INSTRUCTIONS
INSTALLATION OF BACK-CHANNEL COOLING KIT FOR FRAMES D3, D4 & E2

This instruction sheet is for the installation of back-channel cooling kits available for the VLT® series drives. These kits are designed and tested to be used with Rittal TS8 enclosures 1800, 2000 and 2200 mm in height. Other enclosure heights are not supported. In addition to the enclosure a 200 mm vented base/plinth is required.

The minimum enclosure depth is 500 mm (600mm for E2 frame) and the minimum enclosure width is 600 mm (800mm for E2 frame). The maximum depth and width are as required by the installation. When using multiple drives in one enclosure mount each drive on its own back panel and support along the mid-section of the panel. The ductwork kits are very similar in construction for all frames. The D3 and D4 kits do not support "in frame" mounting of the drives. The E2 kit is mounted "in frame" for additional support of the drive. These kits can be used with IP00/ Chassis drives as listed in Table 1 and are suitable for use only with Rittal TS8 IP20 and UL & NEMA 1 and IP54 and UL & NEMA 12 enclosures.

Using these kits as described removes 85% of the losses via the back channel using the drive's main heat sink fan. The remaining 15% must be removed via the door of the Rittal enclosure. (Refer to Note 2 on Page 2 for air flow requirements.)

Table 1. Applicable Frames and Drives

All D3, D4 and E2 Frames *** IP00 ONLY ***
VLT4000 (North America)
VLT5000 VLT5000FLUX
VLT6000
VLT8000
VLT HVAC
VLT Aqua
VLT Automation

Table 2. Kit Part Numbers

Rittal TS8 Enclosure	Frame D3 Kit Part No.	Frame D4 Kit Part No.	Frame E2 Kit Part No.
1800 mm	**176F1824**	**176F1823**	**Does not fit in 1800 mm**
2000 mm	**176F1826**	**176F1825**	**176F1850**
2200 mm	**NA**	**NA**	**176F0299**

Kit Contents

- Ductwork components
- Mounting hardware
- Gasket material
- 175R5631 View of Ductwork components, D3 and D4 frames
- 175R1037 View of Ductwork components, E2 frame
- 175R5639 Template for drive location in “D” frames

Required Tools

- Metric Socket Set, 7-19mm
- Socket Extensions
- Torx Driver Set T10-T40
- Torque Wrench 6-50 in-lbs (.7-6 N-M)

Torque Requirements

1. 10 mm, M5 Nuts torque to 20 in-lbs (2.3 N-M)
2. T25 Torx screws torque to 20 in-lbs (2.3 N-M)

Notes:

1. The photos in this instruction are based on a D4 Frame installation. D3 and E2 frame drives use parts similar to those in the photos however they are sized appropriately for those drives.
2. A doorfan(s) is required on the enclosure to remove the heat losses not contained in the backchannel of the drive and any additional losses generated from other components installed inside the enclosure. The total required air flow must be calculated so that the appropriate fans can be selected. Some enclosure manufacturers offer software for performing the calculations (i.e. Rittal Therm software).

   If the VLT is the only heat generating component in the enclosure, the minimum airflow required at an ambient temperature of 45°C for the D3 and D4 frame drives is 391 m^3/h (230 cfm). The minimum airflow required at an ambient temperature of 45°C for the E2 frame drive is 782 m^3/h (460 cfm).
3. If external duct work is added to the exhaust path of the drive, additional back pressure will be created that will reduce the cooling of the drive. The drive must be derated to accommodate the reduced cooling. First, the pressure drop must be calculated, then refer to the derating tables located in the VLT High Power Operating Instructions.

Install gasket material on the back openings of the drive (Figure 1) prior to installation on the back panel.

Install the drive onto the back panel.

D3 and D4 frames: Use the template provided with the kit (175R5639) to determine the drive location on the back panel of the enclosure. The template is referenced to the top-left corner of the back panel. Therefore the template may be used with any size back panel and both the 1800 mm and 2000 mm high enclosures.

E2 frame: Use the measurements on Drawing 175F1037, Sheet 2 to determine the drive location.

Figure 1. Drive openings on rear are not used in this application.

Two sealing plates and two seal plate gaskets are provided. See Figure 2.

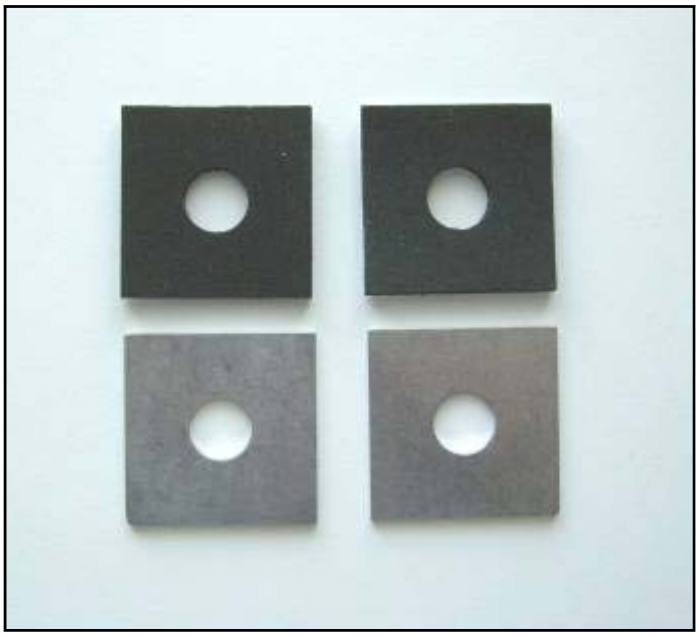


Figure 2. Seal plates and gaskets

Apply gaskets to the seal plates as shown in Figure 3.

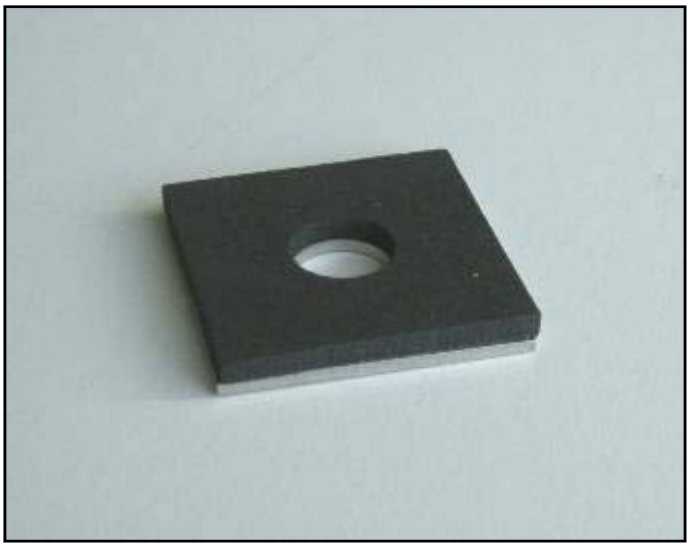


Figure 3. Gasket mounted on seal plate

Install the seal plates over the two bottom drive mounting studs and secure the drive with nuts. See Figures 4 and 5.

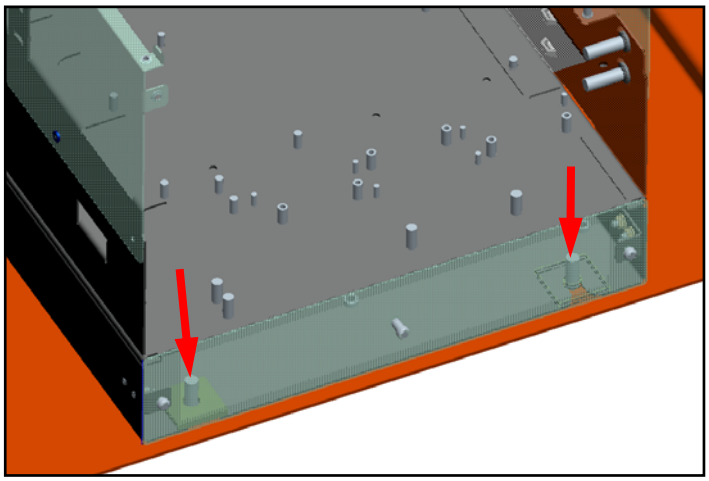


Figure 4. Lower mounting locations

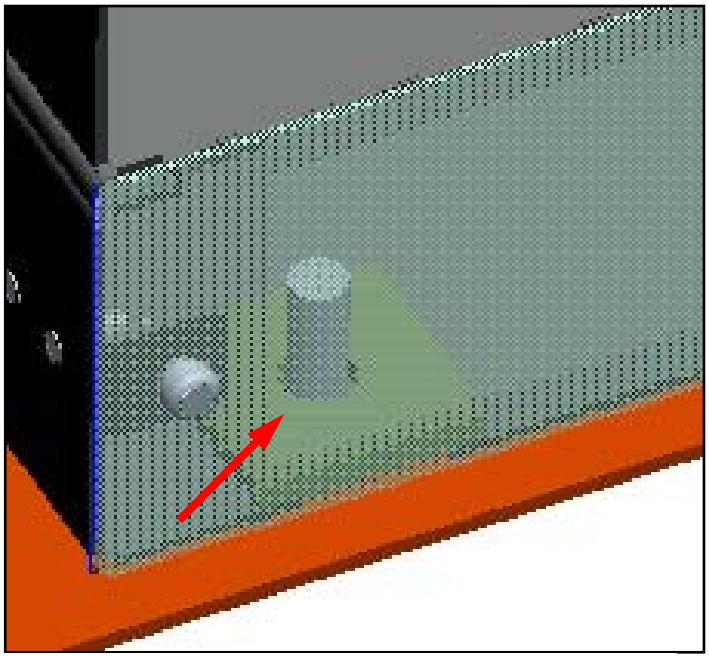


Figure 5. Seal plate installed over mounting stud

Prior to installing the back panel in the enclosure, apply the gasket on both sides of the bottom duct adapter as shown in Figures 6 and 7.

Figure 6. Bottom duct adapter

Figure 7. Bottom duct adapter w/gaskets installed

Install the two mounting brackets on the drive chassis and then install the bottom duct adapter on the bottom of the drive as shown in Figure 8. The curved leading edge of the bottom duct adapter is to the front of the drive and faces down.

Note: Install the bottom plate after the drive has been installed on the back panel to insure proper gasket coverage.

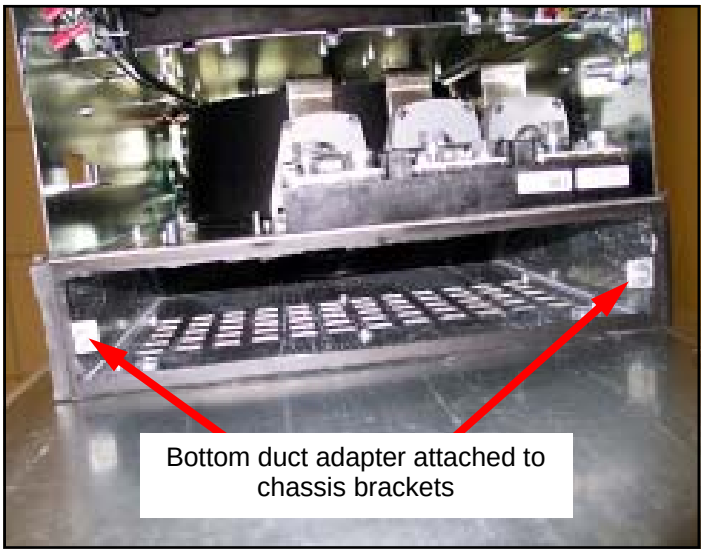


Figure 8. Bottom duct adapter installed

Before installing the back panel with the drive in the enclosure, remove and discard the rear-most screws that are located on the top cover of the drive. See Figure 9. The holes will be used to fasten the top duct-work with longer screws provided with the kit.

Figure 9. Top of IP00/Chassis drive

Install the backpanel (and drive) in the enclosure. See Figure 10 Use Rittal PS4593.000 brackets (minimum one per side at the middle of the drive) with appropriate support strip for additional support of the backpanel. For the D4 frame use two supports per side. Consult the Rittal manual for additional support requirements if additional components are mounted on the

Figure 10. Drive installed in cabinet—D4 Frame

The top duct work cover is composed of the following pieces as shown in Figure 11. From left to right:

- top duct closing plate
- drive bracket
- duct
- vented top cover

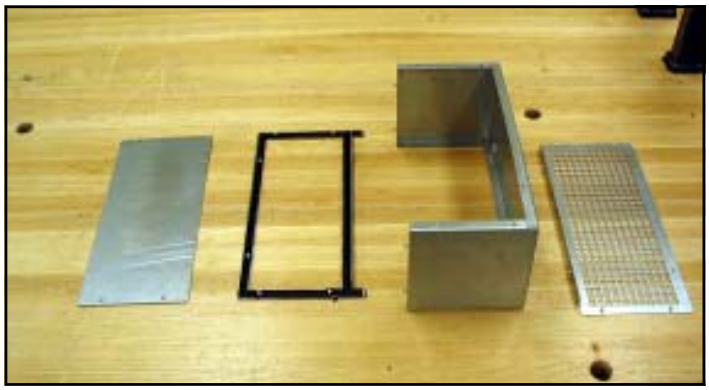


Figure 11. Top duct assembly

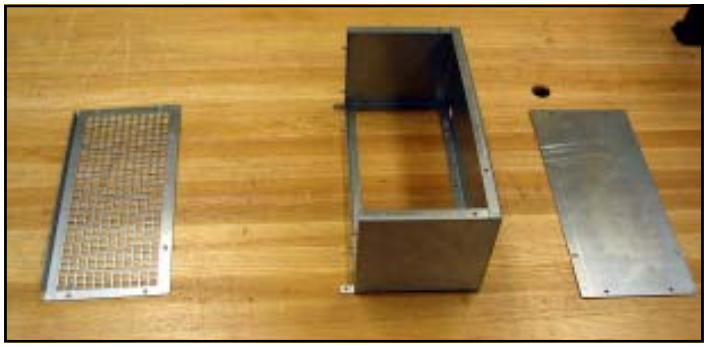


Figure 12. The top duct work partially assembled with bottom flange

Temporarily install the top duct section as shown in Figure 13. Use the top duct cover piece to mark the enclosure top for the opening. Alternately, Drawing 175R5639 can be used to mark the enclosure for cut-out location.

Figure 13. Top duct work and enclosure top installed

Cut the enclosure top. Do not apply gasket to enclosure top (the gasket is part of the duct work). See Figure 14.

Figure 14. Enclosure top with cutout

For the final installation of the duct work, assemble the top duct as shown in Drawing 175R5631, Sheet 2. Note that the gasket is applied to both sides of the drive bracket and grated cover. Also see Figures 15 through 17.

Figure 15. Gasket folds over the edge to form seal between the duct and top vented cover

The top duct closing plate is left off for the installation of the duct work on the drive. The top duct work is attached to the drive using existing holes on the top cover of the drive. Use the 5 longer screws (supplied with kit) to install the top duct work. The duct work will fit over the drive mounting bolts.

Once the duct work is attached to the drive, the duct closing plate can be attached. The top duct work assembly is complete.

The top duct closing plate is left off for the installation of the duct work on the drive. The top duct work is attached to the drive using existing holes on the top cover of the drive. Use the 5 longer screws (supplied with kit) to install the top duct work. The duct work will fit over the drive mounting bolts.

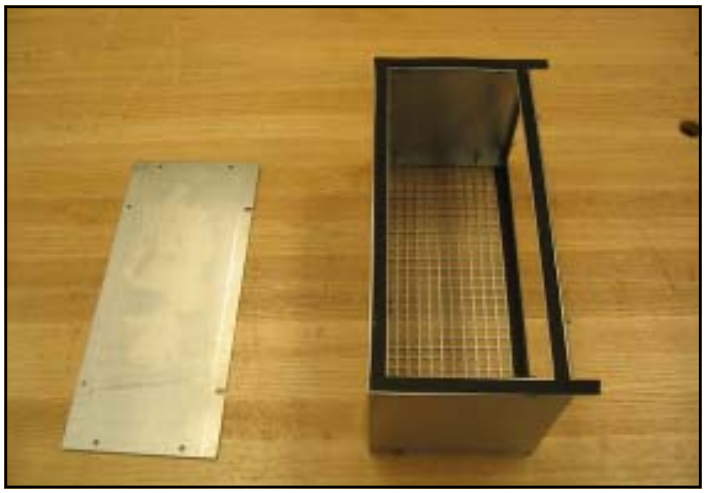


Figure 16. Top duct assembled with gasket

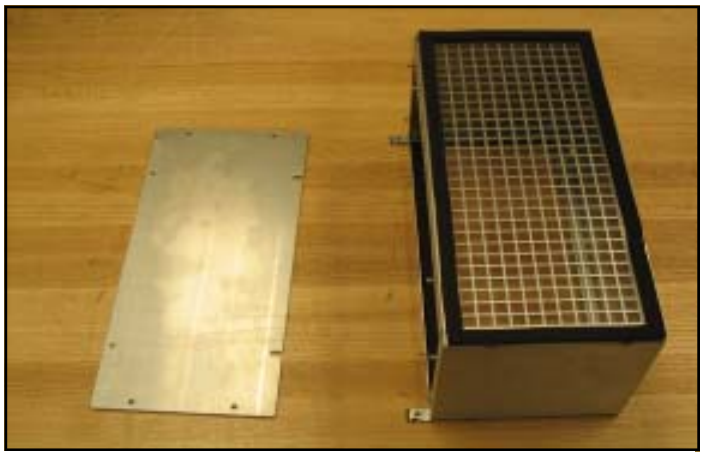


Figure 17. Top duct assembly with gasket (opposite view). Ready to be installed on drive.

Install the top duct assembly into the drive. See Figures 18 and 19.

Figure 18. Top duct installed

Figure 19. Top duct assembly installed

Apply the gasket to the top duct closing plate as shown in Figure 20.

Figure 20. Top duct closing plate with gasket

Install top duct cover assembly using the longer T25 screws provided with the kit in the existing drive top cover holes. See Figure 21.

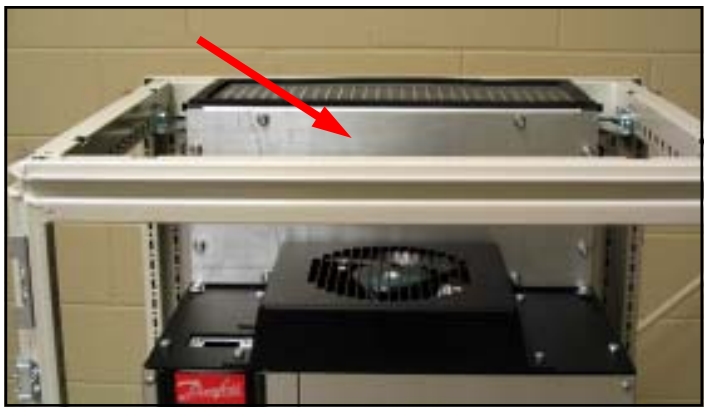


Figure 21. Top duct closing plate installed

Install the top of the enclosure. Reference Figures 22 and 23.

Figure 22. Enclosure top installed

Figure 23. Top view of Rittal enclosure

The bottom duct assembly parts are shown in Figure 24. Refer to drawing 175R5631, Sheet 3. Install the gasket as shown. Assemble the bottom duct but do not attach the cover. Assembly includes the mounting of 3 angle brackets on the front and sides of the partially assembled bottom duct. The bottom duct collar is bolted to the duct using 3 -T25 screws in the outermost holes of the brackets. Tighten screws to compress the gasket. Reference Figure 25.

Figure 24. Bottom duct pieces

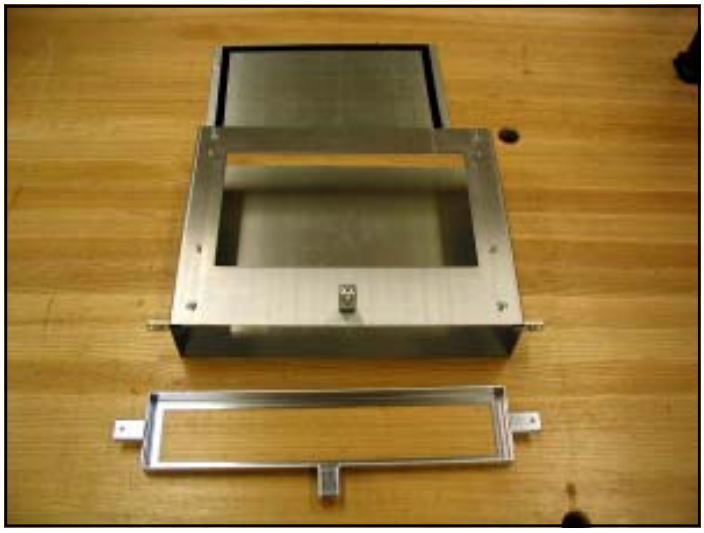


Figure 25. Bottom duct partially assembled

Remove the two front-most gland plates from the drive.

The duct assembly is used to locate the bottom cutout of the enclosure.

Temporarily install the bottom duct-work as shown in Figure 26. Use the inside of the duct assembly to mark the bottom of the enclosure for the opening. Alternately, drawing 175R5639 can be used.

Figure 26. Duct work temporarily installed to mark cut-out on the gland plate

The cutout is made on the inner most gland plate. See Figure 27.

Figure 27. Enclosure bottom cutout

Install the bottom duct assembly by rotating it into position behind the leading edge of the bottom duct adapter. See Figures 28 and 29.

The bottom duct work is designed to fit tightly. The upper part of the duct fits under the bottom duct adapter and requires a tight seal, permitting the enclosure to maintain its IP54 and UL & NEMA 12 ratings.

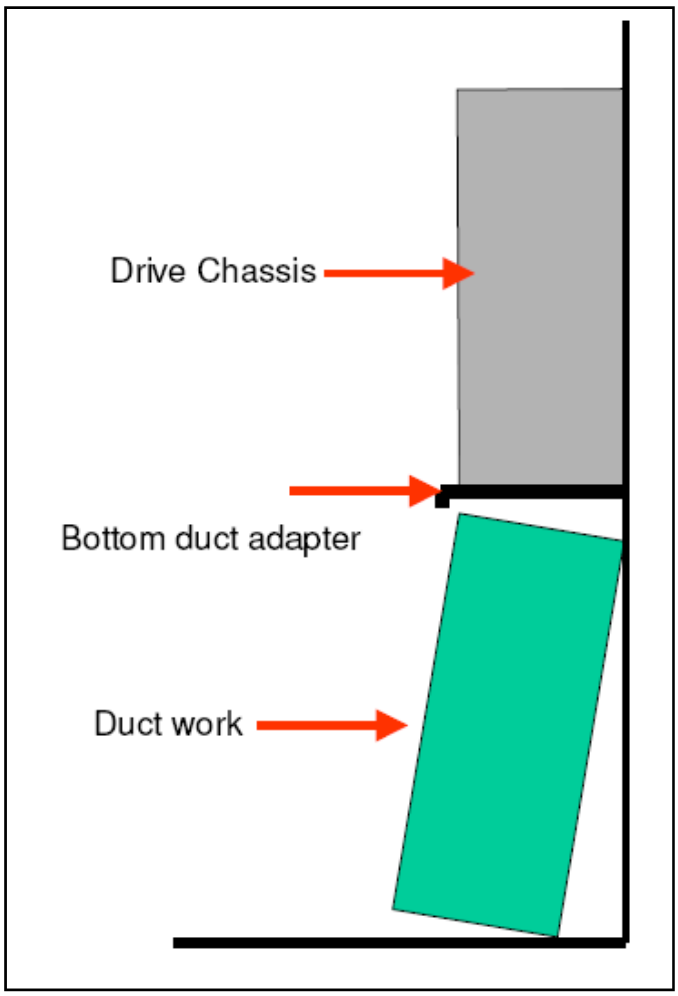


Figure 28. Installation of bottom duct

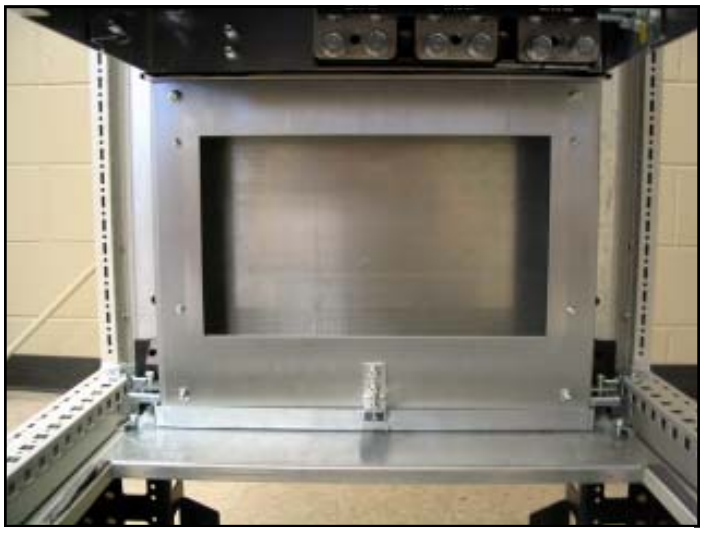


Figure 29. Bottom duct work installed

After the bottom duct work is positioned in place, remove the three T25 screws from the outer holes in the mounting brackets on the sides and front of the duct work and move them to the inner holes of the same brackets. See Figure 30. Tighten the three screws to the specified torque.

The bottom duct work is not fastened to the enclosure.

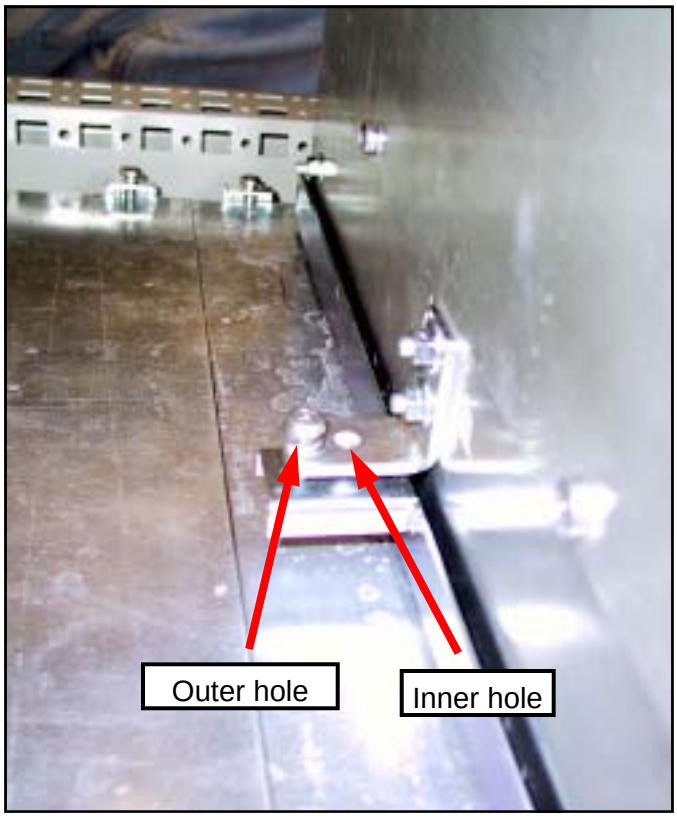
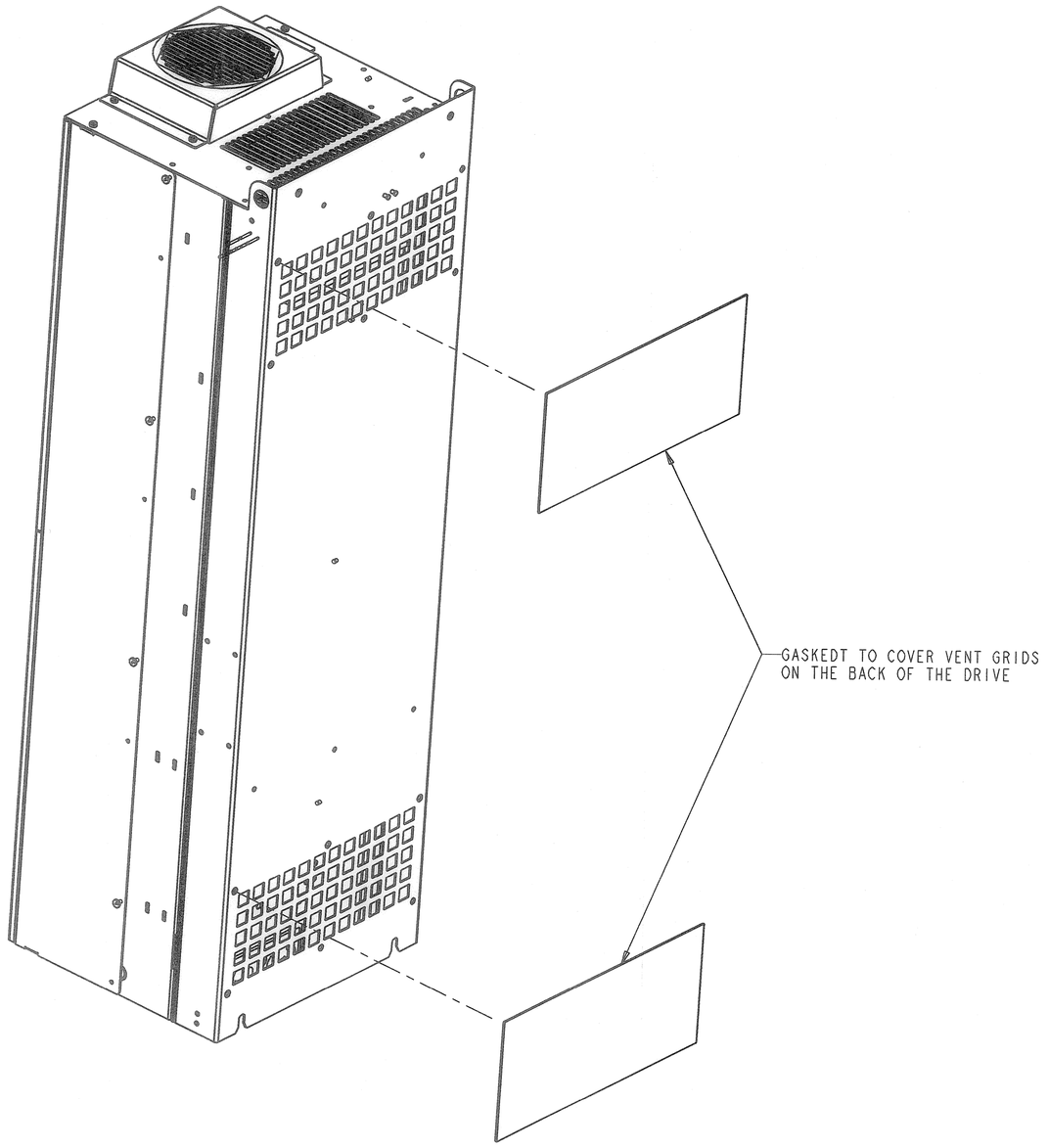


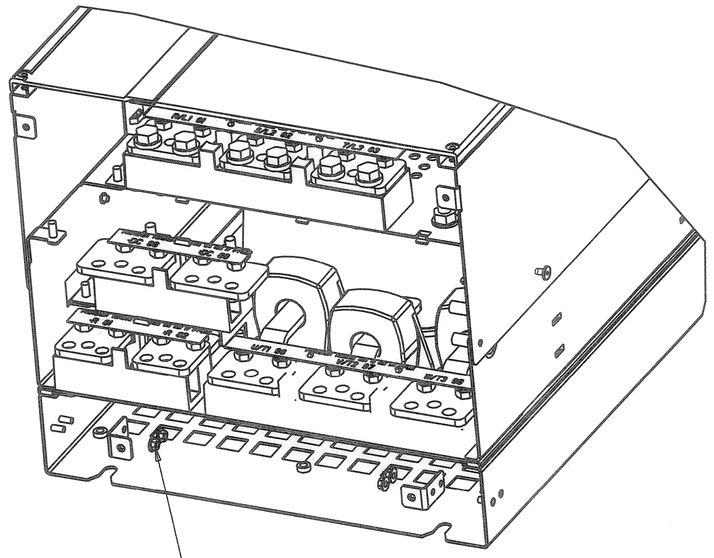
Figure 30. Move mounting screws from the outer hole to the inner hole

Install the front cover of the duct and the cable clamp bracket if used. Re-install the two remaining gland plates. See Figure 31.

Note: The cable clamp bracket is grounded through the screws that secure the bracket to the duct. If additional grounding is desired the grounding strap that is supplied with the kit may be installed.

Figure 31. Installed ductwork





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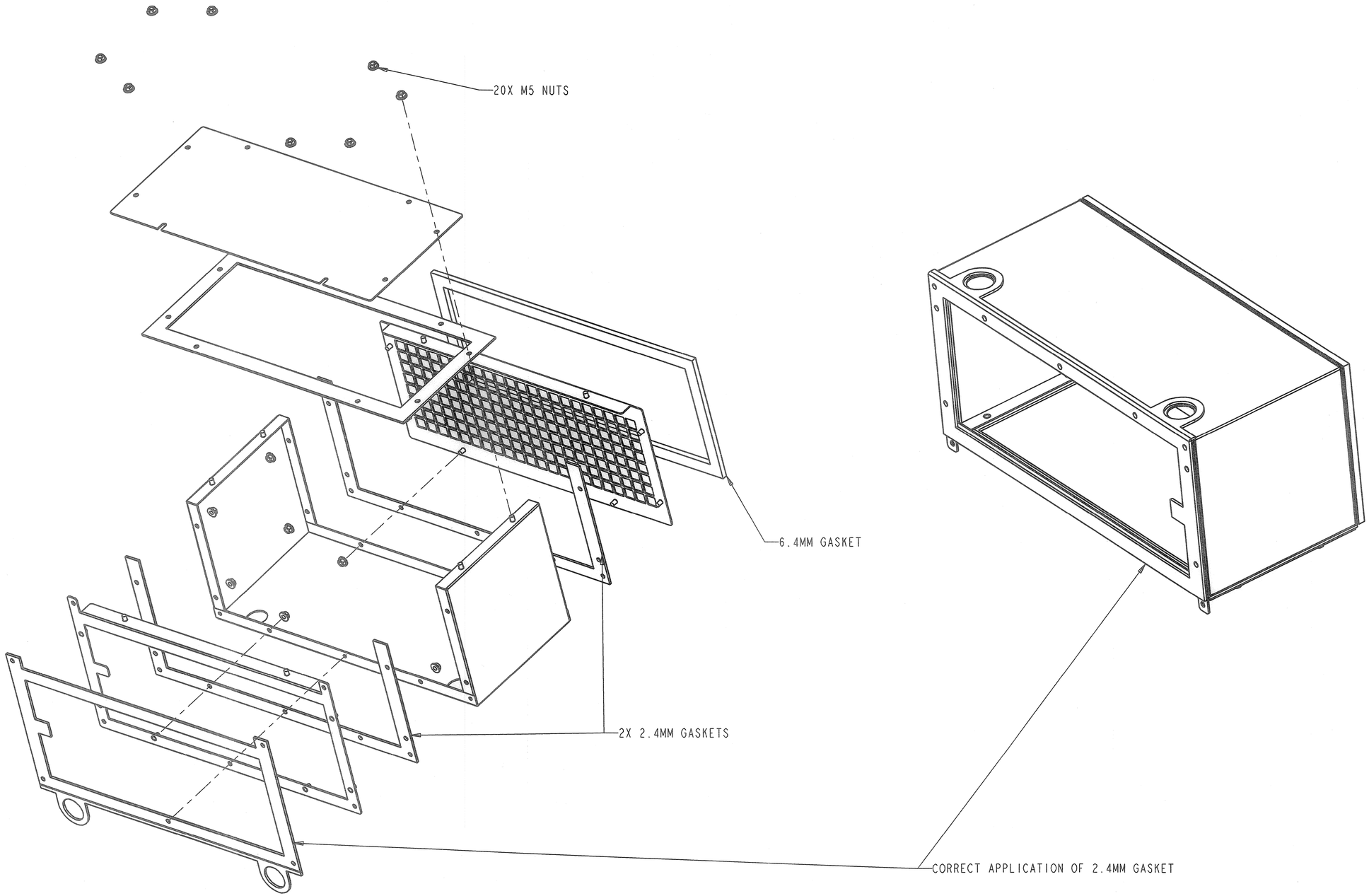

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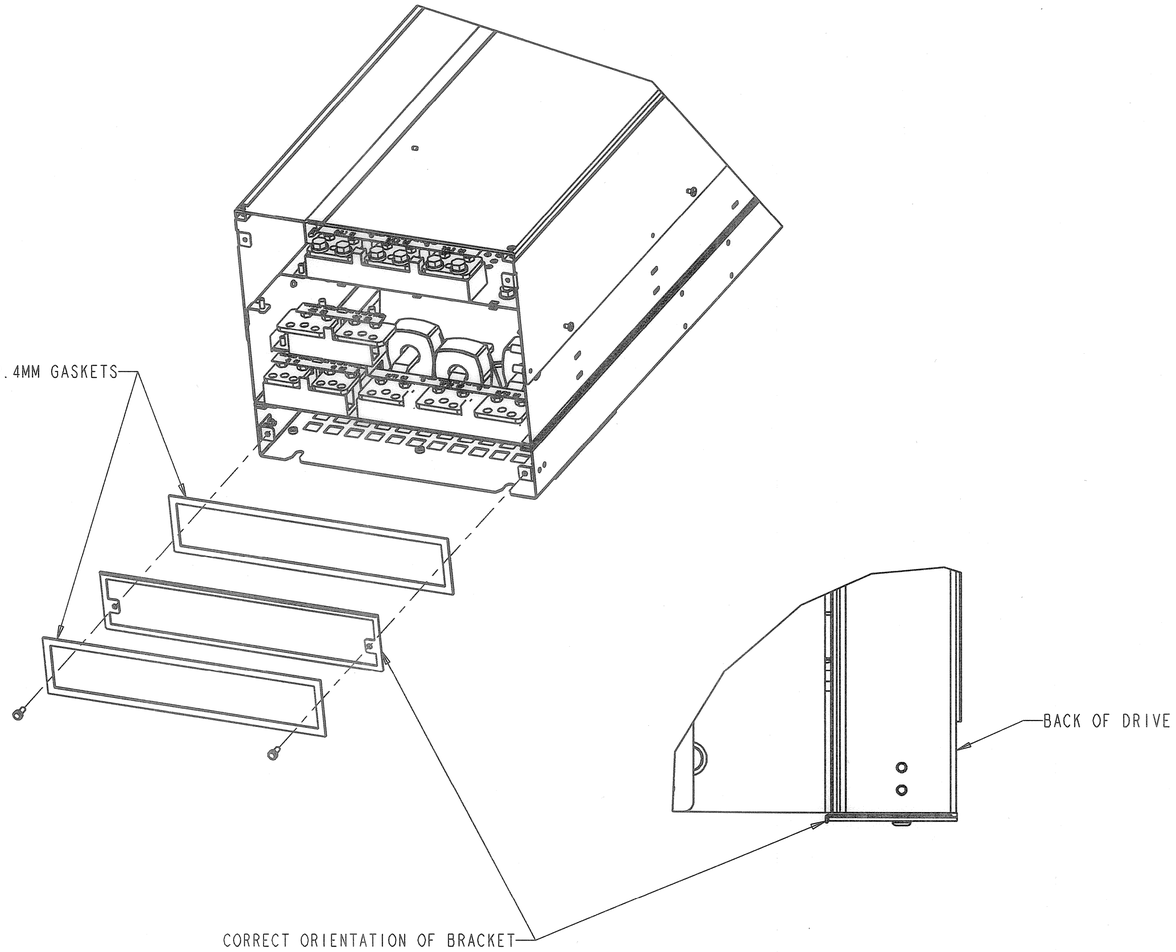

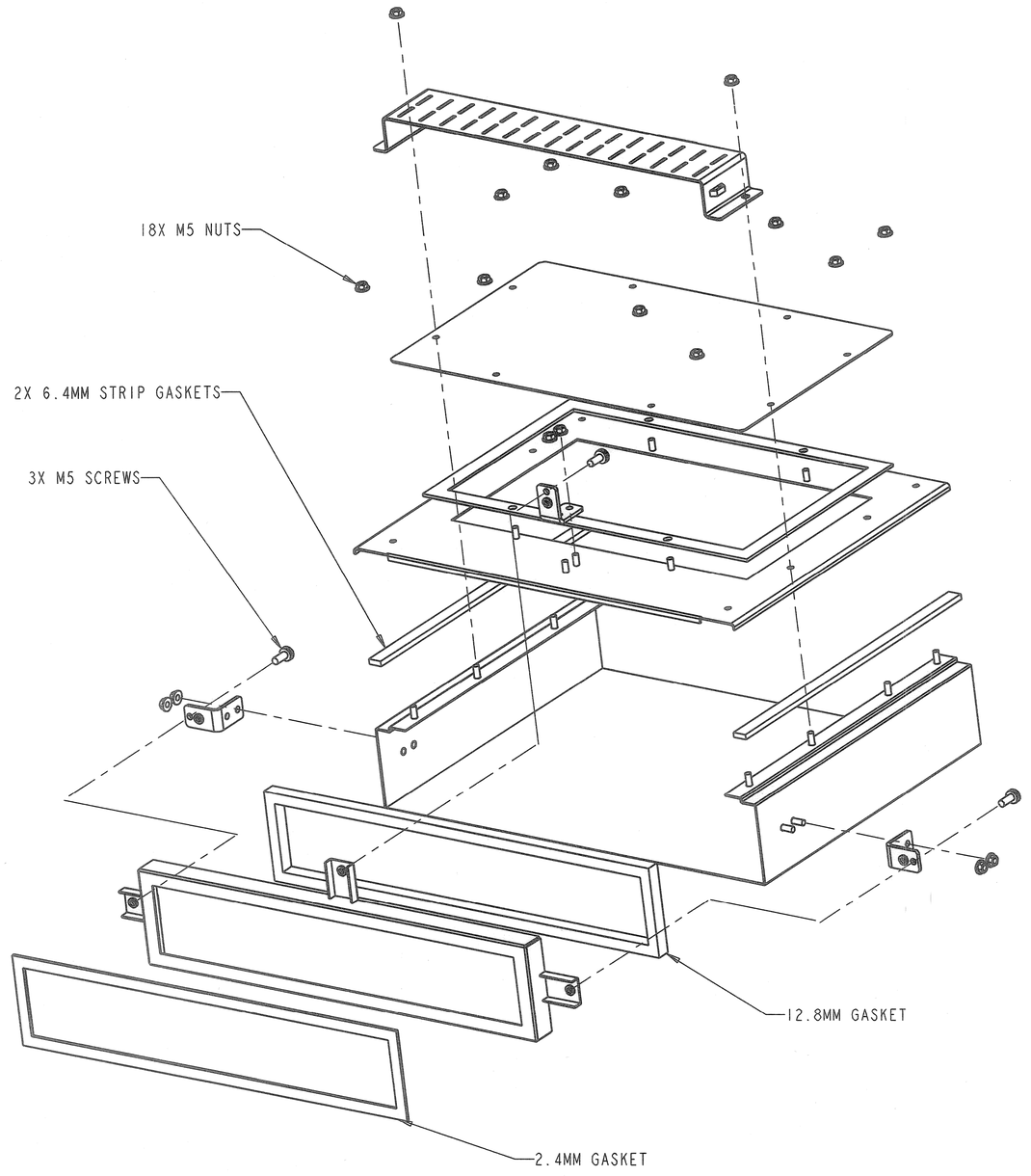

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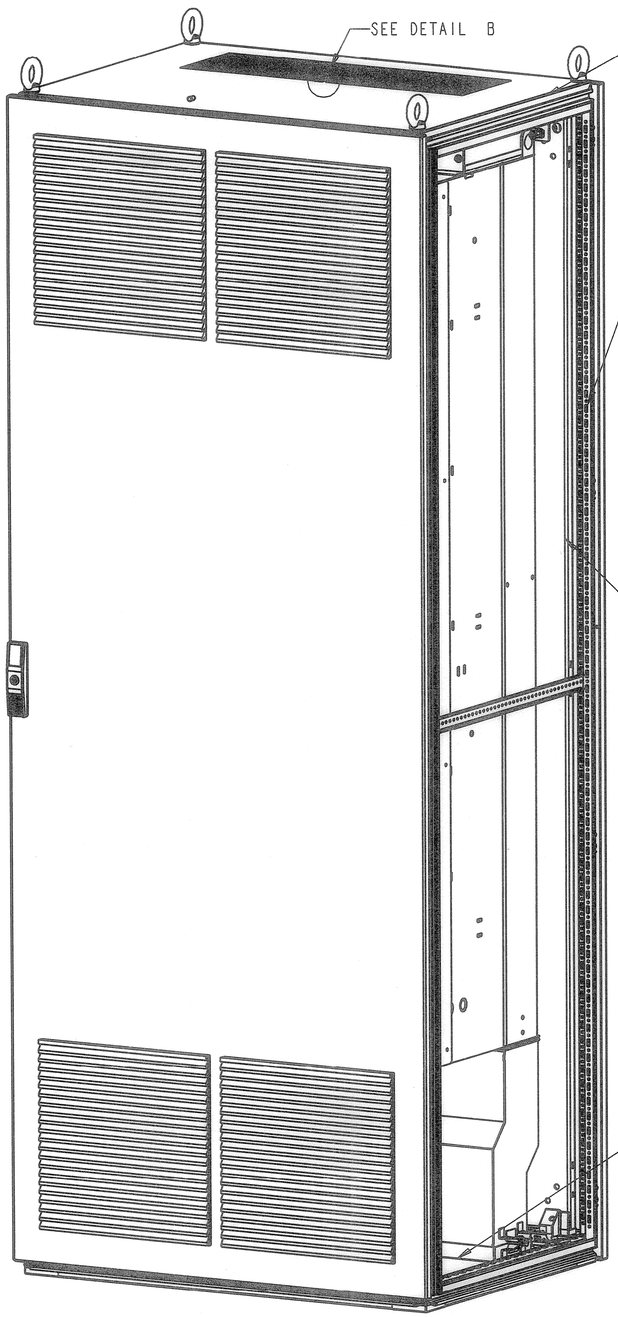

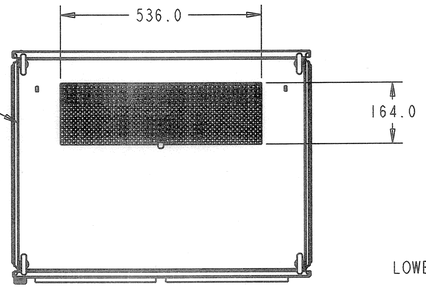

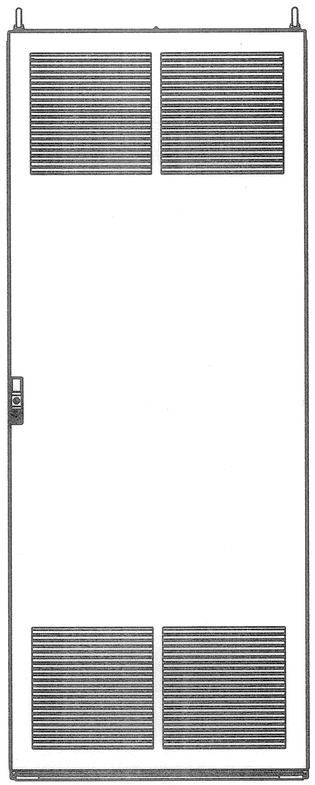

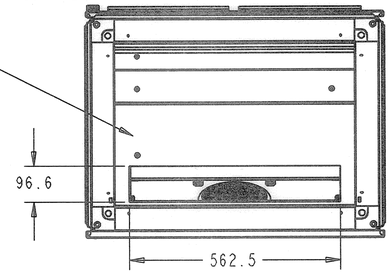

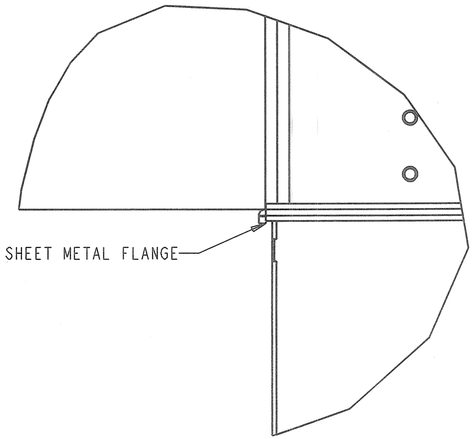

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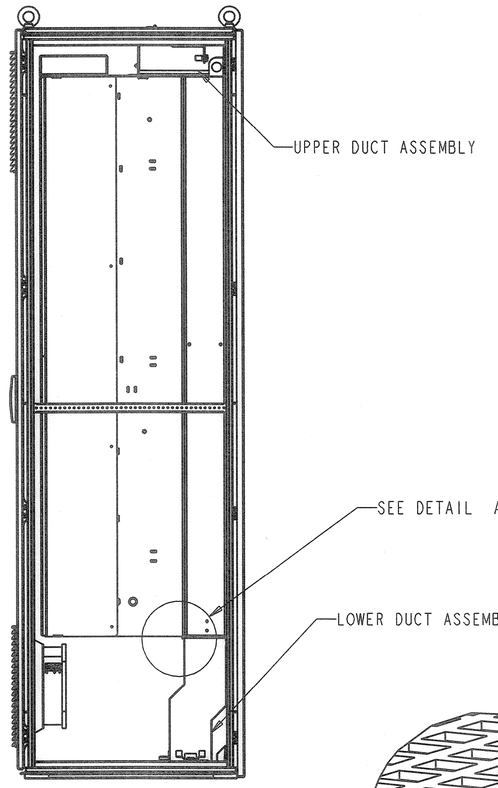

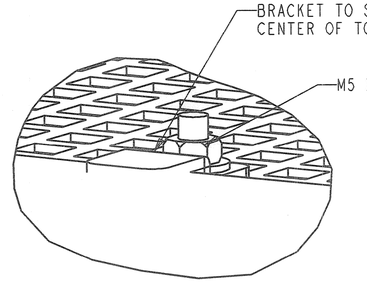

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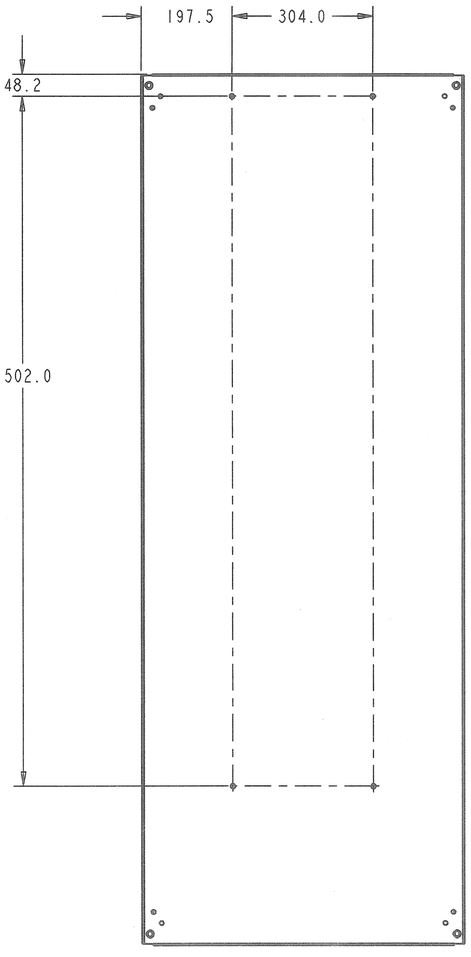

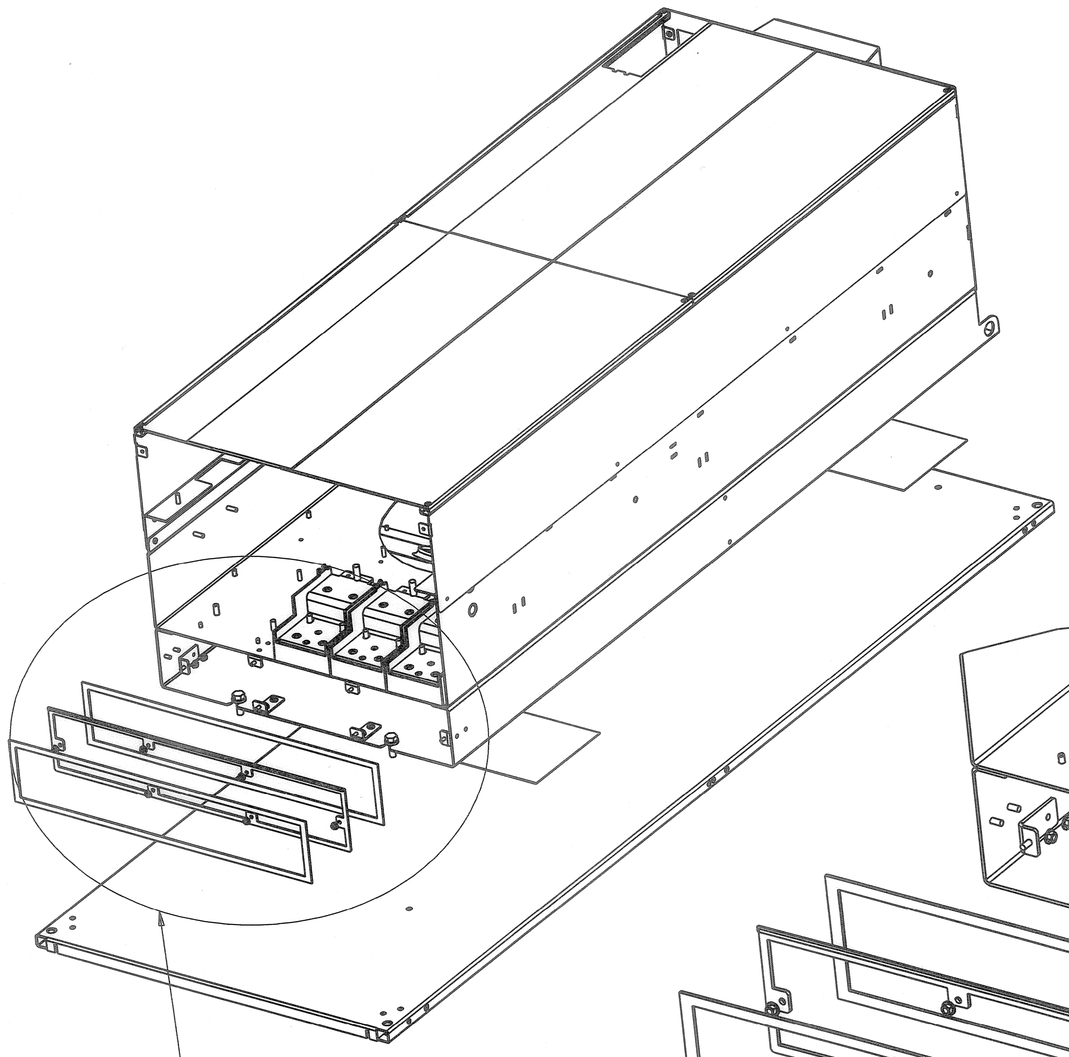

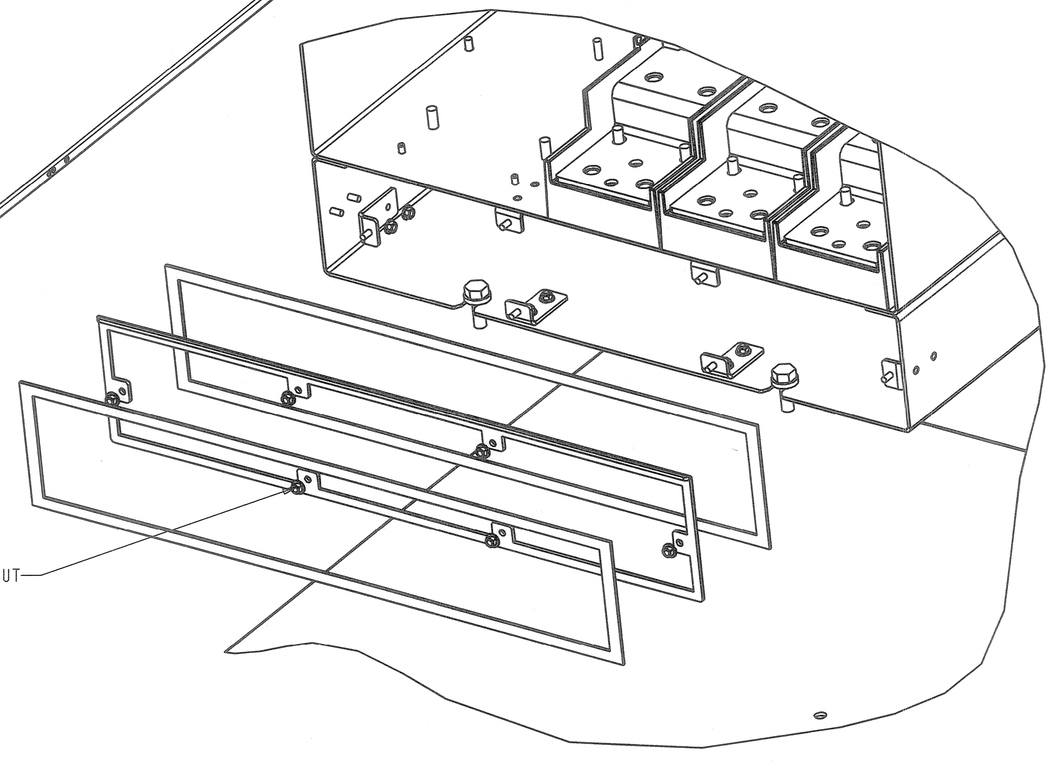

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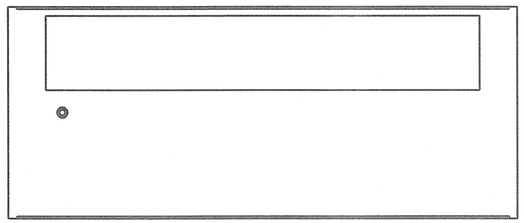
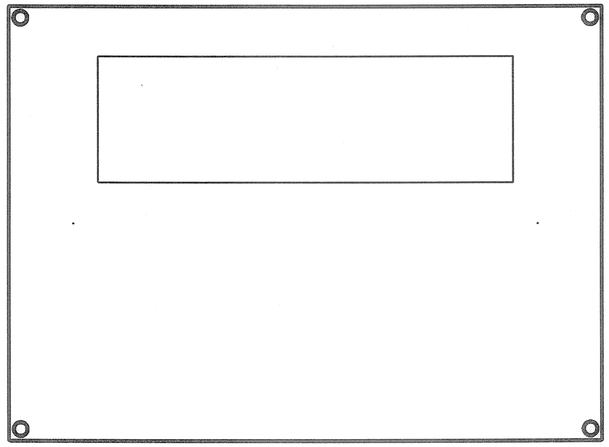
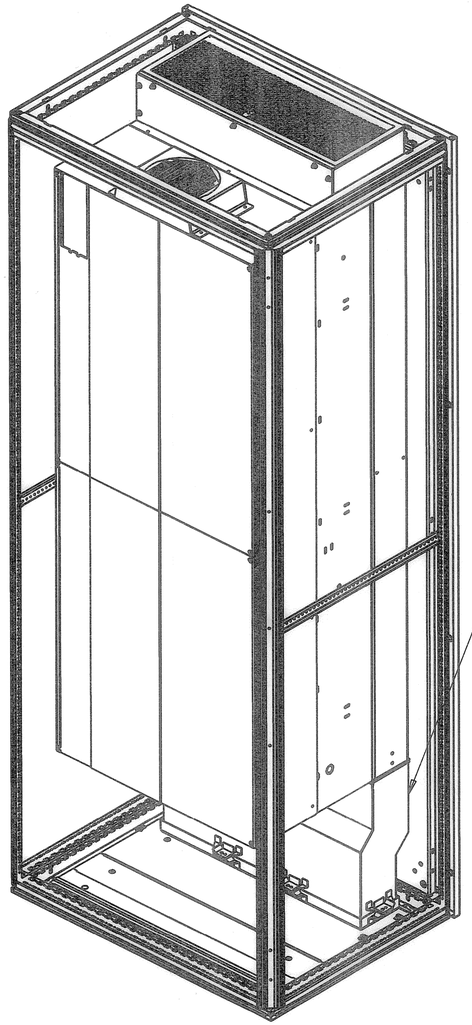
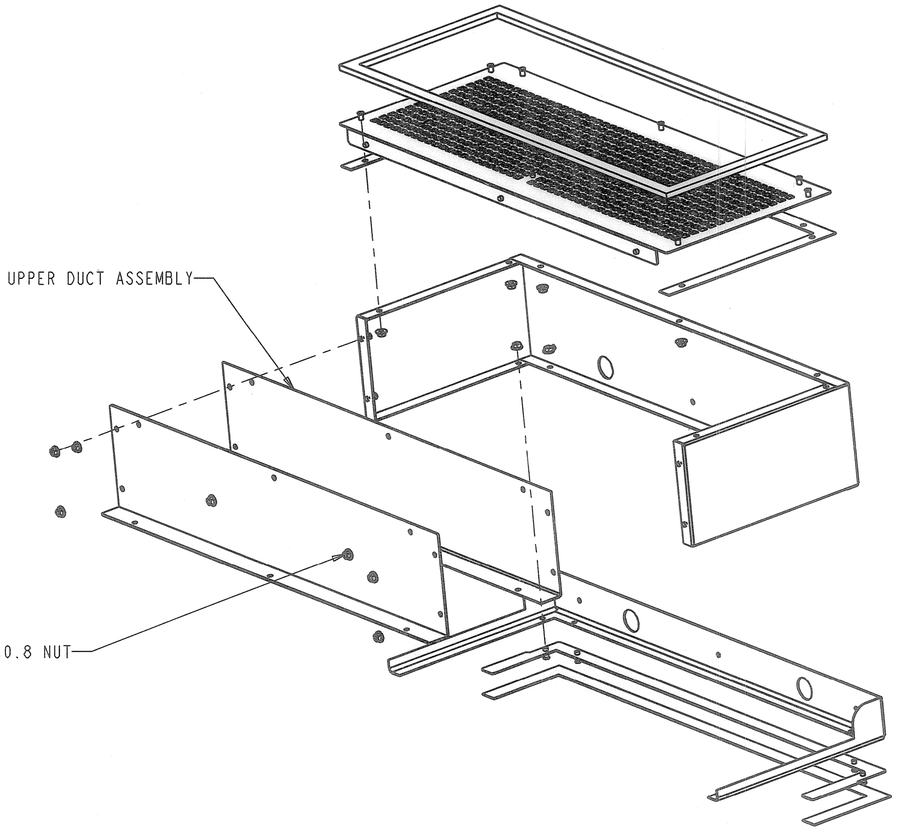


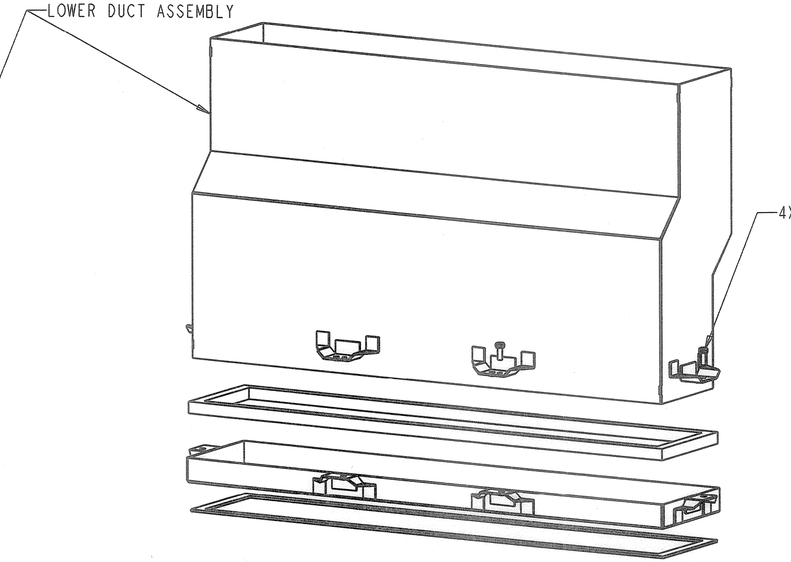
RITTAL BOTTOM PANEL

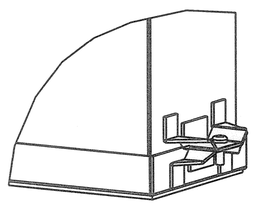


RITTAL TOP COVER

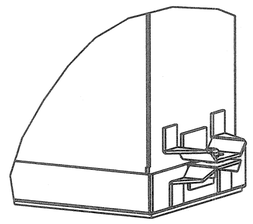








DURING INSTALLATION SET SCREW TO BE MOVED TO OUTER POSITION AND TIGHTENED.



TO COMPLETE INSTALLATION OF LOWER DUCT, SET SCREW MOVED TO INNER POSITION AND TIGHTENED.

LATEST E.C.N. NO.:	E.C.N. PRO-E ENTRY BY/DATE:	PLOT SCALE:	PRO-E FILE:	SHEET:	OF:	DRAWING NO.:	REV.:
HP08010	MN 01/28/08	NONE	175R1037	3	3	175R1037	B

TITLE: DWG,REF,COOLING,RITTAL,E2