

50HCQ

WeatherMaster® Series

Single Package Rooftop

Heat Pump

with Puron® (R-410A) Refrigerant

Sizes 07, 08, 09



Installation Instructions

NOTE: Read the entire instruction manual before starting the installation.

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SAFETY CONSIDERATIONS

Improper installation, adjustment, alteration, service, maintenance, or use can cause explosion, fire, electrical shock or other conditions which may cause personal injury or property damage. Consult a qualified installer, service agency, or your distributor or branch for information or assistance. The qualified installer or agency must use factory-authorized kits or accessories when modifying this product. Refer to the individual instructions packaged with the kits or accessories when installing.

Follow all safety codes. Wear safety glasses and work gloves. Use quenching cloths for brazing operations and have a fire extinguisher available. Read these instructions thoroughly and follow all warnings or cautions attached to the unit. Consult local building codes and appropriate national electrical codes (in USA, ANSI/NFPA 70, National Electrical Code (NEC); in Canada, CSA C22.1) for special requirements.

It is important to recognize safety information. This is the safety-alert symbol . When you see this symbol on the unit and in instructions or manuals, be alert to the potential for personal injury.

Understand the signal words DANGER, WARNING, CAUTION, and NOTE. These words are used with the safety-alert symbol. DANGER identifies the most serious hazards which **will** result in severe personal injury or death. WARNING signifies hazards which **could** result in personal injury or death. CAUTION is used to identify unsafe practices, which **may** result in minor personal injury or product and property damage. NOTE is used to highlight suggestions which **will** result in enhanced installation, reliability, or operation.

WARNING

ELECTRICAL SHOCK HAZARD

Failure to follow this warning could cause personal injury or death.

Before performing service or maintenance operations on unit, always turn off main power switch to unit and install lockout tag. Unit may have more than one power switch.

WARNING

UNIT OPERATION AND SAFETY HAZARD

Failure to follow this warning could cause personal injury, death and/or equipment damage.

Puron® (R-410A) refrigerant systems operate at higher pressures than standard R-22 systems. Do not use R-22 service equipment or components on Puron refrigerant equipment.

WARNING

PERSONAL INJURY AND ENVIRONMENTAL HAZARD

Failure to follow this warning could cause personal injury or death.

Relieve pressure and recover all refrigerant before system repair or final unit disposal.

Wear safety glasses and gloves when handling refrigerants. Keep torches and other ignition sources away from refrigerants and oils.

CAUTION

CUT HAZARD

Failure to follow this caution may result in personal injury.

Sheet metal parts may have sharp edges or burrs. Use care and wear appropriate protective clothing, safety glasses and gloves when handling parts and servicing heat pump units.

Rated Indoor Airflow (cfm)

The table to the right lists the rated indoor airflow used for the AHRI efficiency rating for the units covered in this document.

Model Number	Full Load Airflow (cfm)
50HCQA07	2400
50HCQD07	2400
50HCQD08	3000
50HCQD09	3400

Position:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Example:	5	0	H	C	Q	D	0	8	A	0	A	6	-	0	B	2	A	0

Unit/Series/Model

50HCQ - Packaged Rooftop Heat Pump

Refrig. Systems Options

A = One Stage Cooling Models
D = Two Stage Cooling Models

Cooling Tons

07 - 6 ton
08 - 7.5 ton
09 - 8.5 ton

Sensor Options

A = None
B = RA Smoke Detector
C = SA Smoke Detector
D = RA + SA Smoke Detector
E = CO₂
F = RA Smoke Detector and CO₂
G = SA Smoke Detector and CO₂
H = RA + SA Smoke Detector and CO₂

Indoor Fan Options

1 = Standard Static Option – Belt Drive
2 = Medium Static Option – Belt Drive
3 = High Static Option – Belt Drive

Coil Options (Outdoor - Indoor - Hail Guard)

A = Al/Cu - Al/Cu
B = Precoat Al/Cu - Al/Cu
C = E-coat Al/Cu - Al/Cu
D = E-coat Al/Cu - E-coat Al/Cu
E = Cu/Cu - Al/Cu
F = Cu/Cu - Cu/Cu
M = Al/Cu - Al/Cu — Louvered Hail Guard
N = Precoat Al/Cu - Al/Cu — Louvered Hail Guard
P = E-coat Al/Cu - Al/Cu — Louvered Hail Guard
Q = E-coat Al/Cu - E-coat Al/Cu — Louvered Hail Guard
R = Cu/Cu - Al/Cu — Louvered Hail Guard
S = Cu/Cu - Cu/Cu — Louvered Hail Guard

Voltage

1 = 575/3/60
5 = 208-230/3/60
6 = 460/3/60

Factory Assigned

0 = Standard
1 = LTL

Electrical Options

A = None
C = Non-Fused Disconnect
D = Thru-The-Base Connections
F = Non-Fused Disconnect and Thru-The-Base Connections
G = 2-Speed Indoor Fan (VFD) Controller
J = 2-Speed Indoor Fan (VFD) Controller and Non-Fused Disconnect
K = 2-Speed Indoor Fan (VFD) Controller and Thru-The-Base Connections
M = 2-Speed Indoor Fan (VFD) Controller with Non-Fused Disconnect and Thru-The-Base Connections

Service Options

0 = None
1 = Unpowered Convenience Outlet
2 = Powered Convenience Outlet
3 = Hinged Panels
4 = Hinged Panels and Unpowered Convenience Outlet
5 = Hinged Panels and Powered Convenience Outlet

Intake / Exhaust Options

A = None
B = Temperature Economizer w/ Barometric Relief
F = Enthalpy Economizer w/ Barometric Relief
K = 2-Position Damper
U = Temperature Ultra Low Leak Economizer w/ Barometric Relief
W = Enthalpy Ultra Low Leak Economizer w/ Barometric Relief

Base Unit Controls

0 = Electro-mechanical Controls can be used with W7212 EconoMiSer® IV (Non-Fault Detection and Diagnostic)
1 = PremierLink™ Controller
2 = RTU Open Multi-Protocol Controller
6 = Electro-mechanical with W7220 Economizer controller Controls. Can be used with W7220 EconoMiSer X (with Fault Detection and Diagnostic)

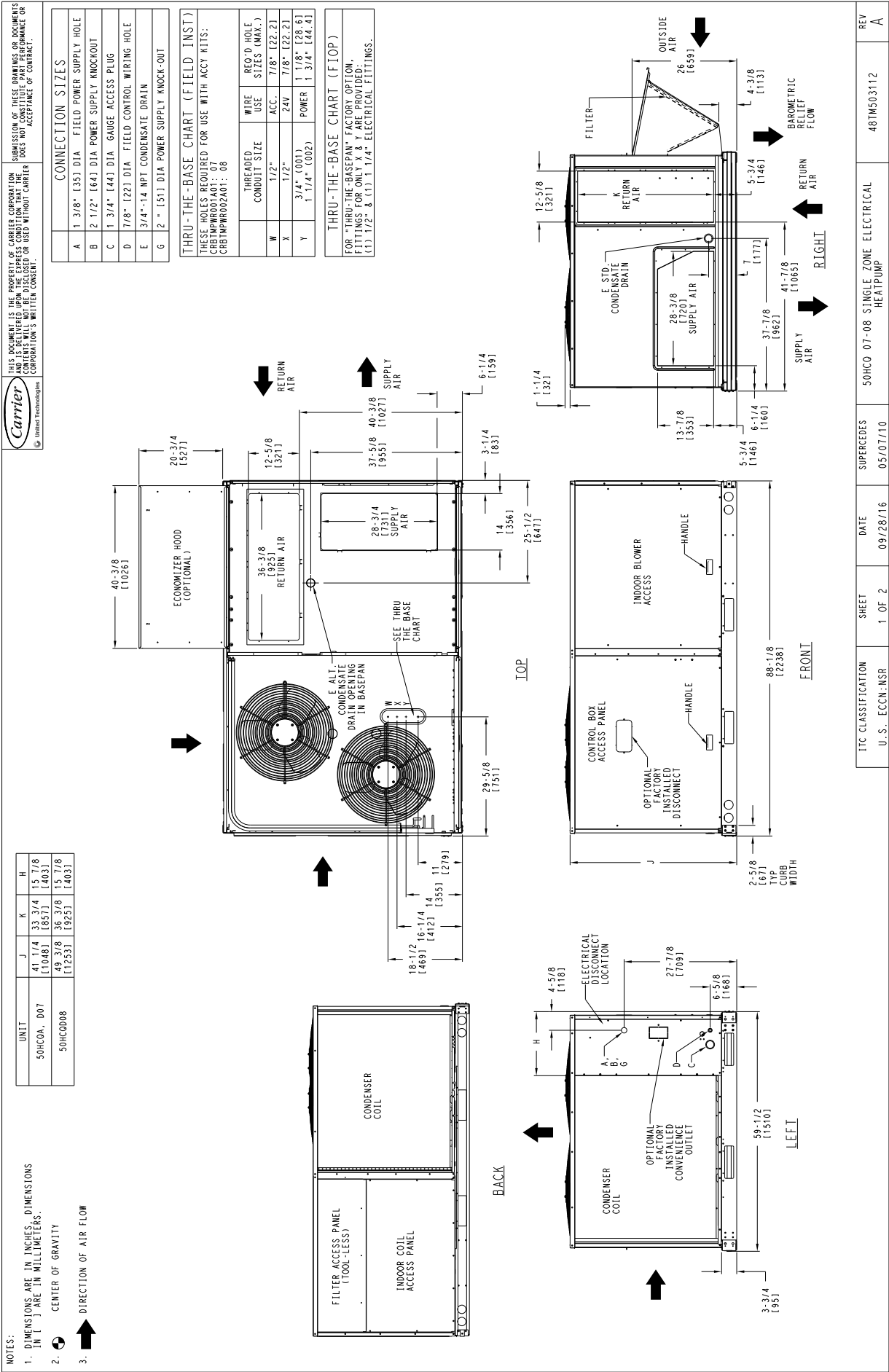
Design Revision

- = Factory Design Revision

50HCQ

Fig. 1 - 50HCQD07-09 Model Number Nomenclature (Example)

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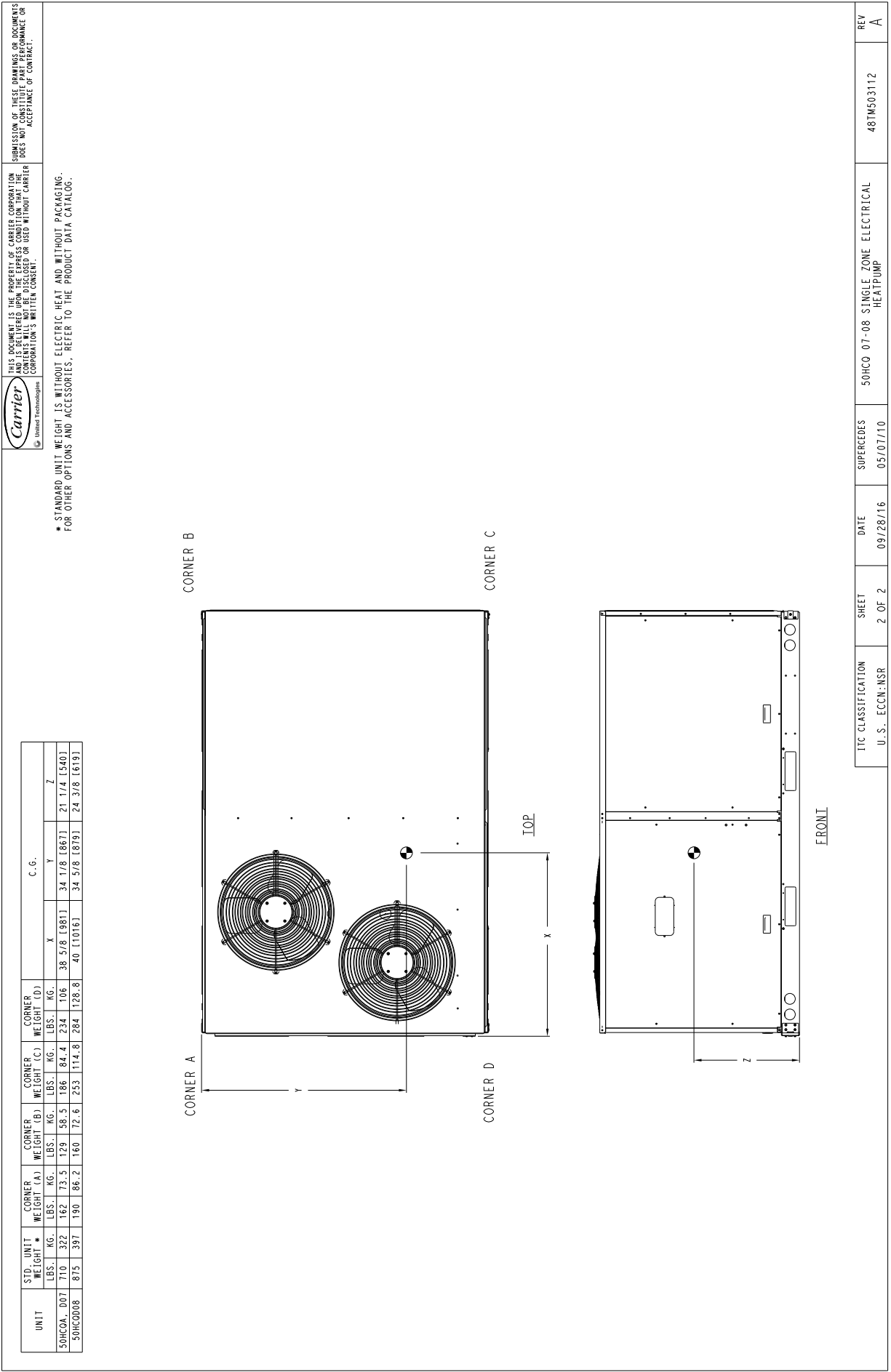


Fig. 2 - Unit Dimensional Drawing: 07 — 08 Size Unit (cont)

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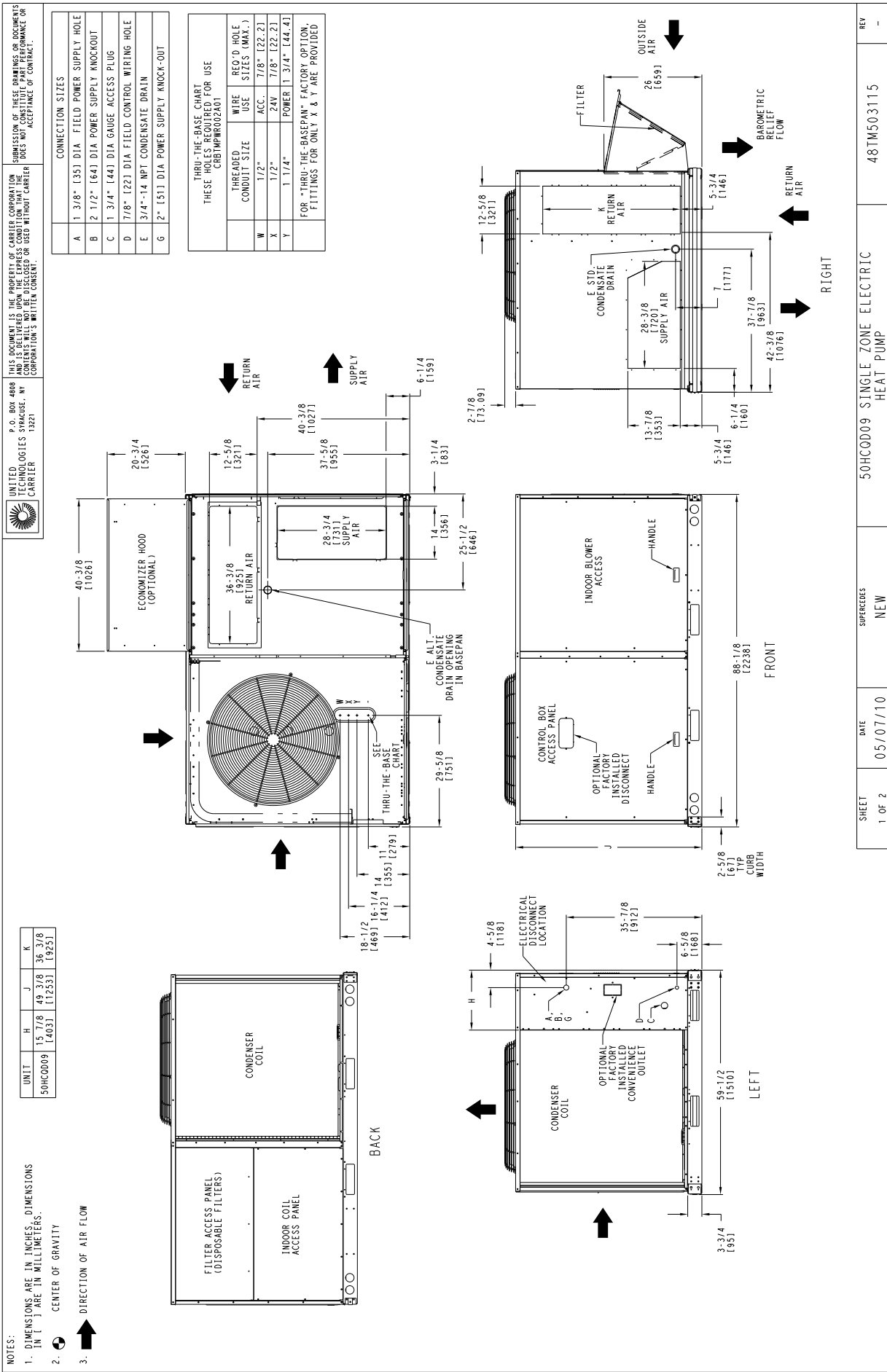


Fig. 3 - Unit Dimensional Drawing: 09 Size Units

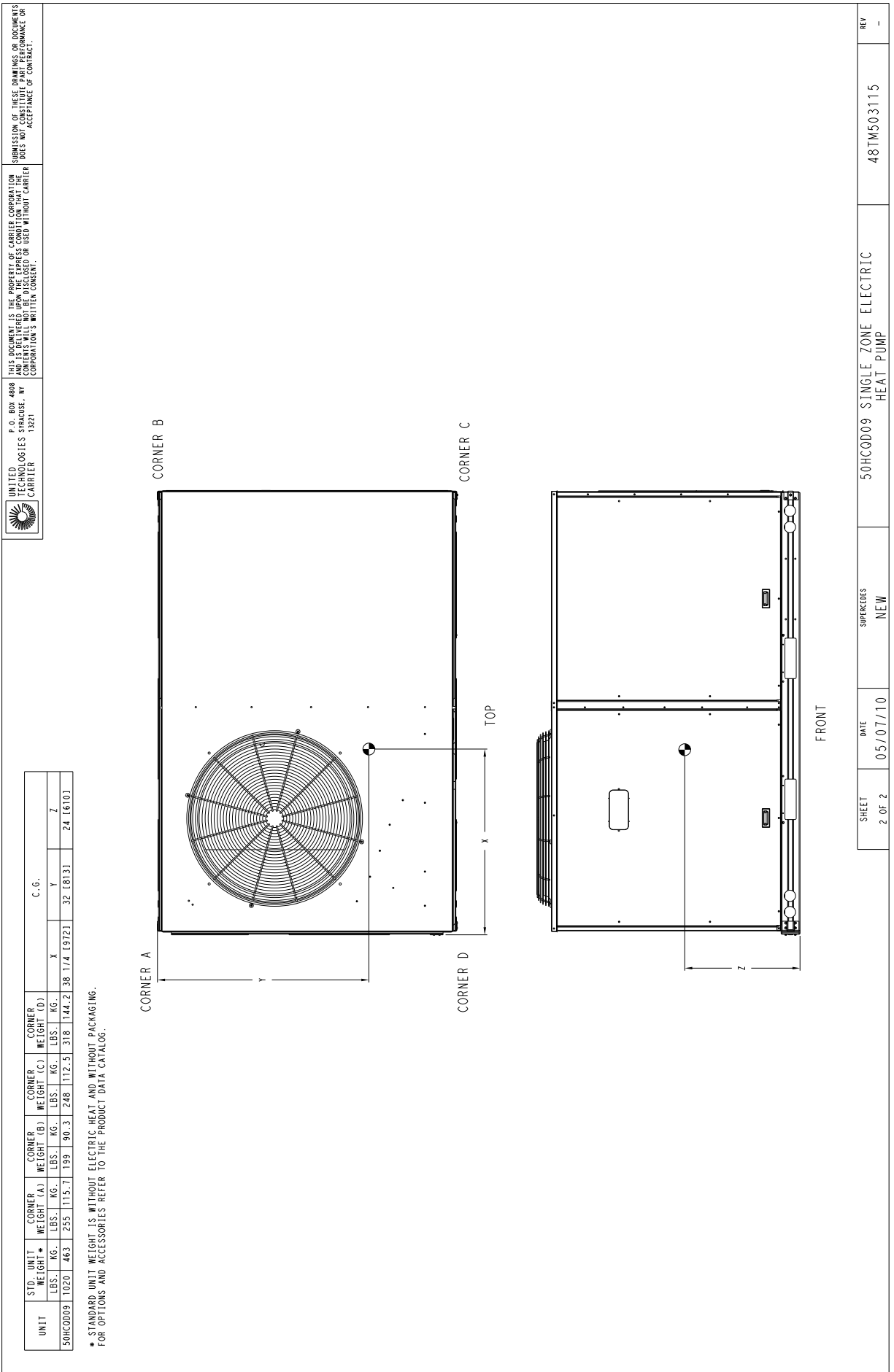
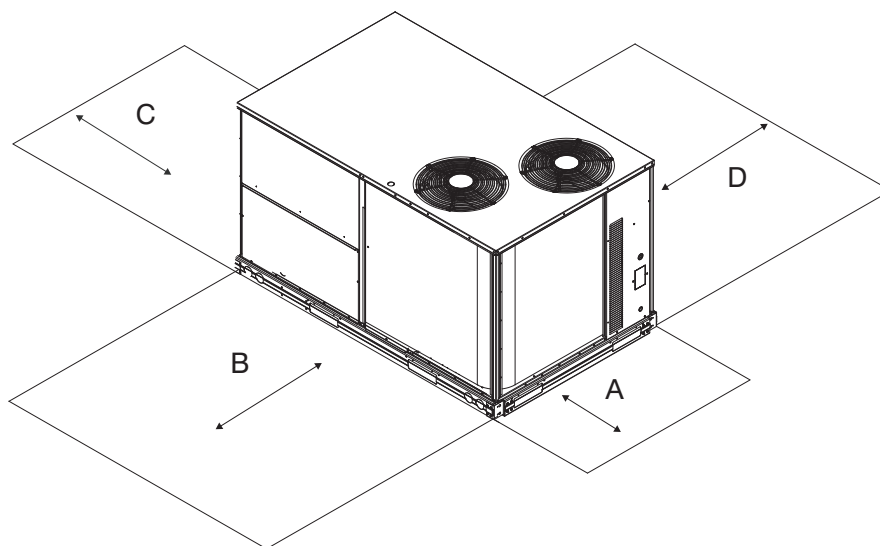


Fig. 3 - Unit Dimensional Drawing: 09 Size Unit (cont)



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LOCATION	DIMENSION	CONDITION
A	48-in (1219 mm) 18-in (457 mm) 18-in (457 mm) 12-in (305 mm)	Unit disconnect is mounted on panel No disconnect, convenience outlet option Recommended service clearance Minimum clearance
B	42-in (1067 mm) 36-in (914 mm) Special	Surface behind servicer is grounded (e.g., metal, masonry wall) Surface behind servicer is electrically non-conductive (e.g., wood, fiberglass) Check sources of flue products within 10-ft of unit fresh air intake hood
C	36-in (914 mm) 18-in (457 mm)	Side condensate drain is used Minimum clearance
D	42-in (1067 mm) 36-in (914 mm)	Surface behind servicer is grounded (e.g., metal, masonry wall, another unit) Surface behind servicer is electrically non-conductive (e.g., wood, fiberglass)

NOTE: Unit not designed to have overhead obstruction. Contact Application Engineering for guidance on any application planning overhead obstruction or for vertical clearances.

Fig. 4 - Service Clearance Dimensional Drawing

REFRIGERATION SYSTEM COMPONENTS

Each heat pump refrigeration system includes a compressor, accumulator, reversing valve, dual-function outdoor coil with vapor header check valve, cooling liquid line with a filter drier and a check valve, dual-function indoor coil with a vapor header check valve, and heating liquid line with a check valve and a strainer. Size 07 units have a single compressor--circuit; unit sizes 08 through 09 have two compressor--circuits. See Fig. 5 for typical unit piping schematic (unit size 09 (4--row indoor coil) with two compressor--circuits is shown).

Dual-function outdoor and indoor coils are designed to provide parallel coil circuits during evaporator-function operation and converging coil circuits during the condenser-function operation.

Reversing Valve and Check Valve Position

See Fig. 5 (on page 9) and Tables 1, 2, and 3.

Troubleshooting Refrigerant Pressure Problems and Check Valves

Refer to Fig. 5 and the Cooling Mode and Heating Mode tables (Tables 1 and 2).

Refrigerant System Pressure Access Ports

There are two access ports in each circuit - on the suction tube and the discharge tube near the compressor. These are brass fittings with black plastic caps. The hose connection fittings are standard $\frac{1}{4}$ -in. SAE male flare couplings.

The brass fittings are two-piece High Flow valves, with a receptacle base brazed to the tubing and an integral spring-closed check valve core screwed into the base. See Fig. 6 on page 9. This check valve is permanently assembled into this core body and cannot be serviced separately. Replace the entire core body if necessary. Service tools are available from RCD that allow the replacement of the check valve core without having to recover the entire system refrigerant charge. Apply compressor refrigerant oil to the check valve core's bottom O-ring. Install the fitting body and torque to 96 ± 10 in-lbs (10.9 ± 1 Nm). Do not exceed 106 in-lbs (11.9 Nm) when tightening.

Table 1 - Cooling Mode (each circuit)

Component	Status/Position
Reversing Valve	Energized
Check Valve A	Closed
Check Valve B	Open
Check Valve C	Closed
Check Valve D	Open

Table 2 – Heating Mode (each circuit)

Component	Status/Position
Reversing Valve	De-energized
Check Valve A	Open
Check Valve B	Closed
Check Valve C	Open
Check Valve D	Closed

Table 3 – Defrost Mode

Component	Status/Position
Defrost Thermostat	Closed
Outdoor Fan(s)	Off
Reversing Valve	Energized
Check Valve A	Closed
Check Valve B	Open
Check Valve C	Closed
Check Valve D	Open

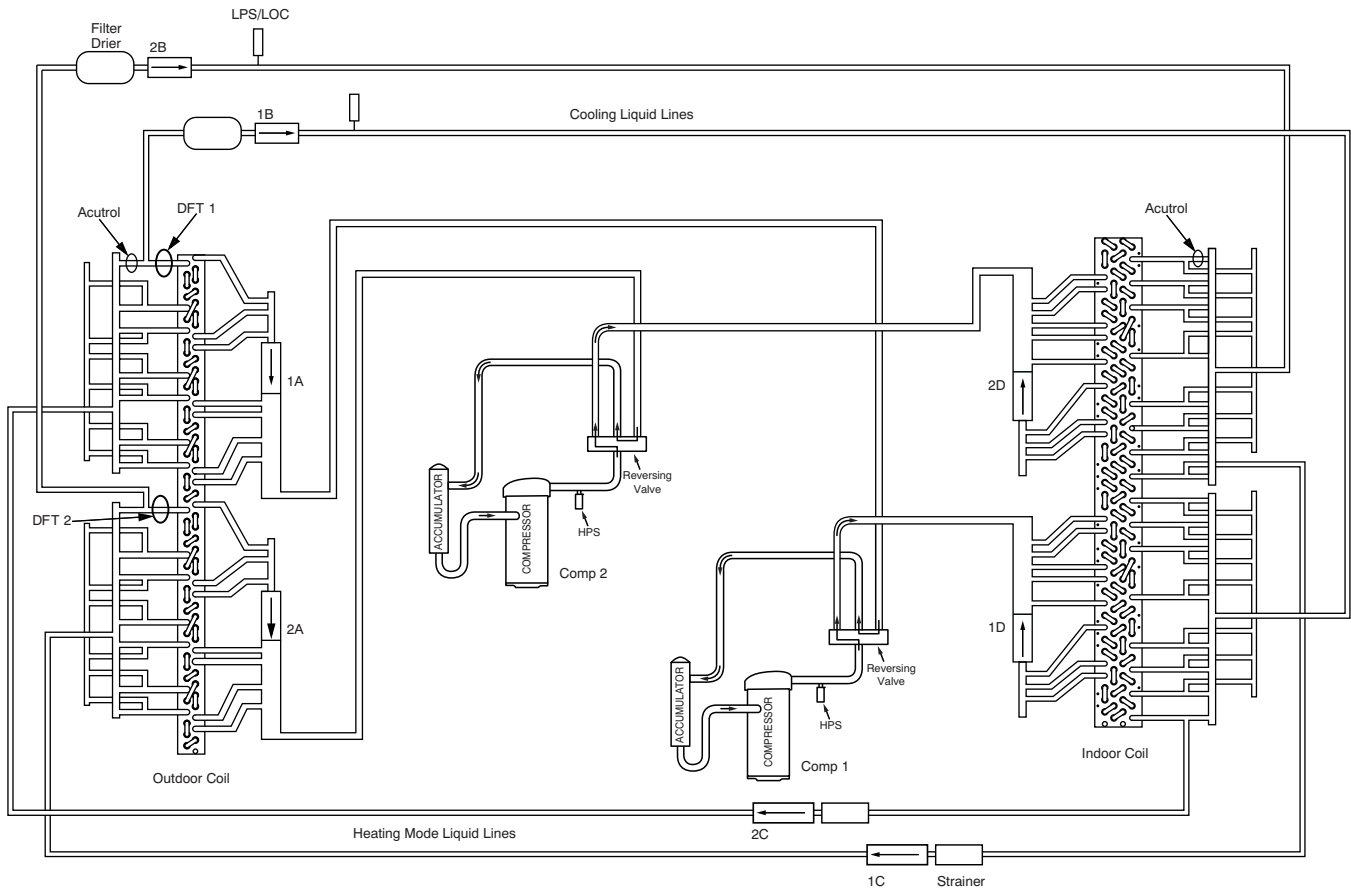


Fig. 5 - Typical Unit Piping Schematic (with TXV valves on Indoor Coils)

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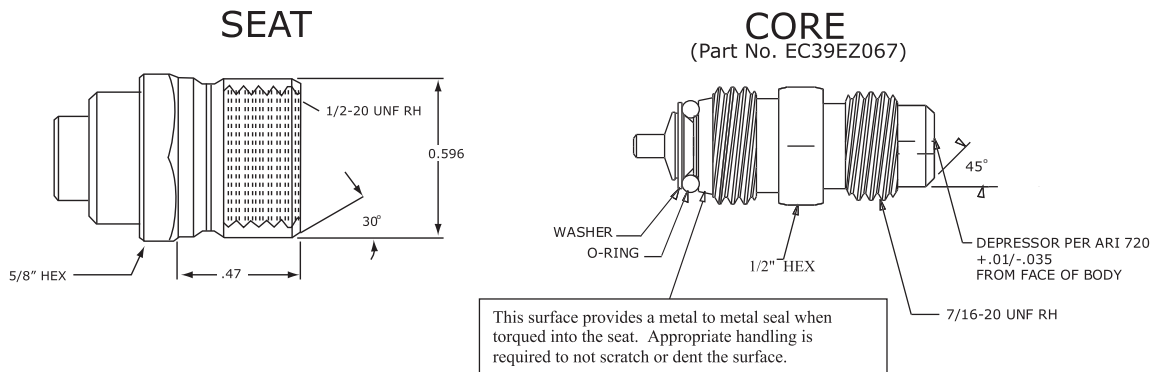


Fig. 6 - CoreMax* Access Port Assembly

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* CoreMax is a registered trademark of Fastest, Inc.

INSTALLATION

Jobsite Survey

Complete the following checks before installation.

1. Consult local building codes and the NEC (National Electrical Code) ANSI/NFPA 70 for special installation requirements.
2. Determine unit location (from project plans) or select unit location.
3. Check for possible overhead obstructions which may interfere with unit lifting or rigging.

Step 1 — Plan for Unit Location

Select a location for the unit and its support system (curb or other) that provides for the minimum clearances required for safety. This includes the clearance to combustible surfaces, unit performance and service access below, around and above unit as specified in unit drawings. See Fig. 4.

NOTE: Consider also the effect of adjacent units.

Unit may be installed directly on wood flooring or on Class A, B, or C roof-covering material when roof curb is used.

Do not install unit in an indoor location. Do not locate air inlets near exhaust vents or other sources of contaminated air.

Although unit is weatherproof, avoid locations that permit water from higher level runoff and overhangs to fall onto the unit.

Select a unit mounting system that provides adequate height to allow for removal and disposal of frost and ice that will form during the heating-defrost mode as well as allow installation of condensate trap per requirements. Refer to Step 9 — Install External Condensate Trap and Line – for required trap dimensions.

Roof Mount —

Check building codes for weight distribution requirements. Unit operating weight is shown in Table 4.

Table 4 – Operating Weights

50HCQ	UNITS LB (KG)		
	A,D07	D08	D09
Base Unit	710 (322)	875 (397)	1020 (463)
Economizer			
Vertical	80 (36)	80 (36)	80 (36)
Horizontal	105 (48)	105 (48)	105 (48)
Powered Outlet	32 (15)	32 (15)	32 (15)
Curb			
14-in / 356mm	110 (50)	110 (50)	110 (50)
24-in / 610mm	145 (66)	145 (66)	145 (66)

Step 2 — Plan for Sequence of Unit Installation

The support method used for this unit will dictate different sequences for the steps of unit installation. For example, on curb-mounted units, some accessories must be installed on

the unit before the unit is placed on the curb. Review the following for recommended sequences for installation steps.

Curb-Mounted Installation —

Install curb

Install field-fabricated ductwork inside curb

Install accessory thru-base service connection package (affects curb and unit) (refer to accessory installation instructions for details)

Prepare bottom condensate drain connection to suit planned condensate line routing (refer to Step 9 for details)

Rig and place unit

Install outdoor air hood

Install condensate line trap and piping

Make electrical connections

Install other accessories

Pad-Mounted Installation —

Prepare pad and unit supports

Check and tighten the bottom condensate drain connection plug

Rig and place unit

Convert unit to side duct connection arrangement

Install field-fabricated ductwork at unit duct openings

Install outdoor air hood

Install condensate line trap and piping

Make electrical connections

Install other accessories

Frame-Mounted Installation —

Frame-mounted applications generally follow the sequence for a curb installation. Adapt as required to suit specific installation plan.

Step 3 — Inspect unit

Inspect unit for transportation damage. File any claim with transportation agency.

Confirm before installation of unit that voltage, amperage and circuit protection requirements listed on unit data plate agree with power supply provided.

On units with hinged panel option, check to be sure all latches are snug and in closed position.

Locate the carton containing the outside air hood parts; see Fig. 12 (on page 15). Do not remove carton until unit has been rigged and located in final position.

Step 4 — Provide Unit Support

Roof Curb Mount —

Accessory roof curb details and dimensions are shown in Fig. 8. Assemble and install accessory roof curb in accordance with instructions shipped with the curb.

NOTE: The gasketing of the unit to the roof curb is critical for a watertight seal. Install gasket supplied with the roof curb as shown in Fig. 8. Improperly applied gasket can also result in air leaks and poor unit performance.

Curb should be level. This is necessary for unit drain to function properly. Unit leveling tolerances are shown in Fig. 7. Refer to Accessory Roof Curb Installation Instructions for additional information as required.

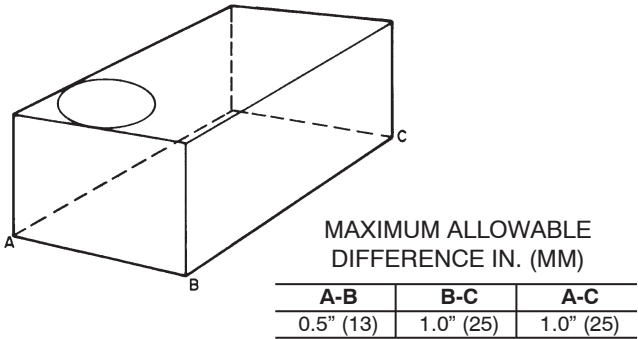


Fig. 7 - Unit Leveling Tolerances

Install insulation, cant strips, roofing felt, and counter flashing as shown. *Ductwork must be attached to curb and not to the unit. The accessory thru-the-base power package must be installed before the unit is set on the roof curb.*

If electric and control wiring is to be routed through the basepan, attach the accessory thru-the-base service connections to the basepan in accordance with the accessory installation instructions.

Slab Mount (Horizontal Units Only) —

Provide a level concrete slab that extends a minimum of 6 in. (150 mm) beyond unit cabinet. Install a gravel apron in front of condenser coil air inlet to prevent grass and foliage from obstructing airflow.

NOTE: Horizontal units may be installed on a roof curb if required.

Alternate Unit Support (In Lieu of Curb or Slab Mount) —

A non-combustible sleeper rail can be used in the unit curb support area. If sleeper rails cannot be used, support the long sides of the unit with a minimum of 3 equally spaced 4-in. x 4-in. (102 mm x 102 mm) pads on each side.

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Step 5 — Field Fabricate Ductwork

Cabinet return-air static pressure (a negative condition) shall not exceed 0.35 in. wg (87 Pa) with economizer or 0.45 in. wg (112 Pa) without economizer.

For vertical ducted applications, secure all ducts to roof curb and building structure. *Do not connect ductwork to unit.*

Fabricate supply ductwork so that the cross sectional dimensions are equal to or greater than the unit supply duct opening dimensions for the first 18 in. (458 mm) of duct length from the unit basepan.

Insulate and weatherproof all external ductwork, joints, and roof openings with counter flashing and mastic in accordance with applicable codes.

Ducts passing through unconditioned spaces must be insulated and covered with a vapor barrier.

If a plenum return is used on a vertical unit, the return should be ducted through the roof deck to comply with applicable fire codes.

⚠ CAUTION

PROPERTY DAMAGE HAZARD

Failure to follow this caution may result in damage to roofing materials.

Membrane roofs can be cut by sharp sheet metal edges. Be careful when placing any sheet metal parts on such roof.

For Units with Accessory Electric Heaters —

All installations require a minimum clearance to combustible surfaces of 1-in (25 mm) from duct for first 12-in (305 mm) away from unit.

Outlet grilles must not lie directly below unit discharge.

⚠ WARNING

PERSONAL INJURY HAZARD

Failure to follow this warning could cause personal injury.

For vertical supply and return units, tools or parts could drop into ductwork and cause an injury. Install a 90-degree turn in the return ductwork between the unit and the conditioned space. If a 90-degree elbow cannot be installed, then a grille of sufficient strength and density should be installed to prevent objects from falling into the conditioned space. Due to electric heater, supply duct will require 90-degree elbow.

Step 6 — Rig and Place Unit

Keep unit upright and do not drop. Spreader bars are not required if top crating is left on unit. Rollers may be used to move unit across a roof. Level by using unit frame as a reference. See Table 4 and Fig. 9 for additional information.

Lifting holes are provided in base rails as shown in Fig. 9. Refer to rigging instructions on unit.

Rigging materials under unit (cardboard or wood) must be removed PRIOR to placing the unit on the roof curb.

When using the standard side drain connection, ensure the red plug in the alternate bottom connection is tight. Do this before setting the unit in place. The red drain pan plug can be tightened with a 1/2-in. square socket drive extension. For further details see Step 9 - Install External Condensate Trap and Line on page 16.

Before setting the unit onto the curb, recheck gasketing on curb.

⚠ CAUTION

UNIT DAMAGE HAZARD

Failure to follow this caution may result in equipment damage.

All panels must be in place when rigging. Unit is not designed for handling by fork truck.

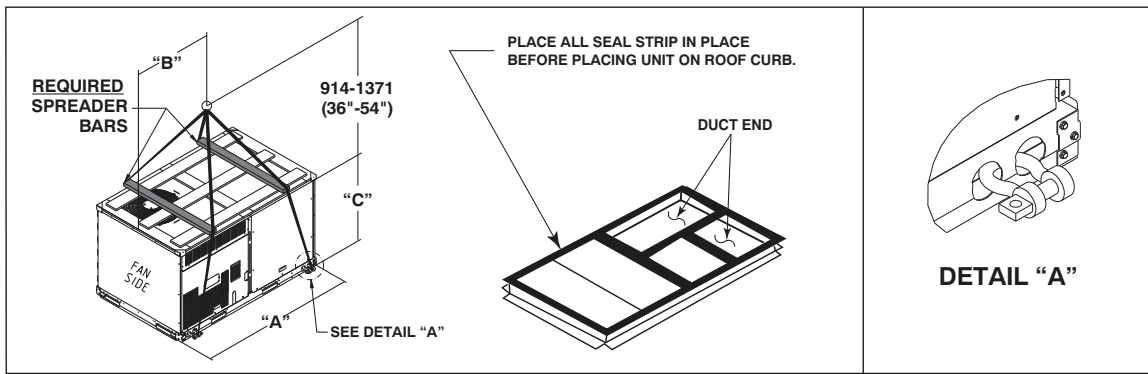
Positioning on Curb —

Position unit on roof curb so that the following clearances are maintained: 1/4 in. (6.4 mm) clearance between the roof curb and the base rail inside the front and rear, 0.0 in. clearance between the roof curb and the base rail inside on the duct end of the unit. This will result in the distance between the roof curb and the base rail inside on the condenser end of the unit being approximately 1/4 in. (6.4 mm).

Although unit is weatherproof, guard against water from higher level runoff and overhangs.

For size 08 and 09 units: after unit is in position, remove the compressor access panel. Holding the blocking between compressors with one hand, cut the strapping. Carefully remove the blocking without damaging tubing, wiring, or controls. Remove the strapping and replace the access panel.

Remove all shipping materials and top skid. Recycle or dispose of all shipping materials.



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UNIT	MAX WEIGHT		DIMENSIONS					
			A		B		C	
	LB	KG	IN	MM	IN	MM	IN	MM
50HCQA,D07	1100	500	88.0	2235	40.8	1035	41.5	1055
50HCQD08	1315	598	88.0	2235	41.6	1057	49.5	1257
50HCQD09	1505	684	88.0	2235	40.0	1015	49.5	1257

NOTES:

1. Dimensions in () are millimeters.
2. Hook rigging shackles through holes in base rail, as shown in detail "A." Holes in base rails are centered around the unit center of gravity. Use wooden top to prevent rigging straps from damaging unit.

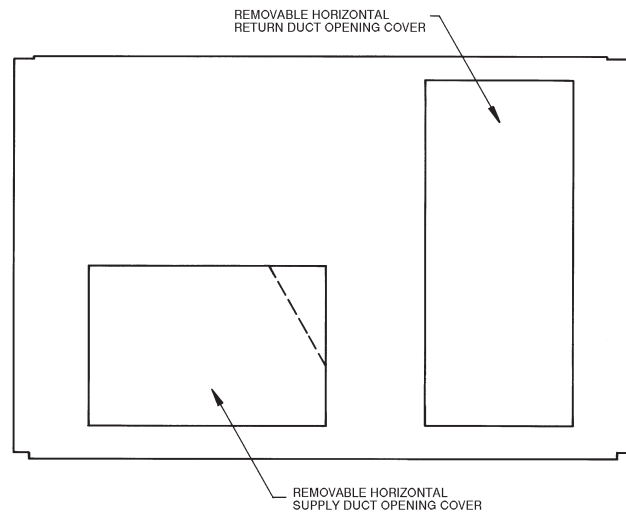
Fig. 9 - Rigging Details

Step 7 — Convert to Horizontal and Connect Ductwork (when required)

Unit is shipped in the vertical duct configuration. Unit *without* factory-installed economizer or return air smoke detector option may be field-converted to horizontal ducted configuration. To convert to horizontal configuration, remove screws from side duct opening covers and remove covers. Using the same screws, install covers on vertical duct openings with the insulation-side down. Seals around duct openings must be tight. See Fig. 10.

Field-supplied flanges should be attached to horizontal duct openings and all ductwork should be secured to the flanges. Insulate and weatherproof all external ductwork, joints, and roof or building openings with counter flashing and mastic in accordance with applicable codes.

Do not cover or obscure visibility to the unit's informative data plate when insulating horizontal ductwork.



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Fig. 10 - Horizontal Conversion Panels

Step 8 — Install Outside Air Hood

Economizer and Two Position Damper Hood Package Removal and Setup - Factory Option

1. The hood is shipped in knock-down form and must be field assembled. The indoor coil access panel is used as the hood top while the hood sides, divider and filter are packaged together, attached to a metal support tray using plastic stretch wrap, and shipped in the return air compartment behind the indoor coil access panel. The hood assembly's metal tray is attached to the basepan and also attached to the damper using two plastic tie-wraps.
2. To gain access to the hood, remove the filter access panel. (See Fig.11.)

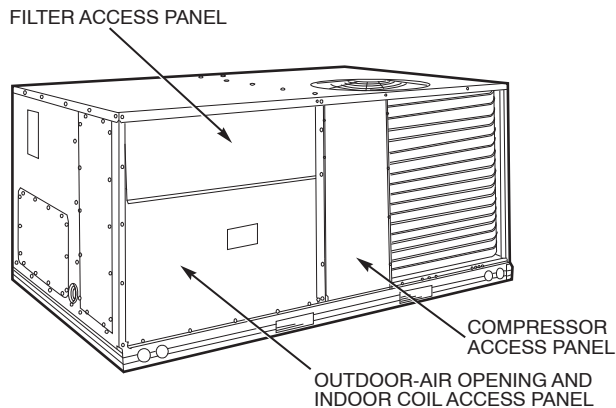


Fig. 11 - Typical Access Panel Locations

C06023

3. Locate the (2) screws holding the metal tray to the basepan and remove. Locate and cut the (2) plastic tie-wraps securing the assembly to the damper. (See Fig. 12.) Be careful to not damage any wiring or cut tie-wraps securing any wiring.

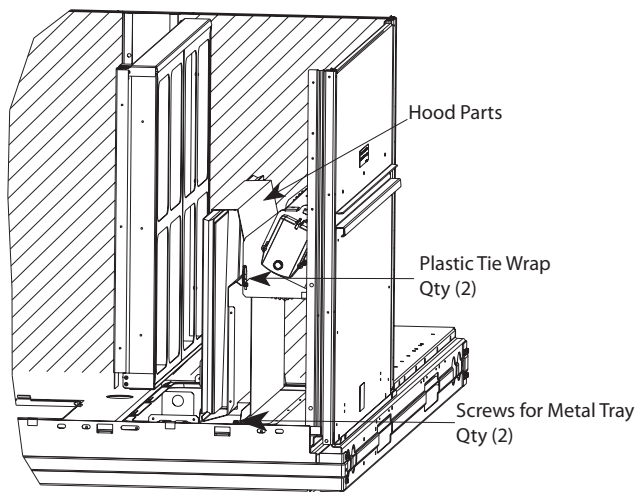


Fig. 12 - Economizer and Two-Position Damper Hood Parts Location

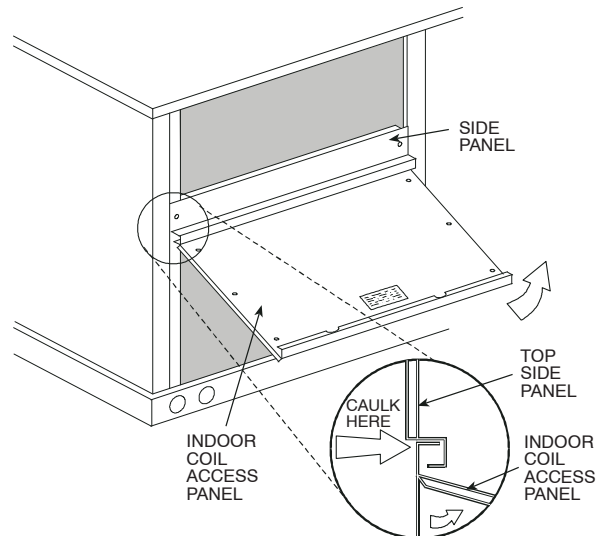
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4. Carefully lift the hood assembly (with metal tray) through the filter access opening and assemble per the steps outlined in *Economizer Hood and Two-Position Hood*, below.

Economizer Hood and Two-Position Hood —

NOTE: If the power exhaust accessory is to be installed on the unit, the hood shipped with the unit will not be used and must be discarded. Save the aluminum filter for use in the power exhaust hood assembly.

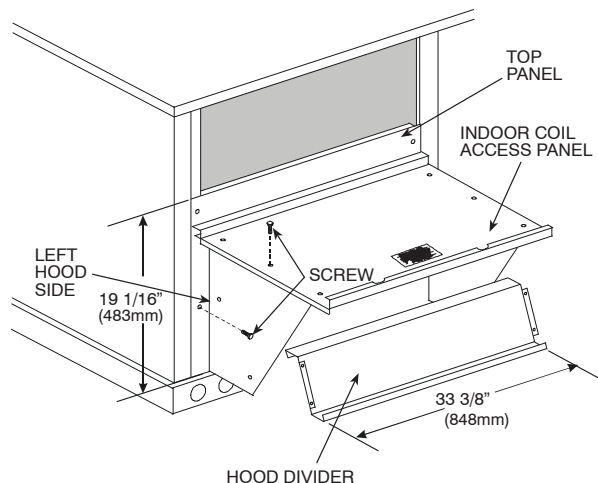
1. The indoor coil access panel will be used as the top of the hood. Remove the screws along the sides and bottom of the indoor coil access panel. See Fig. 13.



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Fig. 13 - Indoor Coil Access Panel Relocation

2. Swing out indoor coil access panel and insert the hood sides under the panel (hood top). Use the screws provided to attach the hood sides to the hood top. Use screws provided to attach the hood sides to the unit. See Fig. 14.



C06026

Fig. 14 - Economizer Hood Construction

3. Remove the shipping tape holding the economizer barometric relief damper in place.
4. Insert the hood divider between the hood sides. See Fig. 14 and 15. Secure hood divider with 2 screws on each hood side. The hood divider is also used as the bottom filter rack for the aluminum filter.

5. Open the filter clips which are located underneath the hood top. Insert the aluminum filter into the bottom filter rack (hood divider). Push the filter into position past the open filter clips. Close the filter clips to lock the filter into place. See Fig. 15.
6. Caulk the ends of the joint between the unit top panel and the hood top.
7. Replace the filter access panel.

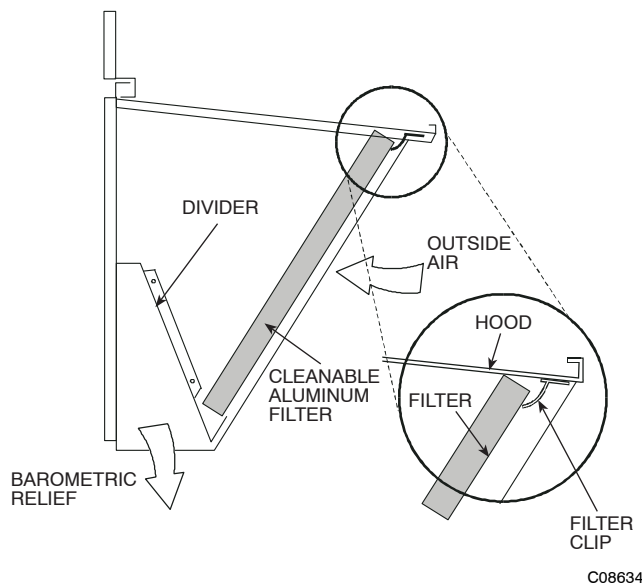


Fig. 15 - Economizer Filter Installation

Step 9 — Install External Condensate Trap and Line

The unit has one $\frac{3}{4}$ -in. condensate drain connection on the end of the condensate pan and an alternate connection on the bottom. See Fig. 16. Unit airflow configuration does not determine which drain connection to use. Either drain connection can be used with vertical or horizontal applications.

To use the alternate bottom drain connection, remove the red drain plug from the bottom connection (use a $\frac{1}{2}$ -in. square socket drive extension) and install it in the side drain connection.

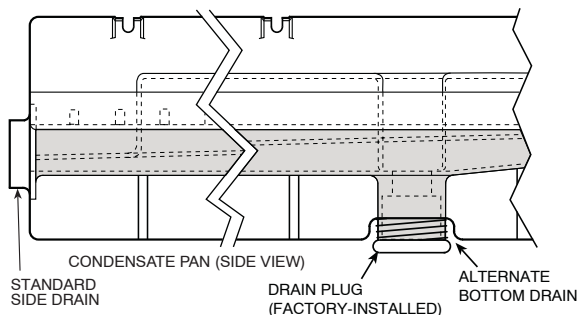
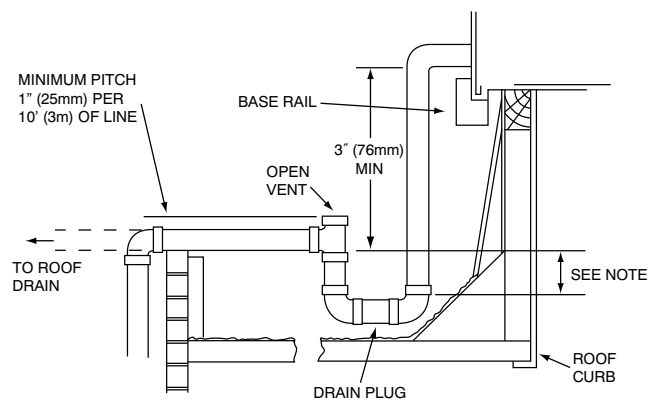


Fig. 16 - Condensate Drain Pan (Side View)

The piping for the condensate drain and external trap can be completed after the unit is in place. See Fig. 17.



NOTE: Trap should be deep enough to offset maximum unit static difference. A 4" (102mm) trap is recommended.

C11291

Fig. 17 - Condensate Drain Piping Details

All units must have an external trap for condensate drainage. Install a trap at least 4-in. (102 mm) deep and protect against freeze-up. If drain line is installed downstream from the external trap, pitch the line away from the unit at 1-in. per 10 ft (25 mm in 3 m) of run. Do not use a pipe size smaller than the unit connection ($\frac{3}{4}$ -in.).

Step 10 — Make Electrical Connections

⚠ WARNING

ELECTRICAL SHOCK HAZARD

Failure to follow this warning could result in personal injury or death.

Do not use gas piping as an electrical ground. Unit cabinet must have an uninterrupted, unbroken electrical ground to minimize the possibility of personal injury if an electrical fault should occur. This ground may consist of electrical wire connected to unit ground lug in control compartment, or conduit approved for electrical ground when installed in accordance with NEC (National Electrical Code); ANSI/NFPA 70, latest edition (in Canada, Canadian Electrical Code CSA [Canadian Standards Association] C22.1), and local electrical codes.

NOTE: Check all factory and field electrical connections for tightness. Field-supplied wiring shall conform with the limitations of 63°F (33°C) rise.

Field Power Supply —

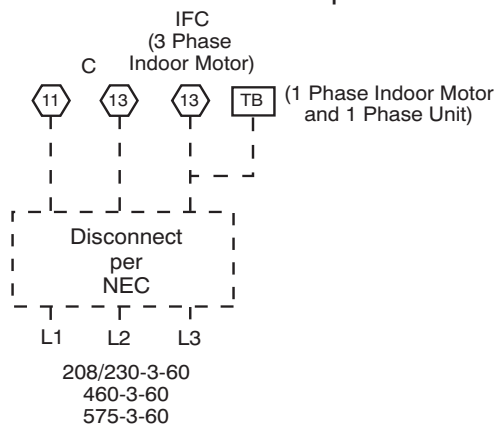
If equipped with optional Powered Convenience Outlet: The power source leads to the convenience outlet's transformer primary are not factory connected. Installer must connect these leads according to required operation of the convenience outlet. If an always-energized convenience outlet operation is desired, connect the source leads to the line side of the unit-mounted disconnect. (Check with local codes to ensure this method is acceptable in your area.) If a de-energize via unit disconnect switch operation of the convenience outlet is desired, connect the source leads to the load side of the

unit disconnect. On a unit without a unit-mounted disconnect, connect the source leads to compressor contactor C and indoor fan contactor IFC pressure lugs with unit field power leads.

Field power wires are connected to the unit at line-side pressure lugs on compressor contactor C and indoor fan contactor IFC or terminal board (see wiring diagram label for control box component arrangement) or at factory-installed option non-fused disconnect switch. Max wire size is #2 AWG (copper only). (See Fig. 18.)

NOTE: TEST LEADS - Unit may be equipped with short leads (pigtailed) on the field line connection points on contactor C or optional disconnect switch. These leads are for factory run-test purposes only; remove and discard before connecting field power wires to unit connection points. Make field power connections directly to line connection pressure lugs only.

Units Without Disconnect Option



Units With Disconnect Option

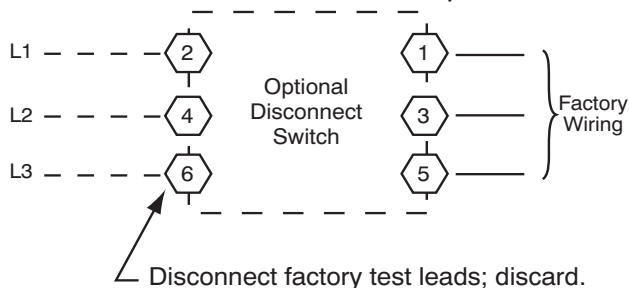


Fig. 18 - Power Wiring Connections

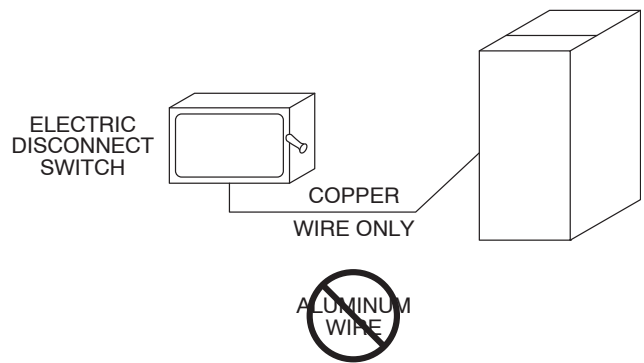
C10468

⚠ WARNING

FIRE HAZARD

Failure to follow this warning could result in personal injury, death, or property damage.

Do not connect aluminum wire between disconnect switch and furnace. Use only copper wire. (See Fig. 19.)



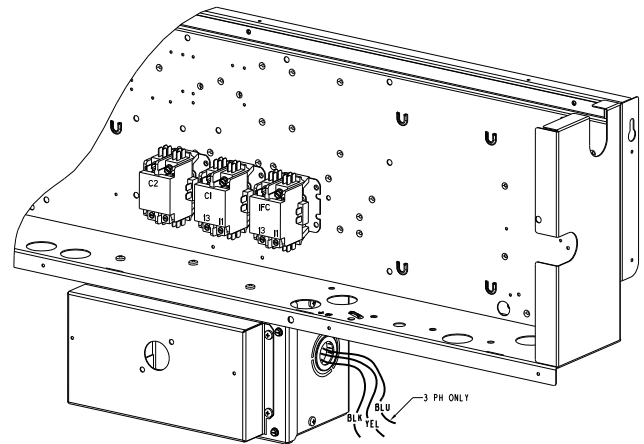
A93033

Fig. 19 - Disconnect Switch and Unit

Units with Factory-Installed Non-Fused Disconnect —

The factory-installed option non-fused disconnect (NFD) switch is located in a weatherproof enclosure located under the main control box. The manual switch handle and shaft are shipped in the disconnect enclosure. Assemble the shaft and handle to the switch at this point. Discard the factory test leads (see Fig. 18).

Connect field power supply conductors to LINE side terminals when the switch enclosure cover is removed to attach the handle.



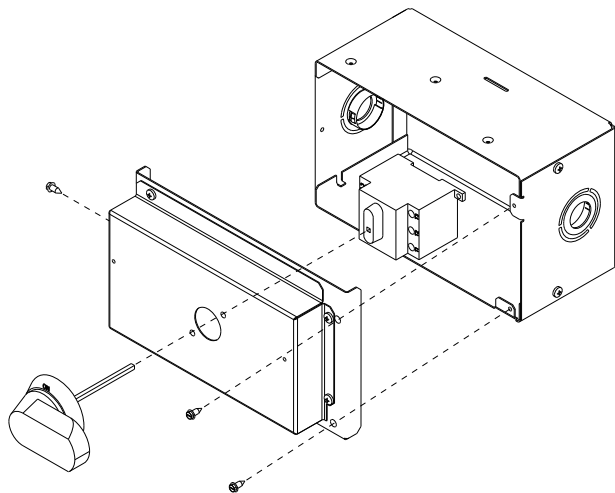
C12284

Fig. 20 - Location of Non-Fused Disconnect Enclosure

To field install the NFD shaft and handle:

1. Remove the unit front panel (see Fig. 2 or 3).
2. Remove (3) hex screws on the NFD enclosure - (2) on the face of the cover and (1) on the left side cover. See Fig. 21.
3. Remove the front cover of the NFD enclosure.
4. Make sure the NFD shipped from the factory is at OFF position (the arrow on the black handle knob is at OFF).
5. Insert the shaft with the cross pin on the top of the shaft in the horizontal position.
6. Measure from the tip of the shaft to the top surface of the black pointer; the measurement should be 3.75 - 3.88 in. (95 - 99 mm).
7. Tighten the locking screw to secure the shaft to the NFD.

8. Turn the handle to the OFF position with red arrow pointing at OFF.
9. Install the handle on to the painted cover horizontally with the red arrow pointing to the left.
10. Secure the handle to the painted cover with (2) screws and lock washers supplied.
11. Engaging the shaft into the handle socket, re-install (3) hex screws on the NFD enclosure.
12. Re-install the unit front panel.



C12279

Fig. 21 - Handle and Shaft Assembly for NFD

Units Without Factory-Installed Non- Fused Disconnect —

When installing units, provide a disconnect switch per NEC (National Electrical Code) of adequate size. Disconnect sizing data is provided on the unit informative plate. Locate on unit cabinet or within sight of the unit per national or local codes. Do not cover unit informative plate if mounting the disconnect on the unit cabinet.

All Units -

All field wiring must comply with NEC and all local codes. Size wire based on MCA (Minimum Circuit Amps) on the unit informative plate. See Fig. 18 and the unit label diagram for power wiring connections to the unit power terminal blocks and equipment ground. Maximum wire size is #2 ga AWG per pole.

Provide a ground-fault and short-circuit over-current protection device (fuse or breaker) per NEC Article 440 (or local codes). Refer to unit informative data plate for MOCP (Maximum Over-current Protection) device size.

All field wiring must comply with the NEC and local requirements.

All units except 208/230-v units are factory wired for the voltage shown on the nameplate. *If the 208/230-v unit is to be connected to a 208-v power supply, the control transformer must be rewired by moving the black wire with the 1/4-in. female spade connector from the 230-v connection and moving it to the 208-v 1/4-in. male terminal on the primary side of the transformer.* Refer to unit label diagram for additional information. Field power wires will be connected line-side pressure lugs on the

power terminal block or at factory-installed option non-fused disconnect.

NOTE: Check all factory and field electrical connections for tightness.

Convenience Outlets —

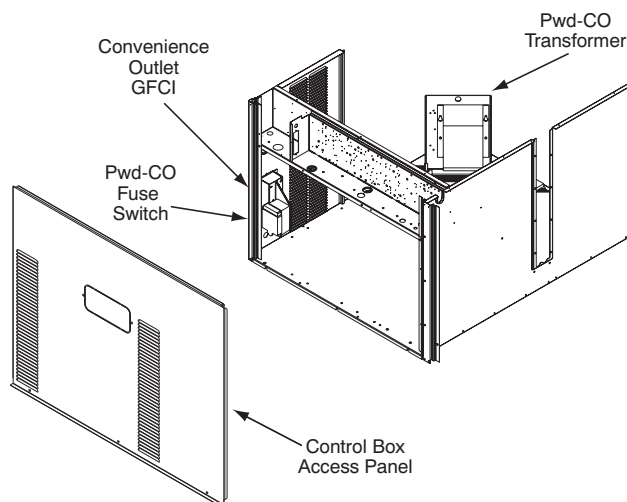
⚠ WARNING

ELECTRICAL OPERATION HAZARD

Failure to follow this warning could result in personal injury or death.

Units with convenience outlet circuits may use multiple disconnects. Check convenience outlet for power status before opening unit for service. Locate its disconnect switch, if appropriate, and open it. Tag-out this switch, if necessary.

Two types of convenience outlets are offered on 50HCQ models: Non-powered and unit-powered. Both types provide a 125-volt GFCI (ground-fault circuit-interrupter) duplex receptacle rated at 15-A behind a hinged waterproof access cover, located on the end panel of the unit. See Fig. 22.



C08128

Fig. 22 - Convenience Outlet Location

Installing Weatherproof Cover: A weatherproof while-in-use cover for the factory-installed convenience outlets is now required by UL standards. This cover cannot be factory-mounted due its depth; it must be installed at unit installation. For shipment, the convenience outlet is covered with a blank cover plate.

The weatherproof cover kit is shipped in the unit's control box. The kit includes the hinged cover, a backing plate and gasket.

DISCONNECT ALL POWER TO UNIT AND CONVENIENCE OUTLET.

Remove the blank cover plate at the convenience outlet; discard the blank cover.

Loosen the two screws at the GFCI duplex outlet, until approximately 1/2-in (13 mm) under screw heads are

exposed. Press the gasket over the screw heads. Slip the backing plate over the screw heads at the keyhole slots and align with the gasket; tighten the two screws until snug (do not over-tighten).

Mount the weatherproof cover to the backing plate as shown in Fig. 23. Remove two slot fillers in the bottom of the cover to permit service tool cords to exit the cover. Check for full closing and latching.

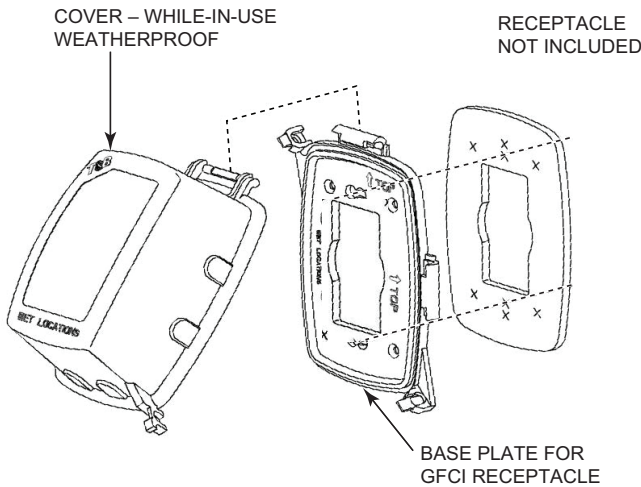


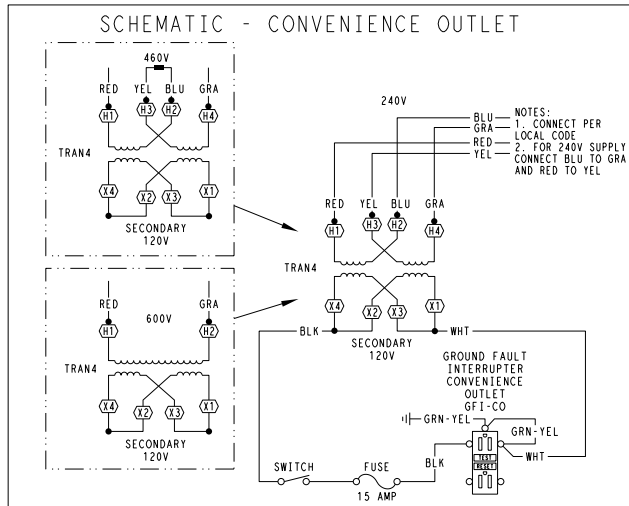
Fig. 23 - Weatherproof Cover Installation

Non-powered type: This type requires the field installation of a general-purpose 125-volt 15-A circuit powered from a source elsewhere in the building. Observe national and local codes when selecting wire size, fuse or breaker requirements and disconnect switch size and location. Route 125-v power supply conductors into the bottom of the utility box containing the duplex receptacle.

Unit-powered type: A unit-mounted transformer is factory-installed to stepdown the main power supply voltage to the unit to 115-v at the duplex receptacle. This option also includes a manual switch with fuse, located in a utility box and mounted on a bracket behind the convenience outlet; access is through the unit's control box access panel. See Fig. 22.

The primary leads to the convenience outlet transformer are not factory-connected. Selection of primary power source is a customer-option. If local codes permit, the transformer primary leads can be connected at the line-side terminals on the unit-mounted non-fused disconnect; this will provide service power to the unit when the unit disconnect switch is open. Other connection methods will result in the convenience outlet circuit being de-energized when the unit disconnect switch is open. See Fig. 24.

Using unit-mounted convenience outlets: Units with unit-mounted convenience outlet circuits will often require that two disconnects be opened to de-energize all power to the unit. Treat all units as electrically energized until the convenience outlet power is also checked and de-energization is confirmed. Observe National Electrical Code Article 210, Branch Circuits, for use of convenience outlets.

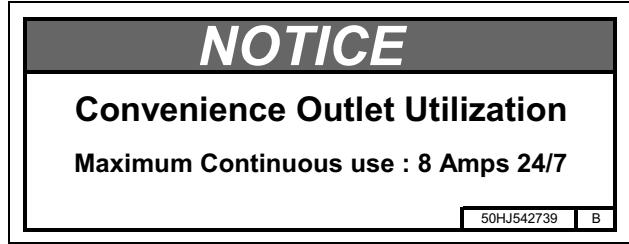


C08283

UNIT VOLTAGE	CONNECT AS	PRIMARY CONNECTIONS	TRANSFORMER TERMINALS
208, 230	240	L1: RED + YEL L2: BLU + GRA	H1 + H3 H2 + H4
460	480	L1: RED L2: Splice BLU + YEL L3: GRA	H1 H2 + H3 H4
575	600	L1: RED L2: GRA	H1 H2

Fig. 24 - Powered Convenience Outlet Wiring

Fuse on power type: The factory fuse is a Bussman "Fusetron" T-15, non-renewable screw-in (Edison base) type plug fuse.



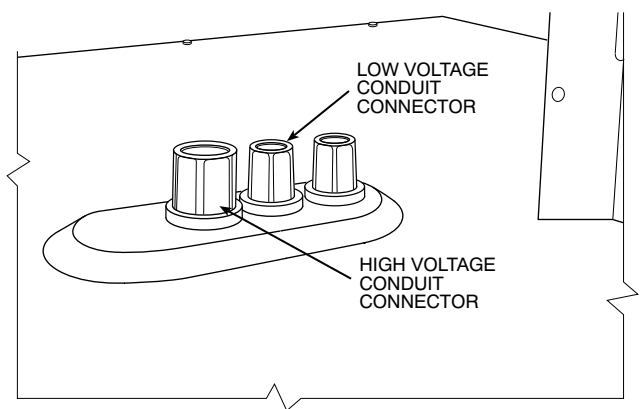
C13415

Fig. 25 - Convenience Outlet Utilization Notice Label

Test the GFCI receptacle by pressing the TEST button on the face of the receptacle to trip and open the receptacle. Check for proper grounding wires and power line phasing if the GFCI receptacle does not trip as required. Press the RESET button to clear the tripped condition.

Factory Option Thru-Base Connections —

This service connection kit consists of a 1/2-in electrical bulkhead connector and a 3/4-in electrical bulkhead connector, all factory-installed in the embossed (raised) section of the unit basepan in the condenser section. The 1/2-in bulkhead connector enables the low-voltage control wires to pass through the basepan. The 3/4-in electrical bulkhead connector allows the high-voltage power wires to pass through the basepan. See Fig. 26.



C13412

Fig. 26 - Thru-Base Connection Fittings

Check tightness of connector lock nuts before connecting electrical conduits.

Field-supplied and field-installed liquid-tight conduit connectors and conduit may be attached to the connectors on the basepan. Pull correctly rated high voltage and low voltage through appropriate conduits. Connect the power conduit to the internal disconnect (if unit is so equipped) or to the external disconnect (through unit side panel). A hole must be field cut in the main control box bottom on the left side so the 24-v control connections can be made. Connect the control power conduit to the unit control box at this hole.

Units without Thru-Base Connections —

1. Install power wiring conduit through side panel openings. Install conduit between disconnect and control box.
2. Install power lines to terminal connections as shown in Fig. 18.

All Units -

Voltage to compressor terminals during operation must be within voltage range indicated on unit nameplate. See Tables 15 and 16. On 3-phase units, voltages between phases must be balanced within 2% and the current within 10%. Use the formula shown in the legend for Tables 15 and 16, Note 3 (see page 43) to determine the percent of voltage imbalance. Operation on improper line voltage or excessive phase imbalance constitutes abuse and may cause damage to electrical components. Such operation would invalidate any applicable Carrier warranty.

Field Control Wiring —

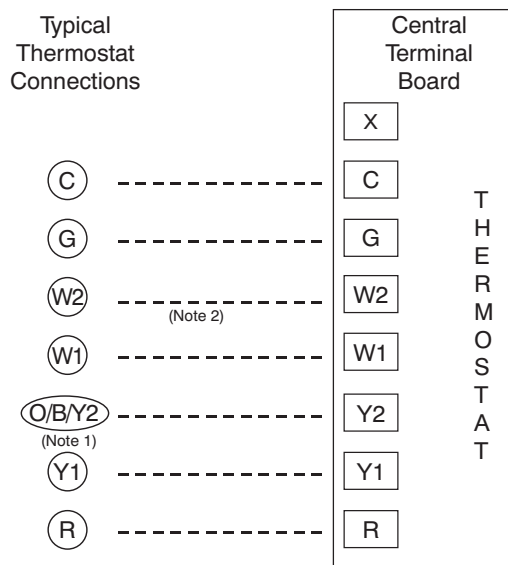
The 50HCQ unit requires an external temperature control device. This device can be a thermostat (field-supplied) or a PremierLink™ controller (available as factory-installed option or as field-installed accessory, for use on a Carrier Comfort Network® or as a stand alone control) or the RTU Open Controller for Building Management Systems using non-CCN protocols (RTU Open controller is available as a factory-installed option only).

Thermostat —

Install a Carrier-approved accessory 2 stage Cooling/Heating thermostat according to installation instructions included with the accessory. The 50HCQ models do not require a thermostat with an O function to control the reversing valve operation. If using an electronic thermostat, configure it for “non-heat pump” operation. Locate the thermostat accessory on a solid wall in the conditioned space to sense average temperature in accordance with the thermostat installation instructions.

If the thermostat contains a logic circuit requiring 24-v power, use a thermostat cable or equivalent single leads of different colors with minimum of seven leads. If the thermostat does not require a 24-v source (no “C” connection required), use a thermostat cable or equivalent with minimum of six leads. Check the thermostat installation instructions for additional features which might require additional conductors in the cable.

For wire runs up to 50 ft. (15 m), use no. 18 AWG (American Wire Gage) insulated wire (35°C minimum). For 50 to 75 ft. (15 to 23 m), use no. 16 AWG insulated wire (35°C minimum). For over 75 ft. (23 m), use no. 14 AWG insulated wire (35°C minimum). All wire sizes larger than no. 18 AWG cannot be directly connected to the thermostat and will require a junction box and splice at the thermostat.



Note 1: Typical multi-function marking. Follow manufacturer's configuration instructions to select Y2. Do not configure for O output.

Note 2: W2 connection not required on units without electric heating.

--- Field Wiring

C09012

Fig. 27 - Typical Low-Voltage Control Connections

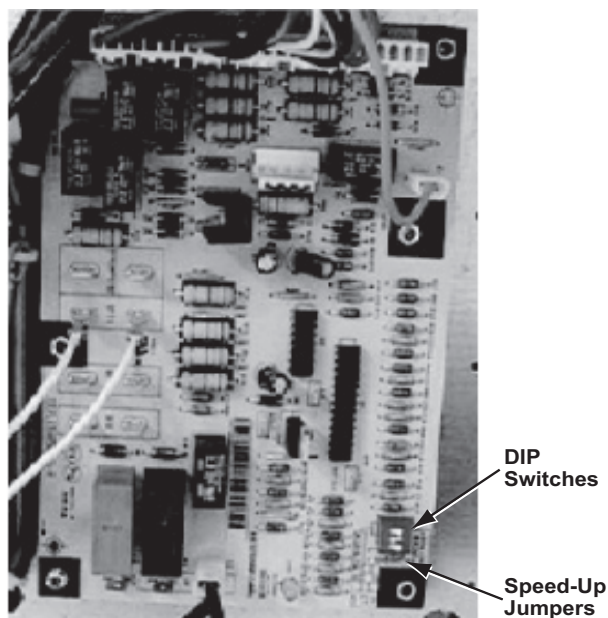
Central Terminal Board

The Central Terminal Board (CTB) is a pass through connection point. The CTB provides the capability to add factory-installed options and field-installed accessories to the units by cutting jumper wires without having to change or reroute wires through the structure of the unit.

The CTB does not provide any microprocessor control; it is simply a basic multifunction wiring terminal configuration.

Commercial Defrost Control

The Commercial Defrost Control Board (DFB) coordinates thermostat demands for supply fan control, 1 or 2 stage cooling, 2 stage heating, emergency heating and defrost control with unit operating sequences. The DFB also provides an indoor fan off delay feature (user selectable). See Fig. 28 for board arrangement.



C09275

Fig. 28 - Defrost Control Board Arrangement

The DFB is located in the 50HCQ unit's main control box (see Fig. 30). All connections are factory-made through harnesses to the unit's CTB, to IFC (belt-drive motor) or to ECM (direct-drive motor), reversing valve solenoids and to defrost thermostats. Refer to Table 5 for details of DFB Inputs and Outputs.

Reversing valve control — The DFB has two outputs for unit reversing valve control. Operation of the reversing valves is based on internal logic; this application does not use an "O" or "B" signal to determine reversing valve position. Reversing valves are energized during the cooling stages and the defrost cycle and de-energized during heating cycles. Once energized at the start of a cooling stage, the reversing valve will remain energized until the next heating cycle demand is received. Once de-energized at the start of a Heating cycle, the reversing valves will remain de-energized until the next cooling stage is initiated.

Compressor control — The DFB receives inputs indicating Stage 1 Cooling, Stage 2 Cooling and Stage 1 Heating from

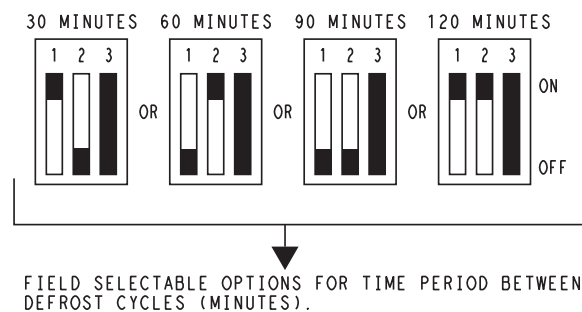
the space thermostat or unit control system (PremierLink™ controller or RTU Open controller); it generates commands to start compressors with or without reversing valve operation to produce Stage 1 Cooling (one compressor on 08-09 systems, compressor unloaded on 07 2-stage system), Stage 2 Cooling (both compressors run on 08-09 systems, compressor full load on 07 2-stage system) or Stage 1 Heating (both compressors run on 08-09 systems; the 07 systems have only one compressor).

Auxiliary (Electric) Heat control — The 50HCQ unit can be equipped with one or two auxiliary electric heaters, to provide a second stage of heating. The DFB will energize this Heating System for a Stage 2 Heating Command (heaters operate concurrently with compressor(s) in the Stage 1 Heating cycle), for an Emergency Heating sequence (compressors are off and only the electric heaters are energized) and also during the Defrost cycle (to eliminate a "cold blow" condition in the space).

Defrost — The defrost control mode is a time/temperature sequence. There are two time components: The continuous run period and the test/defrost cycle period. The temperature component is provided by Defrost Thermostat 1 and 2 (DFT1 and DFT2 [08-09 only]) mounted on the outdoor coil.

The continuous run period is a fixed time period between the end of the last defrost cycle (or start of the current Heating cycle) during which no defrost will be permitted. This period can be set at 30, 60, 90 or 120 minutes by changing the positions of DIP switches SW1 and SW2 (see Fig. 29 and Table 6). The default run periods are 30 minutes for unit size 07 and 90 minutes for unit sizes 08-09.

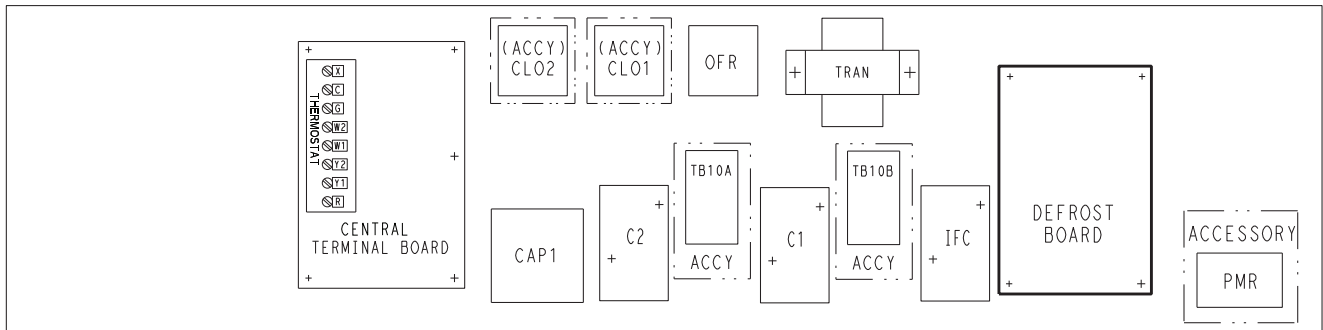
DIP SWITCH SETTINGS - DEFROST BD



C09283

Fig. 29 - DIP Switch Settings — Defrost Board

Shorting the jumpers for a period of 5 to 20 secs bypasses the remaining continuous run period and places the unit in a Forced Defrost mode. If the controlling DFT is closed when this mode is initiated, the unit will complete a normal defrost period that will terminate when the controlling DFT opens or the 10 minute defrost cycle limit is reached. If the controlling DFT is open when this mode is initiated, the Defrost cycle will run for 30 secs. Both modes end at the end of the Defrost cycle.



C09276

Fig. 30 - Defrost Control Board Location

Table 5 – 50HCQ Defrost Board I/O and Jumper Configurations

Inputs

Point Name	Type of I/O	Connection Pin Number	Unit Connection	Note
G Fan	DI, 24Vac	P2-3	CTB-G	
Y1 Cool 1	DI, 24Vac	P2-5	CTB-Y1	
Y2 Cool 2	DI, 24Vac	P2-4	CTB-Y2	
W1 Heat 1	DI, 24Vac	P2-7	CTB-W1	
W2 Heat 2	DI, 24Vac	P2-6	CTB-W2	
R Power	24Vac	P3-1	CONTL BRD-8	
C Common	24Vac	P3-2	CONTL BRD-4	
DFT1	DI, 24Vac	DFT-1 to DFT-1		
DFT 2	DI, 24Vac	DFT-2 to DFT-2		

Outputs

Point Name	Type of I/O	Connection Pin Number	Unit Connection	Note
IFO Fan On	DO, 24Vac	P3-9	REHEAT-2	
OF OD Fan On	DO, 24Vac	OF	OFR	
RVS1	DO, 24Vac	P3-7 to P3-5		Energize in COOL
RVS2	DO, 24Vac	P3-6 to P3-4		Energize in COOL
COMP 1	DO, 24Vac	P3-10	FPT - REHEAT-6	
COMP 2	DO, 24Vac	P3-8	REHEAT-8	
HEAT 2	DO, 24Vac	E-HEAT	HC-1 (TB4-1)	
COM	24Vac	P3-3	HC-1 (TB4-3)	

Configuration

Point Name	Type of I/O	Connection Pin Number	Unit Connection	Note
Select Jumper	24Vac	P1-1		
2 Compressor	24Vac	P1-3		Use for 50HCQD

Speed-Up Configuration

Point Name	Type of I/O	Connection Pin Number	Unit Connection	Note
Speed-Up Jumper		JMP17		
Speed-Up Jumper		JMP18		

Jumper for 1-3 seconds: Factory Test, defrost runs for 9 seconds

Jumper for 5-20 seconds: Forced Defrost, defrost runs for 30 seconds if DFT2 is open

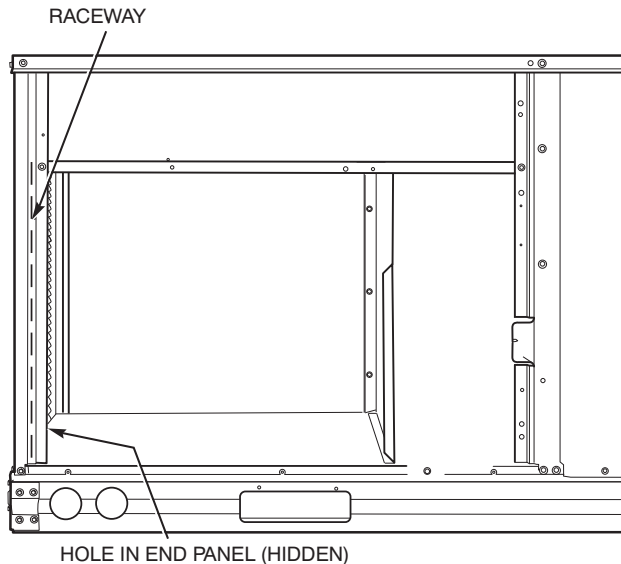
Table 6 – Dip Switch Position

Switch No.

	1	2		1	2		1	2		1	2		3	
1			1		■	1	■		1	■	■	1		On
0	■	■	0	■		0		■	0			0	■	Off
	90 minutes			60 minutes			30 minutes			120 minutes			Fan Delay	

Unit without Thru-Base Connection Kit —

Pass the thermostat control wires through the hole provided in the corner post; then feed the wires through the raceway built into the corner post to the control box. Pull the wires over to the terminal strip on the upper-left corner of the Central Terminal Board (CTB). See Fig. 31.



C08027

Fig. 31 - Field Control Wiring Raceway

NOTE: If thru-the-bottom connections accessory is used, refer to the accessory installation instructions for information on routing power and control wiring.

Heat Anticipator Settings —

Set heat anticipator settings at 0.14 amp for the first stage and 0.14 amp for second-stage heating, when available.

Electric Heaters

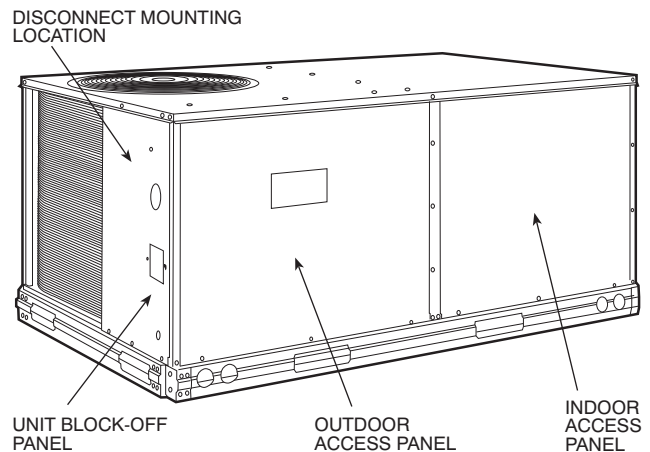
50HCQ units may be equipped with field-installed accessory electric heaters. The heaters are modular in design, with heater frames holding open coil resistance wires strung through ceramic insulators, limit switches and one or two control contactors. One or two heater modules may be used in a unit.

Heater modules are installed in the compartment below the indoor (supply) fan outlet. Access is through the indoor access panel. Heater modules slide into the compartment on tracks along the bottom of the heater opening. See Fig. 32 - 34.

Not all available heater modules may be used in every unit. Use only those heater modules that are UL listed for use in a specific size unit. Refer to the label on the unit cabinet for the list of approved heaters.

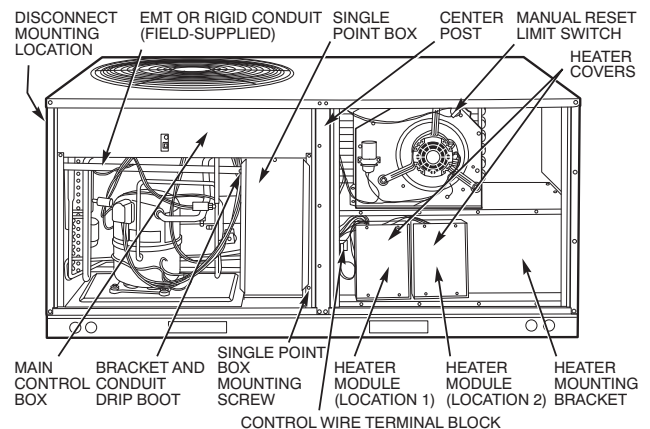
Unit heaters are marked with Heater Model Numbers. But heaters are ordered as and shipped in cartons marked with a corresponding heater Sales Package part number. See Table 7 for correlation between heater Model Number and Sales Package part number.

NOTE: The value in position 9 of the part number differs between the sales package part number (value is 1 or 3) and a bare heater model number (value is 0).



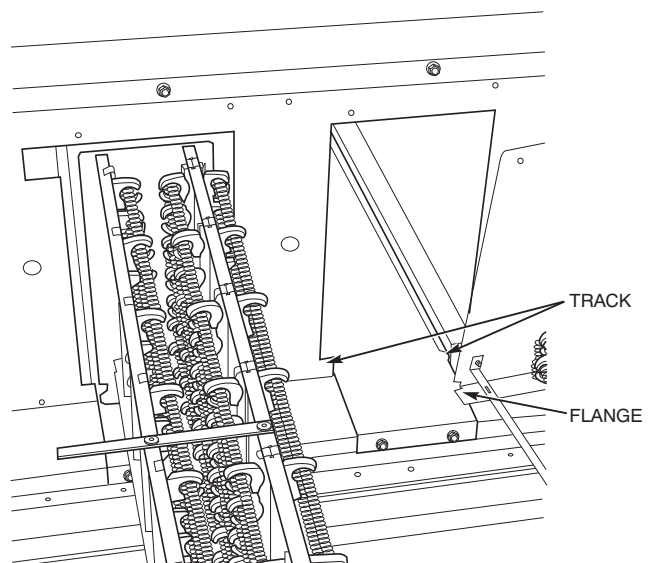
C08133

Fig. 32 - Typical Access Panel Location



C08134

Fig. 33 - Typical Component Location



C08135

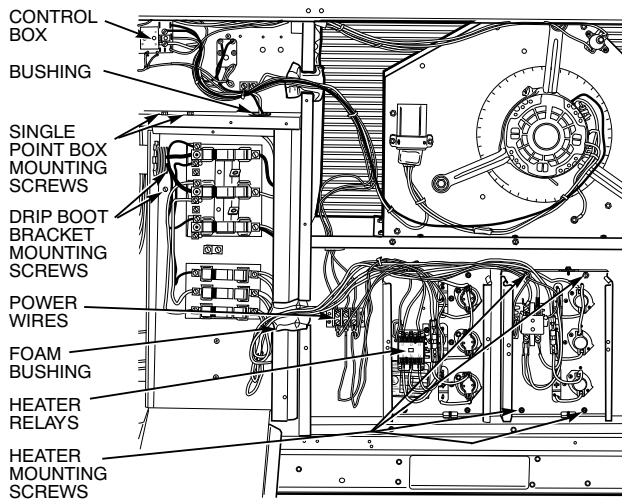
Fig. 34 - Typical Module Installation

Table 7 – Heater Model Number

Bare Heater Model Number	C	R	H	E	A	T	E	R	0	0	1	A/B	0	0
Heater Sales Package P/N Includes: Bare Heater Carton and packing materials Installation sheet	C	R	H	E	A	T	E	R	1	0	1	A/B	0	0

Single Point Boxes and Supplementary Fuses —

When the unit MOCB device value exceeds 60-A, unit-mounted supplementary fuses are required for each heater circuit. These fuses are included in accessory Single Point Boxes, with power distribution and fuse blocks. The single point box will be installed directly under the unit control box, just to the left of the partition separating the indoor section (with electric heaters) from the outdoor section. The Single Point Box has a hinged access cover. See Fig. 35. The Single Point Box also includes pigtailed to complete the wiring between the Single Point Box and the unit's main control box terminals. Refer to the accessory heater and Single Point Box installation instructions for details on tap connections.



C14253

Fig. 35 - Typical Single Point Installation

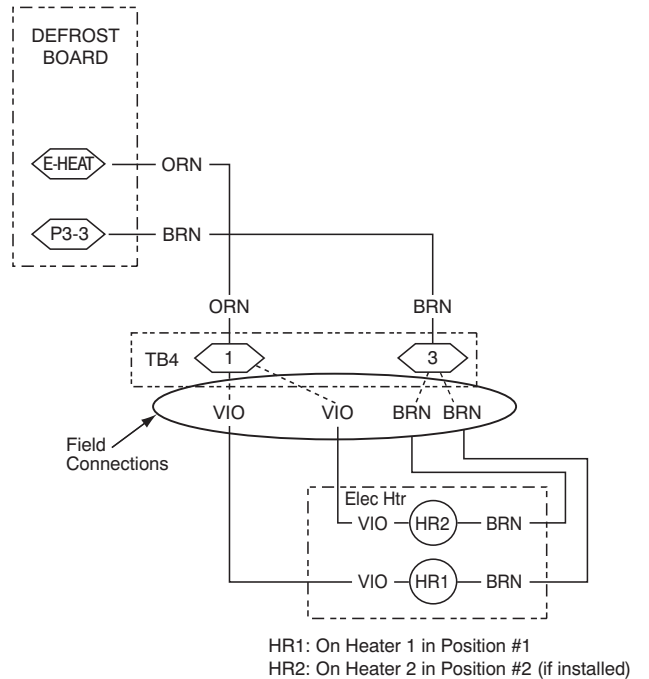
All fuses on 50HCQ units are 60-A. (Note that all heaters are qualified for use with a 60-A fuse, regardless of actual heater ampacity, so only 60-A fuses are necessary.)

Single Point Boxes without Fuses —

Unit heater applications not requiring supplemental fuses require a special Single Point Box without any fuses. The accessory Single Point Boxes contain a set of power taps and pigtailed to complete the wiring between the Single Point Box and the unit's main control box terminals. Refer to accessory heater and Single Point Box installation instructions for details on tap connections.

Low-Voltage Control Connections —

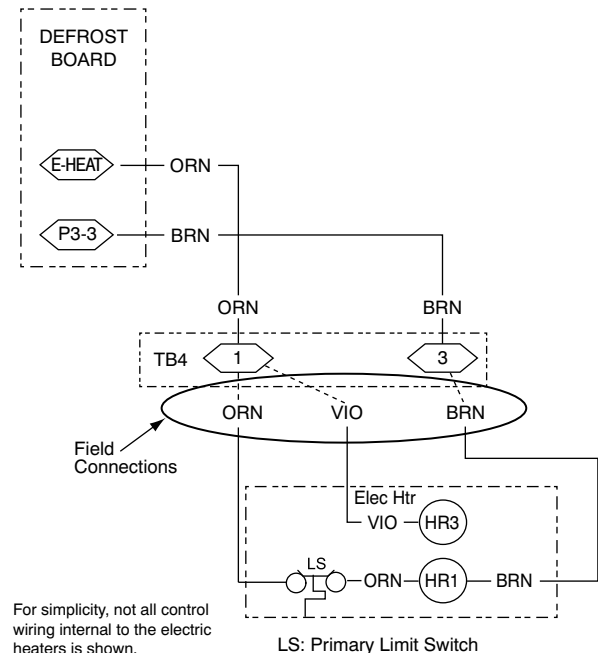
Run the low-voltage control leads from the heater module(s) - VIO and BRN (two of each if two modules are installed) - to the 4-pole terminal board TB4 located on the heater bulkhead to the left of Heater #1. Except for CRHEATER128B00-129B00, connect the VIO leads from Heater #1 and Heater #2 to terminal TB4-1. Connect the BRN leads to terminal TB4-3. See Fig. 36.



C09013

Fig. 36 - Accessory Electric Heater Control Connections (Except CRHEATER128B00-129B00)

For CRHEATER128B00-129B00 only — Connect the ORN lead from HR1 (Heater Relay 1) and the VIO lead from HR3 (Heater Relay 3) to terminal TB4-1. Connect the BRN lead from HR1 to TB4-3. See Fig. 37.



a50-9362

Fig. 37 - Accessory Electric Heater Control Connections for CRHEATER128B00-129B00 Only

EconoMiSer® X (Factory-Installed Option)

For details on operating 50HCQ units equipped with the factory-installed EconoMiSer X option, refer to Factory-Installed Economizers for TC/TCQ/HC/HCQ/LC/KC/KCQ Rooftop Units, 3 to 27.5 Nominal Tons. Economizer Supplement Related to California Title 24.

Staged Air Volume (SAV™) with Variable Frequency Drive (Factory-Installed Option)

For details on operating 50HCQ 2-stage cooling units equipped with the factory-installed Staged Air Volume option, refer to the Variable Frequency Drive (VFD) Installation, Setup & Troubleshooting Supplement.

PremierLink™ Controller (Factory Option)

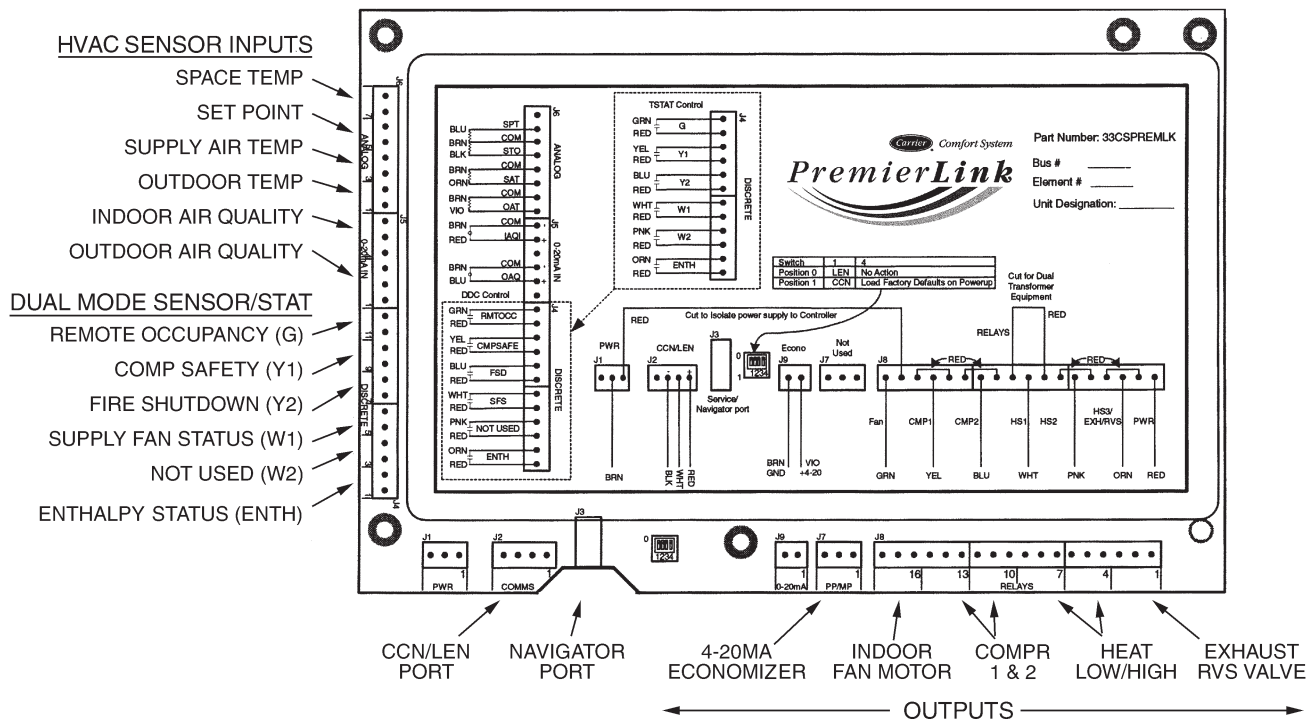


Fig. 38 - PremierLink Controller

C08199

The PremierLink controller (see Fig. 38) is compatible with Carrier Comfort Network® (CCN) devices. This control is designed to allow users the access and ability to change factory-defined settings, thus expanding the function of the standard unit control board. CCN service access tools include System Pilot™, Touch Pilot™ and Service Tool. (Standard tier display tools Navigator™ and scrolling marquee are not suitable for use with latest PremierLink controller (Version 2.x).)

The PremierLink controller is factory-mounted in the 50HCQ unit's main control box to the left of the Central Terminal Board (CTB). Factory wiring is completed through harnesses connected to the CTB thermostat. Field connections are made at a 16-pole terminal block (TB1) located on the bottom shelf of the unit control box in front

of the PremierLink controller. The factory-installed PremierLink controller includes the supply-air temperature (SAT) sensor. The outdoor air temperature (OAT) sensor is included in the FIOP/accessory EconoMi\$er®2 package.

The PremierLink controller requires the use of a Carrier electronic thermostat or a CCN connection for time broadcast to initiate its internal timeclock. This is necessary for broadcast of time of day functions (occupied/unoccupied).

NOTE: PremierLink controller is shipped in Sensor mode. To be used with a thermostat, the PremierLink controller must be configured to Thermostat mode. Refer to PremierLink Configuration instructions for Operating Mode.

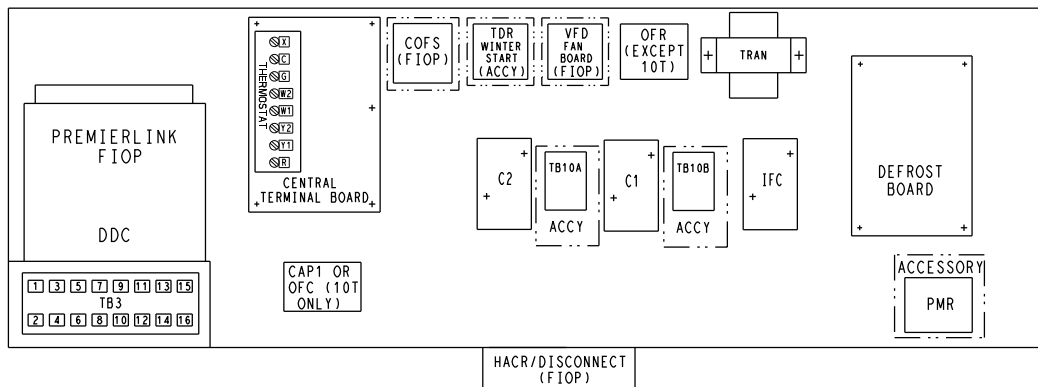


Fig. 39 - 50HCQ Control Box Component Locations

C150037

HEAT PUMP CONTROL 208/230V, 460V, 575V
6TON 2-STG COOLING 1-COMPR MID-TIER

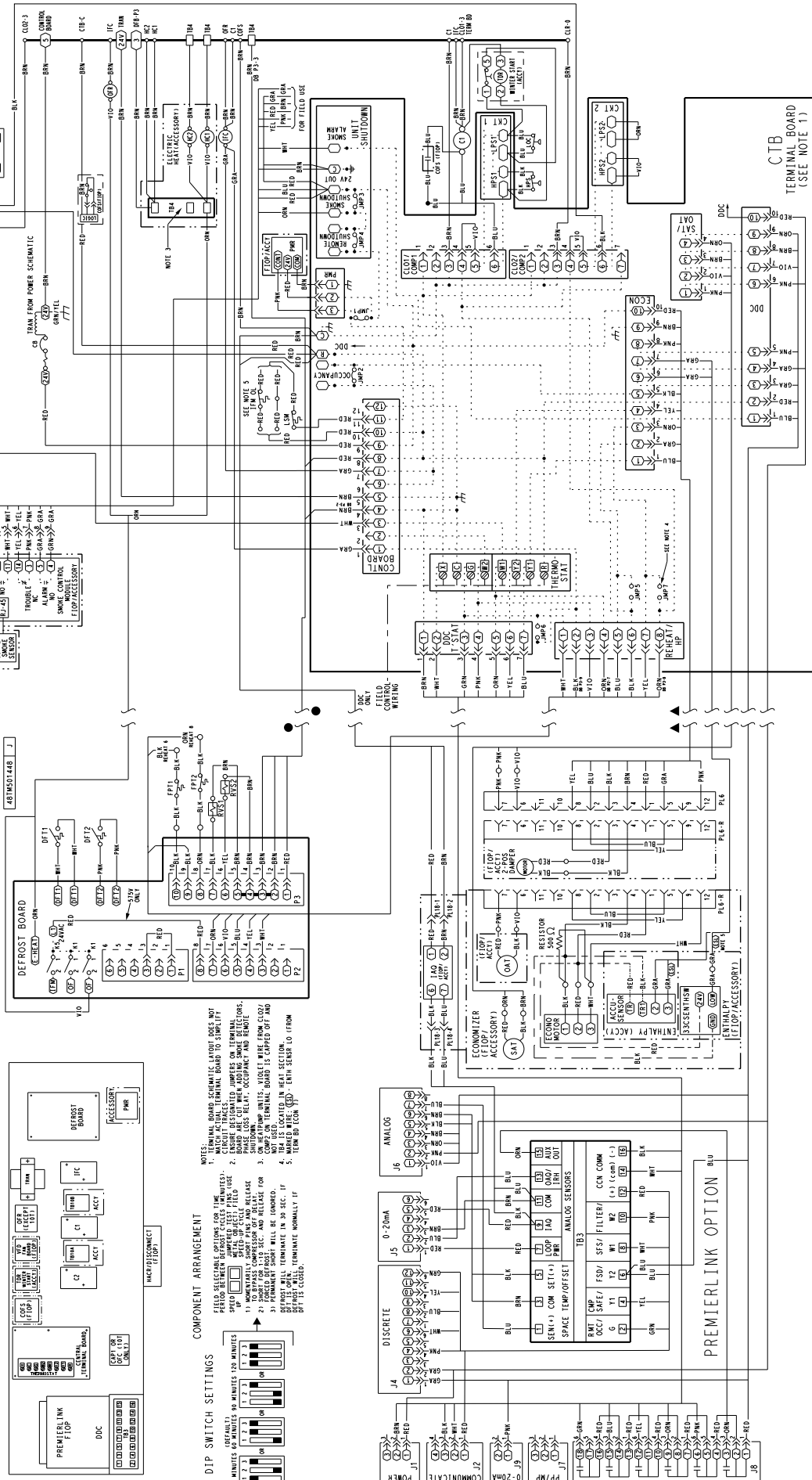


Fig. 40 - Typical PremierLink™ Controller Wiring Diagram

Supply Air Temperature (SAT) Sensor —

On FIOP-equipped 50HCQ unit, the unit is supplied with a supply-air temperature (SAT) sensor (33ZCSENSAT). This sensor is a tubular probe type, approx 6-inches (152 mm) in length. It is a nominal 10k ohm thermistor.

The SAT is factory-wired. The SAT probe is wire-tied to the supply-air opening (on the horizontal opening end) in its shipping position. Remove the sensor for installation. Re-position the sensor in the flange of the supply-air opening or in the supply air duct (as required by local codes). Drill or punch a 1/2-in. hole in the flange or duct. Use two field-supplied, self-drilling screws to secure the sensor probe in a horizontal orientation. See Fig. 41.

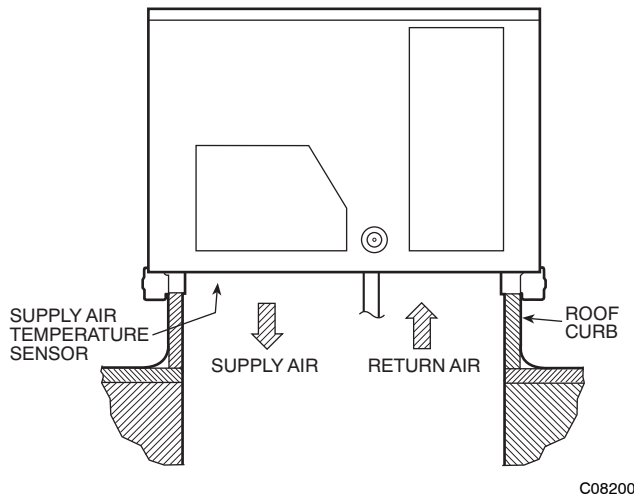


Fig. 41 - Typical Mounting Location for Supply Air Temperature (SAT) Sensor on Small Rooftop Units

NOTE: Refer to the PremierLink™ Controller Installation, Start-up, and Configuration Instructions for complete PremierLink controller configuration, operating sequences and troubleshooting information. Have a copy of this manual available at unit start-up.

NOTE: The sensor must be mounted in the discharge airstream downstream of the cooling coil and any heating devices. Be sure the probe tip does not come in contact with any of the unit's heater surfaces.

Outdoor Air Temperature (OAT) Sensor —

The OAT is factory-mounted in the EconoMiSer®2 (FIOP or accessory). It is a nominal 10k ohm thermistor attached to an eyelet mounting ring.

EconoMiSer®2 —

The PremierLink controller is used with the EconoMiSer2 unit (option or accessory) for outdoor air management. The damper position is controlled directly by the PremierLink controller; the EconoMiSer2 unit has no internal logic device.

Outdoor air management functions can be enhanced with field-installation of these accessory control devices:

- Enthalpy control (outdoor air or differential sensors)
- Space CO₂ sensor
- Outdoor air CO₂ sensor

Refer to Table 8 for accessory part numbers.

Field Connections

Field connections for accessory sensor and input devices are made at the 16-pole terminal block (TB1) located on the control box bottom shelf in front of the PremierLink controller (See Fig. 40). Some input devices also require a 24-vac signal source; connect at CTB terminal R at "THERMOSTAT" connection strip for this signal source. See connections figures on following pages for field connection locations (and for continued connections at the PremierLink controller board inputs).

Table 9 provides a summary of field connections for units equipped with Space Sensor. Table 10 provides a summary of field connections for units equipped with Space Thermostat.

Table 8 – PremierLink™ Controller Sensor Usage

APPLICATION	OUTDOOR AIR TEMPERATURE SENSOR	RETURN AIR TEMPERATURE SENSOR	OUTDOOR AIR ENTHALPY SENSOR	RETURN AIR ENTHALPY SENSOR
Differential Dry Bulb Temperature with PremierLink (PremierLink requires 4–20 mA Actuator)	Included – CRTEMPSN001A00	Required – 33ZCT55SPT or equivalent	–	–
Single Enthalpy with PremierLink (PremierLink requires 4–20mA Actuator)	Included – Not Used	–	Requires – 33CSENTHSW	–
Differential Enthalpy with PremierLink (PremierLink requires 4–20mA Actuator)	Included – Not Used	–	Requires – 33CSENTHSW or equivalent	Requires – 33CSENTSEN or equivalent

NOTES:

CO₂ Sensors (Optional):

33ZCSENCO2 – Room sensor (adjustable). Aspirator box is required for duct mounting of the sensor.

33ZCASPCO2 – Aspirator box used for duct-mounted CO₂ room sensor.

33ZCT55CO2 – Space temperature and CO₂ room sensor with override.

33ZCT56CO2 – Space temperature and CO₂ room sensor with override and setpoint.

50HCO

Table 9 – Space Sensor Mode

TB1 TERMINAL	FIELD CONNECTION	INPUT SIGNAL
1	T55 – SEN/T56 – SEN	Analog (10k thermistor)
2	RMTOCC	Discrete, 24VAC
3	T55 – SEN/T56 – SEN	Analog (10k thermistor)
4	CMPSAFE	Discrete, 24VAC
5	T56 – SET	Analog (10k thermistor)
6	FSD	Discrete, 24VAC
7	LOOP – PWR	Analog, 24VDC
8	SFS	Discrete, 24VAC
9	IAQ – SEN	Analog, 4–20mA
10	FILTER	Discrete, 24VAC
11	IAQ – COM/OAQ – COM/RH – COM	Analog, 4–20mA
12	CCN + (RED)	Digital, , 5VDC
13	OAQ – SEN/RH – SEN	Analog, 4–20mA
14	CCN Gnd (WHT)	Digital, 5VDC
15	AUX OUT(Power Exhaust)	(Output)Discrete 24VAC
16	CCN – (BLK)	Digital, 5VDC

LEGEND:

T55 – Space Temperature Sensor

T56 – Space Temperature Sensor

CCN – Carrier Comfort Network® (communication bus)

CMPSAFE – Compressor Safety

FILTER – Dirty Filter Switch

FSD – Fire Shutdown

IAQ – Indoor Air Quality (CO₂)

OAQ – Outdoor Air Quality (CO₂)

RH – Relative Humidity

SFS – Supply Fan Status

Table 10 – Thermostat Mode

TB1 TERMINAL	FIELD CONNECTION	INPUT SIGNAL
1	RAT SEN	Analog (10k thermistor)
2	G	Discrete, 24VAC
3	RAT SEN	Analog (10k thermistor)
4	Y1	Discrete, 24VAC
5		
6	Y2	Discrete, 24VAC
7	LOOP – PWR	Analog, 24VDC
8	W1	Discrete, 24VAC
9	IAQ – SEN	Analog, 4 – 20mA
10	W2	Discrete, 24VAC
11	IAQ – COM/OAQ – COM/RH – COM	Analog, 4 – 20mA
12	CCN + (RED)	Digital, 5VDC
13	OAQ – SEN/RH – SEN	Analog, 4 – 20mA
14	CCN Gnd (WHT)	Digital, 5VDC
15	AUX OUT (Power Exhaust)	(Output) Discrete 24VAC
16	CCN – (BLK)	Digital, 5VDC

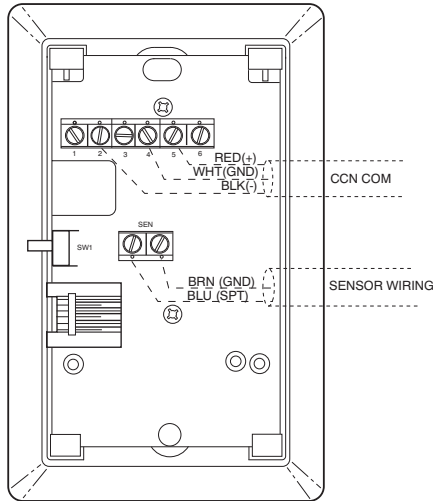
LEGEND:

CCN – Carrier Comfort Network® (communication bus)
 G – Thermostat Fan
 IAQ – Indoor Air Quality (CO₂)
 OAQ – Outdoor Air Quality (CO₂)
 RAT – Return Air Temperature

RH – Relative Humidity
 W1 – Thermostat Heat Stage 1
 W2 – Thermostat Heat Stage 2
 Y1 – Thermostat Cool Stage 1
 Y2 – Thermostat Cool Stage 2

Space Sensors —

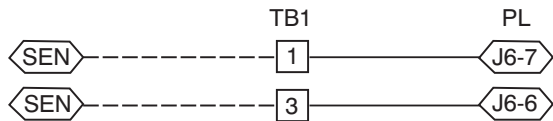
The PremierLink™ controller is factory-shipped configured for Space Sensor Mode. A Carrier T-55 or T-56 space sensor must be used. T-55 space temperature sensor provides a signal of space temperature to the PremierLink controller. T-56 provides same space temperature signal plus it allows for adjustment of space temperature setpoints from the face of the sensor by the occupants.



C08201

Fig. 42 - T-55 Space Temperature Sensor Wiring

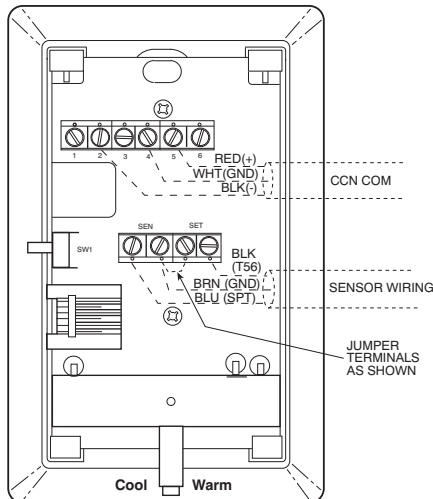
Connect T-55: See Fig. 42 for typical T-55 internal connections. Connect the T-55 SEN terminals to TB1 terminals 1 and 3 (see Fig. 43).



C08212

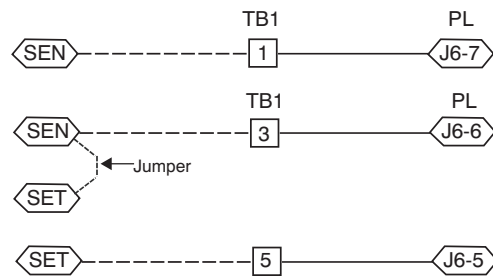
Fig. 43 - PremierLink Controller T-55 Sensor

Connect T-56: See Fig. 44 for T-56 internal connections. Install a jumper between SEN and SET terminals as illustrated. Connect T-56 terminals to TB1 terminals 1, 3 and 5 (see Fig. 45).



C08202

Fig. 44 - T-56 Internal Connections



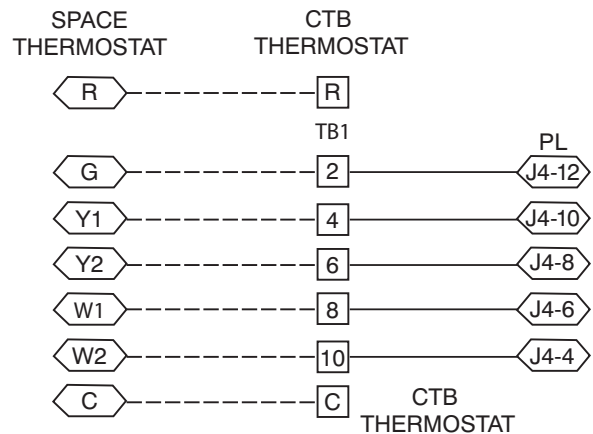
C08213

Fig. 45 - PremierLink Controller T-56 Sensor

Connect Thermostat —

A 7-wire thermostat connection requires a 24-v power source and a common connection. Use the R and C terminals on the CTB's THERMOSTAT connection strip for these. Connect the thermostat's Y1, Y2, W1, W2 and G terminals to PremierLink TB1 as shown in Fig. 46.

If the 50HCQ unit is equipped with factory-installed smoke detector(s), disconnect the factory BLU lead at TB1-6 (Y2) before connecting the thermostat. Identify the BLU lead originating at CTB-DDC-1; disconnect at TB1-6 and tape off. Confirm that the second BLU controller lead at TB1-6 remains connected to the PremierLink controller at J4-8.



C08119

Fig. 46 - Space Thermostat Connections

If the 50HCQ unit has an economizer system and free-cooling operation is required, a sensor representing Return Air Temperature must also be connected (field-supplied and installed). This sensor may be a T-55 Space Sensor (see Fig. 42) installed in the space or in the return duct, or it may be sensor P/N 33ZCSENSAT, installed in the return duct. Connect this sensor to TB1-1 and TB1-3 per Fig. 43.

Configure the Unit for Thermostat Mode —

Connect to the CCN bus using a CCN service tool and navigate to PremierLink Configuration screen for Operating Mode. Default setting is Sensor Mode (value 1). Change the value to 0 to reconfigure the controller for Thermostat Mode.

When the PremierLink controller is configured for Thermostat Mode, these functions are not available: Fire Shutdown (FSD), Remote Occupied (RMT OCC), Compressor Safety (CMPSAFE), Supply Fan Status (SFS), and Filter Pressure Switch (FILTER).

Economizer Controls

Indoor Air Quality (CO₂) Sensor —

The indoor air quality sensor accessory monitors space carbon dioxide (CO₂) levels. This information is used to monitor IAQ levels. Several types of sensors are available, for wall mounting in the space or in return duct, with and without LCD display, and in combination with space temperature sensors. Sensors use infrared technology to measure the levels of CO₂ present in the space air.

The CO₂ sensors are all factory set for a range of 0 to 2000 ppm and a linear mA output of 4 to 20. Refer to the instructions supplied with the CO₂ sensor for electrical requirements and terminal locations. See Fig. 47 for typical CO₂ sensor wiring schematic.

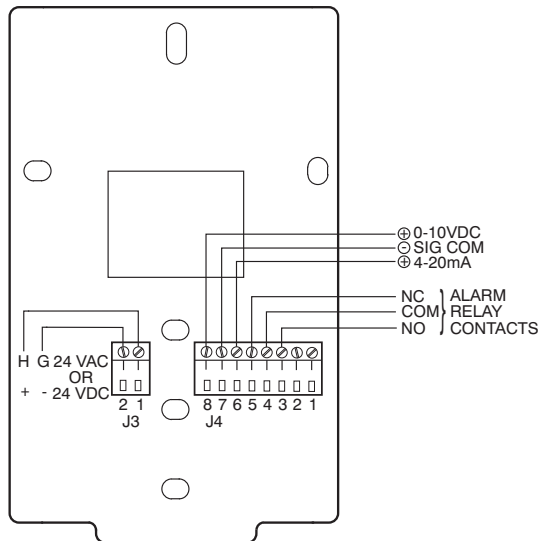


Fig. 47 - Indoor/Outdoor Air Quality (CO₂) Sensor (33ZCSENC02) - Typical Wiring Diagram

To accurately monitor the quality of the air in the conditioned air space, locate the sensor near a return-air grille (if present) so it senses the concentration of CO₂ leaving the space. The sensor should be mounted in a location to avoid direct breath contact.

Do not mount the IAQ sensor in drafty areas such as near supply ducts, open windows, fans, or over heat sources. Allow at least 3 ft (0.9 m) between the sensor and any corner. Avoid mounting the sensor where it is influenced by the supply air; the sensor gives inaccurate readings if the supply air is blown directly onto the sensor or if the supply air does not have a chance to mix with the room air before it is drawn into the return airstream.

Wiring the Indoor Air Quality Sensor: For each sensor, use two 2-conductor 18 AWG (American Wire Gauge) twisted-pair cables (unshielded) to connect the separate isolated 24 vac power source to the sensor and to connect the sensor to the control board terminals.

To connect the sensor to the control, identify the positive (4 to 20 mA) and ground (SIG COM) terminals on the sensor. See Fig. 47. Connect the 4-20 mA terminal to terminal TB1-9 and connect the SIG COM terminal to terminal TB1-11. See Fig. 48.

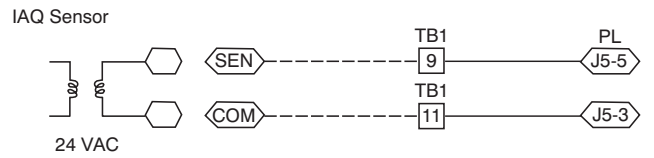


Fig. 48 - Indoor CO₂ Sensor (33ZCSENC02) Connections

Refer to the PremierLink™ Controller Installation, Start-up, and Configuration Instructions, for detailed configuration information.

Outdoor Air Quality Sensor (P/N 33ZCSENC02 plus weatherproof enclosure) —

The outdoor air CO₂ sensor is designed to monitor carbon dioxide (CO₂) levels in the outside ventilation air and interface with the ventilation damper in an HVAC system. The OAQ sensor is packaged with an outdoor cover. See Fig. 49. The outdoor air CO₂ sensor must be located in the economizer outside air hood.

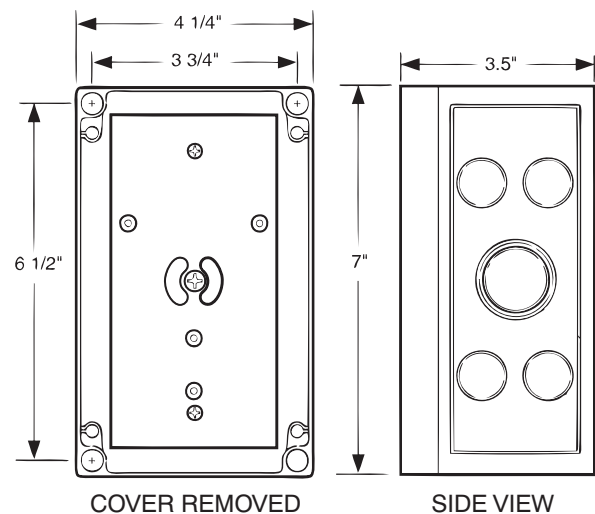


Fig. 49 - Outdoor Air Quality Sensor Cover

Wiring the Outdoor Air CO₂ Sensor: A dedicated power supply is required for this sensor. A two-wire cable is required to wire the dedicated power supply for the sensor. The two wires should be connected to the power supply and terminals 1 and 2.

To connect the sensor to the control, identify the positive (4 to 20 mA) and ground (SIG COM) terminals on the OAQ sensor. See Fig. 47. Connect the 4 to 20 mA terminal to the TB1-13 terminal of the 50HCQ. Connect the SIG COM terminal to the TB1-11 terminal of the 50HCQ. See Fig. 50.

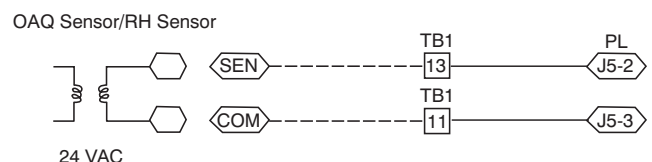


Fig. 50 - Outdoor CO₂ Sensor Connections

Space Relative Humidity Sensors —

Space Relative Humidity Sensors are not used with 50HCQ units at this time.

Smoke Detector/Fire Shutdown (FSD) —

This function is available only when the PremierLink™ controller is configured for (Space) Sensor Mode. The unit is factory-wired for PremierLink FSD operation when the PremierLink controller is factory-installed.

On 50HCQ units equipped with factory-installed Smoke Detector(s), the smoke detector controller implements the unit shutdown through its NC contact set connected to the unit's CTB input. The FSD function is initiated via the smoke detector's Alarm NO contact set. The PremierLink controller communicates the smoke detector's tripped status to the CCN building control. See Fig. 40 (PremierLink controller wiring diagram).

Filter Status Switch —

This function is available only when the PremierLink controller is configured for (Space) Sensor Mode.

The PremierLink controller can monitor return filter status in two ways: By monitoring a field-supplied/installed filter pressure switch or via supply fan runtime hours.

Using switch input: Install the dirty filter pressure switch according to switch manufacturer's instructions, to measure pressure drop across the unit's return filters. Connect one side of the switch's NO contact set to CTB's THERMOSTAT-R terminal. Connect the other side of the NO contact set to TB1-10. Setpoint for Dirty Filter is set at the switch. See Fig. 51.

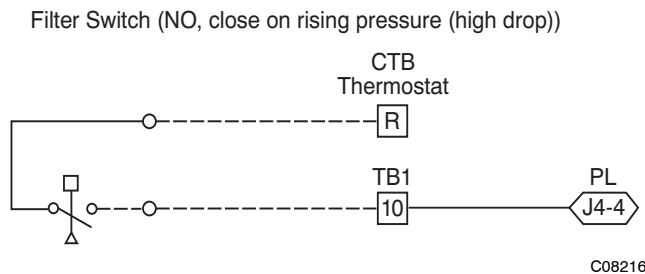


Fig. 51 - PremierLink Controller Filter Switch Connection

When the filter switch's NO contact set closes as filter pressure drop increases (indicating dirt-laden filters), the input signal to the PremierLink controller causes the filter status point to read "DIRTY".

Using Filter Timer Hours: Refer to the PremierLink™ Controller Installation, Start-up, and Configuration Instructions for instructions on using the PremierLink Configuration screens and on unit alarm sequence.

Supply Fan Status Switch —

The PremierLink controller can monitor supply fan operation through a field-supplied/installed differential pressure switch. This sequence will prevent (or interrupt) operation of unit cooling, heating and economizer functions until the pressure switch contacts are closed indicating proper supply fan operation.

Install the differential pressure switch in the supply fan section according to switch manufacturer's instructions. Arrange the switch contact to be open on no flow and to close as pressure rises indicating fan operation.

Connect one side of the switch's NO contact set to CTB's THERMOSTAT-R terminal. Connect the other side of the NO contact set to TB1-8. Setpoint for Supply Fan Status is set at the switch. See Fig. 52.

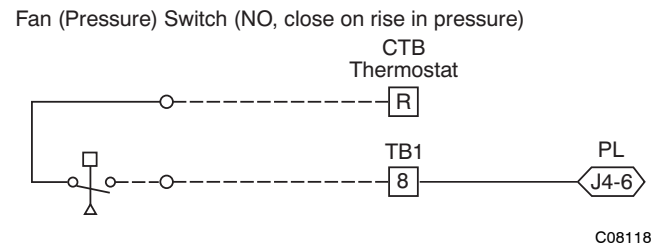


Fig. 52 - PremierLink Controller Wiring Fan Pressure Switch Connection

Remote Occupied Switch —

The PremierLink controller permits a remote timeclock to override the control's on-board occupancy schedule and place the unit into Occupied mode. This function may also provide a "Door Switch" time delay function that will terminate cooling and heating functions after a 2-20 minute delay.

Connect one side of the NO contact set on the timeclock to CTB's THERMOSTAT-R terminal. Connect the other side of the timeclock contact to the unit's TB1-2 terminal (see Fig. 53).

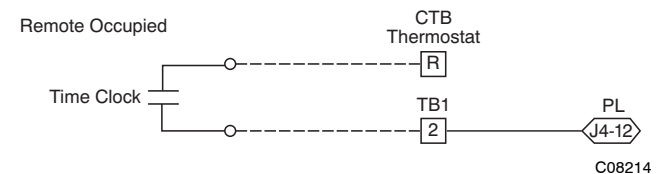
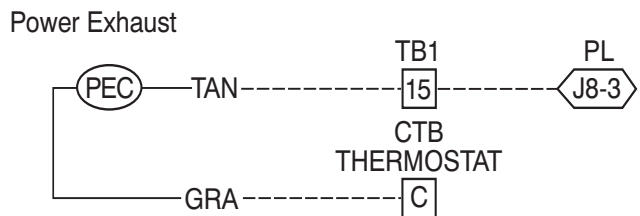


Fig. 53 - PremierLink Controller Wiring Remote Occupied

Refer to the PremierLink™ Controller Installation, Start-up, and Configuration Instructions for additional information on configuring the PremierLink controller for Door Switch timer function.

Power Exhaust (output) —

Connect the accessory Power Exhaust contactor coils(s) per Fig. 54.



C08120

Fig. 54 - PremierLink™ Controller Power Exhaust Output Connection

CCN Communication Bus —

The PremierLink controller connects to the bus in a daisy chain arrangement. Negative pins on each component must be connected to respective negative pins, and likewise, positive pins on each component must be connected to respective positive pins. The controller signal pins must be wired to the signal ground pins. Wiring connections for CCN must be made at the 3-pin plug.

At any baud (9600, 19200, 38400 baud), the number of controllers is limited to 239 devices maximum. Bus length may not exceed 4000 ft, with no more than 60 total devices on any 1000-ft section. Optically isolated RS-485 repeaters are required every 1000 ft.

NOTE: Carrier device default is 9600 baud.

Communications Bus Wire Specifications: The CCN Communication Bus wiring is field-supplied and field-installed. It consists of shielded 3-conductor cable with drain (ground) wire. The cable selected must be identical to the CCN Communication Bus wire used for the entire network.

See Table 11 for recommended cable.

Table 11 – Recommended Cables

MANUFACTURER	CABLE PART NO.
Alpha	2413 or 5463
American	A22503
Belden	8772
Columbia	02525

NOTE: Conductors and drain wire must be at least 20 AWG, stranded, and tinned copper. Individual conductors must be insulated with PVC, PVC/nylon, vinyl, Teflon*, or polyethylene. An aluminum/polyester 100% foil shield and an outer jacket of PVC, PVC/nylon, chrome vinyl, or Teflon with a minimum operating temperature range of -20°C to 60°C is required. Do not run communication wire in the same conduit as or next to any AC voltage wiring.

The communication bus shields must be tied together at each system element. If the communication bus is entirely within one building, the resulting continuous shield must be connected to ground at only one single point. If the communication bus cable exits from one building and enters another building, the shields must be connected to the grounds at a lightning suppressor in each building (one point only).

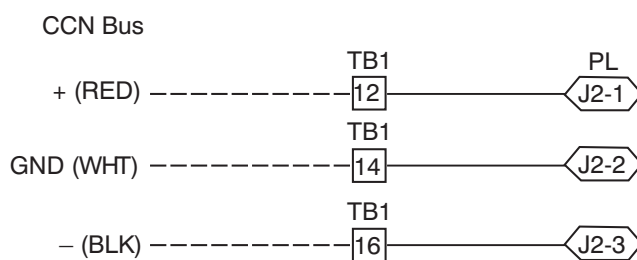
Connecting CCN bus:

NOTE: When connecting the communication bus cable, a color code system for the entire network is recommended to simplify installation and checkout. See Table 12 for the recommended color code.

Table 12 – Color Code Recommendations

SIGNAL TYPE	CCN BUS WIRE COLOR	CCN PLUG PIN NUMBER
+	Red	1
Ground	White	2
–	Black	3

Connect the CCN (+) lead (typically RED) to the unit's TB1-12 terminal. Connect the CCN (ground) lead (typically WHT) to the unit's TB1-14 terminal. Connect the CCN (–) lead (typically BLK) to the unit's TB1-16 terminal. See Fig. 55.



C08276

Fig. 55 - PremierLink Controller CCN Bus Connections

* Teflon is a registered trademark of DuPont.

RTU Open Controller System

The RTU Open controller is factory-mounted in the 50HCQ unit's main control box (see Fig. 57), to the left of the CTB. Factory wiring is completed through harnesses connected to the CTB. Field connections for RTU Open controller sensors will be made at the PCB connectors on the RTU Open board. The factory-installed RTU Open controller includes the supply-air temperature (SAT) sensor. The outdoor air temperature (OAT) sensor is included in the FIOP/accessory EconoMi\$er[®]2 package.

The RTU Open controller is an integrated component of the Carrier rooftop unit. Its internal application programming provides optimum performance and energy

efficiency. The RTU Open controller enables the unit to run in 100% stand-alone control mode, Carrier's i-Vu[®] Open network, or a Third Party Building Automation System (BAS). On-board DIP switches allow you to select your protocol (and baud rate) of choice among the four most popular protocols in use today: BACnet^{*}, Modbus[†], Johnson N2 and LonWorks^{**}. (See Fig. 56.)

Refer to Table 13, RTU Open Controller Inputs and Outputs for locations of all connections to the RTU Open board.

NOTE: The RTU Open controller acts as an intelligent imbedded thermostat. A room thermostat cannot be used with the RTU Open controller.

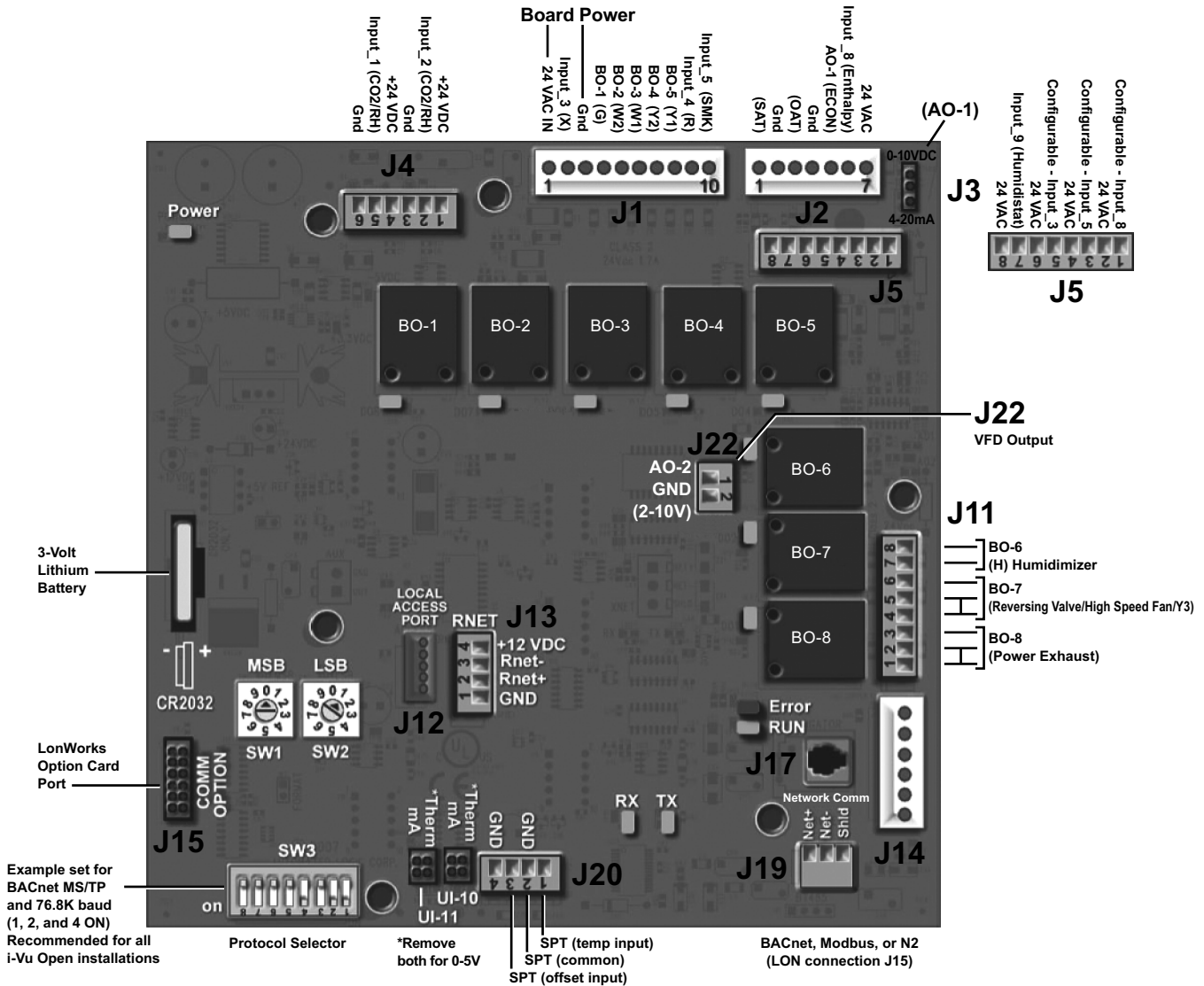


Fig. 56 - RTU Open Multi-Protocol Control Board

C14129

* BACnet is a registered trademark of ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers).

† Modbus is a registered trademark of Schneider Electric.

** LonWorks is a registered trademark of Echelon Corporation.

HEAT PUMP CONTROL 208/230V, 460V, 575V
10TON HP (2)COMPR T1
8.5TON HP(2)COMPR T2

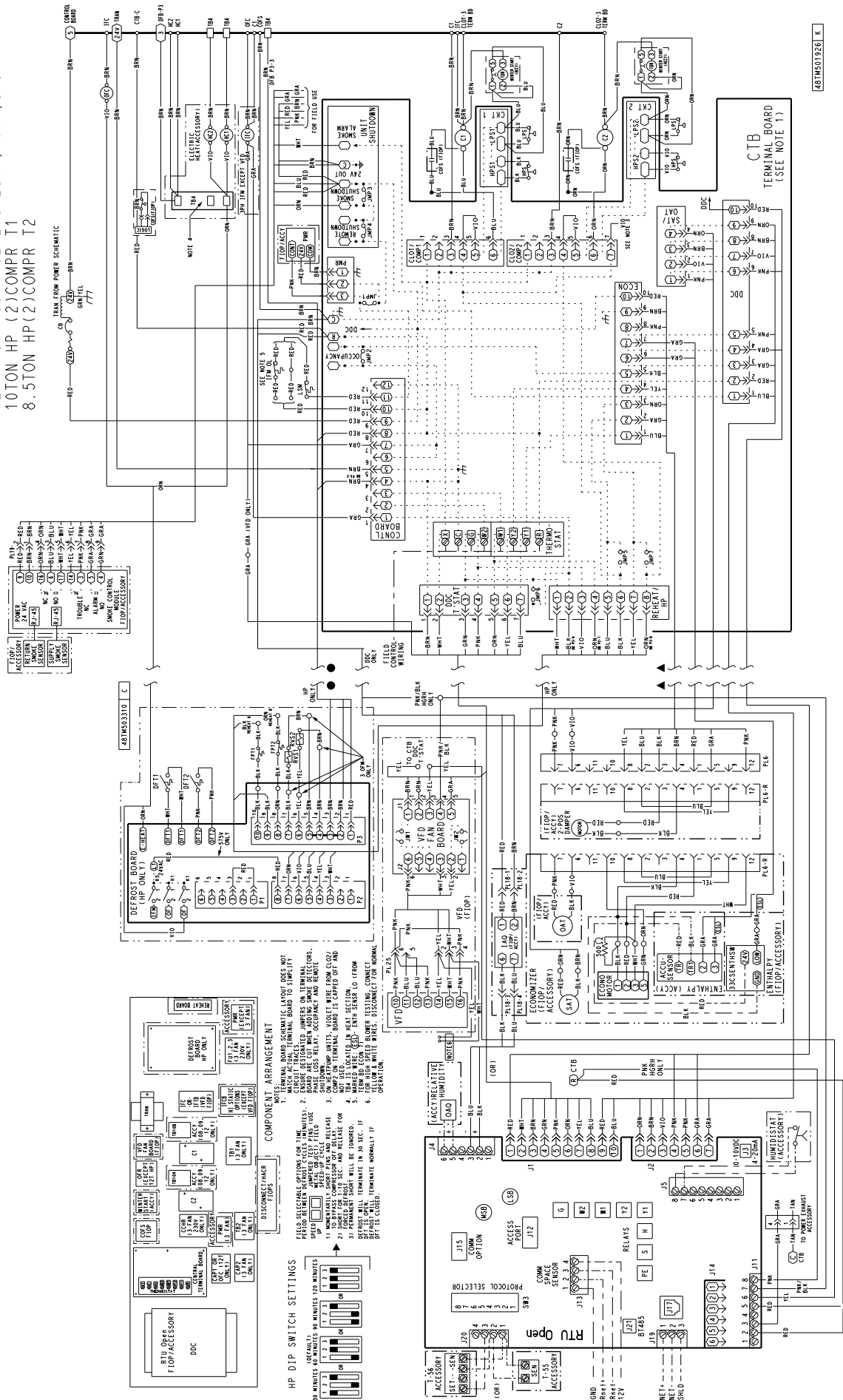


Fig. 57 - Typical RTU Open Controller Wiring Diagram

Table 13 – RTU Open Controller Inputs and Outputs

POINT NAME	BACnet OBJECT NAME	TYPE OF I/O	CONNECTION PIN NUMBER(S)	CHANNEL DESIGNATION
DEDICATED INPUTS				
Space Temp / Zone Temp	zone_temp	AI (10K Thermistor)	J20–1 and 2	Analog Input 10
Supply Air Temperature	sa_temp	AI (10K Thermistor)	J2–1 and 2	Analog Input 6
Outside Air Temperature	oa_temp	AI (10K Thermistor)	J2–3 and 4	Analog Input 7
Space Temperature Offset Pot	stpt_adj_offset	AI (100K Potentiometer)	J20–3 and 4	Analog Input 11
Safety Chain Feedback	safety_status	BI (24 VAC)	J1–9	Binary Input 4
Compressor Safety Status ⁽¹⁾	comp_status	BI (24 VAC)	J1–2	Binary Input 3
Fire Shutdown Status	firedown_status	BI (24 VAC)	J1–10	Binary Input 5
Enthalpy Status	enthalpy_status	BI (24 VAC)	J2–6 and 7	Binary Input 8
Humidistat Input Status	humstat_status	BI (24 VAC)	J5–7 and 8	Binary Input 9
Zone Temperature	n/a	n/a	J13–1–4	Rnet
CONFIGURABLE INPUTS ⁽⁴⁾				
Indoor Air CO2	iaq	AI (4–20 mA)	J4–2 and 3 or J4–5 and 6	Analog Input 2
Outdoor Air CO2	oaq	AI (4–20 mA)		Analog Input 1
Space Relative Humidity	space_rh	AI (4–20 mA)		Analog Input 10
Supply Fan Status ⁽²⁾	sfan_status	BI (24 VAC)	J5–1 and 2 or J5–3 and 4, J5–5 and 6 or J5–7 and 8 ⁽³⁾	Binary Input 3, 5, 8, or 9, except where intrinsic input is used
Filter Status ⁽²⁾	filter_status	BI (24 VAC)		Binary Input 3, 5, 8, or 9, except where intrinsic input is used
Door Contact ⁽²⁾	door_contact_status	BI (24 VAC)		Binary Input 3, 5, 8, or 9, except where intrinsic input is used
Remote Occupancy input ⁽²⁾	occ_contact_status	BI (24 VAC)		Binary Input 3, 5, 8, or 9, except where intrinsic input is used
IGC input ⁽²⁾	igcovr_status	BI (24 VAC)		Binary Input 9. Mandatory input on gas heat units.
OUTPUTS				
Economizer Output	econ_output	AO (4–20mA)	J2–5	Analog Output 1
Supply Fan VFD	vfd_output	AO (2–10Vdc)	J22–1 and 2	Analog Output 2
Supply Fan Relay	sfan	BO Relay (24VAC, 1A)	J1–4	Binary Output 1 (G)
Cool 1 Relay State	comp_1	BO Relay (24VAC, 1A)	J1–8	Binary Output 5 (Y1)
Cool 2 Relay State	comp_2	BO Relay (24VAC, 1A)	J1–7	Binary Output 4 (Y2)
Cool 3 Relay State	comp_3	BO Relay (24VAC, 1A)	J11–5 and 6	Binary Output 7 (Y3)
Heat 1 Relay State	heat_1	BO Relay (24VAC, 1A)	J1–6	Binary Output 3 (W1)
Heat 2 Relay State	heat_2	BO Relay (24VAC, 1A)	J1–5	Binary Output 2 (W2)
Power Exhaust Relay State	pexh	BO Relay (24VAC, 1A)	J11–2 and 3 (N.O.)	Binary Output 8 (PE)
Dehumidification Relay	dehum	BO Relay (24VAC, 1A)	J11–7 and 8 (N.O.)	Binary Output 6

LEGEND

AI – Analog Input
AO – Analog Output
BI – Binary Input
BO – Binary Output

⁽¹⁾ Safety Chain Feedback: 24Vac required at this terminal to provide “Run Enable” status. See Input/Output section for additional instructions.

⁽²⁾ These inputs are configurable. If installed, they take the place of the default input on the specific channel. See appropriate Input Configuration Section for wiring and setup instructions.

⁽³⁾ Parallel pins J5–1 = J2–6, J5–3 = J1–10, J5–5 = J1–2 are used for field installation.

⁽⁴⁾ Refer to the input configuration and accessory sections of the RTU Open Multi–Protocol Controller Controls, Start–Up, Operation and Troubleshooting manual for more detail.

The RTU Open controller requires the use of a Carrier space sensor. A standard thermostat cannot be used with the RTU Open controller system.

Supply Air Temperature (SAT) Sensor —

On FIOP-equipped 50HCQ unit, the unit is supplied with a supply-air temperature (SAT) sensor (33ZCSENSAT). This sensor is a tubular probe type, approx 6-inches (152 mm) in length. It is a nominal 10k ohm thermistor.

The SAT is factory-wired. The SAT probe is wire-tied to the supply-air opening (on the horizontal opening end) in its shipping position. Remove the sensor for installation. Re-position the sensor in the flange of the supply-air opening or in the supply air duct (as required by local codes). Drill or punch a 1/2-in. hole in the flange or duct. Use two field-supplied, self-drilling screws to secure the sensor probe in a horizontal orientation. See Fig. 41.

Outdoor Air Temperature (OAT) Sensor —

The OAT is factory-mounted in the EconoMi\$er[®]2 (option or accessory). It is a nominal 10k ohm thermistor attached to an eyelet mounting ring.

EconoMi\$er2 —

The RTU Open controller is used with EconoMi\$er2 (option or accessory) for outdoor air management. The damper position is controlled directly by the RTU Open controller; the EconoMi\$er2 unit has no internal logic device.

Outdoor air management functions can be enhanced with field-installation of these accessory control devices:

- Enthalpy control (outdoor air or differential sensors)
- Space CO₂ sensor
- Outdoor air CO₂ sensor

Field Connections

Field connections for accessory sensors and input devices are made to the RTU Open controller at plugs J1, J2, J4, J5, J11 and J20. All field control wiring that connects to the RTU Open controller must be routed through the raceway built into the corner post as shown in Fig. 31. The raceway provides the UL required clearance between high and low-voltage wiring. Pass the control wires through the hole provided in the corner post, then feed the wires thorough the raceway to the RTU Open controller. Connect to the wires to the removable PCB connectors and then reconnect the connectors to the board.

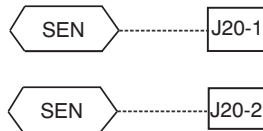
Space Temperature (SPT) Sensors —

There are two types of SPT sensors available from Carrier, resistive input non-communicating (T55, T56, and T59) and Rnet communicating (SPS, SPPL, SPP, and SPPF) sensors. Each type has a variety of options consisting of: timed override button, set point adjustment, a LCD screen, and communication tie in. Space temperature can be also be written to from a building network or zoning system. However, it is still recommended that return air duct sensor be installed to allow stand-alone operation for back-up. Refer to the configuration section for details on controller configurations associated with space sensors.

- 33ZCT55SPT, space temperature sensor with override button (T-55)
- 33ZCT56SPT, space temperature sensor with override button and setpoint adjustment (T-56)
- 33ZCT59SPT, space temperature sensor with LCD (liquid crystal display) screen, override button, and setpoint adjustment (T-59)

Use 20 gauge wire to connect the sensor to the controller. The wire is suitable for distances of up to 500 ft. Use a three-conductor shielded cable for the sensor and setpoint adjustment connections. If the setpoint adjustment (slidebar) is not required, then an unshielded, 18 or 20 gauge, two-conductor, twisted pair cable may be used.

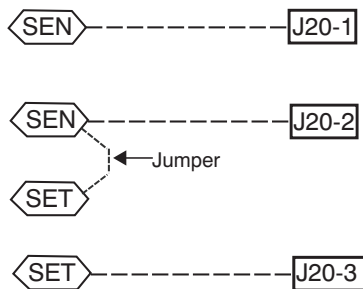
Connect T-55: See Fig. 42 for typical T-55 internal connections. Connect the T-55 SEN terminals to the RTU Open controller at J20-1 and J20-2. See Fig. 58.



C08460

Fig. 58 - RTU Open Controller T-55 Sensor Connections

Connect T-56: See Fig. 44 for T-56 internal connections. Install a jumper between SEN and SET terminals as illustrated. Connect T-56 terminals to the RTU Open controller at J20-1, J20-2 and J20-3 per Fig. 59.

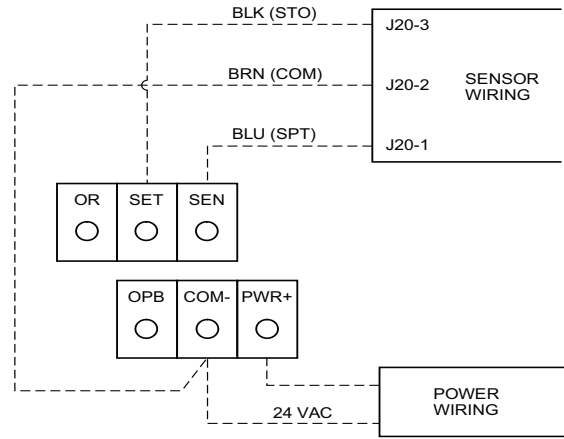


C08461

Fig. 59 - RTU Open Controller T-56 Sensor Connections

Connect T-59: The T-59 space sensor requires a separate, isolated power supply of 24 VAC. See Fig. 60 for internal connections at the T-59. Connect the SEN

terminal (BLU) to the RTU Open controller at J20-1. Connect the COM terminal (BRN) to J20-2. Connect the SET terminal (STO or BLK) to J20-3.



NOTE: Must use a separate isolated transformer.

C10291

Fig. 60 - Space Temperature Sensor Typical Wiring (33ZCT59SPT)

Indoor Air Quality (CO₂) Sensor —

The indoor air quality sensor accessory monitors space carbon dioxide (CO₂) levels. This information is used to monitor IAQ levels. Several types of sensors are available, for wall mounting in the space or in return duct, with and without LCD display, and in combination with space temperature sensors. Sensors use infrared technology to measure the levels of CO₂ present in the space air.

The CO₂ sensors are all factory set for a range of 0 to 2000 ppm and a linear mA output of 4 to 20. Refer to the instructions supplied with the CO₂ sensor for electrical requirements and terminal locations. See Fig. 47 for typical CO₂ sensor wiring schematic.

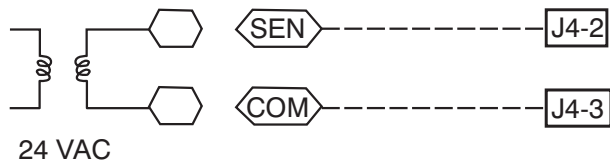
To accurately monitor the quality of the air in the conditioned air space, locate the sensor near a return-air grille (if present) so it senses the concentration of CO₂ leaving the space. The sensor should be mounted in a location to avoid direct breath contact.

Do not mount the IAQ sensor in drafty areas such as near supply ducts, open windows, fans, or over heat sources. Allow at least 3 ft (0.9 m) between the sensor and any corner. Avoid mounting the sensor where it is influenced by the supply air; the sensor gives inaccurate readings if the supply air is blown directly onto the sensor or if the supply air does not have a chance to mix with the room air before it is drawn into the return airstream.

Wiring the Indoor Air Quality Sensor: For each sensor, use two 2-conductor 18 AWG (American Wire Gauge) twisted-pair cables (unshielded) to connect the separate isolated 24 vac power source to the sensor and to connect the sensor to the control board terminals.

To connect the sensor to the control, identify the positive (4 to 20 mA) and ground (SIG COM) terminals on the sensor. See Fig. 47. Connect the 4-20 mA terminal to the RTU Open controller at J4-2 and connect the SIG COM terminal to the RTU Open controller at J4-3. See Fig. 61.

IAQ Sensor



C08462

Fig. 61 - RTU Open Controller / Indoor CO₂ Sensor (33ZCSENC02) Connections

Outdoor Air Quality Sensor

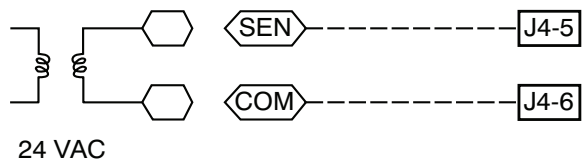
(P/N 33ZCSENC02 plus weatherproof enclosure) —

The outdoor air CO₂ sensor is designed to monitor carbon dioxide (CO₂) levels in the outside ventilation air and interface with the ventilation damper in an HVAC system. The OAQ sensor is packaged with an outdoor cover. See Fig. 49. The outdoor air CO₂ sensor must be located in the economizer outside air hood.

Wiring the Outdoor Air CO₂ Sensor: A dedicated power supply is required for this sensor. A two-wire cable is required to wire the dedicated power supply for the sensor. The two wires should be connected to the power supply and terminals 1 and 2.

To connect the sensor to the control, identify the positive (4 to 20 mA) and ground (SIG COM) terminals on the OAQ sensor. See Fig. 47. Connect the 4 to 20 mA terminal to the RTU Open controller at J4-5. Connect the SIG COM terminal to the RTU Open controller at J4-6.

OAQ Sensor



C11086

Fig. 62 - RTU Open Controller / Outdoor CO₂ Sensor (33ZCSENC02) Connections

Space Relative Humidity Sensor—

The Space Relative Humidity Sensor is not used with 50HCQ units at this time.

Smoke Detector/Fire Shutdown (FSD) —

On 50HCQ units equipped with factory-installed Smoke Detector(s), the smoke detector controller implements the unit shutdown through its NC contact set connected to the unit's CTB input. The FSD function is initiated via the smoke detector's Alarm NO contact set. The RTU Open controller communicates the smoke detector's tripped status to the BAS building control. See Fig. 57 (Typical RTU Open Controller wiring diagram).

The Fire Shutdown Switch configuration, **MENU→Config→Inputs→input 5**, identifies the normally open status of this input when there is no fire alarm.

Connecting Discrete Inputs —

Filter Status: The filter status accessory is a field-installed accessory. This accessory detects plugged filters. When installing this accessory, the unit must be configured for filter status by setting **MENU→Config→Inputs→input 3, 5, 8, or 9** to Filter Status and normally open (N/O) or normally closed (N/C). Input 8 or 9 is recommended for easy of installation. Refer to Fig. 56 and 57 for wire terminations at J5.

Fan Status: The fan status accessory is a field-installed accessory. This accessory detects when the indoor fan is blowing air. When installing this accessory, the unit must be configured for fan status by setting **MENU→Config→Inputs→input 3, 5, 8, or 9** to Fan Status and normally open (N/O) or normally closed (N/C). Input 8 or 9 is recommended for easy of installation. Refer to Fig. 56 and 57 for wire terminations at J5.

Remote Occupancy: The remote occupancy accessory is a field-installed accessory. This accessory overrides the unoccupied mode and puts the unit in occupied mode. When installing this accessory, the unit must be configured for remote occupancy by setting **MENU→Config→Inputs→input 3, 5, 8, or 9** to Remote Occupancy and normally open (N/O) or normally closed (N/C).

Also set **MENU→Schedules→occupancy source** to DI on/off. Input 8 or 9 is recommended for ease of installation. Refer to Fig. 56 and Table 13 for wire terminations at J5.

Power Exhaust (output): The relay used by the RTU Open controller board to control power exhaust is a dry contact which means it does not have 24vac. This 24vac must be connected to the relay to allow it to operate the power exhaust relay in the PE accessory. A 24vac source must be provided to J11-2 on the RTU Open controller board. This can be provided by the unit's transformer from various sources. The "R" terminal on the unit's central terminal board (CTB) is a logical source. Refer to Fig. 56 and 57 for wire terminations at J11.

Communication Wiring - Protocols

General —

Protocols are the communication languages spoken by control devices. The main purpose of a protocol is to communicate information in the most efficient method possible. Different protocols exist to provide different kinds of information for different applications. In the BAS application, many different protocols are used, depending on manufacturer. Protocols do not change the function of a controller; just make the front end user different.

The RTU Open controller can be set to communicate on four different protocols: BACnet, Modbus, N2, and LonWorks. Switch 3 (SW3) on the board is used to set protocol and baud rate. Switches 1 and 2 (SW1 and SW2) are used to set the board's network address. See Fig. 63 and 64 for protocol switch settings and address switches.

The third party connection to the RTU Open controller is through plug J19. See Fig. 65 for wiring.

NOTE: Power must be cycled after changing the SW1-3 switch settings.

Refer to the RTU Open v3 Integration Guide for more detailed information on protocols, third party wiring, and networking.

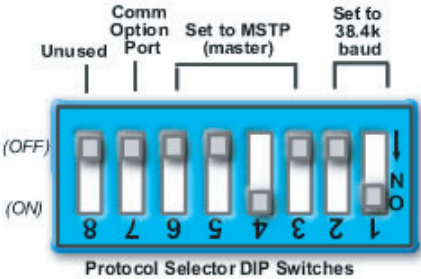
SW3 Protocol Selection

PROTOCOL	DS8	DS7	DS6	DS5	DS4	DS3	DS2	DS1
BACnet MS/TP (Master)	Unused	OFF	OFF	OFF	ON	OFF	Select Baud	Select Baud
Modbus (Slave)	Unused	OFF	OFF	ON	ON	OFF	Select Baud	Select Baud
N2 (Slave)	Unused	OFF	OFF	OFF	ON	ON	OFF	OFF
LonWorks	Unused	ON	ON	OFF	ON	OFF	OFF	ON

NOTE:
DS = Dip Switch
BACnet MS/TP SW3 example shown

Baud Rate Selections

BAUD RATE	DS2	DS1
9600	OFF	OFF
19,200	ON	OFF
38,400	OFF	ON
76,800	ON	ON



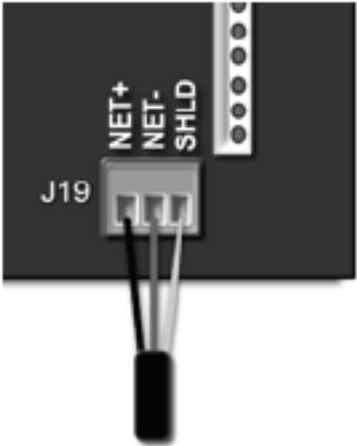
C07166

Fig. 63 - RTU Open Controller SW3 Dip Switch Settings



C10815

Fig. 64 - RTU Open Controller Address Switches



C10816

Fig. 65 - Network Wiring

Local Access

Wall Mounted Equipment Touch™ Interface

The Equipment Touch interface is a wall mounted unit used to connect to the RTU Open controller to access the control information, read sensor values, and perform maintenance. This is an accessory interface that does not come with the RTU Open controller. Wire the Equipment Touch interface to the RTU Open controller's J13 local access port. There are 2 password protected levels in the display (User and Admin). See the Equipment Touch Installation and Setup Guide for more information. See Appendix A of the guide for navigation and screen content.

Field Assistant

Field Assistant is a computer program included with the purchase of the Tech Tool Kit (USB-TKIT). This is a field Tech Tool to set-up, service, or download application software to the RTU Open controller and includes a USB Link Cable. The link cable connects a USB port to the J12 local access port. The Field Assistant's menu structure is similar and functions the same as i-Vu® controller. See Fig. 66.

RTU Open Controller Troubleshooting —

Communication LEDs: The LEDs indicate if the controller is speaking to the devices on the network. The LEDs should reflect communication traffic based on the baud rate set. The higher the baud rate the more solid the LEDs will appear. See Table 14.

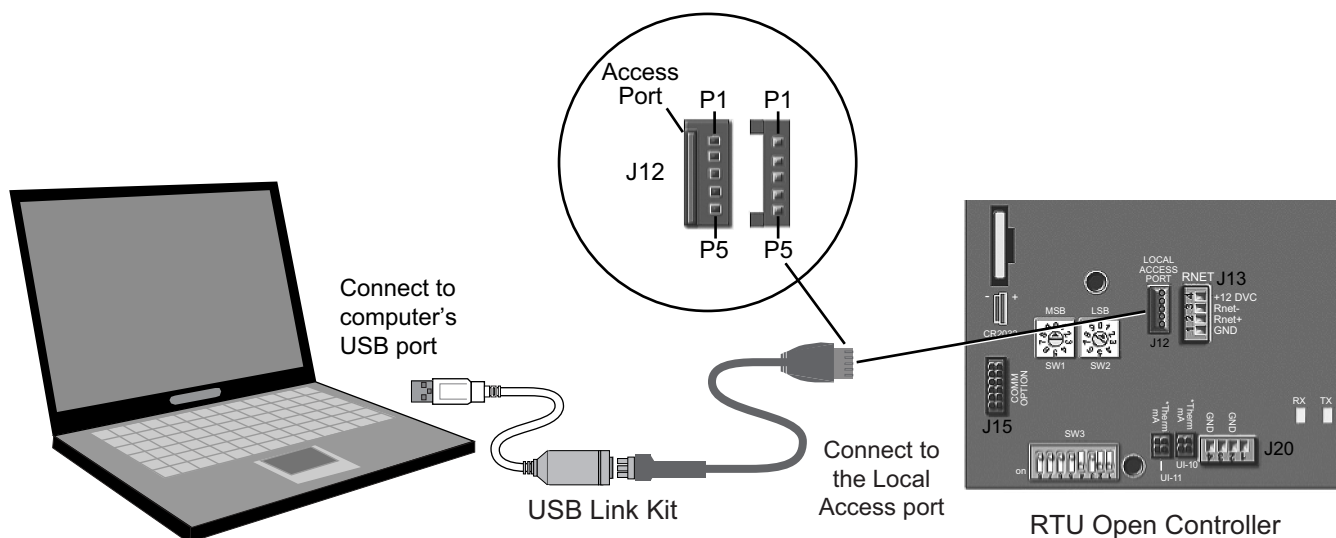


Fig. 66 - PC Running Field Assistant

C14131

50HCO

Table 14 – LEDs

The LEDs on the RTU Open Controller show the status of certain functions

If this LED is on...	Status is...
Power	The RTU Open controller has power
Rx	The RTU Open controller is receiving data from the network segment
Tx	The RTU Open controller is transmitting data over the network segment
BO#	The binary output is active

The **Run** and **Error** LEDs indicate control module and network status

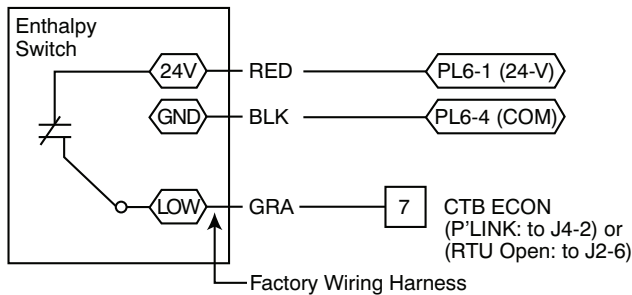
If Run LED shows...	And Error LED shows...	Status is...
2 flashes per second	Off	Normal
2 flashes per second	2 flashes, alternating with Run LED	Five minute auto—restart delay after system error
2 flashes per second	3 flashes, then off	Control module has just been formatted
2 flashes per second	4 flashes, then pause	Two or more devices on this network have the same MSTP network address
2 flashes per second	On	Exec halted after frequent system errors or control programs halted
5 flashes per second	On	Exec start—up aborted, Boot is running
5 flashes per second	Off	Firmware transfer in progress, Boot is running
7 flashes per second	7 flashes per second, alternating with Run LED	Ten second recovery period after brownout
14 flashes per second	14 flashes per second, alternating with Run LED	Brownout
On	On	Failure. Try the following solutions: • Turn the RTU Open controller off, then on. • Format the RTU Open controller. • Download memory to the RTU Open controller. • Replace the RTU Open controller.

NOTE: Refer to the RTU Open Multi-Protocol Controller Controls, Start-Up, Operation and Troubleshooting manual for complete configuration of the RTU Open controller operating sequences and troubleshooting information. Refer to the RTU Open v3 Integration Guide for details on configuration and troubleshooting of connected networks. Have a copy of these manuals available at unit start-up.

Outdoor Air Enthalpy Control (P/N 33CSENTHSW)

The enthalpy control (33CSENTHSW) is available as a field-installed accessory to be used with the EconoMiSer®2 damper system. The outdoor air enthalpy sensor is part of the enthalpy control. (The separate field-installed accessory return air enthalpy sensor (33CSENTSEN) is required for differential enthalpy control. See Fig. 67.)

Locate the enthalpy control in the economizer next to the Actuator Motor. Locate two GRA leads in the factory harness and connect the gray lead labeled “ESL” to the terminal labeled “LOW”. See Fig. 67. Connect the enthalpy control power input terminals to economizer actuator power leads RED (connect to 24V) and BLK (connect to GND).



C11160

Fig. 67 - Enthalpy Switch (33CSENTHSW) Connections

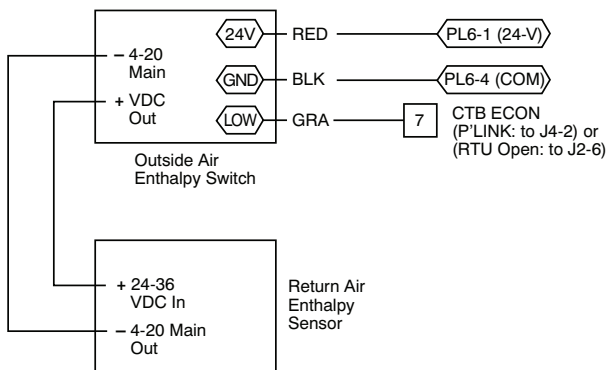
The outdoor enthalpy changeover setpoint is set at the enthalpy controller.

Differential Enthalpy Control —

Differential enthalpy control is provided by sensing and comparing the outside air and return air enthalpy conditions. Install the outdoor air enthalpy control as described above. Add and install a return air enthalpy sensor.

Return Air Enthalpy Sensor —

Mount the return-air enthalpy sensor (33CSENTSEN) in the return-air section of the economizer. The return air sensor is wired to the enthalpy controller (33CSENTHSW). See Fig. 68.



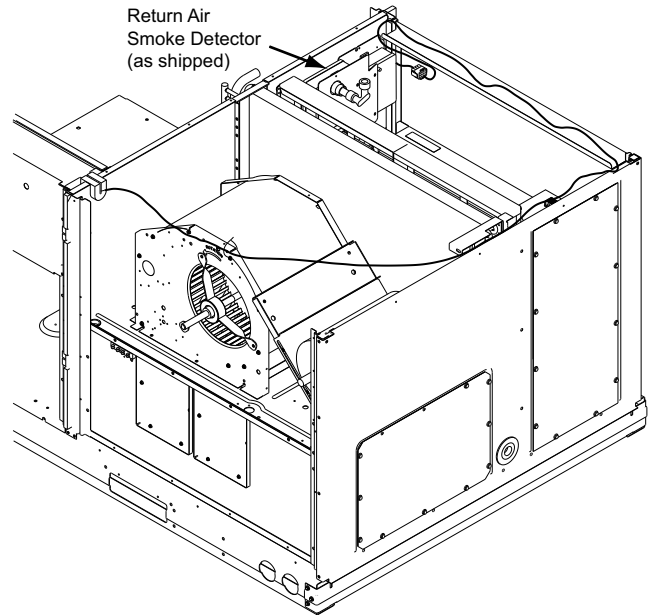
C11161

Fig. 68 - Outside and Return Air Enthalpy Sensor Wiring

Smoke Detectors

Smoke detectors are available as factory-installed options on 50HCQ models. Smoke detectors may be specified for Supply Air only or for Return Air without or with economizer or in combination of Supply Air and Return Air. All components necessary for operation are factory-provided and mounted. The unit is factory-configured for immediate smoke detector shutdown operation; additional wiring or modifications to unit terminal board may be necessary to complete the unit and smoke detector configuration to meet project requirements.

Units equipped with factory-optional Return Air smoke detectors require a relocation of the sensor module at unit installation. See Fig. 69 for the as shipped location.



C12282

Fig. 69 - Return Air Smoke Detector, Shipping Position

Completing Installation of Return Air Smoke Sensor:

1. Unscrew the two screws holding the Return Air Smoke Detector assembly. See Fig. 70, Step 1. Save the screws.
2. Turn the assembly 90 degrees and then rotate end to end. Make sure that the elbow fitting is pointing down. See Fig. 70, Step 2.
3. Screw the sensor and detector plate into its operating position using screws from Step 1. See Fig. 70, Step 3.
4. Connect the flexible tube on the sampling inlet to the sampling tube on the basepan.

Additional Application Data —

Refer to the Application Data sheet titled Factory Installed Smoke Detectors for Small and Medium Rooftop Units 2 to 25 Tons for discussions on additional control features of these smoke detectors including multiple unit coordination.

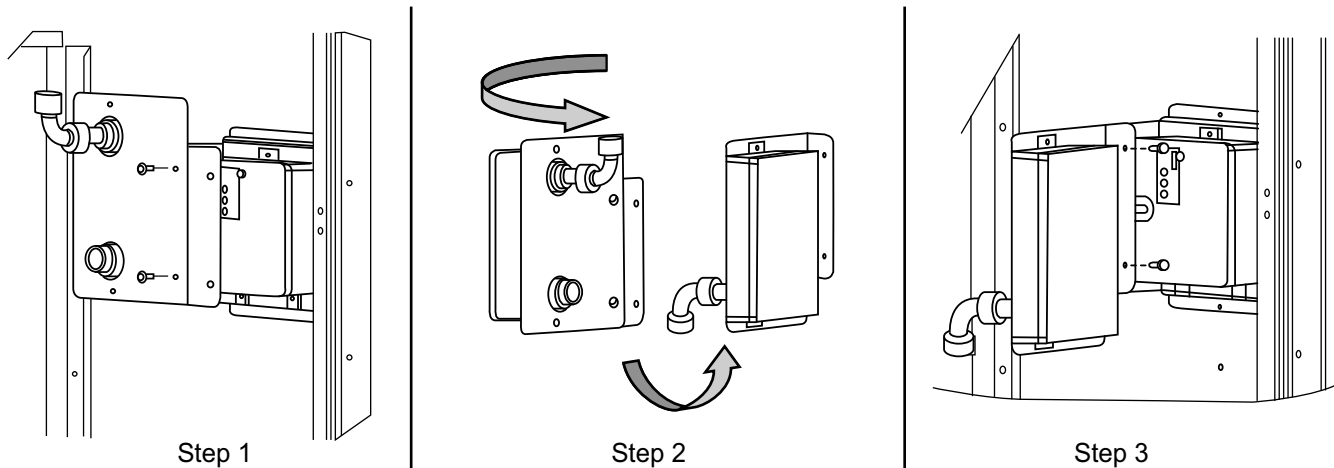


Fig. 70 - Completing Installation of Return Air Smoke Sensor

C12283

50HCO

Legend and Notes for Tables 15 and 16

LEGEND:

BRKR	-	Circuit breaker
C.O.	-	Convenience outlet
DISC.	-	Disconnect
FLA	-	Full load amps
LRA	-	Locked rotor amps
MCA	-	Minimum circuit amps
P.E.	-	Power exhaust
Pwr'd fr/ unit	-	Powered from unit
PWRD C.O.	-	Powered convenience outlet
UNPWR C.O.	-	Unpowered convenience outlet

NOTES:

1. In compliance with NEC requirements for multimotor and combination load equipment (refer to NEC Articles 430 and 440), the overcurrent protective device for the unit shall be fuse or HACR breaker. Canadian units may be fuse or circuit breaker.
2. For 208/230 v units, where one value is shown it is the same for either 208 or 230 volts.
3. **Unbalanced 3-Phase Supply Voltage**
Never operate a motor where a phase imbalance in supply voltage is greater than 2%. Use the following formula to determine the percentage of voltage imbalance.

$$\% \text{ Voltage Imbalance} = 100 \times \frac{\text{max voltage deviation from average voltage}}{\text{average voltage}}$$

Example: Supply voltage is 230-3-60



AB = 224 v
BC = 231 v
AC = 226 v

$$\begin{aligned} \text{Average Voltage} &= \frac{(224 + 231 + 226)}{3} = \frac{681}{3} \\ &= 227 \end{aligned}$$

Determine maximum deviation from average voltage.

(AB) 227 - 224 = 3 v

(BC) 231 - 227 = 4 v

(AC) 227 - 226 = 1 v

Maximum deviation is 4 v.

Determine percent of voltage imbalance.

$$\begin{aligned} \% \text{ Voltage Imbalance} &= 100 \times \frac{4}{227} \\ &= 1.76\% \end{aligned}$$

This amount of phase imbalance is satisfactory as it is below the maximum allowable 2%.

IMPORTANT: If the supply voltage phase imbalance is more than 2%, contact your local electric utility company immediately.

Table 15 – Unit Wire/Fuse or HACR Breaker Sizing Data - Single Speed Indoor Fan Motor

UNIT	NO M. V-Pn-HZ	ELEC. HTR			NO C.O. or UNPWR C.O.						w/ PWRD C.O.										
		CRHEATER ****00	Nom (kW)	FLA	NO PE.			w/ P.E. (pwrdr fr/unit)			NO PE.			w/ P.E. (pwrdr fr/unit)							
					MCA	MAX FUSE or HACR BRKR	DISC. SIZE		MCA	MAX FUSE or HACR BRKR	DISC. SIZE		MCA	MAX FUSE or HACR BRKR	DISC. SIZE						
							FLA	LRA			FLA	LRA			FLA	LRA	FLA	LRA			
STD		NONE	-	-	33	50	32	161	37	50	36	165	38	50	37	166	42	60	60/70	58/60	170
		264A	4.9/6.5	13.6/15.6	50/53	48/50	175/177	54/56	60/60	52/54	179/181	55/57	60/60	53/55	180/182	59/61	60/70	58/60	184/186		
		117A	7.8/10.4	21.7/25.0	60/64	57/61	183/186	64/68	70/80	61/65	187/190	65/69	70/80	62/66	188/191	69/73	80/80	60/80	192/195		
		110A	12.0/16.0	33.4/38.5	75/81	70/76	194/200	79/85	80/90	75/81	198/204	80/86	80/90	76/82	199/205	84/90	90/100	80/86	203/209		
		117A+117A	15.8/21.0	43.8/50.5	88/96	82/90	249/262	92/100	100/100	87/94	253/266	93/101	100/110	88/96	254/267	97/105	100/110	92/100	258/271		
MED	208/230-3-60	110A+117A	19.9/26.5	55.2/63.8	102/113	110/125	95/105	271/289	106/117	110/125	100/110	275/293	107/118	110/125	101/111	276/294	111/122	125/125	105/115	280/288	
		NONE	-	-	35	50	35	198	39	50	39	202	40	50	40	203	44	60	45	207	
		264A	4.9/6.5	13.6/15.6	52/55	50/53	212/214	56/59	60/60	55/57	216/218	57/60	60/70	56/58	217/219	61/64	70/70	60/62	221/223		
		117A	7.8/10.4	21.7/25.0	63/67	60/63	220/223	66/71	80/80	64/68	224/227	67/72	80/80	65/69	225/228	71/75	80/80	69/73	229/232		
		110A	12.0/16.0	33.4/38.5	77/84	73/79	231/237	81/87	90/90	77/83	235/241	82/88	90/90	79/84	236/242	86/92	90/100	83/89	240/246		
HIGH	208/230/230-3-60	117A+117A	15.8/21.0	43.8/50.5	90/99	90/100	85/93	286/299	94/102	100/110	89/97	290/303	95/103	100/110	91/98	291/304	99/107	100/110	90/100	295/308	
		110A+117A	19.9/26.5	55.2/63.8	104/115	110/125	98/108	308/326	108/119	110/125	102/112	312/330	109/120	110/125	104/114	313/331	113/124	125/125	108/118	317/335	
		NONE	-	-	42/41	60/50	42/41	230	45/44	60/60	46/45	234	46/45	60/60	47/46	235	50/49	60/60	52/50	239	
		264A	4.9/6.5	13.6/15.6	59/60	60/70	57/59	244/246	62/64	70/70	62/63	248/250	63/65	70/80	63/64	249/251	67/69	80/80	67/68	253/255	
		117A	7.8/10.4	21.7/25.0	69/72	67/69	252/255	72/76	80/80	71/74	256/259	73/77	80/80	72/75	257/260	77/81	80/90	76/79	261/264		
STD		110A	12.0/16.0	33.4/38.5	83/89	90/90	80/85	263/269	87/93	90/100	84/89	267/273	88/94	90/100	86/90	268/274	92/97	100/100	90/95	272/278	
		117A+117A	15.8/21.0	43.8/50.5	96/104	100/110	92/99	318/331	100/108	100/110	96/103	322/335	101/109	110/110	98/104	323/336	105/112	100/125	102/109	327/340	
		110A+117A	19.9/26.5	55.2/63.8	111/120	125/125	105/114	340/358	114/124	125/125	109/118	344/362	115/125	125/125	111/119	345/363	119/129	125/125	115/124	349/367	
		NONE	-	-	15	20	14	79	17	20	16	81	17	20	17	81	19	25	19	83	
		265A	6.0	7.2	24	25	23	86	26	30	25	88	26	30	25	88	28	30	27	90	
MED	460-3-60	266A	11.5	13.8	32	35	30	93	34	35	32	95	34	35	33	95	36	40	35	97	
		267A	14.0	16.8	36	40	34	96	38	40	36	98	40	40	36	98	40	40	38	100	
		268A	23.0	27.7	50	50	46	107	51	60	48	109	52	60	49	109	54	60	51	111	
		269A	25.5	30.7	53	60	50	110	55	60	52	112	55	60	52	112	57	60	54	114	
		NONE	-	-	16	20	15	98	18	25	17	100	18	25	18	100	20	25	20	102	
HIGH	460-3-60	265A	6.0	7.2	25	30	23	105	27	30	26	107	27	30	26	107	29	30	28	109	
		266A	11.5	13.8	33	35	31	112	35	35	33	114	35	35	34	114	37	40	36	116	
		267A	14.0	16.8	37	40	35	115	39	40	37	117	39	40	37	117	41	45	39	119	
		268A	23.0	27.7	50	50	47	126	52	60	49	128	53	60	50	128	54	60	52	130	
		269A	25.5	30.7	54	60	50	129	56	60	53	131	56	60	53	131	58	60	55	133	
STD	575-3-60	NONE	-	-	19	25	19	114	21	25	21	116	21	25	21	116	23	30	23	118	
		265A	6.0	7.2	28	30	27	121	30	30	29	123	30	30	29	123	32	35	32	125	
		266A	11.5	13.8	36	40	35	128	38	40	37	130	38	40	37	130	40	40	39	132	
		267A	14.0	16.8	40	40	38	131	42	45	40	133	42	45	40	133	44	45	43	135	
		268A	23.0	27.7	53	60	50	142	55	60	53	144	56	60	53	144	57	60	55	146	
MED	575-3-60	269A	25.5	30.7	57	60	54	145	59	60	56	147	59	60	56	147	61	70	59	149	
		NONE	-	-	12	15	11	66	15	20	15	70	13	15	13	68	17	20	17	72	
		118A	18.0	17.3	33	35	31	83	37	40	35	87	35	35	33	85	39	40	37	89	
		299A	28.0	26.9	45	45	42	93	49	50	46	97	47	50	44	95	51	60	48	99	
		NONE	-	-	13	15	12	81	17	20	17	85	14	20	14	83	18	20	19	87	
HIGH	575-3-60	118A	18.0	17.3	34	35	32	98	38	40	36	102	36	40	34	100	40	40	38	104	
		299A	28.0	26.9	46	50	43	108	50	50	47	112	48	50	45	110	52	60	49	114	
		NONE	-	-	16	20	15	95	19	25	20	99	17	20	17	97	21	25	22	101	
		118A	18.0	17.3	37	40	35	112	41	45	40	116	39	40	37	114	43	45	42	118	
		299A	28.0	26.9	49	50	46	122	53	60	51	126	51	60	48	124	55	60	53	128	

See "Legend and Notes for Tables 15 and 16" on page 43.

Table 15 - Unit Wire/Fuse or HACR Breaker Sizing Data - Single Speed Indoor Fan Motor (cont)

UNIT	NO M. V-PH-HZ	ELEC. HTR			NO C.O. or UNPWR C.O.						w/ PWRD C.O.					
		CRHEATER ****00	Nom (kW)	FLA	NO PE.			w/ P.E. (pwrd fr/unit)			NO PE.			w/ P.E. (pwrd fr/unit)		
					MCA	FUSE or HACR BRKR	DISC. SIZE FLA LRA	MCA	FUSE or HACR BRKR	DISC. SIZE FLA LRA	MCA	FUSE or HACR BRKR	DISC. SIZE FLA LRA	MCA	FUSE or HACR BRKR	DISC. SIZE FLA LRA
STD		NONE	-	-	32	50	31 161	36	50	36 165	37	50	37 166	41	50	41 170
		264A	4.9/6.5	13.6/15.6	49/52	60/60	175/177	51/53	60/60	179/181	54/57	60/60	180/182	58/60	60/70	57/59
		117A	7.8/10.4	21.7/25.0	59/64	60/70	183/186	63/67	70/70	187/190	64/68	70/80	188/191	68/72	80/80	66/70
		110A	12.0/16.0	33.4/38.5	74/80	80/80	194/200	78/84	80/90	198/204	79/85	80/90	199/205	83/89	90/90	79/85
		117A+117A	15.8/21.0	43.8/50.5	87/95	90/100	249/262	91/99	100/100	253/266	92/100	100/100	254/267	96/104	100/110	91/99
MED	208/230-3-60	110A+117A	19.9/26.5	55.2/63.8	101/112	110/125	271/289	105/116	110/125	275/293	106/117	110/125	276/294	110/121	110/125	105/114
		NONE	-	-	35	50	34 198	38	50	202	39	50	203	43	60	44
		264A	4.9/6.5	13.6/15.6	52/54	60/60	212/214	55/58	60/60	216/218	56/59	60/60	217/219	60/63	70/70	59/62
		117A	7.8/10.4	21.7/25.0	62/66	70/70	220/223	66/70	70/80	224/227	67/71	70/80	225/228	70/74	80/80	69/72
		110A	12.0/16.0	33.4/38.5	76/83	80/90	231/237	80/87	80/90	235/241	81/88	90/90	236/242	85/91	90/100	82/88
HIGH	208/230-3-60	117A+117A	15.8/21.0	43.8/50.5	89/98	90/100	288/299	93/102	100/110	290/303	94/103	100/110	291/304	98/106	100/110	94/102
		110A+117A	19.9/26.5	55.2/63.8	104/114	110/125	308/326	107/118	110/125	312/330	108/119	110/125	313/331	112/123	125/125	107/117
		NONE	-	-	41/40	50/50	41/40	44/44	60/60	45/44	45/45	60/60	46/45	49/48	60/60	51/50
		264A	4.9/6.5	13.6/15.6	58/59	60/60	244/246	61/63	70/70	248/250	62/64	70/70	249/251	66/68	80/80	66/68
		117A	7.8/10.4	21.7/25.0	68/71	80/80	252/255	72/75	80/80	256/259	73/76	80/80	257/260	76/80	80/80	76/78
STD	460-3-60	110A	12.0/16.0	33.4/38.5	82/88	90/90	263/269	86/92	90/100	267/273	87/93	90/100	268/274	91/97	100/100	89/94
		117A+117A	15.8/21.0	43.8/50.5	95/103	100/110	318/331	99/107	100/110	322/335	100/108	100/110	323/336	104/112	110/125	101/108
		110A+117A	19.9/26.5	55.2/63.8	110/120	110/125	340/358	113/123	125/125	344/362	114/124	125/125	345/363	118/128	125/150	114/123
		NONE	-	-	17	25	16 79	19	25	81	19	25	81	21	30	21
		265A	6.0	7.2	26	30	24 86	28	30	88	28	30	88	30	30	29
MED	460-3-60	266A	11.5	13.8	34	35	32 93	36	40	95	36	40	95	38	40	36
		267A	14.0	16.8	38	40	35 96	40	45	98	40	45	98	42	45	40
		268A	23.0	27.7	51	60	48 107	53	60	109	54	60	109	55	60	52
		269A	25.5	30.7	55	60	51 110	57	60	112	57	60	112	59	60	56
		NONE	-	-	18	25	17 98	19	25	100	20	25	100	22	30	22
HIGH	460-3-60	265A	6.0	7.2	27	30	25 105	28	30	107	29	30	107	31	35	30
		266A	11.5	13.8	35	40	33 112	37	40	114	37	40	114	39	40	37
		267A	14.0	16.8	39	40	36 115	40	45	117	41	45	117	43	45	41
		268A	23.0	27.7	52	60	49 126	54	60	128	54	60	128	56	60	53
		269A	25.5	30.7	56	60	52 129	58	60	131	58	60	131	60	60	57
STD	575-3-60	NONE	-	-	21	25	20 114	22	30	116	23	30	116	25	30	25
		265A	6.0	7.2	30	30	29 121	31	35	123	32	35	123	34	40	33
		266A	11.5	13.8	38	40	36 128	40	45	130	40	45	130	42	45	41
		267A	14.0	16.8	42	45	42 131	43	45	133	44	45	133	46	50	44
		268A	23.0	27.7	55	60	52 142	57	60	144	57	60	144	59	60	57
MED	575-3-60	269A	25.5	30.7	59	60	56 145	61	70	147	61	70	147	63	70	60
		NONE	-	-	13	20	12 66	17	20	70	15	20	68	18	25	18
		118A	18.0	17.3	35	35	32 83	38	40	87	36	40	85	40	40	38
		299A	28.0	26.9	47	50	43 93	50	50	97	48	50	95	52	60	49
		NONE	-	-	14	20	13 81	18	25	85	16	20	83	20	25	20
HIGH	575-3-60	118A	18.0	17.3	36	40	33 98	40	40	102	37	40	100	41	45	40
		299A	28.0	26.9	48	50	44 108	52	60	112	49	50	110	53	60	51
		NONE	-	-	17	20	17 95	21	25	99	19	25	97	22	25	23
		118A	18.0	17.3	39	40	37 112	42	45	116	40	40	114	44	45	43
		299A	28.0	26.9	51	60	48 122	54	60	126	52	60	124	56	60	54

See "Legend and Notes for Tables 15 and 16" on page 43.

Table 15 - Unit Wire/Fuse or HACR Breaker Sizing Data - Single Speed Indoor Fan Motor (cont)

UNIT	NO M. V-PH-HZ	ELEC. HTR			NO C.O. or UNPWR C.O.						w/ PWRD C.O.					
		CRHEATER ***00	Nom (kW)	FLA	NO PE.			w/ P.E. (pwrdr fr/unit)			NO PE.			w/ P.E. (pwrdr fr/unit)		
					MCA	MAX FUSE or HACR BRKR	DISC. SIZE		MCA	MAX FUSE or HACR BRKR	DISC. SIZE		MCA	MAX FUSE or HACR BRKR	DISC. SIZE	
							FLA	LRA			FLA	LRA			FLA	LRA
STD		NONE	-	-	38	50	40	191	42	50	44	195	43	50	45	196
		117A	7.8/10.4	21.7/25.0	65/69	70/70	65/68	213/216	69/73	70/80	69/73	217/220	70/74	80/80	74/78	222/225
		110A	12.0/16.0	33.4/38.5	80/86	80/90	78/84	224/230	84/90	90/90	82/88	228/234	85/91	90/100	88/94	233/239
		111A	18.6/24.8	51.7/59.7	103/113	110/125	99/108	243/251	107/117	110/125	103/113	247/255	108/118	110/125	105/114	109/118
		112A	24.0/32.0	66.7/77.0	122/134	125/150	116/128	258/268	125/138	125/150	121/132	262/272	126/139	150/150	122/134	263/273
MED		112A+117A	31.8/42.4	88.4/102.0	149/166	150/175	141/157	368/395	152/169	175/175	146/161	372/399	153/170	175/175	147/162	373/400
		NONE	-	-	40/40	50/50	42/41	229	44/43	50/50	46/46	233	45/44	50/50	47/47	234
		117A	7.8/10.4	21.7/25.0	67/71	70/80	66/70	251/254	71/75	80/80	71/74	255/258	72/76	80/80	72/76	256/259
		110A	12.0/16.0	33.4/38.5	82/88	90/90	80/86	262/268	85/92	90/100	84/90	266/272	86/93	90/100	85/91	267/273
		111A	18.6/24.8	51.7/59.7	104/114	110/125	101/110	281/289	108/118	110/125	105/114	285/293	109/119	110/125	106/115	286/294
HIGH		112A	24.0/32.0	66.7/77.0	123/136	125/150	118/130	298/306	127/140	150/150	123/134	300/310	128/141	150/150	124/135	301/311
		112A+117A	31.8/42.4	88.4/102.0	150/167	150/175	143/159	408/433	154/171	175/175	148/163	410/437	155/172	175/175	149/164	411/438
		NONE	-	-	44	50	46	258	47	60	50	262	48	60	51	263
		117A	7.8/10.4	21.7/25.0	71/75	80/80	71/75	280/283	74/79	80/80	75/79	284/287	75/80	80/80	76/80	285/288
		110A	12.0/16.0	33.4/38.5	85/92	90/100	84/90	291/297	89/95	90/100	89/94	295/301	90/96	90/100	90/96	296/302
STD		111A	18.6/24.8	51.7/59.7	108/118	110/125	105/114	310/318	112/122	125/125	110/119	314/322	113/123	125/125	111/120	315/323
		112A	24.0/32.0	66.7/77.0	127/140	150/150	122/134	325/335	131/144	150/150	127/139	329/339	132/145	150/150	128/140	330/340
		112A+117A	31.8/42.4	88.4/102.0	154/171	175/175	147/163	435/462	158/175	175/175	152/167	439/466	159/176	175/200	153/169	440/467
		NONE	-	-	18	20	19	95	20	25	21	97	21	25	21	97
		116B	13.9	16.7	39	40	38	112	41	45	40	114	41	45	41	114
MED		113B	16.5	19.8	43	45	42	115	45	45	44	117	45	45	44	117
		114B	27.8	33.4	60	60	57	128	62	70	59	130	62	70	60	130
		115B	33.0	39.7	68	70	65	135	70	70	67	137	70	70	67	137
		128B	41.7	50.2	81	90	77	145	83	90	79	147	83	90	79	147
		NONE	-	-	19	25	20	114	21	25	22	116	21	25	22	116
HIGH		116B	13.9	16.7	40	40	39	131	42	45	41	133	42	45	42	133
		113B	16.5	19.8	44	45	43	134	46	50	45	136	46	50	45	136
		114B	27.8	33.4	61	70	58	147	63	70	60	149	63	70	61	149
		115B	33.0	39.7	69	70	65	154	71	80	68	156	71	80	68	156
		128B	41.7	50.2	82	90	78	164	84	90	80	166	84	90	80	166
STD		NONE	-	-	21	25	22	129	23	25	24	131	23	25	24	131
		116B	13.9	16.7	42	45	41	146	44	45	43	148	44	45	44	148
		113B	16.5	19.8	46	50	45	149	48	50	47	151	48	50	47	151
		114B	27.8	33.4	63	70	60	162	65	70	62	164	65	70	63	164
		115B	33.0	39.7	71	80	68	169	73	80	70	171	73	80	70	171
MED		118A	18.0	17.3	35	35	33	94	39	40	38	98	36	40	35	96
		119A	36.0	34.6	56	60	53	112	60	60	58	116	58	60	55	114
		NONE	-	-	14	15	14	81	17	20	18	85	15	20	16	83
		118A	18.0	17.3	35	35	34	98	39	40	38	102	37	40	36	100
		119A	36.0	34.6	57	60	54	116	61	70	58	120	59	60	56	118
HIGH		NONE	-	-	14	20	15	92	18	20	19	96	16	20	17	94
		118A	18.0	17.3	36	40	35	109	40	40	39	113	38	40	37	111
		119A	36.0	34.6	58	60	55	127	61	70	59	131	59	60	56	129
		NONE	-	-	21	25	20	114	23	25	22	116	23	25	22	116
		116B	13.9	16.7	43	45	42	117	45	45	44	119	45	45	44	119

See "Legend and Notes for Tables 15 and 16" on page 43.

Table 15 - Unit Wire/Fuse or HACR Breaker Sizing Data - Single Speed Indoor Fan Motor (cont)

UNIT	NO M. V-PH-HZ	ELEC. HTR			NO C.O. or UNPWR C.O.						w/ PWRD C.O.					
		CRHEATER ***00	Nom (kW)	FLA	NO PE.			w/ P.E. (pwrd fr/unit)			NO PE.			w/ P.E. (pwrd fr/unit)		
					MCA	MAX FUSE or HACR BRKR	DISC. SIZE		MCA	MAX FUSE or HACR BRKR	DISC. SIZE		MCA	MAX FUSE or HACR BRKR	DISC. SIZE	
							FLA	LRA			FLA	LRA			FLA	LRA
STD		NONE	-	-	46	60	47	236	49	60	52	240	50	60	53	241
		117A	7.8/10.4	21.7/25.0	73/77	80/80	72/76	258/261	76/81	80/90	77/80	282/265	77/82	80/90	78/82	283/266
		110A	12.0/16.0	33.4/38.5	87/94	90/100	86/92	269/275	91/97	100/100	90/96	273/279	92/98	100/100	91/97	274/280
		111A	18.6/24.8	51.7/59.7	110/120	110/125	107/116	288/296	114/124	125/125	111/120	292/300	115/125	125/125	112/121	293/301
		112A	24.0/32.0	66.7/77.0	129/142	150/150	124/136	303/313	133/146	150/150	128/140	307/317	134/147	150/150	129/141	308/318
MED		112A+117A	31.8/42.4	88.4/102.0	156/173	175/175	149/165	413/440	160/177	175/200	153/169	417/444	161/178	175/200	154/170	418/445
		NONE	-	-	49/49	60/60	51/51	278	53/52	60/60	55/55	282	54/53	60/60	56/56	283
		117A	7.8/10.4	21.7/25.0	76/80	80/80	76/80	300/303	80/84	80/90	80/84	304/307	81/85	90/90	81/85	305/308
		110A	12.0/16.0	33.4/38.5	91/97	100/100	89/95	311/317	94/101	100/110	94/99	315/321	95/102	100/110	95/101	316/322
		111A	18.6/24.8	51.7/59.7	113/123	125/125	110/119	330/338	117/127	125/150	115/124	334/342	118/128	125/150	116/125	335/343
HIGH		112A	24.0/32.0	66.7/77.0	132/145	150/150	128/139	345/355	136/149	150/150	132/144	349/359	137/150	150/150	133/145	350/360
		112A+117A	31.8/42.4	88.4/102.0	159/176	175/200	153/168	455/482	163/180	175/200	157/173	459/486	164/181	175/200	158/174	460/487
		NONE	-	-	51	60	53	292	55	60	58	296	56	60	59	297
		117A	7.8/10.4	21.7/25.0	78/82	80/90	78/82	314/317	82/86	90/90	83/87	318/321	83/87	90/90	84/88	319/322
		110A	12.0/16.0	33.4/38.5	93/99	100/100	92/98	325/331	97/103	100/110	96/102	329/335	98/104	100/110	97/103	330/336
STD		111A	18.6/24.8	51.7/59.7	116/126	125/150	113/122	344/352	119/129	125/150	117/127	348/356	120/130	125/150	118/128	349/357
		112A	24.0/32.0	66.7/77.0	134/147	150/150	130/142	359/369	138/151	150/175	135/146	363/373	139/152	150/175	136/148	364/374
		112A+117A	31.8/42.4	88.4/102.0	161/178	175/200	155/171	469/496	165/182	175/200	160/175	473/500	166/183	175/200	161/175	474/501
		NONE	-	-	21	25	22	118	23	25	24	120	23	25	24	120
		116B	13.9	16.7	42	45	41	135	44	45	43	137	44	45	43	137
MED		113B	16.5	19.8	46	50	45	138	48	50	47	140	48	50	47	140
		114B	27.8	33.4	63	70	60	151	65	70	62	153	67	70	63	153
		115B	33.0	39.7	71	80	67	158	73	80	69	160	73	80	70	160
		128B	41.7	50.2	84	90	79	168	86	90	82	170	86	90	82	170
		NONE	-	-	23	25	24	139	25	25	26	141	25	25	26	141
HIGH		116B	13.9	16.7	44	45	43	156	45	45	45	158	46	50	45	158
		113B	16.5	19.8	47	50	46	159	49	50	48	161	50	50	49	161
		114B	27.8	33.4	64	70	62	172	66	70	64	174	67	70	65	174
		115B	33.0	39.7	72	80	69	179	74	80	71	181	75	80	72	181
		128B	41.7	50.2	85	90	81	189	87	90	83	191	88	90	84	191
STD		NONE	-	-	24	30	25	146	26	30	27	148	26	30	27	148
		116B	13.9	16.7	45	45	44	163	46	50	46	165	47	50	47	165
		113B	16.5	19.8	49	50	48	166	50	50	50	168	51	60	50	168
		114B	27.8	33.4	66	70	63	179	67	70	66	181	68	70	66	181
		115B	33.0	39.7	73	80	70	186	75	80	73	188	76	80	73	188
HIGH		128B	41.7	50.2	87	90	83	196	88	90	85	198	89	90	85	198
		NONE	-	-	17	20	17	97	21	25	22	101	18	20	19	99
		118A	18.0	17.3	38	40	37	114	42	45	41	118	43	40	39	116
		119A	36.0	34.6	60	60	57	132	64	70	61	136	62	70	59	134
		NONE	-	-	18	20	18	108	21	25	22	112	19	25	20	110
STD		118A	18.0	17.3	39	40	38	125	43	45	42	129	41	45	40	127
		119A	36.0	34.6	61	70	58	143	65	70	62	147	63	70	60	145
		NONE	-	-	18	20	18	108	21	25	22	112	19	25	20	110
		118A	18.0	17.3	39	40	38	125	43	45	42	129	41	45	40	127
		119A	36.0	34.6	61	70	58	143	65	70	62	147	63	70	60	145
HIGH		NONE	-	-	18	20	18	108	21	25	22	112	19	25	20	110
		118A	18.0	17.3	39	40	38	125	43	45	42	129	41	45	40	127
		119A	36.0	34.6	61	70	58	143	65	70	62	147	63	70	60	145
		NONE	-	-	18	20	18	108	21	25	22	112	19	25	20	110
		118A	18.0	17.3	39	40	38	125	43	45	42	129	41	45	40	127

See "Legend and Notes for Tables 15 and 16" on page 43.

Table 16 – Unit Wire/Fuse or HACR Breaker Sizing Data - Two Speed Indoor Fan Motor

UNIT	NO M. V-PH-HZ	ELEC. HTR			NO C.O. or UNPWR C.O.						w/ PWRD C.O.					
		CRHEATER ****00	Nom (kW)	FLA	NO PE.			w/ P.E. (pwrdr fr/unit)			NO PE.			w/ P.E. (pwrdr fr/unit)		
					MCA	MAX FUSE or HACR BRKR	DISC. SIZE FLA LRA	MCA	MAX FUSE or HACR BRKR	DISC. SIZE FLA LRA	MCA	MAX FUSE or HACR BRKR	DISC. SIZE FLA LRA	MCA	MAX FUSE or HACR BRKR	DISC. SIZE FLA LRA
STD		NONE	–	–	33/33	50/50	32/32 165	37/36	50/50	36/36	38/37	50/50	37/37	41/41	50/50	42/42
		264A	4.9/6.5	13.6/15.6	50/52	60/60	47/50 179/181	54/56	60/60	52/54	55/57	60/60	53/55	58/61	60/70	57/59
		117A	7.8/10.4	21.7/25.0	60/64	70/70	57/60 187/190	64/68	70/70	61/65	65/69	70/80	62/66	69/73	80/80	67/70
		110A	12.0/16.0	33.4/38.5	75/81	80/90	70/76 198/204	78/85	80/90	75/80	79/86	80/90	76/81	83/89	90/90	80/86
		117A+117A	15.8/21.0	43.8/50.5	88/96	90/100	82/90 253/266	91/100	100/100	87/94	92/101	100/110	88/95	96/104	100/110	92/100
MED	208/230-3-60	110A+117A	19.9/26.5	55.2/63.8	102/112	110/125	95/105 275/293	106/116	110/125	100/109	107/117	110/125	101/111	110/121	125/125	105/115
		NONE	–	–	36/35	50/50	35/34 195	39/39	50/50	39/39	40/40	50/50	41/40	44/43	60/60	45/44
		264A	4.9/6.5	13.6/15.6	53/54	60/60	51/52 209/211	56/58	60/60	55/56	57/59	60/60	56/58	61/63	70/70	61/62
		117A	7.8/10.4	21.7/25.0	63/66	70/70	60/63 217/220	67/70	70/80	64/67	68/71	80/80	66/68	71/75	80/80	70/73
		110A	12.0/16.0	33.4/38.5	77/83	80/90	73/78 228/234	81/87	90/90	78/83	82/88	90/90	79/84	86/92	90/100	83/88
HIGH	208/230-3-60	117A+117A	15.8/21.0	43.8/50.5	90/98	90/100	85/92 283/296	94/102	100/110	90/97	95/103	100/110	91/98	99/107	100/110	95/102
		110A+117A	19.9/26.5	55.2/63.8	105/115	110/125	99/108 305/323	108/118	110/125	103/112	109/119	110/125	104/113	113/123	125/125	108/117
		NONE	–	–	41/40	50/50	41/40 230	44/44	60/60	45/44	45/45	60/60	46/45	49/48	60/60	51/50
		264A	4.9/6.5	13.6/15.6	58/59	60/60	56/58 244/246	61/63	70/70	61/62	62/64	70/70	62/63	66/68	80/80	66/68
		117A	7.8/10.4	21.7/25.0	68/71	80/80	66/69 252/255	72/75	80/80	70/73	73/76	80/80	71/74	76/80	80/80	76/78
STD	460-3-60	110A	12.0/16.0	33.4/38.5	82/88	90/90	79/84 263/269	86/92	90/100	84/88	87/93	90/100	85/90	91/97	100/100	89/94
		117A+117A	15.8/21.0	43.8/50.5	95/103	100/110	91/98 318/331	99/107	100/110	96/102	100/108	100/110	97/103	104/112	110/125	101/108
		110A+117A	19.9/26.5	55.2/63.8	110/120	110/125	104/113 340/358	113/123	125/125	109/118	114/124	125/125	110/119	118/128	125/150	114/123
		NONE	–	–	17	25	16 81	19	25	18	19	25	19	21	30	21
		265A	6.0	7.2	26	30	25 88	28	30	27	28	30	27	30	35	29
MED	460-3-60	266A	11.5	13.8	34	40	32 95	36	40	34	37	40	35	38	40	37
		267A	14.0	16.8	38	40	36 100	40	40	38	40	45	38	42	45	40
		268A	23.0	27.7	52	60	48 109	54	60	50	54	60	51	56	60	53
		269A	25.5	30.7	55	60	52 112	57	60	54	58	60	54	59	60	56
		NONE	–	–	18	25	17 97	20	25	19	20	25	20	22	30	22
HIGH	460-3-60	265A	6.0	7.2	27	30	26 104	29	30	28	29	30	28	31	35	30
		266A	11.5	13.8	35	40	33 111	37	40	35	37	40	36	39	45	38
		267A	14.0	16.8	39	40	37 114	41	45	39	41	45	39	43	45	41
		268A	23.0	27.7	53	60	49 125	54	60	51	55	60	52	57	60	54
		269A	25.5	30.7	56	60	53 128	58	60	55	59	60	55	60	60	57
STD	575-3-60	NONE	–	–	21	25	20 114	22	30	22	23	30	23	25	30	25
		265A	6.0	7.2	30	30	29 121	31	35	31	32	35	31	34	40	33
		266A	11.5	13.8	38	40	36 128	40	45	38	40	45	39	42	45	40
		267A	14.0	16.8	42	45	40 131	43	45	42	44	45	42	46	50	44
		268A	23.0	27.7	55	60	52 142	57	60	54	57	60	55	59	60	57
MED	575-3-60	269A	25.5	30.7	59	60	56 145	61	70	58	61	70	58	63	70	60
		NONE	–	–	14	20	13 68	18	25	18	16	20	15	20	25	20
		118A	18.0	17.3	36	40	33 85	40	40	38	37	40	35	41	45	40
		299A	28.0	26.9	48	50	44 95	52	60	49	49	50	46	53	60	51
		NONE	–	–	16	20	15 81	20	25	20	17	20	17	21	25	22
HIGH	575-3-60	118A	18.0	17.3	37	40	35 98	41	45	40	39	40	37	43	45	42
		299A	28.0	26.9	49	50	46 108	53	60	51	51	60	48	55	60	53
		NONE	–	–	17	20	17 95	21	25	22	19	25	19	23	30	24
		118A	18.0	17.3	39	40	37 112	43	45	42	41	45	39	45	45	44
		299A	28.0	26.9	51	60	48 122	55	60	53	53	60	50	57	60	55

See "Legend and Notes for Tables 15 and 16" on page 43

Table 16 - Unit Wire/Fuse or HACR Breaker Sizing Data - Two Speed Indoor Fan Motor (cont)

UNIT	NO M. V-PH-HZ	ELEC. HTR			NO C.O. or UNPWR C.O.						w/ PWRD C.O.					
		CRHEATER ***00	Nom (kW)	FLA	NO PE.			w/ P.E. (pwrdr fr/unit)			NO PE.			w/ P.E. (pwrdr fr/unit)		
					MCA	MAX FUSE or HACR BRKR	DISC. SIZE FLA LRA	MCA	MAX FUSE or HACR BRKR	DISC. SIZE FLA LRA	MCA	MAX FUSE or HACR BRKR	DISC. SIZE FLA LRA	MCA	MAX FUSE or HACR BRKR	DISC. SIZE FLA LRA
STD		NONE	—	—	39/39	50/50	40/40	195	43/42	45/44	44/43	50/50	46/46	47/47	60/60	52/51
		117A	7.8/10.4	21.7/25.0	66/70	70/70	65/69	217/220	70/74	70/80	71/75	80/80	71/74	74/78	80/80	75/79
		110A	12.0/16.0	33.4/38.5	80/87	90/90	79/84	228/234	84/90	90/90	85/91	90/100	84/90	89/95	90/100	89/94
		111A	18.6/24.8	51.7/59.7	103/113	110/125	100/109	247/255	107/117	110/125	108/118	110/125	105/114	112/122	125/125	110/119
		112A	24.0/32.0	66.7/77.0	122/135	125/150	117/129	262/272	126/139	150/150	127/140	150/150	122/134	131/143	150/150	127/138
MED	208/230-3-60	112A+117A	31.8/42.4	88.4/102.0	149/166	150/175	142/157	372/399	153/170	175/175	154/171	175/175	147/163	158/175	175/175	152/167
		NONE	—	—	40/40	50/50	42/41	199	44/44	50/50	45/45	50/50	47/47	49/48	60/60	52/51
		117A	7.8/10.4	21.7/25.0	67/71	70/80	67/70	221/224	71/75	80/80	72/76	80/80	72/76	76/80	80/80	77/80
		110A	12.0/16.0	33.4/38.5	82/88	90/90	80/86	232/238	86/92	90/100	87/93	90/100	86/91	90/96	90/100	90/96
		111A	18.6/24.8	51.7/59.7	105/114	110/125	101/110	251/259	108/118	110/125	109/119	110/125	107/116	113/123	125/125	111/120
HIGH	208/230-3-60	112A	24.0/32.0	66.7/77.0	123/136	125/150	118/130	268/276	127/140	150/150	128/141	150/150	124/135	132/145	150/150	128/140
		112A+117A	31.8/42.4	88.4/102.0	151/167	175/175	143/159	376/403	154/171	175/175	155/172	175/175	149/164	159/176	175/200	153/169
		NONE	—	—	44/43	50/50	46/45	249	48/47	60/60	49/48	60/60	52/50	52/51	60/60	56/55
		117A	7.8/10.4	21.7/25.0	71/74	80/80	71/74	271/274	75/78	80/80	76/79	80/80	76/79	79/83	80/90	81/83
		110A	12.0/16.0	33.4/38.5	85/91	90/100	84/89	282/288	89/95	90/100	90/96	90/100	90/95	94/99	100/100	94/99
STD	460-3-60	111A	18.6/24.8	51.7/59.7	108/117	110/125	105/114	301/309	112/121	125/125	113/122	125/125	111/119	117/126	125/150	115/123
		112A	24.0/32.0	66.7/77.0	127/139	150/150	123/133	316/326	131/143	150/150	132/144	150/150	128/139	136/148	150/150	133/143
		112A+117A	31.8/42.4	88.4/102.0	154/170	175/175	148/162	428/453	158/174	175/175	159/175	175/175	153/168	163/179	175/200	158/172
		NONE	—	—	19	20	19	97	20	25	21	25	22	23	25	24
		116B	13.9	16.7	40	40	38	114	41	45	42	45	41	44	45	43
MED	460-3-60	113B	16.5	19.8	43	45	42	117	45	50	46	50	45	48	50	47
		114B	27.8	33.4	60	60	58	130	62	70	63	70	60	64	70	62
		115B	33.0	39.7	68	70	65	137	70	80	71	80	67	72	80	69
		128B	41.7	50.2	81	90	77	147	83	90	84	90	79	85	90	82
		NONE	—	—	19	25	20	100	21	25	21	25	22	23	25	24
HIGH	460-3-60	116B	13.9	16.7	40	40	39	117	42	45	42	45	42	44	45	44
		113B	16.5	19.8	44	45	43	120	46	50	46	50	45	48	50	47
		114B	27.8	33.4	61	70	58	133	63	70	63	70	61	65	70	63
		115B	33.0	39.7	69	70	65	140	71	80	71	80	68	73	80	70
		128B	41.7	50.2	82	90	78	150	84	90	84	90	80	86	90	82
STD	575-3-60	NONE	—	—	21	25	22	125	22	25	23	25	24	25	30	26
		116B	13.9	16.7	42	45	41	142	43	45	44	45	43	46	50	45
		113B	16.5	19.8	45	45	44	145	47	50	48	50	47	49	50	49
		114B	27.8	33.4	62	70	60	158	64	70	60	70	62	66	70	65
		115B	33.0	39.7	70	70	67	165	72	80	73	80	70	74	80	72
MED	575-3-60	128B	41.7	50.2	83	90	79	175	85	90	86	90	82	87	90	84
		NONE	—	—	14	20	15	79	18	20	16	20	17	20	25	21
		118A	18.0	17.3	36	40	35	96	40	40	38	40	37	41	45	41
		119A	36.0	34.6	58	60	55	114	61	70	59	60	56	63	70	61
		NONE	—	—	15	20	16	83	19	20	17	20	17	21	25	22
HIGH	575-3-60	118A	18.0	17.3	37	40	35	100	40	45	38	40	37	42	45	42
		119A	36.0	34.6	58	60	55	118	62	70	60	60	57	64	70	62
		NONE	—	—	16	20	17	92	20	25	18	20	19	22	25	23
		118A	18.0	17.3	38	40	37	109	42	45	39	40	39	43	45	43
		119A	36.0	34.6	59	60	56	127	63	70	61	70	58	65	70	63

See "Legend and Notes for Tables 15 and 16" on page 43

Table 16 - Unit Wire/Fuse or HACR Breaker Sizing Data - Two Speed Indoor Fan Motor (cont)

UNIT	NO M. V-PH-HZ	ELEC. HTR			NO C.O. or UNPWR C.O.						w/ PWRD C.O.					
		CRHEATER ***00	Nom (kW)	FLA	NO P.E.			w/ P.E. (pwrd fr/unit)			NO P.E.			w/ P.E. (pwrd fr/unit)		
					MCA	MAX FUSE or HACR BRKR	DISC. SIZE		MCA	MAX FUSE or HACR BRKR	DISC. SIZE		MCA	MAX FUSE or HACR BRKR	DISC. SIZE	
							FLA	LRA			FLA	LRA			FLA	LRA
STD		NONE	-	-	47/47	60/60	49/49	233	51/51	60/60	54/53	237	52/52	60/60	55/55	238
		117A	7.8/10.4	21.7/25.0	75/78	80/80	74/78	255/258	78/82	80/90	79/82	259/262	79/83	80/90	80/83	260/263
		110A	12.0/16.0	33.4/38.5	89/95	90/100	88/93	266/272	93/99	100/100	92/98	270/276	94/100	100/100	93/99	271/277
		111A	18.6/24.8	51.7/59.7	112/122	125/125	109/118	285/293	116/126	125/150	113/122	289/297	117/127	125/150	114/123	290/298
		112A	24.0/32.0	66.7/77.0	131/143	150/150	126/138	300/310	135/147	150/150	131/142	304/314	136/148	150/150	132/143	305/315
MED	208/230-3-60	112A+117A	31.8/42.4	88.4/102.0	158/175	175/175	151/166	410/437	162/178	175/200	155/171	414/441	163/179	175/200	157/172	415/442
		NONE	-	-	49/48	60/60	51/50	259	53/52	60/60	56/55	263	54/53	60/60	57/56	264
		117A	7.8/10.4	21.7/25.0	76/79	80/80	76/79	281/284	80/83	80/90	81/83	285/288	81/84	90/90	82/85	286/289
		110A	12.0/16.0	33.4/38.5	91/96	100/100	90/95	292/298	95/100	100/100	94/99	296/302	96/101	100/110	95/100	297/303
		111A	18.6/24.8	51.7/59.7	114/123	125/125	111/119	311/319	117/127	125/150	115/123	315/323	118/128	125/150	116/124	316/324
HIGH	208/230-3-60	112A	24.0/32.0	66.7/77.0	132/144	150/150	128/139	328/336	136/148	150/150	132/143	330/340	137/149	150/150	133/144	331/341
		112A+117A	31.8/42.4	88.4/102.0	159/176	175/200	153/168	436/463	163/179	175/200	157/172	440/467	164/180	175/200	158/173	441/468
		NONE	-	-	51/50	60/60	54/53	283	55/54	60/60	58/57	287	56/55	60/60	59/58	288
		117A	7.8/10.4	21.7/25.0	78/81	80/90	79/81	305/308	82/85	80/90	83/86	309/312	83/86	90/90	84/87	310/313
		110A	12.0/16.0	33.4/38.5	93/98	100/100	92/97	316/322	97/102	100/110	96/101	320/326	98/103	100/110	98/102	321/327
STD	460-3-60	111A	18.6/24.8	51.7/59.7	116/125	125/125	113/121	335/343	120/129	125/150	118/126	339/347	121/130	125/150	119/127	340/348
		112A	24.0/32.0	66.7/77.0	135/146	150/150	130/141	350/360	138/150	150/150	135/145	354/364	139/151	150/175	136/147	355/365
		112A+117A	31.8/42.4	88.4/102.0	162/178	175/200	155/170	460/487	165/181	175/200	160/174	464/491	166/182	175/200	161/175	465/492
		NONE	-	-	22	25	23	117	24	30	25	119	24	30	25	119
		116B	13.9	16.7	43	45	42	134	45	45	44	136	45	45	44	136
MED	460-3-60	113B	16.5	19.8	47	50	45	137	48	50	47	139	49	50	48	139
		114B	27.8	33.4	64	70	61	150	65	70	63	152	66	70	64	152
		115B	33.0	39.7	72	80	68	157	73	80	70	159	74	80	71	165
		128B	41.7	50.2	85	90	80	167	86	90	82	169	87	90	83	172
		NONE	-	-	22	25	23	130	24	30	25	132	25	30	26	132
HIGH	460-3-60	116B	13.9	16.7	43	45	42	147	45	45	44	149	45	45	44	149
		113B	16.5	19.8	47	50	46	150	49	50	48	152	49	50	48	152
		114B	27.8	33.4	64	70	62	163	66	70	65	165	66	70	64	165
		115B	33.0	39.7	72	80	69	170	74	80	71	172	74	80	71	172
		128B	41.7	50.2	85	90	81	180	87	90	83	182	87	90	83	182
STD	575-3-60	NONE	-	-	23	25	24	142	25	30	26	144	26	30	27	144
		116B	13.9	16.7	44	45	44	159	46	50	46	161	46	50	46	161
		113B	16.5	19.8	48	50	47	162	50	50	49	164	50	50	50	164
		114B	27.8	33.4	65	70	63	175	67	70	65	177	67	70	65	177
		115B	33.0	39.7	73	80	70	182	75	80	72	184	75	80	73	184
MED	575-3-60	128B	41.7	50.2	86	90	82	192	88	90	84	194	88	90	85	194
		NONE	-	-	18	20	19	99	22	25	23	103	20	25	21	101
		118A	18.0	17.3	40	40	39	116	44	45	43	120	42	45	41	118
		119A	36.0	34.6	62	70	59	134	65	70	63	138	63	70	61	136
		NONE	-	-	19	25	20	108	23	25	24	112	21	25	22	110
HIGH	575-3-60	118A	18.0	17.3	41	45	40	125	45	45	44	129	43	45	42	127
		119A	36.0	34.6	63	70	60	143	66	70	64	147	64	70	62	145
		NONE	-	-	19	25	20	108	23	25	24	112	21	25	22	110
		118A	18.0	17.3	41	45	40	125	45	45	44	129	43	45	42	127
		119A	36.0	34.6	63	70	60	143	66	70	64	147	64	70	62	145

See "Legend and Notes for Tables 15 and 16" on page 43

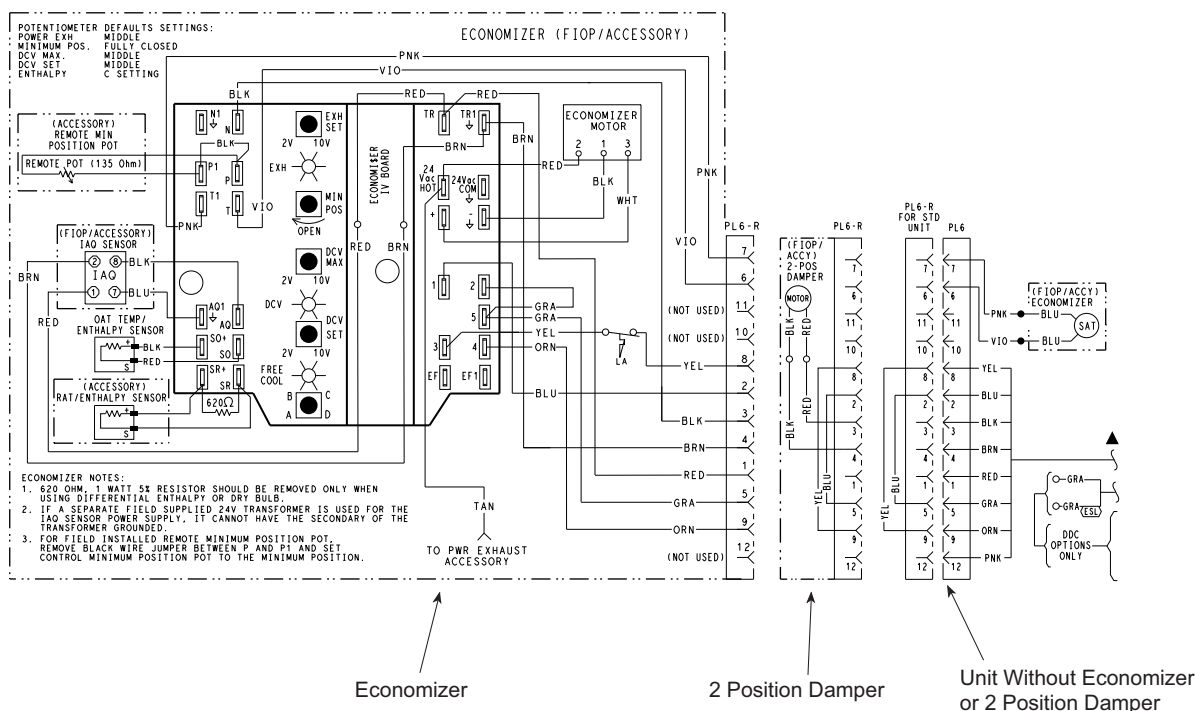


Fig. 71 - EconoMi\$er® IV Wiring

C160126

Step 11 — Adjust Factory-Installed Options

Smoke Detectors —

Smoke detector(s) will be connected at the Central Terminal Board (CTB), at terminals marked “Smoke Shutdown”. Remove jumper JMP 3 when ready to energize unit.

EconoMi\$er IV Occupancy Switch —

Refer to Fig. 71 for general EconoMi\$er IV wiring. External occupancy control is managed through a connection on the Central Terminal Board.

If external occupancy control is desired, connect a time clock or remotely controlled switch (closed for Occupied, open for Unoccupied sequence) at terminals marked OCCUPANCY on CTB. Remove or cut jumper JMP 2 to complete the installation.

Step 12 — Install Accessories

Available accessories include:

- Roof Curb
- Thru-base connection kit (must be installed before unit is set on curb)
- Manual outside air damper
- Two-Position motorized outside air damper

EconoMi\$er IV (with control and integrated barometric relief)

EconoMi\$er2 (without control/for external signal and integrated barometric relief)

Power Exhaust

Differential dry-bulb sensor (EconoMi\$er IV)

Outdoor enthalpy sensor

Differential enthalpy sensor

Time Guard II compressor anti-cycle control

Outdoor coil hail guard

Outdoor coil protector grille

Head pressure control

Programmable setback thermostat

Electrical/Mechanical thermostat and subbase

Electric Heaters

Single Point kits

Thermostat / Sensors

CO₂ sensor

DDC interface (PremierLink™ controller)

Louvered hail guard

Phase monitor control

Refer to separate installation instructions for information on installing these accessories.

Step 13 — Check Belt Tension

Measure the belt span length as shown in Fig. 72. Calculate the required deflection by multiplying the belt span length by $\frac{1}{64}$. For example, if the belt span length is 32 inches: $32 \times \frac{1}{64} = \frac{1}{2}$ inch deflection.

Belt Force - Deflection Method -

Check the belt tension with a spring-force belt force deflection gauge.

1. Place a straightedge along the belt between the two pulleys. Measure the distance between the motor shaft and the blower shaft.

2. Set the tension gauge to the desired tension (see Table 1 in Fig. 72). Place the large O-ring at that point.
3. Press the tension checker downward on the belt until the large O-ring is at the bottom of the straightedge.
4. Adjust the belt tension as needed.

Adjust belt tension by loosening the motor mounting plate front bolts and rear bolt (see Fig. 73) and sliding the plate towards the fan (to reduce tension) or away from the fan (to increase tension). Ensure the blower shaft and motor shaft are parallel to each other (pulleys aligned). Tighten all bolts securely when finished.

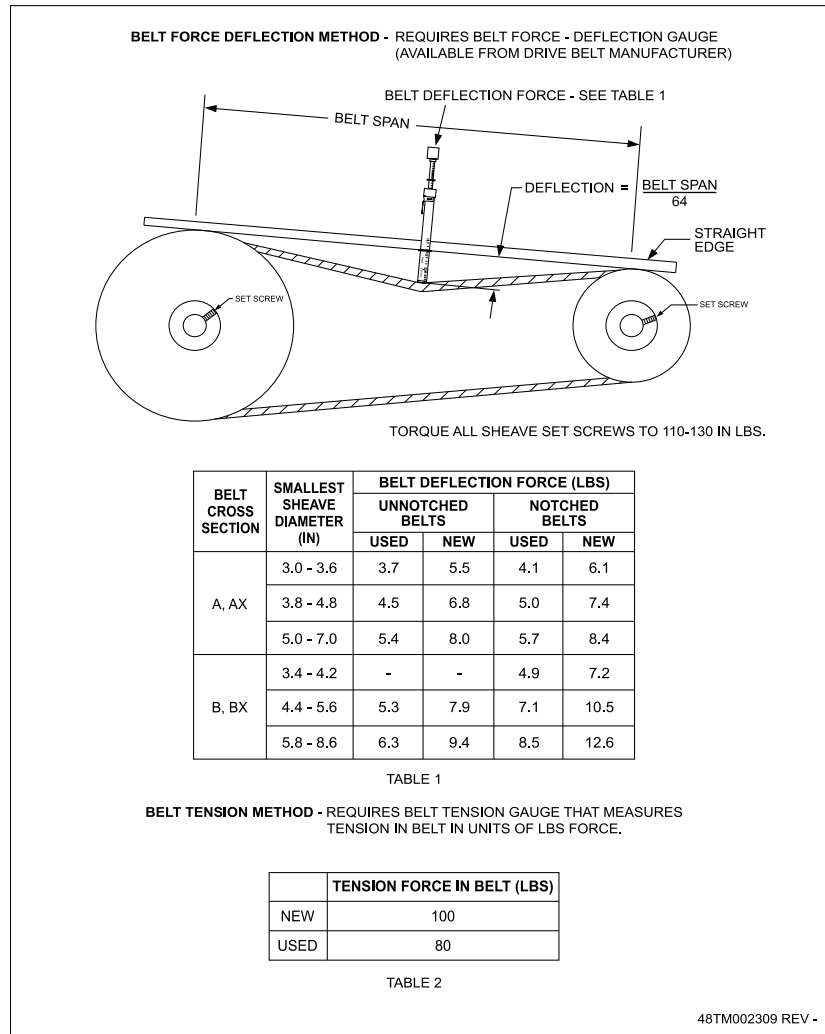


Fig. 72 - V-Belt Force Label

C160146

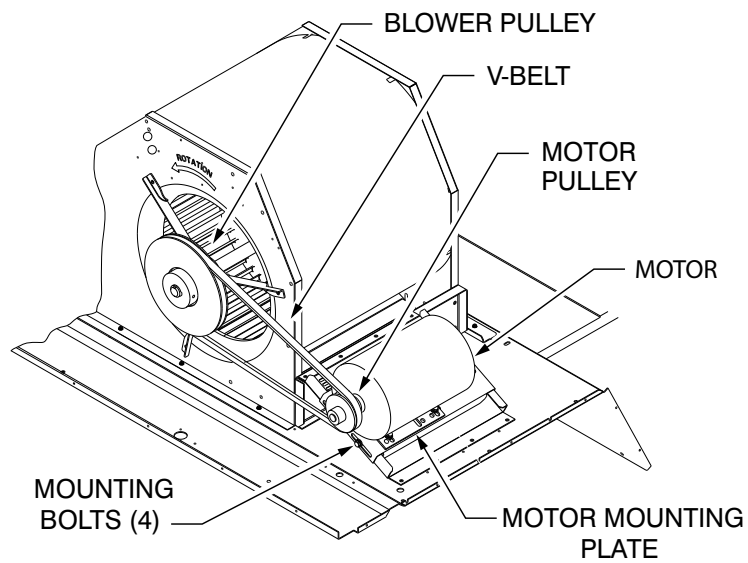


Fig. 73 - Belt Drive Motor Mounting

C11504

50HCQ

Pre-Start and Start-Up

This completes the mechanical installation of the unit. Refer to the unit's Service Manual for detailed Pre-Start and Start-Up instructions. Download the latest versions from HVAC Partners (www.hvacpartners.com).

UNIT START-UP CHECKLIST

(Remove and Store in Job File)

NOTE: To avoid injury to personnel and damage to equipment or property when completing the procedures listed in this start-up checklist, use good judgement, follow safe practices, and adhere to the safety considerations/information as outlined in the preceding sections of this Installation Instructions document.

MODEL NO.: _____

SERIAL NO.: _____

I. PRE-START-UP

- ☐ VERIFY THAT ALL PACKAGING MATERIALS HAVE BEEN REMOVED FROM UNIT
- ☐ VERIFY INSTALLATION OF OUTDOOR AIR HOOD
- ☐ VERIFY THAT CONDENSATE CONNECTION IS INSTALLED PER INSTRUCTIONS
- ☐ VERIFY THAT ALL ELECTRICAL CONNECTIONS AND TERMINALS ARE TIGHT
- ☐ CHECK THAT INDOOR-AIR FILTERS ARE CLEAN AND IN PLACE
- ☐ CHECK THAT OUTDOOR AIR INLET SCREENS ARE IN PLACE
- ☐ VERIFY THAT UNIT IS LEVEL
- ☐ CHECK FAN WHEELS AND PROPELLER FOR LOCATION IN HOUSING/ORIFICE AND VERIFY SETSCREW IS TIGHT
- ☐ VERIFY THAT FAN SHEAVES ARE ALIGNED AND BELTS ARE PROPERLY TENSIONED
- ☐ VERIFY THAT SCROLL COMPRESSORS ARE ROTATING IN THE CORRECT DIRECTION
- ☐ VERIFY INSTALLATION OF THERMOSTAT

II. START-UP

COOLING CYCLE —

ELECTRICAL

SUPPLY VOLTAGE	L1-L2	_____	L2-L3	_____	L3-L1	_____
COMPRESSOR AMPS 1	L1	_____	L2	_____	L3	_____
COMPRESSOR AMPS 2	L1	_____	L2	_____	L3	_____
SUPPLY FAN AMPS	L1	_____	L2	_____	L3	_____

TEMPERATURES

OUTDOOR-AIR TEMPERATURE _____ °F DB (DRY BULB)

RETURN-AIR TEMPERATURE _____ °F DB _____ °F WB (WET BULB)

COOLING SUPPLY AIR TEMPERATURE _____ °F

PRESSURES

REFRIGERANT SUCTION	CIRCUIT A	_____	PSIG
	CIRCUIT B	_____	PSIG
REFRIGERANT DISCHARGE	CIRCUIT A	_____	PSIG
	CIRCUIT B	_____	PSIG

- ☐ VERIFY REFRIGERANT CHARGE USING CHARGING CHARTS

HEATING CYCLE —

ELECTRICAL

SUPPLY VOLTAGE	L1-L2	_____	L2-L3	_____	L3-L1	_____
COMPRESSOR AMPS 1	L1	_____	L2	_____	L3	_____
COMPRESSOR AMPS 2	L1	_____	L2	_____	L3	_____
SUPPLY FAN AMPS	L1	_____	L2	_____	L3	_____

50HCG

TEMPERATURES

OUTDOOR-AIR TEMPERATURE _____ °F DB (DRY BULB)

RETURN-AIR TEMPERATURE _____ °F DB _____ °F WB (WET BULB)

HEAT SUPPLY AIR TEMPERATURE _____ °F

PRESSURES

REFRIGERANT SUCTION CIRCUIT A _____ PSIG

CIRCUIT B _____ PSIG

REFRIGERANT DISCHARGE CIRCUIT A _____ PSIG

CIRCUIT B _____ PSIG

☐ VERIFY REFRIGERANT CHARGE USING CHARGING CHARTS**GENERAL -**☐ ECONOMIZER MINIMUM VENT AND CHANGEOVER SETTINGS TO JOB REQUIREMENTS (IF EQUIPPED)☐ VERIFY SMOKE DETECTOR UNIT SHUTDOWN BY UTILIZING MAGNET TEST**REPEAT PROCESS FOR 2 COMPRESSOR SYSTEMS**