



Installation Instructions

AFDH E-Frame Upgrade Adaptive Frequency™ Drive

Tracer® AdaptiView™ Symbio™ Centrifugal Chiller Controllers



Direct Mount



Transition Mount



LiquiFlo Mount

Model Numbers: CVHE, CVHF, AFDH
Design Sequence: F0

This document applies to service offering applications only.

⚠ SAFETY WARNING

Only qualified personnel should install and service the equipment. The installation, starting up, and servicing of heating, ventilating, and air-conditioning equipment can be hazardous and requires specific knowledge and training. Improperly installed, adjusted or altered equipment by an unqualified person could result in death or serious injury. When working on the equipment, observe all precautions in the literature and on the tags, stickers, and labels that are attached to the equipment.



Introduction

Read this manual thoroughly before operating or servicing this unit.

Warnings, Cautions, and Notices

Safety advisories appear throughout this manual as required. Your personal safety and the proper operation of this machine depend upon the strict observance of these precautions.

The three types of advisories are defined as follows:

- ⚠ WARNING** Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
- ⚠ CAUTION** Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury. It could also be used to alert against unsafe practices.
- NOTICE** Indicates a situation that could result in equipment or property-damage only accidents.

Important Environmental Concerns

Scientific research has shown that certain man-made chemicals can affect the earth's naturally occurring stratospheric ozone layer when released to the atmosphere. In particular, several of the identified chemicals that may affect the ozone layer are refrigerants that contain Chlorine, Fluorine and Carbon (CFCs) and those containing Hydrogen, Chlorine, Fluorine and Carbon (HCFCs). Not all refrigerants containing these compounds have the same potential impact to the environment. Trane advocates the responsible handling of all refrigerants.

Important Responsible Refrigerant Practices

Trane believes that responsible refrigerant practices are important to the environment, our customers, and the air conditioning industry. All technicians who handle refrigerants must be certified according to local rules. For the USA, the Federal Clean Air Act (Section 608) sets forth the requirements for handling, reclaiming, recovering and recycling of certain refrigerants and the equipment that is used in these service procedures. In addition, some states or municipalities may have additional requirements that must also be adhered to for responsible management of refrigerants. Know the applicable laws and follow them.

⚠ WARNING

Proper Field Wiring and Grounding Required!

Failure to follow code could result in death or serious injury. All field wiring **MUST** be performed by qualified personnel. Improperly installed and grounded field wiring poses **FIRE** and **ELECTROCUTION** hazards. To avoid these hazards, you **MUST** follow requirements for field wiring installation and grounding as described in **NEC** and your local/state/national electrical codes.

⚠ WARNING

Personal Protective Equipment (PPE) Required!

Failure to wear proper PPE for the job being undertaken could result in death or serious injury. Technicians, in order to protect themselves from potential electrical, mechanical, and chemical hazards, **MUST** follow precautions in this manual and on the tags, stickers, and labels, as well as the instructions below:

- Before installing/servicing this unit, technicians **MUST** put on all PPE required for the work being undertaken (Examples; cut resistant gloves/sleeves, butyl gloves, safety glasses, hard hat/bump cap, fall protection, electrical PPE and arc flash clothing). **ALWAYS** refer to appropriate Safety Data Sheets (SDS) and OSHA guidelines for proper PPE.
- When working with or around hazardous chemicals, **ALWAYS** refer to the appropriate SDS and OSHA/GHS (Global Harmonized System of Classification and Labeling of Chemicals) guidelines for information on allowable personal exposure levels, proper respiratory protection and handling instructions.
- If there is a risk of energized electrical contact, arc, or flash, technicians **MUST** put on all PPE in accordance with OSHA, NFPA 70E, or other country-specific requirements for arc flash protection, **PRIOR** to servicing the unit. **NEVER PERFORM ANY SWITCHING, DISCONNECTING, OR VOLTAGE TESTING WITHOUT PROPER ELECTRICAL PPE AND ARC FLASH CLOTHING. ENSURE ELECTRICAL METERS AND EQUIPMENT ARE PROPERLY RATED FOR INTENDED VOLTAGE.**

⚠ WARNING**Follow EHS Policies!**

Failure to follow instructions below could result in death or serious injury.

- All Trane personnel must follow the company's Environmental, Health and Safety (EHS) policies when performing work such as hot work, electrical, fall protection, lockout/tagout, refrigerant handling, etc. Where local regulations are more stringent than these policies, those regulations supersede these policies.
- Non-Trane personnel should always follow local regulations.

⚠ WARNING**Refrigerant May Be Under Positive Pressure!**

Failure to follow instructions below could result in an explosion which could result in death or serious injury or equipment damage.

System contains refrigerant and may be under positive pressure; system may also contain oil. Recover refrigerant to relieve pressure before opening the system. See unit nameplate for refrigerant type. Do not use non-approved refrigerants, refrigerant substitutes, or non-approved refrigerant additives.

⚠ WARNING**Stand-Mounted AFDH Supported by Equipment Room Floor!**

Trane assumes no responsibility for equipment damage caused by the installation of an AFDH drive version that is specified as being incorrect for the application. A stand-mounted version of an AFDH drive is designed to be rigidly supported by the equipment room floor.

Therefore, a stand-mounted AFDH drive is not recommended for use with a chiller that is equipped with spring-type vibration or seismic isolators. Trane recommends using a remote floor-mounted AFDH drive in this application.

⚠ WARNING**Incorrect Application! Adapting a Floor Stand Kit to an E-Frame AFDH!**

The smallest model E-Frame drive weighs 1203 pounds. Any attempt to adapt the 50689890010 Floor Stand Kit to an E-Frame model AFDH drive will be considered an unsupported field modification to the drive unit design. Trane assumes no responsibility for the equipment damage caused by a stress or fatigue failure of the floor stand kit due to any use outside of its intended application.

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Revision History

- Updated digit 15 in the Model Number Descriptions chapter.
- Updated unit-mounted AFDH drives topic in the Pre-Installation chapter.
- Added connector; plug/screw information in the Tracer AdaptiView miscellaneous hardware contents parts list table in chapter AFDH Drive Package Specifications.
- Updated wiring connections to 2X1 terminal strip in AFDH figure in the Installation chapter.



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Model Number Descriptions

Unit Model Number

For service purposes, Trane® Model AFDH Air-Cooled drive upgrade packages are assigned a multiple character alphanumeric model number to precisely identifies each unit.

An explanation of the identification code that appears on the unit nameplate is shown below. Use of the service model number will enable the owner/operator, installing contractors, and service technicians to define the operation, components, and options for any specific unit.

Refer to the model number printed on the nameplate when ordering replacement parts or requesting service.

Digits 1, 2, 3 — Air Cooled Adaptive Frequency Drive

AFD = Air Cooled Adaptive Frequency Drive

Digit 4 — Development Sequence

H

Digits 5, 6, 7, 8 — Starter Size (Performance RLA rating)

Performance RLA = Performance RLA

Digit 9 — Chiller Voltage

- D = 380V 60 Hz 3 Phase
- E = 440V 60 Hz 3 Phase
- F = 460V 60 Hz 3 Phase
- G = 480V 60 Hz 3 Phase
- H = 575V 60 Hz 3 Phase
- J = 600V 60 Hz 3 Phase
- R = 380V 50 Hz 3 Phase
- T = 400V 50 Hz 3 Phase
- U = 415V 50 Hz 3 Phase

Digits 10, 11— Design Sequence

** = Factory assigned

Digit 12 — New Short Circuit Rating

- C = 35K Short Circuit
- A = 65K Short Circuit
- B = 100K Short Circuit

Digits 13, 14 — Maximum RLA

- 1B = 190 Maximum RLA - 60 Hz (460/480)
- 1C = 240 Maximum RLA - 60 Hz (460/480)
- 0C = 302 Maximum RLA - 60 Hz (460/480)
- 0D = 361 Maximum RLA - 60 Hz (460/480)
- 0E = 443 Maximum RLA - 60 Hz (460/480)
- 1A = 535 Maximum RLA - 60 Hz (460/480)
- 0H = 590 Maximum RLA - 60 Hz (460/480)

- 0J = 678 Maximum RLA - 60 Hz (460/480)
- 0K = 730 Maximum RLA - 60 Hz (460/480)
- 01 = 780 Maximum RLA - 60 Hz (460/480)
- 02 = 890 Maximum RLA - 60 Hz (460/480)
- 1D = 131 Maximum RLA - 60 Hz (575/600)
- 1E = 155 Maximum RLA - 60 Hz (575/600)
- 1F = 192 Maximum RLA - 60 Hz (575/600)
- 0L = 242 Maximum RLA - 60 Hz (575/600)
- 0M = 290 Maximum RLA - 60 Hz (575/600)
- 0N = 344 Maximum RLA - 60 Hz (575/600)
- 0P = 400 Maximum RLA - 60 Hz (575/600)
- 0R = 450 Maximum RLA - 60 Hz (575/600)
- 0T = 500 Maximum RLA - 60 Hz (575/600)
- 0U = 570 Maximum RLA - 60 Hz (575/600)
- 0V = 630 Maximum RLA - 60 Hz (575/600)
- 03 = 729 Maximum RLA - 60 Hz (575/600)
- 04 = 850 Maximum RLA - 60 Hz (575/600)
- 1G = 212 Maximum RLA - 50 Hz (380/400)
- 1H = 260 Maximum RLA - 50 Hz (380/400)
- 0W = 315 Maximum RLA - 50 Hz (380/400)
- 0X = 395 Maximum RLA - 50 Hz (380/400)
- 0Y = 480 Maximum RLA - 50 Hz (380/400)
- 0Z = 588 Maximum RLA - 50 Hz (380/400)
- 05 = 658 Maximum RLA - 50 Hz (380/400)
- 06 = 745 Maximum RLA - 50 Hz (380/400)
- 07 = 800 Maximum RLA - 50 Hz (380/400)
- 08 = 880 Maximum RLA - 50 Hz (380/400)
- 09 = 990 Maximum RLA - 50 Hz (380/400)

Digit 15 — Chiller Control Type

- 3 = AdaptiView™ Controls
- 4 = Symbio™ 800 Controls

Digit 16 — Agency Listing

- 1 = UL Listing (includes Canada and California)
- 0 = No Listing

Digit 17 — AFD Type

- C = NEMA 1 Upgrade Enclosure

Digit 18 — Mounting Type

- C = Remote Mount
- A = Transition Mount
- L = LiquiFlo Mount
- P = Direct Mount 440E, 5000, 5800 Frame
- T = Direct Mount 400 Frame

Digit 19 — AFD to Motor Transition

- 0 = No Motor Transition
- A = 6" Sheetmetal Transition
- C = 12" Sheetmetal Transition
- B = 18" Sheetmetal Transition

Digit 20 — Frame Size

- D = D - Frame
- E = E - Frame

Digit 21 — Evaporator Shell Size

- 0 = For Transition, LiquiFlo, or Remote
- 5 = 050S Short Evaporator Shell
- 6 = 050L Long Evaporator Shell
- 7 = 080S Short Evaporator Shell
- 8 = 080L Long Evaporator Shell
- A = 142E Extended Evaporator Shell
- B = 142M Medium Evaporator Shell
- C = 142L Long Evaporator Shell
- E = 210L Long Evaporator Shell

Digit 22 — Replacement Bracket for LF1.0/LF1.5

- 0 = No Bracket Needed
- 1 = Replacement Bracket Kit Needed

Digit 23

0

Digit 24 — Lug Sizes

- 0 = All Applicable Lugs
- N = Two Wire 3/0 - 250 KCmil
- B = Two Wire 400 - 500 KCmil
- C = Four Wire 4/0 - 400 KCmil
- D = Three Wire 4/0 - 400 KCmil
- E = Three Wire 500 - 750 KCmil
- F = Two Wire 2/0 - 250 KCmil
- G = One Wire 2/0 - 500 KCmil
- H = Three Wire 3/0 400 KCmil
- J = Two Wire 500 - 750 KCmil
- K = One Wire 200 - 500 KCmil
- L = Two Wire 3/0 - 350 KCmil
- M = Two Wire 2AWG - 500 KCmil
- P = Three Wire 4/0 - 500 KCmil
- Q = Four Wire 4/0 - 500 KCmil
- R = Four Wire 3/0 - 400 KCmil

Digit 25 — Jumper Bar Kit

- 0 = No Jumper Bars Required
- A = Bar Kit 1 (distance between holes 5.385 and dia. .812)
- B = Bar Kit 2 (distance between holes 5.831 and dia. .812)
- C = Bar Kit 3 (distance between holes 6.103 and dia. .812)
- D = Bar Kit 4 (distance between holes 6.103 and dia. 1.187)
- E = All Bars Included

Digits 26, 27 — Design Specials

- 00 = No Design Special



Model Number Descriptions

Digits 28, 29 — Harmonic Attenuation

00 = No Attenuation

Line Reactors

- 0A = Line /Load Reactor, 0.125mH, 320 Amps, NEMA1
- 0B = Line /Load Reactor, 0.105mH, 400 Amps, NEMA1
- 0C = Line /Load Reactor, 0.085mH, 500 Amps, NEMA1
- 0D = Line /Load Reactor, 0.065mH, 600 Amps, NEMA1
- 0E = Line /Load Reactor, 0.048mH, 750 Amps, NEMA1
- 0F = Line /Load Reactor, 0.042mH, 850 Amps, NEMA1
- 0G = Line /Load Reactor, 0.040mH, 900 Amps, NEMA1
- 0H = Line /Load Reactor, 0.0038mH, 1000 Amps, NEMA1

Advanced Filter

- 1A = Advanced Filter -208 Amp free standing harmonic filter
- 1B = Advanced Filter -240 Amp free standing harmonic filter
- 1C = Advanced Filter -320 Amp free standing harmonic filter
- 1D = Advanced Filter -403 Amp free standing harmonic filter
- 1E = Advanced Filter -482 Amp free standing harmonic filter
- 1F = Advanced Filter -636 Amp free standing harmonic filter
- 1G = Advanced Filter -786 Amp free standing harmonic filter
- 1H = Advanced Filter -850 Amp free standing harmonic filter
- 1J = Advanced Filter -1000 Amp free standing harmonic filter
- 1K = Advanced Filter -1200 Amp free standing harmonic filter
- 1L = Advanced Filter -208 Amp free standing harmonic filter
- 1M = Advanced Filter -208 Amp free standing harmonic filter
- 1N = Advanced Filter -208 Amp free standing harmonic filter
- 1P = Advanced Filter -208 Amp free standing harmonic filter
- 1Q = Advanced Filter -208 Amp free standing harmonic filter



Nameplates

A nameplate is installed on each AFDH Air-Cooled Drive unit. Provide the model number and serial number printed on the nameplate when making warranty inquiries, ordering parts, or ordering literature for the unit.



General Information

This manual describes the procedures required to install NEMA 1 AFDH Air-Cooled Adaptive Frequency Drive package in place of existing direct mount starter, transition mount starter, and LiquiFlo 1.0/1.5 drive on Trane CVHE, CVHF, CVHG model centrifugal chillers, and retrofit LiquiFlo1.0/1.5 drives. This only applies to chillers with Tracer® AdaptiView™ controller.

E-Frame AFDH can be ordered in a unit-mounted configuration. Voltage options include 380/400V, 460/480V, and 575/600V.

E-Frame units can be equipped with drive rating:

- 658 amps, 745 amps, 800 amps, 880 amps, or 990 amps for 380V/400V.
- 590 amps, 678 amps, 730 amps, 780 amps, or 890 amps for 460V/480V.
- 450 amps, 500 amps, 570 amps, 630 amps, 730 amps, or 850 amps for 575V/600V.

Note: *The factory installed Tracer CH530 chiller controller system will not support an AFDH Air-Cooled Adaptive Frequency drive. The controller system must be upgraded to Tracer AdaptiView before an AFDH upgrade package can be installed.*

The AFDH series of upgrade air-cooled Adaptive Frequency drive packages are only intended for installation on existing Trane chillers with CVHE, CVHF, or CVHG model centrifugal compressors. Trane makes no claim of suitability or performance regarding upgrade AFDH drives on older Trane centrifugal compressor models or on chillers made by other manufacturers. There may be successful drive retrofits to these units, but users are cautioned that Trane has not evaluated these installations. Trane cannot verify performance, reliability or suitability of upgrade AFDH installations outside of Trane model CVHE, CVHF, and CVHG compressors.

Other Literature Required Before Ordering or Installing an AFDH Upgrade

This manual must be used in conjunction with the following publications:

- *Chiller Upgrades - Selection and Application Guideline for Air-Cooled Adaptive Frequency™ Drive Retrofit - Engineering Bulletin (SO-PRB001*-EN).*
- *TR200 - Programming Guide (BAS-SVP04*-EN).*
- *Tracer® TU Service Tool for Water-Cooled CenTraVac Chillers with Tracer® AdaptiView™ Controls - Programming Guide (CTV-SVP02*-EN).*
- *Tracer® TU Service Tool For Water-Cooled CenTraVac™ Chillers with Symbio™ Controls - Programming Guide (CTV-SVP004*-EN).*

- HUB Document DOC-155220 - MCT 10 Installation Instructions.docx (Danfoss VLT Motion Control Tools MCT 10 Set-up Software manual).
- HUB Document DOC-179427 - Creating a Project a Master File and Configuration for AFDH D and E Frame Drive.docx (AFDH D and E-Frame Drive Configuration Instructions Using MCT 10 Tool).



Pre-Installation

Installation Considerations

This chapter details potential interference fit problems, mechanical incompatibility situations, electrical code stipulations, and electrical conduit and wiring issues that can prevent successful installation and/or operation of an AFDH upgrade drive package.

Unit-Mounted AFDH Drives

Important:

- Route incoming power conduit to the roof of AFDH cabinet. The air-cooled AFDH drive is designed to have the incoming power conduit routed vertically into the unit through the removable conduit connection cover located on the left-hand rear corner of the cabinet roof. If the starter being replaced by the AFDH drive has the incoming power conduit routed horizontally across the top of the starter, or connected to the side or to the bottom of the starter cabinet, an electrician will be required to reconfigure the conduit and wiring.
- Routing the incoming power conduit into the AFDH cabinet anywhere other than through the specified location on the cabinet roof, will be considered an unsupported field modification to the cabinet design.
- When replacing a wye-delta starter with an AFDH, run conduit between the purge and the drive enclosure.

Evaluate Space Available for Rigging/ Installing Unit-mounted AFDH

All models of the E-Frame AFDH unit-mounted upgrade drives are taller, wider, and deeper than the typical wye delta unit-mounted starter they are intended to replace. Any project should start with a careful evaluation to determine if there is enough space to rig the AFDH into place and confirm existing building piping and conduit will not interfere with its mounting.

NOTICE

Route Incoming Power Conduit to the Roof of AFDH Cabinet!

Routing the incoming power conduit into the AFDH cabinet anywhere other than through the specified location on the cabinet roof, will be considered an unsupported field modification to the cabinet design. The air-cooled AFDH drive is designed to have the incoming power conduit routed vertically into the unit through the removable conduit connection cover located on the left-hand rear corner of the cabinet roof. If the starter that is being replaced by the AFDH drive has the incoming power conduit routed horizontally across the top of the starter, or connected to the side or to the bottom of the starter cabinet, an electrician will be required to reconfigure the conduit and wiring.

Direct Mount:

Figure 1. Comparison of direct-mounted AFDH to typical unit-mounted starter

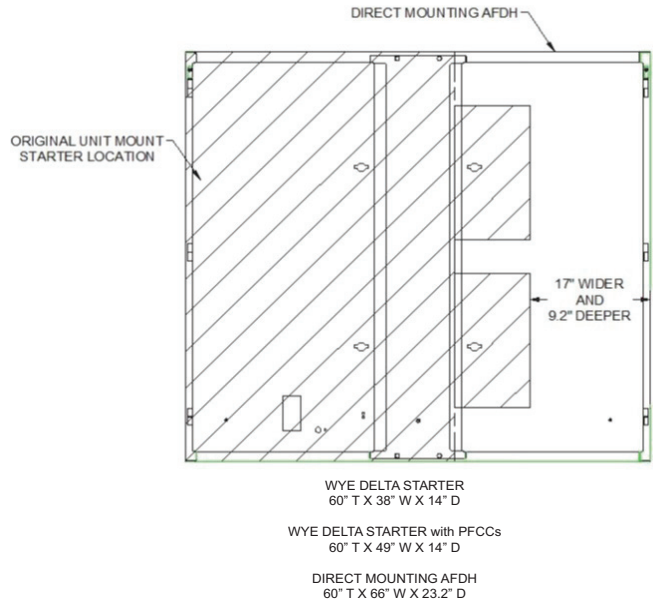
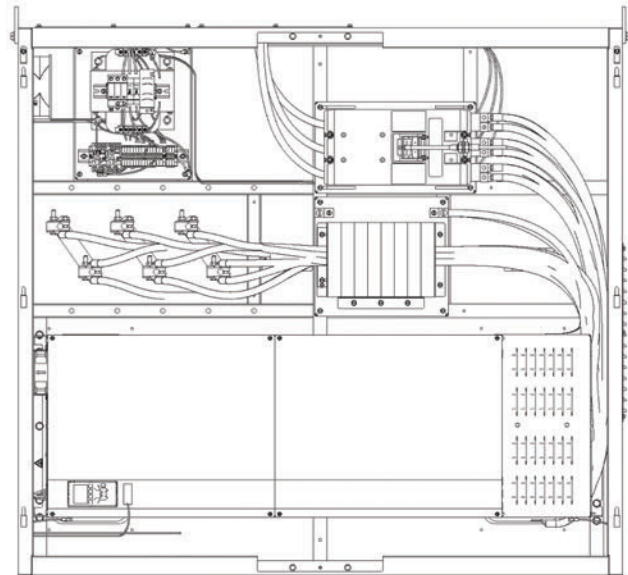


Figure 2. Open direct mount AFDH internal view



Transition Mount:

Figure 3. Comparison of transition-mounted AFDH to typical unit-mounted starter

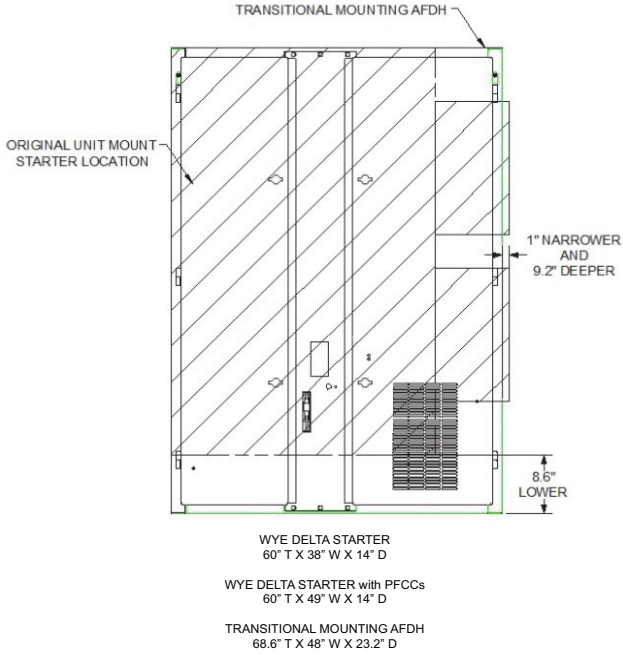
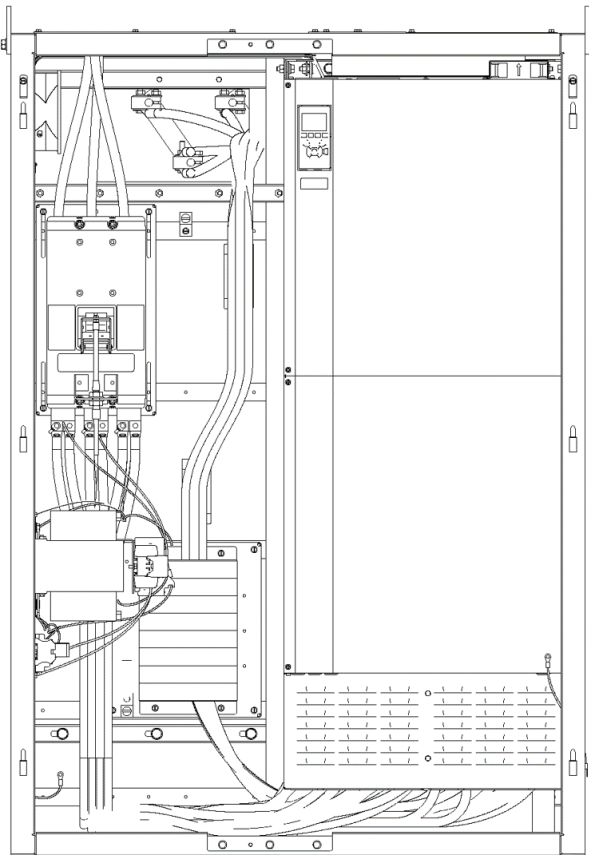


Figure 4. Open transition mount AFDH internal view



LiquidFlo:

Figure 5. Comparison of LiquiFlo AFDH to AFDB

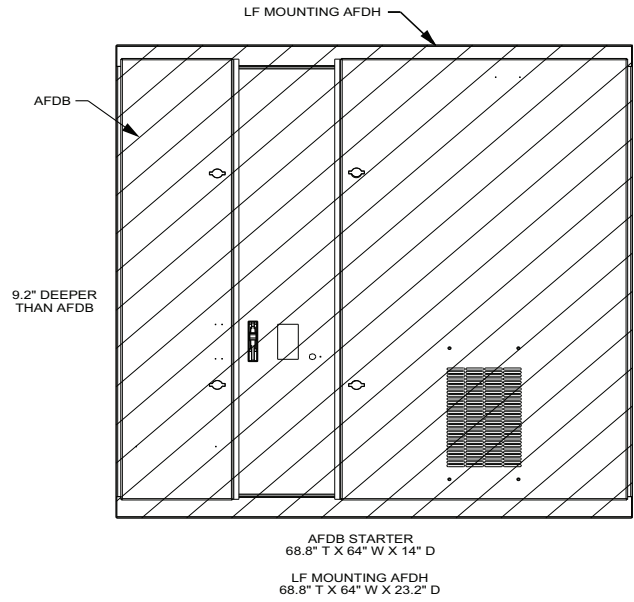
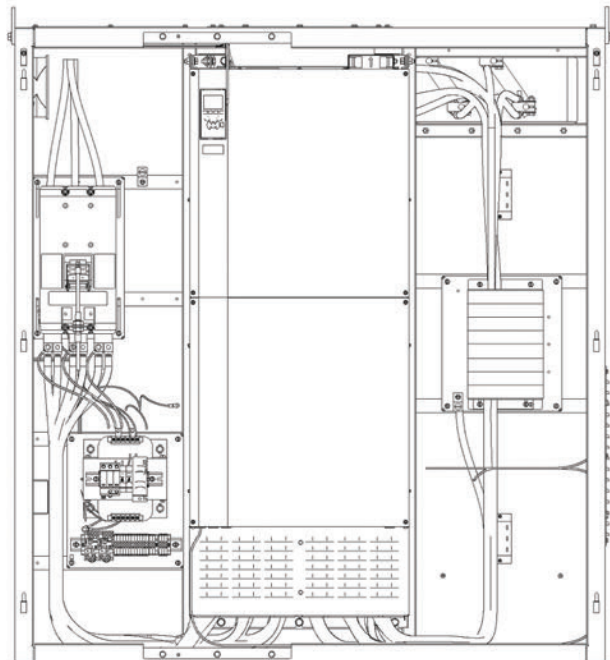


Figure 6. Open LiquiFlo AFDH internal view



Important:

- Verify electrical disconnect switch installation height meets requirements of current NEC and/or local codes. Typically, it is required the switch can be no higher than 72-inches above the surface of the operator area floor or platform. Check the potential mounted height of the AFDH disconnect switch specially if the chiller has large shells or mounted on structural steel.
- Include clearance distances specified by local electrical codes to successfully install a stand mounted AFDH drive.
- Typical code regulations require an average of 36-inches of clearance from the panel to nonconducting surfaces and 47-inches to a conducting surface.
- Drive clearances, when installed, should conform to all local codes.
- Account for cabinet door swing clearances.

Note: Refer to manual section “AFDH Drive Package Specifications,” for the dimensions and weights of all models of AFDH drives.

Confirm Chiller Controller System Compatibility with AFDH Drive

NOTICE

Excessive Cable Lengths Between AFDH Drive and Compressor Motor!

Trane assumes no responsibility for equipment damage caused by use of improper cable lengths. The variable frequency drive industry recommends that the length of the electrical cables connecting a drive unit to a motor should be kept to less than 250 feet to protect the motor from reflected voltage waves that can cause the motor to fail. Cable lengths that exceed 250 feet between the drive and the motor create the potential for damage to occur to the motor windings and/or insulation.

1. Before starting the process of installing the AFDH, confirm the existing chiller controller system has the hardware and/or software components required to make it compatible with an AFDH upgrade.
2. The controller systems that can accept an AFDH upgrade is Tracer® AdaptiView™.

Note: UC800 controller must be equipped with a Tracer AdaptiView software version released in January 2019 or newer. Upload the correct Tracer AdaptiView software version as required.

Equipment Room Ambient Temperature and Environmental Considerations

An air-conditioned equipment room is not a prerequisite for the installation and operation of NEMA 1 AFDH upgrade drive package.

- All models of the AFDH air-cooled drives are not suitable for installation into equipment rooms where the ambient temperature conditions are expected to exceed either 104°F for a continuous 24-hour period, or where the potential maximum ambient temperatures can exceed 113°F.
- If the ambient temperatures exceed either of these conditions, the potential exists to trigger a drive shutdown from an over temperature fault. This will disable the chiller until the drive temperature drops to the factory set, non-adjustable, safe temperature level that will allow the drive to be restarted.
- If the ambient temperature routinely exceeds either of these conditions, the overall service life of the drive may be compromised. Verify the drive location will meet the environmental conditions specified in the following table.

Table 1. Environmental conditions

Condition	Specification
Operating temperature (inside NEMA 1 enclosure)	32°F to 131°F (0°C to 55°C)
Ambient temperature (outside NEMA 1 enclosure)	32°F to 104°F (0°C to 40°C)
Storage temperature (ambient)	-40°F to 149°F (-40°C to 65°C)
Humidity	5 percent to 95percent (non-condensing)

Chiller Upgrades

The chiller condenser loop setpoint should be reset to fully exploit the energy savings possible with a upgrade AFDH drive. It is recommended to use Trane Option Analyzer or a similar software to determine the optimum setpoint.

Important: Under low condenser water conditions, use of an oil recovery system is recommended. These systems are found on all Trane chillers built since 1985.



Electrical Cable Size Specifications for AFDH Drives

Table 2. Input/output power wire cable sizes AFDH E-Frame drives (380V/400V)

380 V/400 V E-frame AFDH maximum amps	658	745	800	880	990
Incoming power to drive circuit breaker: Number of cable lugs per phase and range of wire sizes standard lugs will accept	Four wire lugs 4/0–500 KCmil	Four wire lugs 4/0–500 KCmil	Four wire lugs 4/0–500 KCmil	Four wire lugs 4/0–500 KCmil	Four wire lugs 4/0–500 KCmil
Incoming power to drive circuit breaker: Number of cable lugs per phase and range of wire sizes optional lugs will accept	Three wire lugs 500-750 KCmil	Three wire lugs 500-750 KCmil	Three wire lugs 500-750 KCmil	Three wire lugs 500-750 KCmil	Three wire lugs 500-750 KCmil
	Four wire lugs 3/0-400 KCmil	Four wire lugs 3/0-400 KCmil	Four wire lugs 3/0-400 KCmil	Four wire lugs 3/0-400 KCmil	Four wire lugs 3/0-400 KCmil
Phase wire between drive and circuit breaker: Number of wire cable per phase and size of factory installed wires	Three 4/0 DLO wires	Three 4/0 DLO wires	Three 313 MCM DLO wires	Three 313 MCM DLO wires	Four 4/0 DLO wires
Output power to compressor motor: Number of wire cable per phase and size of factory installed wires	Three 4/0 DLO wires	Three 4/0 DLO wires	Three 313 MCM DLO wires	Three 313 MCM DLO wires	Four 4/0 DLO wires

Table 3. Input/output power wire cable sizes AFDH E-Frame drives (460V/480V)

460V/480V E-frame AFDH maximum amps	590	678	730	780	890
Incoming power to drive circuit breaker: Number of cable lugs per phase and range of wire sizes standard lugs will accept	Four wire lugs 4/0-500 KCmilKCmil	Four wire lugs 4/0-500 KCmil	Four wire lugs 4/0-500 KCmil	Four wire lugs 4/0-500 KCmil	Four wire lugs 4/0-500 KCmil
Incoming power to drive circuit breaker: Number of cable lugs per phase and range of wire sizes optional lugs will accept	Three wire lugs 500-750 KCmil	Three wire lugs 500-750 KCmil	Three wire lugs 500-750 KCmil	Three wire lugs 500-750 KCmil	Three wire lugs 500-750 KCmil
	Four wire lugs 3/0-400 KCmil	Four wire lugs 3/0-400 KCmil	Four wire lugs 3/0-400 KCmil	Four wire lugs 3/0-400 KCmil	Four wire lugs 3/0-400 KCmil
Phase wire between drive and circuit breaker: Number of wire cable per phase and size of factory installed wires	Two 313 MCM DLO wires	Three 4/0 DLO wires	Three 4/0 DLO wires	Three 313 MCM DLO wires	Three 313 MCM DLO wires
Output power to compressor motor: Number of wire cable per phase and size of factory installed wires	Two 313 MCM DLO wires	Three 4/0 DLO wires	Three 4/0 DLO wires	Three 313 MCM DLO wires	Three 313 MCM DLO wires

Table 4. Input/output power wire cable sizes AFDH E-Frame drives (575V/600V)

575V/600V E-frame AFDH maximum amps	450	500	570	630	730	850
Incoming power to drive circuit breaker: Number of cable lugs per phase and range of wire sizes standard lugs will accept	Four wire lugs 4/0-500 KCmil	Four wire lugs 4/0-500 KCmil	Four wire lugs 4/0-500 KCmil	Four wire lugs 4/0-500 KCmil	Four wire lugs 4/0-500 KCmil	Four wire lugs 4/0-500 KCmil
Incoming power to drive circuit breaker: Number of cable lugs per phase and range of wire sizes optional lugs will accept	Three wire lugs 500-750 KCmil	Three wire lugs 500-750 KCmil	Three wire lugs 500-750 KCmil	Three wire lugs 500-750 KCmil	Three wire lugs 500-750 KCmil	Three wire lugs 500-750 KCmil
	Four wire lugs 3/0-400 KCmil	Four wire lugs 3/0-400 KCmil	Four wire lugs 3/0-400 KCmil	Four wire lugs 3/0-400 KCmil	Four wire lugs 3/0-400 KCmil	Four wire lugs 3/0-400 KCmil
Phase wire between drive and circuit breaker: Number of wire cable per phase and size of factory installed wires	Two 4/0 DLO wires	Two 4/0 DLO wires	Two 313 MCM DLO wires	Three 4/0 DLO wires	Three 4/0 DLO wires	Three 313 MCM DLO wires
Output power to compressor motor: Number of wire cable per phase and size of factory installed wires	Two 4/0 DLO wires	Two 4/0 DLO wires	Two 313 MCM DLO wires	Three 4/0 DLO wires	Three 4/0 DLO wires	Three 313 MCM DLO wires

Requirements for Installation Technicians

To properly install an AFDH upgrade Adaptive Frequency drive package, the technician must have a good working knowledge of the centrifugal chiller controller system involved in the application. Training is highly recommended before beginning this upgrade.

Required Tools

Normal tools are required to perform the work. A trained, HVAC service technician with a well-stocked tool chest should already have the majority of the normal tools needed for this job.

The following is a partial list of specific field supplied hardware and software components and special tools required to perform the drive upgrade:

- The appropriate lifting device or devices (including all necessary rigging hardware) with the capacity to safely lift up to 1500 lb.

Important: *A spreader bar will be required if the drive unit will be hoisted into position using a single lifting device that is capable of making only a single-point lift.*

- Torque wrench capable of 40 to 170 foot-pounds.
- A PC or laptop equipped with the correct software tools for the chiller controller involved in the application.
 - Tracer TU service software version 10.2.174 or newer.

Notes:

- Refer to *TR200 - Programming Guide (BAS-SVP04*-EN)* for full program parameter details and descriptions, and the instructions necessary to operate the Local Control Panel (LCP) and program the necessary drive parameters.
- The most current CTV and CVR microprocessor (MP) firmware files are included with the program files for the Tracer TU service software tools.
- Type A to Type B USB cable to connect the computer to a Tracer UC800 controller.
- Magnet screwdriver (TOL01343).

Field-Provided Material

Field provided material will be required to perform the drive upgrade. See the partial list of material here to help the technician to plan ahead and to avoid material shortages at the job site.

- Self-adhesive cable tie mounting bases and cable ties.
 - Used to help clean up wiring runs during the installation process.
- Loctite® 554 thread sealant for refrigerant applications (Trane part number SEL00528).
 - Used in applications where a pressure transducer needs to be installed.
- For direct mount drive install, have a 3-inch x 3-inch slotted shim full assortment kit available.
 - Used to shim between the enclosure and the evaporator attached bracket.

Recommended Rigging and Lifting Procedures for AFDH Drive Units

WARNING

Heavy Objects!

Failure to follow instructions below could result in unit dropping which could result in death or serious injury, and equipment or property-only damage.

Ensure that all the lifting equipment used is properly rated for the weight of the unit being lifted. Each of the cables (chains or slings), hooks, and shackles used to lift the unit must be capable of supporting the entire weight of the unit. Lifting cables (chains or slings) may not be of the same length. Adjust as necessary for even unit lift.

WARNING

Improper Unit Lift!

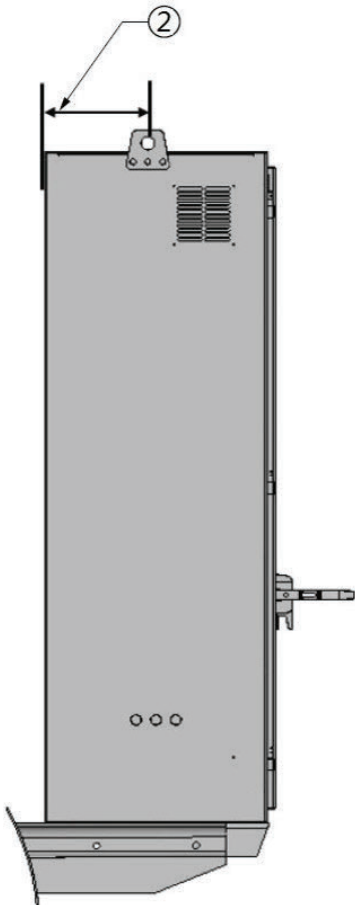
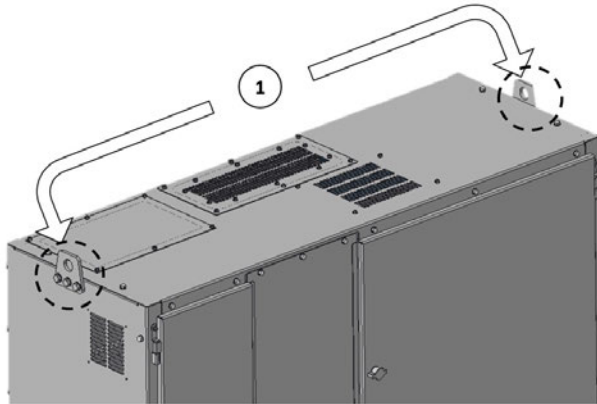
Failure to properly lift unit in a LEVEL position could result in unit dropping and possibly crushing operator/ technician which could result in death or serious injury, and equipment or property-only damage.

An AFDH cabinet assembly is top heavy. Test lift unit approximately 24 inches (61 cm) to verify proper center of gravity lift point. To avoid dropping of unit, reposition lifting point if unit is not level.

Do not lift such that any angle is placed on the lifting tabs. They must only be lifted vertically.

Unit Lifting Points

Figure 7. Unit lifting points and center of gravity

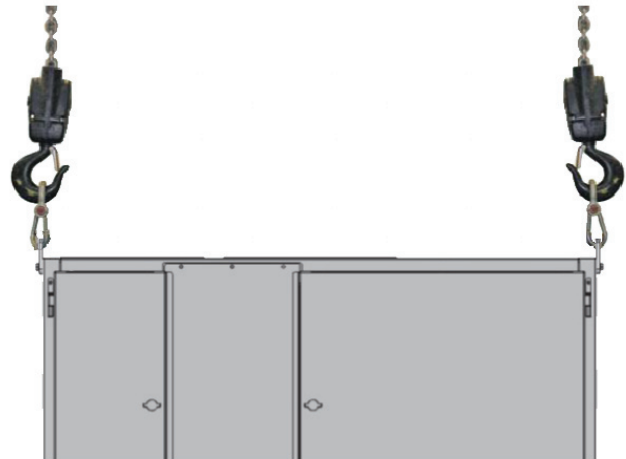


- 1. Factory provided unit lift tabs.
- 2. AFDH E-Frame Unit front-to-rear center of gravity.

Preferred Lifting Method

The preferred method for lifting an AFDH drive unit to position it for installation, is to use an identical individual hoisting device at each lift point.

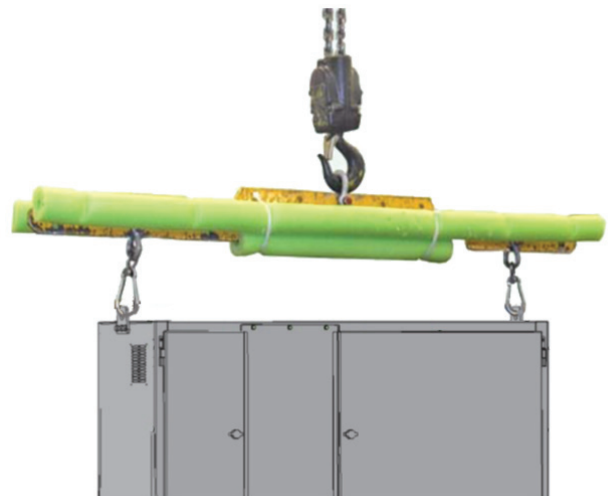
Figure 8. Preferred lifting method using two identical individual hoists



Alternative Lifting Method

If it is only possible to use a single hoisting device to lift an AFDH drive unit to position it for installation, a spreader bar should be used to allow adjusting the rigging as necessary to balance the unit around its center-of-gravity to ensure full control of the unit during lifting.

Figure 9. Alternative lifting method using a single hoist and spreader bar



Center of Gravity Reference (FEA Method)

Figure 10. Direct mount

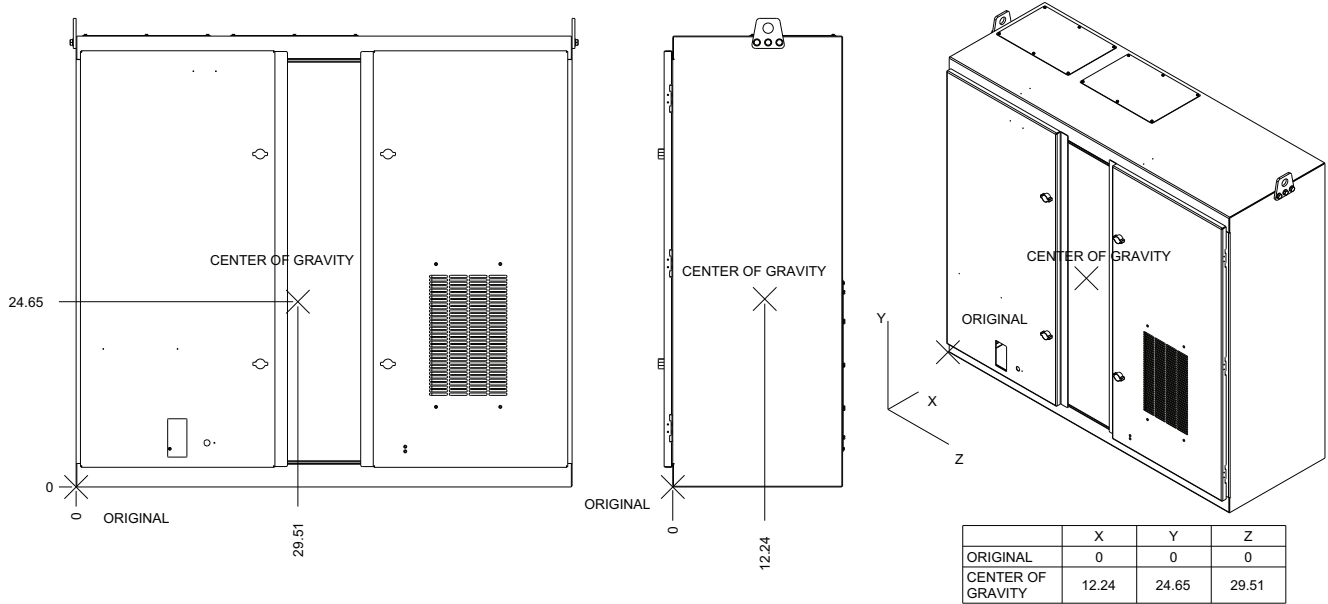


Figure 11. Transition mount and LiquiFlo 1.0/1.5 frame 3

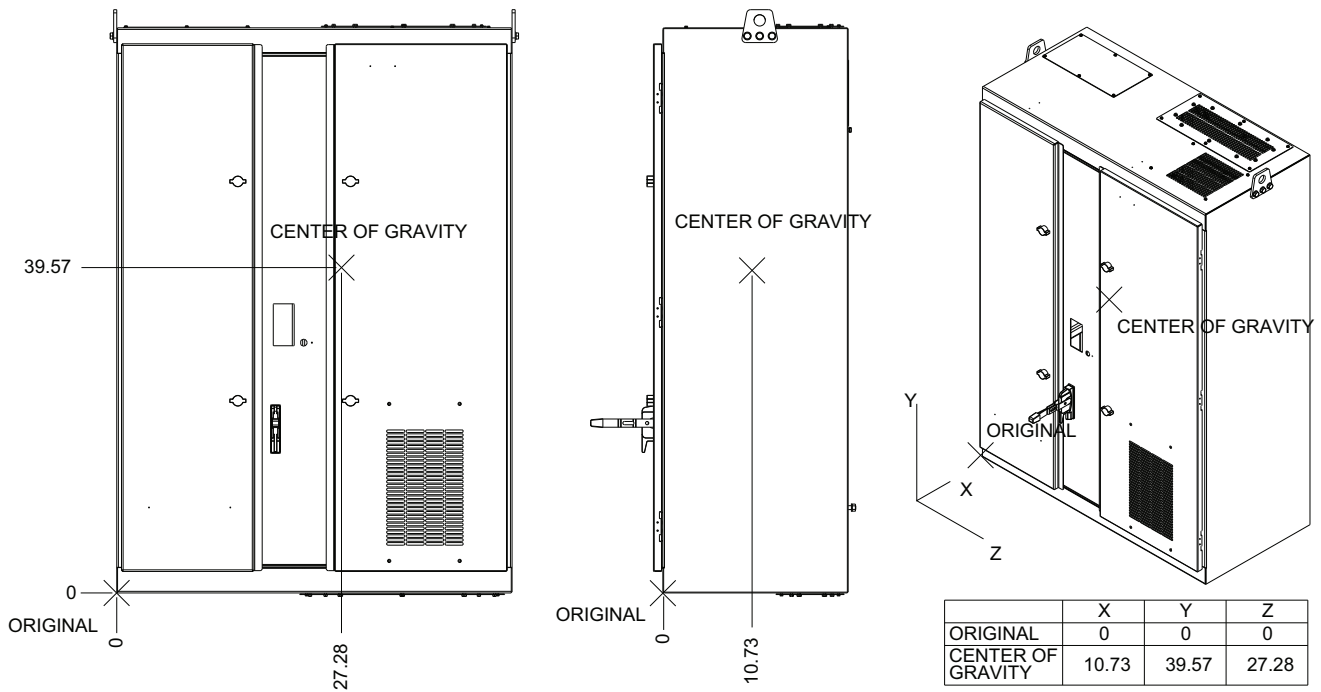
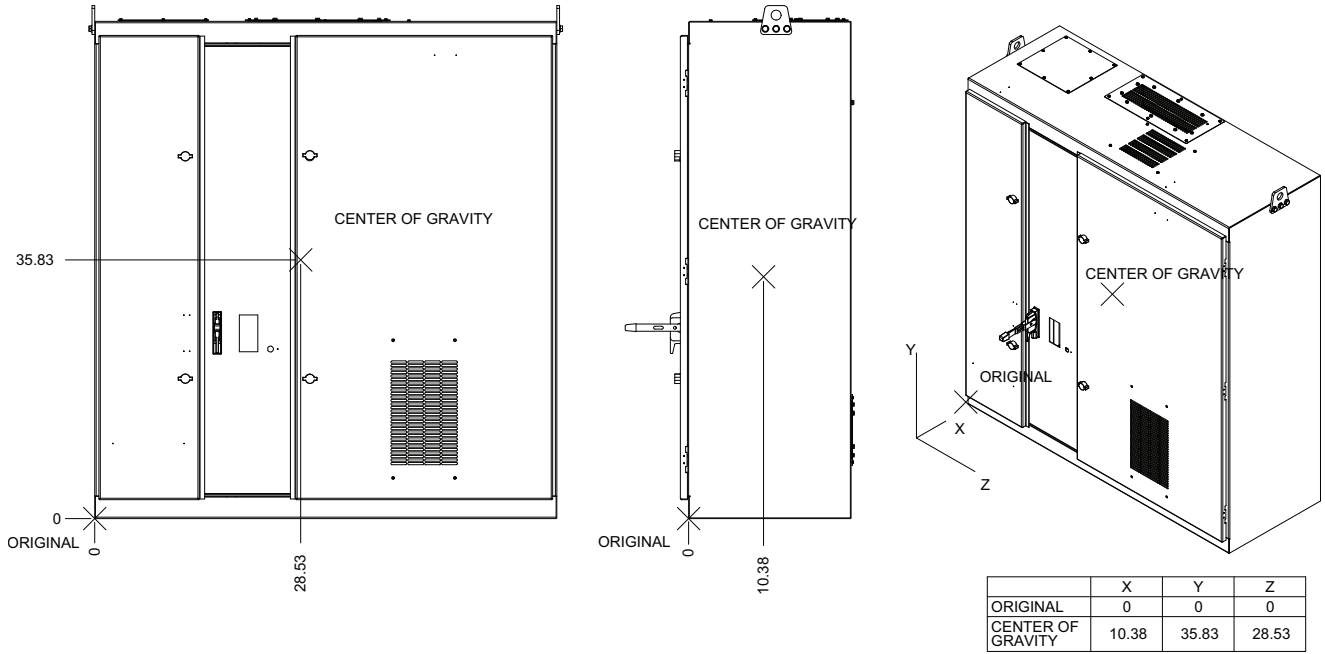


Figure 12. LiquiFlo 1.0/1.5 frame 4

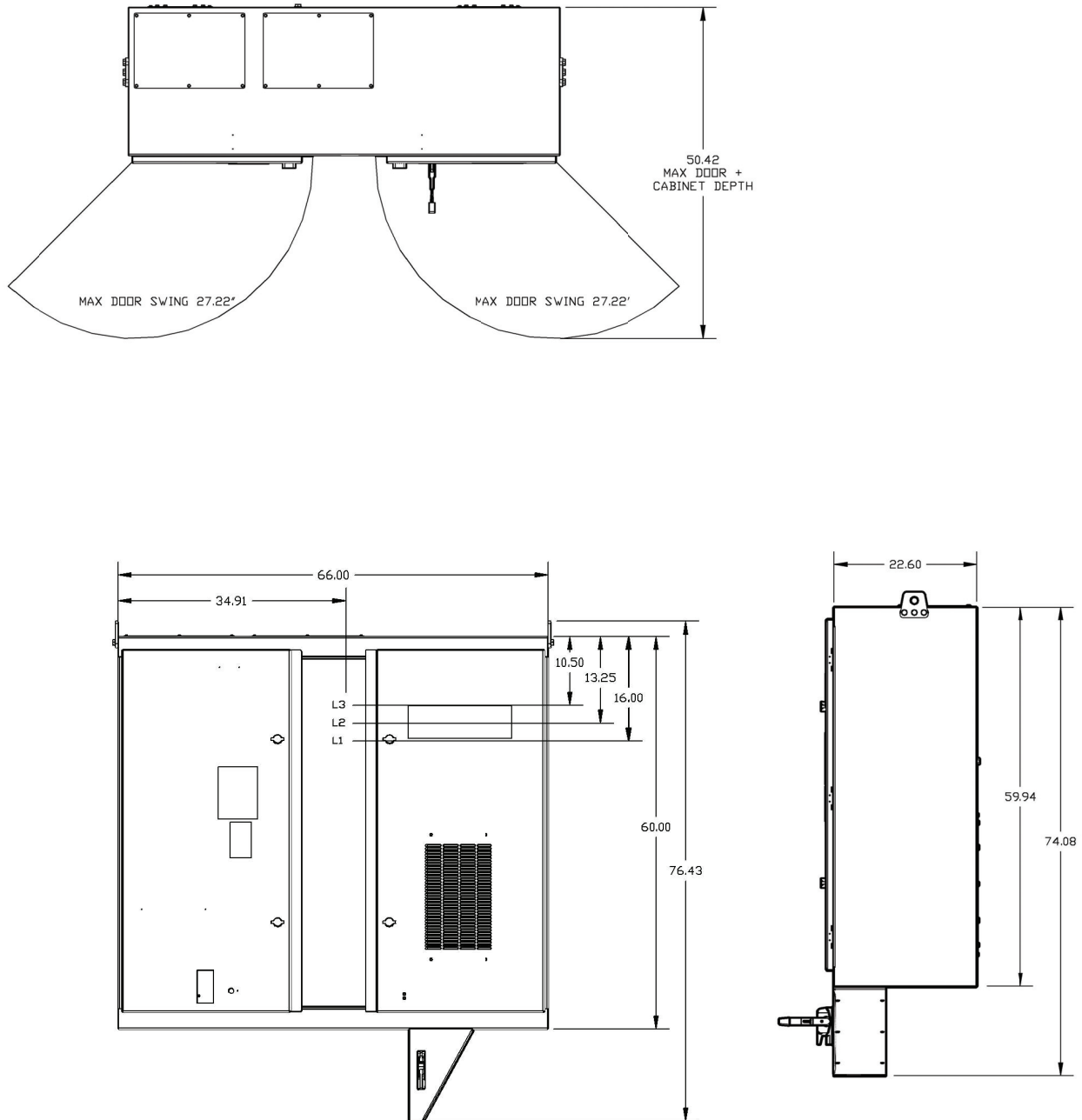




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Direct Mount Unit Dimension

Figure 13. Top, front, and side view of E-Frame AFDH cabinet with dimensions - direct mount drive

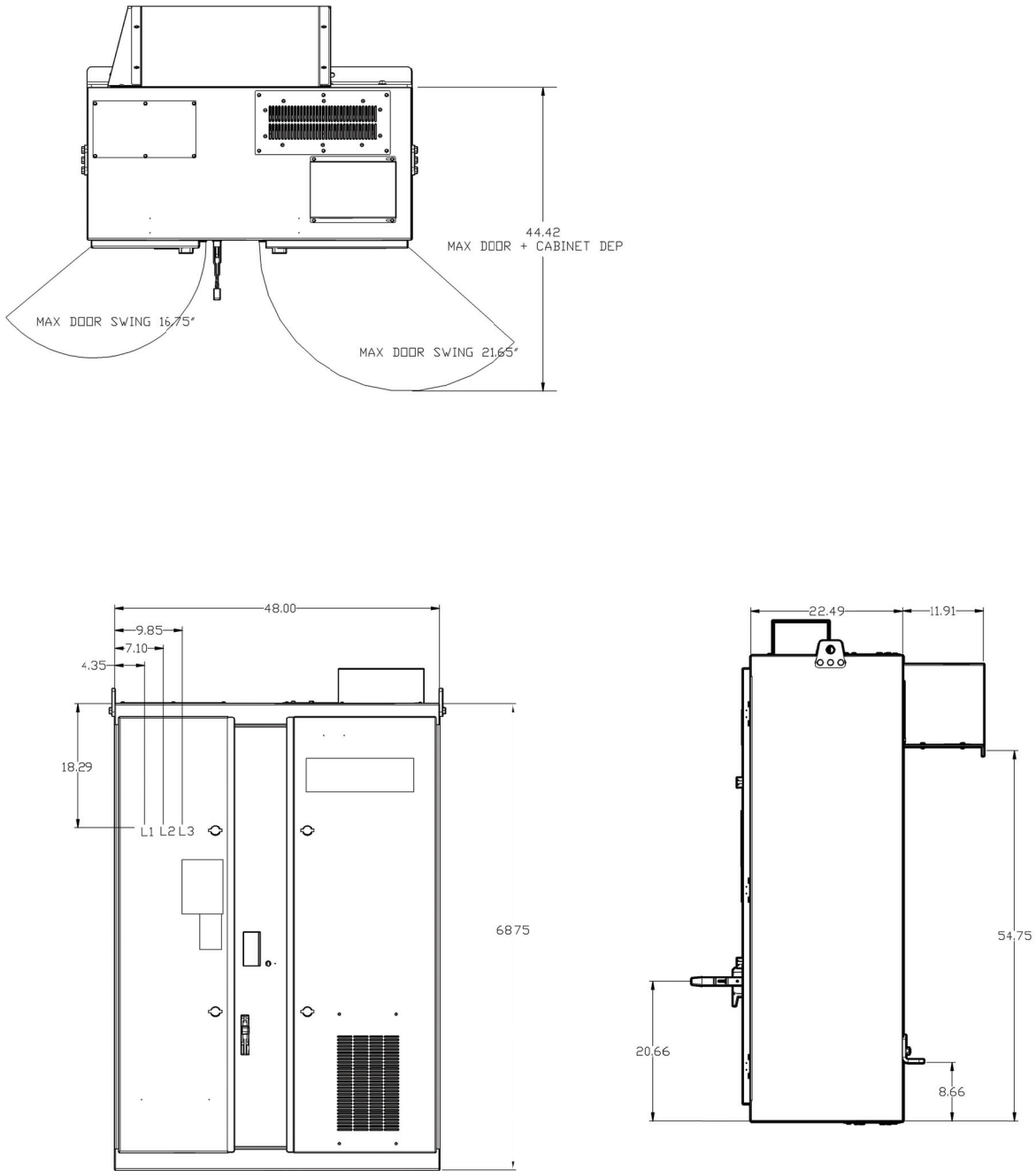




AFDH Drive Package Specifications

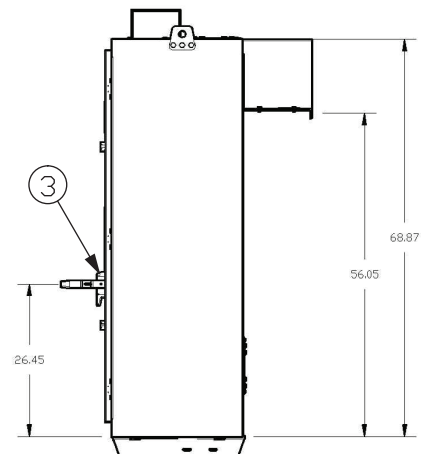
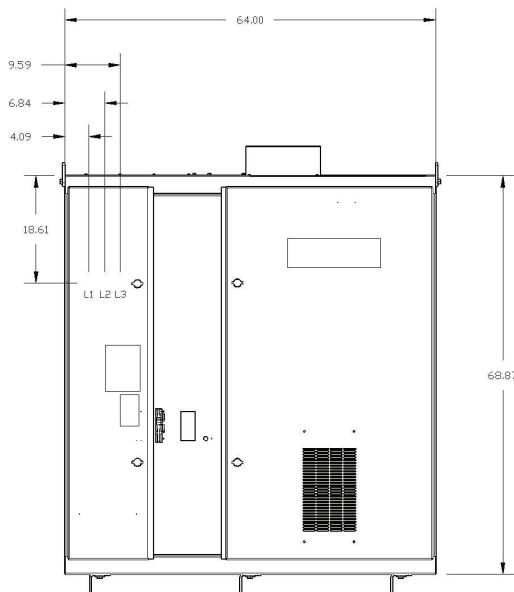
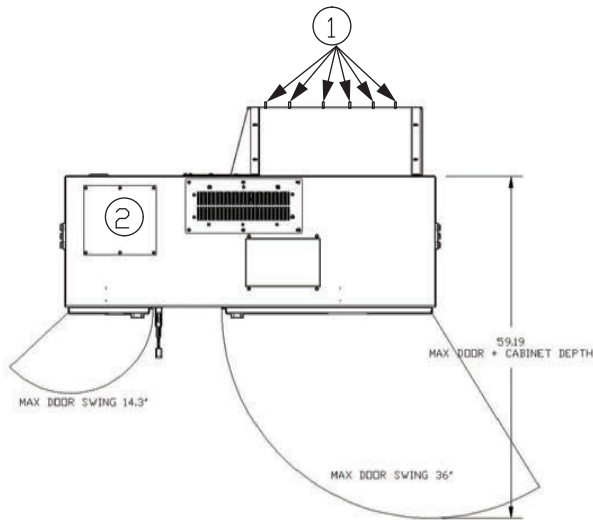
Transition Mount Unit Dimensions

Figure 14. Top, front, and side view of E-Frame AFDH cabinet with dimensions - transition mount drive



LiquiFlo 1.0/1.5 Frame 4 Unit Dimensions

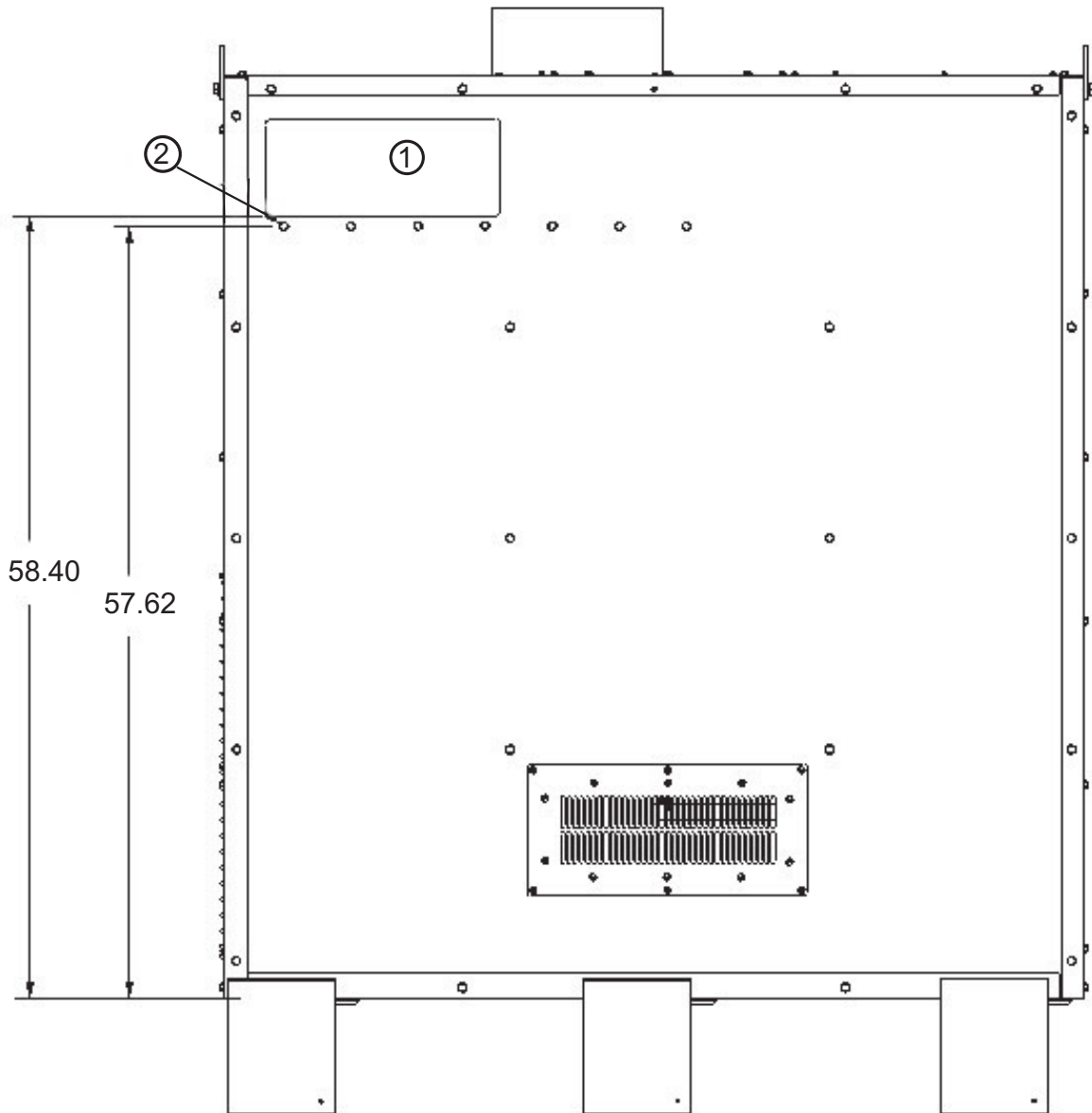
Figure 15. Top, front, and side view of LF 1/1.5 frame 4 E-Frame AFDH cabinet with dimensions - LiquiFlo drive



1. Z-bracket mounting studs (each stud = 3/8-16 x 1.75 in.)
2. Two-piece access door cover on top of the 9.3 in. x 14.9 in. incoming power wire cutout.
3. Electrical disconnect switch

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Figure 16. Rear view of LF 1/1.5 frame 4 E-Frame AFDH cabinet with dimensions - LiquiFlo drive



1. Tor terminal access cover. Size of cutout is 7.2 in. x 17.6 in.
2. Centerline of Z-bracket mounting studs

Drive Unit Weights and Heat Rejection

Table 5. AFDH E-Frame unit weights (380V/480V)

380V/480V E-frame AFDH maximum amps	658			745			800			880			990		
Enclosure type	Direct	Transition	LF	Direct	Transition	LF	Direct	Transition	LF	Direct	Transition	LF	Direct	Transition	LF
Unit weight (lb)	1402	1437.5	1516.2	1402	1437.5	1516.2	1402	1437.5	1516.2	1452	1487.5	1566.2	1452	1487.5	1566.2
Heat rejection (Btu/h)	24306			28084			30632			32984			38539		

Table 6. AFDH E-Frame unit weights (460V/480V)

460V/480V E-frame AFDH maximum amps	590			678			730			780			890		
Enclosure type	Direct	Transition	LF	Direct	Transition	LF	Direct	Transition	LF	Direct	Transition	LF	Direct	Transition	LF
Unit weight (lb)	1402	1437.5	1516.2	1402	1437.5	1516.2	1402	1437.5	1516.2	1452	1487.5	1566.2	1452	1487.5	1566.2
Heat rejection (Btu/h)	20835			24323			27856			27310			32176		

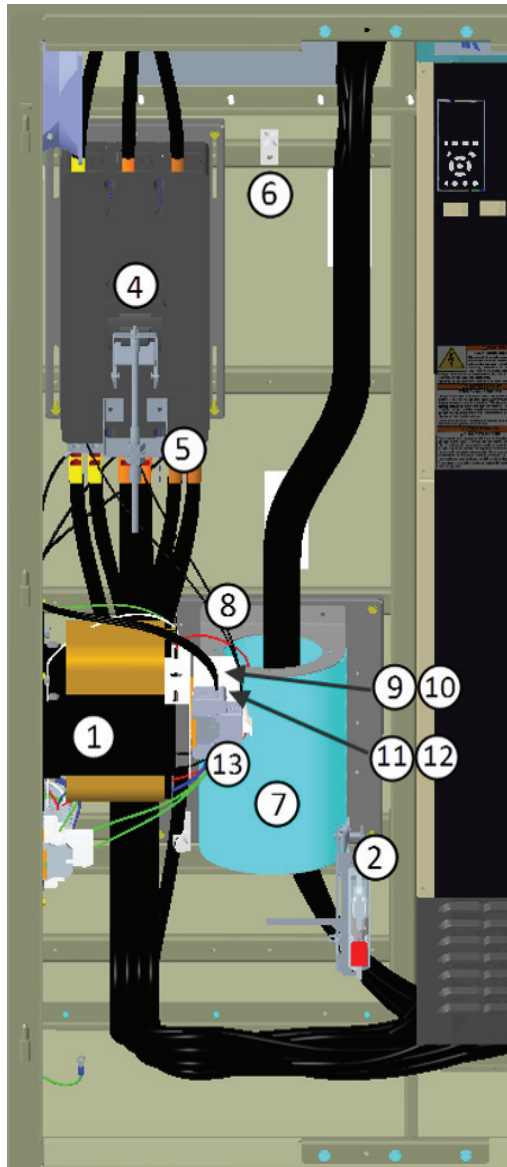
Table 7. AFDH E-Frame unit weights (575V/600V)

575V/600V E-frame AFDH maximum amps	450			500			570		
Enclosure type	Direct	Transition	LF	Direct	Transition	LF	Direct	Transition	LF
Unit weight (lb)	1402	1437.5	1516.2	1402	1437.5	1516.2	1402	1437.5	1516.2
Heat rejection (Btu/h)	21353			24139			28221		
575V/600V E-frame AFDH maximum amps	630			730			850		
Enclosure type	Direct	Transition	LF	Direct	Transition	LF	Direct	Transition	LF
Unit weight (lb)	1402	1437.5	1516.2	1452	1487.5	1566.2	1452	1487.5	1566.2
Heat rejection (Btu/h)	32081			35961			44067		

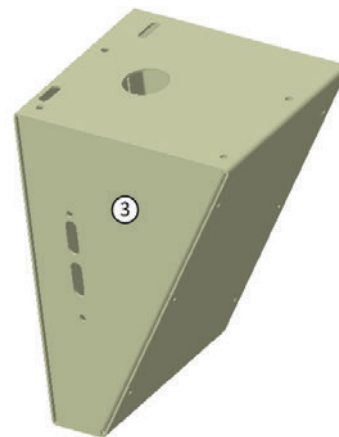
E-Frame Drive Unit Components

Drive Unit Component Parts Housed within the Custom Enclosure

Figure 17. Custom enclosure parts



E-Frame



D and E-Frame

Table 8. Custom enclosure parts: E-Frame 658 amps model drives (380V/400V)

Trane assembly part numbers for all optional model versions of 380V/400 V E-Frame 658 amps AFDH					
Figure 17 Callout	Part description	Trane X-code part number	Trane mnemonic number	Supplier part number	Quantity
1	4 KVA Transformer	X13550916020			1
2	Circuit breaker handle		HDL01302		1
3	Circuit breaker handle metal mounting base	X19091662001			1
4	Circuit breaker			NGH312033E	1
				NGC312033E(Opt)	
5	Circuit breaker lug			TA1200NB1	3
				TA1201NB1(Opt)	
				T1200NB3(Opt)	
6	Ground lug	X19170060020			2
7	Choke	X13640734010			7
8	Choke mounting bracket	506898810100			2
9	Fuse holder; 60A, 600V, 1P	X13111194010			1
10	Fuse 40A, 600V	X13110755020			1
11	Fuse holder; 30A, 600V, 2P	X13111193010			1
12	Fuse 15A, 600V	X13110683300			2
13	Arrester; 3-pole MOV,600V WYE	X13641480001			1

Table 9. Custom enclosure parts: E-Frame 745 amps model drives (380V/400V)

Trane assembly part numbers for all optional model versions of 380V/400 V E-Frame 745 amps AFDH					
Figure 17 Callout	Part description	Trane X-code part number	Trane mnemonic number	Supplier part number	Quantity
1	4 KVA Transformer	X13550916020			1
2	Circuit breaker handle		HDL01302		1
3	Circuit breaker handle metal mounting base	X19091662001			1
4	Circuit breaker			NGH312033E	1
				NGC312033E(Opt)	
5	Circuit breaker lug			TA1200NB1	3
				TA1201NB1(Opt)	
				T1200NB3(Opt)	
6	Ground lug	X19170060020			2
7	Choke	X13640734010			7
8	Choke mounting bracket	506898810100			2
9	Fuse holder; 60A, 600V, 1P	X13111194010			1
10	Fuse 40A, 600V	X13110755020			1
11	Fuse holder; 30A, 600V, 2P	X13111193010			1
12	Fuse 15A, 600V	X13110683300			2
13	Arrester; 3-pole MOV,600V WYE	X13641480001			1



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Table 10. Custom enclosure parts; E-Frame 800 amps model drives (380V/400V)

Trane assembly part numbers for all optional model versions of 380V/400V E-Frame 800 amps AFDH					
Figure 17 Callout	Part description	Trane X-code part number	Trane mnemonic number	Supplier part number	Quantity
1	4 KVA Transformer	X13550916020			1
2	Circuit breaker handle		HDL01302		1
3	Circuit breaker handle metal mounting base	X19091662001			1
4	Circuit breaker			NGH312033E	1
				NGC312033E(Opt)	
5	Circuit breaker lug			TA1200NB1	3
				TA1201NB1(Opt)	
				T1200NB3(Opt)	
6	Ground lug	X19170060020			2
7	Choke	X13640734010			7
8	Choke mounting bracket	506898810100			2
9	Fuse holder; 60A, 600V, 1P	X13111194010			1
10	Fuse 40A, 600V	X13110755020			1
11	Fuse holder; 30A, 600V, 2P	X13111193010			1
12	Fuse 15A, 600V	X13110683300			2
13	Arrester; 3-pole MOV,600V WYE	X13641480001			1

Table 11. Custom enclosure parts; E-Frame 880 amps model drives (380V/400V)

Trane assembly part numbers for all optional model versions of 380V/400V E-Frame 880 amps AFDH					
Figure 17 Callout	Part description	Trane X-Code part number	Trane mnemonic number	Supplier part number	Quantity
1	4 KVA Transformer	X13580273010			1
2	Circuit breaker handle		HDL01302		1
3	Circuit breaker handle metal mounting base	X19091662001			1
4	Circuit breaker			NGH312033EC	1
				NGC312033EC(Opt)	
5	Circuit breaker lug			TA1200NB1	3
				TA1201NB1(Opt)	
				T1200NB3(Opt)	
6	Ground lug	X19170060020			2
7	Choke	X13640735010			8
8	Choke mounting bracket	507123430001			2
9	Fuse holder; 60A, 600V, 1P	X13111194010			1
10	Fuse 40A, 600V	X13110755020			1
11	Fuse holder; 30A, 600V, 2P	X13111193010			1
12	Fuse 15A, 600V	X13110683300			2
13	Arrester; 3-pole MOV,600V WYE	X13641480001			1

Table 12. Custom enclosure parts: E-Frame 990 amps model drives (380V/400V)

Trane assembly part numbers for all optional model versions of 380V/400V E-Frame 990 amps AFDH					
Figure 17 Callout	Part description	Trane X-code part number	Trane mnemonic number	Supplier part number	Quantity
1	4 KVA Transformer	X13550916020			1
2	Circuit breaker handle		HDL01302		1
3	Circuit breaker handle metal mounting base	X19091662001			1
4	Circuit breaker			NGH312033EC	1
				NGC312033EC(Opt)	
5	Circuit breaker lug			TA1200NB1	3
				TA1201NB1(Opt)	
				T1200NB3(Opt)	
6	Ground lug	X19170060020			2
7	Choke	X13640735010			8
8	Choke mounting bracket	507123430001			2
9	Fuse holder; 60A, 600V, 1P	X13111194010			1
10	Fuse 40A, 600V	X13110755020			1
11	Fuse holder; 30A, 600V, 2P	X13111193010			1
12	Fuse 15A, 600V	X13110683300			2
13	Arrester; 3-pole MOV,600V WYE	X13641480001			1

Table 13. Custom enclosure parts; E-Frame 590 amps model drives (460V/480V)

Trane assembly part numbers for all optional model versions of 460V/480V E-Frame 590 amps AFDH					
Figure 17 Callout	Part Description	Trane X-Code Part Number	Trane mnemonic number	Supplier part number	Quantity
1	4 KVA Transformer	X13550916030			1
2	Circuit breaker handle		HDL01302		1
3	Circuit breaker handle metal mounting base	X19091662001			1
4	Circuit breaker			NGH308033E	1
				NGC308033E(Opt)	
5	Circuit breaker lug			TA1200NB1	3
				TA1201NB1(Opt)	
				T1200NB3(Opt)	
6	Ground lug	X19170060020			2
7	Choke	X13640734010			7
8	Choke mounting bracket	506898810100			2
9	Fuse holder; 60A, 600V, 1P	X13111194010			1
10	Fuse 40A, 600V	X13110755020			1
11	Fuse holder; 30A, 600V, 2P	X13111193010			1
12	Fuse 15A, 600V	X13110683300			2
13	Arrester; 3-Pole MOV,600V WYE	X13641480001			1



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Table 14. Custom enclosure parts; E-Frame 678 amps model drives (460V/480V)

Trane assembly part numbers for all optional model versions of 460V/480V E-Frame 678 amps AFDH					
Figure 17 Callout	Part description	Trane X-code part number	Trane mnemonic number	Supplier part number	Quantity
1	4 KVA Transformer	X13550916030			1
2	Circuit breaker handle		HDL01302		1
3	Circuit breaker handle metal mounting base	X19091662001			1
4	Circuit breaker			NGH312033E	1
				NGC312033E(Opt)	
5	Circuit breaker lug			TA1200NB1	3
				TA1201NB1(Opt)	
				T1200NB3(Opt)	
6	Ground lug	X19170060020			2
7	Choke	X13640734010			7
8	Choke mounting bracket	506898810100			2
9	Fuse holder; 60A, 600V, 1P	X13111194010			1
10	Fuse 40A, 600V	X13110755020			1
11	Fuse holder; 30A, 600V, 2P	X13111193010			1
12	Fuse 15A, 600V	X13110683300			2
13	Arrester; 3-pole MOV,600V WYE	X13641480001			1

Table 15. Custom enclosure parts; E-Frame 730 amps model drives (460V/480V)

Trane assembly part numbers for all optional model versions of 460V/480V E-Frame 730 amps AFDH					
Figure 17 Callout	Part description	Trane X-code part number	Trane mnemonic number	Supplier part number	Quantity
1	4 KVA Transformer	X13550916030			1
2	Circuit breaker handle		HDL01302		1
3	Circuit breaker handle metal mounting base	X19091662001			1
4	Circuit breaker			NGH312033E	1
				NGC312033E(Opt)	
5	Circuit breaker lug			TA1200NB1	3
				TA1201NB1(Opt)	
				T1200NB3(Opt)	
6	Ground lug	X19170060020			2
7	Choke	X13640734010			7
8	Choke mounting bracket	506898810100			2
9	Fuse holder; 60A, 600V, 1P	X13111194010			1
10	Fuse 40A, 600V	X13110755020			1
11	Fuse holder; 30A, 600V, 2P	X13111193010			1
12	Fuse 15A, 600V	X13110683300			2
13	Arrester; 3-pole MOV,600V WYE	X13641480001			1

Table 16. Custom enclosure parts; E-Frame 780 amps model drives (460V/480V)

Trane assembly part numbers for all optional model versions of 460V/480V E-Frame 780 amps AFDH					
Figure 17 Callout	Part description	Trane X-code part number	Trane mnemonic number	Supplier part number	Quantity
1	4 KVA Transformer	X13550916030			1
2	Circuit breaker handle		HDL01302		1
3	Circuit breaker handle metal mounting base	X19091662001			1
4	Circuit breaker			NGH312033E	1
				NGC312033E(Opt)	
5	Circuit breaker lug			TA1200NB1	3
				TA1201NB1(Opt)	
				T1200NB3(Opt)	
6	Ground lug	X19170060020			2
7	Choke	X13640735010			8
8	Choke mounting bracket	507123430001			2
9	Fuse holder; 60A, 600V, 1P	X13111194010			1
10	Fuse 40A, 600V	X13110755020			1
11	Fuse holder; 30A, 600V, 2P	X13111193010			1
12	Fuse 15A, 600V	X13110683300			2
13	Arrester; 3-pole MOV,600V WYE	X13641480001			1

Table 17. Custom enclosure parts; E-Frame 890 amps model drives (460V/480V)

Trane assembly part numbers for all optional model versions of 460V/480V E-Frame 890 amps AFDH					
Figure 17 Callout	Part description	Trane X-code part number	Trane mnemonic number	Supplier part number	Quantity
1	4 KVA Transformer	X13550916030			1
2	Circuit breaker handle		HDL01302		1
3	Circuit breaker handle metal mounting base	X19091662001			1
4	Circuit breaker			NGH312033EC	1
				NGC312033EC(Opt)	
5	Circuit breaker lug			TA1200NB1	3
				TA1201NB1(Opt)	
				T1200NB3(Opt)	
6	Ground lug	X19170060020			2
7	Choke	X13640735010			8
8	Choke mounting bracket	507123430001			2
9	Fuse holder; 60A, 600V, 1P	X13111194010			1
10	Fuse 40A, 600V	X13110755020			1
11	Fuse holder; 30A, 600V, 2P	X13111193010			1
12	Fuse 15A, 600V	X13110683300			2
13	Arrester; 3-pole MOV,600V WYE	X13641480001			1



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Table 18. Custom enclosure parts; E-Frame 450 amps model drives (575V/600V)

Trane assembly part numbers for all optional model versions of 575V/600V E-Frame 450 amps AFDH					
Figure 17 Callout	Part description	Trane X-code part number	Trane mnemonic number	Supplier part number	Quantity
1	4 KVA Transformer	X13550916040			1
2	Circuit breaker handle		HDL01302		1
3	Circuit breaker handle metal mounting base	X19091662001			1
4	Circuit breaker			NGH312033E	1
				NGC312033E(Opt)	
5	Circuit breaker lug			TA1200NB1	3
				TA1201NB1(Opt)	
				T1200NB3(Opt)	
6	Ground lug	X19170060020			2
7	Choke	X13640734010			7
8	Choke mounting bracket	506898810100			2
9	Fuse holder; 60A, 600V, 1P	X13111194010			1
10	Fuse 40A, 600V	X13110755020			1
11	Fuse holder; 30A, 600V, 2P	X13111193010			1
12	Fuse 15A, 600V	X13110683300			2
13	Arrester; 3-Pole MOV,600V WYE	X13641480001			1

Table 19. Custom enclosure parts; E-Frame 500 amps model drives (575V/600V)

Trane assembly part numbers for all optional model versions of 575V/600V E-Frame 500 amps AFDH					
Figure 17 Callout	Part description	Trane X-code part number	Trane mnemonic number	Supplier part number	Quantity
1	4 KVA Transformer	X13550916040			1
2	Circuit breaker handle		HDL01302		1
3	Circuit breaker handle metal mounting base	X19091662001			1
4	Circuit breaker			NGH312033E	1
				NGC312033E(Opt)	
5	Circuit breaker lug			TA1200NB1	3
				TA1201NB1(Opt)	
				T1200NB3(Opt)	
6	Ground lug	X19170060020			2
7	Choke	X13640734010			7
8	Choke mounting bracket	506898810100			2
9	Fuse holder; 60A, 600V, 1P	X13111194010			1
10	Fuse 40A, 600V	X13110755020			1
11	Fuse holder; 30A, 600V, 2P	X13111193010			1
12	Fuse 15A, 600V	X13110683300			2
13	Arrester; 3-pole MOV,600V WYE	X13641480001			1

Table 20. Custom enclosure parts; E-Frame 570 amps model drives (575V/600V)

Trane assembly part numbers for all optional model versions of 575V/600V E-Frame 570 amps AFDH					
Figure 17 Callout	Part description	Trane X-code part number	Trane mnemonic number	Supplier part number	Quantity
1	4 KVA Transformer	X13550916040			1
2	Circuit breaker handle		HDL01302		1
3	Circuit breaker handle metal mounting base	X19091662001			1
4	Circuit breaker			NGH312033E	1
				NGC312033E(Opt)	
5	Circuit breaker lug			TA1200NB1	3
				TA1201NB1(Opt)	
				T1200NB3(Opt)	
6	Ground lug	X19170060020			2
7	Choke	X13640734010			7
8	Choke mounting bracket	506898810100			2
9	Fuse holder; 60A, 600V, 1P	X13111194010			1
10	Fuse 40A, 600V	X13110755020			1
11	Fuse holder; 30A, 600V, 2P	X13111193010			1
12	Fuse 15A, 600V	X13110683300			2
13	Arrester; 3-pole MOV,600V WYE	X13641480001			1

Table 21. Custom enclosure parts; E-Frame 630 amps model drives (575V/600V)

Trane assembly part numbers for all optional model versions of 575V/600V E-Frame 630 amps AFDH					
Figure 17 Callout	Part description	Trane X-code part number	Trane mnemonic number	Supplier part number	Quantity
1	4 KVA Transformer	X13550916040			1
2	Circuit breaker handle		HDL01302		1
3	Circuit breaker handle metal mounting base	X19091662001			1
4	Circuit breaker			NGH312033E	1
				NGC312033E(Opt)	
5	Circuit breaker lug			TA1200NB1	3
				TA1201NB1(Opt)	
				T1200NB3(Opt)	
6	Ground lug	X19170060020			2
7	Choke	X13640734010			7
8	Choke mounting bracket	506898810100			2
9	Fuse holder; 60A, 600V, 1P	X13111194010			1
10	Fuse 40A, 600V	X13110755020			1
11	Fuse holder; 30A, 600V, 2P	X13111193010			1
12	Fuse 15A, 600V	X13110683300			2
13	Arrester; 3-pole MOV,600V WYE	X13641480001			1



AFDH Drive Package Specifications

Table 22. Custom enclosure parts; E-Frame 730 amps model drives (575V/600V)

Trane assembly part numbers for all optional model versions of 575V/600V E-Frame 730 amps AFDH					
Figure 17 Callout	Part description	Trane X-code part number	Trane mnemonic number	Supplier part number	Quantity
1	4 KVA Transformer	X13550916030			1
2	Circuit breaker handle		HDL01302		1
3	Circuit breaker handle metal mounting base	X19091662001			1
4	Circuit breaker			NGH312033E	1
				NGC312033E(Opt)	
5	Circuit breaker lug			TA1200NB1	3
				TA1201NB1(Opt)	
				T1200NB3(Opt)	
6	Ground lug	X19170060020			2
7	Choke	X13640735010			8
8	Choke mounting bracket	507123430001			2
9	Fuse holder; 60A, 600V, 1P	X13111194010			1
10	Fuse 40A, 600V	X13110755020			1
11	Fuse holder; 30A, 600V, 2P	X13111193010			1
12	Fuse 15A, 600V	X13110683300			2
13	Arrester; 3-pole MOV,600V WYE	X13641480001			1

Table 23. Custom enclosure parts; E-Frame 850 amps model drives (575V/600V)

Trane assembly part numbers for all optional model versions of 575V/600V E-Frame 850 amps AFDH					
Figure 17 Callout	Part description	Trane X-code part number	Trane mnemonic number	Supplier part number	Quantity
1	4 KVA Transformer	X13550916030			1
2	Circuit breaker handle		HDL01302		1
3	Circuit breaker handle metal mounting base	X19091662001			1
4	Circuit breaker			NGH312033E	1
				NGC312033E(Opt)	
5	Circuit breaker lug			TA1200NB1	3
				TA1201NB1(Opt)	
				T1200NB3(Opt)	
6	Ground lug	X19170060020			2
7	Choke	X13640735010			8
8	Choke mounting bracket	507123430001			2
9	Fuse holder; 60A, 600V, 1P	X13111194010			1
10	Fuse 40A, 600V	X13110755020			1
11	Fuse holder; 30A, 600V, 2P	X13111193010			1
12	Fuse 15A, 600V	X13110683300			2
13	Arrester; 3-pole MOV,600V WYE	X13641480001			1

Additional Hardware Shipped with Tracer® AdaptiView™ AFDH Packages

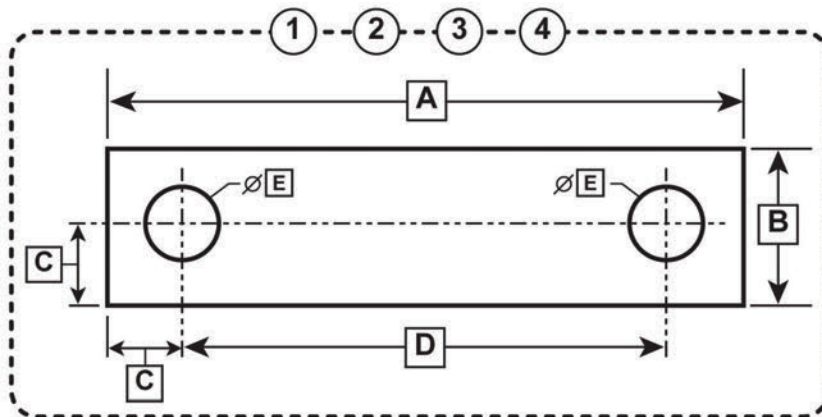
Table 24. Tracer AdaptiView miscellaneous hardware contents parts list

Part description	Quantity	Trane X-code part number	Mnemonic number
Low pressure transducer; 0–70 PSIA, IPC3 output, 24 VDC, 0-70 PSIA, 0.25 - 18 NPTF	1	X13790362090	TDR00733
Branching cable; male to two female, 39.37 inches long	1	X19051622020	CAB01147
Extension cable; male to female, 39.37 inches long	1	X19051623010	CAB01149
Executive beige paint; 10 oz. aerosol can	1	X35020476020	PAI00297
TR200 Programming Guide	1		BAS-SVP04*-EN
UC800 to drive Modbus cable	1		50712390
Schematics	1		50712127
AFDH E-Frame Upgrade Adaptive Frequency Drive Installation manual	1		SO-SVN026*-EN
Connector; Plug/Screw, 3	1	X19220085020	CON00430

Note: Shorting buss bars that could be required for a upgrade AFDH drive installation are not included within the Tracer AdaptiView miscellaneous hardware package

kit. Use the buss bars that best match the spacing and size of the compressor motor terminal lugs on the specific chiller receiving the drive upgrade.

Figure 18. Buss bars specifications: Tracer AdaptiView hardware packages



1. Example of shorting buss bars contained in kit BAR0177
2. Example of shorting buss bars contained in kit BAR0163
3. Example of shorting buss bars contained in kit BAR00176
4. Example of shorting buss bars contained in kit BAR00165

	A	B	C	D	E
①	7.0 in.	1.62 in.	0.81 in.	5.385 in.	0.812 in.
②	7.46 in.	1.62 in.	0.81 in.	5.831 in.	0.812 in.
③	7.73 in.	1.62 in.	0.81 in.	6.103 in.	0.812 in.
④	8.29 in.	2.18 in.	1.09 in.	6.103 in.	1.187 in.



AFDH Drive Package Specifications

Motor panel transition covers for Transition Mount and LiquiFlo

- It is possible to order a complete new motor panel transition cover assembly if one is needed, either as part of the drive package order or separately if necessary.
- The transition cover assembly when properly installed, prevents direct access to the output motor lead sections that emerge from the access cutout at the back of a unit-mounted or stand-mounted AFDH drive, and connect to the compressor motor terminal board.

Table 25. Part numbers for motor panel transition covers

Part Description	Trane Part Number	Mnemonic Number
6-inch motor panel transition cover assembly	506820000100	COV02946
12-inch motor panel transition cover assembly	506859440100	COV03203
18-inch motor panel transition cover assembly	506819750100	COV02945



Installation

Removal of Electrical Connections to the Existing Starter

⚠ WARNING

Hazardous Voltage w/Capacitors!

Failure to disconnect power and discharge capacitors before servicing could result in death or serious injury. Disconnect all electric power, including remote disconnects and discharge all motor start/run capacitors before servicing. Follow proper lockout/tagout procedures to ensure the power cannot be inadvertently energized. For variable frequency drives or other energy storing components provided by Trane or others, refer to the appropriate manufacturer's literature for allowable waiting periods for discharge of capacitors. Verify with a CAT III or IV voltmeter rated per NFPA 70E that all capacitors have discharged.

1. Turn off the main power disconnect to the chiller and follow the correct lockout/tagout safety procedures to confirm main power to the machine cannot be inadvertently restored.
 - a. For additional safety, open all starter and control panel disconnect switches and secure them in the open position.
 - b. Depending upon the starter type, verify no electrical power exists at either the starter breaker, starter disconnect switch, starter terminal block, and other starter components before removing wiring.
2. Note the orientation of the power cable connections to the starter breaker, or starter disconnect switch, or starter terminal block.
 - a. Identify and clearly label the L1, L2, L3, and ground wiring cables before they are disconnected.
3. Identify and clearly label the power wiring cables at the compressor motor terminal lugs T1, T2, T3, T4, T5, and T6 and disconnect them.
 - a. Disconnect the cables from their connection points on the starter.
 - b. Remove them from the cabinet area to prevent them from getting in the way during the rest of the starter removal process.
 - c. Keep the motor terminal lugs. They will be reused later in the installation.
4. At the starter cabinet, identify and clearly label the control and communication wiring running to the starter panel.
 - a. Identify and record the termination point of each wire at the terminal block and then disconnect them.
 - b. Remove and save the conduit fittings from the line, load, and control power entrances and exits on the starter cabinet.
 - c. Remove and save the conduit top plate for possible reuse later in the installation.

Mechanical Removal of Existing Unit-Mounted Starter

⚠ WARNING

Heavy Objects!

Failure to follow instructions below could result in unit dropping which could result in death or serious injury, and equipment or property-only damage. Ensure that all the lifting equipment used is properly rated for the weight of the unit being lifted. Each of the cables (chains or slings), hooks, and shackles used to lift the unit must be capable of supporting the entire weight of the unit. Lifting cables (chains or slings) may not be of the same length. Adjust as necessary for even unit lift.

⚠ WARNING

Improper Unit Lift!

Failure to properly lift unit in a LEVEL position could result in unit dropping and possibly crushing operator/ technician which could result in death or serious injury, and equipment or property-only damage. An AFDH cabinet assembly is top heavy. Test lift unit approximately 24 inches (61 cm) to verify proper center of gravity lift point. To avoid dropping of unit, reposition lifting point if unit is not level.

1. Depending on the model type, a unit-mounted starter can weigh up to 750 pounds.
 - a. Verify the intended lifting device and rigging has the capacity to safely handle the load before hooking up to the designated lifting points on the starter unit.

Note: *On some existing starters, lifting tabs are spot-welded to the enclosure. These welds can break if not lifted straight up. For a safe lift, Trane recommends drilling a hole and bolting the tabs to the enclosure to ensure a safe lift.*
2. Using safe lifting practices, slowly begin taking up the slack in the rigging.

Tension the rigging only to the point necessary to take up enough of the weight of the starter panel to enable loosening the bolts connecting the panel.
3. While steadying the starter panel to prevent it from tipping forward, carefully begin removing the retaining bolts that connect it to the lower motor panel transition cover (Z-

bracket). See [Figure 41](#) for the transition mount and LiquiFlo only. For direct mount remove motor flange bolts.

Note: *The existing Z-bracket and transition cover on transition and LF 1/1.5 installations will be reused and do not need to be removed unless greater access is required to the motor terminals during drive installation.*

4. Remove the bolts securing the bottom of the starter to the brackets on the evaporator.
5. Carefully remove the starter panel from the chiller and set it down in a safe location.

Important:

- *Do not cut off the starter panel brackets that are welded to the evaporator shell as they will be reused!*
- *Do not discard any of the nuts, bolts, washers, or the angle-iron clips that were used to attach the starter panel tabs to the evaporator bracket as they will all be reused!*

Mechanical Removal of Existing Unit-Mounted LiquiFlo 1.0/1.5 Adaptive Frequency Drive

⚠ WARNING

Heavy Objects!

Failure to follow instructions below could result in unit dropping which could result in death or serious injury, and equipment or property-only damage. Ensure that all the lifting equipment used is properly rated for the weight of the unit being lifted. Each of the cables (chains or slings), hooks, and shackles used to lift the unit must be capable of supporting the entire weight of the unit. Lifting cables (chains or slings) may not be of the same length. Adjust as necessary for even unit lift.

⚠ WARNING

Improper Unit Lift!

Failure to properly lift unit in a LEVEL position could result in unit dropping and possibly crushing operator/ technician which could result in death or serious injury, and equipment or property-only damage. Test lift unit approximately 24 inches (61 cm) to verify proper center of gravity lift point. To avoid dropping of unit, reposition lifting point if unit is not level.

Note: *On some existing LiquiFlo drives, lifting tabs are spot-welded to the enclosure. These welds can break if not lifted straight up. For a safe lift, Trane recommends drilling a hole and bolting the tabs to the enclosure to ensure a safe lift.*

4. Using safe lifting practices, slowly begin taking up the slack in the rigging. Tension the rigging only to the point that is necessary to take up enough of the weight of the starter panel to enable loosening the bolts connecting the panel to the Z-bracket on the motor flange.
5. While steadying the starter panel to prevent it from tipping forward, carefully begin removing the retaining bolts that connect it to the Z-bracket.

Note: *The existing Z-bracket and transition cover will be reused and do not need to be removed unless greater access is required to the motor terminals during drive installation.*

6. Remove the bolts securing the bottom of the LiquiFlo drive to the brackets on the evaporator.
7. Carefully remove the starter panel from the chiller and set it down in a safe location.

Important:

- *Do not cut off the starter panel brackets that are welded to the evaporator shell as they will be reused!*
 - *Do not discard any of the nuts, bolts, washers, or the angle-iron clips that were used to attach the starter panel tabs to the evaporator bracket as they will all be reused!*
8. Remove the bottom panel bracket from the starter panel brackets as shown in following figure.

1. Isolate the LiquiFlo drive water-side with isolation valves.
2. Cut and cap the LiquiFlo drive water-side connections.
3. Depending upon model type, a LiquiFlo drive can weigh up to 970 pounds. Verify that the intended lifting device and rigging has the capacity to safely handle the load before hooking up to the designated lifting points on the LiquiFlo drive.

Figure 19. Removing bottom panel bracket from starter panel brackets



Mechanical Installation of a Unit-Mounted AFDH E-Frame

Transition Mount Drive to Replace Transition Mount Starter

⚠ WARNING

Heavy Objects!

Failure to follow instructions below could result in unit dropping which could result in death or serious injury, and equipment or property-only damage.

Ensure that all the lifting equipment used is properly rated for the weight of the unit being lifted. Each of the cables (chains or slings), hooks, and shackles used to lift the unit must be capable of supporting the entire weight of the unit. Lifting cables (chains or slings) may not be of the same length. Adjust as necessary for even unit lift.

⚠ WARNING

Improper Unit Lift!

Failure to properly lift unit in a LEVEL position could result in unit dropping and possibly crushing operator/ technician which could result in death or serious injury, and equipment or property-only damage.

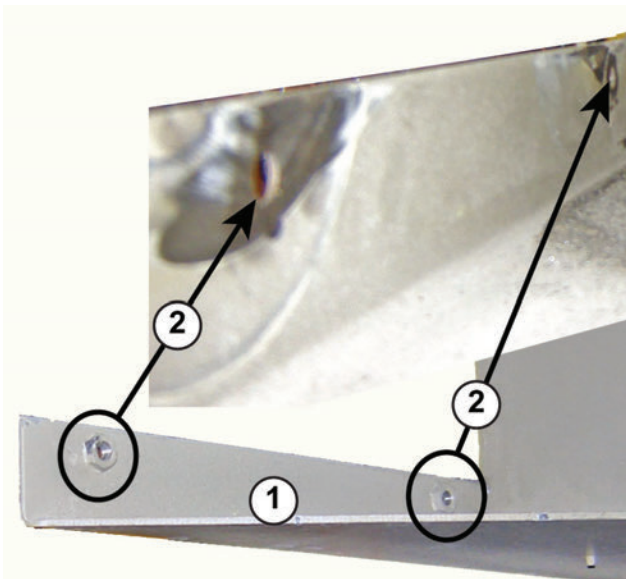
An AFDH cabinet assembly is top heavy. Test lift unit approximately 24 inches (61 cm) to verify proper center of gravity lift point. To avoid dropping of unit, reposition lifting point if unit is not level.

⚠ WARNING

Unit Lowering!

Do not drop the drive cabinet assembly onto the evaporator mounting brackets when setting it into position! Dropping the cabinet onto the brackets could result in damage to the drive cabinet, the brackets, and/or the evaporator shell.

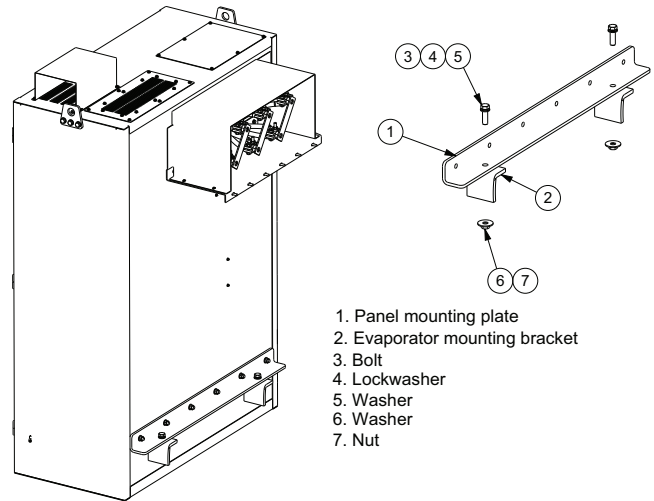
Figure 20. Removal of Z-bracket weldment nuts



Callout number	Description
1	Z-bracket
2	Weldment nuts (4 total on bracket, only 2 shown) drill out or grind off flush.

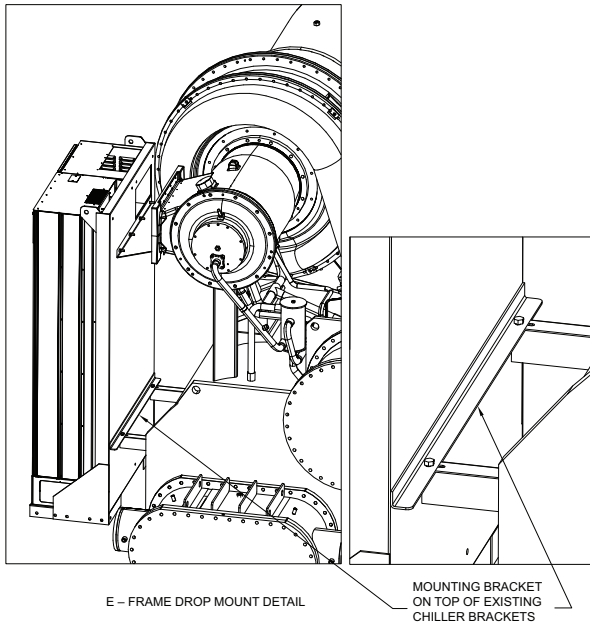
1. Inspect the Z-bracket on the chiller motor flange. If the Z-bracket is equipped with weldment nuts, these nuts must either be ground off or drilled out to allow the M8X25 bolts on the back of the new drive cabinet to slide into the bracket at these locations.
2. Prepare lifting equipment and rigging.
 - a. Depending upon the model type, a unit-mounted AFDH can weigh up to 1400 pounds. Confirm the weight of the AFDH unit to be installed. For E-Frame units refer to Table.
 - b. Verify that the intended lifting device and rigging has the capacity to safely handle the load before hooking up to the two factory provided lifting points on top of the cabinet assembly.
 - c. Use the appropriate rigging techniques to confirm the cabinet assembly will be balanced about its center of gravity during lifting. Refer to ["Recommended Rigging and Lifting Procedures for AFDH Drive Units,"](#) p. 13.

Figure 21. Transition mounting



3. Using safe lifting practices, carefully lift the cabinet and position it over the brackets on the evaporator.
4. Slowly lower the cabinet until the lower mounting bracket makes contact with the evaporator brackets but do not place the full weight of the cabinet onto the brackets at this time. Keep tension on the lift rigging to support the weight of the cabinet.
 - a. Adjust the position of the lower mounting bracket as necessary until the back of the cabinet is level and lined up against the Z-bracket, then attach the cabinet to the bracket using the kit hardware provided (screws for the motor terminal access). Shims may be necessary to level the lower mounting bracket. The front edge of the evaporator brackets may need to be ground down to allow for more adjustment.
 - b. Secure the lower mounting bracket to the evaporator brackets with the bolts provided and previously used (if needed) to secure the old starter panel to them.
 - c. Verify all nuts are properly tightened at all cabinet mounting points.
5. Confirm that the drive is firmly attached to all brackets and is stable before slowly lowering the lifting device to slacken the rigging and remove it from the lifting points.

Figure 22. Position cabinet base over evaporator brackets



LiquiFlo Frame 3 Drive Replacement

⚠ WARNING

Heavy Objects!

Failure to follow instructions below could result in unit dropping which could result in death or serious injury, and equipment or property-only damage.

Ensure that all the lifting equipment used is properly rated for the weight of the unit being lifted. Each of the cables (chains or slings), hooks, and shackles used to lift the unit must be capable of supporting the entire weight of the unit. Lifting cables (chains or slings) may not be of the same length. Adjust as necessary for even unit lift.

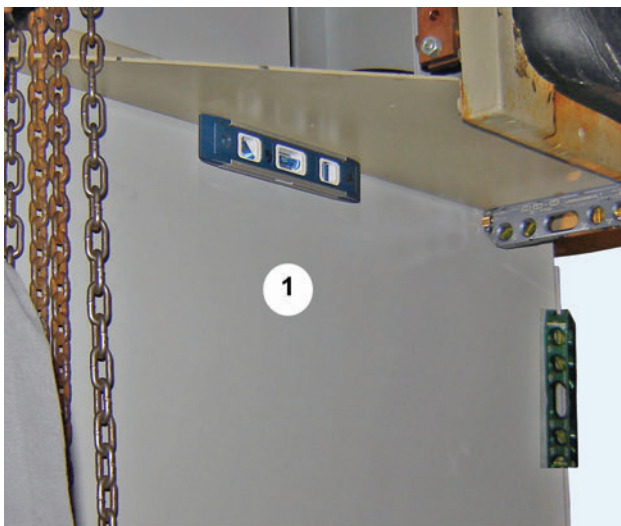
⚠ WARNING

Improper Unit Lift!

Failure to properly lift unit in a LEVEL position could result in unit dropping and possibly crushing operator/ technician which could result in death or serious injury, and equipment or property-only damage.

An AFDH cabinet assembly is top heavy. Test lift unit approximately 24 inches (61 cm) to verify proper center of gravity lift point. To avoid dropping of unit, reposition lifting point if unit is not level.

Figure 23. Leveling the AFDH drive cabinet against the Z-bracket



⚠ WARNING

Unit Lowering!

Do not drop the drive cabinet assembly onto the evaporator mounting brackets when setting it into position! Dropping the cabinet onto the brackets could result in damage to the drive cabinet, the brackets, and/or the evaporator shell.

1. The AFDH drive angle bracket has slotted holes to allow for adjustment. Loosen the nuts to allow for adjustment. Do not take the nuts completely out.

Callout number	Description
1	Adjust position of angle iron clips on evaporator brackets to bring the drive back level vertically against the Z-bracket flange.

Figure 24. AFDH drive angle bracket adjustment

2. Mark to trim the starter panel brackets that are welded to the evaporator shell as they will interfere with the drive. Line up the motor terminal access with the starter panel bracket and only trim the extra length. Refer to the following figures.

Figure 25. Starter panel welded brackets markings to trim**Figure 26. Starter panel brackets markings to trim extra length**

3. Use a saw-zaw to trim the starter panel brackets. Refer to the following figure.

Figure 27. Starter panel brackets during trimming



Figure 28. Starter panel brackets after trimming



4. Inspect the lower panel transition cover (Z-bracket) on the chiller motor flange. If the Z-bracket is equipped with weldment nuts, these nuts must either be ground off or drilled out to allow the M8X25 bolts on the back of the new drive cabinet to slide into the bracket at these locations.

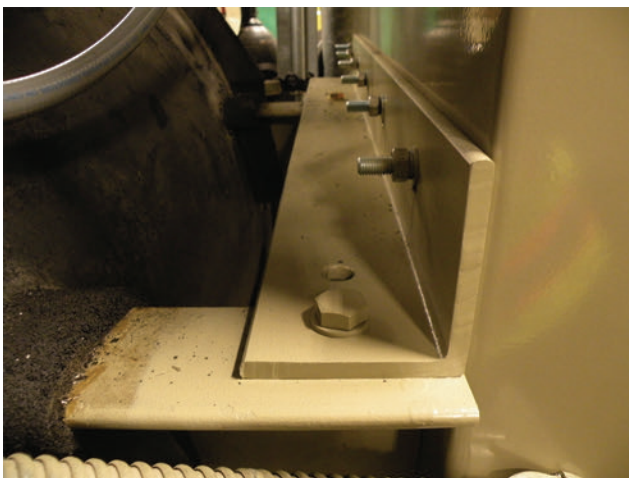
5. Prepare lifting equipment and rigging.
 - a. Depending upon the model type, a unit-mounted AFDH can weigh up to 1400 pounds. Confirm the weight of the AFDH drive. See [Table 5, p. 21](#), [Table 6, p. 21](#), and [Table 7, p. 21](#).
 - b. Verify that the intended lifting device and rigging has the capacity to safely handle the load before hooking up to the two factory provided lifting points on top of the cabinet assembly.
 - c. Use the appropriate rigging techniques to ensure that the cabinet assembly will be balanced about its center of gravity during lifting. Refer to [“Recommended Rigging and Lifting Procedures for AFDH Drive Units,” p. 13](#).
6. Implement safe lifting practices and carefully lift the cabinet to position it over the mounting brackets on the evaporator. Slowly lower the cabinet until the panel and angle bracket make contact with the evaporator brackets and rests on the brackets. The cabinet angle bracket is slotted if the AFDH needs to be moved for adjustment. Do not place the full weight of the cabinet onto the brackets at this time. Keep tension on the lift rigging to support the weight of the cabinet.
7. Keep the upper part of the AFDH panel flush with the Z-bracket face. Keep tension on the lift rigging to hold the AFDH panel in position.
8. Verify that the Z-bracket is flush against the AFDH panel. See [Figure 23, p. 37](#).
9. Attach the Z-bracket at the top of the panel, make sure the AFDH panel is level.
10. Once the upper Z-bracket is secured, leave the lift rigging in place and attach a C-clamp to the cabinet angle bracket and starter panel brackets to hold the cabinet angle bracket in place. See the following figure.

Figure 29. Installing bolts on mounting brackets on the evaporator and cabinet angle bracket



11. Use a lubricated drill bit (for M16 bolt) and drill through the mounting brackets on the evaporator and cabinet angle bracket.
12. Bolt cabinet angle bracket to the evaporator support brackets with M16 bolts, nuts, and washers (washer on top and bottom).

Figure 30. Cabinet angle bracket and evaporator support bracket in position



Direct Mount Drive to Replace Direct Mount Starter

⚠ WARNING

Heavy Objects!

Failure to follow instructions below could result in unit dropping which could result in death or serious injury, and equipment or property-only damage.

Ensure that all the lifting equipment used is properly rated for the weight of the unit being lifted. Each of the cables (chains or slings), hooks, and shackles used to lift the unit must be capable of supporting the entire weight of the unit. Lifting cables (chains or slings) may not be of the same length. Adjust as necessary for even unit lift.

⚠ WARNING

Improper Unit Lift!

Failure to properly lift unit in a **LEVEL** position could result in unit dropping and possibly crushing operator/ technician which could result in death or serious injury, and equipment or property-only damage.

An AFDH cabinet assembly is top heavy. Test lift unit approximately 24 inches (61 cm) to verify proper center of gravity lift point. To avoid dropping of unit, reposition lifting point if unit is not level.

⚠ WARNING

Unit Lowering!

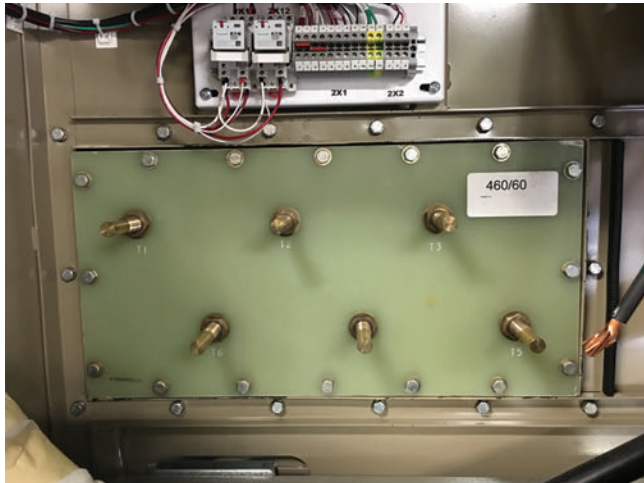
Do not drop the drive cabinet assembly onto the evaporator mounting brackets when setting it into position! Dropping the cabinet onto the brackets could result in damage to the drive cabinet, the brackets, and/or the evaporator shell.

1. Prepare lifting equipment and rigging.
 - a. Depending upon the model type, a unit-mounted AFDH can weigh up to 1400 pounds. Confirm the weight of the AFDH drive. See [Table 5, p. 21](#), [Table 6, p. 21](#), and [Table 7, p. 21](#).
 - b. Verify that the intended lifting device and rigging has the capacity to safely handle the load before hooking up to the two factory provided lifting points on top of the cabinet assembly.
 - c. Use the appropriate rigging techniques to verify the cabinet assembly will be balanced about its center of gravity during lifting. Refer to "[Recommended Rigging and Lifting Procedures for AFDH Drive Units](#)," p. 13.
2. Implement safe lifting practices and carefully lift the cabinet to position it over the mounting brackets on the evaporator. Slowly lower the cabinet until the AFDH panel flush and lineup with the motor terminal access bolt pattern.

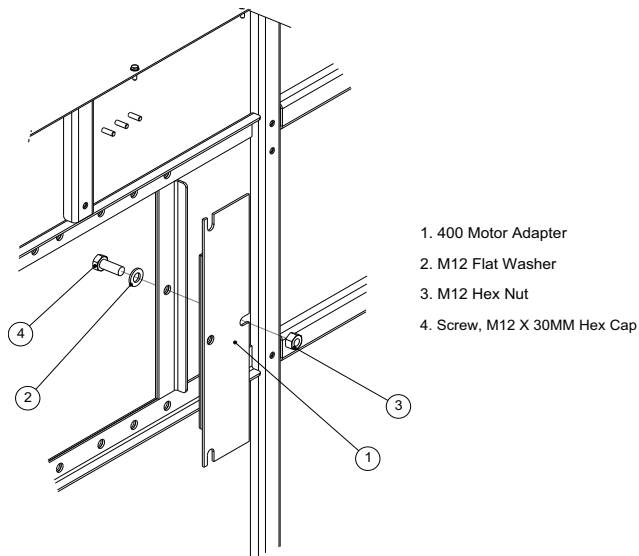
- Reuse the motor terminal access bolts and bolt the cabinet to the motor at the motor terminal.

Important: Do not place the full weight of the cabinet onto the brackets.

Keep tension on the lift rigging to support the weight of the cabinet.



- The 400 frame motor requires an adapter plate to cover the excess gap at the AFDH drive motor terminal access opening.



- Confirm the cabinet is level and bolt the cabinet to the evaporator support brackets with the provided bolts, nuts, and washers.
- Shim the space between the cabinet and the evaporator support brackets with 3-inch x 3-inch slotted shims. Place the shims slots around the bolts. Ease the tension on the lifting rigging, confirm the shims are snug, and tighten the bolts to secure the cabinet on top of the evaporator support brackets.



Linkage Bracket Installation for a Unit-Mounted Direct Mount E-Frame

⚠ WARNING

Heavy Objects!

Failure to follow instructions below could result in unit dropping which could result in death or serious injury, and equipment or property-only damage.

Ensure that all the lifting equipment used is properly rated for the weight of the unit being lifted. Each of the cables (chains or slings), hooks, and shackles used to lift the unit must be capable of supporting the entire weight of the unit. Lifting cables (chains or slings) may not be of the same length. Adjust as necessary for even unit lift.

⚠ WARNING

Improper Unit Lift!

Failure to properly lift unit in a LEVEL position could result in unit dropping and possibly crushing operator/technician which could result in death or serious injury, and equipment or property-only damage.

An AFDH cabinet assembly is top heavy. Test lift unit approximately 24 inches (61 cm) to verify proper center of gravity lift point. To avoid dropping of unit, reposition lifting point if unit is not level.

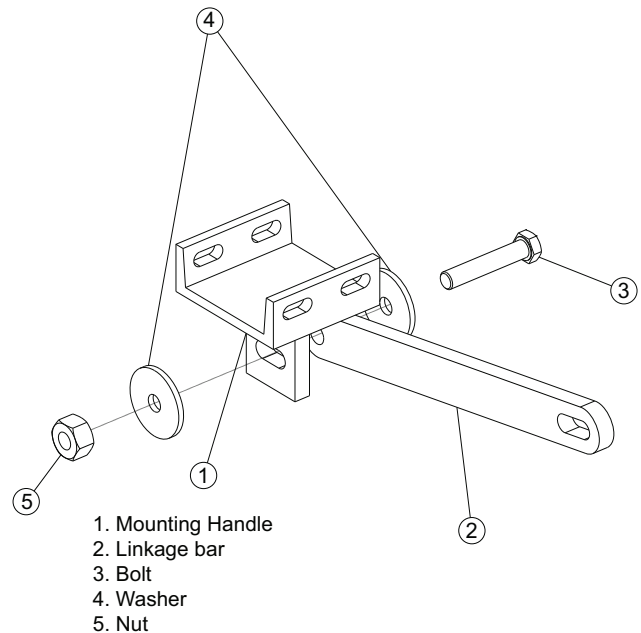
⚠ WARNING

Unit Lowering!

Do not drop the drive cabinet assembly onto the evaporator mounting brackets when setting it into position! Dropping the cabinet onto the brackets could result in damage to the drive cabinet, the brackets, and/or the evaporator shell.

1. Install drive on direct mount stand. Loosely attach bolts to motor flange. Tightly attach bolts to base. Leave lifting gantry connected to right side of AFD.
2. Install linkage bar to mounting handle with bolt, washers and nut, but do not fasten the bolts. The linkage bar will need to be adjusted to a proper direction when installed into the tube sheet.

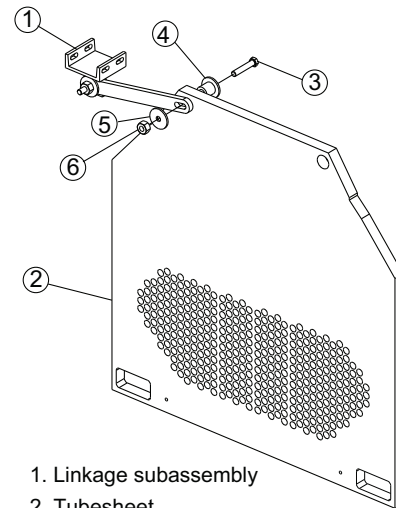
Figure 31. Linkage subassembly installation



3. Install linkage subassembly into tube sheet with bolt, spacers, plane washer, and nut. Confirm bolt is tightened to 150 ft-lbs torque.



Figure 32. Install linkage subassembly into tube sheet

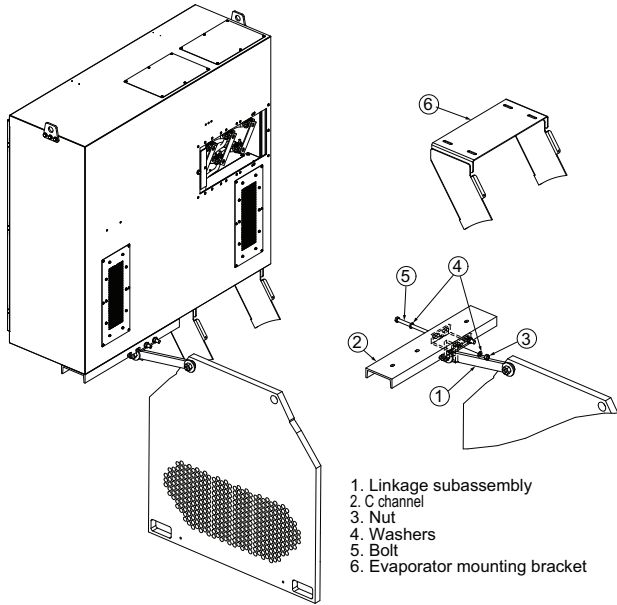


- 1. Linkage subassembly
- 2. Tubesheet
- 3. Bolt
- 4. Spacers
- 5. Plane washer
- 6. Nut



4. Use gantry to lift right side of drive slightly over horizontal fixed linkage under the C channel from enclosure with bolts, washers and nuts.
5. Tighten the fasteners. Linkage bar will be set at a proper position.
6. Tighten all bolts including motor terminal bolts.
7. Release tension from gantry and confirm that panel is setting correctly and not sagging.

Figure 33. Fixing linkage under the C channel



Circuit Breaker Adjustment to Accommodate Power Line Wiring

Adjust circuit breaker location to ease power line wiring installation. See the following image.



LiquiFlo 1.0/1.5 Frame 4 Replacement

Figure 34. LiquiFlo 1.0/1.5 frame 4 mounting installation

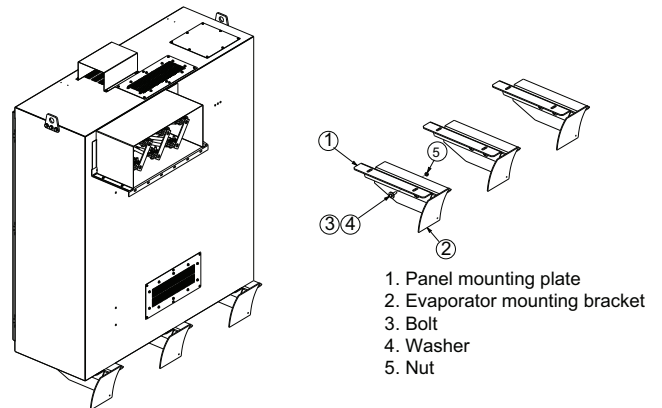
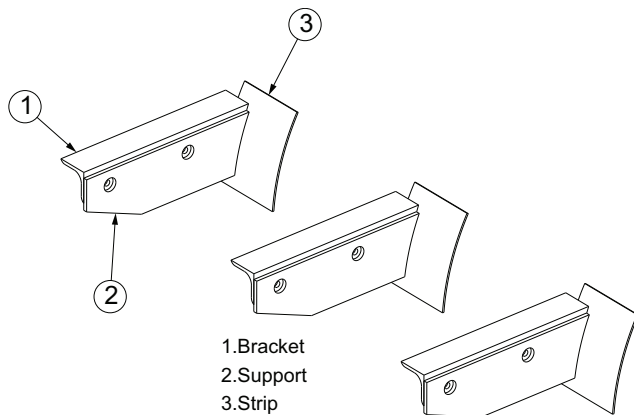


Figure 35. Evaporator mounting bracket


Electrical Installation (All AFDH Models)

⚠ WARNING

Hazardous Voltage w/Capacitors!

Failure to disconnect power and discharge capacitors before servicing could result in death or serious injury. Disconnect all electric power, including remote disconnects and discharge all motor start/run capacitors before servicing. Follow proper lockout/tagout procedures to ensure the power cannot be inadvertently energized. For variable frequency drives or other energy storing components provided by Trane or others, refer to the appropriate manufacturer's literature for allowable waiting periods for discharge of capacitors. Verify with a CAT III or IV voltmeter rated per NFPA 70E that all capacitors have discharged.

⚠ WARNING

Conform to All Applicable National, State, and Local Electrical Codes!

Failure to follow all applicable codes could result in an arc flash event, electrocution, explosion, or fire, which could result in death or serious injury. Users **MUST** conform to all applicable national, state, and local electrical codes during the electrical installation and servicing of this product.

NOTICE

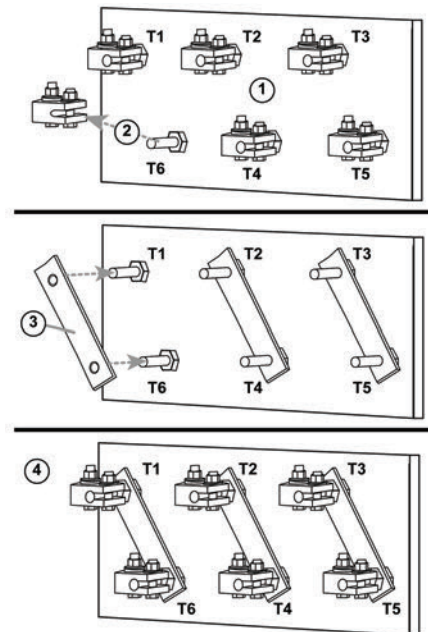
Use Copper Conductors Only!

Failure to use copper conductors could result in equipment damage as the equipment was not designed or qualified to accept other types of conductors.

Install Shorting Buss Bars

Note: Shorting buss bars must be installed since the AFDH is a three-lead device while the starter was a six-lead device. The wires must be connected (shorted) at both ends (at the AFDH and at the motor terminals) to verify there is no difference in potential between the two paired leads caused by different wire lengths. Some existing starters may have this done already.

1. Remove the motor terminal lug from all six terminals on the compressor motor terminal board.
2. Install the three buss bars provided, one each between the following motor terminal pairs.
 - T1 - T6
 - T2 - T4
 - T3 - T5
3. Reinstall all of the motor terminal lugs.

Figure 36. Buss bar installation on compressor motor terminal board


Callout number	Description
1	Compressor motor terminal board.
2	Remove motor terminal lugs (from all 6 terminals).
3	Install shorting buss bars across the motor terminal pairs as shown.
4	Motor terminal lugs reinstalled.

Input Power Wire Installation

NOTICE

Route Incoming Power Conduit to the Roof of the AFDH Cabinet!

Routing the incoming power conduit into the AFDH cabinet anywhere other than through the specified location on the cabinet roof, will be considered an unsupported field modification to the cabinet design. The air-cooled AFDH drive is designed to have the incoming power conduit routed vertically into the unit through the removable conduit connection cover located on the left-hand rear corner of the cabinet roof. If the starter that is being replaced by the AFDH drive has the incoming power conduit routed horizontally across the top of the starter, or connected to the side or to the bottom of the starter cabinet, an electrician will be required to reconfigure the conduit and wiring.

NOTICE

Keep Dirt, Debris, or Metal Filings From Entering the Drive Cabinet!

Failure to observe the appropriate precautions could result in damage to the electrical components when they are energized for the first time. Take all precautions necessary to prevent any dirt, debris, or metal filings from entering into the drive cabinet during the installation process.

Note: The L1, L2, and L3 input power leads for this unit will be connected to a factory installed input disconnect circuit breaker inside of the drive cabinet.

- To prevent metallic debris from falling into the drive, remove the access cover pieces. Move them to another location for marking and drilling the required wire routing holes for the input wire leads.

Notes:

- These wire routing holes are the only entry points that should be used for bringing input power wiring into the drive cabinet.
- In some cases, the top plate with conduit hubs from the original starter may be reused and installed over the incoming wire access cut-out on the top of the cabinet, in place of the two-piece access covers.

Important: Install the appropriate conduit hubs before reinstalling the access door pieces on top of the cabinet.

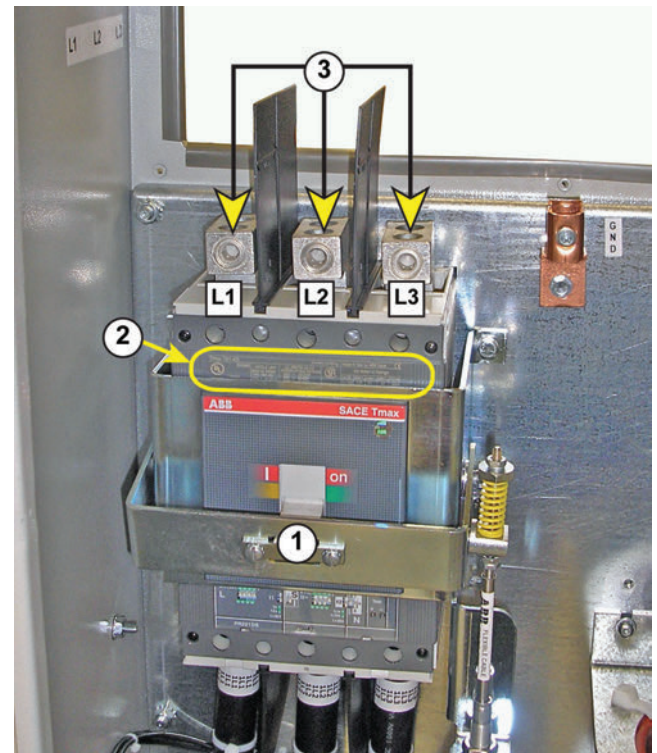
- Route the input wire leads into the cabinet and connect them to circuit breaker terminals L1, L2, and L3.
 - The torque specification for these terminal connections is 23 foot-pounds.

Figure 37. Adjustable circuit breaker



Note: Adjustable circuit breaker to accommodate inlet wires length.

Figure 38. Factory installed input disconnect circuit breaker



Callout number	Description
1	Input disconnect circuit breaker.
2	Nameplate.
3	Input power terminals. Terminal connections should be torqued to 23 foot-pounds.

Grounding AFDH Cabinet

⚠ WARNING

Proper Field Wiring and Grounding Required!

Failure to follow code could result in death or serious injury. All field wiring **MUST** be performed by qualified personnel. Improperly installed and grounded field wiring poses **FIRE** and **ELECTROCUTION** hazards. To avoid these hazards, you **MUST** follow requirements for field wiring installation and grounding as described in NEC and your local/state/national electrical codes.

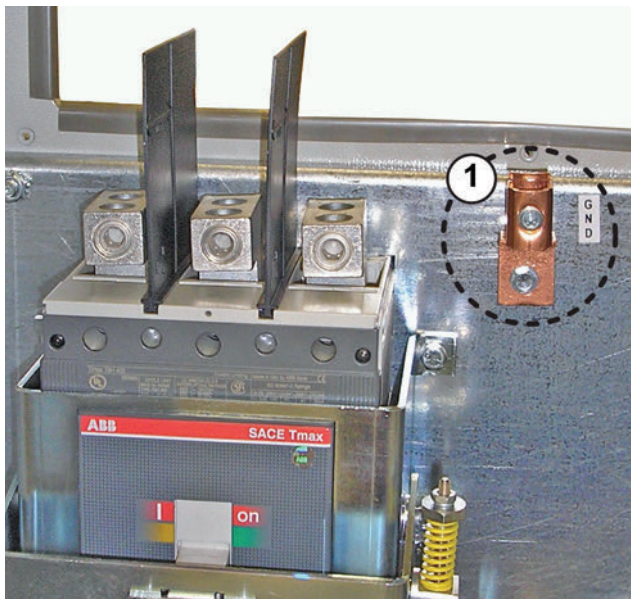
NOTICE

Use Copper Conductors Only!

Failure to use copper conductors could result in equipment damage as the equipment was not designed or qualified to accept other types of conductors.

Run a suitable, unbroken, grounding conductor from the drive cabinet ground connection terminal to the motor ground terminal, and then on to earth ground.

Figure 39. Location of AFDH cabinet ground terminal



Callout number	Description
1	Cabinet ground connection terminal.

Output Wiring from the AFDH to the CTV Motor

1. Remove the cover plate from the motor terminal access cutout on the back of the drive cabinet.
2. Feed the six motor leads through the back of the drive cabinet to the compressor motor terminal board.

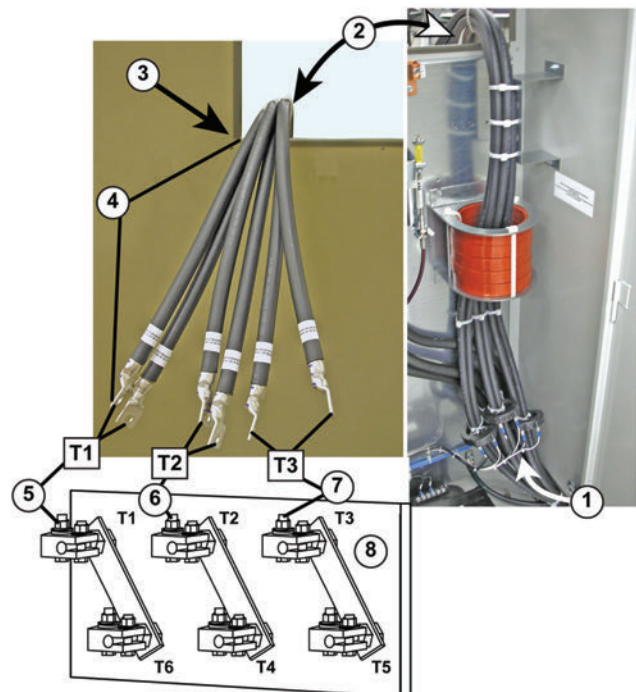
3. Attach the leads in pairs to the correct motor terminals (both T1 leads to the T1 terminal, both T2 leads to the T2 terminal, and both T3 leads to the T3 terminal).

Torque the 3/8-inch bolts at each terminal connection to 44 foot-pounds.

Note: Power connections should be re-torqued to 44 foot-pounds after the first three to six months of operation and then annually.

4. Put the transition cover back in place and reseal it when finished.

Figure 40. Output wiring from AFDH to CTV motor



Callout number	Description
1	Output motor leads coming in from the right hand cabinet compartment (drive module) and routed up to the motor terminal access cutout.
2	Motor leads routed through cabinet motor terminal access cutout.
3	Transition cover removed and Z-bracket blanked out of photo for clarity.
4	Factory installed motor leads are long enough to extend approximately 18-inches out from the access cutout.
5	Attach both T1 motor leads to compressor motor terminal T1.
6	Attach both T2 motor leads to compressor motor terminal T2.
7	Attach both T3 motor leads to compressor motor terminal T3.
8	Compressor motor terminal board.

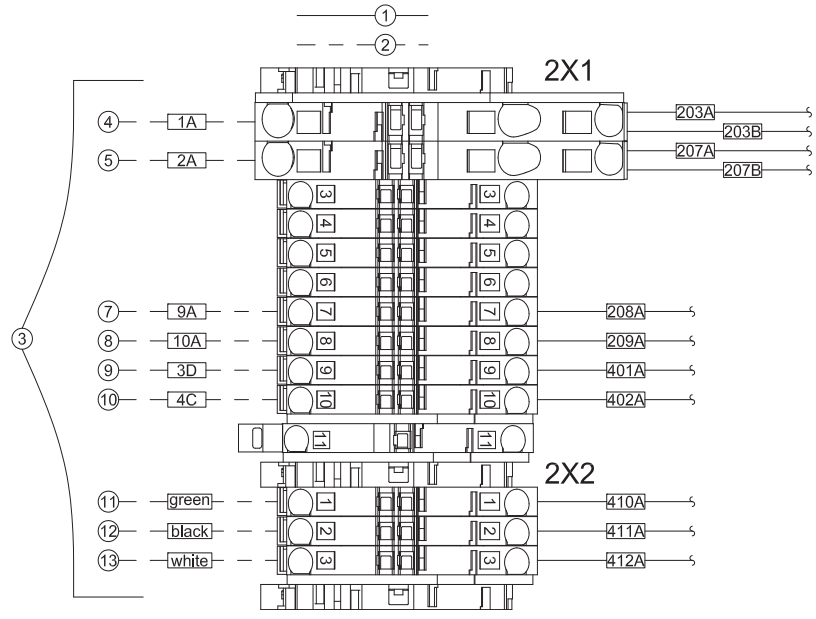
Routing of Control Wiring to AFDH Cabinet

NOTICE
Route Incoming Power Conduit to the Roof of the AFDH Cabinet!
 Routing the incoming power conduit into the AFDH cabinet anywhere other than through the specified location on the cabinet roof, will be considered an unsupported field modification to the cabinet design. The air-cooled AFDH drive is designed to have the incoming power conduit routed vertically into the unit through the removable conduit connection cover located on the left-hand rear corner of the cabinet roof. If the starter that is being replaced by the AFDH drive has the incoming power conduit routed horizontally across the top of the starter, or connected to the side or to the bottom of the starter cabinet, an electrician will be required to reconfigure the conduit and wiring.

NOTICE
Keep Dirt, Debris, or Metal Filings From Entering the Drive Cabinet!
 Failure to observe the appropriate precautions could result in damage to the electrical components when they are energized for the first time. Take all precautions necessary to prevent any dirt, debris, or metal filings from entering into the drive cabinet during the installation process.

Control Wiring Connections (Tracer® AdaptiView™ Model AFDH Only)

Figure 41. Wiring connections to 2X1 terminal strip in AFDH



Callout Number	Description
1	Factory installed wiring
2	Field installed wiring
3	Actual wire designators may vary depending upon the specific model/version of chiller control that the AFDH drive is being linked with. Please refer to the original chiller control wiring diagrams and the wire descriptions listed in figure Callouts 4 to 11 if an actual wire designator does not match the one shown in this graphic.
4	115 VAC feed to chiller control panel
5	Neutral feed to chiller control panel
7	From 1A7 J2-4 oil pump LLID
8	From 1A7 J2-2 oil LLID or could come from the 1X1 terminal block
9, 10	Normal closed terminal on HPC switch (3S1) for original chiller with comm. Drive terminals 9 and 10 are 24 VDC only. Note: For original chillers with a communicating drive, high pressure cutout wiring is 24 V.
11, 12, 13	From UC800 IMC Modbus link

Important: If the chiller does not already have a condenser pressure transducer. Do not forget to install the condenser pressure transducer provided in the Tracer® AdaptiView™ miscellaneous hardware package. The accurate pressure readings required by the chiller controls to enable the most efficient operation of the chiller with the upgraded AFDH drive can only be effectively measured with a pressure transducer.

Required Reprogramming of Tracer® AdaptiView™ Controls

Reprogramming Factory Installed Tracer AdaptiView Controls (CTV Simplex Firmware)

Important: Make sure your laptop is loaded with the most current version of Tracer TU tool software so that you have the most up-to-date version of CTV MP firmware available to install into the UC800.

Note: CTV MP firmware is always used in factory installed Tracer AdaptiView control systems or in Tracer AdaptiView display upgrades to factory installed CH530 control systems.

Table 26. UC800/Tracer AdaptiView CTV parameter values with upgrade AFDH

Tracer TU service setpoints view: Adjustable frequency drive setpoints	Range	Default setting	Recommended setting
AF control	Auto, fixed	Auto	Auto
ReOptimization sensitivity	0 to 100%	20	20
Tracer TU field start-up view: Adjustable frequency drive	Range	Default setting	Recommended setting
AFD Temperature limit setpoint	0.0 to 360.0	180.0	212.0
Surge speed increase	0 to 2 Hz	1	1
Tracer TU configuration view: Main	Range	Default setting	Recommended setting
Unit type (MODL)	CVHE, CVHF, CVHG, CVGF	CVHE	Enter chiller model from unit nameplate (Note: only CVHE or CVHF apply)
Tracer TU configuration view: UC800	Range	Default setting	Recommended setting
Starter type	Not applicable	Unit mount Wye-delta	TR200 Modbus AFD
Impeller diameter (CPIM)	50 to 345	275	Enter CPIM from unit nameplate
Tracer TU configuration view: Starter	Range	Default setting	Recommended setting
Unit line voltage	180 to 15000 V	460	Enter from unit nameplate
Motor NP power	4000 kW	400	Enter from unit nameplate
Motor temperature protection type	75 ohm@75F, 100 ohm@ 0C	75 ohm	75 ohm



AFDH Start-Up Procedure

Follow the procedure below when starting the water chiller and drive.

1. The CenTraVac™ chiller control starts, stops, and monitors all unit and AFDH run functions.

Complete all items on the commissioning checklist and in the start-up procedures for the CVHE and CVHF as defined in the operation maintenance manual or other applicable manual.

⚠ WARNING

Hazardous Voltage w/Capacitors!

Failure to follow these instructions could result in death or serious injury.

Disconnect all electric power, including remote disconnects and discharge all motor start/run and AFD (Adaptive Frequency™ Drive) capacitors before servicing. Follow proper lockout/tagout procedures to ensure the power cannot be inadvertently energized.

- For variable frequency drives or other energy storing components provided by Trane or others, refer to the appropriate manufacturer's literature for allowable waiting periods for discharge of capacitors. Verify with an appropriate voltmeter that all capacitors have discharged.
- DC bus capacitors retain hazardous voltages after input power has been disconnected. Follow proper lockout/tagout procedures to ensure the power cannot be inadvertently energized. After disconnecting input power, wait five (5) minutes for the DC capacitors to discharge, then check the voltage with a voltmeter. Make sure DC bus capacitors are discharged (0 VDC) before touching any internal components.

2. Check the following on the drive:
 - a. Verify input wire sizing to the drive is sized correctly based on unit nameplate voltage, and connected as noted in this manual.
 - b. Check the drive ground connection, and cabinet wire routing and grounding.
3. Check all drive wiring and connections in the drive to confirm they are tight and free of any shipping damage.
4. AFDH control checkout:
 - a. Chiller setpoints: With any new chiller, check out all setpoints for the chiller.
 - b. AFD setpoints: Check all AFD setpoints (refer to "Drive Settings," p. 50).
 - c. AFD configuration: Verify the **sales order** specific setpoints in the **Starter Configurations for AFD Starters**. These settings are specific to unit/motor combination in the drive. All remaining settings are factory-determined default setpoints that are the same on all AFDH air-cooled drives.

Note: If the set values do not match, contact the local Trane service agency first, or the global parts technical service department. The correct values are listed on the unit nameplate shipped with each unit.

5. When ready, start the drive from the chiller display.
6. Document all information on the start-up log.

Drive Settings

Important:

- Any AFDH drive module menu parameter numbers not listed in this manual are non-Trane specific program parameters.
- All non-Trane specific program parameter values have been set by the manufacturer before shipment, to provide optimum drive performance.
- Under no circumstances should any of the pre-set values in these menu parameters be changed unless specifically directed to do so by a factory engineer or a factory technical support person.

Note: Refer to the TR200 - Programming Guide (BAS-SVP04*-EN), or the most recent version, for full program parameter details and descriptions, and the instructions necessary to operate the Local Control Panel (LCP) and program the necessary drive parameters.

For additional information, refer to the programming manual shipped with the drive. The programming manual includes a detailed section for accessing the parameters in the drive.

This process is summarized briefly below:

1. To access the parameters, press the **Main Menu** key.
2. If required, enter the password (**999**).
3. To select a parameter group, use the up/down arrow keys to highlight the parameter group, and then press the **Enter** key to access that group.
4. Use the up/down arrow keys to access the parameter number, and then press the **OK** key.
5. Use the up/down arrow keys to change the parameter, and then press the **OK** key to change the setting.

TR200 Drive Configuration

Note: Technician may elect to configure the drive by using Danfoss VLT motion control tool MCT10. See the following steps:

1. If the TDU Drive Utility Program is installed on your laptop: Uninstall the TDU Drive Utility to install the MCT 10 software.
2. Install MCT 10 toll: HUB document DOC-155220: MCT 10 Installation Instructions.docx (Danfoss VLT motion control tools MCT 10 Set-up software manual).
3. Configure the TR200 drive using MCT 10 tool: HUB document DOC-179427: Creating a project master file and configuration for AFDH D and E-Frame Drive.docx (AFDH D and E-Frame Drive Configuration Instructions Using MCT 10 Tool).

To manually configuring the drive, confirm the drive is at the default settings by performing the following procedures to reset the drive:

1. Disconnect power to the drive, and wait for the display to shutdown.
2. While powering up the drive, press and hold the following keys: **Status**, **Main**, and **OK**.
3. After 5 seconds, release the keys.

After the drive is reset, reprogram the items listed in the below tables.

Table 27. Job specific settings

Group	Parameter	Description	Settings (UC800 and Symbio™ 800)
0	32	Custom Readout Max Value	Nameplate NMRA
1	20	Motor kW	Set to nameplate NMKW
1	24	Motor current	Set to nameplate NMRA
1	25	Motor nominal speed	Set to nameplate TRPM
4	16	Torque limit mode	Set to maximum
4	18	Current limit	Set to maximum

Table 28. Trane default settings

Group	Parameter	Description	Setting (UC800)	Setting (Symbio 800)
0	20	Display line 1.1 small	DC link voltage (1630)	DC link voltage (1630)
0	21	Display line 1.2 small	Motor Current (1614)	Motor Current (1614)
0	22	Display line 1.3 small	Heat sink temp (1634)	Heat sink temp (1634)
0	23	Display line 2 large	Input Power Kw (1610)	Input Power Kw (1610)
0	24	Display line 3 large	Freq Hz (1613)	Freq Hz (1613)
0	40	Hand on key	Disabled (0)	Disabled (0)
0	41	Off key	Disabled (0)	Disabled (0)
0	60	Main Menu password	999	999
0	61	Access to Main Menu w/o password	LCP; Read only (1)	LCP; Read only (1)
1	03	Torque characteristics	Variable torque (1)	Variable torque (1)
1	22	Motor voltage	Nameplate voltage	Nameplate voltage
1	23	Motor frequency	60 Hz	60 Hz
1	39	Motor poles	Poles (2)	Poles (2)
3	02	Minimum reference	30 Hz	30 Hz
3	03	Maximum reference	60 Hz	65 Hz
3	15	Reference 1 source	No Function	No Function
3	16	Reference 2 source	No Function	No Function
3	41	Ramp 1 ramp up time	10 sec	10 sec
3	42	Ramp 1 ramp down time	20 sec	20 sec
4	12	Motor speed low limit	38 Hz	38 Hz
4	14	Motor speed high limit	60 Hz	60 Hz
5	12	Terminal 27 digital Input	No operation (0)	No operation (0)
5	40.1	Function relay	Running	Running
8	01	Control site	Controlword only (2)	Controlword only (2)
8	03	Control timeout time	15 sec	15 sec
8	04	Control timeout function	Stop	Stop
8	30	Protocol	Modbus RTU	Modbus RTU
8	31	Address	3	3
8	32	Baud rate	38400 Baud	38400 Baud
8	33	Parity / stop bits	No Parity, 1 Stop bit	Even, 1 Stop bit [0]



AFDH Start-Up Procedure

Table 28. Trane default settings (continued)

Group	Parameter	Description	Setting (UC800)	Setting (Symbio 800)
8	36	Maximum response delay	100	100
14	21	Automatic restart time	10 sec	10 sec

After all settings are made save a copy chiller service report for future use. Trane Techs should load to ComfortSite by chiller serial number.



Troubleshooting

The drive displays three types of faults:

Warning

A warning or alarm is signaled by the LEDs on the front of the AFD by a code on the LCP.

A warning indicates a condition that may require attention or a trend that may eventually require attention, and will remain active until the cause is no longer present. Under some circumstances, motor operation may continue.

Trip

A trip is the action when an alarm has appeared. The trip removes power to the motor and, after the condition has been cleared, can be reset by pressing the **Reset** button. The event that caused an alarm cannot damage the AFD or cause a dangerous condition.

After its cause has been rectified, an alarm must be reset to restart operation.

Trip Lock

A trip lock is an action when an alarm occurs that may cause damage to the AFD or equipment. Power is removed from the motor, and a trip lock can only be reset after the condition is cleared by cycling power.

Once the problem has been rectified, only the alarm continues flashing until the AFD is reset.

- Number of chiller starts, and hours of operation.
- Time since last diagnostic shutdown (<1 minute, <1 hour, >1 hour, etc.)

- a. What was the chiller state at the time of the failure? (Chiller starting? Running low load? Running full load? etc.)
- c. Record the chiller sales order and serial numbers, and the drive serial and model numbers.

3. Troubleshooting

- a. Measure and record the DC bus (Local Control Panel - LCP).
- b. Check all wiring (tightness, ribbon cables fully seated, proper phasing, etc.)
- c. Refer to the Danfoss manuals for additional troubleshooting information.

WARNING

Hazardous Voltage w/Capacitors!

Failure to disconnect power and discharge capacitors before servicing could result in death or serious injury. Disconnect all electric power, including remote disconnects and discharge all motor start/run capacitors before servicing. Follow proper lockout/tagout procedures to ensure the power cannot be inadvertently energized. For variable frequency drives or other energy storing components provided by Trane or others, refer to the appropriate manufacturer's literature for allowable waiting periods for discharge of capacitors. Verify with a CAT III or IV voltmeter rated per NFPA 70E that all capacitors have discharged.

1. Tracer® AdaptiView™ only: Collect alarm and parameter information.
 - a. Do not cycle unit power or reset the controls. Leave the AFD and the UC800 in their present states.
 - b. Record all UC800 active and historic alarms. Make a full chiller service report.
 - c. Document and check all applicable parameter settings. This information can be verified off of the chiller nameplate, and by referring to this manual.
2. Collect chiller information.
 - a. Note the following chiller information:
 - Operating mode and any sub-mode (100 percent or 75 percent load).



Start-Up Test Log

Water-Cooled CenTraVac Chiller with Tracer® AdaptiView™ Control and Adjustable Frequency Drive (AFD) Starter

Job Name	AFD Serial Number
Job Location	AFD Model Number
Sales Order Number	Ship Date
Chiller Serial Number	Start Date
Chiller Model Number	
Starter Date:	Tracer TU: Service Setpoints View: AFD
Manufacture	Default Setting
Type	AFD Control
Model Number	Auto
Volts and Hz	Re-Optimization Sensitivity
Amps	20%
	UC800 Starter Type: Unit Mount AFD
	Tracer TU: Configuration View: Starter
	Trane Default Setting
	Unit Line Voltage
	460
	Motor NP Power
	400
	Motor Temperature Protection Type
	75 ohm@75°F
	Test Log Date:
	Log 1 Log 2
	AFD Output Power (KW)
	Speed
	Frequency
	Tracer TU Field Start-up View: AFD
	Maximum Frequency
	60
	Minimum Frequency
	38
	AFD Surge Capacity Increase
	1
	Tracer TU Status View: Motor
	Average Line Current
	Motor Winding 1 temp
	Motor Winding 2 temp
	Motor Winding 3 temp



Recommended Periodic Maintenance and Inspection

Inspection Frequency

Perform inspections outlined below every 1 to 12 months, depending on operating environment.

Visual Inspection - Power Removed

⚠ WARNING

Hazardous Voltage w/Capacitors!

Failure to disconnect power and discharge capacitors before servicing could result in death or serious injury. Disconnect all electric power, including remote disconnects and discharge all motor start/run capacitors before servicing. Follow proper lockout/tagout procedures to ensure the power cannot be inadvertently energized. For variable frequency drives or other energy storing components provided by Trane or others, refer to the appropriate manufacturer's literature for allowable waiting periods for discharge of capacitors. Verify with a CAT III or IV voltmeter rated per NFPA 70E that all capacitors have discharged.

1. Confirm door interlocks are present and working.
2. Verify the safety ground connections to the door panels are securely connected.
3. Inspect power wire cables and devices to confirm no abrasion is occurring from vibrations against chassis of cabinets, or other edges.
4. Verify the drive interior and exterior is clear of any dust or debris. Fans, circuit boards, vents etc. must be clean. Only use a vacuum for cleaning. Do not use compressed air. Review actual operation environment against specs if any concern.
5. Inspect the interior of the drive for any signs of moisture entry or leakage.
6. Visually inspect all drive components and wiring. Look for signs of heat or failure (look for swelled or leaking capacitors, discolored reactors or inductors, broken pre-charge resistors, smoke or arc trails on MOVs and capacitors, etc.)
7. Closely inspect the motor terminal board for any signs of leakage, arcing, etc.
8. Check all cable/lug/terminal connections inside the drive enclosure. Confirm all are clean and tight, and not rubbing against the other.

Operational Inspection - Power Applied

⚠ WARNING

Live Electrical Components!

Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury. When it is necessary to work with live electrical components, have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks.

1. Verify the drive cabinet cooling fans are operating.
While outside the enclosure, look in the cabinet at the door and cabinet vents to avoid electrical hazards.
Note: The power module fan comes on with power. Other fans cycle with drive operation.
2. Check historic fault codes using Local Control Panel (LCP) connected to the AFD.
3. Check configuration settings and confirm all proper settings are still present in the controls.
4. Review the diagnostic history.
5. Make chiller service report to document all setpoints.
6. Check the UC800 alarm histories for any indications of operational problems.

To properly diagnose service issues for Adaptive Frequency drives for centrifugal chillers equipped with AFDH starters, all drives will be equipped with the LCP as standard on the drive power module. This is for service only and NEVER for machine operation.

Air Filter

Clean or replace filter every 1 to 12 months, depending on operating environment.

Filter Description	Part Number
Direct mount drive air filter	FLR08814
Transition mount drive air filter	FLR08814
LiquiFlo 1.0/1.5 drive air filter	FLR08814



Wiring Diagram Matrix

Wiring Diagram Number	Description
50712127	CenTraVac™ Wiring Diagram with Danfoss Adaptive Frequency Drive

Note: Wiring diagrams are available via e-Library.



Notes

Trane - by Trane Technologies (NYSE: TT), a global climate innovator - creates comfortable, energy efficient indoor environments for commercial and residential applications. For more information, please visit trane.com or tranetechnologies.com.

Trane has a policy of continuous product and product data improvement and reserves the right to change design and specifications without notice. We are committed to using environmentally conscious print practices.