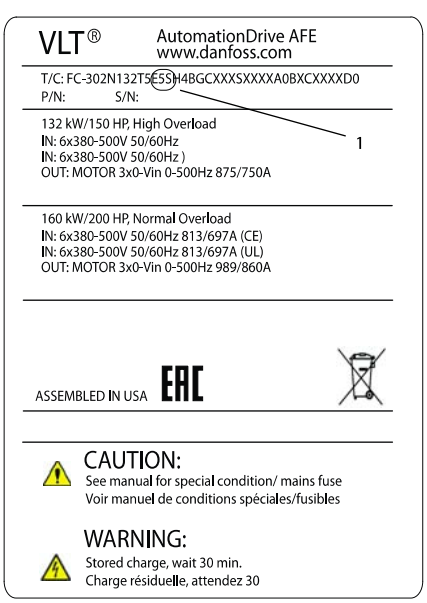
Installation Instructions
NEMA-3R Cover Kit for D1h–D2h
VLT® FC Series FC 102, FC 103, FC 202, and FC 302

1.1 Description

The NEMA 3R cover kit is designed for D1h and D2h enclosure sizes for the following applications:

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

This kit adds a cover to the outside vents of the frequency converter and provides NEMA 3R compliant protection against weather and hosed water. The kit is used only with frequency converters that have E5S in the 13–15 position of the type code. The type code is found on the nameplate.



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1	Protection rating for the NEMA 3R kit

Illustration 1.1 Example of a D-size Enclosure Nameplate

The NEMA 3R kit contains the following parts:

- Top plate (1).
- Gland plate with attached gasket (1).
- NEMA 3R cover (1).
- Adhesive label (1).
- 3-sectioned plastic bag containing:
  - For top plate, lifting eyelets (2) and screws (6) without captive washers.
  - For gland plate, screws (6) for D1h or (8) for D2h. These screws have captive washers.
  - For NEMA 3R cover, screws (6) without captive washers.

1.2 Kit Part Numbers

Part number	Kit description
176F6302	NEMA 3R cover kit for D1h enclosures
176F6303	NEMA 3R cover kit for D2h enclosures

Table 1.1 Part Numbers for the NEMA 3R Cover Kit

1.3 Safety Instructions

⚠WARNING

ELECTRICAL SHOCK HAZARD

VLT® frequency converters 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 frequency converter from all power sources before installation or service.**
- **Treat the bus bar and heat sink as live whenever the unit has mains voltage connected (including when the frequency converter is tripped or waiting for a command).**
- **Follow the guidelines in these instructions and local electrical safety codes.**

⚠WARNING

DISCHARGE TIME

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 the specified time after power has been removed before performing service or repair work can result in death or serious injury.

- **Stop 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 PM motor.**
- **Wait for the capacitors to discharge fully. The minimum duration of waiting time is specified in *Table 1.2*.**
- **Before performing any service or repair work, use an appropriate voltage measuring device to make sure that the capacitors are fully discharged.**

Voltage [V]	Frequency converter model	Minimum waiting time (minutes)
3x400	N110–N315	20
	N90K–N250	20
3x690	N75K–N400	20
	N55K–N315	20

Table 1.2 Discharge Time

1.4 Installation

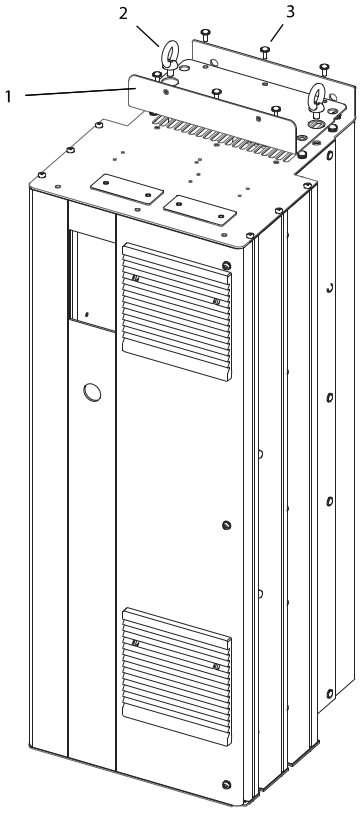
1.4.1 Installing the Top Plate

1. Along the back side of the top vent opening, remove the 4 screws (T25).
2. Place the top plate over the top vent opening. See *Illustration 1.2*.
3. Secure the top plate with the 6 screws without captive washers provided in the bag. Torque to 2.3 Nm (20 in/lbs).
4. If lifting eyebolts are needed for the application, remove the plated eyebolts that came with the unit and replace with the stainless steel eyebolts provided in the bag.

NOTICE

UL NEMA 3R RATING

Eyebolts are not required to meet UL NEMA 3R rating.

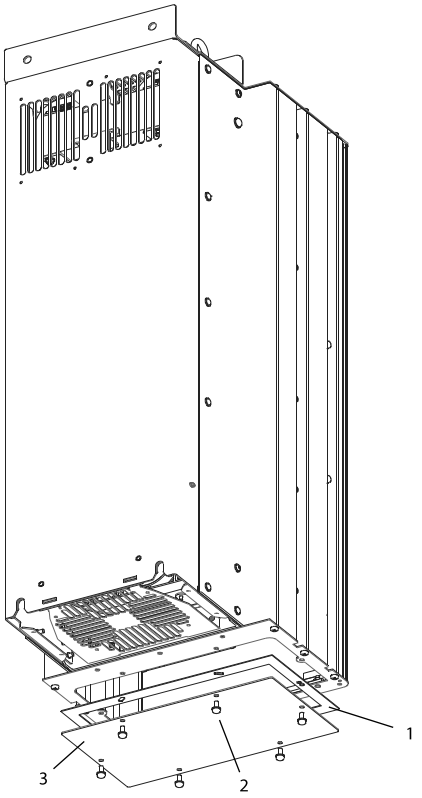


1	Top plate
2	Eye bolt
3	Screw without captive washer

Illustration 1.2 Installing NEMA 3R Top Plate

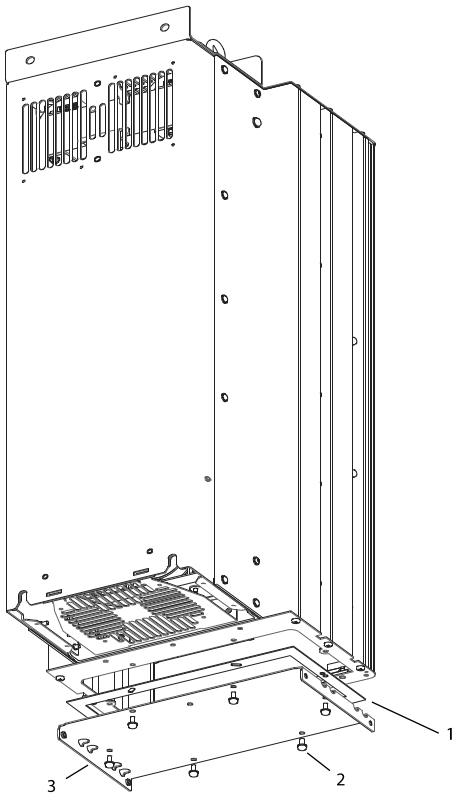
1.4.2 Installing the Gland Plate

1. Remove the existing gland plate and gasket from the bottom of the frequency converter by removing 6 screws (T25) from the D1h or 8 screws (T25) from the D2h. See *Illustration 1.3*.
2. Make sure that the flange on the frequency converter is smooth and clean in preparation for the new gasket.
3. Place the new gland plate over the opening, with the gasket side facing the opening. See *Illustration 1.4*.
4. Secure the new gland plate to the frequency converter using the provided screws with captive washers (6) for D1h or (8) for the D2h. Torque to 2.3 Nm (20 in/lbs).



1	Gasket
2	Screw with captive washer
3	Gland plate

Illustration 1.3 Removing Gland Plate



1	Gasket
2	Screw with captive washer
3	Gland plate

Illustration 1.4 Installing NEMA 3R Gland Plate

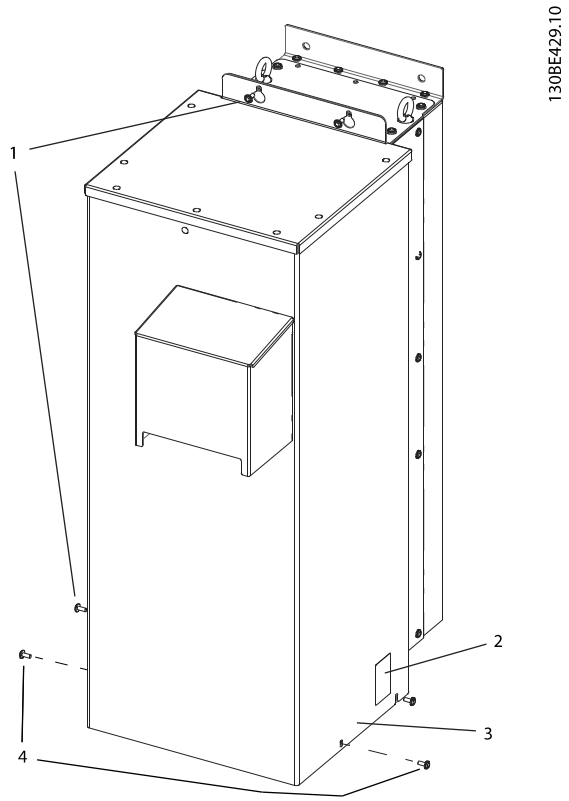
1.4.3 Installing the NEMA 3R Cover

1. Set the NEMA 3R cover over the top of the frequency converter. Align the NEMA 3R cover with the screw holes on the top mounting plate and the screw holes on the side of the unit.
2. Using the 6 screws provided in the bag, loosely secure the cover to the frequency converter.
3. Torque all 6 screws to 2.3 Nm (20 in/lbs).
4. Apply adhesive label to the cover. See *Illustration 1.5*.

NOTICE

REMOVING COVER

To remove the NEMA 3R cover after it has been installed, remove the front 2 screws on the bottom of the unit. The cover can be removed after the other 4 screws are loosened since the cover has slotted screw openings.



1	Screw without captive washer
2	NEMA 3R sticker
3	NEMA 3R cover
4	Screws to remove for taking off the NEMA 3R cover

Illustration 1.5 Installing NEMA 3R Cover

1.4.4 Calculating Nominal Current when Using a NEMA 3R Cover

The nominal current of a frequency converter with the NEMA 3R cover is 90% of its current rating. For example, in a FC-302N250T5 standard IP54 frequency converter, the nominal output current in normal overload mode is 588 A. With the NEMA 3R cover, the normal overload current is 0.90 x 588 = 529.2 A. The same calculation is used to calculate the nominal current for the high overload mode.

1.4.5 Derating for Ambient Temperature when Using a NEMA 3R Cover

Using the NEMA 3R cover kit requires derating due to higher ambient temperatures within the enclosure. Using SFAVM (stator flux asynchronous vector modulation) gives greater switching control, but generates more heat than using 60° AVM (asynchronous vector modulation). SFAVM switches throughout the entire cycle, where 60° AVM only switches 2/3 of the time.

The maximum switching frequency is 16 kHz for 60° AVM and 10 kHz for SFAVM. The discrete switching frequencies are shown in *Illustration 1.6*.

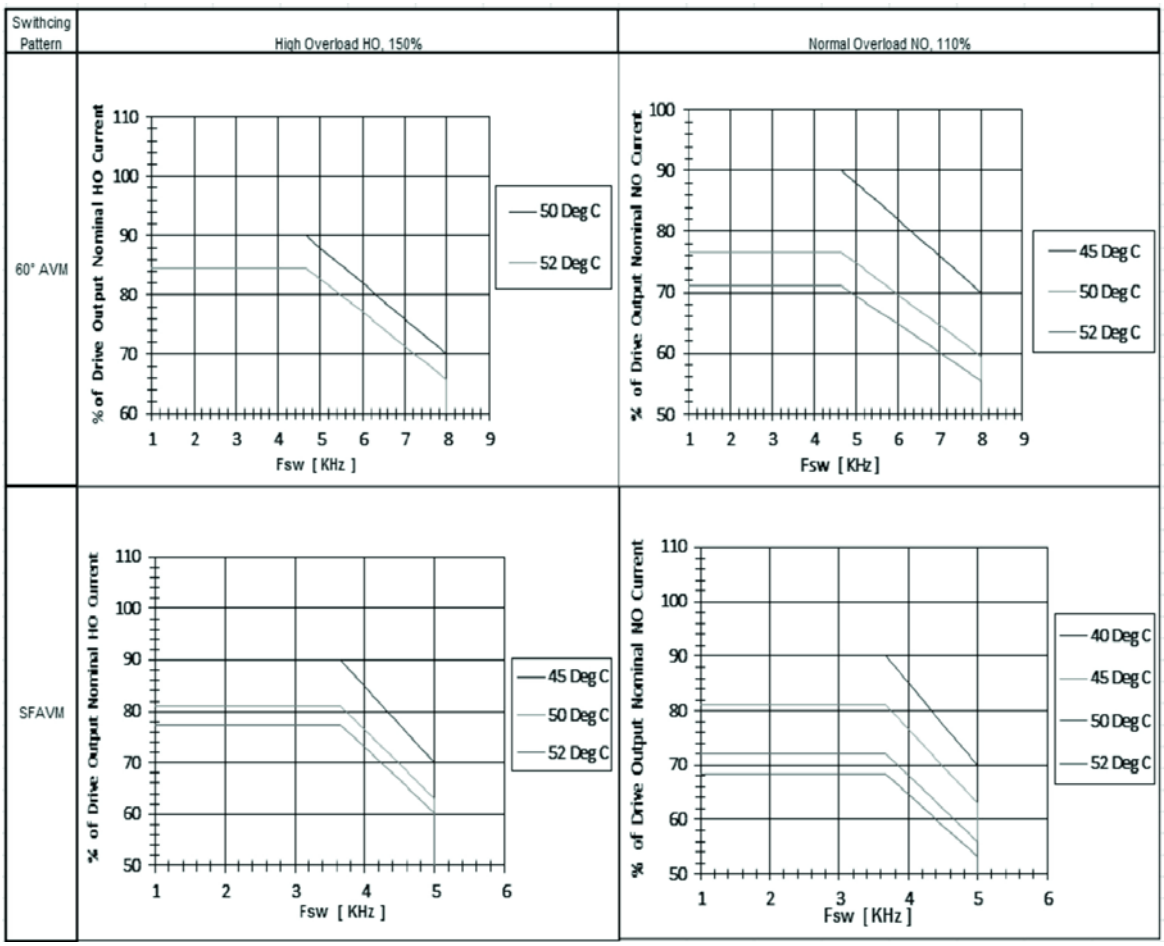


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Illustration 1.6 Derating for Ambient Temperature

1.4.6 Dimensions

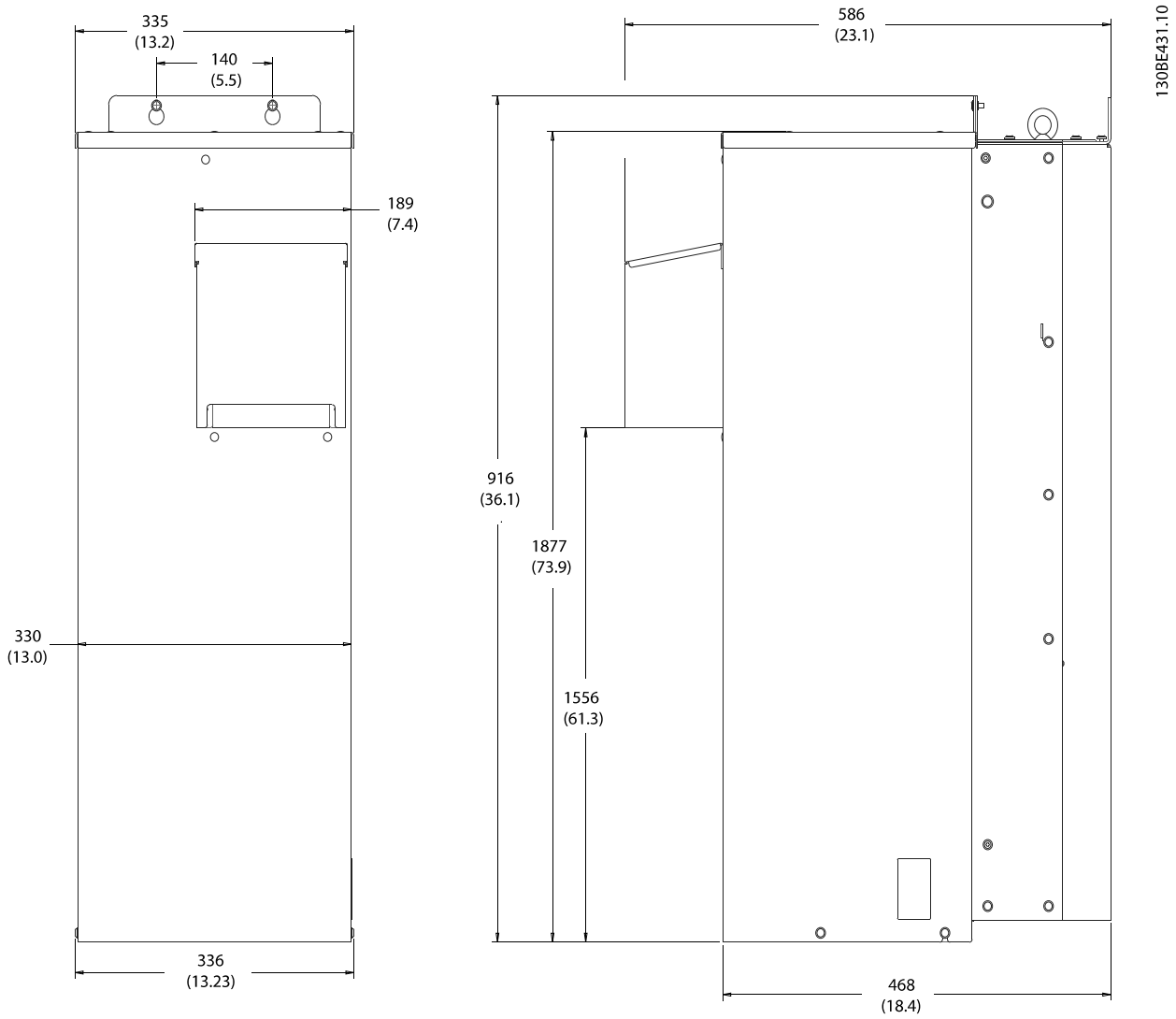

Illustration 1.7 Exterior Dimensions for D1h with NEMA 3R Kit

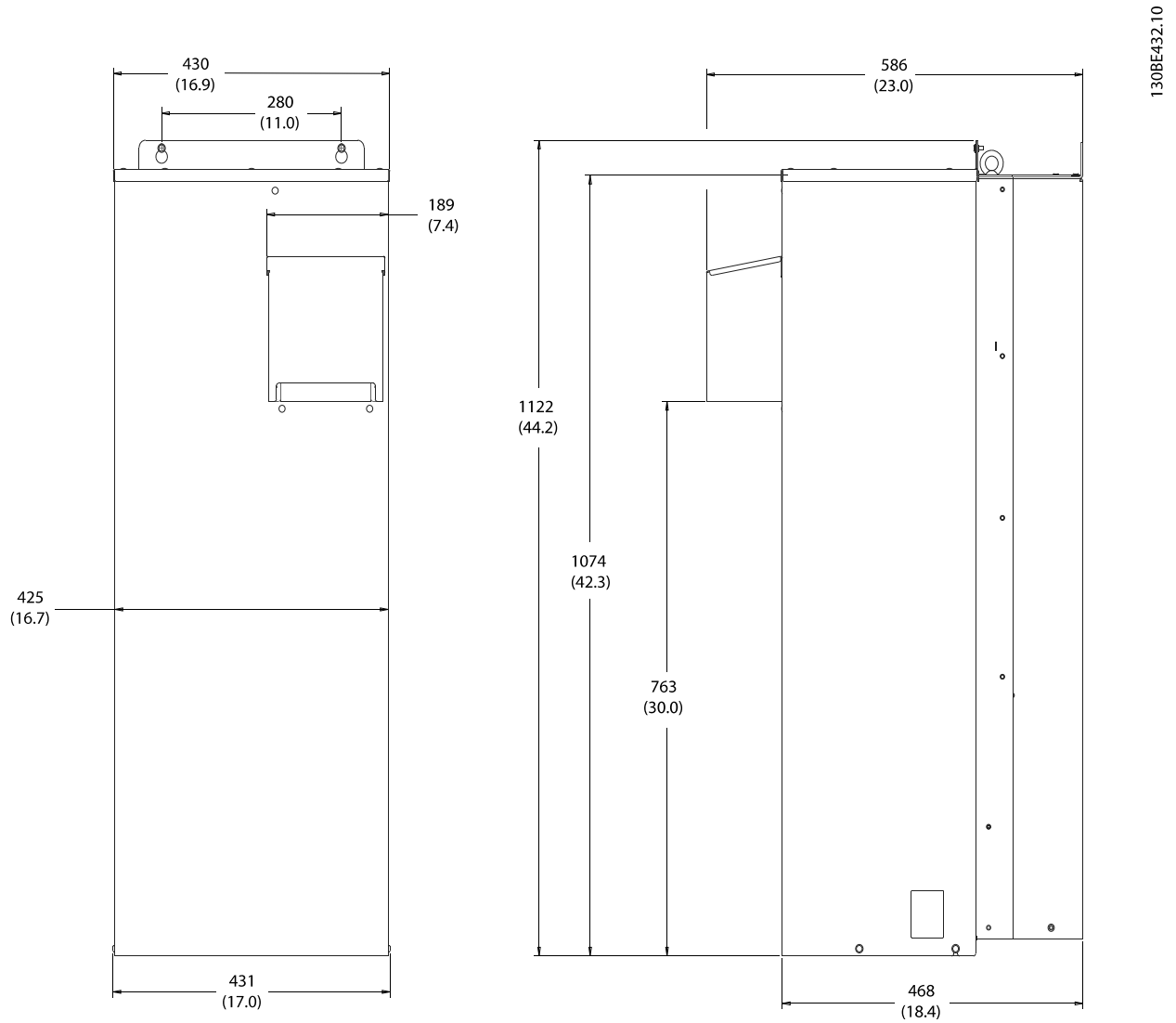

Illustration 1.8 Exterior Dimensions for D2h with NEMA 3R Kit

Danfoss A/S
Ulsnaes 1
DK-6300 Graasten
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