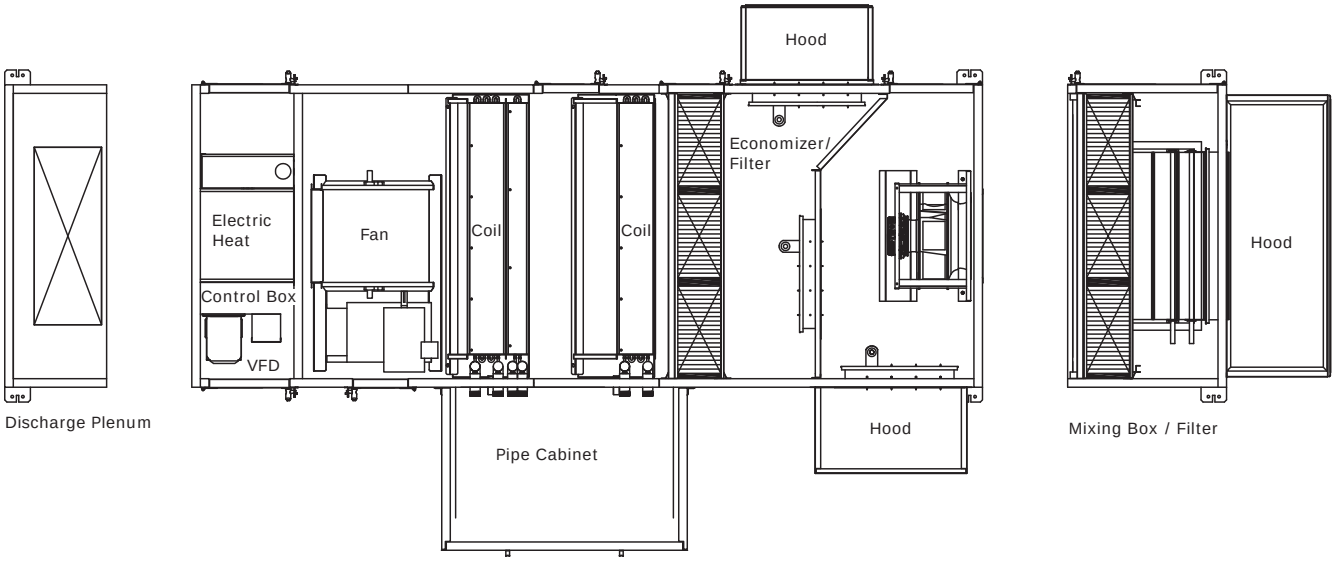
Installation, Operation and Maintenance

Performance Climate Changer™ Air Handler Model UCCA for Indoor and Outdoor Applications



Sizes 3 to 30

⚠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.

March 2020 **CLCH-SVX009J-EN**

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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-including industry replacements for CFCs and HCFCs such as saturated or unsaturated HFCs and HCFCs.

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 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.**

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⚠ 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.**

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Revision History

- Updated unit volt from 208 to 220-208 in digit 8 in the model number description.
- Updated unit volt from 208 to 220-208 in table 5 and table 6 in dimensions and weights chapter.
- Updated heat voltage in the table - electric heat voltage ratings in electrical requirements chapter.
- Updated typical VFD wiring schematic for indoor and outdoor air handlers in the electrical requirements chapter.
- Updated typical dual fan VFD wiring schematic -indoor and outdoor air handler in the electrical requirements chapter.
- Updated typical starter wiring schematic for indoor and outdoor air handler in the electrical requirements chapter.

Table of Contents

Introduction 5
Overview of Manual 5
Nameplate 5
General Information 6
Operating Environment 6
Unit Description 6
Control Solutions 7
Model Number Descriptions 8
Pre-Installation 11
Receiving and Handling 11
Jobsite Storage 11
Site Preparation 12
Roof Curb Installation Checklist 13
Dimensions and Weights 14
Service Clearances 14
Fans 18
Motors 18
Controls 19
Installation - Mechanical 20
Lifting and Rigging 20
Unit Placement and Assembly for Indoor Air Handlers 24
Unit Placement and Assembly for Outdoor Air Handlers 30
Duct Connections 35
Field Conversions 36
Coil Piping and Connections 38
General Recommendations 38
Drain Pan Trapping 38
Steam Coil Piping 39
Suction Lines 44
Expansion Valves 44
Hot Gas Bypass 44
Remodel, Retrofit, or Replacement 45
Field-Installed Evaporator Piping Examples . 46
Electrical Requirements 51
Start-Up 59
Pre-Startup Checklist 59
Unit Operation 60
External Insulating Requirements 64
Routine Maintenance 65
Maintenance Checklist 65
Air Filters 66
Coils 66
Drain Pans 69
Low Limit Switch 69
Fans 72
Outside Air Intake Hoods 73
Troubleshooting 74

Introduction

Overview of Manual

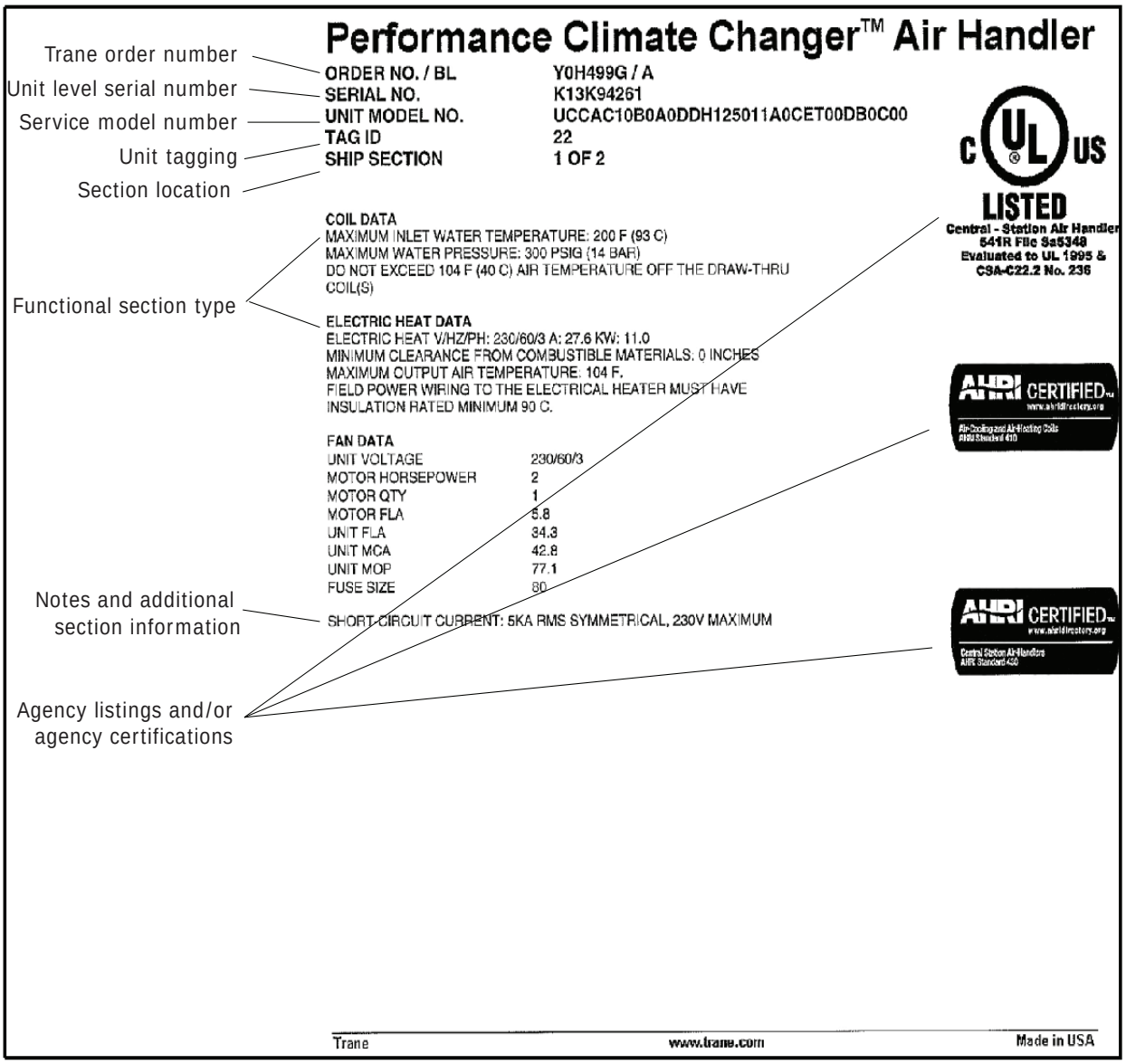
Use this manual to install, startup, operate, and maintain the Performance Climate Changer™ air handler model UCCA. Carefully review the procedures discussed in this manual to minimize installation and startup difficulties.

Nameplate

Each Performance air handler section includes one or more nameplate/label as shown in the figure below, that identifies the type of section and functional components, customer tagging information, the unit serial number, the unit order number, the build-section position for installation, and the unit model number.

Note: *The unit serial number and order number is required when ordering parts or requesting service for a Trane air handler.*

Figure 1. Performance air handler section nameplate



General Information

Operating Environment

The Performance Climate Changer™ air handler is a central station air handler for indoor and outdoor applications. When considering the placement of the air handler, it is important to consider the operating environment. The acceptable ambient temperature range for unit operation is -40°F to 140°F (-40°C to 60°C).

Do not operate unit above maximum fan speed or unit airflow as shown in the unit fan curves. See these catalogs for more information:

- *CLCH-PRC024*-EN Performance Climate Changer Air Handler Model UCCA for Indoor Applications*
- *CLCH-PRC026*-EN Performance Climate Changer Air Handler Model UCCA for Outdoor Applications*

Unit operation at greater than maximum fan speed can drastically reduce bearing life and result in a catastrophic failure. Operating at greater than the maximum allowable airflow in the cooling mode may result in unsatisfactory operation due to moisture carryover from the coil. In addition, it is often not economical to operate a unit at its maximum fan speed due to the greater motor power requirements.

Do not operate units with electric heat below the minimum airflow listed (see Table 10, p. 51). This is to prevent excessive leaving air temperatures and electric heat limit trips.

Do not operate a hydronic (or steam) coil and electric heat simultaneously. This is to prevent excessive leaving air temperatures and limit trips. Electric heat units are equipped with a lockout switch to disable the electric heater if the temperature of the hydronic (or steam) coil is greater than 95°F (35C).

For heating applications, a special motor may be required to withstand the higher temperatures. Motors with Class B insulation are acceptable for ambient temperatures up to 104° F, while motors with Class F insulation can withstand ambient temperatures to +140° F (60° C).

Note: *Units with UL approval have a maximum ambient temperature requirement of 104°F. The customer should provide adequate freeze protection for the coils. See "Routine Maintenance," p. 65 for more information.*

Unit Description

The Performance air handler model UCCA is designed for budget-conscience applications, but does not sacrifice on construction, quality, or performance.

- 2-in. R13 foam insulated panels and doors
- Less than 0.005 inches at +/-6 inches w.g. panel and door deflection
- All airfoil bladed dampers meet ASHRAE 90.1 lowest specified leakage
- Quick-connect wiring minimizes installation costs and provides wiring integrity between sections
- Factory engineered and mounted control packages
- Hinged and handled access doors
- UL/CUL listed
- AHRI Standard 430-certified air-handling unit
- AHRI Standard 410-certified coils
- 2-in. flat, 2-in, angled, and 2-in./4-in. combination filter racks or filters in a mixing box
- Fan options including forward curved (FC) and direct-drive plenum (DDP) fans
- Electric heat including full modulating control
- Indoor units ship on skid for forklift transportation at job site.
- Building Information Modeling (BIM) drawing to minimize jobsite ductwork, electrical, piping, and structural interference

For more information, refer to the following documents, available from your local Trane sales engineer:

- *CLCH-PRC024*-EN Performance Climate Changer Air Handler Model UCCA for Indoor Applications*
- *CLCH-PRC026*-EN Performance Climate Changer Air Handler Model UCCA for Outdoor Applications*
- *CLCH-SVN-006*-EN Performance Climate Changer Air Handler Model UCCA Roof Curb Installation*
- *CLCH-PRG004-EN, Performance Climate Changer Air handler Model UCCA guide specifications*
- *CLCH-SLB022-EN, Performance Climate Changer™ Air Handlers for Every Need sales brochure*

Control Solutions

Performance air handlers are available with an optional control interface. This package can be used as part of a stand-alone operation, or it can be fully integrated into a comprehensive control system. The Trane EarthWise™ system incorporates the benefits of factory-installed controls and links the air handler to the Tracer® SC system controls building management system. This option is designed to lower installation costs and risk while dramatically improving the quality of the application and the performance of the air handler. The entire air handler control system is engineered, mounted, wired, and tested before leaving the factory. As a result of strict quality manufacturing methods, these control options bring consistency and reliability to the control-system package and provide single-source responsibility.

The following control devices are available as standard mounted on fan sections:

- Trane UC600 controller
- Variable-frequency drives (VFDs)
- Control interface package
  - Fan motor disconnect switch (indoor units only)
  - Fused transformer(s)
  - Fan contactor
  - Customer terminal strip for field-provided controls
- Various end device options, including:
  - Low limit protection
  - Condensate overflow switch
  - Fan status switch
  - Filter status switch
  - Discharge air sensor
  - Mixed air sensor
  - Return air sensor
  - Damper actuator

Wiring

⚠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 electrical codes.

Entrances are generally provided for field-installation of high and low voltage wiring through a pipe/nipple connection in the unit depending on unit configuration with or without factory-mounted controls. Before installation, consider overall unit serviceability and accessibility before mounting, running wires (power), making penetrations, or mounting any components to the cabinet.

Wiring to the air handler must be provided by the installer and must comply with all national and local codes. The fan motor nameplate includes a wiring diagram. If there are any questions concerning the wiring of the motor, write down the information on the motor nameplate and contact your local Trane sales office.

Model Number Descriptions

Digit 1, 2, 3, 4— Product Group

UCCA = Performance Climate Changer

Digit 5 - Configuration

A = Horizontal/front top with housed fan
B = Horizontal/top front with housed fan
C = Vertical/front top with housed fan
D = Vertical/top front with housed fan
E = Vertical/back top with housed fan
F = Vertical/top back with housed fan
G = Horizontal/front top with DDP fan
H = Horizontal/top front with DDP fan
J = Horizontal/bottom front with housed fan
K = Horizontal/bottom front with DDP fan
L = Vertical/front top with MI fan
M = Vertical/top front with MI fan
N = Vertical/back top with MI fan
P = Vertical/front top with high static MI fan
R = Vertical/top front with high static MI fan
T = Vertical/back top with high static MI fan
S = Special

Digit 6, 7 - Unit size

03 = Unit size 3
06 = Unit size 6
08 = Unit size 8
10 = Unit size 10
12 = Unit size 12
14 = Unit size 14
17 = Unit size 17
21 = Unit size 21
25 = Unit size 25
30 = Unit size 30

Digit 8 - Unit voltage

0 = No motor, controls, or electric heat
A = 200-208 volt/60 Hz/3 phase
B = 230 volt/60 Hz/3 phase
C = 460 volt/60 Hz/3 phase
D = 575 volt/60 Hz/3 phase
S = Special

Digit 9 - Unit type

0 = Indoor unit
1 = Outdoor unit

Digit 10, 11 - Design sequence

** = Factory Assigned

Digit 12 - Coil, Drain Pan and Motor Side

R = Polymer drain pan, RH coil/RH motor
L = Polymer drain pan, LH coil/LH motor
C = Polymer drain pan, RH coil/LH motor
D = Polymer drain pan, LH coil/RH motor
E = Stainless steel drain pan, RH coil/RH motor
F = Stainless steel drain pan, LH coil/LH motor
G = Stainless steel drain pan, RH coil/LH motor
H = Stainless steel drain pan, LH coil/RH motor
S = Special

Digit 13 - Unit Coil #1 first in airstream

0 = No unit coil #1
A = 1 row preheat hydronic coil/9 fpi
B = 1 row preheat hydronic coil/12 fpi
C = 1 row preheat hydronic coil/14 fpi
D = 2 row preheat hydronic coil /9 fpi
E = 2 row preheat hydronic coil/12 fpi
F = 2 row preheat hydronic coil/14 fpi
G = 1 row preheat steam coil/6 fpi
H = 4 row hydronic coil/9 fpi
J = 4 row hydronic coil/12 fpi
K = 4 row hydronic coil/14 fpi
L = 6 row hydronic coil/9 fpi
M = 6 row hydronic coil/12 fpi
N = 6 row hydronic coil/14 fpi
P = 8 row hydronic coil/9 fpi
R = 8 row hydronic coil/12 fpi
T = 8 row hydronic coil/14 fpi
U = 4 row DX coil/9 fpi
V = 4 row DX coil/12 fpi
W = 4 row DX coil/14 fpi
Y = 6 row DX coil/9 fpi
Z = 6 row DX coil/12 fpi
1 = 6 row DX coil/14 fpi
S = Special

Digit 14 - Unit Coil #2 second in airstream

0 = No unit coil #2
A = 1 row reheat hydronic coil/9 fpi
B = 1 row reheat hydronic coil/12 fpi
C = 1 row reheat hydronic coil/14 fpi
D = 2 row reheat hydronic coil/9 fpi
E = 2 row reheat hydronic coil/12 fpi
F = 2 row reheat hydronic coil/14 fpi
G = 1 row reheat steam coil/6 fpi
H = 4 row hydronic coil/9 fpi
J = 4 row hydronic coil/12 fpi
K = 4 row hydronic coil/14 fpi
L = 6 row hydronic coil/9 fpi
M = 6 row hydronic coil/12 fpi
N = 6 row hydronic coil/14 fpi
P = 8 row hydronic coil/9 fpi
R = 8 row hydronic coil/12 fpi
T = 8 row hydronic coil/14 fpi
U = 4 row DX coil/9 fpi
V = 4 row DX coil/12 fpi
W = 4 row DX coil/14 fpi
Y = 6 row DX coil/9 fpi
Z = 6 row DX coil/12 fpi
1 = 6 row DX coil/14 fpi
S = Special

Digit 15 - Coil options

0 = No coil option
1 = Aluminum fin with galvanized casing, 1/2 in. coil
2 = Aluminum fin with stainless steel coil casing, 1/2 in. coil
3 = Aluminum fin with galvanized casing, 3/8 in. coil
4 = Aluminum fin with stainless steel casing, 3/8 in. coil
5 = Aluminum fin with galvanized casing, 1/2 in. coil with extended drain and vent
6 = Aluminum fin with stainless steel casing, 1/2 in. coil with extended drain and vent
7 = Aluminum fin with galvanized casing, 1/2 in. coil, turb, without extended drain and vent
8 = Aluminum fin with stainless steel casing, 1/2 in. coil, turb, without extended drain and vent
9 = Aluminum fin with galvanized casing, 3/8 in. coil, with extended drain and vent
A = Aluminum fin with stainless steel casing, 3/8 in. coil, with extended drain and vent
S = Special

Digit 16 - Controller options

0 = No control type
1 = Unwired end devices
2 = Control Interface
3 = Tracer® UC600 unit controller
S = Special

Digit 17 - Electric heat/factory mounted only

0 = No electric heat
1 = Electric heat with 1 stage
2 = Electric heat with 2 stages
4 = Electric heat with 4 stages
5 = Electric heat with SCR control
S = Special

Digit 18, 19, 20 - Electric heater kW

000 = No electric heat
006 = 6.0 kW
007 = 7.0 kW
008 = 8.0 kW
009 = 9.0 kW
010 = 10.0 kW
011 = 11.0 kW
012 = 12.0 kW
013 = 13.0 kW
014 = 14.0 kW
015 = 15.0 kW
016 = 16.0 kW
017 = 17.0 kW
018 = 18.0 kW
020 = 20.0 kW
022 = 22.0 kW
024 = 24.0 kW
026 = 26.0 kW
028 = 28.0 kW

Model Number Descriptions

030 = 30.0 kW
032 = 32.0 kW
034 = 34.0 kW
036 = 36.0 kW
038 = 38.0 kW
041 = 41.0 kW
044 = 44.0 kW
047 = 47.0 kW
050 = 50.0 kW
053 = 53.0 kW
056 = 56.0 kW
059 = 59.0 kW
063 = 63.0 kW
067 = 67.0 kW
071 = 71.0 kW
075 = 75.0 kW
079 = 79.0 kW
083 = 83.0 kW
087 = 87.0 kW
091 = 91.0 kW
095 = 95.0 kW
100 = 100 kW
105 = 105 kW
110 = 110 kW
115 = 115 kW
120 = 120 kW
SSS = Special

Digit 21 - Electric heat options

0 = No electric heat
A = Line fuse, door interlocking disconnect switch and airflow switch
B = Line fuse and airflow switch
S = Special

Digit 22 - Refrigerant circuit options

0 = No refrigerant options
1 = Single circuit with 1 stage DX, 1/4 in. distributor
2 = Face split circuit with 2 stage DX, 1/4 in. distributor
3 = Intertwined circuit with 2 stage DX, 1/4 in. distributor
4 = Single circuit with 2 stage DX, 1/4-in. distributor
5 = Face split circuit with 4 stage DX, 1/4 in. distributor
6 = Intertwined circuit with 4 stage DX, 1/4 in. distributor
A = Single circuit with 1 stage DX, 3/16 in. distributor
B = Face split circuit with 2 stage DX 3/16 in. distributor
C = Intertwined circuit with 2 stage DX 3/16 in. distributor
D = Single circuit with 2 stage DX, 3/16 in. distributor
E = Face split circuit with 4 stage DX, 3/16 in.distributor
F = Intertwined circuit with 4 stage DX, 3/16 in. distributor
S = Special

Digit 23 - Motor horsepower

0 = No motor
A = 1 hp (0.746 kW)
B = 1 1/2 hp (1.119 kW)
C = 2 hp (1.492 kW)
D = 3 hp (2.238 kW)
E = 5 hp (3.730 kW)
F = 7 1/2 hp (5.595 kW)
G = 10 hp (7.460 kW)
H = 15 hp (11.190 kW)
J = Motorized impeller fan
S = Special

Digit 24 - Volume control

0 = No volume control
A = Constant volume with variable pitch
B = Constant volume with fixed pitch
C = VFD with fixed pitch or DDP fan
D = FC fan with fixed pitch or DDP fan and VFD, shaft grounding
E = FC fan constant volume with fixed pitch or DDP, shaft grounding
F = ECM Motor
S = Special

Digit 25 - Drives

0 = No drive
A = 650 rpm fixed/600-700 variable
B = 700 rpm fixed/650-750 variable
C = 750 rpm fixed/700-800 variable
D = 800 rpm fixed/750-850 variable
E = 850 rpm fixed/800-900 variable
F = 900 rpm fixed/850-950 variable
G = 950 rpm fixed/900-1000 variable
H = 1000 rpm fixed/950-1050 variable
J = 1050 rpm fixed/1000-1100 variable
K = 1100 rpm fixed/1050-1150 variable
L = 1150 rpm fixed/1100-1200 variable
M = 1200 rpm fixed/1150-1250 variable
N = 1250 rpm fixed/1200-1300 variable
P = 1300 rpm fixed/1250-1350 variable
R = 1350 rpm fixed/1300-1400 variable
T = 1400 rpm fixed/1350-1450 variable
U = 1450 rpm fixed/1400-1500 variable
V = 1500 rpm fixed/1450-1550 variable
W = 1550 rpm fixed/1500-1600 variable
Y = 1600 rpm fixed/1550-1650 variable
Z = 1650 rpm fixed/1600-1700 variable
1 = 1700 rpm fixed/1650-1750 variable
2 = 1750 rpm fixed/1700-1800 variable
3 = 1800 rpm fixed/1750-1850 variable
4 = 1850 rpm fixed/1800-1900 variable
5 = 1900 rpm fixed/1850-1950 variable
6 = 1950 rpm fixed/1900-2000 variable
7 = 2000 rpm fixed/1950-2050 variable
8 = Direct-drive plenum/MI fan
S = Special

Digit 26, 27 - VFD setting/DDP fan speed

00 = Housed/MI fans
54 = 54 Hz/1604 rpm
55 = 55 Hz/1634 rpm
56 = 56 Hz/1663 rpm
57 = 57 Hz/1693 rpm
58 = 58 Hz/1723 rpm
59 = 59 Hz/1752 rpm
60 = 60 Hz/1782 rpm
61 = 61 Hz/1872 rpm
62 = 62 Hz/1841 rpm
62 = 63 Hz/1871 rpm
64 = 64 Hz/1901 rpm
65 = 65 Hz/1931 rpm
66 = 66 Hz/1960 rpm
67 = 67 Hz/1990 rpm
68 = 68 Hz/2020 rpm
69 = 69 Hz/2049 rpm
70 = 70 Hz/2079 rpm
71 = 71 Hz/2109 rpm
72 = 72 Hz/2138 rpm
73 = 73 Hz/2168 rpm
74 = 74 Hz/2198 rpm
75 = 75 Hz/2228 rpm
76 = 76 Hz/2257 rpm
77 = 77 Hz/2287 rpm
78 = 78 Hz/2317 rpm
79 = 79 Hz/2346 rpm
80 = 80 Hz/2376 rpm
81 = 81 Hz/2406 rpm
82 = 82 Hz/2435 rpm
83 = 83 Hz/2465 rpm
84 = 84 Hz/2495 rpm
85 = 85 Hz/2525 rpm
86 = 86 Hz/2554 rpm
87 = 87 Hz/2584 rpm
88 = 88 Hz/2614 rpm
89 = 89 Hz/2643 rpm
90 = 90 Hz/2673 rpm
91 = 91 Hz/2703 rpm
92 = 92 Hz/2732 rpm
93 = 93 Hz/2762 rpm
94 = 94 Hz/2792 rpm
95 = 95 Hz/2822 rpm
96 = 96 Hz/2851 rpm
97 = 97 Hz/2881 rpm
98 = 98 Hz/2911 rpm
99 = 99 Hz/2941 rpm
A0 = 100 Hz/2970 rpm
A1 = 101 Hz/3000 rpm
A2 = 102 Hz/3030 rpm
A3 = 103 Hz/3060 rpm
A4 = 104 Hz/3089 rpm
A5 = 105 Hz/3119 rpm
A6 = 106 Hz/3149 rpm
A7 = 107 Hz/3178 rpm
A8 = 108 Hz/3208 rpm
A9 = 109 Hz/3238 rpm
B0 = 110 Hz/3267 rpm
B1 = 111 Hz/3297 rpm
B2 = 112 Hz/3327 rpm
B3 = 113 Hz/3357 rpm
B4 = 114 Hz/3386 rpm
B5 = 115 Hz/3416 rpm
B6 = 116 Hz/3446 rpm
B7 = 117 Hz/3475 rpm
B8 = 118 Hz/3505 rpm
B9 = 119 Hz/3535 rpm
C0 = 120 Hz/3564 rpm
C1 = 60 Hz/3450 rpm
C2 = 61 Hz/3508 rpm

C3 = 62 Hz/3565 rpm
C4 = 63 Hz/3623 rpm
C5 = 64 Hz/3680 rpm
C6 = 65 Hz/3738 rpm
C7 = 66 Hz/3795 rpm
C8 = 67 Hz/3853 rpm
C9 = 68 Hz/3910 rpm
D0 = 69 Hz/3968 rpm
D1 = 70 Hz/4025 rpm
D2 = 71 Hz/4083 rpm
D3 = 72 Hz/4140 rpm
D4 = 73 Hz/4198 rpm
D5 = 74 Hz/4255 rpm
D6 = 75 Hz/4313 rpm
D7 = 76 Hz/4370 rpm
D8 = 77 Hz/4428 rpm
D9 = 78 Hz/4485 rpm
E0 = 79 Hz/4543 rpm
E1 = 80 Hz/4600 rpm
SS = Special

Digit 28 - Filter/Mixing/ Economizer/Return Section

0 = None
A = 2 in. flat filter rack
B = 2 in. flat filter/mixing
C = 2 in. angle filter
D = 2 in. angle filter/mixing
E = 2 in./4 in. combination filter rack
F = 2 in./4 in. combination filter/ mixing
G = Mixing only
H = 2 in. flat filter with bottom return economizer
J = 2 in. angle filter with bottom return economizer
K = 2 in./4 in. combination filter with bottom return economizer
L = 2 in. flat filter with bottom return economizer, single-point power
M = 2 in. angle filter with bottom return economizer, single-point power
N = 2 in./4 in. combination filter with bottom return economizer, single-point power
P = 2 in. flat filter with back return economizer
R = 2 in. angle filter with back return, economizer
T = 2 in./4 in. combination filter with back return economizer
U = 2 in. flat filter with back return economizer, single-point power
V = 2 in. angle filter with back return economizer, single-point power
W = 2 in./4 in. combination filter with back return economizer, single-point power
X = 2 in. flat filter top return
Y = 2 in. angle filter with top return
Z = 2 in./4 in. combination filter with top return
1 = 2 in. flat filter with top return, single-point power
2 = 2 in. angle filter with top return, single-point power
3 = 2 in./4 in. combination filter with top return, single-point power
4 = 2 in. flat filter with back return
5 = 2 in. angle filter with back return
6 = 2 in./4 in. combination filter with back return
7 = 2 in. flat filter with back return, single-point power
8 = 2 in. angle filter with back return, single-point power
9 = 2 in./4 in. combination filter with back return, single-point power
S = Special

Digit 29 - Filter type

0 = Customer supplied/no filters
A = 2 in. MERV 8
B = 2 in. MERV 13
C = 2 in. MERV 8/4 in. MERV 11
D = 2 in. MERV 8/4 in. MERV 13
E = 2 in. MERV 13/4 in. MERV 13
S = Special

Digit 30 - Controls options 1

0 = No controls - 1 option
1 = Low limit switch, condensate overflow switch, dirty filter switch and fan status switch

Digit 31 - Controls options 2

0 = No controls - 2 options
A = Discharge Air Sensor (DAS)
B = Discharge air sensor and Mixed Air Sensor (MAS)
C = Discharge air sensor, mixed air sensor, factory-mounted N.O. mixing box actuator
D = Discharge air sensor, mixed air sensor, factory-mounted N.C. mixing box actuator
S = Special

Digit 32 - Controls options 3

0 = No controls - 3 options
A = Outdoor air temperature sensor field wired
B = Duct static pressure sensor field wired
C = Outdoor air temperature sensor and duct static pressure sensor, field wired
S = Special

Digit 33 - Special Option

0 = Standard order
S = Special order

Digit 34 - Unit Options

0 = Indoor unit
A = Factory-provided curb, pipe cabinet, standard paint
B = Field-provided curb, pipe cabinet, standard paint
C = Pier-mounted unit, pipe cabinet, standard paint
D = Factory-provided curb, no pipe cabinet, standard paint
E = Field-provided curb, no pipe cabinet, standard paint
F = Pier-mounted unit, no pipe cabinet, standard paint
S = Special

Digit 35 - Access section with optional coil

0 = No access section
1 = Access section without coil
2 = Access section with coil
S = Special

Digit 36 - Door Section

0 = Standard - door on motor side
1 = Doors on both sides
S = Special

Digit 37 - Mix Boxing Return - Top

0 = No opening/damper
A = Opening only
B = Damper
S = Special

Digit 38 - Mix Box Return - Bottom

0 = No opening/damper
A = Opening only
B = Damper
S = Special

Digit 39 - Mix Box Return - Back

0 = No opening/damper
A = Opening only
B = Damper
C = Opening with hood
D = Damper with hood
S = Special

Digit 40 - Optional Indoor Baserail

0 = None
1 = 6 in. Baserail
S = Special

Pre-Installation

Receiving and Handling

Inspection

Upon delivery, thoroughly inspect all components for any shipping damage that may have occurred, and confirm that the shipment is complete. See the Receiving Checklist section below for detailed instructions.

Note: *Delivery cannot be refused. All units are shipped F.O.B. factory. Trane is not responsible for shipping damage.*

Packaging/Shipping

Performance air handlers ship as a complete unit or in individual sections to be field assembled. Indoor air handler sections are stretch-wrapped before shipping. All factory shipping protection should be removed upon delivery. This wrapping is for transit protection only.

Outdoor Performance air handlers are not wrapped, but openings are covered to comply with LEED EQ Credit 5.

Smaller components and hardware may be shipped separately, or shipped inside the unit. This hardware is typically packaged in a clear plastic envelope or cardboard box, and can be found inside the fan or mixing box.

Identification

Each air handler section includes a nameplate identifying the section type and functional components, customer tagging information, unit serial number, unit order number, the build-section position for installation, and the unit model number. See "Nameplate," p. 5.

Handling

Indoor air handlers sizes 3-30 are shipped with a shipping skid designed for forklift transport.

Outdoor air handlers have an integral base frame designed with the necessary number of lift points for safe installation. See "Lifting and Rigging," p. 20.

Receiving Checklist

Complete the following checklist immediately after receiving shipment to detect possible shipping damage.

- ☐ Check to ensure that the shipment is complete. Small components may ship inside the unit or ship separately. Check the parts list to ensure all materials are present. If any component is missing, contact your local Trane sales office.
- ☐ Check all units, components, connections, and piping. Check fan wheel for free rotation by spinning manually. Check all doors, latches and hinges. Inspect interior of each unit or section. Inspect coils for damage to fin surface and coil connections. Check for rattles, bent corners, or other visible indications of shipping damage. Tighten loose connections.
- ☐ If a unit is damaged, make specific notations concerning the damage on the freight bill. Do not refuse delivery.
- ☐ Notify the carrier's terminal of the damage immediately by phone and mail. Request an immediate joint inspection of the damage by the carrier and consignee.
- ☐ Notify your Trane sales representative of the damage and arrange for repair. Do not attempt to repair the unit without consulting the Trane representative.
- ☐ Inspect the unit for concealed damage as soon as possible after delivery. Report concealed damage to the freight line. It is the receiver's responsibility to provide reasonable evidence that concealed damage did not occur after delivery. Take photos of damaged material if possible.

  Note: *Concealed damage must be reported within 15 days of receipt.*

Jobsite Storage

Indoor air handlers and field-installed accessories must be protected from the elements. A controlled indoor environment is recommended for proper storage.

Note: *All factory shipping protection should be removed, This wrapping is for transit protection only.*

The unit controller and all other electrical/electronic components should be stored in conditions of -20°F to 120°F and 5 to 95 percent relative humidity, non-condensing. Electrical components are not moisture-tolerant.

Outdoor units require no special protection for storage prior to installation.

Outdoor Storage

NOTICE

Corrosion!

Use only canvas tarps to cover air handlers. Plastic tarps can cause condensation to form in and on the equipment, which could result in corrosion damage or wet storage stains.

Outdoor storage is **not** recommended for units that will be installed indoors. When outdoor storage is necessary, several things must be done to prevent damage:

Note: *Keep the equipment on the original skid for protection and ease of handling.*

- Select a well-drained area, preferably a concrete pad or blacktop surface.
- Place the unit on a dry surface or raised off the ground to assure adequate air circulation beneath the unit and to assure no portion of the unit will contact standing water at any time.
- Loosen the belt tension on the drive belts.
- Cover the unit securely with a **canvas** tarp.
- Do not stack units.
- Do not pile other material on the unit.

Long-Term Storage

For longer periods of storage, allow proper clearance around the unit to perform periodic inspections and maintenance on the equipment. While the unit is in storage:

- Every two weeks, rotate the fan and motor shaft 30 revolutions by hand. Check for free rotation.
- Every six months, check fan shaft bearings and grease lines. Add grease using a manual grease gun following the lubrications recommendations in "Fan Bearing Lubrication," p. 73.
- Check the motor lubrication; remove and clean grease plugs and check for the presence of moisture in the grease. If moisture is present, remove the motor and send it to an authorized repair shop for bearing inspection/replacement. If no moisture if present, refer to the motor manufacturer's lubrication recommendation for proper lubrication.

Site Preparation

- Ensure the installation site can support the total weight of the unit (see the Dimensions and Weights chapter for approximate section weights; refer to the unit submittals for actual weights).
- Allow sufficient space for adequate free air and necessary service access (see "Service Clearances," p. 14). Refer to submittals for specific minimums.
- Allow room for supply and return piping, ductwork, electrical connections, and coil removal.
- Ensure there is adequate height for condensate drain requirements. See "Drain Pan Trapping," p. 38.

Note: *If unit is installed in a mechanical room on a pad, inadequate height may necessitate core-drilling the floor to attain proper trap height. Insufficient height could inhibit condensate drainage and result in flooding the unit and/or equipment room.*

NOTICE

Microbial Growth!

The floor or foundation must be level and the condensate drain at the proper height for proper coil drainage and condensate flow. Standing water and wet surfaces inside the equipment can become an amplification site for microbial growth (mold), which could cause odors and damage to the equipment and building materials.

- Confirm the roof curb, floor, or foundation of the mounting platform is level and large enough to accommodate the unit. Refer to the unit submittals for specific dimensions.
- Provide adequate lighting for maintenance personnel to perform maintenance duties.
- Provide permanent power outlets in close proximity to the unit for installation and maintenance.
- Wiring for the air handler must be provided by the installer and must comply with all national and local electrical codes.
- Rooftop curb-mounted units must be sealed tightly to the curb. Use proper sealants and roof-to-curb sealing techniques to prevent water and air leakage. Refer to CLCH-SVN-006*-EN Performance Climate Changer Air Handler Model UCCA Roof Curb Installation.

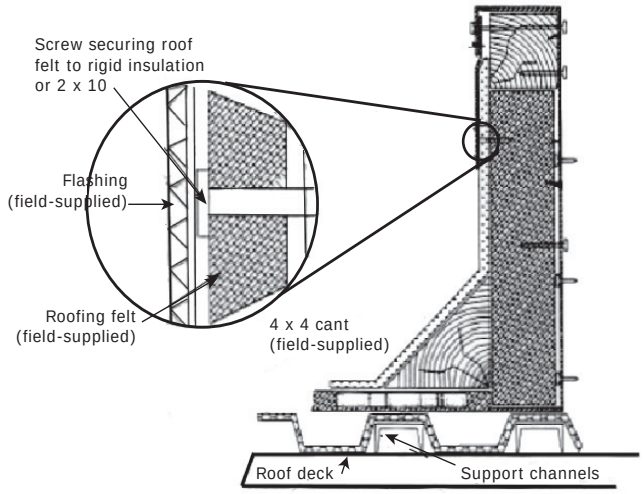
Note: *Preparation of the roof curb or pier mount and roof openings should be completed prior to lifting the unit to the roof.*

Roof Curb Installation Checklist

See *CLCH-SVN-006*-EN Performance Climate Changer Air Handler Model UCCA Roof Curb Installation* for information on installing roof curbs.

It is recommended that the curb be installed directly on the support members and fastened to the supports using tack welds or other equivalent methods. Properly supported decking should be installed inside the air handler section of the curb when this method is used. See the figure below

Figure 2. Cross section of typical curb installation on new construction



1. Verify that the roof structure can adequately support the combined weight of the unit and curb assembly.
2. Ensure that the selected installation location provides sufficient service and operational clearances.
3. Remove any twist within the curb due to roof supports and square the curb.
4. Level the curb.
5. Secure the curb to the roof support members.
6. Install 2-in. thick boards or rigid insulation around the curb.
7. Install cant strips around the curb.
8. Bring field supplied roofing felt up to the top of the curb nailing strips. Nail felt into place.
9. Install field supplied flashing under the lip of the curb flanges and over the felt.
10. Apply sealant to the four corners.
11. Caulk all joints between the curb and the roof. Attach the gasket material to the curb's top flanges (entire perimeter) and to the supply and return air duct opening panel flanges.

Dimensions and Weights

Service Clearances

Figure 3. Service clearances for indoor units

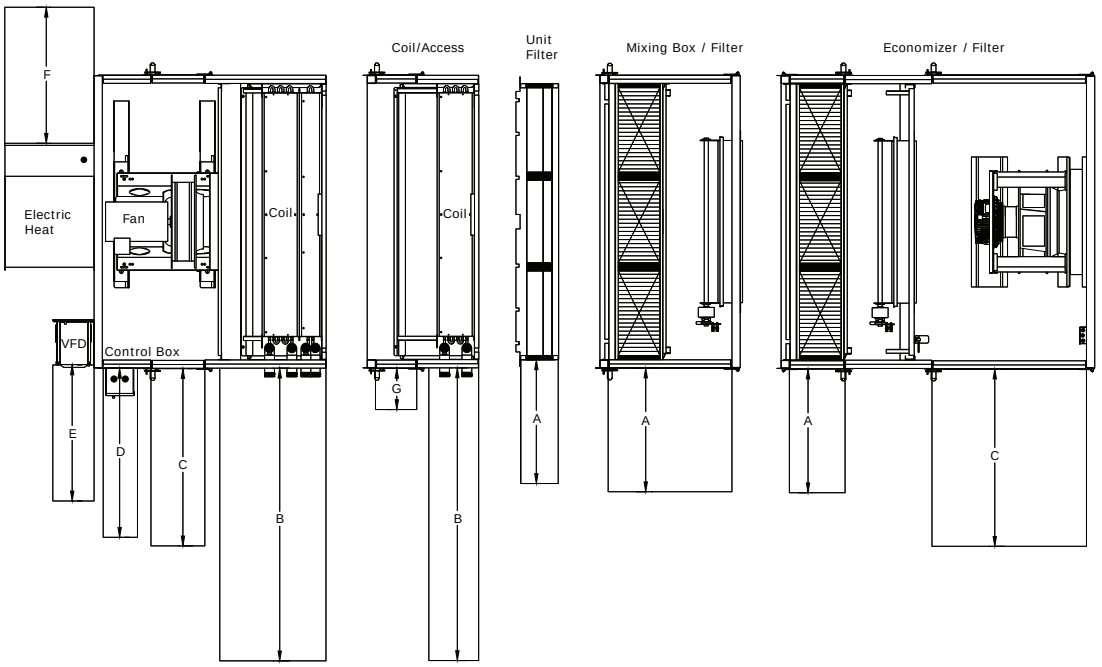


Table 1. Service clearance dimensions (inches) for indoor units

		Unit Size									
	Component	**3**	**6**	**8**	**10**	**12**	**14**	**17**	**21**	**25**	**30**
A	Filter	40.00	44.00	42.00	42.00	40.00	45.00	45.00	45.00	51.00	51.00
B	Coil Pull	49.00	62.00	66.00	78.00	86.00	86.00	94.00	94.00	96.00	109.00
C	Fan Access, horizontal unit (motor side)	48.00	48.00	48.00	51.00	54.00	58.00	61.00	61.00	66.00	66.00
C	Fan Access, vertical unit (motor side)	48.00	48.00	48.00	51.00	54.00	58.00	61.00	61.00		
C	Fan Access, vert unit with MI fan (motor side)	48.00	48.00	48.00	51.00	54.00	58.00	61.00	61.00	66.00	66.00
C	Fan Access, return section (motor side)	48.00	48.00	48.00	51.00	54.00	58.00	61.00	61.00	66.00	66.00
D	Control Box	56.00	56.00	56.00	56.00	56.00	56.00	56.00	56.00	56.00	56.00
E	VFD	48.00	48.00	48.00	48.00	48.00	48.00	48.00	48.00	48.00	48.00
F	EH	48.00	48.00	48.00	48.00	48.00	48.00	48.00	48.00	48.00	48.00
G	Access Door - Access Section	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00

Note: At a minimum, the above clearance dimensions are recommended on one side of the unit for regular service and maintenance. Clearances are mirrored to other side for units with doors both sides. Refer to as-built submittal for locations of items such as filter access doors, coil, piping connections, motor locations, etc. Sufficient clearance must be provided on all sides of unit for removal of access panels, plug panels, or section-to-section attachment brackets. Clearance for starters, VFD's, or other high-voltage devices must be provided per NEC requirements.

Figure 4. Service clearances for outdoor units

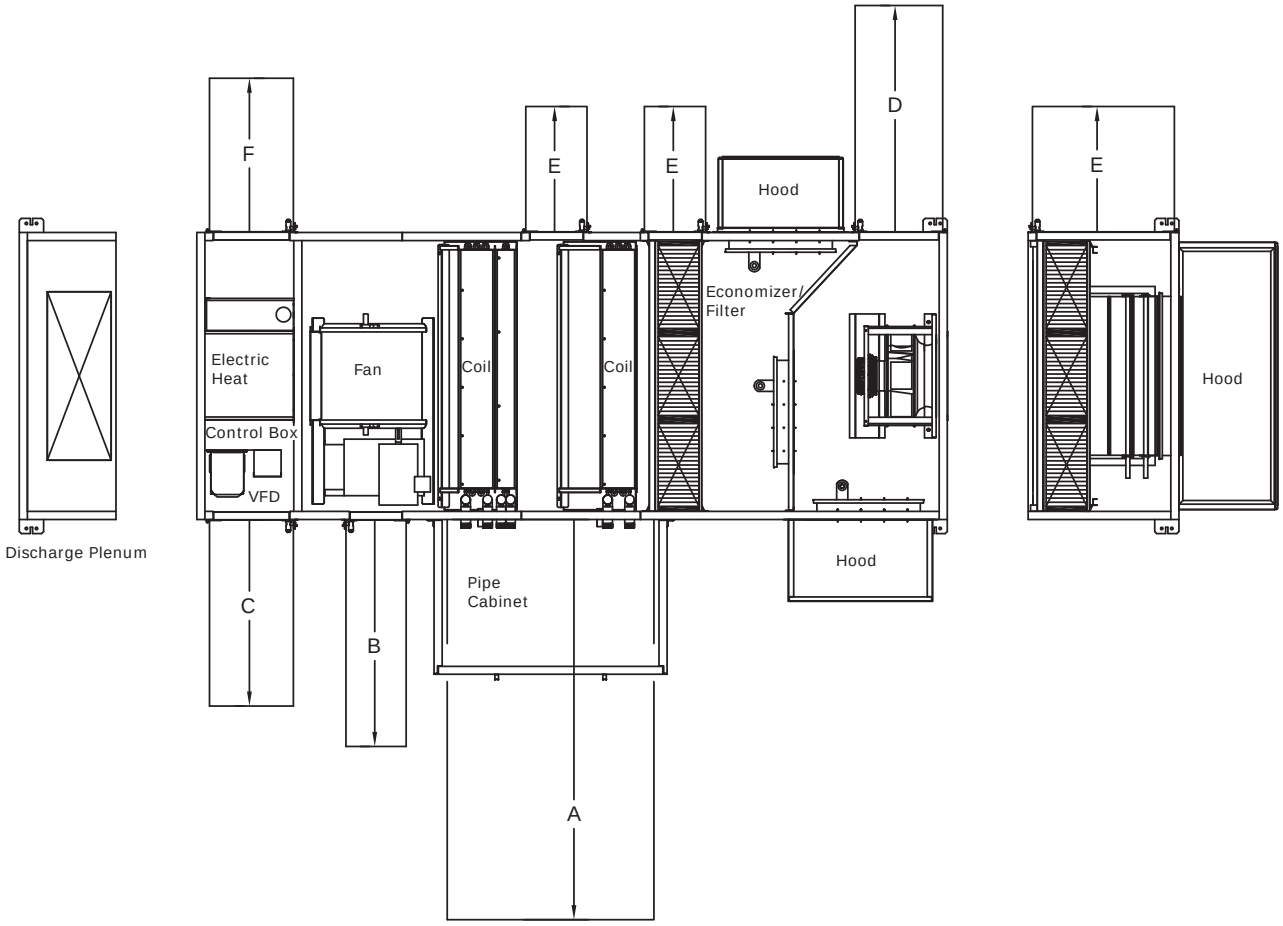


Table 2. Service clearance dimensions (inches for outdoor units)

		Unit Sizes									
	Component	**3**	**6**	**8**	**10**	**12**	**14**	**17**	**21**	**25**	**30**
A	Coil Pull	49.00	62.00	66.00	78.00	86.00	86.00	94.00	94.00	96.00	109.00
B	Fan Access, horizontal unit (motor side)	48.00	48.00	48.00	51.00	54.00	58.00	61.00	61.00	66.00	66.00
C	Controls Access	56.00	56.00	56.00	56.00	56.00	56.00	56.00	56.00	56.00	56.00
D	Return Fan Door	48.00	48.00	48.00	51.00	54.00	58.00	61.00	61.00	66.00	66.00
E	Filter (mixing box/ economizer, opposite coil connection side)	30.00	34.00	32.00	32.00	30.00	35.00	35.00	35.00	41.00	41.00
F	Electric Heat	48.00	48.00	48.00	48.00	48.00	48.00	48.00	48.00	48.00	48.00

Note: At a minimum, the above clearance dimensions are recommended for regular service and maintenance. Refer to as-built submittal for locations of items such as filter access doors, coil, piping connections, motor locations, etc. Sufficient clearance must be provided on all sides of unit for removal of access panels, plug panels, or section-to-section attachment brackets. Clearance for starters, VFDs, or other high-voltage devices must be provided per NEC requirements.

Table 3. Performance air handler model UCCA dimensions (inches)

Nom airflow (CFM)	1500	3000	4000	5000	6000	7000	3500	10,500	12,500	15,000
Unit size	**3**	**6**	**8**	**10**	**12**	**14**	**17**	**21**	**25**	**30**
Indoor units										
Horizontal unit height	27.50	32.50	38.00	38.00	41.75	45.57	48.07	54.32	60.57	60.57
Horizontal unit width	34.00	47.00	51.00	63.00	71.00	71.00	79.00	79.00	81.00	94.00
Horizontal unit length	51.94	54.94	52.31	54.66	54.66	56.16	60.16	60.24	62.94	69.56
Vertical unit height with FC fan	51.40	61.30	65.10	69.90	80.10	83.80	92.90	99.20	n/a	n/a
Vertical unit height with MI fan	46.33	53.82	62.42	63.98	67.73	74.13	72.41	80.23	86.48	89.13
Vertical unit width	34.00	47.00	51.00	63.00	71.00	71.00	79.00	79.00	81.00[1]	94.00[1]
Vertical unit length	34.10	37.10	29.40	32.10	36.10	36.10	42.10	42.10	47.10[1]	47.10[1]
[1]Size 25 and 30 not available with FC fan.										
Outdoor units										
Horizontal unit height	31.80	36.80	42.30	42.30	46.10	49.90	52.40	58.60	64.90	64.90
Horizontal unit width	41.25	54.25	58.25	70.25	78.25	78.25	86.25	86.25	88.25	101.25
Horizontal unit length	76.00	79.00	76.40	78.70	78.70	80.20	84.30	84.30	87.00	93.60
Coils										
Hydronic / DX coils (galvanized and stainless steel casing)										
Area (ft^2)	2.80	5.60	7.60	9.90	12.30	14.30	16.30	20.40	24.00	28.50
Width (in.)	17.50	22.50	27.50	27.50	30.00	35.00	35.00	43.75	50.00	50.00
Length (in.)	23.00	36.00	40.00	52.00	59.00	59.00	67.00	67.00	69.00	82.00
Velocity (fpm)	537	533	524	504	488	488	522	516	522	527
Dry Weight (lb.)										
- 1-row hydronic	23	34	42	51	63	72	78	92	110	122
- 2-row hydronic	29	46	57	71	87	101	110	133	155	176
- 4-row hydronic	46	75	96	122	149	171	189	239	271	310
- 4-row DX	39	67	90	115	137	157	177	213	247	292
- 6-row hydronic	58	98	127	161	197	228	253	320	366	423
- 6-row DX	52	92	121	153	185	213	238	297	341	405
- 8-row hydronic	73	125	162	207	254	293	327	410	472	547
Wet Weight (lb.)										
- 1-row	29	43	52	64	81	93	101	119	142	158
- 2-row	37	58	74	91	115	132	145	179	209	237
- 4-row	59	97	125	158	196	226	250	318	364	417
- 6-row	76	129	168	213	264	306	340	431	497	575
- 8-row	97	165	217	275	340	394	439	554	641	745
Steam coils										
Area (ft^2)	1.80	4.40	6.50	8.50	9.80	13.30	15.10	16.80	21.30	25.30
Width (in.)	12.00	18.00	24.00	24.00	24.00	33.00	33.00	18.00 18.00	12.00 33.00	12.00 33.00
Length (in.)	22.00	35.00	39.00	51.00	59.00	58.00	66.00	67.00	68.00	81.00
Velocity (FPM)	818	686	615	588	610	527	562	627	588	593
Weight (lb.)	31	54	75	86	93	122	132	156	239	266

Table 3. Performance air handler model UCCA dimensions (inches) (continued)

Nom airflow (CFM)	1500	3000	4000	5000	6000	7000	3500	10500	12500	15000
Unit size	**3**	**6**	**8**	**10**	**12**	**14**	**7**	**21**	**25**	**30**
Fan / Motor data										
FC fans										
Wheel size (in.)	9x7	12x9	12x12	15x15	18x15	18x18	20x15	20x20	20x18	22x20
Maximum RPM	2000	1500	1700	1400	1200	1200	1100	1000	1300	1150
Motor HP	1-2	1-3	1-5	1 - 5	1 - 7 1/2	1 - 7 1/2	1 - 10	2 - 15	3 - 15	1 1/2 - 15
Minimum design CFM	1050	2100	2800	3500	4200	4900	5950	7350	8750	10500
DDP fans										
Wheel size (in.)	11	14	16	18	18	20	20	2 x 18	2 x 20	2 x 20
Maximum RPM	4600	3600	3400	3025	3025	2720	2720	3025	2720	2720
Motor HP	1-3	1 1/2 - 7 1/2	2- 7 1/2	3 - 7 1/2	3 - 10	3 - 15	3 - 15	3- 10	3- 10	5 - 15
MI fans (std TSP)										
Wheel size (mm)	280	n/a	400	n/a	500	560	2 X 400	n/a	2 X 500	2 X 560
Maximum RPM	3100	n/a	2550	n/a	2200	1750	2550	n/a	2200	1750
Motor HP (kW)	1	n/a	3	n/a	6	6	3	n/a	6	6
MI fans (high TSP)										
Wheel size (mm)	310	400	450	500	2 X 450	2 X 450	2 X 450	2 X 500	n/a	n/a
Maximum RPM	3900	2550	2750	2200	2750	2750	2750	2200	n/a	n/a
Motor HP (kW)	3	3	6	6	6	6	6	6	n/a	n/a
Filters (height x width - inches) with quantity per size										
2 in. and 2/4 in. combination flat filter										
- 16 x 20			4		2	2	4	2		
- 16 x 25				4	1	1		2	2	6
- 20 x 20					2	2	4	2		
- 20 x 25	1	2			1	1		2	6	4
Area (ft^2)	3.50	6.90	8.90	11.10	16.30	16.30	20.00	22.50	26.40	30.60
Nominal Velocity (fpm)	432.0	432.0	450.0	450.0	369.2	430.8	425.0	466.7	473.7	490.9
2-in. Angle Filter										
- 16 x 20				2	6	6	6	4		12
- 16 x 25	2				3	3		8		
- 20 x 20		4	2	4			6			8
- 20 x 25			2						12	
Area (ft^2)	5.6	11.1	12.5	15.6	21.7	21.7	30.0	31.1	41.7	48.9
Nominal Velocity (fpm)	270.0	270.0	320.0	321.4	276.9	323.1	283.3	337.5	300.0	306.8
Mixing Box / Indoor Return Section										
Damper Area (ft^2)	1.30	2.40	3.10	4.10	5.10	5.60	7.00	8.20	10.30	12.00
Nominal Velocity (fpm)	1166.90	1224.70	1288.50	1205.60	1178.00	1239.20	1217.00	1277.90	1208.10	1247.10
Economizer										
Damper Area (ft^2)	1.14	2.30	3.13	3.96	4.63	5.39	6.67	8.54	9.98	11.70
Nominal Velocity (fpm)	1310.68	1304.23	1278.04	1263.15	1297.010	1298.92	1274.98	1230.13	1252.81	1281.56

Notes:

1. Hydronic coil weight based on 14 fins per inch. Steam coil weight based on 6 fins per in. Coil width = length in direction of coil header, typically vertical. Coil length = length of coil in direction of the coil tubes, typically horizontal and perpendicular to airflow. Unit sizes 21-30 have two stacked steam coils. Fan wheel size is diameter x length of blade (width). Minimum airflow limit is for units with hot water, steam, or electric heat. There is no minimum airflow for cooling-only units.
2. For indoor units with optional baserail, add 6 inches to the height dimension.

Fans

Table 4. Fan weights (pounds)

Unit Size	Supply Fan FC Fan[a]	Supply Fan DDP Fan[a]	Return Fan Motorized Impeller[b]	Supply Fan Motorized Impeller[b] Fan (Std TSP)	Supply Fan Motorized Impeller[b] Fan (High TSP)	Indoor Return Fan Motorized Impeller[b]
3	30.71	60.63	57.00	30.00	60.00	30.00
6	47.09	96.03	57.00	n/a	87.00	57.00
8	69.21	110.09	98.00	87.00	120.50	100.00
10	83.02	149.12	98.00	n/a	128.00	100.00
12	97.90	158.25	98.00	128.00	241.00	125.00
14	110.46	164.44	125.00	161.00	241.00	160.00
17	133.09	172.89	160.00	256.00	241.00	125.00
21	155.81	290.14	196.00	n/a	256.00	125.00
25	168.83	304.07	196.00	256.00	n/a	250.00
30	208.34	317.00	250.00	322.00	n/a	322.00

(a) Add motor weight to get total weight of the supply fan.
(b) Includes the weight of both the fan and motor.

Motors

Table 5. Housed and direct-drive fan motor weights (pounds)

Motor HP	Voltage	Motor Weight	Frame Size
1	200-208, 230/460, 575	38	143
1.5	200-208, 230/460, 575	37	145
2	200-208, 230/460, 575	43	145
3	200-208, 230/460, 575	71	182
3 (3600 rpm, size-3)	200-208, 230/460, 575	89	182
5	200-208, 230/460, 575	82	184
7.5	200-208, 230/460, 575	91	213
10	200-208, 230/460, 575	127	215
15	200-208, 230/460, 575	217	254

Controls

All controls boxes and starters weigh 15 pounds.

Table 6. VFD Weights (pounds) and line input

				VFD (single Fan)		VFD (dual Fan)	
HP	Type	FLA	RPM	Line Input	Weight	Line Input	Weight
1	200 V / 60 Hz / 3 PH	3.50	1800	4.20	10		
	230 V / 60 Hz / 3 PH	3.00	1800	4.20	10		
	460 V / 60 Hz / 3 PH	1.50	1800	2.10	10		
	575 V / 60 Hz / 3 PH	1.20	1800	3.90	20		
1.5	200 V / 60 Hz / 3 PH	5.10	1800	6.80	10		
	230 V / 60 Hz / 3 PH	4.40	1800	6.80	10		
	460 V / 60 Hz / 3 PH	3.00	1800	3.40	10		
	575 V / 60 Hz / 3 PH	1.80	1800	3.90	20		
2	200 V / 60 Hz / 3 PH	6.50	1800	6.80	10		
	230 V / 60 Hz / 3 PH	5.80	1800	6.80	10		
	460 V / 60 Hz / 3 PH	2.90	1800	3.40	10		
	575 V / 60 Hz / 3 PH	2.40	1800	3.90	20		
3	200 V / 60 Hz / 3 PH	9.70	1800	15.20	15	22.00	27
	230 V / 60 Hz / 3 PH	8.60	1800	15.20	15	22.00	27
	460 V / 60 Hz / 3 PH	4.20	1800	4.80	12	11.00	20
	575 V / 60 Hz / 3 PH	3.30	1800	3.90	20	9.00	25
5	200 V / 60 Hz / 3 PH	15.70	1800	22.00	22	42.00	31
	230 V / 60 Hz / 3 PH	13.60	1800	22.00	22	42.00	31
	460 V / 60 Hz / 3 PH	6.70	1800	8.20	12	14.00	20
	575 V / 60 Hz / 3 PH	5.30	1800	6.10	20	11.00	25
7.5	200 V / 60 Hz / 3 PH	22.40	1800	28.00	22	59.40	64
	230 V / 60 Hz / 3 PH	19.40	1800	28.00	22	59.40	64
	460 V / 60 Hz / 3 PH	9.40	1800	11.00	15	21.00	27
	575 V / 60 Hz / 3 PH	7.60	1800	9.00	20	18.00	37
10	200 V / 60 Hz / 3 PH	29.50	1800	42.00	26	59.40	64
	230 V / 60 Hz / 3 PH	25.20	1800	42.00	26	59.40	64
	460 V / 60 Hz / 3 PH	12.50	1800	14.00	15	27.00	27
	575 V / 60 Hz / 3 PH	10.00	1800	11.00	20	22.00	37
15	200 V / 60 Hz / 3 PH	43.40	1800	59.40	59		
	230 V / 60 Hz / 3 PH	37.80	1800	59.40	59		
	460 V / 60 Hz / 3 PH	18.50	1800	21.00	22	40.00	31
	575 V / 60 Hz / 3 PH	14.80	1800	18.00	20	34.00	64

Installation - Mechanical

Lifting and Rigging

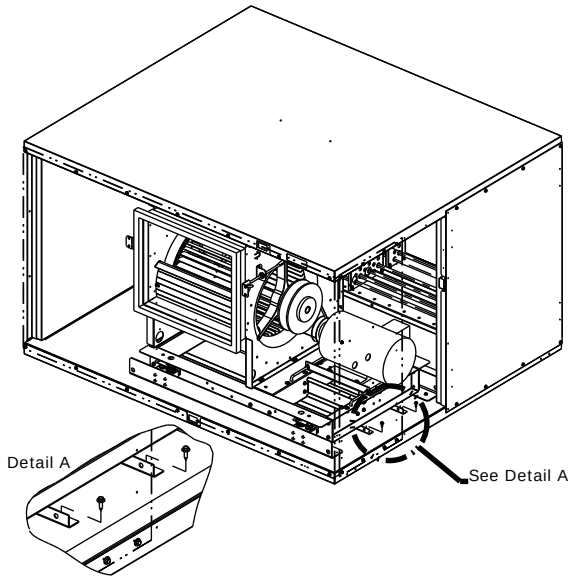
Remove Shipping Tie-Downs

Prior to unit placement, remove the shipping tie-downs. See Figure 5 thru Figure 10.

Horizontal FC Fan 3-10

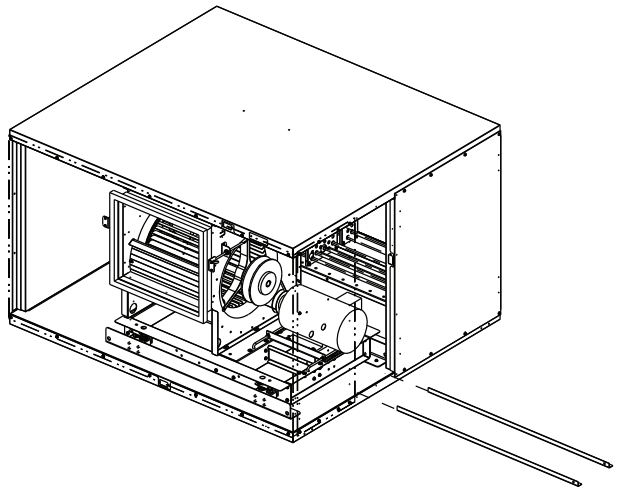
1. Remove screws attaching shipping protection brackets from floor.

Figure 5. Shipping tie-down removal for horizontal FC fan 3-10 - remove screws



2. Remove shipping protection brackets through the door.

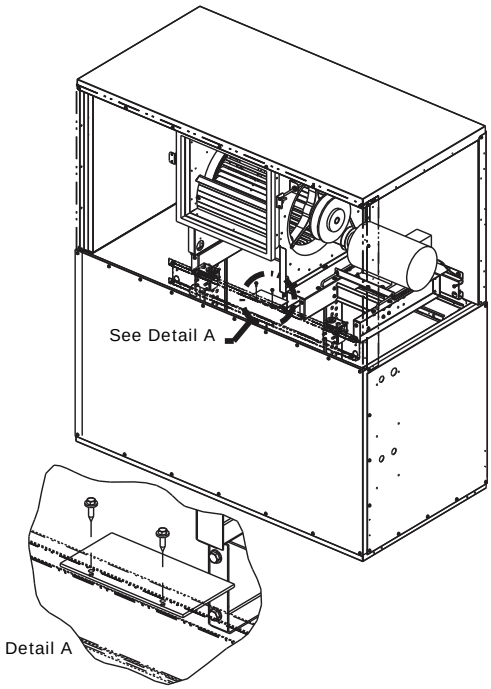
Figure 6. Shipping tie-down removal for horizontal FC fan 3-10 - remove bracket



Vertical FC Fan 3-10

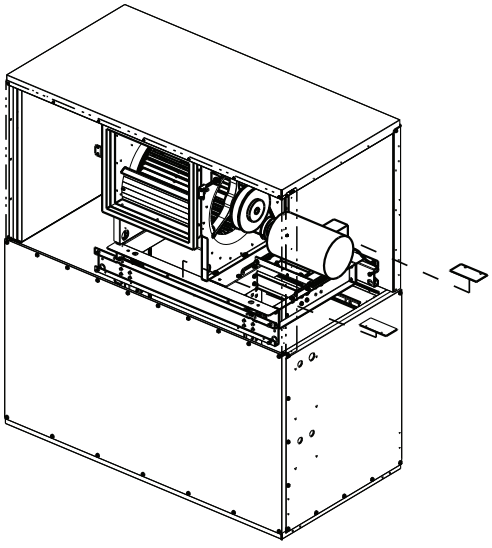
1. Remove screws attaching shipping protection brackets from center of isolation base to casing mounting bracket.

Figure 7. Shipping tie-down removal for vertical FC fan 3-10 - remove screws



2. Remove shipping protection brackets through door.

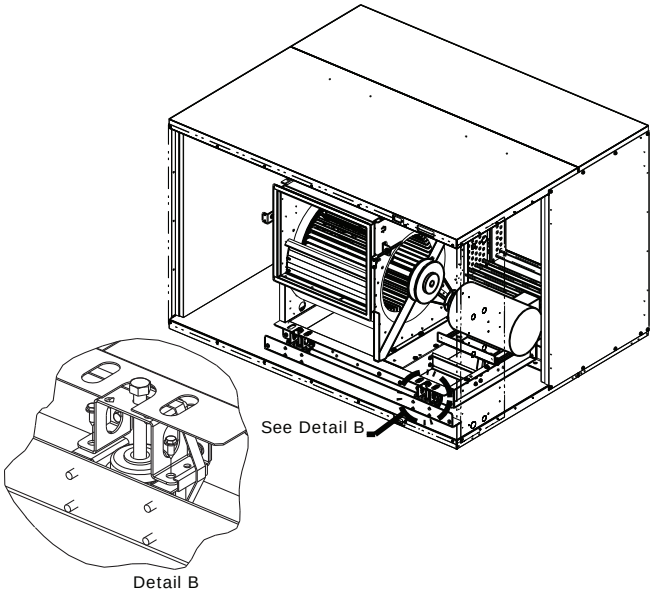
Figure 8. Shipping tie-down removal for vertical FC fan 3-10 - remove brackets



FC Fan Size 12-30

1. Remove drive side screws on isolator brackets
2. Cut banding and remove

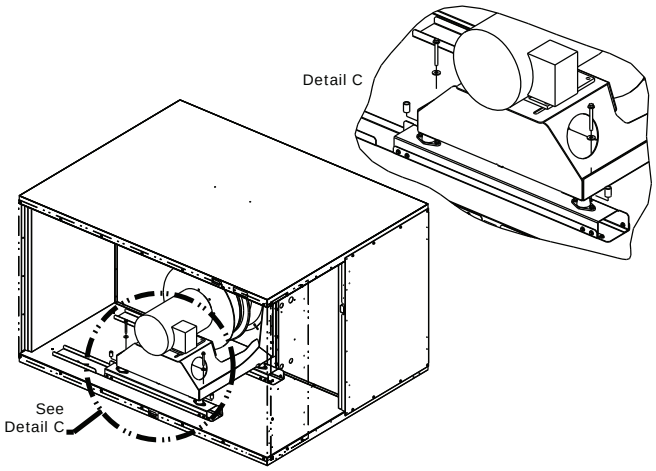
Figure 9. Shipping tie-down removal for FC fan 12-30



Direct-Drive Plenum Fans

1. Remove two screws on the motor side of the fan assembly.
2. Remove tie-down.

Figure 10. Shipping tie-down removal for DDP fan



Skid Removal for Indoor Units

NOTICE

Equipment Damage!

Premature skid removal could result in equipment damage. Keep skid in place until unit is ready to set. Do not move the unit or subassembly without the skid in place as shipped from the factory.

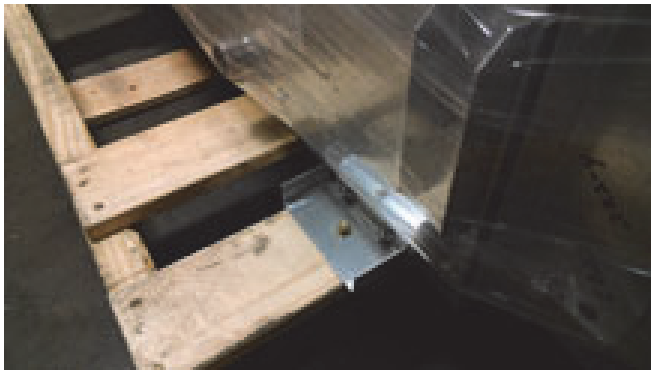
⚠WARNING

Risk of Unit Dropping!

Improper use of the tie down brackets could result in unit dropping and crushing technicians which could result in death or serious injury, and equipment damage. Do not use skid tie down brackets to lift the unit.

Indoor units ship on a skid that provides forklift locations from the front or rear. The skid allows easy maneuverability of the unit during storage and transportation. Do not use the skid tie down for lifting. Do not remove the skids until ready to place the unit in its permanent location.

Figure 11. Do not use skid tie down for lifting



General Lifting Considerations

⚠WARNING

Risk of Unit Dropping!

Failure to follow instruction below could result in death or serious injury. To prevent modules/subassemblies from dropping, ALWAYS place, assemble, and suspend them one at a time.

⚠WARNING

Improper Unit Lift!

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

Before preparing the unit for lifting, estimate the approximate center of gravity for lifting safety. Because of placement of internal components, the unit weight may be unevenly distributed, with more weight in the coil and fan areas. Approximate unit weights are provided in the Dimensions and Weights chapter. Refer to the unit submittals for actual weights. Test the unit for proper balance before lifting.

Lifting Indoor Units

⚠WARNING

Heavy Objects!

Failure to follow instructions below or properly lift unit could result in unit dropping and possibly crushing operator/technician 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 slings used to lift the unit must be capable of supporting the entire weight of the unit. Lifting slings may not be of the same length. Adjust as necessary for even unit lift.

Always rig subassemblies or sections as they ship from the factory. Never bolt sections together before rigging.

- Make the loop of the sling parallel to the direction of airflow, if possible.
- When hoisting the unit into position, use the proper rigging method, such as straps, slings, spreader bars and lifting lugs for protection and safety. See the Figure 12 and Figure 13.

Figure 12. Hoist indoor units with slings and spreader bars

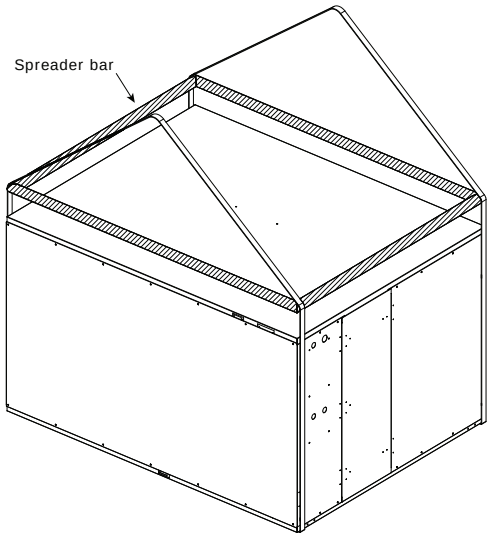
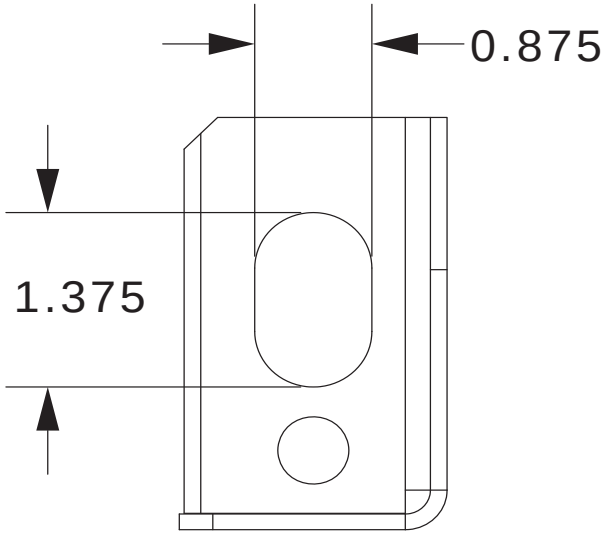
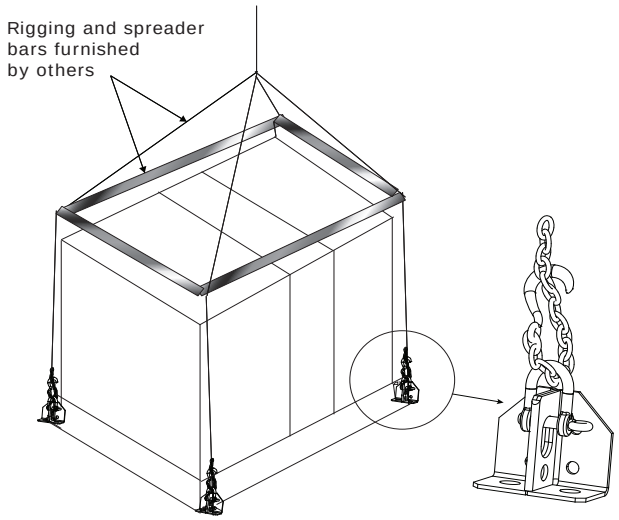


Figure 13. Lifting indoor lug (with optional baserail)



- For unit sizes 3-30 with integral base frame, use field-provided spreader bars and slings to rig the units and subassemblies as shown in the Figure 14. The air handler is not designed to be lifted or rigged from the top of the unit.

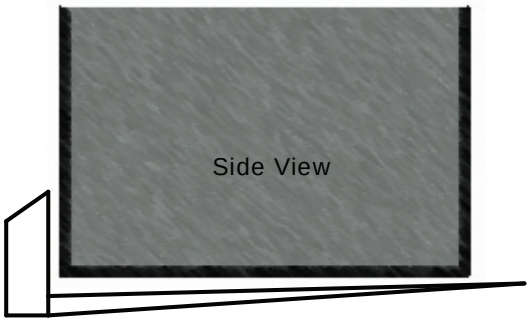
Figure 14. Lifting detail for unit sizes 3 to 30



- To lift unit with forklift, extend the forks under both ends of the unit as indicated in the below figure. The forks should extend past the end of the unit and should not contact the bottom of the air handler. Units should only be lifted from the proper end identified by the lifting label on the unit.

Note: *Do not use a forklift on outdoor air handlers.*

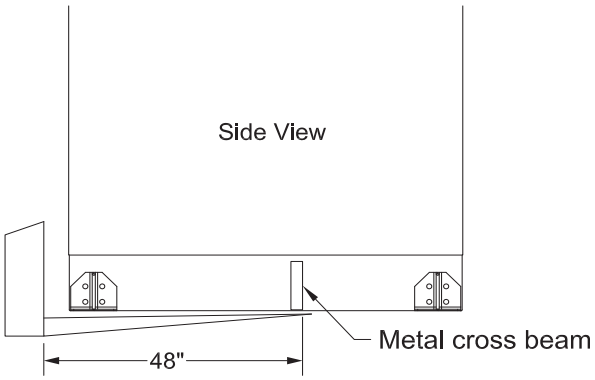
Figure 15. Fork lift points



- Lifting Indoor Units with Optional Baserail

For unit sizes 3 to 30, a forklift may be used to lift a single section or small subassembly, provided the forks extend under both ends of the base frame, or as indicated in the figure below. The forks should not contact the bottom of the air handler. Units should only be lifted from the proper end identified by the lifting label on the unit. A lifting crane or other means should be used for larger units where forks cannot extend under both base rails.

Figure 16. Fork lift points with optional baserail

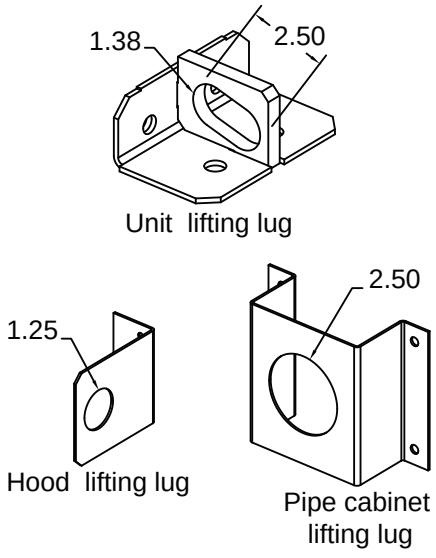


Lifting Outdoor Units

Note: *For outdoor air handlers, preparation of the roof curb or pier mount and roof openings must be completed before lifting to the roof. See CLCH-SVN-006*-EN Performance Climate Changer Air Handler Model UCCA Roof Curb Installation.*

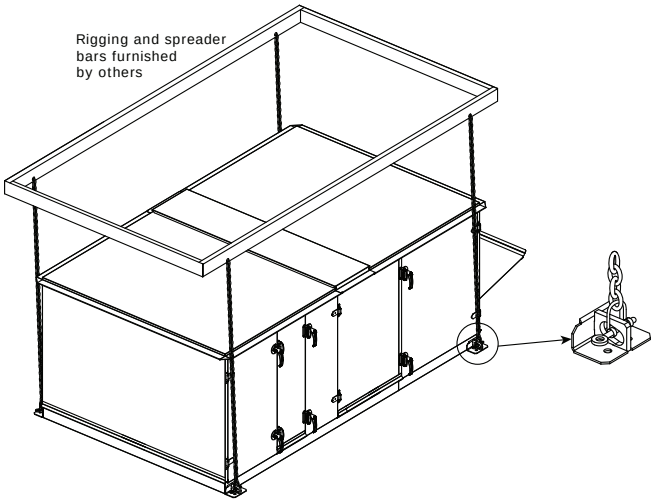
- When hoisting the unit into position, use the proper rigging method, such as straps, slings, spreader bars and lifting lugs for protection and safety.
- Use **all** lifting lugs provided. See the figure below for lug hole sizes and location.

Figure 17. Outdoor lifting lugs



Use field-provided spreader bars and slings to rig units and subassemblies. The air handler is not designed to be lifted or rigged from the top of the unit.

Figure 18. Lifting lug detail



- Never stack the pipe cabinet or inlet hoods on the unit as it is being lifted.
- Do not attach the intake/exhaust hood or pipe cabinet to the unit prior to lifting the unit. Doing so may damage the equipment. Attach the hoods to the unit only after all sections are in place.
- All shipping supports and crating on the face of the sections must be removed to permit proper fit-up and sealing of the surfaces. Dispose of properly.

Lifting Hoods and Pipe Cabinets

⚠WARNING

Risk of Unit Dropping!

Placing, assembling, and/or suspending more than one module/subassembly at a time could result in module/subassemblies dropping and crushing technicians which could result in death, serious injury, or equipment damage. Always place, assemble, and suspend modules/subassemblies one at a time.

Figure 19. Lifting exhaust hood

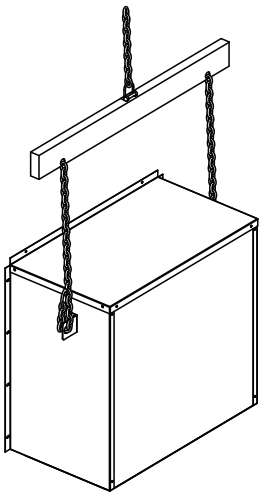
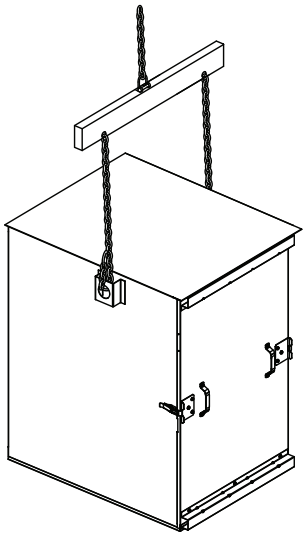


Figure 20. Lifting pipe cabinet



Unit Placement and Assembly for Indoor Air Handlers

- If the air handler is ordered with a mixing box or angle filter section, it will arrive in sections. Some assembly may be required. For details, see:
- Section assembly; see "Unit Assembly for Indoor Units," p. 27.
- Ceiling-suspended indoor unit assembly; see "Ceiling Suspension for Indoor Units," p. 25

⚠WARNING

Toxic Fumes!

Keep open flame away from unit exterior or interior. Do not weld or use cutting torch on the exterior or interior of the unit. The unit contains polyurethane insulation. Flame could produce toxic gas which could result in death or serious injury.

NOTICE

Equipment Damage!

Failure to comply with temperature requirements could result in equipment damage. The internal sections of this unit containing electrical components must not exceed 104o F operating temperature. Internal sections of the unit which do not contain electrical components must not exceed 200°F temperature.

Unit Placement

NOTICE

Microbial Growth!

Standing water and wet surfaces inside the equipment can become an amplification site for microbial growth (mold), which could cause odors and damage to the equipment and building materials. The floor or foundation must be level and the condensate drain at the proper height for proper coil drainage and condensate flow.

For proper operation, the unit must be installed level (zero tolerance) in both horizontal axes. For vertical discharge units, allow space under the unit for supply air ductwork connections.

Each section must be individually hoisted, set on the housekeeping pad, roof curb, or pier mount and then assembled. Individually place each section in the appropriate installation location.

Note: *Prior to placing fan section in the appropriate installation location, verify shipping tie-downs have been removed.*

Floor Mounting for Indoor Units

The skid tie down brackets can be used to tie down the unit to the concrete slabs or other flat surface. Do not use tie downs to lift the unit.

Figure 21. Tie downs can be used to tie down to floor

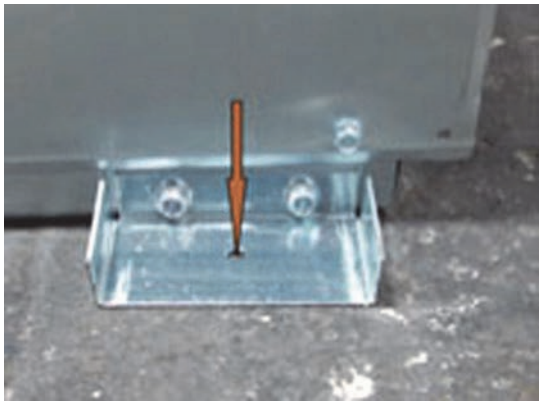
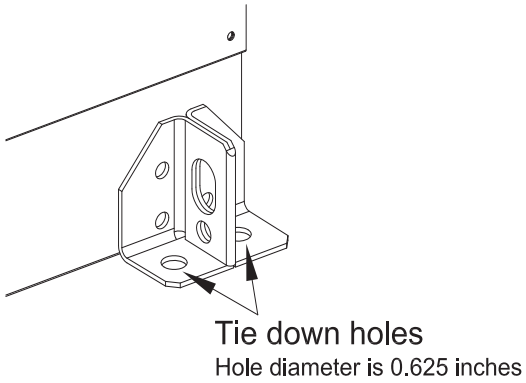


Figure 22. Tie down with optional baserail



Ceiling Suspension for Indoor Units

⚠WARNING

Risk of Unit Dropping!

Improper use of the tie down brackets could result in unit dropping and crushing technicians which could result in death or serious injury, and equipment damage. Do not use skid tie down brackets to lift the unit. Tie down brackets are designed only to secure the unit to the floor, housekeeping pad, or platform.

Using a Field-Provided Mounting Frame

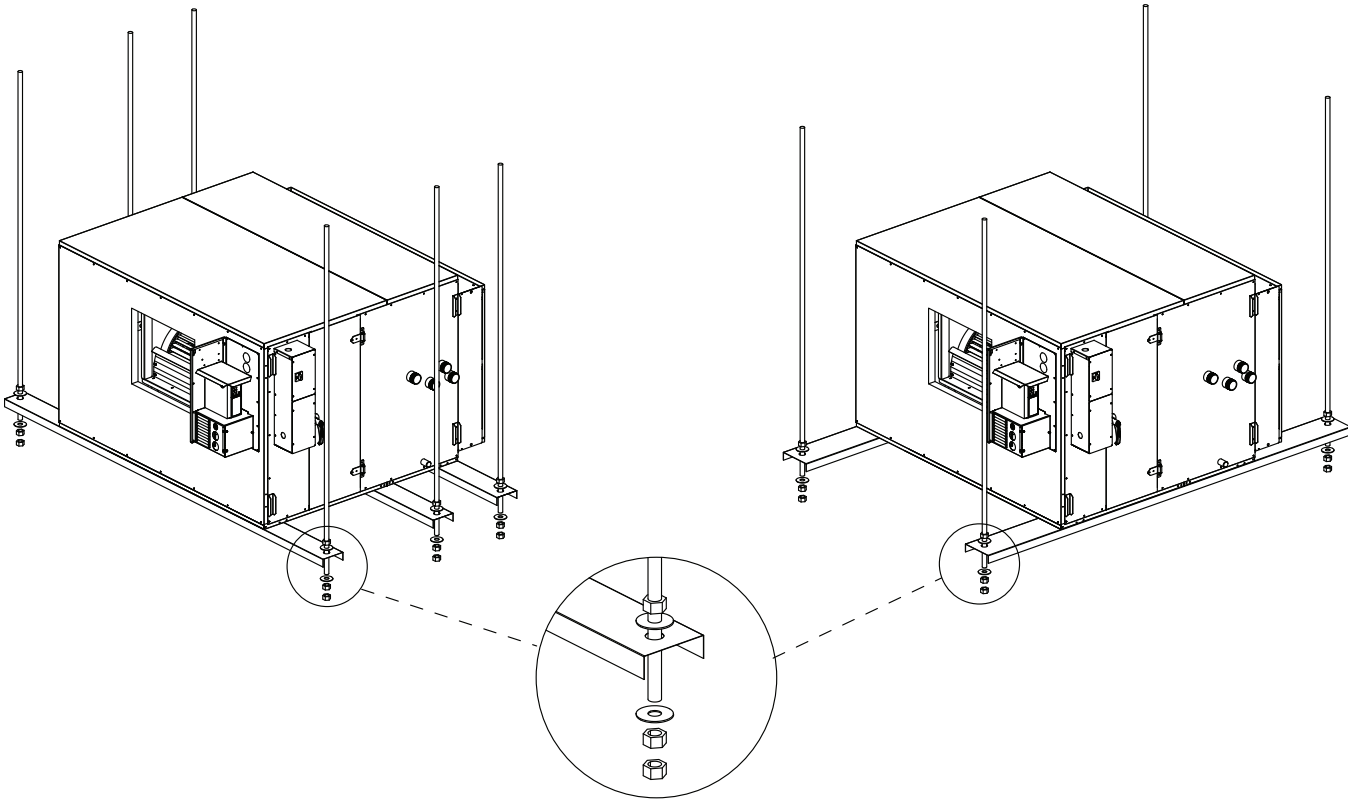
If a field-provided mounting frame is used for ceiling suspension, the installer/contractor must provide a ceiling-suspended mounting frame designed to support the length, width, and weight of the entire air-handling unit. See the Dimensions and Weights chapter for approximate weights.

Note: *It is the building engineer's responsibility to size the structural channels and to provide the appropriate hangers.*

Structural channels in a field-provided frame can be mounted parallel to airflow or perpendicular to airflow:

- For parallel-to-airflow channels, size channels based on a four-point load distribution.
- For perpendicular-to-airflow channels, size channels based on the load distribution of the individual sections and install the channels so that *both ends of every section are supported*.

Figure 23. Typical ceiling suspension for parallel-to-airflow channels and perpendicular-to-airflow channels



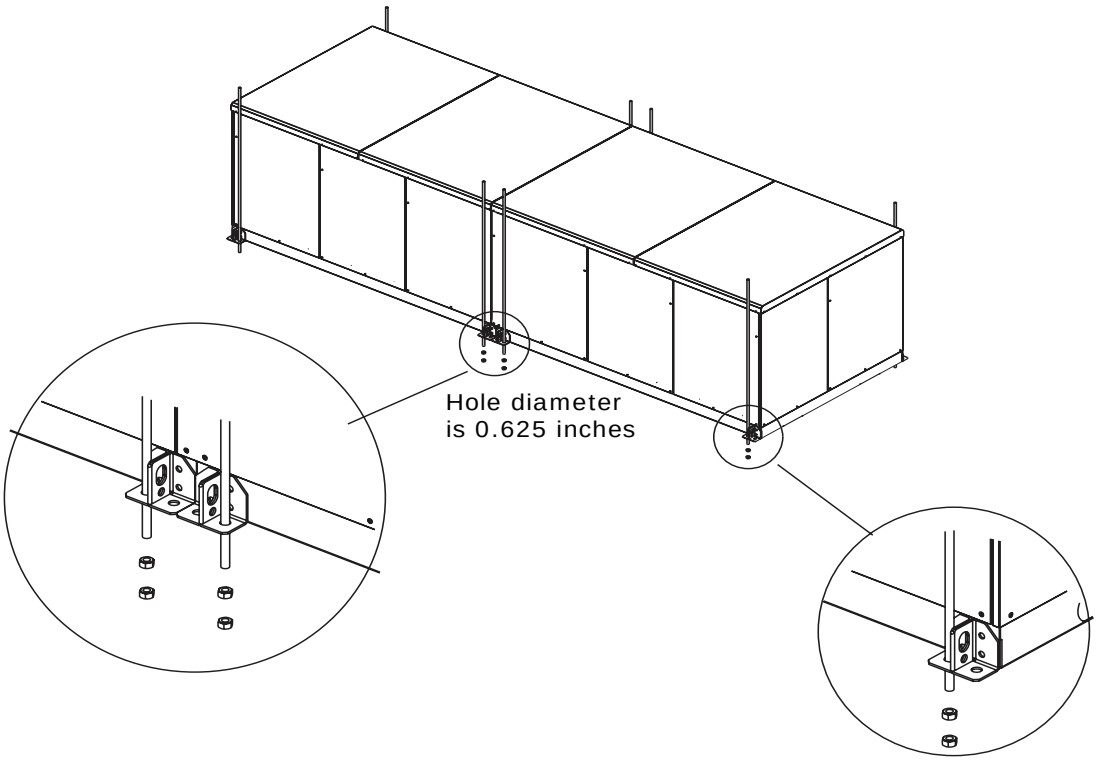
Using Integral Base Frame

If a factory-provided integral base frame is used for ceiling suspension, the individual sections and/or subassemblies will have base frame shipping splits and base frame lifting lugs.

While using the base frame for ceiling suspension:

- Suspend the unit (on both sides of the unit) at each shipping split lug and on the four corners of the unit as shown in the Figure 24. See Figure 22 for lug hole sizes and location.

Figure 24. Ceiling suspension for unit sizes 3 to 30



- Bolt the shipping splits together.
- Ensure that the hanger rods extend through the bottom of the base lug. It is the responsibility of the building engineers to provide the appropriate hangers.

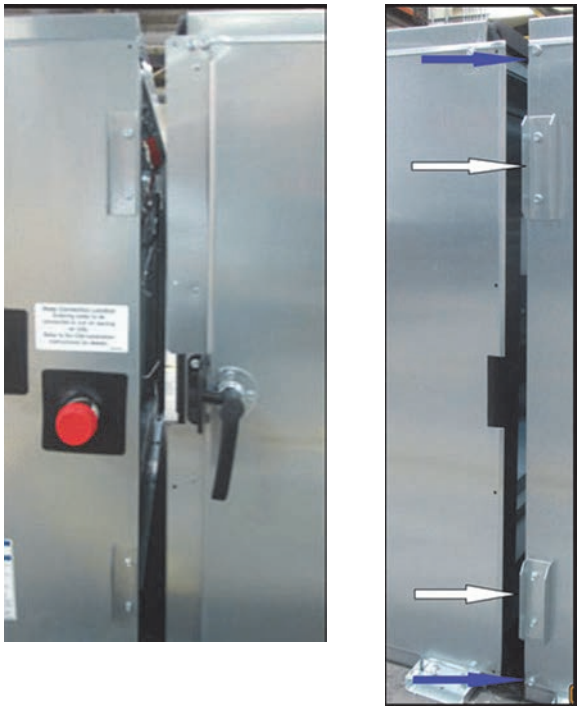
Unit Assembly for Indoor Units

Note: *Air handlers often include optional factory-provided casing penetration entry points for field-provided wiring. Consider overall unit serviceability and accessibility before mounting, running wires (power), making cabinet penetrations, or mounting any components to the cabinet.*

Joining at Shipping Splits

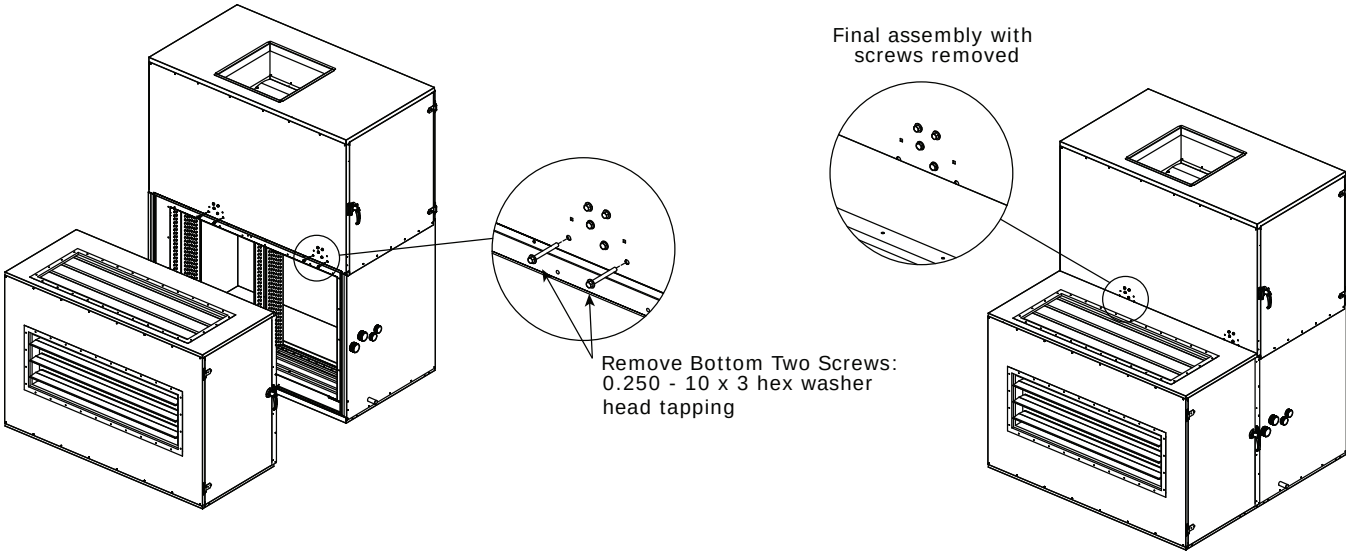
1. Bring sections close to each other prior to connecting.
2. Remove the strap channels, top and bottom screws from the main section, and retain the screws. Screws will be used to tie the sections together. See the Figure 25 .

Figure 25. Bring sections close, remove strap channels.



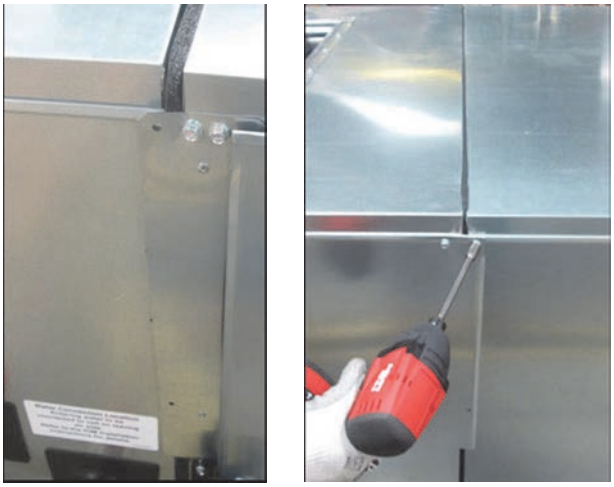
If the unit has a second level fan, it is necessary to remove the screws, as shown in the figure below, before joining the mixing or filter section to the coil section.

Figure 26. Joining mixing, return, and other accessories section to unit with second level fan



3. Slide the sections together so the side flanges overlap the main section.
4. Align the top and bottom holes and replace the screws.

Figure 27. Bring sections together, align holes



5. Use pipe clamps or other means to crowd the sections, if needed.
6. Make sure to provide enough protections to the sections, so the clamps do not damage it.
7. Only top and bottom mounting holes will be aligned.
8. Use self drilling screws on the other section mounting holes.
9. Make sure the section joint gasket is compressed and sealed properly.

Fan Removal

⚠WARNING

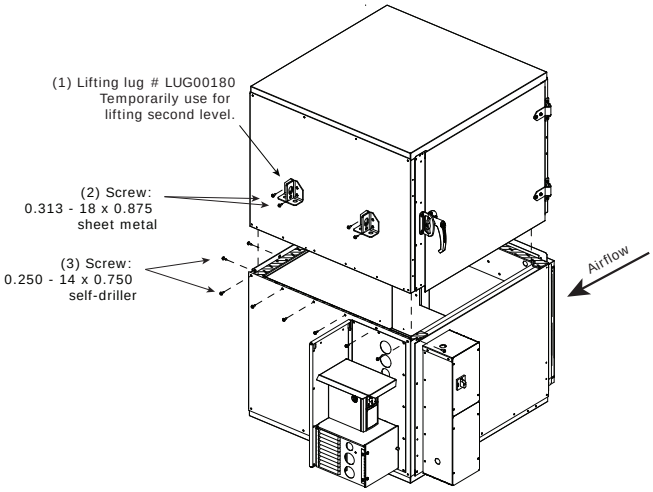
Hazardous Voltage!

Failure to disconnect power before servicing could result in death or serious injury. Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized.

When the air handler must fit into a tight space, the second level fan section of a vertical unit can be removed to maneuver the unit into the space. Removal will require field-supplied lifting lugs (part # LUG00180).

1. Remove screws (Item 2) located in front and rear panels of second level fan portion.
2. Install four lifting lugs (Item 1). Install two on front panel and two on rear panel of second level fan portion using screws (Item 2). See Figure 28.

Figure 28. Remove screws, install lifting lugs



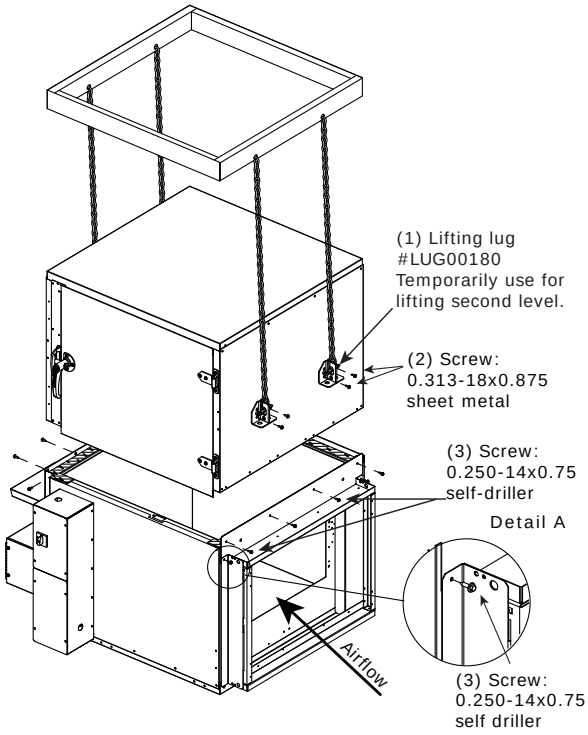
⚠WARNING

Risk of Unit Dropping!

Improper use of the tie down brackets could result in unit dropping and crushing technicians which could result in death or serious injury, and equipment damage. Do not use skid tie down brackets to lift the unit. Tie down brackets are designed only to secure the unit to the floor, housekeeping pad, or platform.

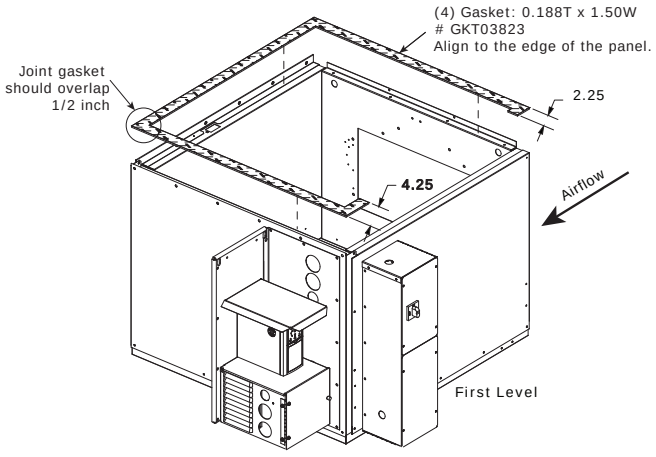
3. Use field-provided spreader bars and slings to rig as shown Figure 29. Straps can be used but careful consideration must be taken not to damage equipment panels.
4. Remove screws (Item 3) around parameter lip where second level is attached to first level.
5. If unit is equipped with optional filter rack, insert screws (Item 3) in vertical flanges on each side of filter rack (see detail A in Figure 29). Screws installed to support filter rack temporarily and must be removed after reassembly.
6. Lift second level fan portion vertically to clear parameter lip on first level portion of unit.

Figure 29. Use spreader bars to lift top unit



Repeat steps 1-6 in reverse order to reinstall second level fan portion on the first level portion of unit. Lifting lugs should be removed once reassembly is complete. Check gasket between the two sections. In the event the gasket between the two sections is damaged, replace with new gasket (Item 4) (Part# GKT03823). See the figure below.

Figure 30. Check gasket between sections, replace if necessary



Note: *If unit is equipped with a control interface, VFD or electric heat, disconnect electrical wiring. Wiring between fan motor and contactor or VFD can be disconnected via quick connects in the control interface or VFD box respectively. Electric heat*

wiring should be disconnected from switch in control interface box. Any controls low voltage end devices located in second level fan portion should be disconnected via quick connects at each device.

Unit Placement and Assembly for Outdoor Air Handlers

NOTICE

Microbial Growth!

Standing water and wet surfaces inside the equipment can become an amplification site for microbial growth (mold), which could cause odors and damage to the equipment and building materials. The floor or foundation must be level and the condensate drain at the proper height for proper coil drainage and condensate flow.

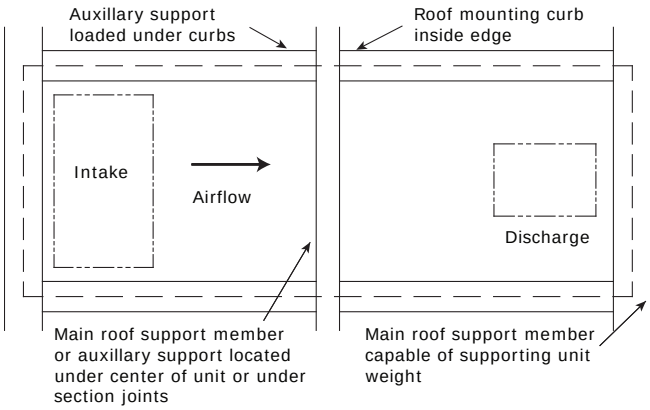
Note: *For outdoor air handlers, preparation of the roof curb or pier mount and roof openings must be completed before lifting to the roof. See CLCH-SVN-006*-EN Performance Climate Changer Air Handler Model UCCA Roof Curb Installation Instructions.*

For proper operation, the unit must be installed level (zero tolerance) in both horizontal axes. For vertical discharge units, allow space under the unit for supply air ductwork connections.

Roof Curbs

The roof curb must be supported along its entire perimeter. The curb may be set parallel or at right angles to roof support members. If at right angles to the support members, there must be adequate supporting roof cross members between the ends (in the direction of airflow). Be sure the cross members do not interfere with the connection of supply and return ducts to the unit. See the figure below for details.

Figure 31. Unit set perpendicular to roof curb members

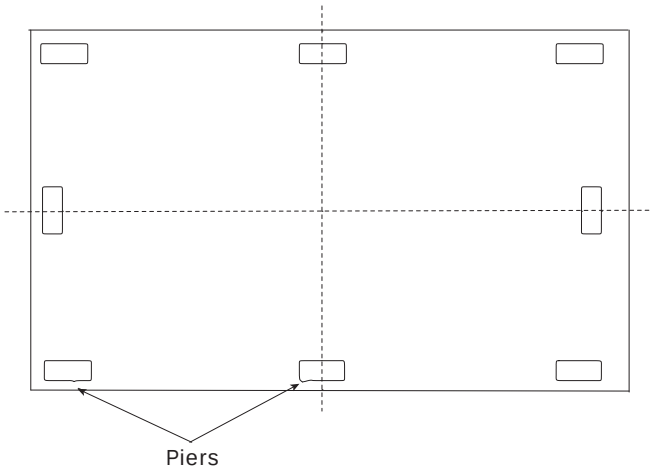


When mounting the unit on its roof curb, make sure that the gasketing between the roof curb and unit base provides an airtight seal.

Pier Mount

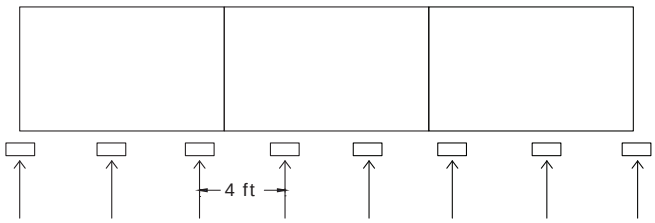
If a unit is pier-mounted, at a minimum, locate one pier at each corner and then every four feet at equally spaced intervals around the perimeter of the unit. Both the unit and the pipe cabinet should be supported by their base channel around the entire perimeter (see Figure 32 and Figure 33).

Figure 32. Pier locations (typical)



Note: Piers be must be structurally sound to support the weight of the unit.

Figure 33. Pier mount - side view



Assembly

If a unit arrives in sections, then each section must be individually hoisted, set on the housekeeping pad, roof curb, or pier mount and then assembled.

Refer to the unit submittals and unit tagging for correct placement of all sections. If there are any discrepancies between the submittals and the unit tagging, contact your local Trane representative before proceeding.

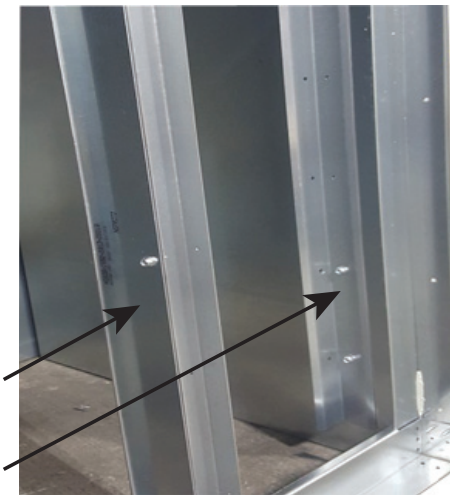
Following the order of the sections on the unit submittals and tagging, individually place each unassembled section or subassembly in the appropriate installation location.

Note: *Prior to placing fan section in the appropriate installation location, verify shipping tie-downs have been removed.*

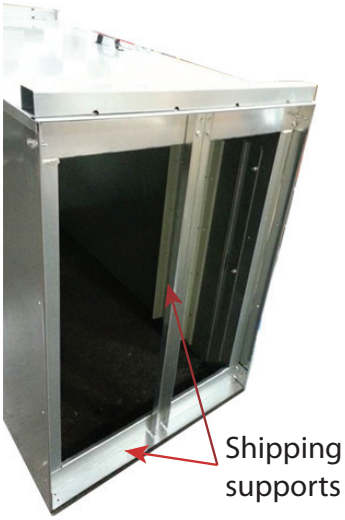
Pipe Cabinets

For outdoor units, the pipe cabinet must be mounted as an individual section.

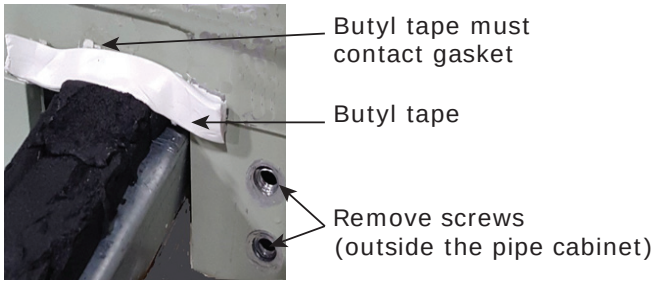
1. Remove trim angle and roof hook from the inner side of the pipe cabinet side wall.



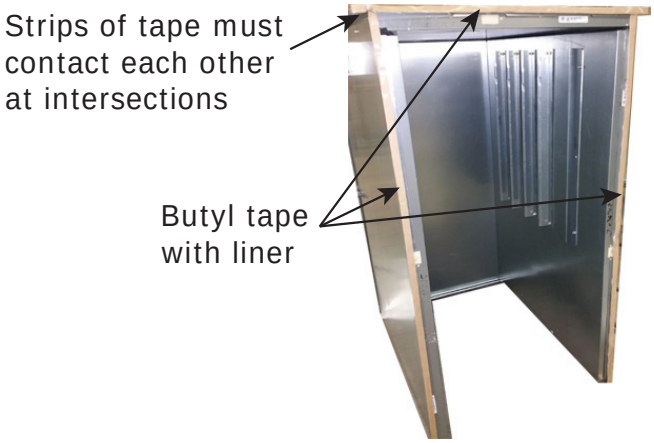
2. Remove the shipping supports from the pipe cabinet.



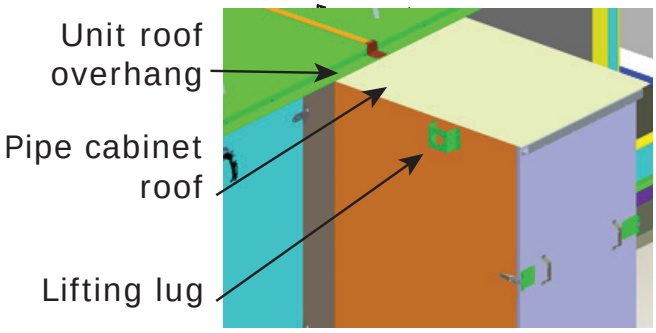
3. Apply Butyl tape to the unit baserail roof curb notches (tape must extend beyond the notch) on both sides, and peel off liner). Remove screw from baserail that will interfere with trim angles.



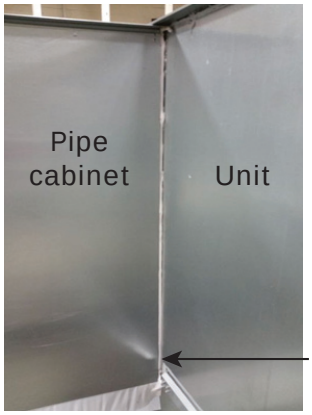
4. Apply Butyl tape to the back of pipe cabinet side wall (full height of the side wall along the outer edge to base) and roof (full length of the roof along the outer edge), and peel off the liner. Strips of tape must contact each other at intersections. Tape must contact gasket.



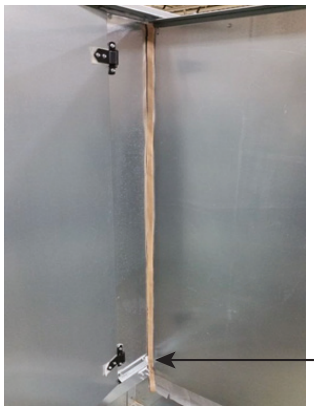
5. Lift the pipe cabinet using the side lifting lugs. Tuck the pipe cabinet roof underneath the unit roof overhang.



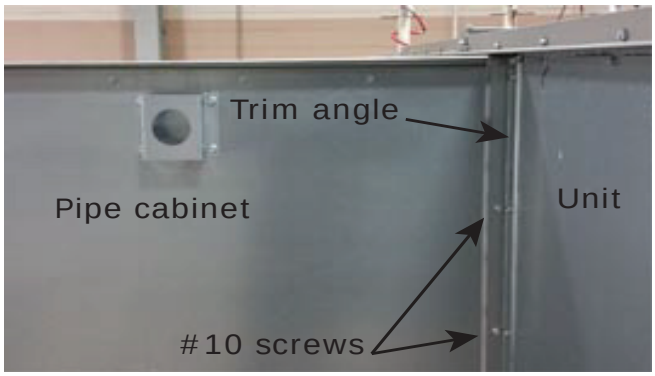
6. Place the pipe cabinet against the unit and push firmly to squeeze Butyl tape.



7. Maker sure there is a gap between pipe cabinet and bottom deflectors.

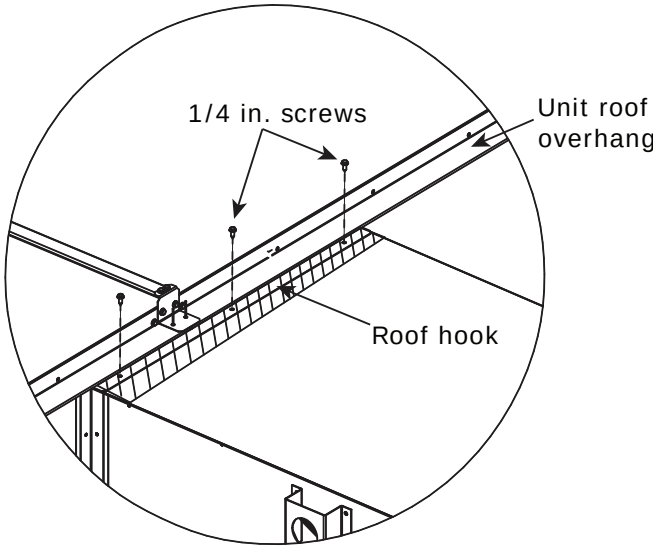


8. Starting from the bottom, attach the trim angles to the pipe cabinet first, then fasten the trim angles to the unit wall.



9. Apply the roof hook to the roof of the pipe cabinet, sliding in from the side of the unit overhang.

Figure 34. Attach roof hook



Weather Hoods

1. Remove shipping protection plastic film from the hood.
2. Per the unit drawing, determine mounting locations of the unit weather hoods.
3. Using the factory provided screws, mount the weather hoods to the unit.
4. Units with multiple intake hoods require that the hoods be installed from bottom to top. Overlap locations should be sealed with butyl caulk between the hoods.

Note: *It is required that the hoods be sealed to the unit using factory-provided Butyl caulk tape. This is applicable to mixing box hoods as well.*

Figure 35. Exhaust hood assembly

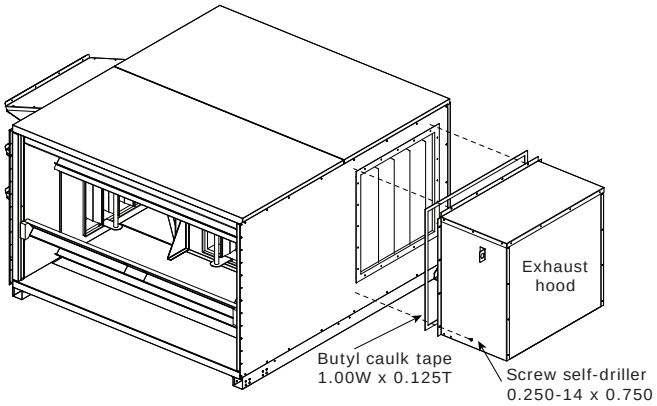
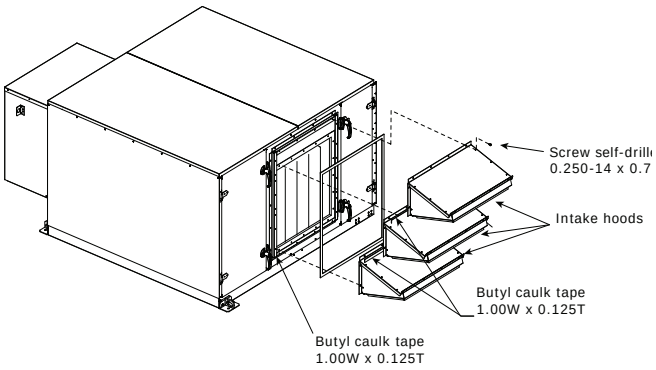


Figure 36. Intake hood installation



Filter Placement

Figure 37. Flat filter arrangement

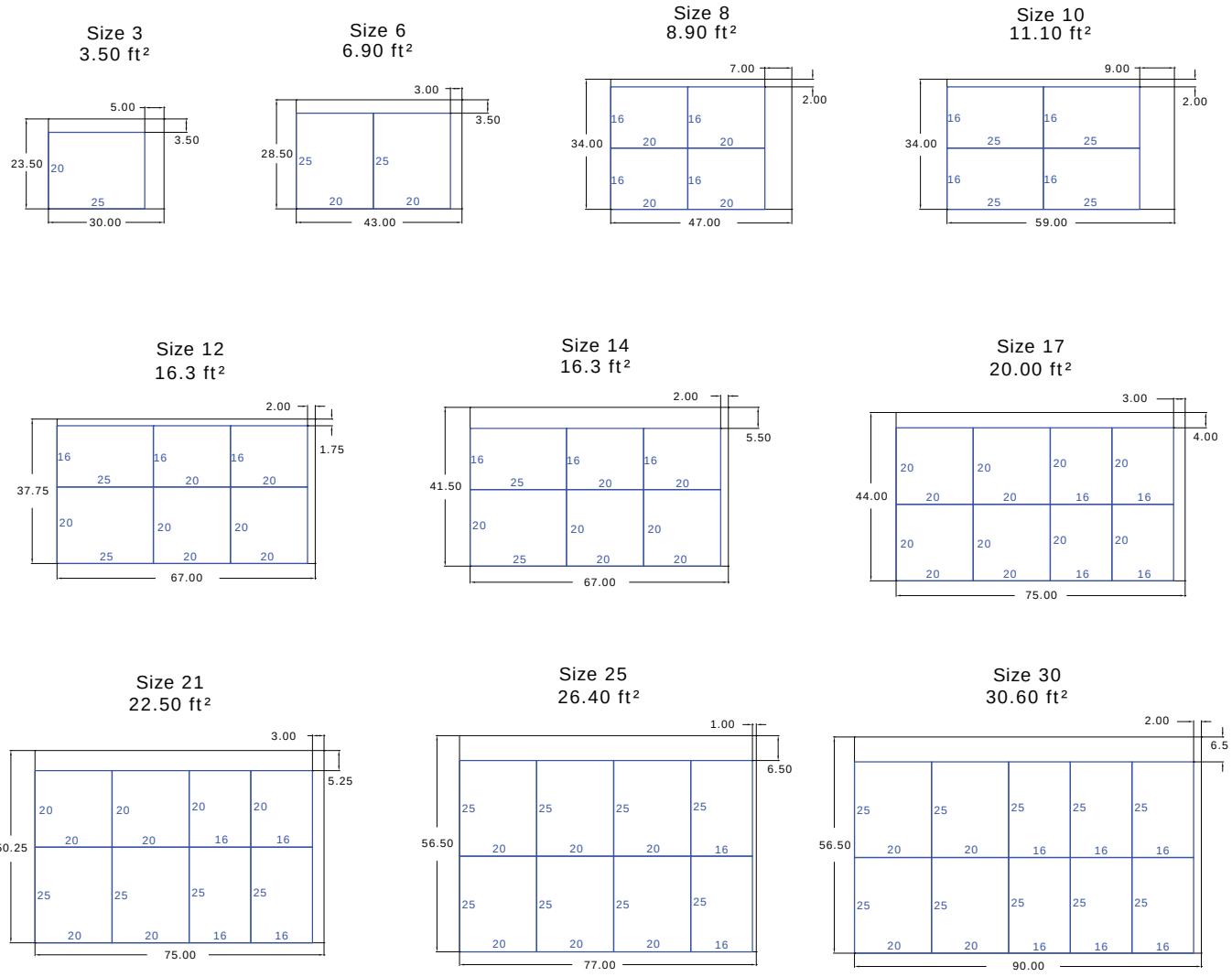
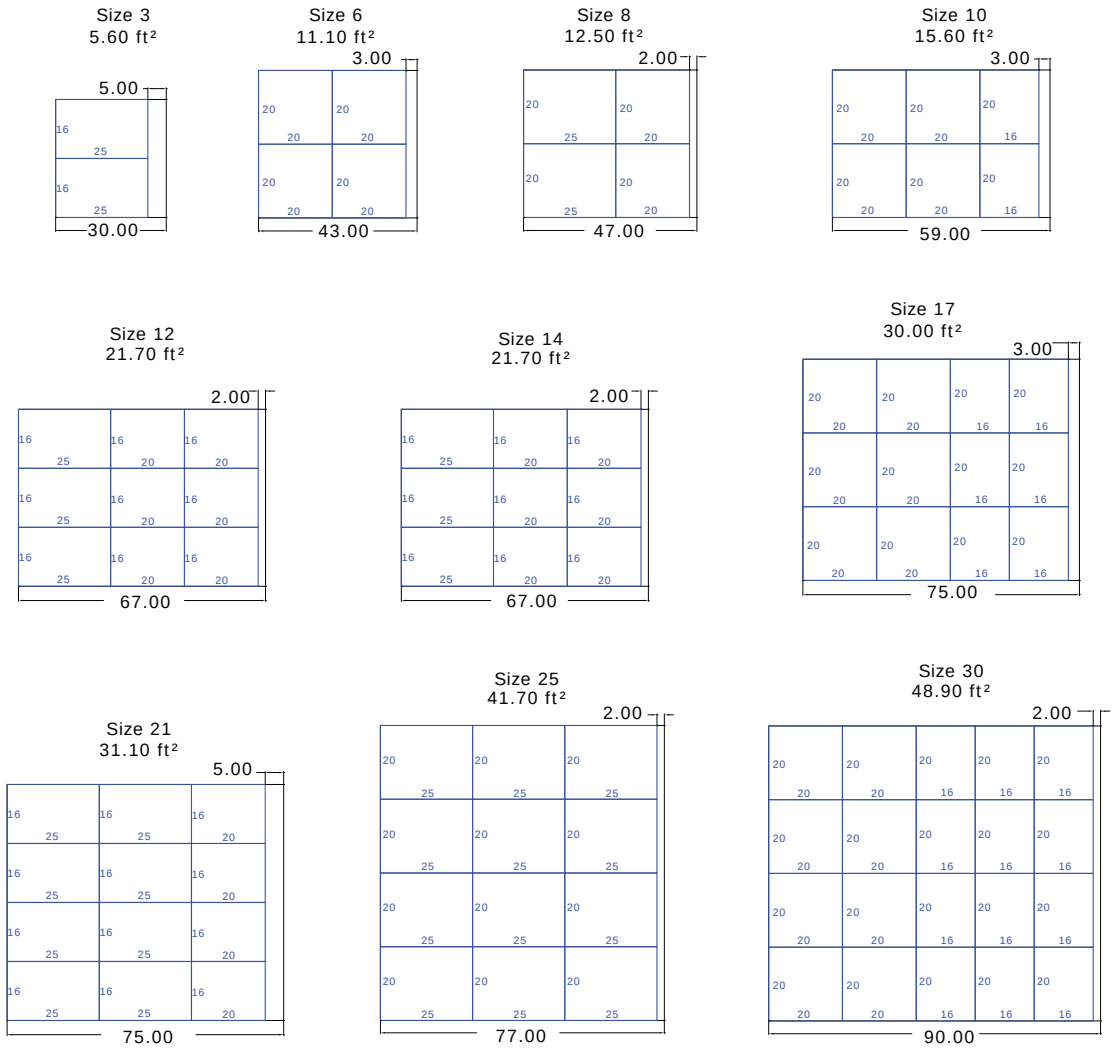


Figure 38. Angle filter arrangement



Duct Connections

All duct connections to the air handlers should be installed in accordance with the standards of the National Fire Protection Association (NFPA):

- NFPA 90A for installing air conditioning and ventilating systems other than residence type.
- NFPA 90B for residence-type warm air heating and air-conditioning systems.

See unit submittal documentation for additional duct mounting information.

Condensate Drain Connections

The main drain line and the trap must be the same size as the drain connection. Drain traps must be primed. If they are not, the trap is essentially non-existent and the drain will likely overflow. Plug or trap the auxiliary drain connection, if applicable. If the auxiliary drain connection is left open, air can be drawn in through the opening. This drawn in air can cause moisture carryover. All drain lines downstream of the trap must flow continuously downhill. If segments of the line are routed uphill, this can cause the drain line to become pressurized. With a pressurized drain line, the trap can back up into the drain pan, causing it to overflow. See "Drain Pan Trapping," p. 38.

Fan Discharge Connections

To ensure the highest fan efficiency, duct turns and transitions must be made carefully, minimizing air friction losses and turbulence. Proper ductwork installation, as outlined by such organizations as Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA), should be followed closely.

Field Conversions

Fan Discharge Conversion for Indoor Air Handlers

Performance UCCA air handlers are available in the following arrangements:

- Horizontal direct-drive fan with top front discharge
- Horizontal FC fan with top front discharge
- Horizontal FC fan with front top discharge
- Vertical FC van with front top discharge
- Vertical FC fan with back top discharge
- Vertical FC fan with top back discharge
- Vertical FC fan with top front discharge
- Vertical MI fan with front top discharge
- Vertical MI fan with top front discharge
- Vertical MI fan with back top discharge

Field conversions from one configuration to another can be made for sizes 8 through 21 by modifying certain parts of the cabinet and by rotating the fan. Also, if changing from a front or back discharge to a top discharge configuration, a new duct extension will need to be added.

For sizes 3 and 6, a new fan assembly will be needed.

For vertical MI fans, field conversions from one configuration to another can be made for sizes 3-30 by modifying certain parts of the cabinet. No need to relocate the fans.

For indoor return sections, field conversions from one configuration to another can be made for sizes 3-30 by modifying certain parts of the cabinet. Converting fan location from top to back. Contact Service Parts for foam covers, duct extensions, and fan supports.

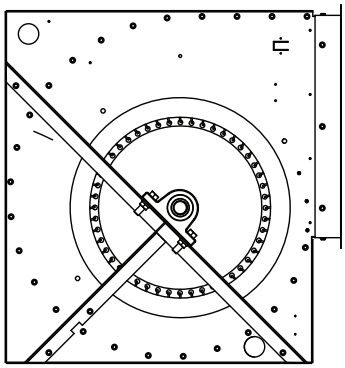
⚠WARNING

Hazardous Voltage!

Failure to disconnect power before servicing could result in death or serious injury. Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized.

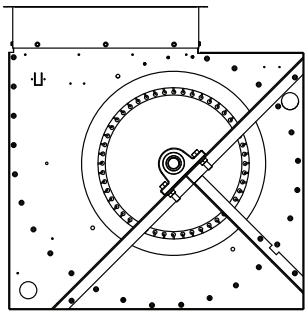
1. Disconnect power from the unit.
2. Remove access door and remove wall panel from non-drive side of the fan section.
3. Remove the screws inside the cabinet along the top of the coil that secure the coil to the cabinet roof. Remove the screws that attach the roof to the side walls and the front panel.
4. Remove roof.
5. If horizontal (front or back) discharge, loosen and remove j-bolt securing fan housing to cabinet.
6. Loosen bolts securing sliding motor base in place and loosen nuts on belt tensioning j-bolt.
7. Remove V-belt(s).
8. Detach fan from the isobase and rotate to the desired discharge position.
9. It may be necessary to remove and reinstall the fan shaft on the opposite side depending on the new discharge position. Loosen set screws on the fan bearings that hold the shaft in place. Loosen set screw holding fan in place. Remove shaft from the fan and reinstall so that the driven end is on the opposite side.
10. Reattach fan to the isobase.
11. Reattach v-belt, tighten, and secure sliding motor base in place. Because the distance between the motor shaft and the fan shaft may change, it may be necessary to purchase a new V-belt.
12. Cut a hole in the discharge panel for the air discharge and cover the exposed foam insulation at the inside edges of the hole using the insulation cover channels installed on the other discharge panel.
13. If changing from horizontal discharge to vertical (such as front/top to top/ front) the duct extension will be different. Contact Service Parts for a duct extension kit.

Figure 39. Contact service parts for front/top duct extension kit



Front/Top

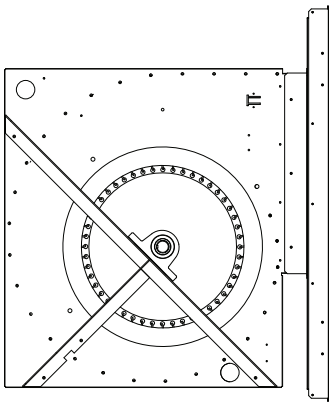
Figure 40. Contact service parts for top/front duct extension kit



Top/Front

14. The duct extensions do not extend as far and do not reach the cabinet panel. The gap is bridged by a flexible foam gasket. Contact Service Parts for angle/gasket ki

Figure 41. Contact service parts for angle/gasket kit



15. Reattach front/back panels.
16. Reattach access doors and side panels.
17. Reattach roof.
18. Reattach coil to roof support.

Adjusting the Isolators

Once the shipping tie-downs are removed and the internal isolation is released on FC fans only, it may be necessary to adjust the isolators to achieve the proper operation height of the fan and motor isolation base. Minimum required clearances are listed in Table 7. To determine the isolator clearances on all unit sizes, measure between the top of the cabinet channel and the bottom of the isolation base channel. See Figure 42, Figure 43, and Figure 44.

Table 7. Minimum isolator clearance

Unit size	Required Clearance
3-10	1 in.
12-30	3/8 in.

Figure 42. Isolator adjustment for sizes 3-8

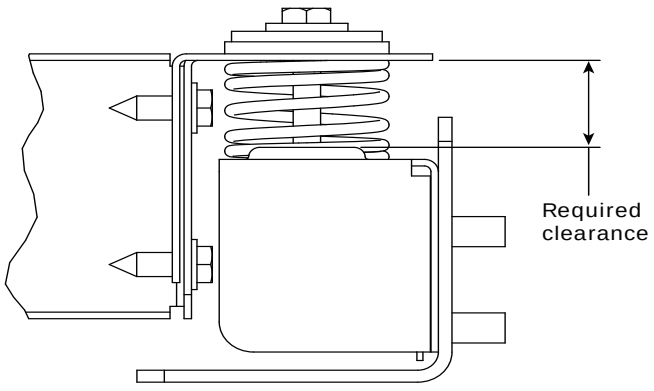


Figure 43. Isolator adjustment for unit size 10

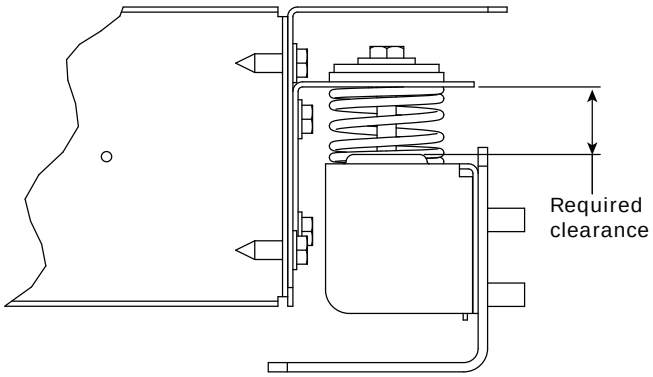
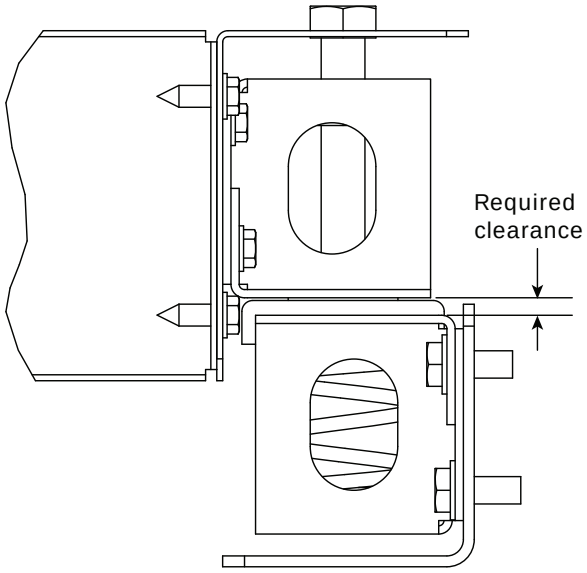


Figure 44. Isolator adjustment for unit size 12-30



Coil Piping and Connections

NOTICE

Connection Leaks!

Use a backup wrench when attaching piping to coils with copper headers to prevent damage to the coil header. Do not use brass connectors because they distort easily and could cause connection leaks.

NOTICE

Over Tightening!

Do not use Teflon-based products for any field connections because their high lubricity could allow connections to be over-tightened, resulting in damage to the coil header.

NOTICE

Leakage!

Failure to seal penetrations from inner panel to outer panel could result in unconditioned air entering the module, and water infiltrating the insulation, resulting in equipment damage. Properly seal all penetrations in unit casing.

General Recommendations

Proper installation, piping, and trapping is necessary to ensure satisfactory coil operation and to prevent operational damage:

- Support all piping independently of the coils.
- Provide swing joints or flexible fittings on all connections that are adjacent to heating coils to absorb thermal expansion and contraction strains.

Note: *The contractor is responsible for supplying the installation hardware.*

- For best results, use a short pipe nipple on the coil headers prior to making any welded flange or welded elbow type connections.
- Pipe coils counterflow to airflow.
- When attaching the piping to the coil header, make the connection only tight enough to prevent leaks. Maximum recommended torque is 200 foot-pounds.
- Use pipe sealer on all thread connections.
- After completing the piping connections, seal around pipe from inner panel to outer panel.

Drain Pan Trapping

⚠WARNING

No Step Surface!

Failure to follow this recommendation could result in death or serious injury. Do not walk drain pan. Walking on the drain pan could cause the supporting metal to collapse, resulting in the operator/technician to fall.

⚠WARNING

Water Damage!

Connecting all drains to a common line with only one trap can result in condensate retention and possible water damage to the air handler or adjoining space. When more than one section has a drain pain, trap each section individually.

Condensate drain connections are provided on only one side of the coil section. Pitch the connection lines horizontal or downward toward an open drain. Trane recommends installing a plug to facilitate cleaning of the trap. See the table below for drain connection sizes.

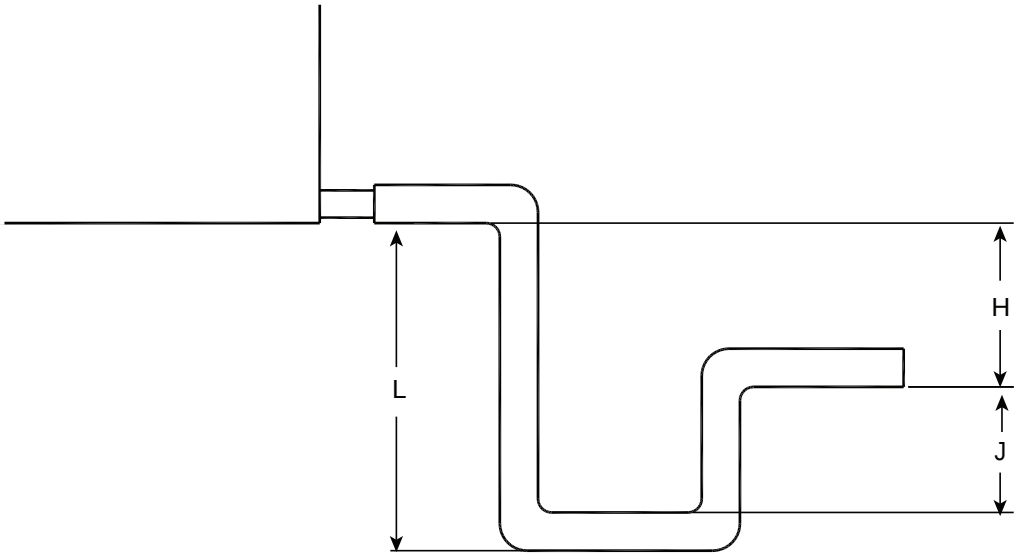
Table 8. Drain connections

Unit size	Connection size
3-6	0.75 in.
8-21	1.00 in.
25-30	1.25 inches

Notes:
- Nominal schedule 40 on PVC drain pan.
- Threaded connection size on stainless drain pan.

Figure 45 illustrates the proper trapping, piping, and operation of the trap. Use the formula under the figure to determine the correct minimum depth for the condensate trap. If a section has a drain pan for cleaning purposes only, it does not need a trap; however, a cap or shutoff valve should be installed on the drain connection. Only sections handling condensate, such as a cooling coil section or moisture eliminator section, require a trap.

Figure 45. Drain pan trapping for negative and positive pressure applications



Section under negative pressure

L = H + J + pipe diameter where:
H = 1 inch for each inch of negative pressure plus 1 inch
J = 1/2 H

Section under positive pressure

L = H + J + pipe diameter where:
H = 1/2 inch (minimum)
J = 1/2 inch plus the unit positive static pressure at coil discharge (loaded filters)

Steam Coil Piping

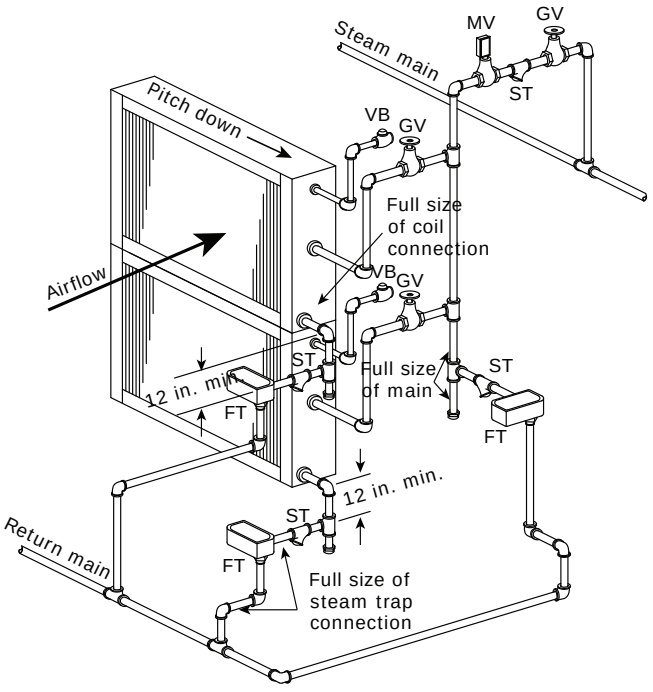
Air handlers fitted with steam coils have labeled holes for piping penetrations. Figure 46 illustrates a typical steam coil piping configuration. See Table 9 for the codes of system components in these figures.

The coil condensate return line must be piped full size of the condensate trap connection, except for a short nipple screwed directly into the coil header's condensate return tapping. Do not bush or reduce the coil return trapping size.

Table 9. Code of system components for piping figures

Code	System component
FT	Float and thermostatic steam trap
GV	Gate valve
OV	Automatic two-position (ON-OFF) control valve
VB	Vacuum breaker
ST	Strainer
AV	Automatic or manual air vent
MV	Modulating control valve

Figure 46. Typical piping for Type NS steam coils and horizontal tubes for horizontal airflow



NOTICE

Breaker Cracking Pressure!

Failure to follow these instructions could result in equipment damage. The 1/2-in. NPT, 15 degree swing check valve vacuum breaker is recommended because other vacuum breakers, such as spring-loaded ball-check breakers, have cracking pressures as high as 1.25 inches Hg (17 inches of water). Vacuum breakers with fitting sizes smaller than 1/2 in. NPT are too small to relieve vacuum quick enough to ensure complete condensate drainage. Other types of swing check valve vacuum breakers are acceptable if the fittings size is not smaller than 1/2-in. NPT and the cracking pressure is not larger than 0.25 inches HG (3.5 inches of water).

To prevent coil damage, complete the following recommendations:

- Install a 1/2-in. NPT, 15 degree swing check valve vacuum breaker with cracking pressure of 0.25 inches Hg (3.4 inches water) or lower at the top of the coil. This vacuum breaker should be installed as close to the coil as possible.
- For coil type NS, install the vacuum breaker in the unused condensate return tapping at the top of the coil.
- Vent the vacuum breaker line to atmosphere or connect it into the return main at the discharge side of the steam trap

Note: *Vacuum breaker relief is mandatory when the coil is controlled by a modulating steam supply or automatic two position (ON-OFF) steam supply valve. Vacuum breaker relief is also recommended when face-and-bypass control is used.*

NOTICE

Coil Condensate!

Failure to follow these instructions could result in equipment damage. Condensate must flow freely from the coil at all times to prevent coil damage from water hammer, unequal thermal stresses, freeze-up and/or corrosion. In all steam coil installations, the condensate return connections must be at the low point of the coil.

Proper steam trap installation is necessary for satisfactory coil performance and service life. For steam trap installation:

1. Install the steam trap discharge 12 inches below the condensate return connection. Twelve inches provides sufficient hydrostatic head pressure to overcome trap losses and ensures complete condensate removal.
   a. Use float and thermostatic traps with atmospheric pressure gravity condensate return, with automatic controls, or where the possibility of low-pressure supply steam exists. (Float and thermostatic traps are recommended because of gravity drain and continuous discharge operation.)
   b. Use bucket traps only when the supply steam is not modulated and is 25 psig or higher.

Note: *Trane steam coils require a minimum of 2 psi of pressure to assure even heat distribution.*

2. Trap each coil separately to prevent holding up condensate in one or more of the coils.
3. Install strainers as close as possible to the inlet side of the trap.
4. If installing coils in series airflow, control each coil bank independently with an automatic steam-control valve. Size the traps for each coil using the capacity of the first coil in direction of airflow.
5. Use a modulating valve that has linear flow characteristics to obtain gradual modulation of the coil steam supply.

Note: *Do not modulate systems with overhead or pressurized returns unless the condensate is drained by gravity into a receiver, vented to atmosphere, and returned to the condensate pump.*

6. Pitch all supply and return steam piping down 1 in. for every 10 feet in the direction of the steam or condensate flow.

Note: *Do not drain the steam mains or take-offs through the coils. Drain the mains ahead of the coils through a steam trap to the return line.*

7. Ensure overhead returns have 1 psig of pressure at the steam trap discharge for every 2 feet of elevation for continuous condensate removal.

Water Coil Piping

Figure 47 and Figure 48 illustrate typical water coil piping configurations.

Water coils are self-venting only if the water velocity exceeds 1.5 feet per second (fps) in the coil tubes. See the unit submittals for coil water velocity. If the water velocity is below these minimums, vent the coil by one of the following methods:

1. Install an air vent in the top pipe plug tapping of the return header.
2. When the return line rises above the top of the coil, vent from the top of the return header horizontally to the return piping.

Figure 47. Typical piping for one-row water coil

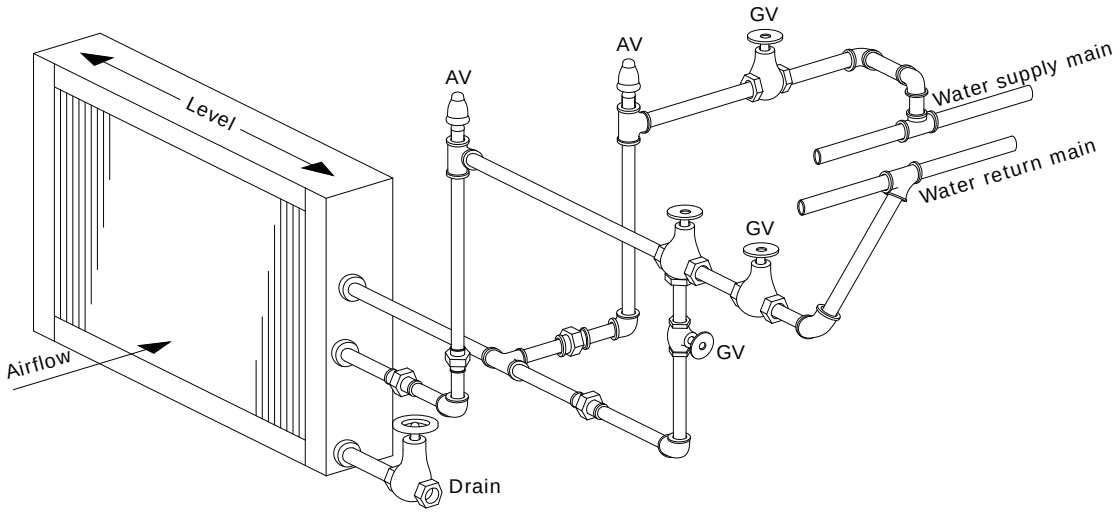
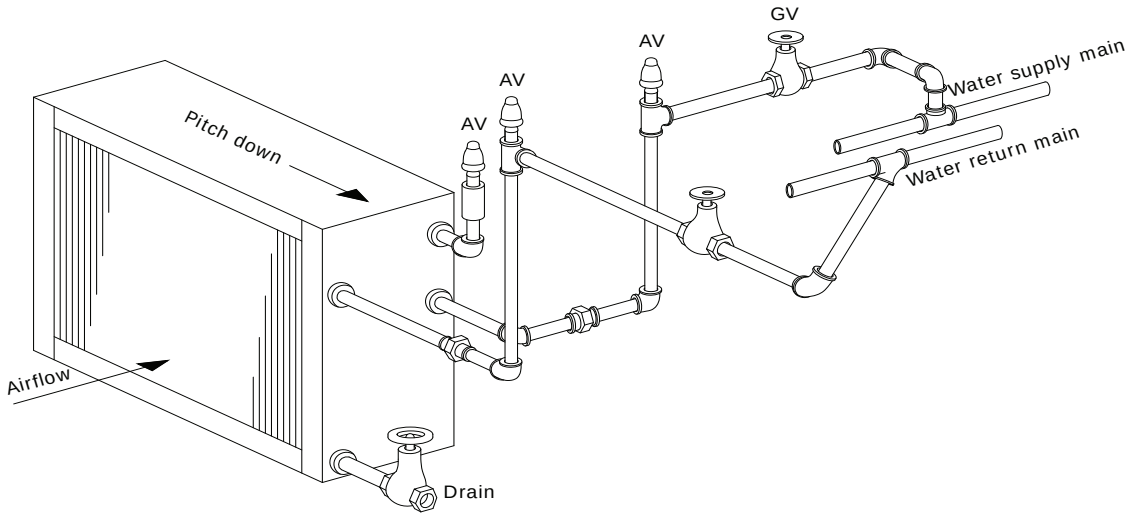


Figure 48. Typical piping for 2 - 8-row water coils

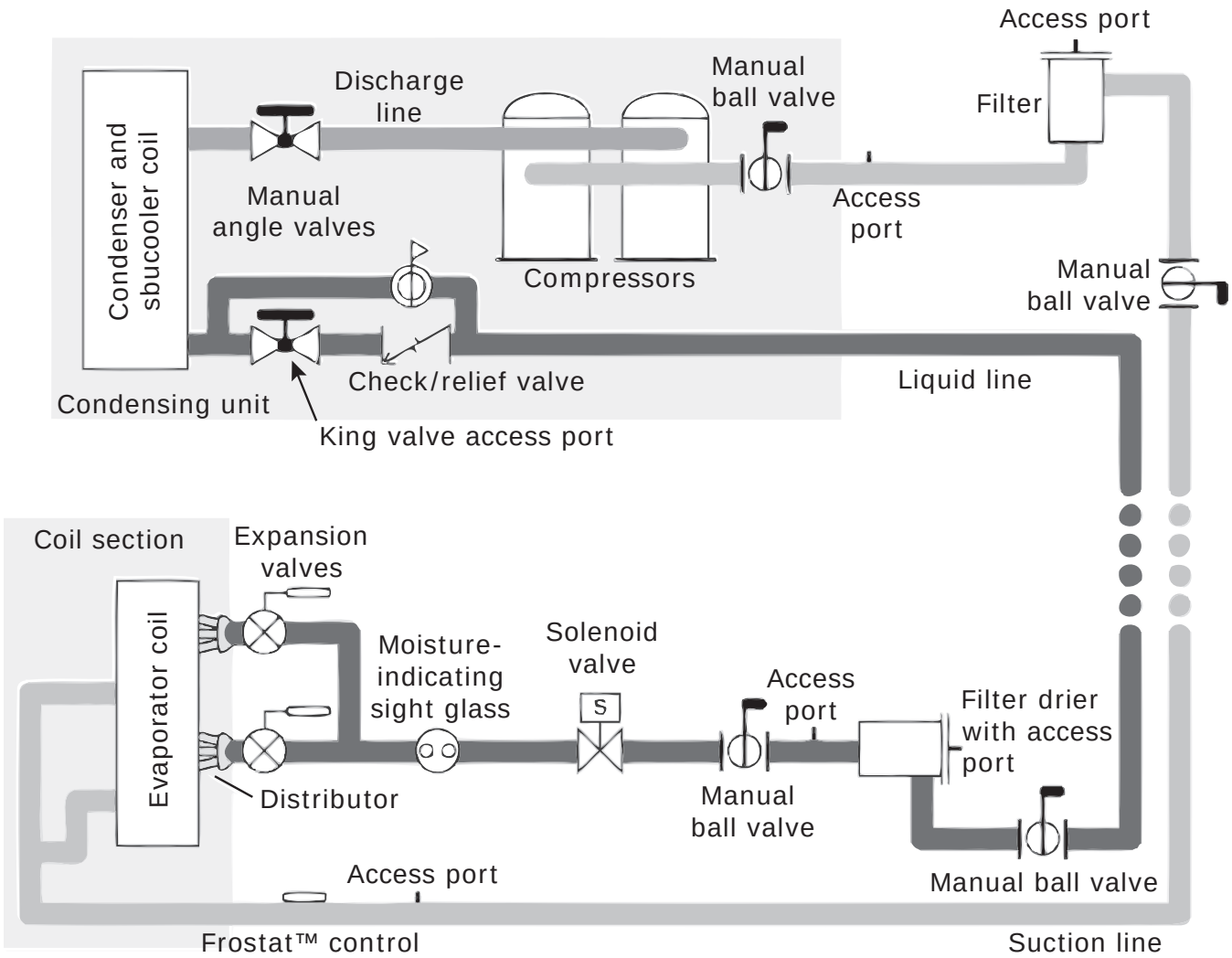


Refrigerant Coil Piping

Note: *Refer to for information on handling refrigerants.*

Figure 49 illustrates an example of a split-system component arrangement. Use it to determine the proper, relative sequence of the components in the refrigerant lines that connect the condensing unit to an evaporator coil. Refer to "Field-Installed Evaporator Piping Examples," p. 46 for more detailed schematics of evaporator piping.

Figure 49. Example of placement for split-system components



Kit with sensor - X13790452010 SEN-01212
Kit with switch - X13100429010 THT 02442

Liquid Lines

Line Sizing

Properly sizing the liquid line is critical to a successful split-system application. The selected tube diameter must provide at least 5°F [2.7°C] of subcooling at the expansion valve throughout the operating envelope. Increasing the size of the liquid line will not increase the available subcooling.

Routing

Install the liquid line with a slight slope in the direction of flow so that it can be routed with the suction line. Minimize tube bends and reducers because these items tend to increase pressure drop and to reduce subcooling at the expansion valve. Liquid line receivers, other than those that are factory-installed, are not recommended.

Insulation

The liquid line is generally warmer than the surrounding air, so it does not require insulation. In fact, heat loss from the liquid line improves system capacity because it provides additional subcooling. However, if the liquid line is routed through a high-temperature area, such as an attic or a mechanical room, insulation would be required.

Components

Liquid-line refrigerant components necessary for a successful job include a filter drier, access port, solenoid valve, moisture-indicating sight glass, expansion valve(s), and ball shutoff valves. Figure 49 illustrates the proper sequence for positioning them in the liquid line. Position the components as close to the evaporator as possible.

- *Filter drier.* There is no substitute for cleanliness during system installation. The filter drier prevents residual contaminants, introduced during installation, from entering the expansion valve and solenoid valve.
- *Access port.* The access port allows the unit to be charged with liquid refrigerant and is used to determine subcooling. This port is usually a Schraeder® valve with a core.
- *Solenoid valve.* In split systems, solenoid valves isolate the refrigerant from the evaporator during off cycles; under certain conditions, they may also trim the amount of active evaporator as compressors unload. Generally, the "trim" solenoid valve is unnecessary for VAV comfort-cooling applications, and is only required for constant-volume applications when dehumidification is a concern.
  In split systems with mircochannel heat exchanger condensers (MCHE), solenoid valves isolate the refrigerant from the evaporator during the off cycles. Trim solenoids cannot be used with MCHE.

Note: *Trane condensing units with MCHE no longer employ pump-down, but isolation solenoids are required. The suggested solenoid uses a 120-volt service and requires code-compliant wiring to the condensing unit.*

- *Moisture-indicating sight glass.* Be sure to install one moisture-indicating sight glass in the main liquid line. The only value of the sight glass is its moisture indication ability. Use actual measurements of temperature and pressure—not the sight glass—to determine subcooling and whether the system is properly charged. The moisture indicator/sight glass must be sized to match the size of the liquid line at the thermal expansion valve.

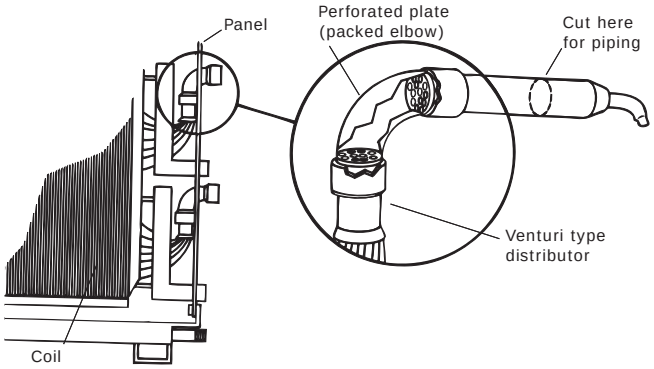
NOTICE

Valve Damage!

Failure to protect the valve from high temperatures could result in damage to internal components. Disassemble the thermal expansion valve before completing the brazing connections. If necessary, wrap the valve in a cool, wet cloth while brazing.

- *Thermal expansion valve.* The expansion valve is the throttling device that meters the refrigerant into the evaporator coil. Metering too much refrigerant floods the compressor; metering too little elevates the compressor temperature. Choosing the correct size and type of expansion valve is critical to assure it will correctly meter refrigerant into the evaporator coil throughout the entire operating envelope of the system. *Correct refrigerant distribution into the coil requires an expansion valve for each distributor.* The thermal expansion valve must be selected for proper size and capacity. The size of the expansion valve should cover the full range of loadings. Check that the valve will successfully operate at the lightest load condition. For improved modulation, choose expansion valves with balanced port construction and external equalization. Cut the process tube and cap assembly from the liquid connection as shown in Figure 50 and install the expansion valve directly to the liquid connections.

Figure 50. Type F refrigerant coil with packed elbow



- *Ball shutoff valves.* Adding manual, ball-type shutoff valves upstream and downstream of the filter simplifies replacement of the filter core.

Suction Lines

Line sizing

Proper line sizing is required to guarantee the oil returns to the compressor throughout the system's operating envelope. At the same time, the line must be sized so that the pressure drop does not excessively affect capacity or efficiency. To accomplish both objectives, it may be necessary to use two different line diameters: one for the horizontal run and for the vertical drops, and another for the vertical lifts (risers).

Routing

To prevent residual or condensed refrigerant from "free-flowing" toward the compressor during the off cycle, install the suction line so it slopes by ¼ in. to 1 inch per 10 feet of run toward the evaporator.

When the application includes a suction riser, oil must be forced to travel the height of the riser. Riser traps are unnecessary in the suction line. They will add pressure drop. Double risers must not be used. They not only add pressure drop, but can hold great amounts of oil - oil better used in the compressor.

Note: *If a suction riser is properly sized, oil will return to the compressor regardless of whether a trap is present. If a suction riser is oversized, adding a trap will not restore proper oil entrainment.*

Avoid Underground Refrigerant Lines

Refrigerant condensation during the off cycle, installation debris inside the line (including condensed ambient moisture), service access, and abrasion/corrosion can quickly impair reliability.

Insulation

Any heat that transfers from the surrounding air to the cooler suction lines increases the load on the condenser (reducing the system's air-conditioning capacity) and promotes condensate formation. After operating the system and testing all fittings and joints to verify that the system is leak-free, insulate suction lines to prevent heat gain and unwanted condensation.

Components

Installing the suction line requires field installation of these components: a filter, access port, and a Frostat™ control when the refrigerant coil is used with Trane condensing units. Position them as close to the compressor as possible.

Note: *Placement of the Frostat control is illustrated in* *Figure 49 on page 42**.*

- *Filter:* The suction filter prevents contaminants, introduced during installation, from entering the compressor. For this reason, the suction filter should be the replaceable-core type, *and* a clean core should be installed after the system is cleaned up.
- *Access port:* The access port is used to determine suction pressure. This port is usually a Schraeder valve with a core.
- *Frostat™ coil frost protection:* The Frostat control is the preferred method for protecting evaporator coils from freezing when the refrigerant coil is used with Trane condensing units. It senses the suction-line temperature and temporarily disables mechanical cooling if it detects frost conditions. The control is mechanically attached to the outside of the refrigerant line, near the evaporator, and wired to the unit control panel.
- *Ball shutoff valve:* Adding manual, ball-type shutoff valves upstream and downstream of the filter simplifies replacement of the filter core.

Expansion Valves

Expansion valves meter refrigerant into the evaporator under controlled conditions. If there is too much refrigerant, the refrigerant will not completely vaporize and the remaining liquid will slug the compressor. If there is too little refrigerant, there may not be enough cooling for the compressor.

Expansion valve requirements vary based on condensing unit design. Consult the product literature for the condensing unit to be used for proper valve selection.

Hot Gas Bypass

Many years ago, hot gas bypass (HGBP) was successfully added to HVAC systems to correct a number of operational problems. Hoping to avoid such problems altogether, it eventually became common practice for designers to specify hot gas bypass in new systems. Unfortunately, the practice often degraded rather than improved reliability.

Hot gas bypass increases the minimum refrigerant charge; it also inflates the first cost of the system. Besides adding more paths for potential refrigerant leaks, hot gas bypass increases the likelihood of refrigerant distribution problems. Finally, hot gas bypass uses excessive amounts of energy by preventing the compressors from cycling with fluctuating loads.

Trane now has many years of experience in the successful use of equipment *without hot gas bypass* in commercial comfort-cooling applications. To prevent evaporator freeze-up, Trane equipment typically includes Frostat™ coil frost protection.

Like hot gas bypass, the Frostat system protects the coil from freezing, but it does so by turning off compressors when a sensor detects the formation of frost on the evaporator coil. The compressor is released to operate when the coil temperature rises a few degrees above the frost threshold. The Frostat control strategy reduces the overall energy consumption of the system while maintaining system control.

Systems should be designed to avoid HGBP whenever possible. For more information about HGBP, refer to the *Engineers Newsletter*, "Hot Gas Bypass – Blessing or a Curse?" (ADM-APN007-EN).

Remodel, Retrofit, or Replacement

Inevitably, older condensing units and evaporator systems will need to be replaced or retrofitted. Due to the phase-out of many of these older refrigerants, the major components for those older units or systems may no longer be available. The only option will be to convert the system to R-410A, POE oil, and R-410A components.

When upgrading an existing refrigerant split system due to remodel, retrofit, or replacement, the entire system must be reviewed for compatibility with R-410A and POE oil. Each and every part of the split HVAC system MUST be compatible with the properties of R-410A refrigerant and POE oil. In addition, ensure the existing electrical service is adequate for the product being installed.

⚠ WARNING

R-410A Refrigerant under Higher Pressure than R-22!

Failure to use proper equipment or components as described below, could result in equipment failing and possibly exploding, which could result in death, serious injury, or equipment damage. The units described in this manual use R-410A refrigerant which operates at higher pressures than R-22. Use ONLY R-410A rated service equipment or components with these units. For specific handling concerns with R-410A, please contact your local Trane representative.

Every part of an existing split system needs to be analyzed to determine if it can be reused in an R-410A and POE oil system:

- R-22 condensing units will not work with R-410A; they must be replaced.
- Most older evaporator coils were not pressure- and cycle-rated for R-410A pressures. If they weren't, they will need to be replaced. If they were properly pressure-rated for R-410A, existing coils must be modeled to determine if they will meet capacity requirements, are properly circuited, have correctly sized distributor tubes, and employ acceptable distributors and orifices.
- The required R-410A line sizes may be different than the existing line sizes. The lines need to be re-sized and compared to existing lines for reusability.
- Suction lines 2-5/8 OD and smaller of type L copper are suitable for use with R-410A. Suction lines 3-1/8 OD must use type K or thicker wall.
- Discharge lines, liquid lines, heat pump vapor lines, and hot gas bypass lines 1-3/8 OD and smaller of type L copper are suitable for use with R-410A. These same lines sized at 1-5/8 OD or 2-1/8 OD must use type K or thicker wall.
- Expansion valves need to be reselected. Expansion valves are refrigerant specific.
- Any gasket or o-ring should be replaced. Shrinkage of the original seal may occur after an HFC conversion, potentially causing a refrigerant leak. Components commonly affected are Schraeder cores, solenoid valves, ball valves, and flange seals. But *all* external seals in contact with refrigerant should be viewed as potential leak sources after a retrofit.
- All other valves, filters, valve packing, pressure controls, and refrigeration accessories must be researched through their manufacturer for compatibility with the pressures of an R-410A system, and for their compatibility with the newer POE oil.
- For the best performance and operation, the original mineral oil should be removed from the components of the system that are not being replaced. Any component of the system that is suspected of trapping oil (piping, traps, and coil), should be dismantled, drained, and reassembled. After all components have been drained, the amount of residual mineral oil will have a negligible effect on performance and reliability

NOTICE

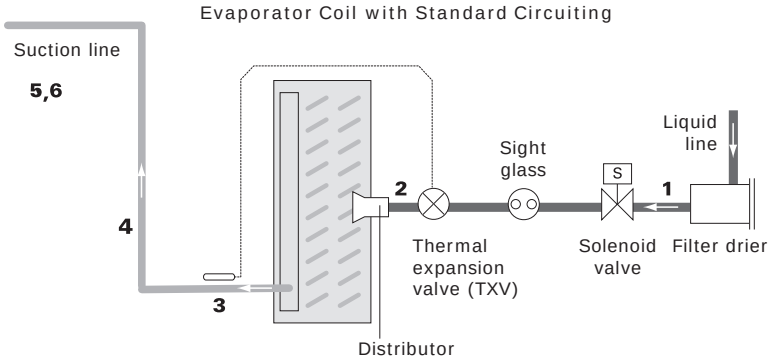
Compressor Damage!

POE oil is hygroscopic – it absorbs water directly from the air. This water is nearly impossible to remove from the compressor oil and can cause compressor failures. For this reason, the system should not be open for longer than necessary, dry nitrogen should flow in the system while brazing, and only new containers of oil should be used for service and maintenance.

All Codes take precedence over anything written here.

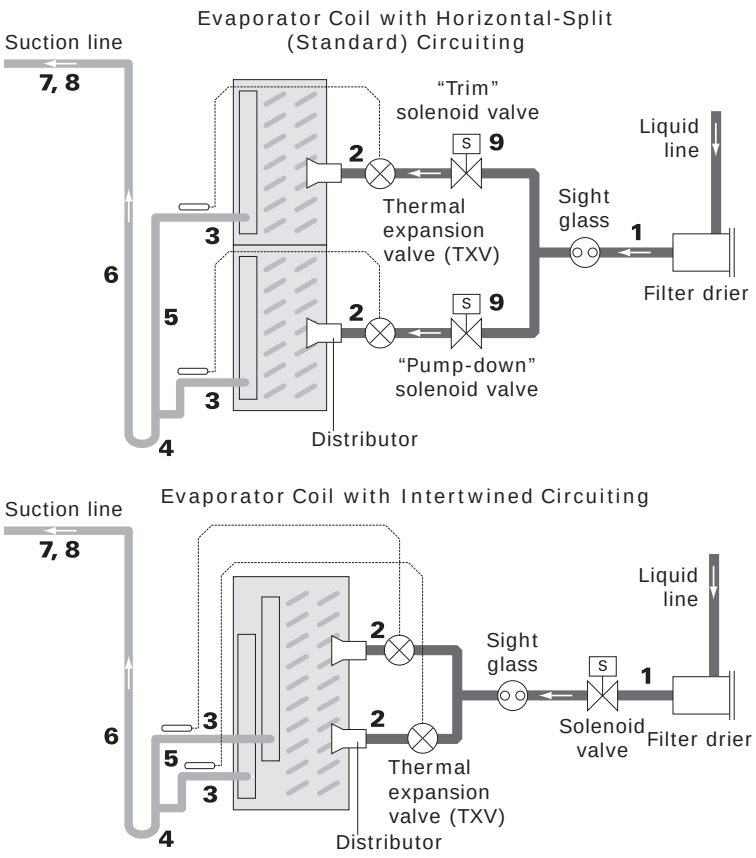
Field-Installed Evaporator Piping Examples

Figure 51. Single-circuit condensing unit: evaporator coil with one distributor



1. Pitch the liquid line slightly—1 inch/10 feet —so that the refrigerant drains toward the evaporator.
2. Provide one expansion valve per distributor.
3. Slightly pitch the outlet line from the suction header toward the suction riser—that is, 1 inch/10 feet in the direction of flow. Use the tube diameter that matches the suction-header connection.
4. Use the tube diameter recommended in the condensing unit application manual for a vertical rise. Ensure that the top of the riser is higher than the evaporator coil.
5. Pitch the suction line slightly—1 inch/10 feet —so the refrigerant drains toward the evaporator.
6. Insulate the suction line.

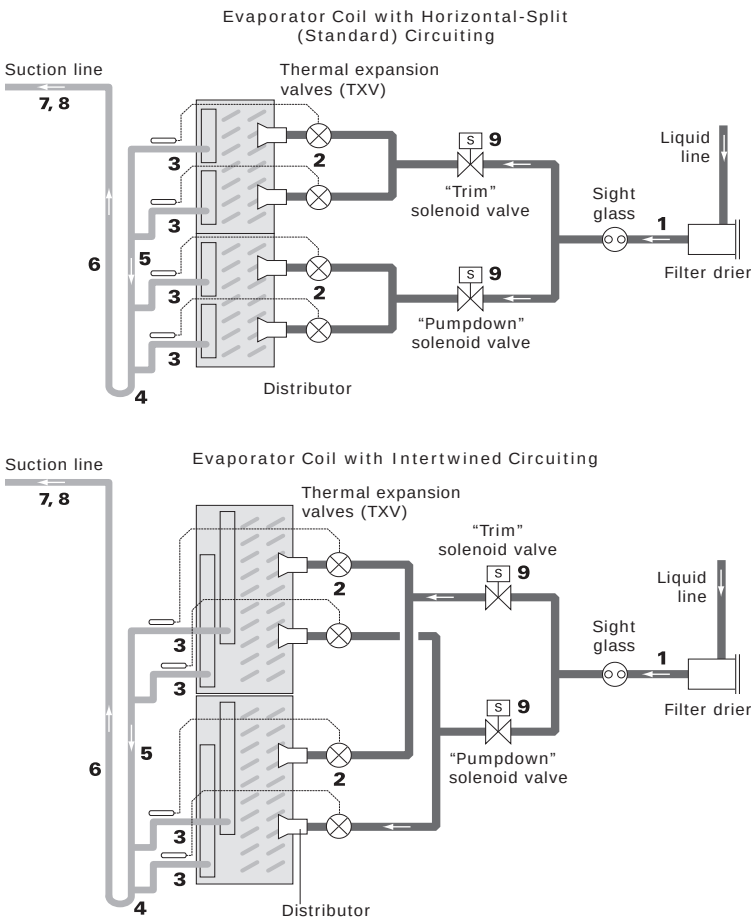
Figure 52. Single-circuit condensing unit: evaporator coil with two distributors



1. Pitch the liquid line slightly—1 inch/10 feet —so the refrigerant drains toward the evaporator.
2. Provide one expansion valve per distributor.
3. Slightly pitch the outlet line from the suction header toward the suction riser— 1 inch/10 feet in the direction of flow. Use the tube diameter that matches the suction-header connection. Use a double-elbow configuration to isolate the TXV bulb from other suction headers.
4. This looks like a trap, but is actually due to the requirement that the refrigerant gas leaving the coil flows downward, past the lowest suction-header outlet, before turning upward.
5. Use the "horizontal" tube diameter as specified in the condensing unit application manual.
6. Use the tube diameter recommended for a vertical rise as specified in the condensing unit application manual. Assure the top of the riser is higher than the evaporator coil.
7. Pitch the suction line slightly—1 inch/10 feet — so that the refrigerant drains toward the evaporator.
8. Insulate the suction line.
9. Only use a "trim" solenoid valve for constant-volume, humidity-sensitive applications. For all other applications, install a single solenoid valve (the "pumpdown" solenoid valve) between the liquid-line filter drier and the sight glass.

Note: *Due to reduced coil volume in condensing units with microchannel heat exchanger condenser, do not use trim solenoid valves for these units.*

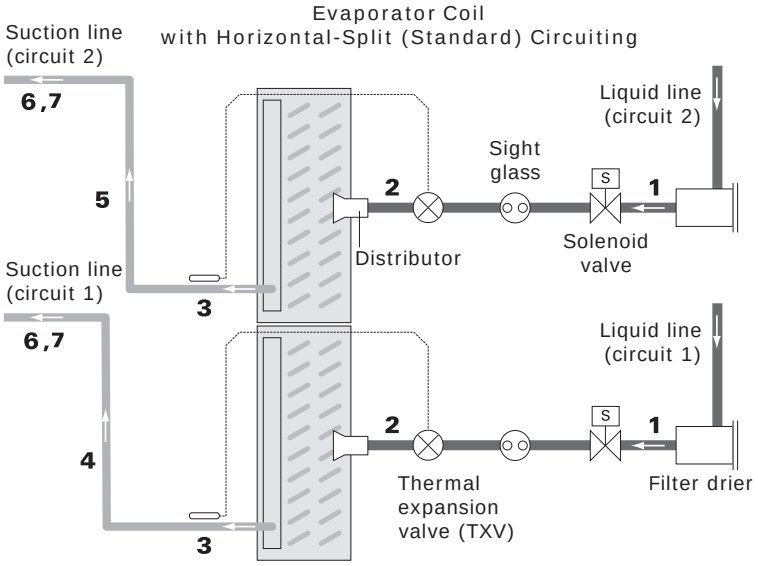
Figure 53. Single-circuit condensing unit: evaporator coil with four distributors



1. Pitch the liquid line slightly—1 in./10 feet —so that the refrigerant drains toward the evaporator.
2. Provide one expansion valve per distributor.
3. Slightly pitch the outlet line from the suction header toward the suction riser— 1 in./10 feet in the direction of flow. Use the tube diameter that matches the suction-header connection.
4. This looks like a trap, but is actually due to the requirement that the refrigerant gas leaving the coil flows downward, past the lowest suction-header outlet, before turning upward. Use the double-elbow configuration to isolate the TXV bulb from other suction headers.
5. Use the "horizontal" tube diameter as specified in the condensing unit application manual.
6. Use the tube diameter recommended for a vertical rise as specified in the condensing unit application manual. Ensure that the top of the riser is higher than the evaporator coil.
7. Pitch the suction line slightly—1 in./10 feet —so that the refrigerant drains toward the evaporator.
8. Insulate the suction line.
9. Only use a "trim" solenoid valve for constant-volume, humidity-sensitive applications. For all other applications, install a single solenoid valve (the "pumpdown" solenoid valve) between the liquid-line filter drier and the sight glass.

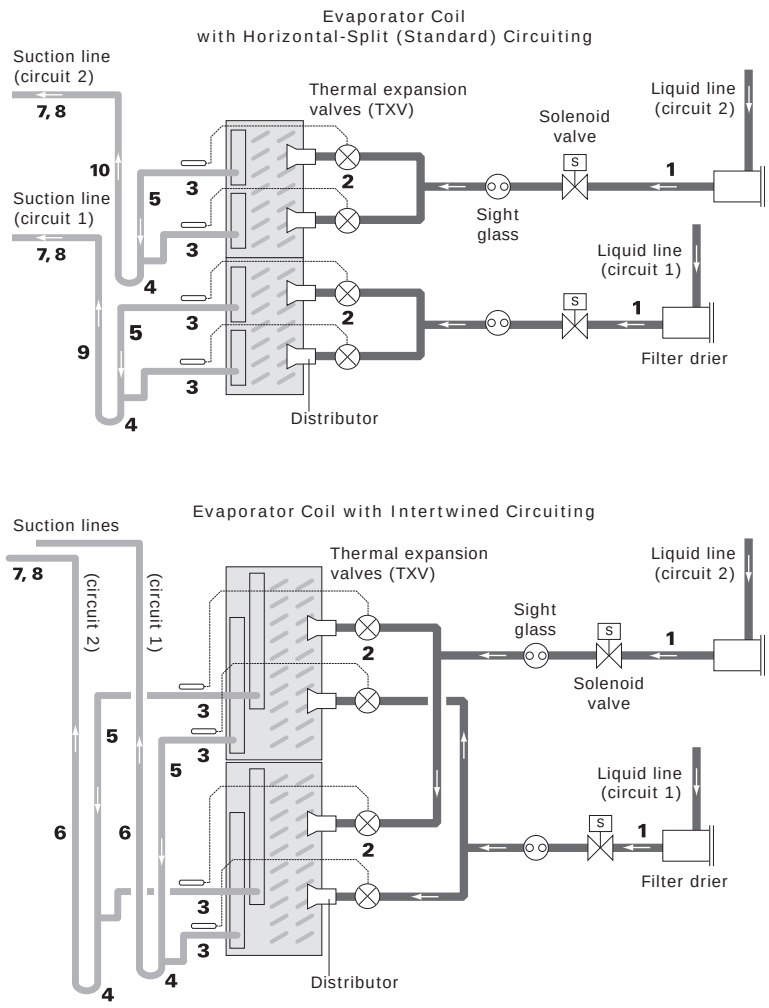
Note: *Due to reduced coil volume in condensing units with microchannel heat exchanger condenser, do not use trim solenoid valves for these units.*

Figure 54. Dual-circuit condensing unit: evaporator coil with two distributors



1. Pitch the liquid lines slightly—1 in./10 feet —so that the refrigerant drains toward the evaporator.
2. Provide one expansion valve per distributor.
3. Slightly pitch the outlet line from the suction header toward the suction riser—1 in./10 feet in the direction of flow. Use the tube diameter that matches the suction-header connection.
4. The top of the Circuit 1 suction riser must be higher than the bottom evaporator coil. Use the tube diameter recommended for a vertical rise as specified in the condensing unit application manual.
5. The top of the Circuit 2 suction riser must be higher than the top evaporator coil. Use the tube diameter recommended for a vertical rise as specified in the condensing unit application manual.
6. Pitch the suction lines slightly—1 in./10 feet —so that the refrigerant drains toward the evaporator.
7. Insulate the suction lines.

Figure 55. Dual-circuit condensing unit: evaporator coil with four distributors



1. Pitch the liquid line slightly—1 in./10 feet —so that the refrigerant drains toward the evaporator.
2. Provide one expansion valve per distributor.
3. Slightly pitch the outlet line from the suction header toward the suction riser— 1 in./10 feet in the direction of flow. Use the tube diameter that matches the suction-header connection.
4. This looks like a drain trap, but is actually due to the requirement that the refrigerant gas leaving the coil flows downward, past the lowest suction-header outlet, before turning upward. Use the double-elbow configuration to isolate the TXV bulb from other suction headers.
5. Use the "horizontal" tube diameter as specified in the condensing unit application manual.
6. Use the tube diameter recommended for a vertical rise as specified in the condensing unit application manual. Ensure that the top of the riser is higher than the evaporator coil.
7. Pitch the suction line slightly—1 in./10 feet —so that the refrigerant drains toward the evaporator.
8. Insulate the suction line.
9. The top of the Circuit 1 suction riser must be higher than the bottom evaporator coil. Use the tube diameter recommended for a vertical rise as specified in the condensing unit application manual.
10. The top of the Circuit 2 suction riser must be higher than the top evaporator coil. Use the tube diameter recommended for a vertical rise as specified in the condensing unit application manual.

Electrical Requirements

Unit Wiring Diagrams

Specific unit wiring diagrams are provided on the inside of the control panel door. Use these diagrams for connections or trouble analysis.

⚠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 an appropriate voltmeter that all capacitors have discharged.

For additional information regarding the safe discharge of capacitors, see PROD-SVB06A-EN

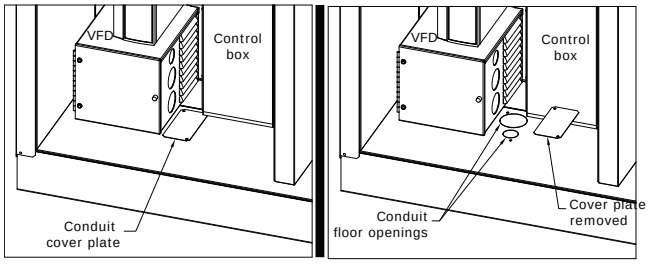
Supply Power Wiring

It is the installer's responsibility to provide power supply wiring to the unit. Wiring should conform to NEC and all applicable code requirements. When units are ordered without controls, the contractor must also furnish an on/off switch, thermostat, and a fused disconnect switch in compliance with national and local electrical codes.

For indoor units, bring supply wiring through the knockout in the unit control box. Connect the three phase wires to the power terminal block or the non-fused disconnect switch in the control box terminals. Refer to specific wiring diagrams and fuse information in the unit's control panel.

For outdoor units, bring supply wiring through cutout in the unit base in the unit control box or electric heat control box. For return fan units without single point power, also bring supply wiring through cut out in the unit base next to the return fan. To access cutouts, remove cover plate on base to expose conduit holes in the unit base.

Figure 56. Conduit cover plate



For the electric heat or unit control box, connect the three phase wire to the power terminal block.

For the return fan, connect the three phase wires to the auxiliary junction box attached to the return fan.

For outdoor units, unit disconnect is not provided.

Refer to unit specific wiring diagrams for specific wiring connections. Locate unit wiring diagrams on the inside of the control box cover. Refer to the unit nameplate for unit specific electrical information, such as voltage, minimum circuit ampacity (MCA), and maximum fuse size (MFS).

NOTICE

Use Copper Conductors Only!

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

NOTICE

Motor Winding Damage!

Voltage sparkover could cause damage to the motor windings. Do not use a megohm meter or apply voltage greater than 50 Vdc to a compressor motor winding while it is under a deep vacuum.

Electrical Grounding Restrictions

All sensor and input circuits are normally at or near ground (common) potential. When wiring sensors and other input devices to the control interface or controller, avoid creating ground loops with grounded conductors external to the unit control circuit. Ground loops can affect the measurement accuracy of the controller.

All input/output circuits (except isolated relay contacts and optically isolated inputs) assume a grounded source, either a ground wire at the supply transformer to control panel chassis, or an installer supplied ground.

Note: *Do not connect any sensor or input circuit to an external ground connection.*

The installer must provide interconnection wiring to connect wall mounted devices such as a zone sensor module. Refer to the unit wiring schematic for specific wiring details and point-to-point wiring connections. Dashed lines indicate field wiring on the unit wiring schematics. All interconnection wiring must conform to NEC Class 2 wiring requirements and any state and local requirements. Refer to Table 10 for the wire size range and maximum wiring distance for each device.

Table 10. Zone sensor maximum wiring distance

Wire Size Range	Max. Wiring Distance
16-12 AWG	200 ft

Important recommendation

Do not bundle or run interconnection wiring in parallel with or in the same conduit with any high-voltage wires (110 V or greater). Exposure of interconnection wiring to high-voltage wiring, inductive loads, or RF transmitters may cause radio frequency interference (RFI). In addition, improper separation may cause electrical noise problems. Therefore, use shielded wire (Beldon 83559/83562 or equivalent) in applications that require a high degree of noise immunity. Connect the shield to the chassis ground and tape at the other end.

Figure 57. Interface power requirements

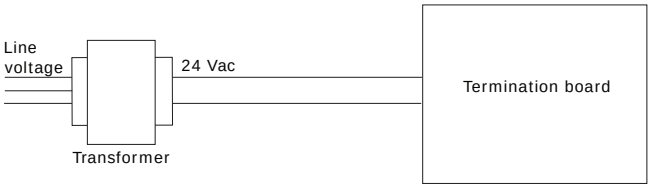


Table 11. Electric heat voltage ratings

Unit Voltage	Heater Voltage
200	200
230	230
460	460
575	575

Useful formulas:

kW = (Airflow x Delta T)/K

Delta T = (kW x K)/Airflow

K = 3145 (English)

K = 824.7 (SI)

Heater input current = (kW x 1000)/(Voltage x 1.73)

MCA = Minimum Circuit Ampacity

MOP = Maximum Overcurrent Protection rating or Maximum fuse size

Table 12. Electric heat kW limits (min/max)

Motor	3	6	8	10	12	14	17	21	25	30
200 V / 60 Hz / 3 PH	6/13	6/26	7/28	8/41	10/50	12/50	14/50	17/50	20/47	20/41
230 V / 60 Hz / 3 PH	6/13	6/26	7/32	8/41	10/53	12/59	14/59	17/59	20/56	20/50
460 V / 60 Hz / 3 PH	6/13	6/24	7/32	8/44	10/53	12/63	14/75	17/95	20/95	20/120
575 V / 60 Hz / 3 PH	6/13	6/26	7/34	8/44	10/53	12/63	14/75	17/95	20/95	20/120
Min airflow (CFM)	1050	2100	2800	3500	4200	4900	5950	7350	8750	10,500

Notes: Units drawing less than 100 amps are available with or without door interlocking disconnect. Units drawing more than 100 amps are not available with door interlocking disconnect.
Units drawing less than 48 amps are available with or without line fusing. Units drawing greater than 48 amps have line fusing as standard.
Units with electric heat must not be run below the minimum cfm listed above.
Heaters available in the following kW increments: 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 41, 44, 47, 50, 53, 56, 59, 63, 67, 71, 75, 79, 83, 87, 91, 95, 100, 110, 115, 120.

Fuse Sizes

The standard ampere ratings for fuses and inverse time circuit breakers are listed in Table 13. The use of fuse and inverse time circuit breakers with non-standard ampere ratings shall be permitted provided the rating does not exceed the maximum fuse size defined on the unit nameplate.

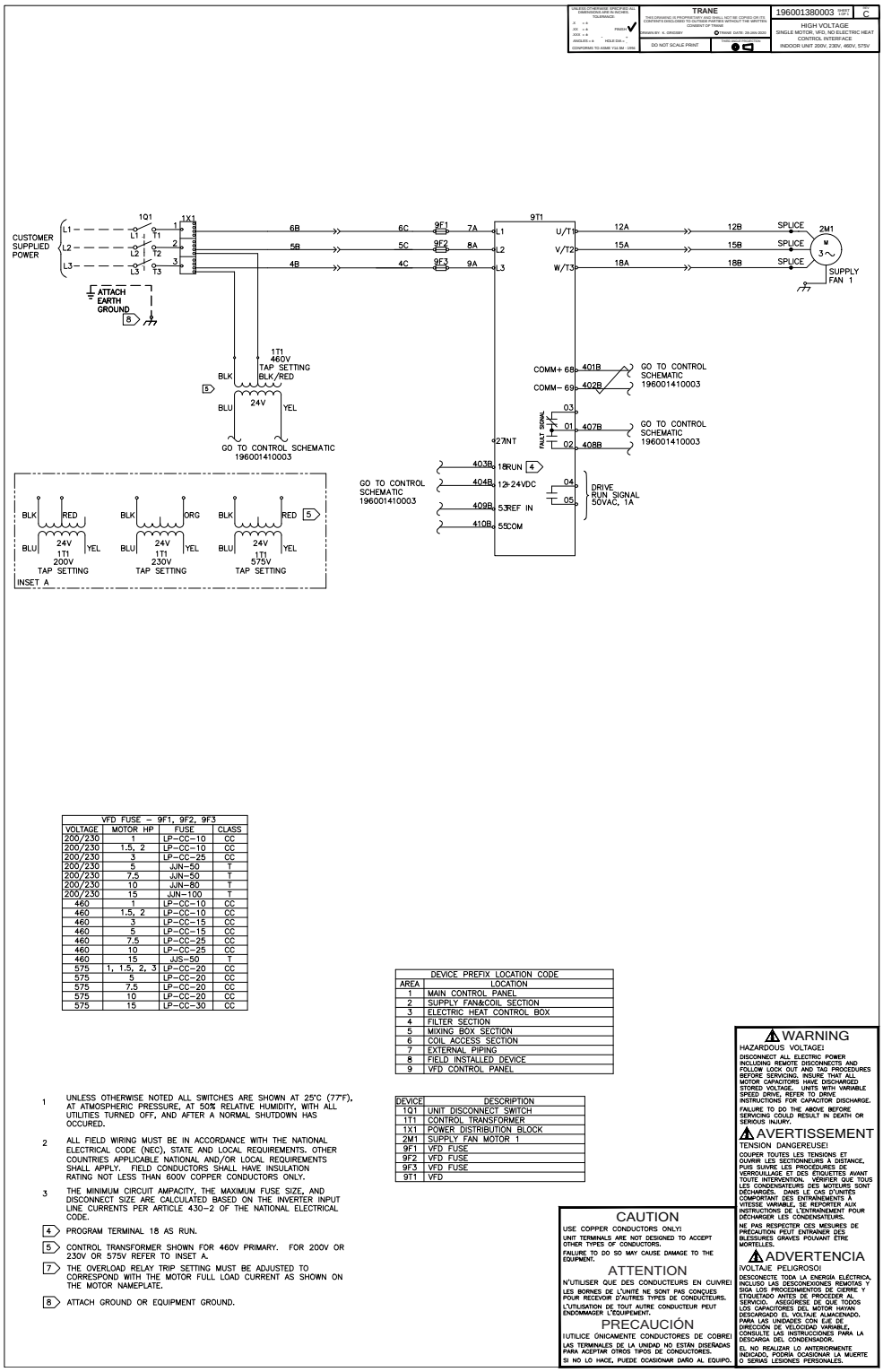
Table 13. Standard fuse sizes (amperes)

15	20	25	30	35	40	45	50	60	70
80	90	100	110	125	150	175	200	225	250
300	350	400	450	500	600	700	800	1000	
1200	1600	2000	2500	3000	4000	5000	6000		

VFD Wiring Schematic

Typical wiring schematic for a VFD is shown in the figure below. Unit specific wiring schematics are shipped with each unit.

Figure 58. Typical VFD wiring schematic for indoor air handlers



VFD FUSE – 9F1, 9F2, 9F3			
VOLTAGE	MOTOR HP	FUSE	CLASS
200/230	1	LP-CC-10	CC
200/230	1.5, 2	LP-CC-10	CC
200/230	3	LP-CC-25	CC
200/230	5	JJN-50	T
200/230	7.5	JJN-50	T
200/230	10	JJN-80	T
200/230	15	JJN-100	T
460	1	LP-CC-10	CC
460	1.5, 2	LP-CC-10	CC
460	3	LP-CC-15	CC
460	5	LP-CC-15	CC
460	7.5	LP-CC-25	CC
460	10	LP-CC-25	CC
460	15	JJS-50	T
575	1, 1.5, 2, 3	LP-CC-20	CC
575	5	LP-CC-20	CC
575	7.5	LP-CC-20	CC
575	10	LP-CC-20	CC
575	15	LP-CC-30	CC

DEVICE PREFIX LOCATION CODE	
AREA	LOCATION
1	MAIN CONTROL PANEL
2	SUPPLY FAN&COIL SECTION
3	ELECTRIC HEAT CONTROL BOX
4	FILTER SECTION
5	MIXING BOX SECTION
6	COIL ACCESS SECTION
7	EXTERNAL PIPING
8	FIELD INSTALLED DEVICE
9	VFD CONTROL PANEL

DEVICE	DESCRIPTION
1Q1	UNIT DISCONNECT SWITCH
1T1	CONTROL TRANSFORMER
1X1	POWER DISTRIBUTION BLOCK
2M1	SUPPLY FAN MOTOR 1
9F1	VFD FUSE
9F2	VFD FUSE
9F3	VFD FUSE
9T1	VFD

1. UNLESS OTHERWISE NOTED ALL SWITCHES ARE SHOWN AT 25°C (77°F), AT ATMOSPHERIC PRESSURE, AT 50% RELATIVE HUMIDITY, WITH ALL UTILITIES TURNED OFF, AND AFTER A NORMAL SHUTDOWN HAS OCCURED.
2. ALL FIELD WIRING MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE (NEC), STATE AND LOCAL REQUIREMENTS. OTHER COUNTRIES APPLICABLE NATIONAL AND/OR LOCAL REQUIREMENTS SHALL APPLY. FIELD CONDUCTORS SHALL HAVE INSULATION RATING NOT LESS THAN 600V COPPER CONDUCTORS ONLY.
3. THE MINIMUM CIRCUIT AMPACITY, THE MAXIMUM FUSE SIZE, AND DISCONNECT SIZE ARE CALCULATED BASED ON THE INVERTER INPUT LINE CURRENTS PER ARTICLE 430-2 OF THE NATIONAL ELECTRICAL CODE.
4. PROGRAM TERMINAL 18 AS RUN.
5. CONTROL TRANSFORMER SHOWN FOR 460V PRIMARY. FOR 200V OR 230V OR 575V REFER TO INSET A.
7. THE OVERLOAD RELAY TRIP SETTING MUST BE ADJUSTED TO CORRESPOND WITH THE MOTOR FULL LOAD CURRENT AS SHOWN ON THE MOTOR NAMEPLATE.
8. ATTACH GROUND OR EQUIPMENT GROUND.

CAUTION

USE COPPER CONDUCTORS ONLY!
UNIT TERMINALS ARE NOT DESIGNED TO ACCEPT OTHER TYPES OF CONDUCTORS.
FAILURE TO DO SO MAY CAUSE DAMAGE TO THE EQUIPMENT.

ATTENTION

N'UTILISER QUE DES CONDUCTEURS EN CUIVRE!
LES BORNES DE L'UNITE NE SONT PAS CONÇUES POUR RECEVOIR D'AUTRES TYPES DE CONDUCTEURS.
L'UTILISATION DE TOUT AUTRE CONDUCTEUR PEUT ENDOMMAGER L'EQUIPEMENT.

PRECAUCIÓN

¡UTILICE ÚNICAMENTE CONDUCTORES DE COBRE!
LAS TERMINALES DE LA UNIDAD NO ESTAN DISEÑADAS PARA ACEPTAR OTROS TIPOS DE CONDUCTORES.
SI NO LO HACE, PUEDE OCASIONAR DAÑO AL EQUIPO.

⚠ WARNING

HAZARDOUS VOLTAGE!
DISCONNECT ALL ELECTRIC POWER INCLUDING REMOTE DISCONNECTS AND FOLLOW LOCK OUT AND TAG PROCEDURES BEFORE SERVICING. INSURE THAT ALL MOTOR CAPACITORS HAVE DISCHARGED STORED VOLTAGE. UNITS WITH VARIABLE SPEED DRIVE, REFER TO DRIVE INSTRUCTIONS FOR CAPACITOR DISCHARGE.
FAILURE TO DO THE ABOVE BEFORE SERVICING COULD RESULT IN DEATH OR SERIOUS INJURY.

⚠ AVERTISSEMENT

TENSION DANGEREUSE!
COUPER TOUTES LES TENSIONS ET OUVRIR LES SECTIONNEURS À DISTANCE, PUIS SUIVRE LES PROCÉDURES DE VERROUILLAGE ET DES ÉTIQUETTES AVANT TOUTE INTERVENTION. VÉRIFIER QUE TOUS LES CONDENSATEURS DES MOTEURS SONT DÉCHARGÉS. DANS LE CAS D'UNITÉS COMPORTANT DES ENTRAÎNEMENTS À VITESSE VARIABLE, SE REPORTER AUX INSTRUCTIONS DE L'ENTRAÎNEMENT POUR DÉCHARGER LES CONDENSATEURS.
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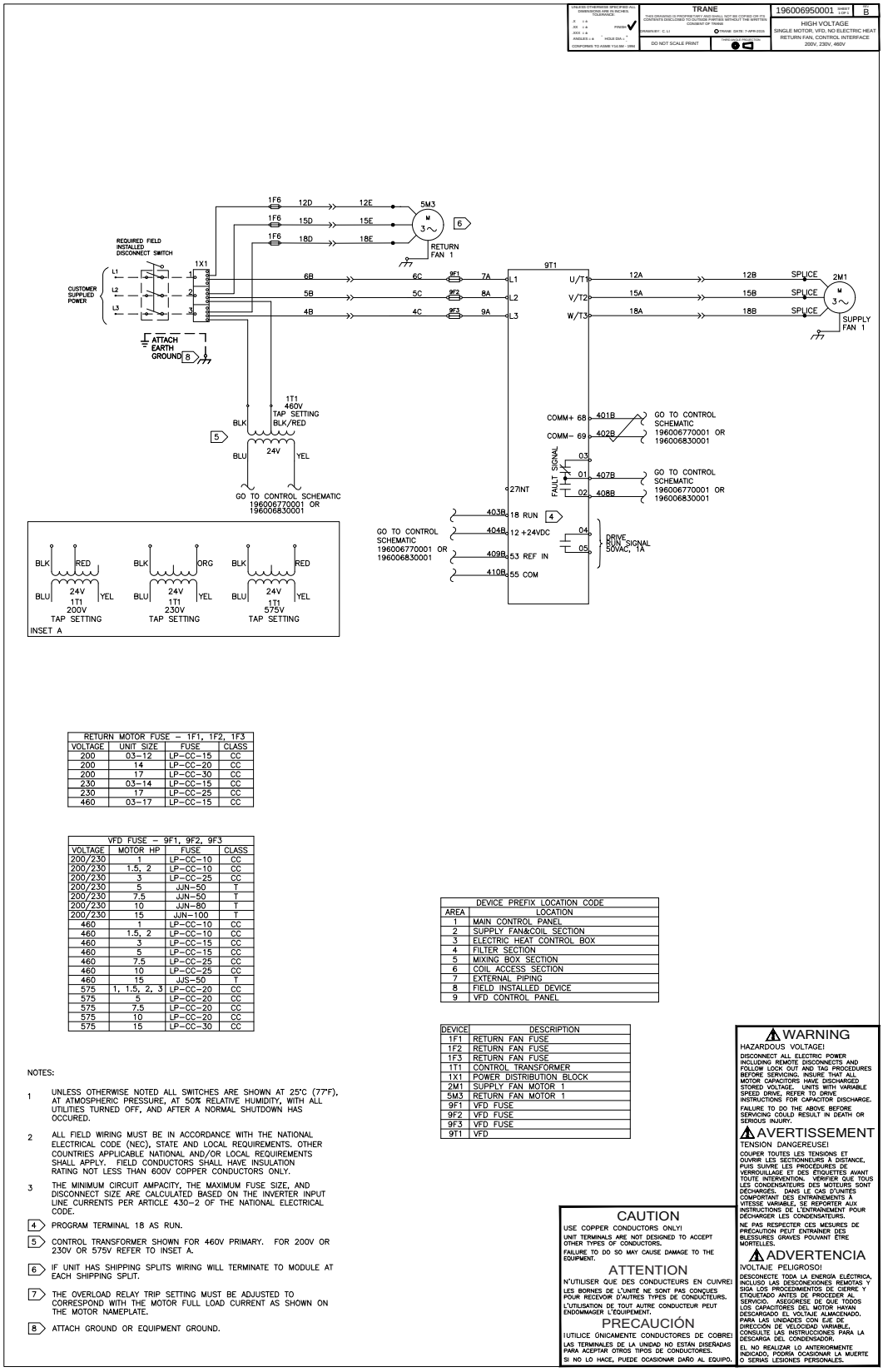
Figure 59. Typical VFD wiring schematic for outdoor air handlers



RETURN MOTOR FUSE – 1F1, 1F2, 1F3			
VOLTAGE	UNIT SIZE	FUSE	CLASS
200	03–12	LP–CC–15	CC
200	14	LP–CC–20	CC
200	17	LP–CC–30	CC
230	03–14	LP–CC–15	CC
230	17	LP–CC–25	CC
460	03–17	LP–CC–15	CC

VFD FUSE – 9F1, 9F2, 9F3			
VOLTAGE	MOTOR HP	FUSE	CLASS
200/230	1	LP–CC–10	CC
200/230	1.5, 2	LP–CC–10	CC
200/230	3	LP–CC–25	CC
200/230	5	JJN–50	T
200/230	7.5	JJN–50	T
200/230	10	JJN–80	T
200/230	15	JJN–100	T
460	1	LP–CC–10	CC
460	1.5, 2	LP–CC–10	CC
460	3	LP–CC–15	CC
460	5	LP–CC–15	CC
460	7.5	LP–CC–25	CC
460	10	LP–CC–25	CC
460	15	JJS–50	T
575	1, 1.5, 2, 3	LP–CC–20	CC
575	5	LP–CC–20	CC
575	7.5	LP–CC–20	CC
575	10	LP–CC–20	CC
575	15	LP–CC–30	CC

DEVICE PREFIX LOCATION CODE	
AREA	LOCATION
1	MAIN CONTROL PANEL
2	SUPPLY FAN&COIL SECTION
3	ELECTRIC HEAT CONTROL BOX
4	FILTER SECTION
5	MIXING BOX SECTION
6	COIL ACCESS SECTION
7	EXTERNAL PIPING
8	FIELD INSTALLED DEVICE
9	VFD CONTROL PANEL

DEVICE	DESCRIPTION
1F1	RETURN FAN FUSE
1F2	RETURN FAN FUSE
1F3	RETURN FAN FUSE
1T1	CONTROL TRANSFORMER
1X1	POWER DISTRIBUTION BLOCK
2M1	SUPPLY FAN MOTOR 1
5M3	RETURN FAN MOTOR 1
9F1	VFD FUSE
9F2	VFD FUSE
9F3	VFD FUSE
9T1	VFD

NOTES:

1. UNLESS OTHERWISE NOTED ALL SWITCHES ARE SHOWN AT 25°C (77°F), AT ATMOSPHERIC PRESSURE, AT 50% RELATIVE HUMIDITY, WITH ALL UTILITIES TURNED OFF, AND AFTER A NORMAL SHUTDOWN HAS OCCURED.
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4. PROGRAM TERMINAL 18 AS RUN.
5. CONTROL TRANSFORMER SHOWN FOR 460V PRIMARY. FOR 200V OR 230V OR 575V REFER TO INSET A.
6. IF UNIT HAS SHIPPING SPLITS WIRING WILL TERMINATE TO MODULE AT EACH SHIPPING SPLIT.
7. THE OVERLOAD RELAY TRIP SETTING MUST BE ADJUSTED TO CORRESPOND WITH THE MOTOR FULL LOAD CURRENT AS SHOWN ON THE MOTOR NAMEPLATE.
8. ATTACH GROUND OR EQUIPMENT GROUND.

CAUTION

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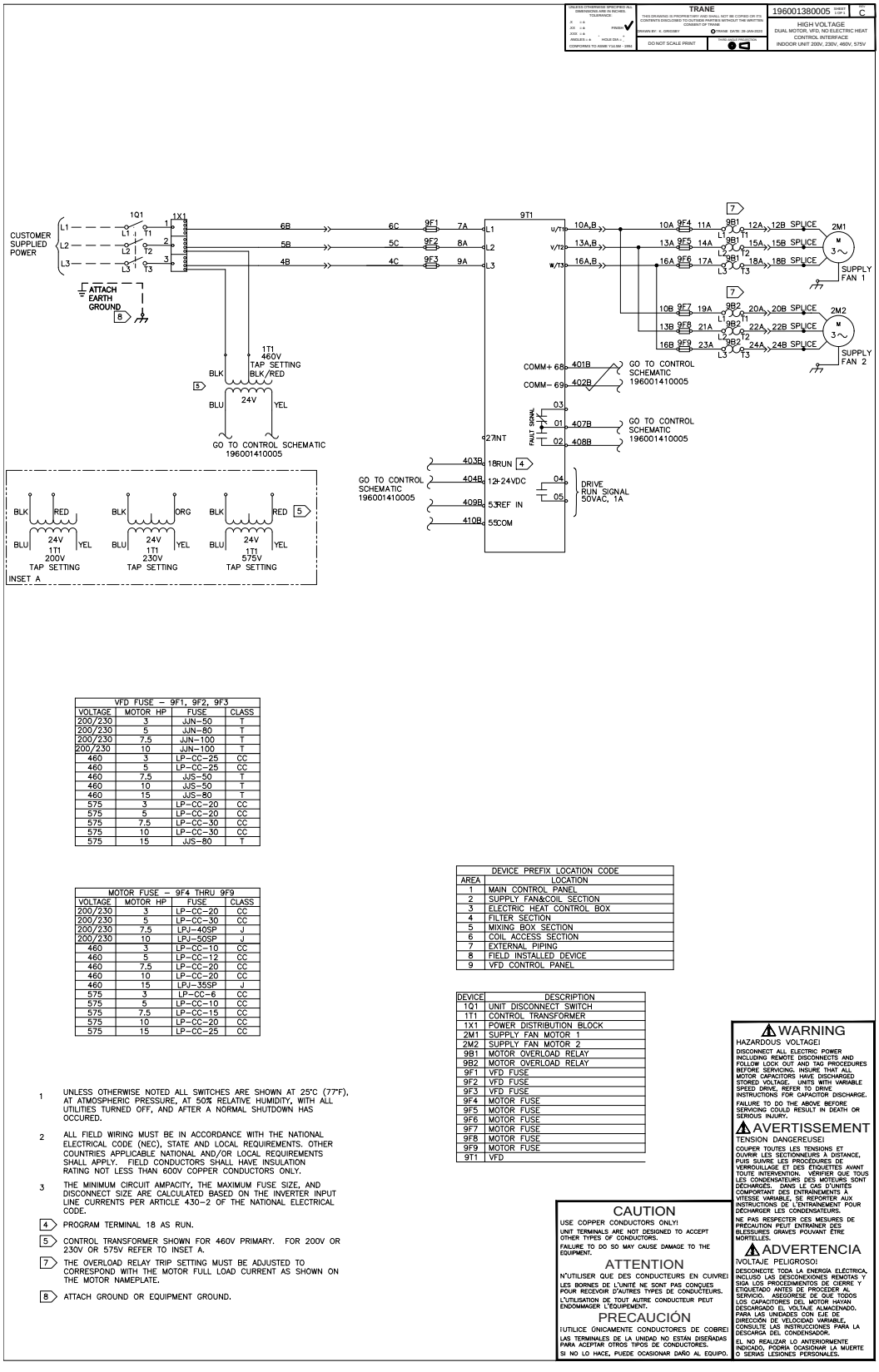
Figure 60. Typical dual fan VFD wiring schematic - indoor air handler only



VFD FUSE – 9F1, 9F2, 9F3			
VOLTAGE	MOTOR HP	FUSE	CLASS
200/230	3	JJN–50	T
200/230	5	JJN–80	T
200/230	7.5	JJN–100	T
200/230	10	JJN–100	T
460	3	LP–CC–25	CC
460	5	LP–CC–25	CC
460	7.5	JJS–50	T
460	10	JJS–50	T
460	15	JJS–80	T
575	3	LP–CC–20	CC
575	5	LP–CC–20	CC
575	7.5	LP–CC–30	CC
575	10	LP–CC–30	CC
575	15	JJS–80	T

MOTOR FUSE – 9F4 THRU 9F9			
VOLTAGE	MOTOR HP	FUSE	CLASS
200/230	3	LP–CC–20	CC
200/230	5	LP–CC–30	CC
200/230	7.5	LPJ–40SP	J
200/230	10	LPJ–50SP	J
460	3	LP–CC–10	CC
460	5	LP–CC–12	CC
460	7.5	LP–CC–20	CC
460	10	LP–CC–20	CC
460	15	LPJ–35SP	J
575	3	LP–CC–6	CC
575	5	LP–CC–10	CC
575	7.5	LP–CC–15	CC
575	10	LP–CC–20	CC
575	15	LP–CC–25	CC

DEVICE PREFIX LOCATION CODE	
AREA	LOCATION
1	MAIN CONTROL PANEL
2	SUPPLY FAN&COIL SECTION
3	ELECTRIC HEAT CONTROL BOX
4	FILTER SECTION
5	MIXING BOX SECTION
6	COIL ACCESS SECTION
7	EXTERNAL PIPING
8	FIELD INSTALLED DEVICE
9	VFD CONTROL PANEL

DEVICE	DESCRIPTION
1Q1	UNIT DISCONNECT SWITCH
1T1	CONTROL TRANSFORMER
1X1	POWER DISTRIBUTION BLOCK
2M1	SUPPLY FAN MOTOR 1
2M2	SUPPLY FAN MOTOR 2
9B1	MOTOR OVERLOAD RELAY
9B2	MOTOR OVERLOAD RELAY
9F1	VFD FUSE
9F2	VFD FUSE
9F3	VFD FUSE
9F4	MOTOR FUSE
9F5	MOTOR FUSE
9F6	MOTOR FUSE
9F7	MOTOR FUSE
9F8	MOTOR FUSE
9F9	MOTOR FUSE
9T1	VFD

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3 THE MINIMUM CIRCUIT AMPACITY, THE MAXIMUM FUSE SIZE, AND DISCONNECT SIZE ARE CALCULATED BASED ON THE INVERTER INPUT LINE CURRENTS PER ARTICLE 430-2 OF THE NATIONAL ELECTRICAL CODE.

4 PROGRAM TERMINAL 18 AS RUN.

5 CONTROL TRANSFORMER SHOWN FOR 460V PRIMARY. FOR 200V OR 230V OR 575V REFER TO INSET A.

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8 ATTACH GROUND OR EQUIPMENT GROUND.

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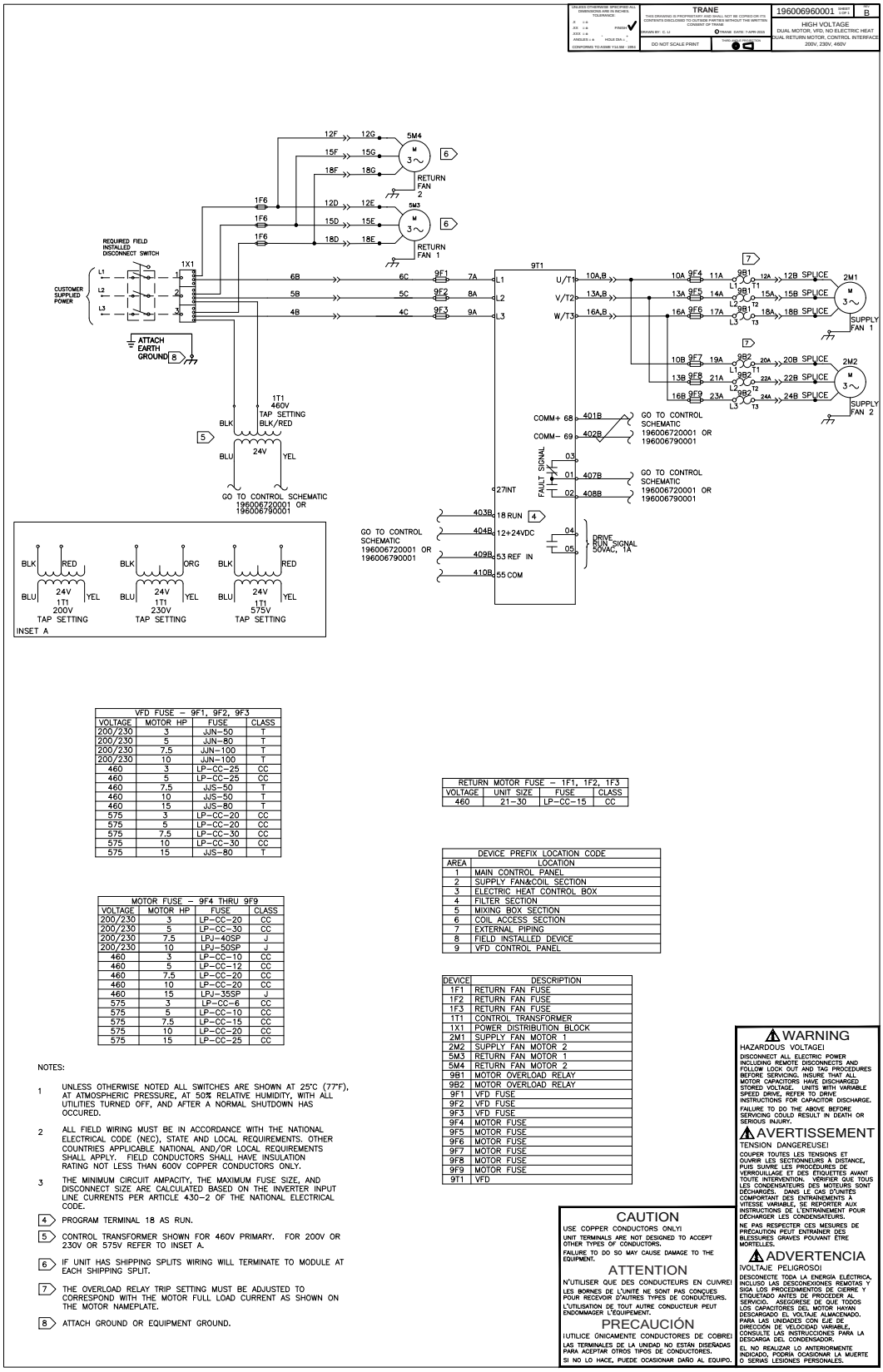

VFD FUSE – 9F1, 9F2, 9F3			
VOLTAGE	MOTOR HP	FUSE	CLASS
200/230	3	JJN–50	T
200/230	5	JJN–80	T
200/230	7.5	JJN–100	T
200/230	10	JJN–100	T
460	3	LP–CC–25	CC
460	5	LP–CC–25	CC
460	7.5	JJS–50	T
460	10	JJS–50	T
460	15	JJS–80	T
575	3	LP–CC–20	CC
575	5	LP–CC–20	CC
575	7.5	LP–CC–30	CC
575	10	LP–CC–30	CC
575	15	JJS–80	T

MOTOR FUSE – 9F4 THRU 9F9			
VOLTAGE	MOTOR HP	FUSE	CLASS
200/230	3	LP–CC–20	CC
200/230	5	LP–CC–30	CC
200/230	7.5	LPJ–40SP	J
200/230	10	LPJ–50SP	J
460	3	LP–CC–10	CC
460	5	LP–CC–12	CC
460	7.5	LP–CC–20	CC
460	10	LP–CC–20	CC
460	15	LPJ–35SP	J
575	3	LP–CC–6	CC
575	5	LP–CC–10	CC
575	7.5	LP–CC–15	CC
575	10	LP–CC–20	CC
575	15	LP–CC–25	CC

RETURN MOTOR FUSE – 1F1, 1F2, 1F3			
VOLTAGE	UNIT SIZE	FUSE	CLASS
460	21–30	LP–CC–15	CC

DEVICE PREFIX LOCATION CODE	
AREA	LOCATION
1	MAIN CONTROL PANEL
2	SUPPLY FAN&COIL SECTION
3	ELECTRIC HEAT CONTROL BOX
4	FILTER SECTION
5	MIXING BOX SECTION
6	COIL ACCESS SECTION
7	EXTERNAL PIPING
8	FIELD INSTALLED DEVICE
9	VFD CONTROL PANEL

DEVICE	DESCRIPTION
1F1	RETURN FAN FUSE
1F2	RETURN FAN FUSE
1F3	RETURN FAN FUSE
1T1	CONTROL TRANSFORMER
1X1	POWER DISTRIBUTION BLOCK
2M1	SUPPLY FAN MOTOR 1
2M2	SUPPLY FAN MOTOR 2
5M3	RETURN FAN MOTOR 1
5M4	RETURN FAN MOTOR 2
9B1	MOTOR OVERLOAD RELAY
9B2	MOTOR OVERLOAD RELAY
9F1	VFD FUSE
9F2	VFD FUSE
9F3	VFD FUSE
9F4	MOTOR FUSE
9F5	MOTOR FUSE
9F6	MOTOR FUSE
9F7	MOTOR FUSE
9F8	MOTOR FUSE
9F9	MOTOR FUSE
9T1	VFD

NOTES:

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7. THE OVERLOAD RELAY TRIP SETTING MUST BE ADJUSTED TO CORRESPOND WITH THE MOTOR FULL LOAD CURRENT AS SHOWN ON THE MOTOR NAMEPLATE.
8. ATTACH GROUND OR EQUIPMENT GROUND.

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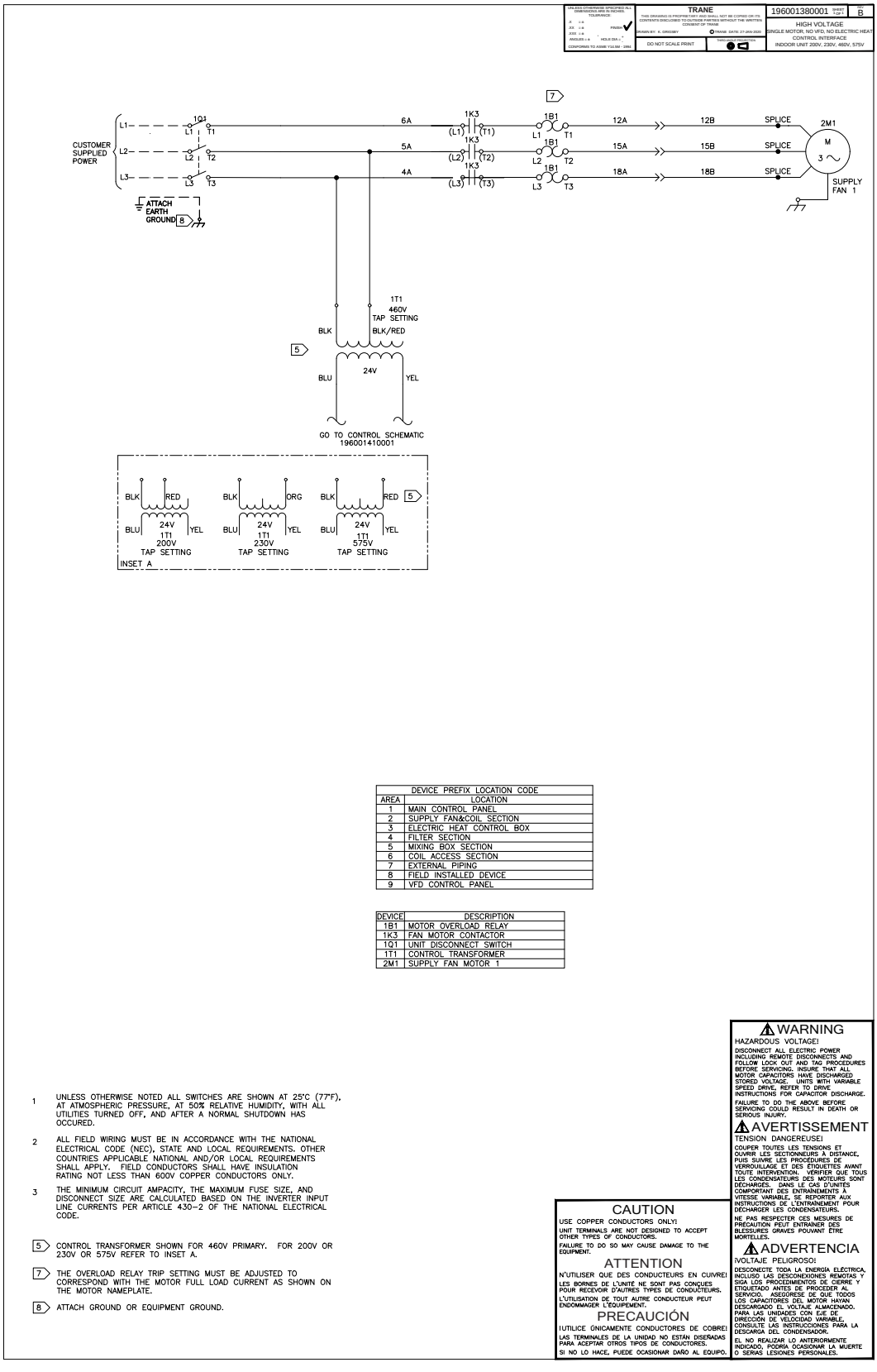
Figure 62. Typical starter wiring schematic for indoor air handler only



DEVICE PREFIX LOCATION CODE	
AREA	LOCATION
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3	ELECTRIC HEAT CONTROL BOX
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5	MIXING BOX SECTION
6	COIL ACCESS SECTION
7	EXTERNAL PIPING
8	FIELD INSTALLED DEVICE
9	VFD CONTROL PANEL

DEVICE	DESCRIPTION
1B1	MOTOR OVERLOAD RELAY
1K3	FAN MOTOR CONTACTOR
1Q1	UNIT DISCONNECT SWITCH
1T1	CONTROL TRANSFORMER
2M1	SUPPLY FAN MOTOR 1

1 UNLESS OTHERWISE NOTED ALL SWITCHES ARE SHOWN AT 25°C (77°F), AT ATMOSPHERIC PRESSURE, AT 50% RELATIVE HUMIDITY, WITH ALL UTILITIES TURNED OFF, AND AFTER A NORMAL SHUTDOWN HAS OCCURED.

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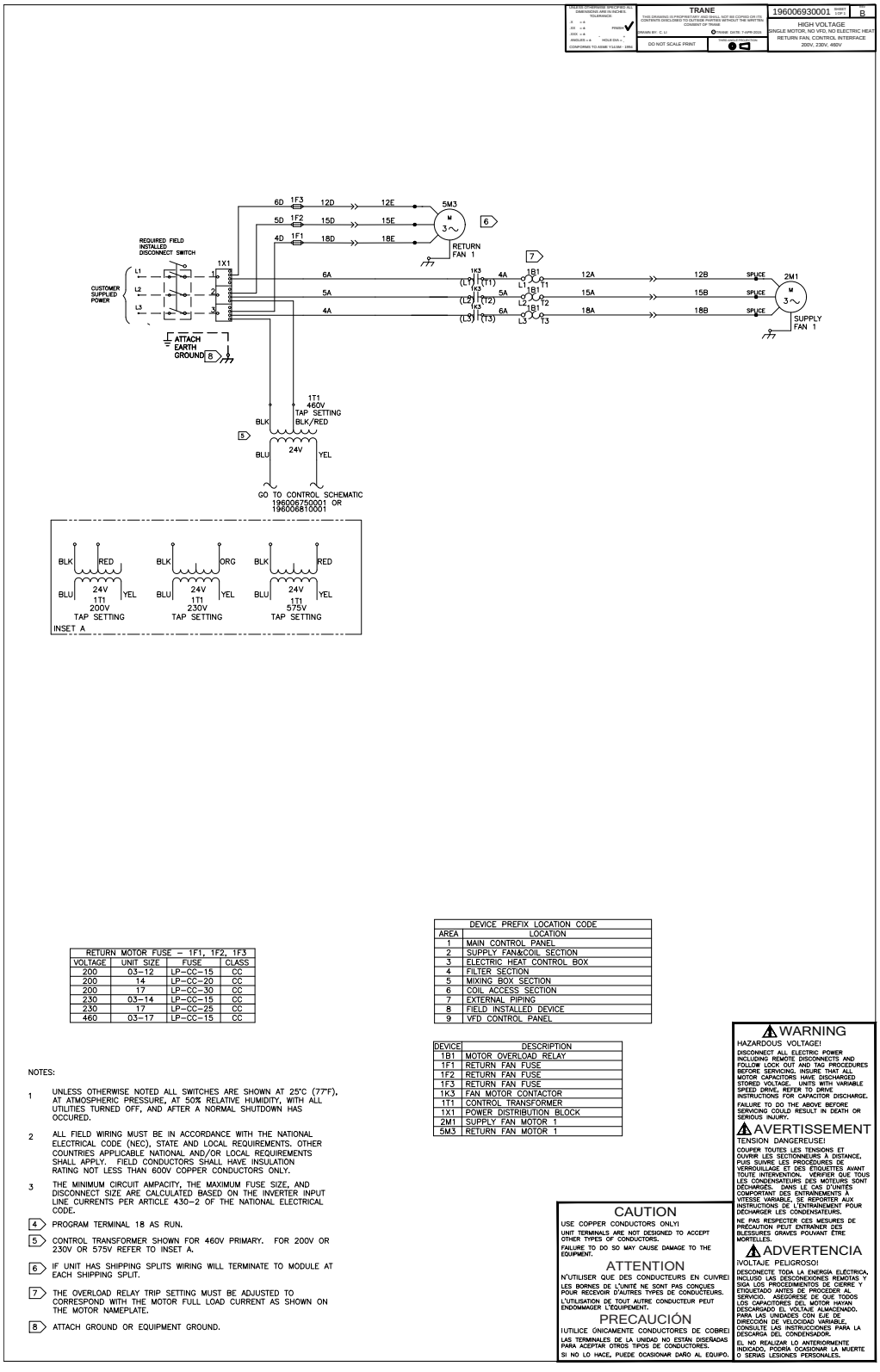
EL NO REALIZAR LO ANTERIORMENTE INDICADO, PODRÍA OCASIONAR LA MUERTE O SERIAS LESIONES PERSONALES.

Figure 63. Typical starter wiring schematic for outdoor air handler only



RETURN MOTOR FUSE – 1F1, 1F2, 1F3			
VOLTAGE	UNIT SIZE	FUSE	CLASS
200	03–12	LP–CC–15	CC
200	14	LP–CC–20	CC
200	17	LP–CC–30	CC
230	03–14	LP–CC–15	CC
230	17	LP–CC–25	CC
460	03–17	LP–CC–15	CC

DEVICE PREFIX LOCATION CODE	
AREA	LOCATION
1	MAIN CONTROL PANEL
2	SUPPLY FAN&COIL SECTION
3	ELECTRIC HEAT CONTROL BOX
4	FILTER SECTION
5	MIXING BOX SECTION
6	COIL ACCESS SECTION
7	EXTERNAL PIPING
8	FIELD INSTALLED DEVICE
9	VFD CONTROL PANEL

DEVICE	DESCRIPTION
1B1	MOTOR OVERLOAD RELAY
1F1	RETURN FAN FUSE
1F2	RETURN FAN FUSE
1F3	RETURN FAN FUSE
1K3	FAN MOTOR CONTACTOR
1T1	CONTROL TRANSFORMER
1X1	POWER DISTRIBUTION BLOCK
2M1	SUPPLY FAN MOTOR 1
5M3	RETURN FAN MOTOR 1

NOTES:

1. UNLESS OTHERWISE NOTED ALL SWITCHES ARE SHOWN AT 25°C (77°F), AT ATMOSPHERIC PRESSURE, AT 50% RELATIVE HUMIDITY, WITH ALL UTILITIES TURNED OFF, AND AFTER A NORMAL SHUTDOWN HAS OCCURED.
2. ALL FIELD WIRING MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE (NEC), STATE AND LOCAL REQUIREMENTS. OTHER COUNTRIES APPLICABLE NATIONAL AND/OR LOCAL REQUIREMENTS SHALL APPLY. FIELD CONDUCTORS SHALL HAVE INSULATION RATING NOT LESS THAN 600V COPPER CONDUCTORS ONLY.
3. THE MINIMUM CIRCUIT AMPACITY, THE MAXIMUM FUSE SIZE, AND DISCONNECT SIZE ARE CALCULATED BASED ON THE INVERTER INPUT LINE CURRENTS PER ARTICLE 430–2 OF THE NATIONAL ELECTRICAL CODE.
4. PROGRAM TERMINAL 18 AS RUN.
5. CONTROL TRANSFORMER SHOWN FOR 460V PRIMARY. FOR 200V OR 230V OR 575V REFER TO INSET A.
6. IF UNIT HAS SHIPPING SPLITS WIRING WILL TERMINATE TO MODULE AT EACH SHIPPING SPLIT.
7. THE OVERLOAD RELAY TRIP SETTING MUST BE ADJUSTED TO CORRESPOND WITH THE MOTOR FULL LOAD CURRENT AS SHOWN ON THE MOTOR NAMEPLATE.
8. ATTACH GROUND OR EQUIPMENT GROUND.

CAUTION

USE COPPER CONDUCTORS ONLY!

UNIT TERMINALS ARE NOT DESIGNED TO ACCEPT OTHER TYPES OF CONDUCTORS.

FAILURE TO DO SO MAY CAUSE DAMAGE TO THE EQUIPMENT.

ATTENTION

N'UTILISER QUE DES CONDUCTEURS EN CUIVRE! LES BORNES DE L'UNITÉ NE SONT PAS CONÇUES POUR RECEVOIR D'AUTRES TYPES DE CONDUCTEURS.

L'UTILISATION DE TOUT AUTRE CONDUCTEUR PEUT ENDOMMAGER L'EQUIPEMENT.

PRECAUCIÓN

¡UTILICE ÚNICAMENTE CONDUCTORES DE COBRE! LAS TERMINALES DE LA UNIDAD NO ESTÁN DISEÑADAS PARA ACEPTAR OTROS TIPOS DE CONDUCTORES.

SI NO LO HACE, PUEDE OCASIONAR DAÑO AL EQUIPO.

⚠ WARNING

HAZARDOUS VOLTAGE!

DISCONNECT ALL ELECTRIC POWER INCLUDING REMOTE DISCONNECTS AND FOLLOW LOCK OUT AND TAG PROCEDURES BEFORE SERVICING. INSURE THAT ALL MOTOR CAPACITORS HAVE DISCHARGED STORED VOLTAGE. UNITS WITH VARIABLE SPEED DRIVE, REFER TO DRIVE INSTRUCTIONS FOR CAPACITOR DISCHARGE.

FAILURE TO DO THE ABOVE BEFORE SERVICING COULD RESULT IN DEATH OR SERIOUS INJURY.

⚠ AVERTISSEMENT

TENSION DANGEREUSE!

COUPER TOUTES LES TENSIONS ET OUVRIR LES SECTIONNEURS À DISTANCE, PUIS SUIVRE LES PROCÉDURES DE VERROUILLAGE ET DES ÉTIQUETTES AVANT TOUTE INTERVENTION. VÉRIFIER QUE TOUS LES CONDENSATEURS DES MOTEURS SONT DÉCHARGÉS. DANS LE CAS D'UNITÉS COMPORTANT DES ENTRAÎNEMENTS À VITESSE VARIABLE, SE REPORTER AUX INSTRUCTIONS DE L'ENTRAÎNEMENT POUR DÉCHARGER LES CONDENSATEURS.

NE PAS RESPECTER CES MESURES DE PRÉCAUTION PEUT ENTRAÎNER DES BLESSURES GRAVES POUVANT ÊTRE MORTELLES.

⚠ ADVERTENCIA

¡VOLTAJE PELIGROSO!

DESCONECTE TODA LA ENERGÍA ELÉCTRICA, INCLUSO LAS DESCONEXIONES REMOTAS Y SIGA LOS PROCEDIMIENTOS DE CIERRE Y ETIQUETADO ANTES DE PROCEDER AL SERVICIO. ASEGÚRESE DE QUE TODOS LOS CAPACITORES DEL MOTOR HAYAN DESCARGADO EL VOLTAJE ALMACENADO. PARA LAS UNIDADES CON EJE DE DIRECCIÓN DE VELOCIDAD VARIABLE, CONSULTE LAS INSTRUCCIONES PARA LA DESCARGA DEL CONDENSADOR.

EL NO REALIZAR LO ANTERIORMENTE INDICADO, PODRÍA OCASIONAR LA MUERTE O SERIAS LESIONES PERSONALES.

Start-Up

Pre-Startup Checklist

Once the air handler has been assembled and installed, attention must be directed to individual components for proper operation. Before operating the unit, complete the pre-startup checklist.

⚠ 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 an appropriate voltmeter that all capacitors have discharged.

For additional information regarding the safe discharge of capacitors, see PROD-SVB06A-EN.

General Checks

- Ensure the unit has been installed level.
- Ensure supply-air and return-air ducts have been connected.
- Ensure damper operator motors and connecting linkage have been installed.
- Verify damper operation and linkage alignment.
- Check that air filters are in place and positioned properly.
- Remove any debris from the unit interior.
- Remove all foreign material from the drain pan and check drain pan opening and condensate line for obstructions.
- Close and secure all unit access doors.
- If differential pressure switch is provided on filter rack, adjust per system requirements.
- Inspect electrical connections to the unit
  - Connections should be clean and secure.
  - Compare the actual wiring with the unit diagrams.
- Check piping and valves for leaks. Open or close the valves to check for proper operation. Drain lines should be open.
- Leave this manual with the unit.

Fan-Related Checks

- For supply fans, if the unit is *not* externally isolated, ensure that the fan isolator tie-down bolts have been removed. See "Remove Shipping Tie-Downs," p. 20 for more information.
- Rotate all fan wheels manually to confirm they turn freely in the proper direction.
- Check fan shaft bearings, fan wheel, and drive sheave set screws for proper torque settings (see Table 17 on page 64.
  - Fan sheaves should be tight and aligned.
- Check fan drive belt tension. See "Tension the Fan Belt" section on page 62.
- Inspect fan motor and bearings for proper lubrication, if necessary. See "Fan Bearing Lubrication," p. 73.

Coil-Related Checks

NOTICE

Proper Water Treatment!

The use of untreated or improperly treated water in coils could result in scaling, erosion, corrosion, algae or slime. It is recommended that the services of a qualified water treatment specialist be engaged to determine what water treatment, if any, is required. Trane assumes no responsibility for equipment failures which result from untreated or improperly treated water, or saline or brackish water.

- Ensure coil and condensate drain piping connections are complete.
- Check the piping and valves for leaks.
  - Open or close the valves to check operation.
  - The drain lines should be open.
- If unit has a refrigerant coil, ensure that it has been charged and leak-tested according to the instructions provided with the condenser equipment. Adjust the superheat setting.
- Remove all foreign material from the drain pan and check the pan opening and condensate line for obstructions.
- For steam coils, slowly turn the steam on full for at least 10 minutes before opening the fresh air intake on units with fresh air dampers.

Motor-Related Checks

- Locate installation manual from the motor manufacturer for the specific motor installed. This can be found by contacting the motor manufacturer's representative. The motor manufacturer's recommendations take precedence for all matters related to the start-up and routine maintenance of the motor.
- For supply fan motor, check the motor lubrication for moisture and rust.
  - Remove and clean grease plugs to inspect.
  - If moisture is present, consult an authorized repair shop for bearing inspection/replacement. This may require removal and transport of motor.
  - If no moisture is present, refer to the motor manufacturer's lubrication recommendations for proper lubrication.
  - The motor manufacturer may recommend lubricating the motor as part of their routine start-up instructions.
- Check motor winding. An acceptable winding resistance reading is from 6 meg-ohms to infinity. If reading is less than 5 mega-ohms, the winding should be dried out in an oven or by a blower.
- Inspect the entire motor for rust and corrosion.
- Bump-start the unit and confirm the fan wheel rotates properly, as indicated by the rotation arrow located on the fan housing.

Note: *For motor warranty needs, contact your local Trane sales office.*

Unit Operation

⚠WARNING

Rotating Components!

Failure to follow all safety precautions could result in rotating components cutting and slashing technician which could result in death or serious injury. During installation, testing, servicing and troubleshooting of this product it may be necessary to work with live and exposed rotating components. Have a qualified or licensed service individual who has been properly trained in handling exposed rotating components, perform these tasks.

⚠WARNING

Live Electrical Components!

Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury. During installation, testing, servicing and troubleshooting of this product, it may be 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.

Before complete start-up, bump-start the unit and confirm the fan wheel rotates properly, as indicated by the rotation arrow located on the fan housing.

After initial startup:

- Calculate the motor voltage imbalance, notifying the power company to correct unacceptable imbalances.
- Periodically check the fan belt tension.

Calculate Motor Voltage Imbalance

After startup, measure the motor voltage and amperage on all phases to ensure proper operation. The readings should fall within the range given on the motor nameplate. The maximum allowable voltage imbalance is 2 percent.

Voltage imbalance is defined as 100 times the sum of the deviation of the three voltages from the average, divided by twice the average voltage. For example, if the three measured voltages are 221, 230 and 227, the average voltage would be 226 volts. The percent of voltage imbalance is then calculated.

$$\text{Voltage imbalance} = \frac{100A}{2 \times AvgVoltage}$$

where:

A = (226-221) + (230-226) + (227-226)

Voltage imbalance = 2.2% (not acceptable)

In the example, 2.2 percent imbalance is not acceptable and the power company should be notified to correct it.

VFD Programming Parameters

Units shipped with an optional variable frequency drive (VFD) are preset and run-tested at the Trane factory. If a problem with a VFD occurs, ensure that the programmed parameters listed in Table 15 have been set. If trouble still persist after verifying factory parameters are correct, call Trane Drive Technical Support at 1-877-872-6363. Have the unit serial number from the drive available for the technical support representative. The technician will determine if drive can be repaired or needs to be replaced.

Table 14. Trane TR150 switching frequency

Horsepower	Voltage	Max KHz	Trane Setting
0.5 - 15	200/230	16	16
20-60	200/230	12	12
0.5 - 30	460	16	16
40 - 125	460	12	12
0.5 - 10	575	12	12
15 - 125	575	8	8

⚠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 an appropriate voltmeter that all capacitors have discharged.

For additional information regarding the safe discharge of capacitors, see PROD-SVB06A-EN.

Table 15. Trane TR150 VFD programming parameters

Parameter # TR150	Description	Factory Default	Trane Setting
0-03	Region	International	North American
1-03	Torque Characteristics	Auto Energy Optim. VT	Auto Energy Optim. VT [3]for Belt-Drive Fans Variable Torque [1]for Direct-Drive Fans
1-20	Motor Power	Depends on unit	Set Based on Motor Nameplate
1-22	Motor Voltage	Depends on unit	Set Based on Motor Nameplate
1-24	Motor Current	Depends on unit	Set Based on Motor Nameplate
1-25	Rated Motor Speed	Depends on unit	Set Based on Motor Nameplate
1-71	Start Delay	0.0 Sec	2 Sec
1-73	Flying Start	Disabled	Enable
1-90	Motor Thermal Protection	ETR Trip 1 [4]	ETR Trip 1 [4]
3-02	Minimum Reference	Application dependant	0 Hz
3-03	Maximum Reference	60Hz	60 or the Value of Maximum Inverter Frequency (Hz) on nameplate if fan is direct drive.
3-15	Terminal 53 Analog Input	Analog Input 53	Analog Input 53
3-41	Ramp-up Time	Application dependant	30 Sec
3-42	Ramp-down Time	Application dependant	30 Sec
4-12	Output Freq Low Limit	Application dependant	20 Hz
4-14	Output Freq High Limit	60 or the Value of Maximum Inverter Frequency (Hz) on nameplate if fan is direct drive.	60 or the Value of Maximum Inverter Frequency (Hz) on nameplate if fan is direct drive.
4-18	Current Limit	Application dependant	110%
4-19	Max Output Frequency	Application dependant	65 Hz or 120 Hz for Direct Drive Fan
5-12	Terminal 27 Digital Input	No Operation	Coast Inverse
5-40	Function Relay	No Operation	Relay 1 Active No Alarm [160] Relay 2 Active Motor Running [5]
6-14	Terminal 53 Low Ref Feedback	0.0 Hz	20 Hz
6-15	Terminal 53 High Ref Feedback	Application dependant	60 or the Value of Maximum Inverter Frequency (Hz) on Nameplate if fan is direct drive.
14-01	Switching Frequency	5.0 kHz	Set to Max for HP (see Table 14)
14-20	Reset Mode	Manual Reset	Automatic Reset x 5

Tension the Fan Belt

Notice

Belt Over-Tension!

Over-tensioning the belt could result in equipment damage as it reduces fan and motor bearing life, accelerates belt wear, and can cause shaft failure.

Notice

Belt Under-Tension!

Under tensioning the belt could result in belt failure. Belts should not squeal at startup. Recheck belt tension after 8 hours, 24 hours, and 100 hours of operation and monthly thereafter.

Proper belt tension is required to ensure maximum bearing and drive component life and is based on motor horsepower requirement. A label located on the bearing support on the drive side of the unit lists all drive parts, the proper belt tension, and deflection for that tension for the specific drive (Figure 64).

If the drive is changed from the original, proper belt tension can be estimated using Table 16.

The correct operation tension for a V-belt drive is the lowest tension at which the belts will not slip under the peak load conditions. It may be necessary, however, to increase the tension of some drives to reduce excessive belt flopping or to reduce excessive startup squealing.

Figure 64. Tension drive belt label

Browning V-BELT DRIVE KIT 1627373
MODULE 0400

PURCHASE ORD. NUMBER B24597-061 H5D073B A
CUSTOMER'S KIT # H5D073B A-012-0400
MTR HP.= 10.0
FAN RPM = 1458 CD = 9.4 AT 3.00 TRN OPN
TENSION INFO - 3.86 LB., 0.14 IN.
DRIVE'S BELTS - B40
MOTOR SHEAVE - 2VP75X 1 3/8
MOTOR BUSHING - NONE REQUIRED
FAN SHEAVE - 2B5V80
FAN BUSHING - B 1 7/16

Check the fan belt tension at least three times during the first days of operation because there is a rapid decrease in tension until the belt settles in. To measure belt tension, use a belt tensiometer (see Figure 65). Determine actual deflection by depressing one belt with the belt tensiometer and measuring the deflection relative to the other belts or to belt line (see Figure 66). Adjust the belt tension to the correct pounds force and tighten all bolts to the proper torque. See Table 19, p. 72.

Figure 65. Belt tensioner

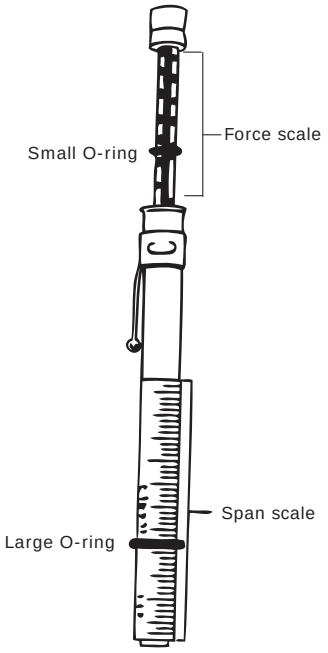


Figure 66. Belt tension measurement

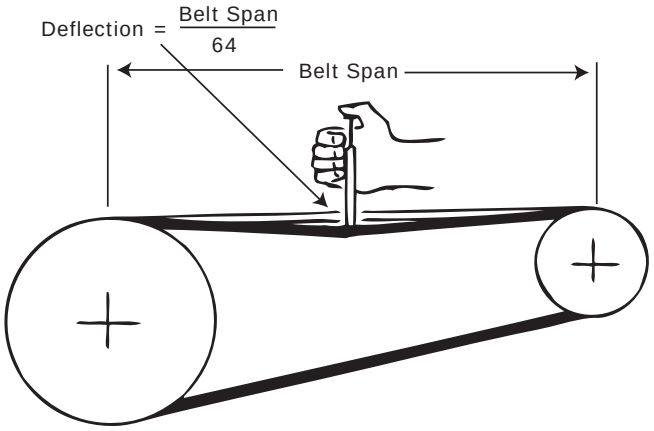


Table 16. Typical sheave diameter and deflection force

Cross section	Smallest sheave diameter range (in.)	Speed (rpm) range	Belt Deflection Force (lbs)			
			Super gripbelts and unnotched gripbands		Gripnotch belts and notched gripbands	
			Used belt	New belt	Used belt	New belt
A, AX	3.0–3.6	1,000–2,500	3.7	5.5	4.1	6.4
		2,501–4,000	2.8	4.2	3.4	5.0
	3.8–4.8	1,000–2,500	4.5	6.8	5.0	7.4
		2,501–4,000	3.8	5.7	4.3	6.4
	5.0–7.0	1,000–2,500	5.4	8.0	5.7	9.4
		2,501–4,000	4.7	7.0	5.1	7.6
B, BX	3.4–4.2	860–2,500	n/a	n/a	4.9	7.2
		2,501–4,000	n/a	n/a	4.2	6.2
	4.4–5.6	860–2,500	5.3	7.9	7.1	10.5
		2,501–4,000	4.5	6.7	7.1	9.1
	5.8–8.6	860–2,500	6.3	9.4	8.5	12.6
		2,501–4,000	6.0	8.9	7.3	10.9
C, CX	7.0–9.0	500–1,740	11.5	17.0	14.7	21.8
		1,741–3,000	9.4	13.8	11.9	17.5
	9.5–16.0	500–1,740	14.1	21.0	15.9	23.5
		1,741–3,000	12.5	18.5	14.6	21.6
D	12.0–16.0	200–850	24.9	37.0	n/a	n/a
		851–1,500	21.2	31.3	n/a	n/a
	18.0–20.0	200–850	30.4	45.2	n/a	n/a
		851–1,500	25.6	38.0	n/a	n/a
3V, 3VX	2.2–2.4	1,000–2,500	n/a	n/a	3.3	4.9
		2,501–4,000	n/a	n/a	2.9	4.3
	2.65–3.65	1,000–2,500	3.6	5.1	4.2	6.2
		2,501–4,000	3.0	4.4	3.8	5.6
	4.12–6.90	1,000–2,500	4.9	7.3	5.3	7.9
		2,501–4,000	4.4	6.6	4.9	7.3
5V, 5VX	4.4–6.7	500–1,749	n/a	n/a	10.2	15.2
		1,750–3,000	n/a	n/a	8.8	13.2
		3,001–4,000	n/a	n/a	5.6	8.5
	7.1–10.9	500–1,749	12.7	18.9	14.8	22.1
		1,750–3,000	11.2	16.7	13.7	20.1
	11.8–16.0	500–1,749	15.5	23.4	17.1	25.5
		1,750–3,000	14.6	21.8	16.8	25.0
8V	12.5–17.0	200–850	33.0	49.3	n/a	n/a
		851–1,500	26.8	39.9	n/a	n/a
	18.0–22.4	200–850	39.6	59.2	n/a	n/a
		851–1,500	35.3	52.7	n/a	n/a

Determine Fan Speed

⚠WARNING

Live Electrical Components!

Failure to follow all safety precautions when exposed to rotating components could result in death or serious injury. During installation, testing, servicing and troubleshooting of this product, it may be necessary to measure the speed of rotating components. Have a qualified licensed service individual who has been properly trained in handling exposed rotating components perform these tasks.

Fan speed can be determined using a strobe-type tachometer, or revolution counter.

Check unit vibration if the fan speed is changed more than five percent from the original designed speed, or if parts such as shafts, fan wheels, bearings, or other drive components are replaced. Do not exceed the maximum fan speed.

Pay particular attention to any vibration, noise, or overheating of the motor and fan bearings; however, note that bearings may run warm during break in.

Align Fan and Motor Sheaves

Align the fan and motor sheaves using a straightedge. The straightedge must be long enough to span the distance between the outside edges of the sheaves. When the sheaves are aligned, the straightedge will touch both sheaves at points **A** through **D** (see Figure 67) to confirm the shaft is parallel. For uneven width sheaves, place a string in the center groove of both sheaves and pull tight. Adjust the sheaves and tighten the sheave set screws to the proper torque given in Table 17.

Check Multiple Belts

Tighten the belts slightly and rotate the drive several times.

On multiple belt drives, ensure the force of deflection is approximately the same on each belt by pushing each belt in an equal distance at a point halfway from each sheave (see Figure 67). If this force is not the same for each belt, the motor and fan shaft are not parallel. Realign as required. After realignment, tighten the belts again to the standard belt tensioning specifications. If the force is still not the same for all belts, the belts or sheaves are worn and must be replaced.

Figure 67. Proper drive alignment

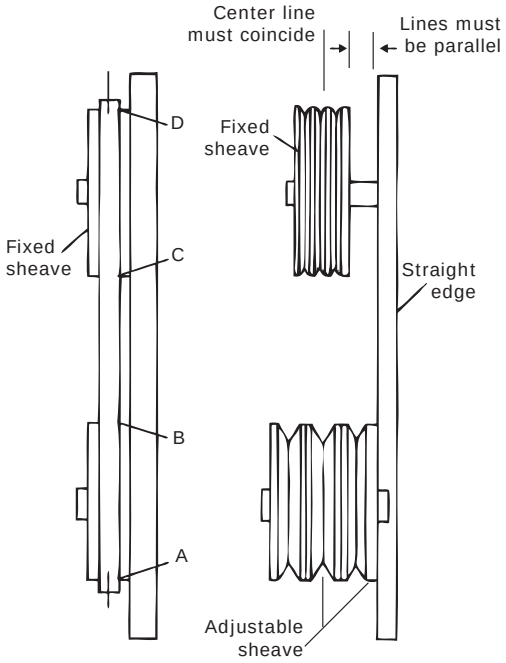


Table 17. Set screw torque settings (inches)

Screw Size	Hex Key	Square Head	Hex Head	Torque (in.-lb.)	Torque (ft.-lb.)
1/4	1/8	3/8	7/16	66-90	5.5-7.5
5/16	5/32	1/2	1/2	126-164	10.5-13.7
3/8	3/16	9/16	9/16	228-300	19.0-25.0
7/15	7/32	5/8	5/8	348-450	29.0-37.5
1/2	1/4	3/4	3/4	504-650	42.0-54.2
5/8	5/16	15/16	15/16	1290-1390	107.0-116.0
#10	3/32	-	-	28-40	2.3-3.3

External Insulating Requirements

The following areas should be specifically addressed, as applicable:

- Supply and return water piping connections
- Supply and return refrigerant piping connections
- Condensate drain lines and connections
- Outdoor-air-intake duct connections
- Discharge duct connections
- Special requirements for low-temperature-air systems
- Electric duct heaters mounted on the fan discharge

Routine Maintenance

⚠WARNING

Hazardous Service Procedures!

Failure to follow all of the recommended safety warnings provided, could result in death or serious injury. The maintenance and troubleshooting procedures recommended in this manual could result in exposure to electrical, mechanical or other potential safety hazards. Always refer to the safety warnings provided throughout this manual concerning these procedures. Unless specified otherwise, disconnect all electrical power including remote disconnect and discharge all energy storing devices such as capacitors before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. When necessary to work with live electrical components, have a qualified licensed electrician or other individual who has been trained in handling live electrical components perform these tasks.

⚠WARNING

Rotating Components!

Failure to secure rotor or disconnect power before servicing could result in rotating components cutting and slashing technician which could result in death or serious injury. The following procedure involves working with rotating components. Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/ tagout procedures to ensure the power can not be inadvertently energized. Secure rotor to ensure rotor cannot freewheel.

Maintenance Checklist

Table 18. Maintenance checklist

After 48 hours of operation
☐ For belt-drive fans, the belts have acquired their permanent set. Readjust but do not overtighten. See "Tension the Fan Belt," p. 62 for more information.
Every week
☐ Observe unit weekly for any change in running condition and unusual noise.
Every month
☐ Clean or replace air filters if clogged or dirty; coat permanent filters with oil after cleaning; change bag filters when pressure drop is 1 in. wg. See "Air Filters," p. 66 for more information.
☐ Belt-drive fans - re-lubricate fan bearings if necessary. See "Fan Bearing Lubrication," p. 73 for more information.
☐ Belt-drive fans - check and adjust fan belt tension. See "Tension the Fan Belt," p. 62 for more information.
Every three to six months
☐ Belt-drive fans - check fan bearing grease line connections. Lines should be tight to the bearings.
☐ Check motor bracket torque. See Table 19, p. 72 for torque requirements.
☐ Belt-drive fans - check bearing bolt torque and bearing setscrew torque. See Table 19, p. 72 for torque requirements.
☐ Belt-drive fans - align fan and motor sheaves. Tighten sheave set screws to the proper torque. See "Align Fan and Motor Sheaves," p. 64 for more information.
☐ Inspect and clean drain pans. See "Coils," p. 66 for more information.
☐ Tighten electrical connections.
☐ Inspect coils for dirt build-up. See "Coils," p. 66 for more information.
Every year
☐ Inspect the unit casing for corrosion. If damage is found, clean and repaint.
☐ Clean the fan wheels and shaft. See "Coils," p. 66 for more information.
☐ Inspect and clean drain pans.
☐ Check damper linkages, set screws, and blade adjustment. Clean, but do not lubricate, the nylon damper rod bushings.
☐ Clean damper operators.
☐ Inspect electrical components and insulation.
☐ Inspect wiring for damage.
☐ Rotate the fan wheel and check for obstructions. The wheel should not rub. Adjust the center if necessary.
☐ Lubricate motor bearings in accordance with motor manufacturer's recommendations (see "Motor Bearing Lubrication," p. 73 for more information).
☐ Check condition of gasketing and insulation around unit, door and dampers.
☐ Examine flex connections for cracks or leaks. Repair or replace damaged material.

Air Filters

⚠WARNING

Rotating Components!

Failure to secure rotor or disconnect power before servicing could result in rotating components cutting and slashing technician which could result in death or serious injury. The following procedure involves working with rotating components. Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/ tagout procedures to ensure the power can not be inadvertently energized. Secure rotor to ensure rotor cannot freewheel.

Throwaway Filters

To replace throwaway filters, install new filters with the directional arrows pointing in the direction of airflow.

Note: *Bag and cartridge filters must have an airtight seal to prevent air bypass. If using filters not supplied by Trane, apply foam gasketing to the vertical edges of the filter.*

Coils

All coils should be kept clean to maintain maximum performance.

Steam and Water Coils

⚠WARNING

Hazardous Voltage!

Failure to disconnect power before servicing could result in death or serious injury. Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized.

⚠WARNING

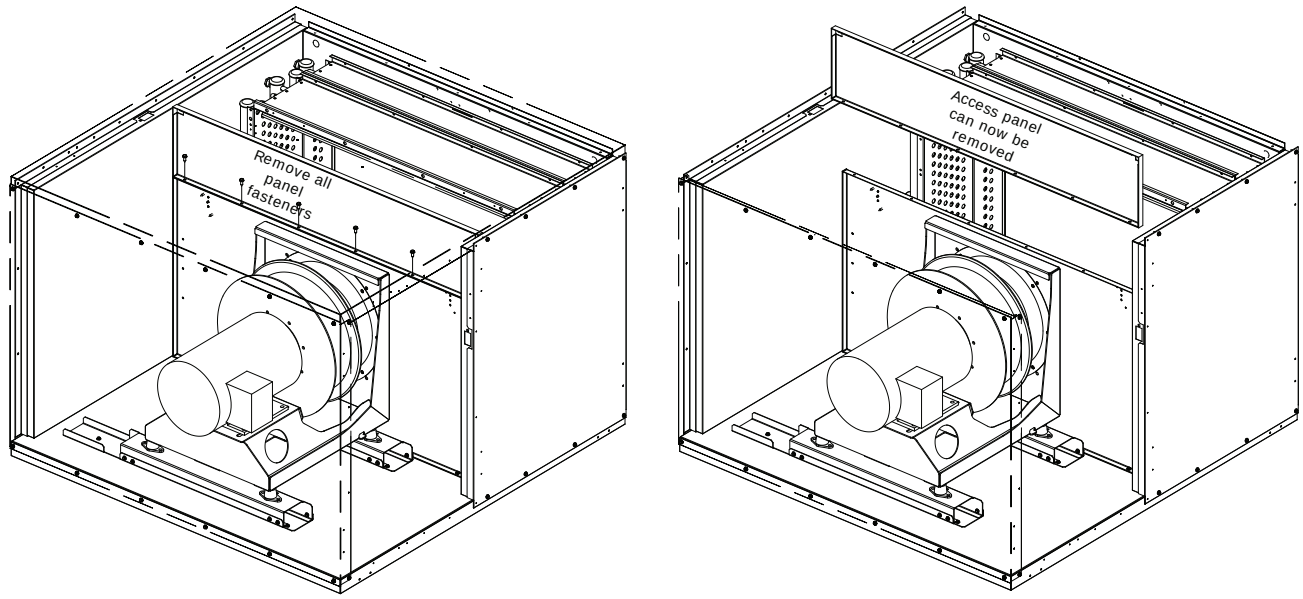
Hazardous Chemicals!

Failure to follow all safety instructions could result in death or serious injury. Coil cleaning agents can be either acidic or highly alkaline and can burn severely if contact with skin occurs. Handle chemical carefully and avoid contact with skin. ALWAYS wear Personal Protective Equipment (PPE) including goggles or face shield, chemical resistant gloves, boots, apron or suit as required. For personal safety refer to the cleaning agent manufacturer's Materials Safety Data Sheet and follow all recommended safe handling practices.

To clean steam and water coils:

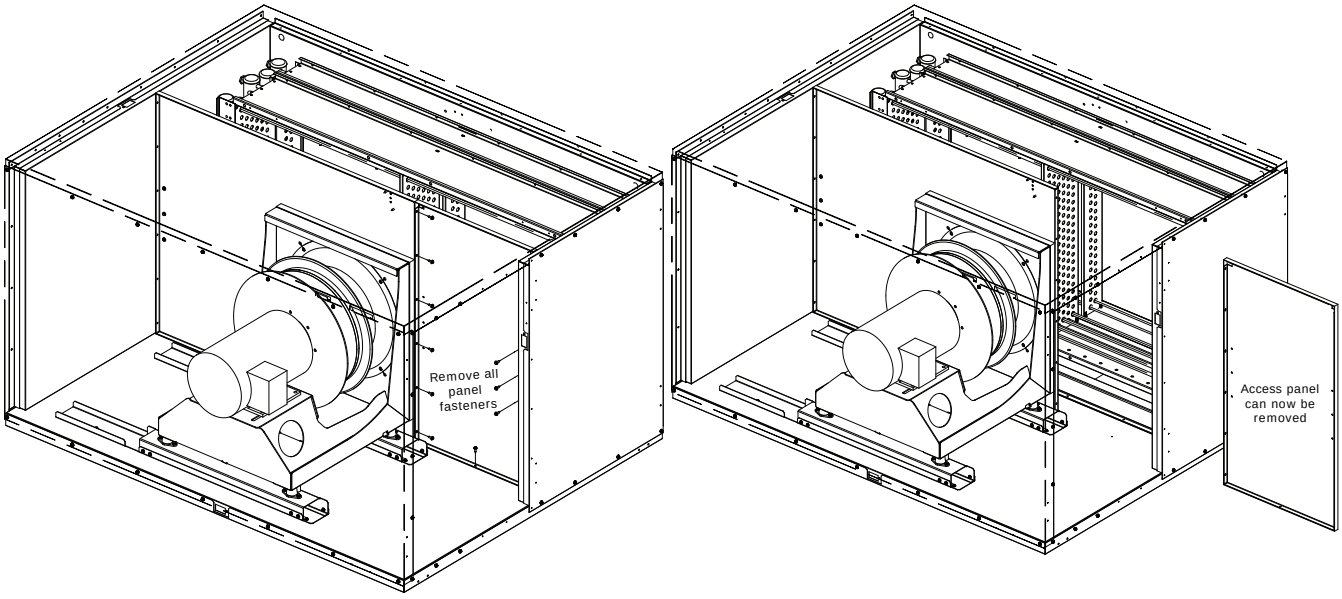
1. Disconnect all electrical power to the unit.
2. Gain access to both sides of the coil.
   For DDP fans, remove the access panel.
   For unit sizes 3, 6, 10 and 12, see Figure 68.

Figure 68. Gain access to both sides of coil shown for sizes 3, 6, 10, and 12



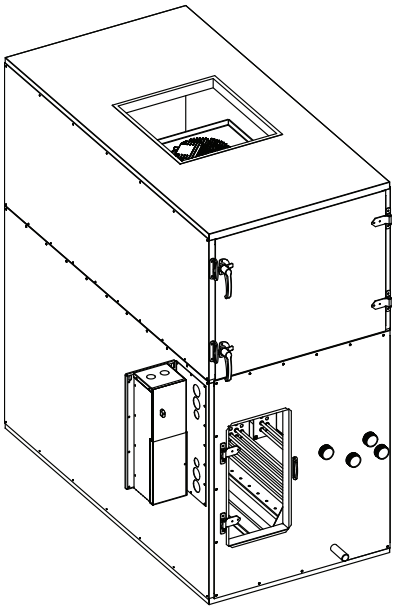
For unit sizes 8, 14, 17, 21, 25, and 30, see Figure 69.

Figure 69. Gain access to both sides of coil shown for sizes 8, 14, 17, 21, 25, and 30



For MI fan vertical unit, access via the coil door, see Figure 70.

Figure 70. For vertical MI fan, gain access via the coil door



Note: Coil access door removed for clarity

3. Wearing the appropriate personal protective equipment, use a soft brush to remove loose debris from both sides of the coil.
4. Install a block-off to prevent spray from going through the coil and into a dry section of the unit and/or system ductwork.
5. Mix a high-quality coil cleaning detergent with water according to the manufacturer's instructions.

Note: *If the detergent is strongly alkaline after mixing (PH 8.5 or higher), it must contain an inhibitor. Follow the cleaning solution manufacturer's instructions regarding the use of the product.*

6. Place the mixed solution in a garden pump-up sprayer or high-pressure sprayer. If a high pressure sprayer is to be used:
   - Maintain minimum nozzle spray angle of 15 degrees.
   - Spray perpendicular to the coil face.
   - Keep the nozzle at least 6 inches from the coil.
   - Do *not* exceed 600 psi.
7. Spray the leaving air side of the coil first, then the entering air side.
8. Thoroughly rinse both sides of the coil and the drain pan with cool, clean water.
9. Repeat steps 6 and 7 as necessary.
10. Straighten any coil fins that may have been damaged during the cleaning process.
11. Confirm the drain line is open following the cleaning process.
12. Allow the unit to dry thoroughly before putting it back into service.
13. Replace all panels and parts and restore electrical power to the unit.
14. Be careful any contaminated material does not contact other areas of the unit or building. Properly dispose of all contaminated materials.

Refrigerant Coils

⚠WARNING

Hazardous Pressures!

Failure to follow these safety precautions could result in coil bursting, which could result in death or serious injury. Coils contain refrigerant under pressure. When cleaning coils, maintain coil cleaning solution temperature under 150°F to avoid excessive pressure in the coil.

⚠WARNING

Hazardous Voltage!

Failure to disconnect power before servicing could result in death or serious injury. Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized.

⚠WARNING

Hazardous Pressures!

Failure to follow all safety instructions could result in death or serious injury. Coil cleaning agents can be either acidic or highly alkaline and can burn severely if contact with skin occurs. Handle chemical carefully and avoid contact with skin. ALWAYS wear Personal Protective Equipment (PPE) including goggles or face shield, chemical resistant gloves, boots, apron or suit as required. For personal safety refer to the cleaning agent manufacturer's Materials Safety Data Sheet and follow all recommended safe handling practices.

To clean refrigerant coils:

1. Disconnect all electrical power to the unit.
2. Wearing the appropriate personal protective equipment, use a soft brush to remove loose debris from both sides of the coil.
3. Install a block-off to prevent spray from going through the coil and into a dry section of the unit and/or system ductwork.
4. Mix a high-quality coil cleaning detergent with water according to the manufacturer's instructions.

Note: *If the detergent is strongly alkaline after mixing (PH 8.5 or higher), it must contain an inhibitor. Follow the cleaning solution manufacturer's instructions regarding the use of the product.*

5. Place the mixed solution in a garden pump-up sprayer or high-pressure sprayer. If a high pressure sprayer is to be used:
   - Maintain minimum nozzle spray angle of 15 degrees.
   - Spray perpendicular to the coil face.
   - Keep the nozzle at least 6 inches from the coil.
   - Do *not* exceed 600 psi.
6. Spray the leaving air side of the coil first, then the entering air side.
7. Thoroughly rinse both sides of the coil and the drain pan with cool, clean water.
8. Repeat steps 6 and 7 as necessary.
9. Straighten any coil fins damaged during the cleaning process.
10. Confirm the drain line is open following the cleaning process.
11. Allow the unit to dry thoroughly before putting it back into service.
12. Replace all panels and parts and restore electrical power to the unit.
13. Be careful any contaminated material does not contact other areas of the unit or building. Properly dispose of all contaminated materials and cleaning solution.

Coil Winterization

Water coil winterization procedures consist primarily of draining water from the coil before the heating season. Trane recommends flushing the coil with glycol if coils will be exposed to temperatures below 35 degrees.

NOTICE

Coil Freeze-up!

Failure to follow instructions below could result in coil damage. Drain and vent coils when not in use. Trane recommends glycol protection in all possible freezing applications. Use a glycol approved for use with commercial cooling and heating systems and copper tube coils.

Install field-fitted drains and vents to permit winterization of coils not in use and to assist in evacuating air from the water system during startup. If draining is questionable because of dirt or scale deposits inside the coil, fill the coil with glycol before the heating season begins.

Note: *On many unit sizes, there are multiple coils in the coil section. Be sure to winterize all coils in a given coil section.*

To winterize hydronic coils:

1. Remove the vent and drain plugs.
2. Blow the coil out as completely as possible with compressed air.
3. Fill and drain the coil several times with full strength glycol so that it mixes thoroughly with the water retained in the coil.
4. Drain the coil out as completely as possible.
5. To ensure no water remains in the coil, do not replace the vent and drain plugs until the coils are put back into service.

Moisture Purge Cycle

By it's very nature, any HVAC unit with a cooling coil serves as a dehumidifier, reducing the surrounding air's ability to hold water vapor as its temperature falls. This normally doesn't present a problem when the unit is running. However, when the fan stops, water vapor condenses on the cold metal surfaces inside the air handler and remains there until the air warms sufficiently to re-evaporate it. This damp, dark environment—though temporary—can encourage the growth of mold, mildew, and other microbial contaminants.

Providing a moisture purge cycle 15 to 30 minutes after shutdown disperses the cold, humid air inside the air-handling system more evenly throughout the building. This four-step cycle:

- Closes the outdoor air dampers.
- Turns off the cooling coil.
- Opens any variable-air-volume terminals connected to the air handler.
- Operates the supply fan for 10 to 15 minutes.

Air movement discourages water condensation and hastens re-evaporation of any condensate that does happen to form. This simple preventative measure effectively combats microbial growth and curbs moisture-related deterioration of air-handling components.

Drain Pans

⚠WARNING

Hazardous Voltage!

Failure to disconnect power before servicing could result in death or serious injury. Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized.

⚠WARNING

No Step Surface!

Failure to follow this recommendation could result indeath or serious injury. Do not walk on the sheet metal drain pan. Walking on the drain pan could cause the supporting metal to collapse, resulting in the operator/technician to fall.

The condensate drain pan and drain line must be checked to assure the condensate drains as designed. This inspection should occur a minimum of every six months or more often as dictated by operating experience.

If evidence of standing water or condensate overflow exists, identify and remedy the cause immediately. Refer to "Troubleshooting," p. 74 for possible causes and solutions.

To clean drain pans:

1. Disconnect all electrical power to the unit.
2. Wearing the appropriate personal protective equipment, remove any standing water.
3. Scrape solid matter off of the drain pan.
4. Vacuum the drain pan with a vacuum device that uses high-efficiency particulate arrestance (HEPA) filters with a minimum efficiency of 99.97 percent at 0.3 micron particle size.
5. Thoroughly clean any contaminated area(s) with a mild bleach and water solution or an EPA-approved sanitizer specifically designed for HVAC use.
6. Immediately rinse the affected surfaces thoroughly with fresh water and a fresh sponge to prevent potential corrosion of metal surfaces.
7. Allow the unit to dry completely before putting it back into service.
8. Be careful any contaminated material does not contact other areas of the unit or building. Properly dispose of all contaminated materials and cleaning solution.

Drive Motor and Pulley Replacement

⚠WARNING

Hazardous Voltage!

Failure to disconnect power before servicing could result in death or serious injury. Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized.

1. Disconnect all electrical power.
2. Remove the belt from the pulley and temporarily position it around the wheel rim.
3. Measure and record the distance from the inner edge of the pulley to the mounting wall.
4. Loosen the set screw in the wheel drive pulley using an Allen wrench and remove the pulley from the motor drive shaft.
5. While supporting the weight of the drive motor in one hand, loosen and remove the four mounting bolts.
6. Install a replacement motor with the hardware kit supplied.
7. Install the pulley and adjust it to the distance recorded in the previous step.
8. Tighten the set screw to the drive shaft.
9. Stretch the belt over the pulley and engage it in the groove.

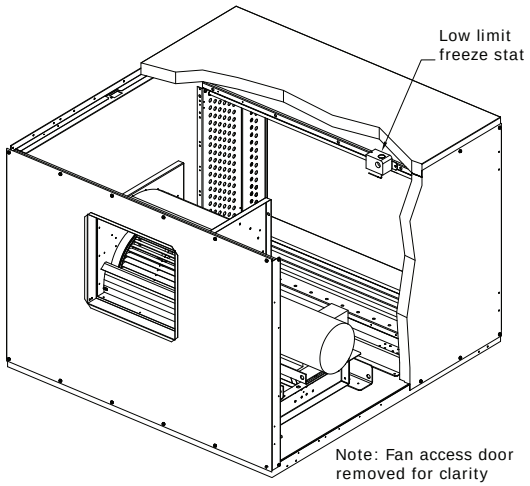
Low Limit Switch

In the event low limit switch (freeze stat) trips, the switch will need to be reset manually. The low limit switch is positioned on the air leaving face of the furthest

downstream coil. The reset button is located on the low limit switch box. The unit configuration will determine the method used.

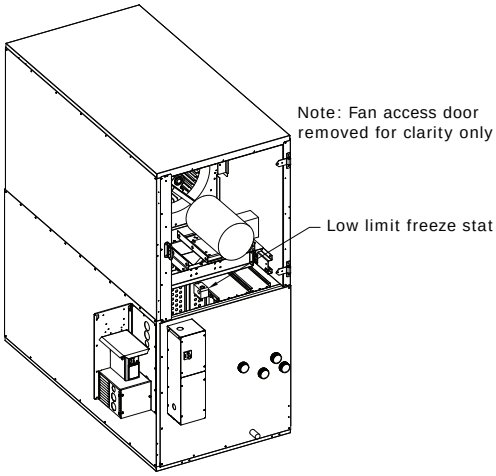
- Horizontal units equipped with a housed fan, low limit switch can be accessed through the fan access door (see Figure 71).

Figure 71. Resetting low limit switch for horizontal units with housed fans



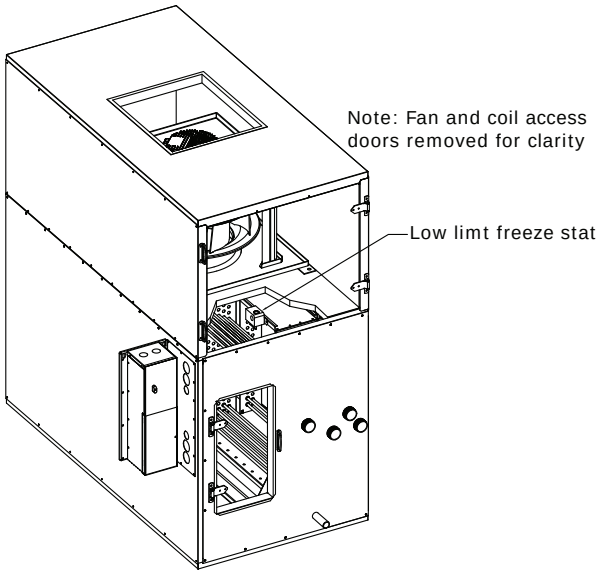
- Vertical units with housed fans, low limit switch can be accessed through the fan access door (see Figure 72).

Figure 72. Resetting low limit switch for vertical units



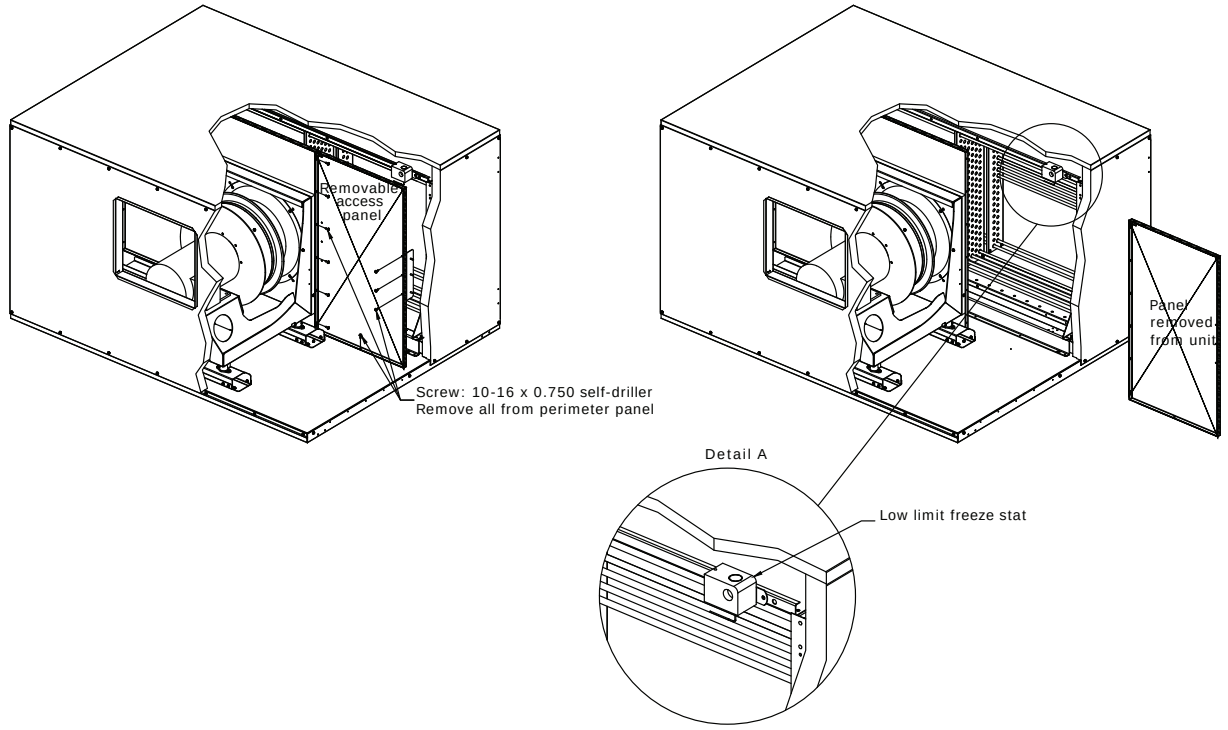
- Vertical unit with motorized impeller fan access through coil door.

Figure 73. Resetting low limit switch for vertical motorized impeller fans



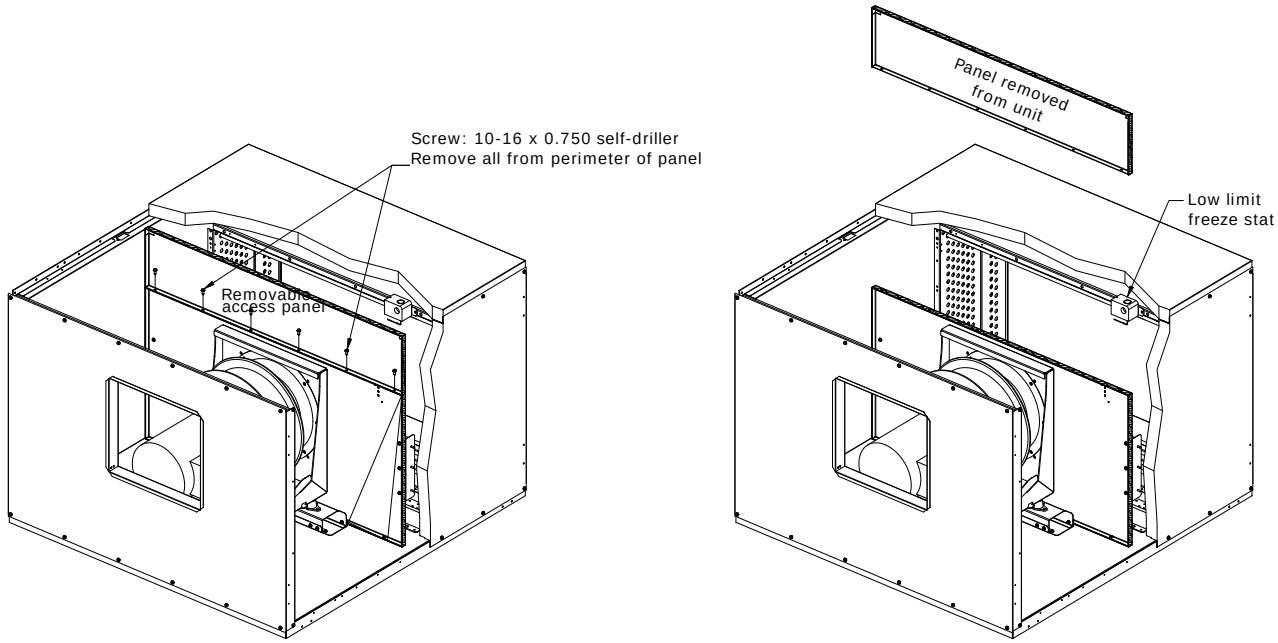
- Horizontal units equipped with a direct-drive plenum fan, the low limit switch can be accessed through the fan access door. For sizes 3, 6, 10 and 12, see Figure 74.

Figure 74. Resetting low limit switch for horizontal DDP fan units sizes 3, 6, 10, and 12



For unit sizes 8 and 14-30, see Figure 75.

Figure 75. Resetting low limit switch for horizontal DDP fan units sizes 8 and 14-30



Fans

⚠WARNING

Rotating Components!

Failure to secure rotor or disconnect power before servicing could result in rotating components cutting and slashing technician which could result in death or serious injury. The following procedure involves working with rotating components. Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/ tagout procedures to ensure the power can not be inadvertently energized. Secure rotor to ensure rotor cannot freewheel.

Inspecting and Cleaning Fans

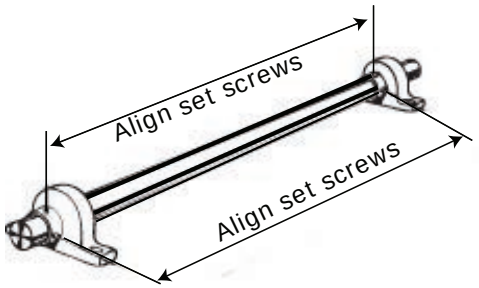
Fan sections of air handlers should be inspected every six months at a minimum or more frequently if operating experience dictates. If evidence of microbial growth (mold) is found, identify and remedy the cause immediately. Refer to "Troubleshooting," p. 74 for possible causes and solutions. To clean the fan section:

1. Disconnect all electrical power to the unit.
2. Wearing the appropriate personal protective equipment, remove any contamination.
3. Vacuum the section with a vacuum device that uses high-efficiency particulate arrestance (HEPA) filters with a minimum efficiency of 99.97 percent at 0.3 micron particle size.
4. Thoroughly clean any contaminated area(s) with a mild bleach and water solution or an EPA-approved sanitizer specifically designed for HVAC use.
5. Immediately rinse the affected surfaces thoroughly with fresh water and a fresh sponge to prevent potential corrosion of metal surfaces.
6. Allow the unit to dry completely before putting it back into service.
7. Be careful any contaminated material does not contact other areas of the unit or building. Properly dispose of all contaminated materials and cleaning solution.

Bearing Set Screw Alignment

Align bearing set screws for belt-drive fans as illustrated in Figure 76. See Table 17, p. 64 for set screw torque measurements.

Figure 76. Bearing set screw alignment



Torque Requirements

Refer to Table 19 for minimum torque of motor mounting and bearings bolts. Refer to Table 17, p. 64 for minimum set screw torque.

Table 19. Minimum hex head bolt torque in lb.-ft. (Grade 5 bolts)

Size (inches)	Thread Designation	Minimum Torque
1/4-20	UNC	6
1/4-28	UNF	7
65/16-18	UNC	14
5/16-24	UNF	16
3/8-16	UNC	24
3/8-24	UNF	28
7/16-14	UNC	42
7/16-20	UNF	45
1/2-13	UNC	69
1/2-20	UNF	83
9/16-12	UNC	99
9/16-18	UNF	118
5/8-11	UNC	150
5/8-18	UNF	176
3/4-10	UNC	254
3/4-16	UNF	301
7/8-9	UNC	358
7/8-14	UNF	422
1-8	UNC	500
1-14	UNF	602

Note: Soft metric conversions are not acceptable for screw and hex sizes.

Fan Bearing Lubrication

NOTICE

Bearing Failure!

Mixing grease within the bearing could result in premature bearing failure. Do not mix greases with different bases within the bearing.

For belt-drive fans, the grease used in electric motor bearings is usually not compatible with the grease used in fan bearings. Never mix the two grease types! See Table 20 for compatible greases and Table 21 for maximum grease capacity.

Note: *Lubricate the motor bearing according to the motor manufacturer's recommendations and use the manufacturer-recommended grease. See "Motor Bearing Lubrication" on page 73.*

Table 20. Compatible greases

Type
Texaco Multi Fak 2
Shell Alvania 2
Mobil 532
Chevron Dura-Lith 2
Exxon Beacon
Keystone 84H

Table 21. Fan bearing maximum grease capacity

Shaft size (inches)	Capacity (fluid ounce)
1/2 - 3/4	1/7
7/8 - 1 3/16	3/8
1 1/4 - 1 1/2	5/8
1 11/16 - 1 15/16	7/8
2 - 2 7/16	1 1/4
2 1/2 - 2 15/16	2

- Fan bearings without lubrication lines are sealed bearings. Re-lubrication is not required.
- Fan bearings equipped with lubrication lines should be lubricated with a lithium-based grease that conforms to NLGI No. 2 for consistency.

Motor Bearing Lubrication

Obtain an operation and maintenance manual from the motor manufacturer for the specific motor installed. The motor manufacturer's recommendations take precedence for all matters related to the start-up and routine maintenance of the motor.

Motor grease fittings have been removed from factory-installed motors in compliance with UL regulations. Motor bearings require periodic maintenance throughout their life. Many different styles of motors come as standard selections, so please obtain the motor IOM and use the manufacturer-recommended grease.

Fan Motor Inspection

Inspect fan motors periodically for excessive vibration or temperature. Operating conditions will vary the frequency of inspection and lubrication. Motor lubrication instructions are on the motor tag or nameplate. If for some reason these instructions are not available, contact the motor manufacturer. Some motor manufacturers may not provide oil tubes on motors with permanently sealed bearings.

Outside Air Intake Hoods

OA hoods are now equipped with a mesh-type moisture eliminator. This eliminator may require periodic cleaning to remove, pollen, dirt, and debris. Use vacuum and/or soft bristle brush to clean bulky debris off exterior of eliminator. Use a garden hose or pressure washer from inside the unit, spray water toward the outside surface of the eliminator. The spray should penetrate through the eliminator completely.

Troubleshooting

This section is intended to be used as a diagnostic aid only. For detailed repair procedures, contact your local Trane service representative.

⚠WARNING

Hazardous Service Procedures!

Failure to follow all of the recommended safety warnings provided could result in death or serious injury. The maintenance and troubleshooting procedures recommended in this manual could result in exposure to electrical, mechanical or other potential safety hazards. Always refer to the safety warnings provided throughout this manual concerning these procedures. Unless specified otherwise, disconnect all electrical power including remote disconnect and discharge all energy storing devices such as capacitors before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. When necessary to work with live electrical components, have a qualified licensed electrician or other individual who has been trained in handling live electrical components perform these tasks.

Table 22. Air handler troubleshooting recommendations

Symptom	Probable Cause	Recommended Action
Bearing is excessively hot	First start after relubrication (Grease distribution)	Allow machine to cool down and restart.
	Over-lubrication	Clean surface of grease and purge.
	Over tensioned belts	Adjust belt tension.
	No lubricant	Apply lubricant. Check bearings for damage.
	Misaligned bearing	Correct alignment. Check shaft level.
Motor fails to start	Blown fuse or open circuit breaker	Replace fuse or reset circuit breaker.
	Overload trip	Check and reset overload.
	Improper wiring or connections	Check wiring with diagram supplied on unit.
	Improper current supply	Compare actual supply power with motor nameplate recommendations. Contact power company for adjustments.
	Mechanical failure	Check that motor and drive rotate freely. Check bearing lubricant.
Motor stalls	Open phase	Check line for an open phase.
	Overloaded motor	Reduce load or replace with larger motor.
	Low line voltage	Check across AC line. Correct voltage if possible.
Excessive vibration	Poor alignment	Align bearing set screws (see Table 17, p. 64). Loosen and retighten bearing set screws.
	Over tensioned belts	Adjust belt tension.
	Misaligned drive	Align drive.
Motor runs and then dies down	Partial loss of line voltage	Check for loose connections. Determine adequacy of main power supply.
	Starter shorts when motor warms up	Replace starter.
Motor does not come up to speed	Low voltage at motor terminals	Check across AC line and correct voltage loss if possible.
	Line wiring to motor too small	Replace with larger sized wiring.
Motor overheats	Overloaded motor	Reduce load or replace with a larger motor.
	Motor fan is clogged with dirt preventing proper ventilation	Remove fan cover, clean fan and replace cover.
Excessive motor noise	Motor mounting bolts loose	Tighten motor mounting bolts.
	Rigid coupling connections	Replace with flexible connections.
	Worn motor bearings	Replace bearings and seals.
	Fan rubbing on fan cover	Remove interference in motor fan housing.
Rapid motor bearing wear	Excessive overhung load due to over tensioned drive	Check belt tension and overhung load.
	Excessive overhung load due to a small diameter motor sheave	Replace sheave with larger one.
Loose fan belt	Motor is poorly positioned	Adjust belt tension.
	Worn or damaged belt	Replace belt or belt set. Check sheave alignment.
	Worn sheaves	Replace sheaves.
Short belt life	Worn sheaves	Replace sheaves.
	Misaligned belt	Realign drive with MVP sheave set at mean pitch diameter.
	Grease or oil on belts	Check for leaky bearings. Clean belts and sheaves.
	Belt slipping	Improper belt tension. Adjust tension.
	Belts rubbing	Remove obstruction or realign drive for clearance.

Table 22. Air handler troubleshooting recommendations (continued)

Symptom	Probable Cause	Recommended Action
Bearing noise	Poor alignment	Loosen bearing set screws and realign (see "Align Fan and Motor Sheaves," p. 64)
	Failed bearing	Replace bearing.
	Inadequate lubrication	Replace bearing.
Low water coil capacity	Incorrect airflow	Check fan operating condition.
	Incorrect water flow	Inspect the water pumps and valves for proper operation and check the lines for obstructions.
	Incorrect water temperature	Adjust the chiller or boiler to provide the proper water temperature.
	Coil is piped incorrectly	Verify coil piping (see "Coil Piping and Connections," p. 38).
	Dirty fin surface	Clean the fin surface (see "Coils," p. 66).
	Incorrect glycol mixture	Verify glycol mixture and adjust if necessary.
Low refrigerant coil capacity	Incorrect airflow	Check fan operating condition.
	Expansion valve is not operating properly or is sized incorrectly	Check sensing bulb temperature. Verify valve operation. Verify proper valve size.
	Incorrect refrigerant charge	Verify refrigerant charge and adjust if necessary.
	Condensing unit failure	Verify condensing unit operation.
	Coil is piped incorrectly	Verify coil piping (see "Coil Piping and Connections," p. 38.)
	Clogged refrigerant line filter	Change filter core.
	Failure of suction/liquid line components	Verify component operation
	Dirty fin surface	Clean the fin surface (see "Coils," p. 66). Do not use steam to clean refrigerant coils.
	Fin frosting	Verify defrost cycle operation. Verify frostat operation. Verify refrigerant charge.
Low steam coil capacity	Incorrect airflow	Check fan operating condition.
	Coil is piped incorrectly	Verify coil piping (see "Coil Piping and Connections," p. 38).
	Incorrect steam pressure	Verify steam pressure and adjust if necessary.
	Excessive steam superheat	Check steam superheat. Steam superheat should not exceed 50°F.
	Failure of steam line/condensate return components	Verify component operation
	Boiler failure	Verify boiler operation
	Dirty fin surface	Clean the fin surface (see "Coils," p. 66).
Drain pan is overflowing	Plugged Drain Line	Clean drain line
	Unit not level	Level unit
	Improper trap design	Design trap per unit installation instructions
Standing water in drain pan	Improper trap design	Design trap per unit installation instructions
	Unit not level	Level unit
	Plugged drain line	Clean drain line
Wet interior	Coil face velocity too high	Reduce fan speed
	Improper trap design	Design trap per unit installation instructions
	Drain pan leaks/overflows	Repair leaks
	Condensation on surfaces	Insulate surfaces
Excess dirt in unit	Missing filters	Replace filters
	Filter bypass	Reduce filter bypass by ensuring all blockoffs are in place.
Microbial growth (mold) inside air handler	Standing water in drain pan	See "Standing water in drain pan" above

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