Installation Instructions

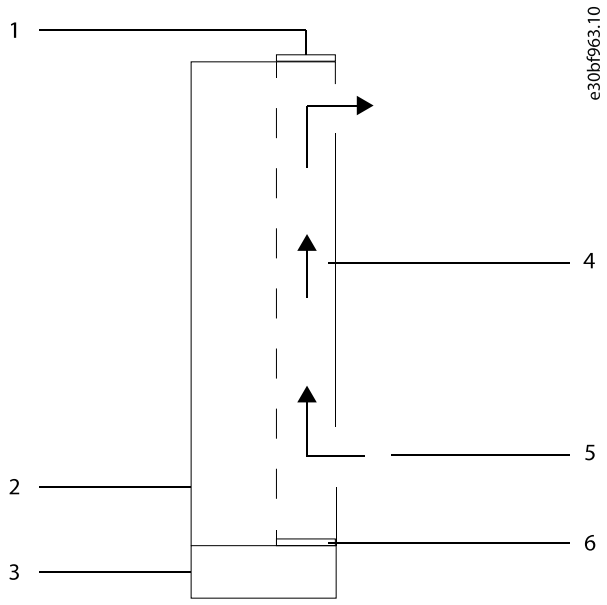
In-back/Out-back Cooling Kit for E3h/E4h Drives VLT® FC Series FC 102, FC 103, FC 202, and FC 302

1.1 Description

The in-back/out-back cooling kit fits the following E3h and E4h drives. It is compatible with drives mounted in Rittal TS8 cabinets with widths of 600 mm (24 in) or 800 mm (32 in).

- VLT® HVAC Drive FC 102
- VLT® Refrigeration Drive FC 103
- VLT® AQUA Drive FC 202
- VLT® AutomationDrive FC 302

When the kit is installed, air flows into the lower back duct and out through the upper back duct of the drive. See *Illustration 1.1*.



1	Top cover
2	Enclosure
3	Pedestal
4	Cooling back channel
5	Airflow direction
6	Bottom cover

Illustration 1.1 Direction of Airflow with Kit Installed

1.1.1 Kit Part Numbers

Use these instructions with the following cooling kits.

Kit number	Kit description
176F6610	In-back/out-back cooling kit for E3h drive
176F6611	In-back/out-back cooling kit for E4h drive

Table 1.1 Part Numbers for Cooling Kits

1.1.2 Items Supplied

The in-back/out-back cooling kit contains the following items.

Item	Quantity
Top cover	1
Top gasket	1
Bottom cover	1
Bottom gasket	1
Back duct	2
6-hole gasket	4
8-hole gasket	4
Clip-on nuts	16
M5x14 screws	8–10
M5x18 screws	16
M6x12 screws	12

Table 1.2 Items Supplied in Cooling 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 40 minutes after power has been removed before performing service or repair work can result in death or serious injury.

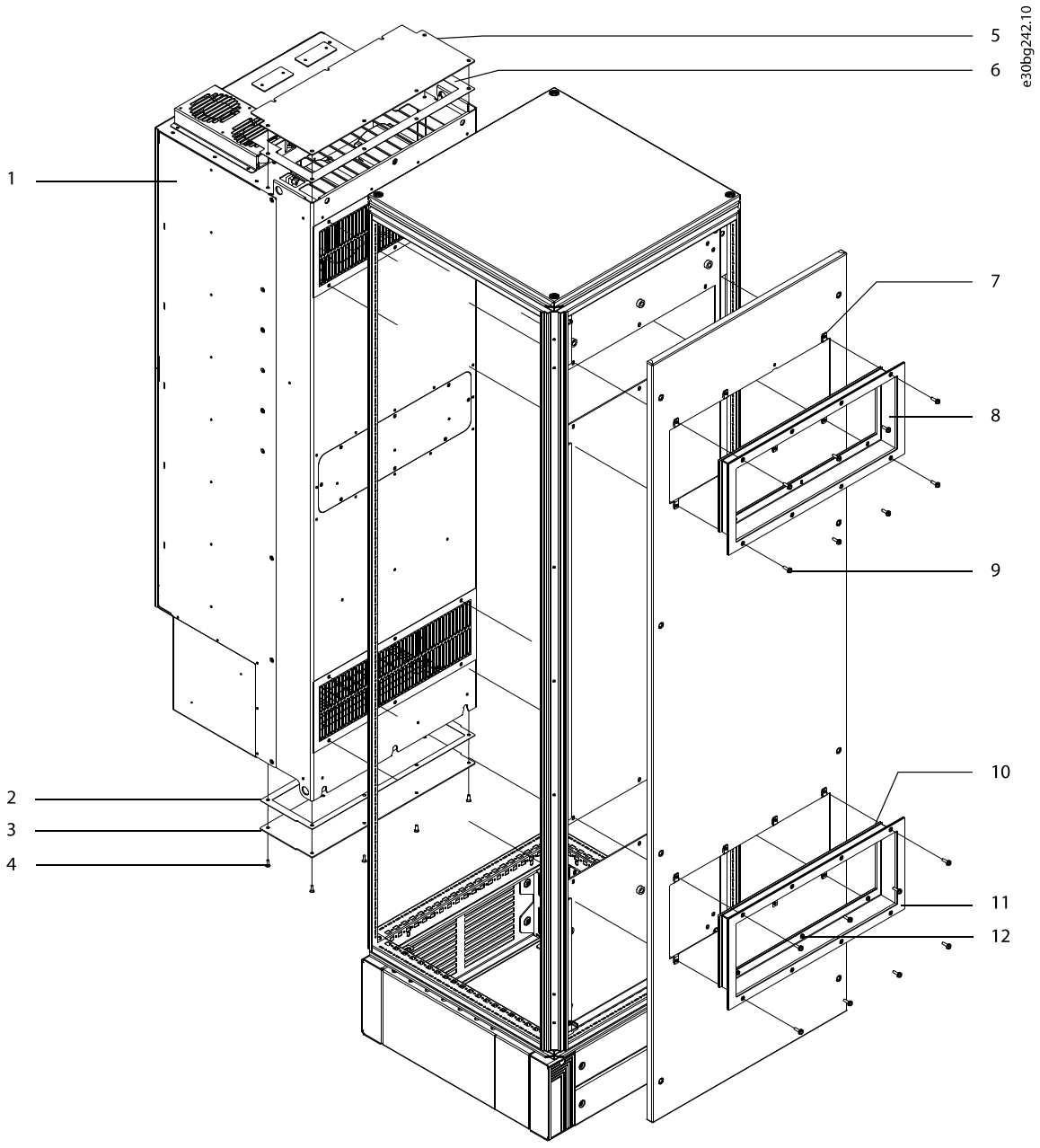
- **Stop the motor.**
- **Disconnect AC mains and remote DC-link power supplies, including battery back-ups, UPS, and DC-link connections to other drives.**
- **Disconnect or lock PM motor.**
- **Wait 40 minutes for capacitors to discharge fully.**
- **Before performing any service or repair work, use an appropriate voltage measuring device to make sure that the capacitors are fully discharged.**

1.3 Installation Instructions

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.



1	Drive	7	Clip-on nut
2	Bottom gasket	8	Back duct
3	Bottom cover	9	M5x18 screw
4	M5x14 screw	10	6-hole gasket
5	Top cover	11	8-hole gasket
6	Top gasket	12	M6x12 screw

Illustration 1.2 Overview of In-back/Out-back Cooling Kit

1.3.1 Creating Vent Openings in the Mounting Plate

To create upper and lower vent openings in the drive mounting plate, use the following steps. Refer to *Illustration 1.3* for 600 mm (24 in) enclosures, and to *Illustration 1.4* for 800 mm (32 in) enclosures.

1. Drill 6 mounting holes in the back of the drive using the dimensions in *Illustration 1.3* or *Illustration 1.4*. Insert 6 M10 pem self-clinching nuts (not supplied) in the mounting holes.
2. Cut out the upper and lower vent openings in the mounting plate. The openings must match the drive vent openings.
3. Drill 6 screw holes around each vent opening. The holes must match the holes in the drive and the inner flange of the back ducts.

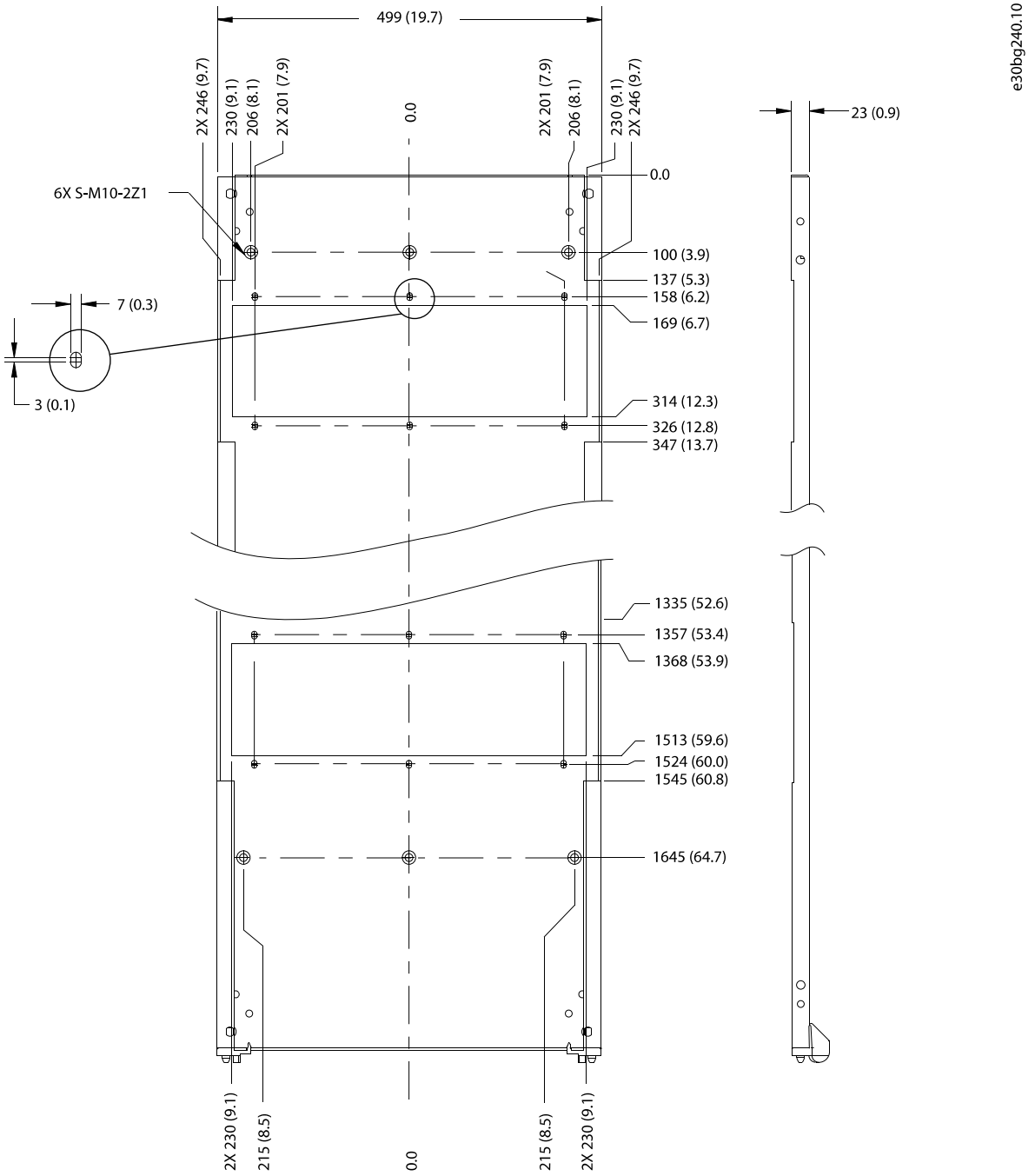


Illustration 1.3 Vent Dimensions for Mounting Plate in 600 mm (24 in) Enclosure

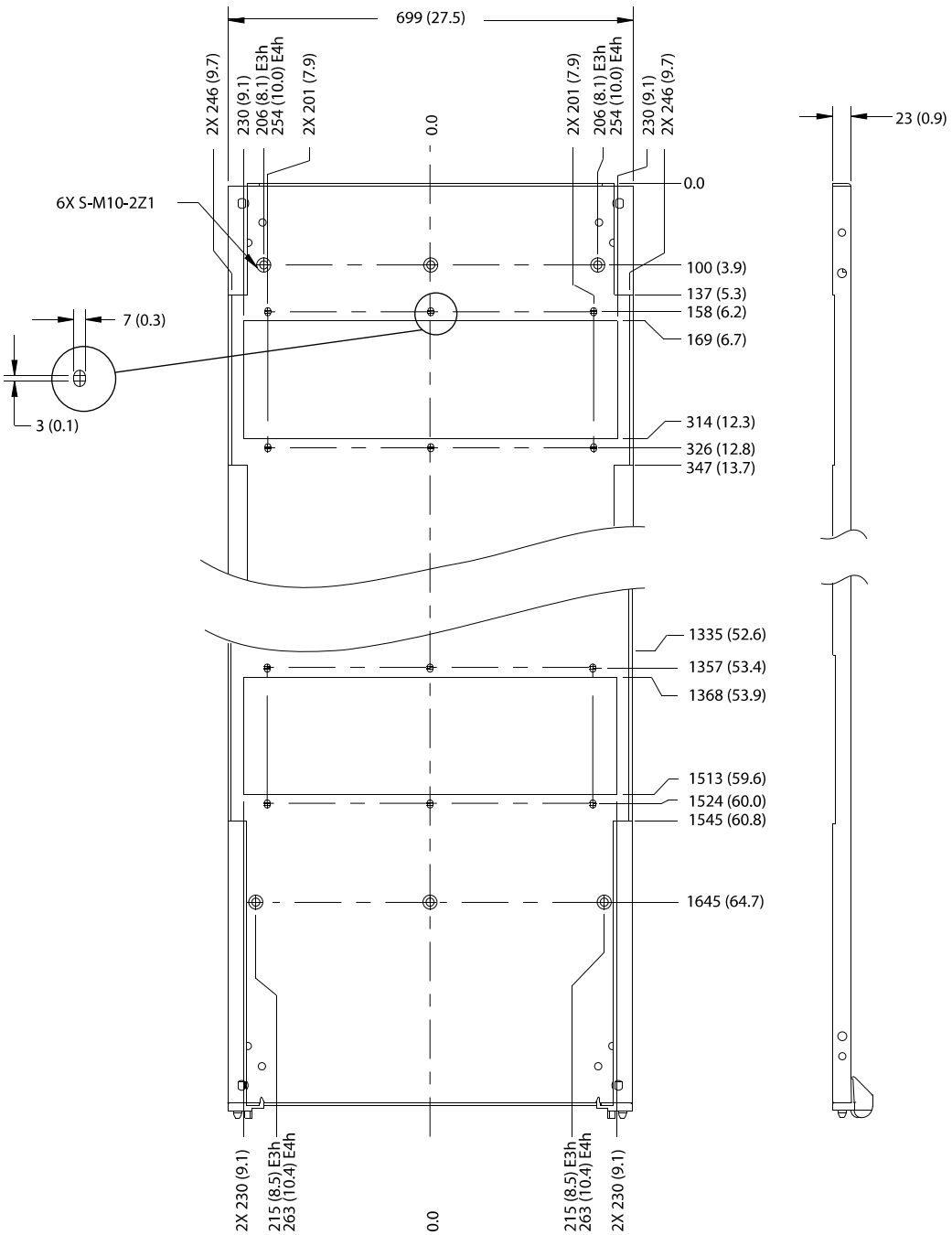


Illustration 1.4 Vent Dimensions for Mounting Plate in 800 mm (32 in) Enclosure

1.3.2 Creating Vent Openings in the Backplate

To create upper and lower vent openings in the enclosure backplate to match the opening in the mounting plate and drive, use the following steps. Refer to *Illustration 1.5* for 600 mm (24 in) enclosures, and to *Illustration 1.6* for 800 mm (32 in) enclosures.

1. Cut out the vent openings in the enclosure backplate using the dimensions in *Illustration 1.5* or *Illustration 1.6*. The openings must match the drive and mounting plate vent openings.
2. Drill 8 screw holes (6 mm) around each vent opening. The holes must match the holes in the drive and in the outer flange of the back duct.

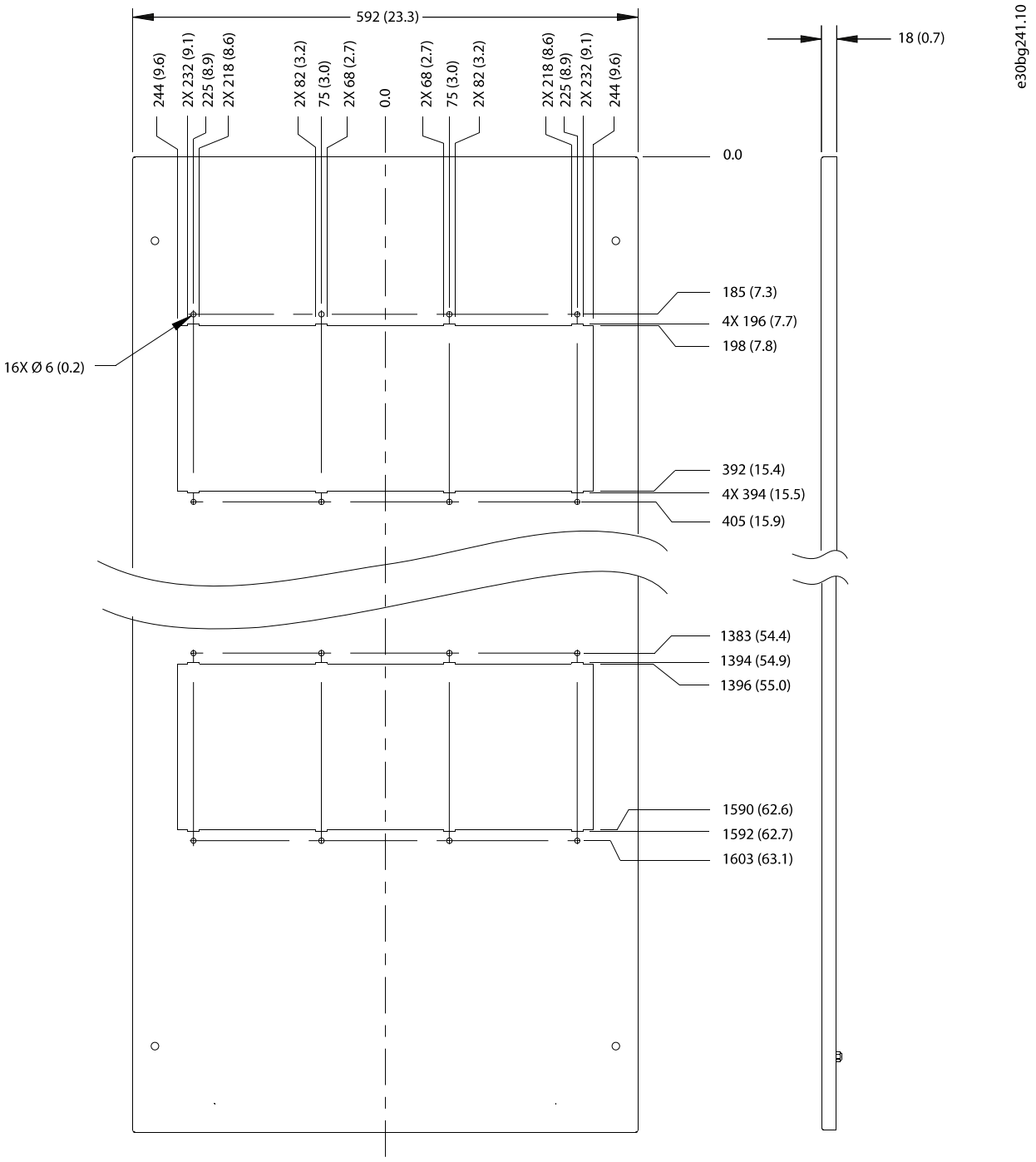


Illustration 1.5 Vent Dimensions for Backplate in 600 mm (24 in) Enclosure

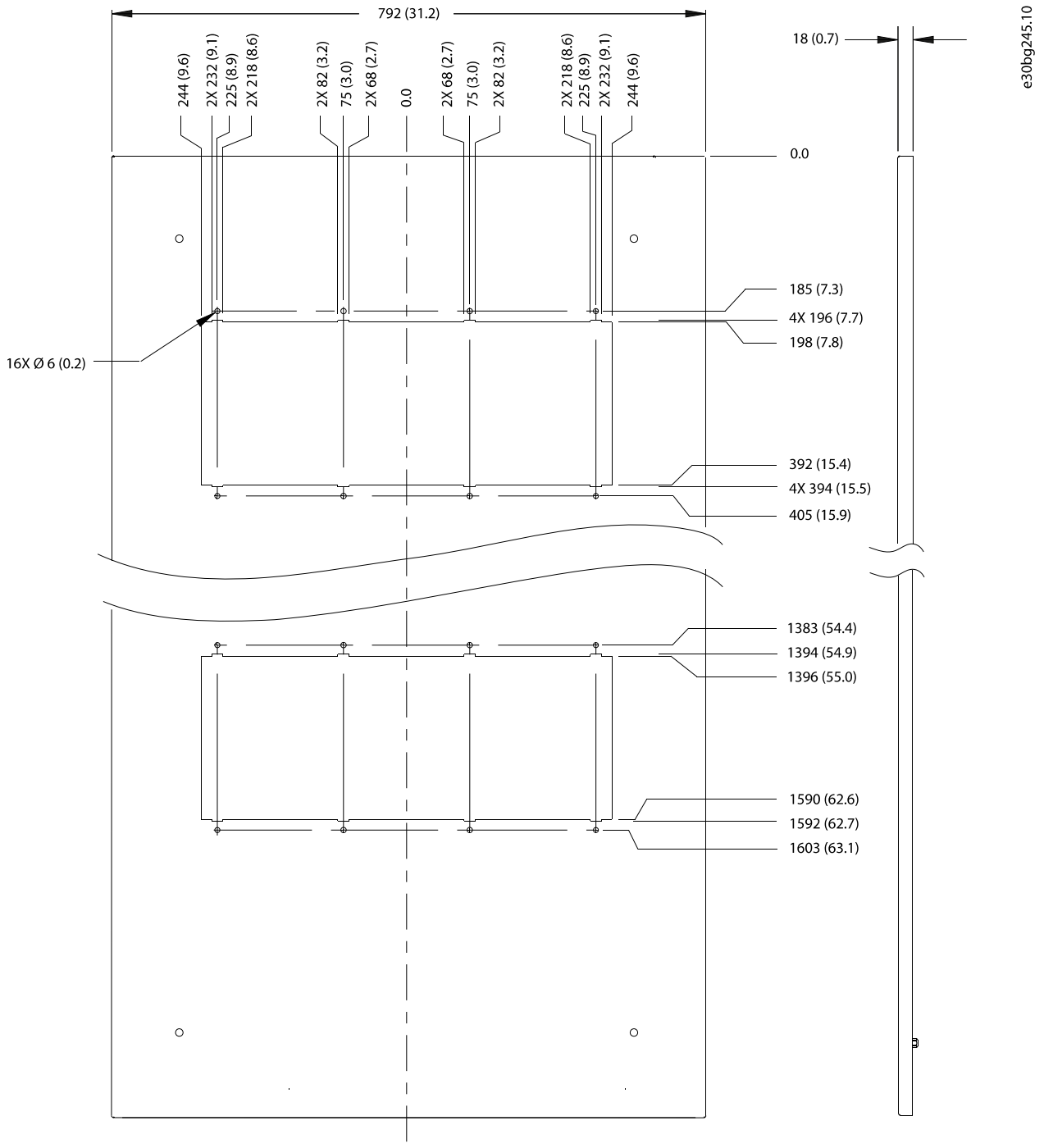
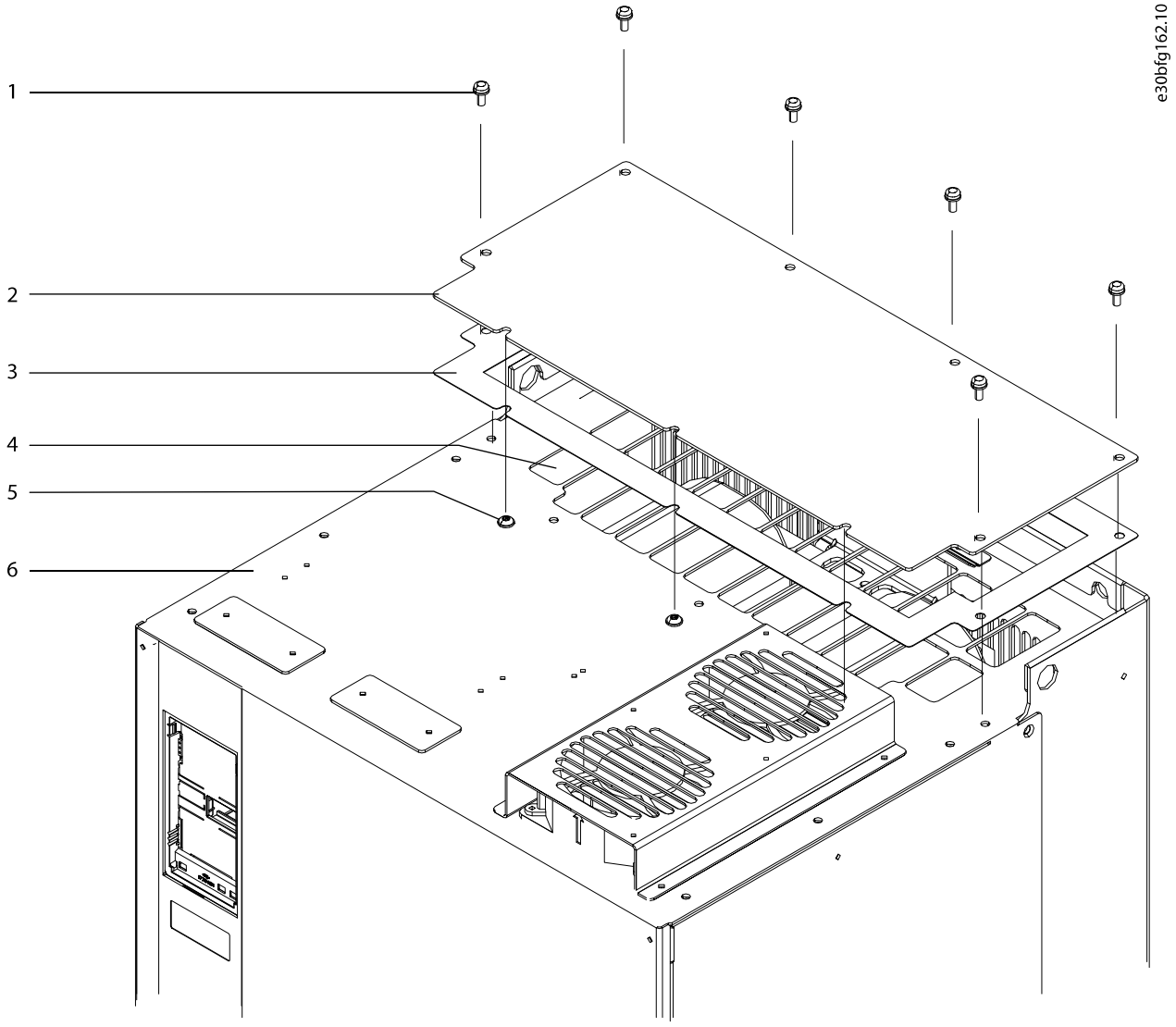


Illustration 1.6 Vent Dimensions for Backplate in 800 mm (32 in) Enclosure

1.3.3 Installing the Top Cover

To install the top cover over the top vent in the drive, use the following procedure. See *Illustration 1.7*.

1. Remove the paper backing from the top gasket, exposing the adhesive. Adhere the gasket to the top cover underside.
2. Remove 6-7 M5x14 screws (T25) surrounding the sides and back of the vent in the top of the drive. E3h drives have 6 screws; E4h drives have 7 screws. Retain the screws.
3. Loosen 3 M5x12 screws (T25) at the front of the vent in the top of the drive.
4. Slide the edge of the top cover under the 3 loosened screws, positioning the cover over the vent in the top of the drive.
5. Secure the top cover to the drive with 8 M5x14 screws (T25) previously removed. Torque fasteners to 2.3 Nm (20 in-lb).



1	M5x14 screw	4	Top vent
2	Top cover	5	M5x12 screws
3	Top gasket	6	Top of drive

Illustration 1.7 Installation of the Top Cover

1.3.4 Installing the Bottom Cover

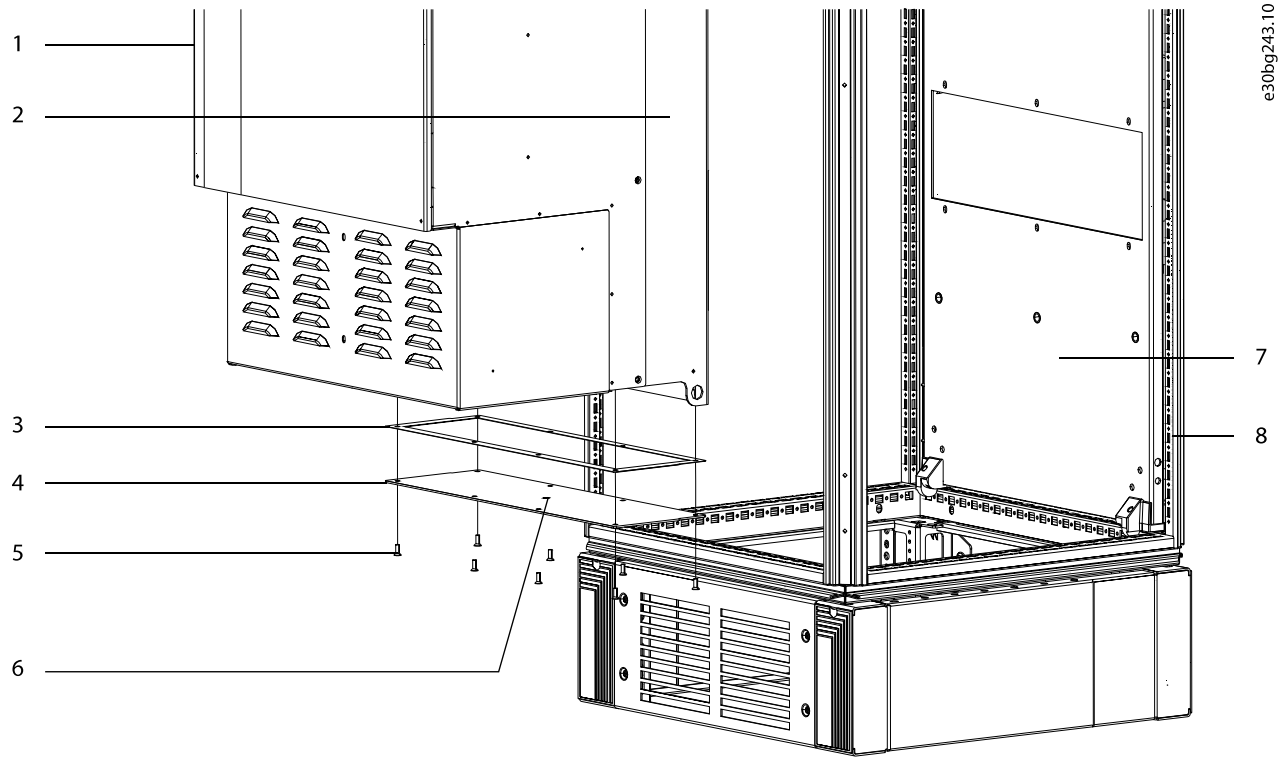
NOTICE

DRAIN OPENING

The bottom cover features a drain opening in the middle of the plate. To drain moisture in wet or humid environments, attach nylon tubing with interior diameter of 8 mm (0.3 in). To seal the drain in dry environments, fasten a screw in the drain hole.

To install the bottom cover at the lower end of the cooling back channel, use the following procedure. See *Illustration 1.8*.

1. Remove paper backing from the bottom gasket. Adhere the bottom gasket to the upper side of the bottom cover.
2. Position the bottom cover and gasket over the opening at the lower end of the cooling channel.
3. Secure the bottom cover using the M5x14 screws (T25) provided with the kit. Installation in E3h drives requires 8 screws, and installation in E4h drives requires 10 screws. Torque screws to 2.3 Nm (20 in-lb).



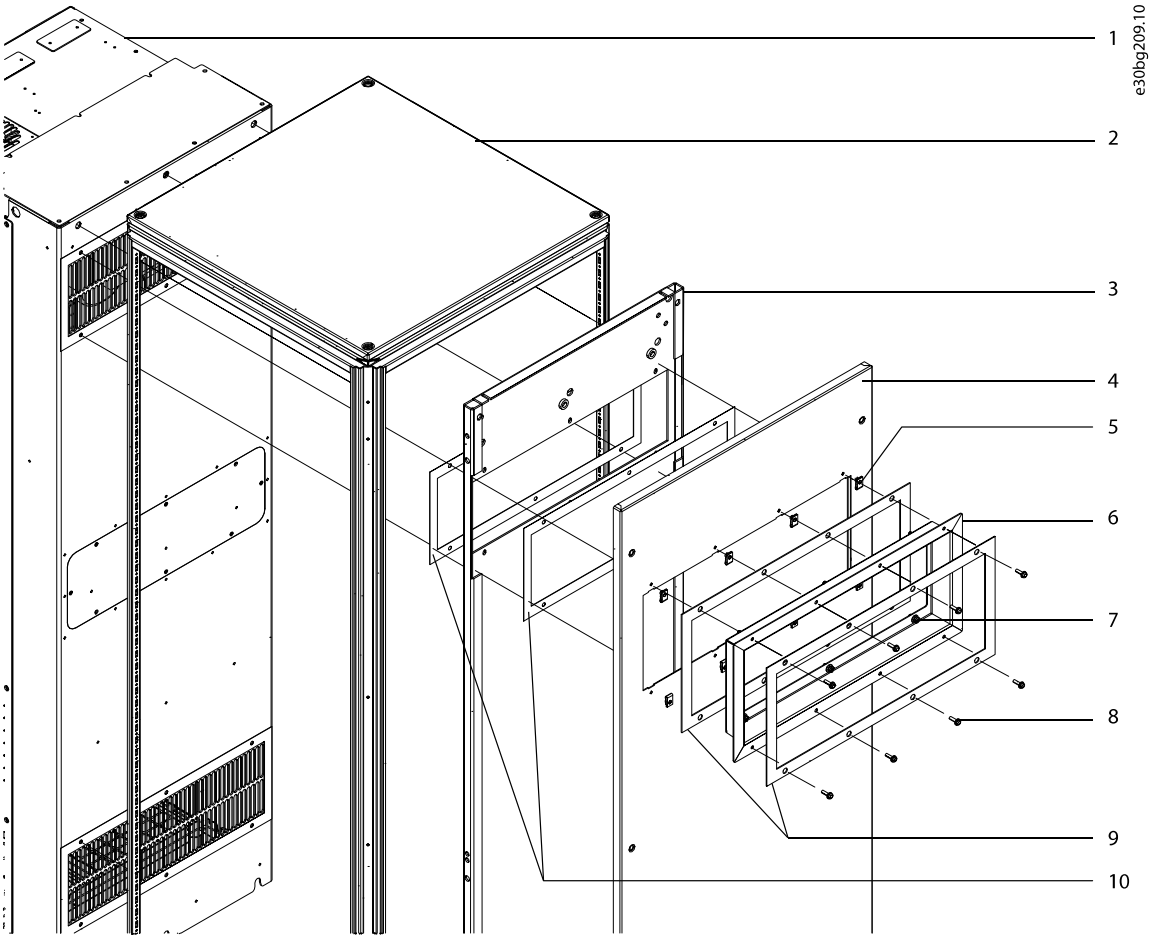
1	Drive	5	M5x14 screws
2	Cooling back channel	6	Drain hole
3	Bottom gasket	7	Mounting plate
4	Bottom cover	8	Enclosure rails

Illustration 1.8 Installation of Bottom Cover

1.3.5 Mounting the Drive in the Enclosure

To install the mounting plate and drive in the enclosure, use the following steps. Refer to *Illustration 1.9*.

1. Remove the paper backing from both 6-hole gaskets, exposing the adhesive. Adhere 1 gasket around the vent opening on each side of the mounting plate.
2. Attach the mounting plate to the enclosure rails, making sure that the pem nuts face the back of the enclosure.
3. Loosely fasten 3 M10 screws (not supplied in kit) into the pem nuts at the lower end of the mounting plate. Make sure that the screws are secure since the base of the drive rests on these screws.
4. Slightly lean the top of the drive forward and set the cutouts in the base onto the 3 screws in the mounting plate.
5. Slowly push the top of the drive back against the mounting plate until the top 3 pem nuts line up with the holes in the drive. Secure the top of the drive using 3 M10 screws.
6. Torque all 6 M10 screws to 19 Nm (170 in-lb).



1	Drive	6	Back duct
2	Rittal enclosure	7	M6x12 screw
3	Mounting plate	8	M5x18 screw
4	Backplate	9	8-hole gaskets
5	M5 clip-on nut	10	6-hole gaskets

Illustration 1.9 Installation of the Drive, Mounting Plate, Backplate, and Back Duct

1.3.6 Installing the Backplate and Back Ducts

To attach the enclosure backplate and the upper and lower back ducts, use the following steps. Refer to *Illustration 1.9*.

1. Position the backplate on the rear rails of the enclosure behind the mounting plate.
2. Secure the backplate to the rails using the existing fasteners.
3. Slide 8 M5 clip-on nuts over the screw holes surrounding the upper duct opening in the backplate. Repeat for the lower duct opening.
4. Remove the paper backing from 1 pair of 8-hole gaskets, exposing the adhesive. Adhere 1 gasket to the back and 1 to the front of the upper back duct outer flange. Repeat for the lower duct.
5. Position each back duct in the hole created for it in the mounting plate and backplate.
6. Fasten the inner flanges of the back ducts with 12 M6x12 screws (T30), 6 screws in each duct. Torque to 3.9 Nm (35 in-lb).
7. Fasten the outer flanges of the back ducts with 16 M5x18 screws (T25), 8 screws in each duct. Torque fasteners to 2.3 Nm (20 in-lb).

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