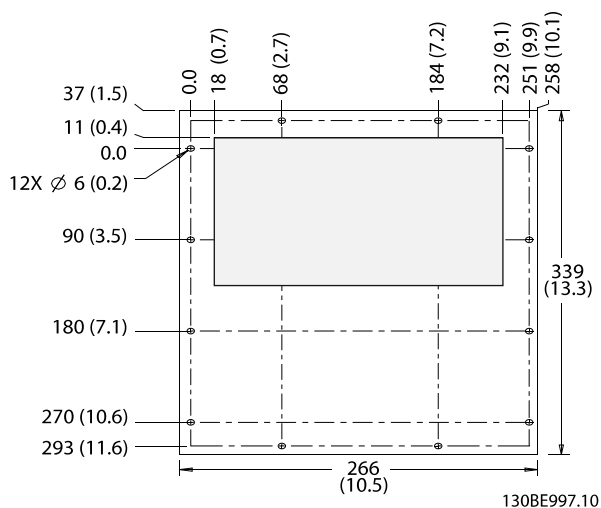


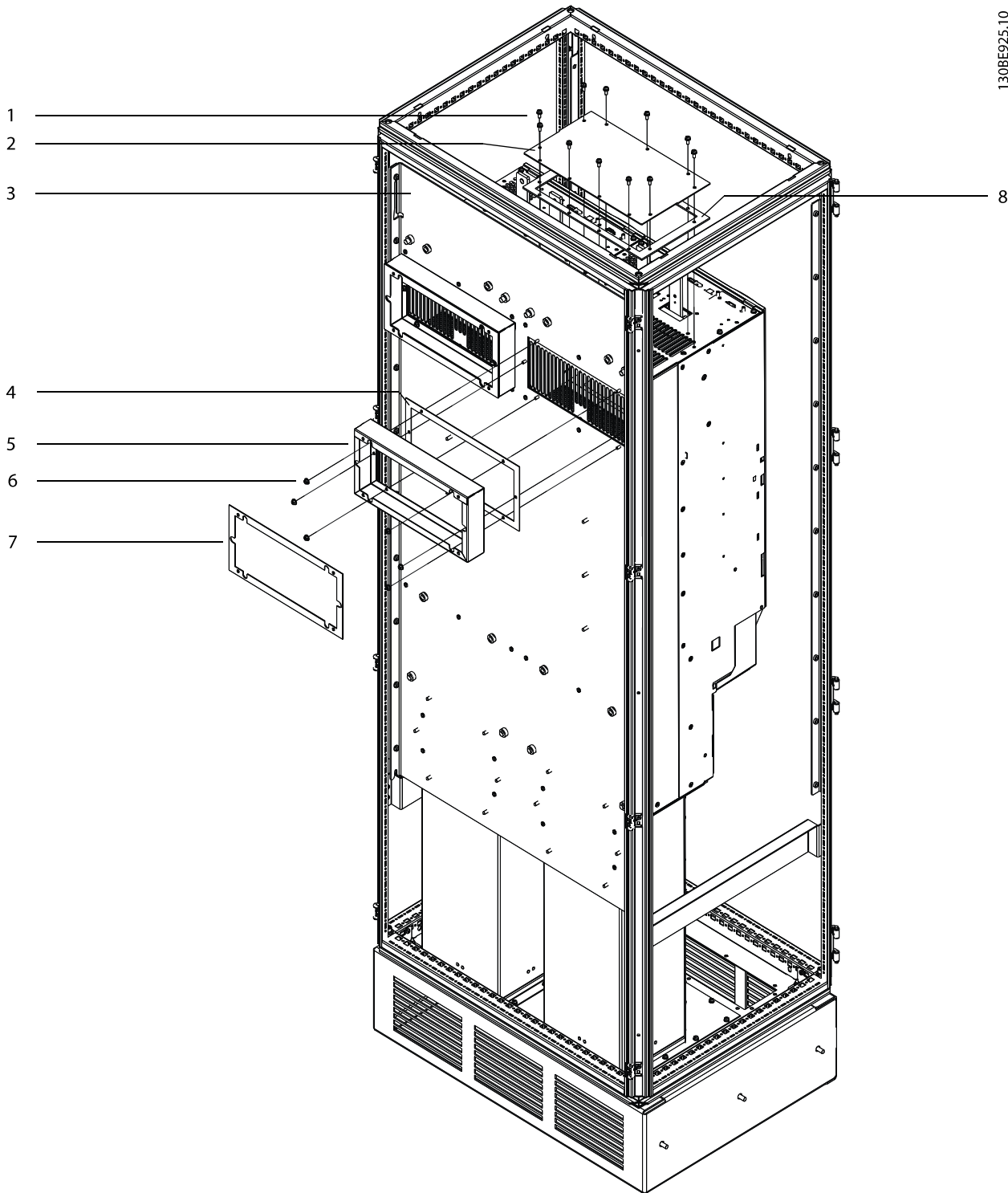
Illustration 1.9 Vent Opening Dimensions for the Cover Plate

## Installing the Back Panel Cover

Refer to *Illustration 1.10* for the following steps:

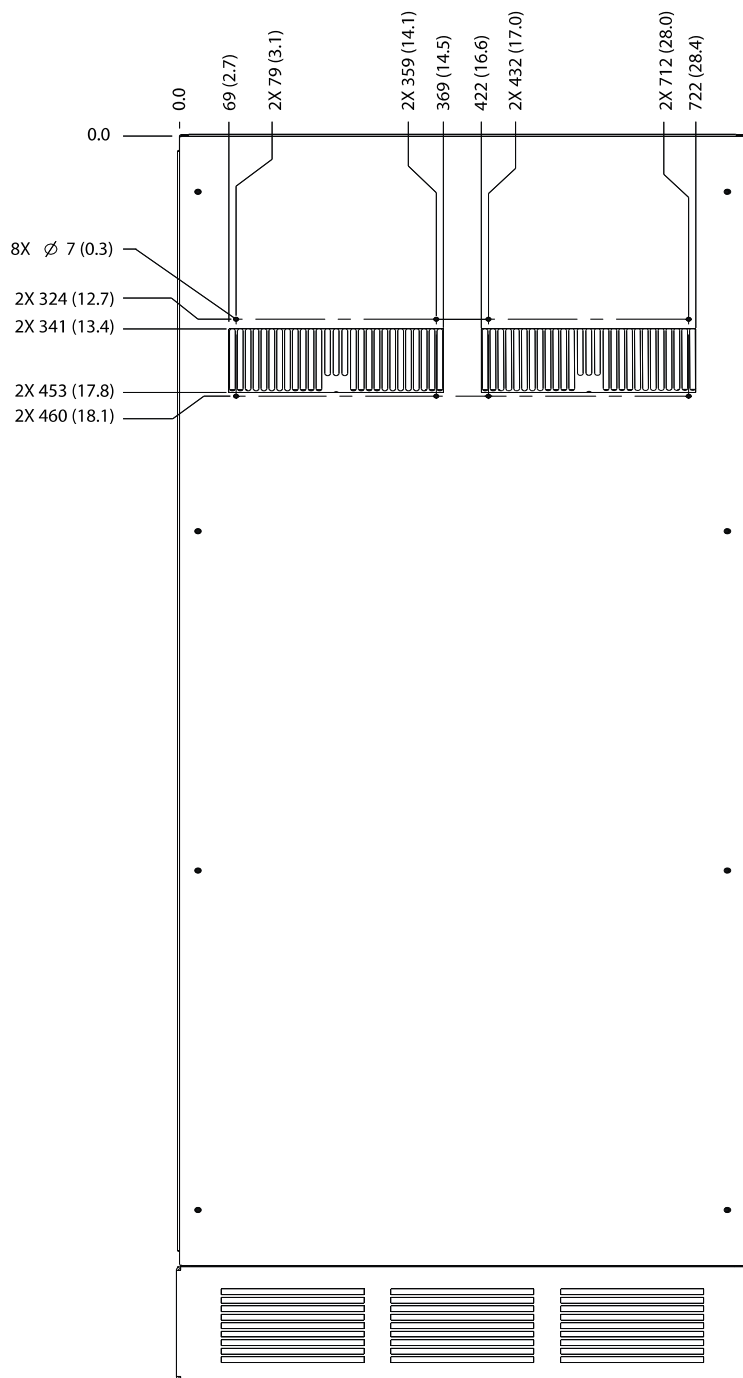
1. Install a gasket (4) around each exhaust vent opening on the back side of the mounting backplate (3).
2. Install a duct spacer (5) onto each exhaust gasket and secure with 6 M5 nuts. Torque to 5.1 N · m (45 in-lb).
3. Place a gasket (7) onto each exhaust duct spacer.
4. Prepare the back panel cover. Refer to *Illustration 1.11*.
  - 4a Cut out the 2 exhaust vent openings in the back panel. The openings must match to the exhaust duct spacer openings.
  - 4b Drill the 8 screw holes around the vent openings.
5. Secure the back panel cover to the frame.
6. Secure the back panel cover to the duct spacers with 8 M5x16 screws. Torque to 5.1 N · m (45 in-lb).

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1	M5x12 screw	5	Duct spacer, exhaust
2	Top plate	6	M5 nut
3	Mounting backplate	7	Gasket between exhaust duct spacer and back panel cover
4	Gasket between mounting backplate and exhaust duct spacer	8	Gasket between top plate and drive module

Illustration 1.10 Installing the Duct Spacers



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Illustration 1.11 Vent Dimensions for Back Panel Cover

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