50TCQD
Single Package Rooftop Heat Pump with Puron® (R−410A) Refrigerant 15 and 20 Nominal Tons − (Sizes 17 and 24)

Carrier
United Technologies
turn to the experts

Installation Instructions

50TCQ units for installation in the United States contain use of Carrier's Staged Air Volume (SAV™) 2-speed indoor fan control system. This complies with the U.S. Department of Energy (DOE) efficiency standard of 2018.

50TCQ units for installation outside the United States may or may not contain use of the SAV 2-speed indoor fan control system as they are not required to comply with the U.S. Department of Energy (DOE) efficiency standard of 2018.

For specific details on operation of the Carrier SAV 2-speed indoor fan system refer to the Variable Frequency Drive (VFD) Factory-Installed Option 2-Speed Motor Control Installation, Setup and Troubleshooting manual.

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/NFPA70, 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 air conditioning equipment.

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)	
	Vertical Airflow Units	Horizontal Airflow Units
50TCQD17	5250	5250
50TCQD24	6500	6000

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

Unit Heat Type
50 - Electric Heat
Packaged Rooftop

Model Series - WeatherMaker®
TC - Standard Efficiency

Heat Options
Q = Heat Pump

Refrig. Systems Options
D = Two stage cooling models

Cooling Tons
17 - 15 ton
24 - 20 ton

Sensor Options
A = None
B = RA Smoke Detector
C = SA Smoke Detector
D = RA + SA Smoke Detector
E = CO_2
F = RA Smoke Detector and CO_2
G = SA Smoke Detector and CO_2
H = RA + SA Smoke Detector and CO_2
J = Condensate Overflow Switch (electro-mechanical controls only)
K = Condensate Overflow Switch and RA Smoke Detectors
L = Condensate Overflow Switch and RA and SA Smoke Detectors

Indoor Fan Options
1 = Standard Static Option, Vertical
2 = Medium Static Option, Vertical
3 = High Static Option,Vertical
B = Medium Static, High Efficiency Motor, Vertical
C = High Static, High Efficiency Motor, Vertical

5 = Standard Static Option, Horizontal*
6 = Medium Static Option, Horizontal
7 = High Static Option, Horizontal
F = Medium Static, High Efficiency Motor, Horizontal
G = High Static, High Efficiency Motor, Horizontal

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

Design Revision
- = Factory Assigned

Base Unit Controls
0 = Base Electro-mechanical Controls
1 = PremierLink™ Controller
2 = RTU Open Multi-Protocol Controller
6 = Electro-mechanical with 2-Speed Fan and W7220 Economizer Controller. Can be used with W7220 EconoMi$er X (with Fault Detection and Diagnostic)

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
V = Temperature Ultra Low Leak Economizer w/ PE (cent) - Vertical Air Only
W = Enthalpy Ultra Low Leak Economizer w/ Barometric Relief
X = Enthalpy Ultra Low Leak Economizer w/ PE (cent) - Vertical Air Only

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

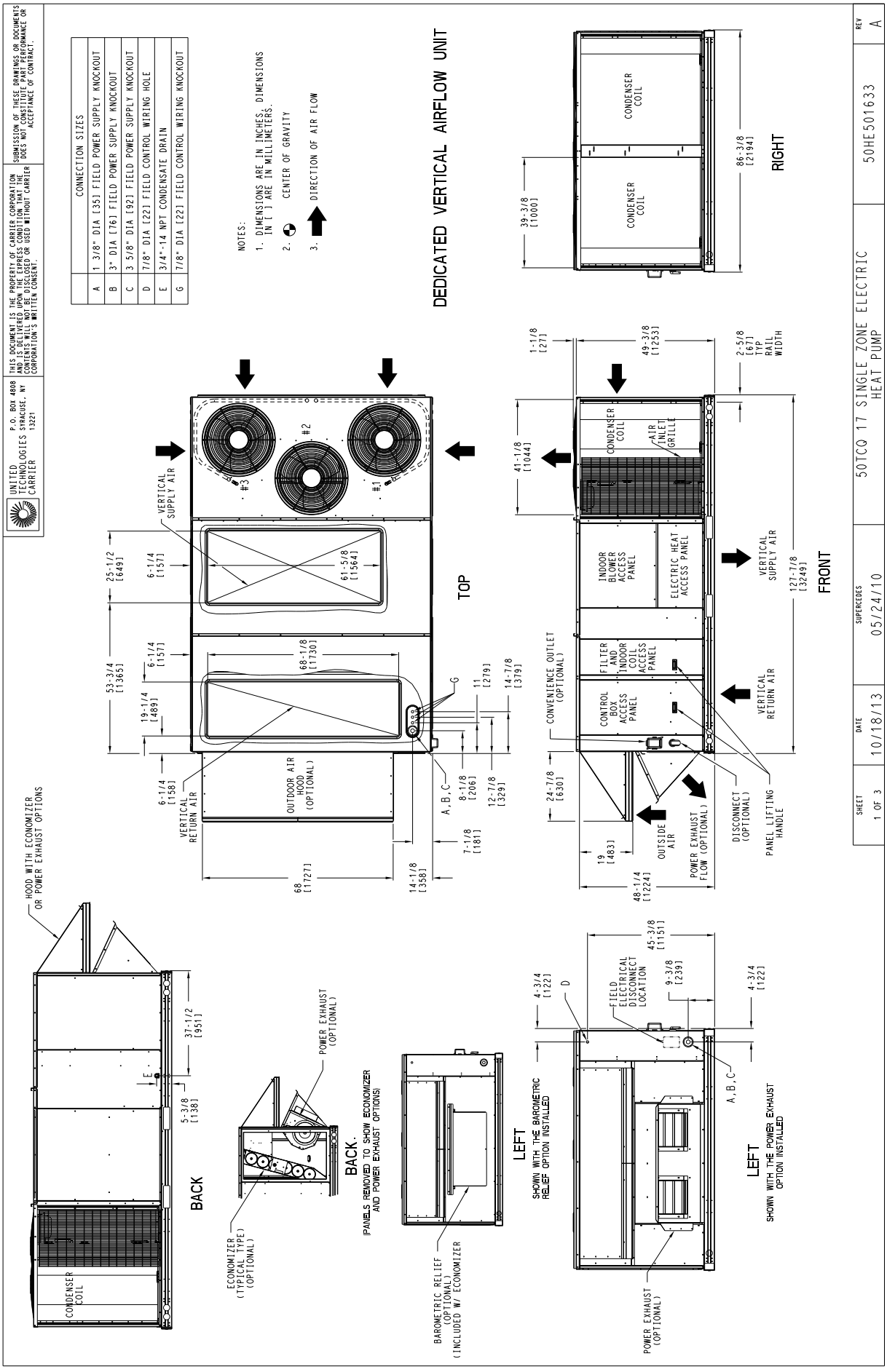
Electrical Options
A = None
C = Non-Fused Disconnect
G = 2-Speed Indoor Fan (VFD) Controller
J = 2-Speed Fan Controller (VFD) and Non-Fused Disconnect

Packing & Seismic Compliance
0 = Standard
3 = California seismic compliant

* Not available on horizontal 50TCQ 24 units.

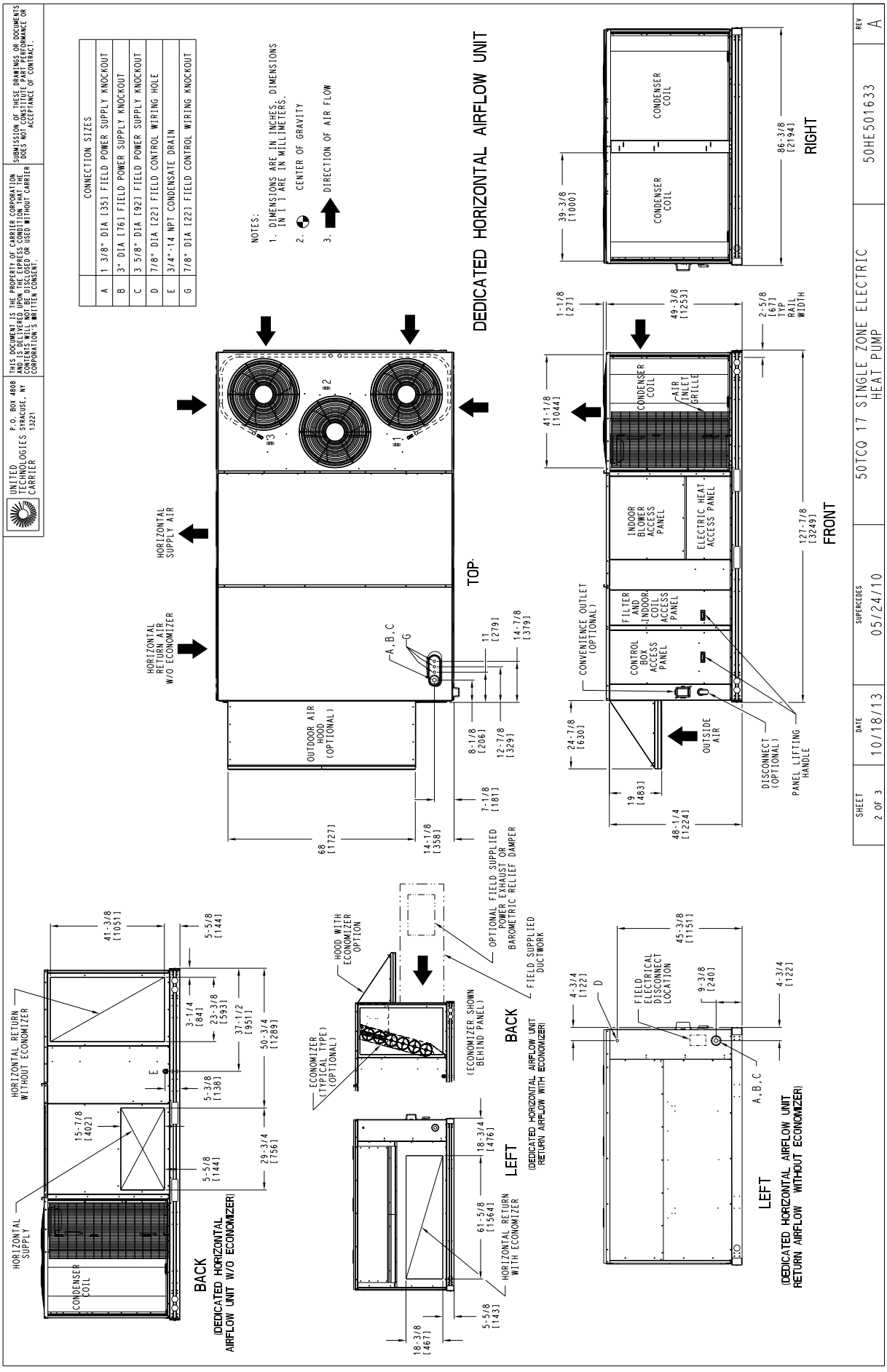
a50-9695

Fig. 1 - 50TCQD 17-24 Model Number Nomenclature (Example)



C14001

Fig. 2 - Unit Dimensional Drawing – Size 17 Units, Sheet 1 of 3

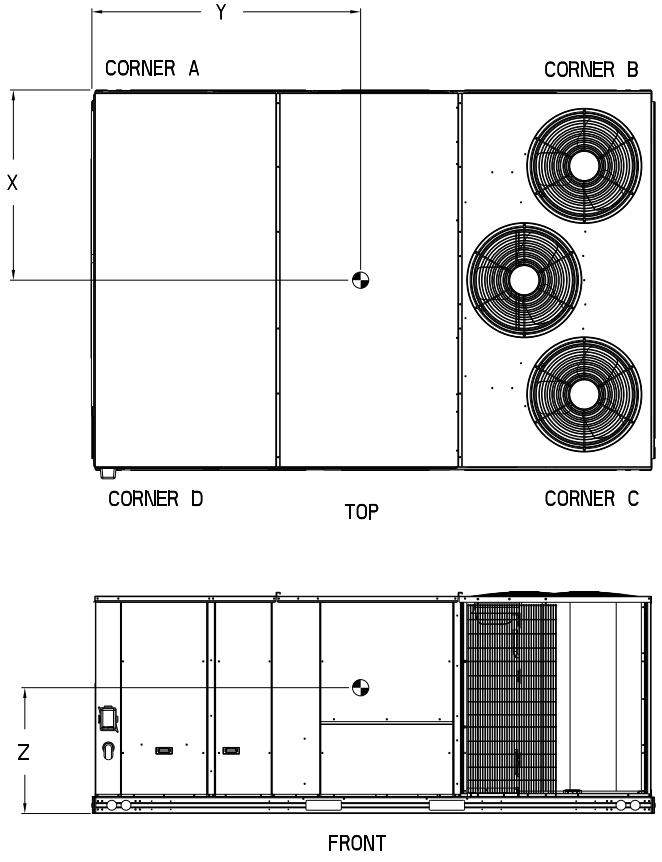


C14002

Fig. 2 - Unit Dimensional Drawing – Size 17 Units, Sheet 2 of 3

UNIT	STD UNIT WEIGHT *		CORNER WEIGHT (A)		CORNER WEIGHT (B)		CORNER WEIGHT (C)		CORNER WEIGHT (D)		C.G.		
	LBS.	KG.	LBS.	KG.	LBS.	KG.	LBS.	KG.	LBS.	KG.	X	Y	Z
50TCQ17	1775	807	479	218	364	166	403	183	530	241	45 1/4 [1149]	55 1/4 [1403]	16 1/2 [419]

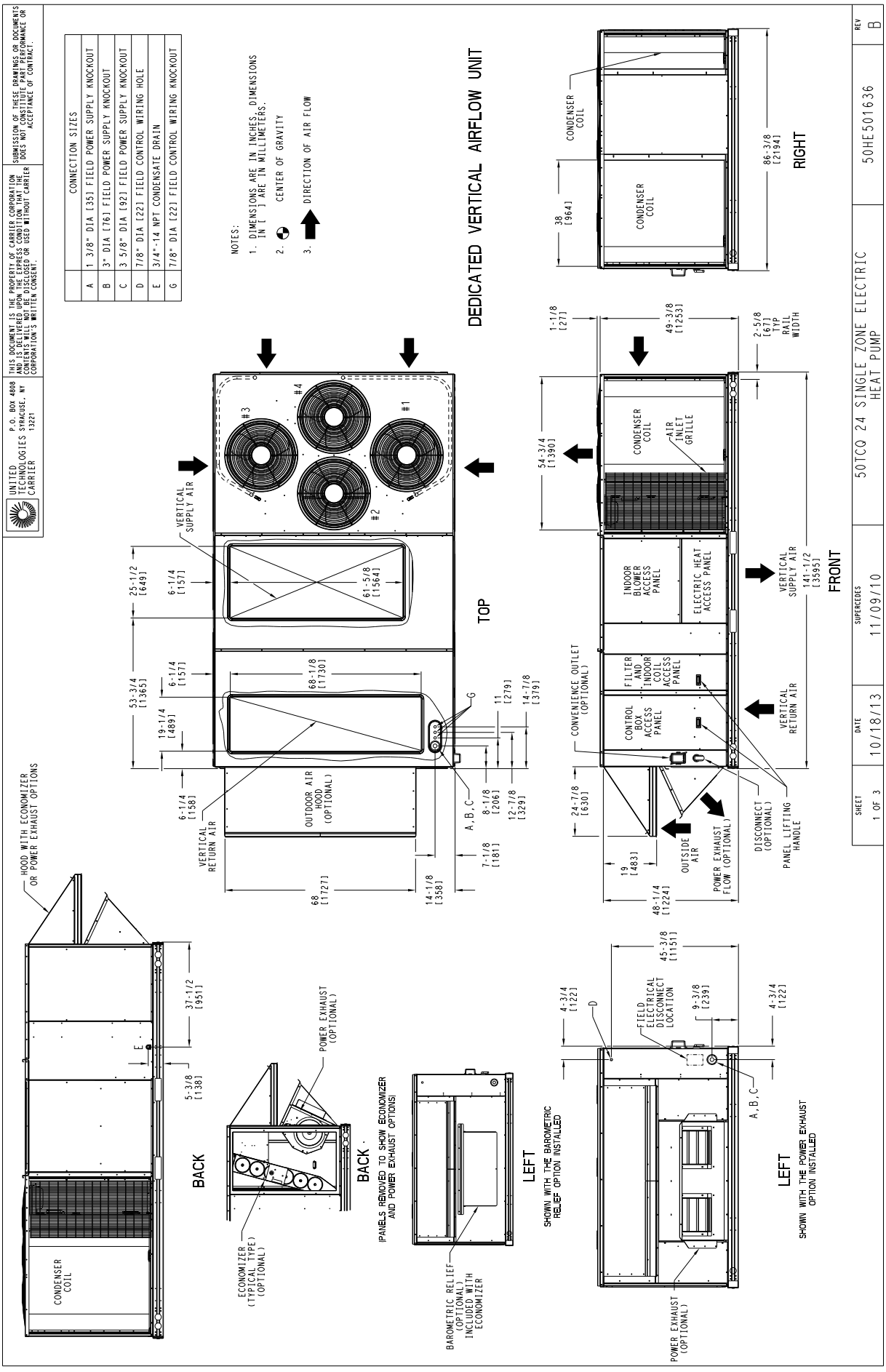
* STANDARD UNIT WEIGHT IS WITHOUT ELECTRIC HEAT AND WITHOUT PACKAGING.
FOR OTHER OPTIONS AND ACCESSORIES, REFER TO THE PRODUCT DATA CATALOG.



SHEET	DATE	SUPERCEDES			REV
3 OF 3	10/18/13	05/24/10	50TCQ 17 SINGLE ZONE ELECTRIC HEAT PUMP	50HE501633	A

Fig. 2 - Unit Dimensional Drawing – Size 17 Units, Sheet 3 of 3

C14003



C14004

Fig. 3 - Unit Dimensional Drawing – Size 24 Units, Sheet 1 of 3

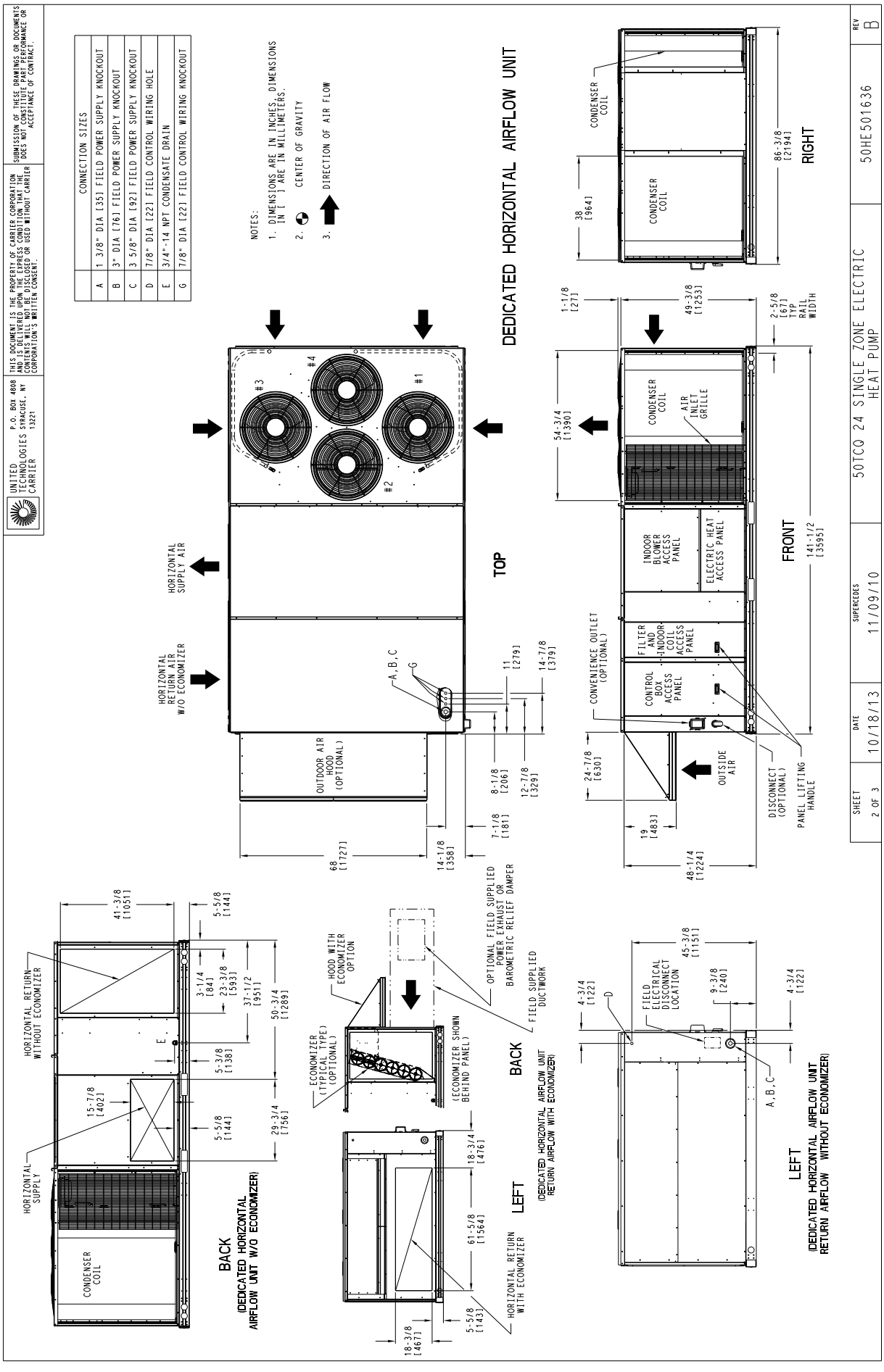


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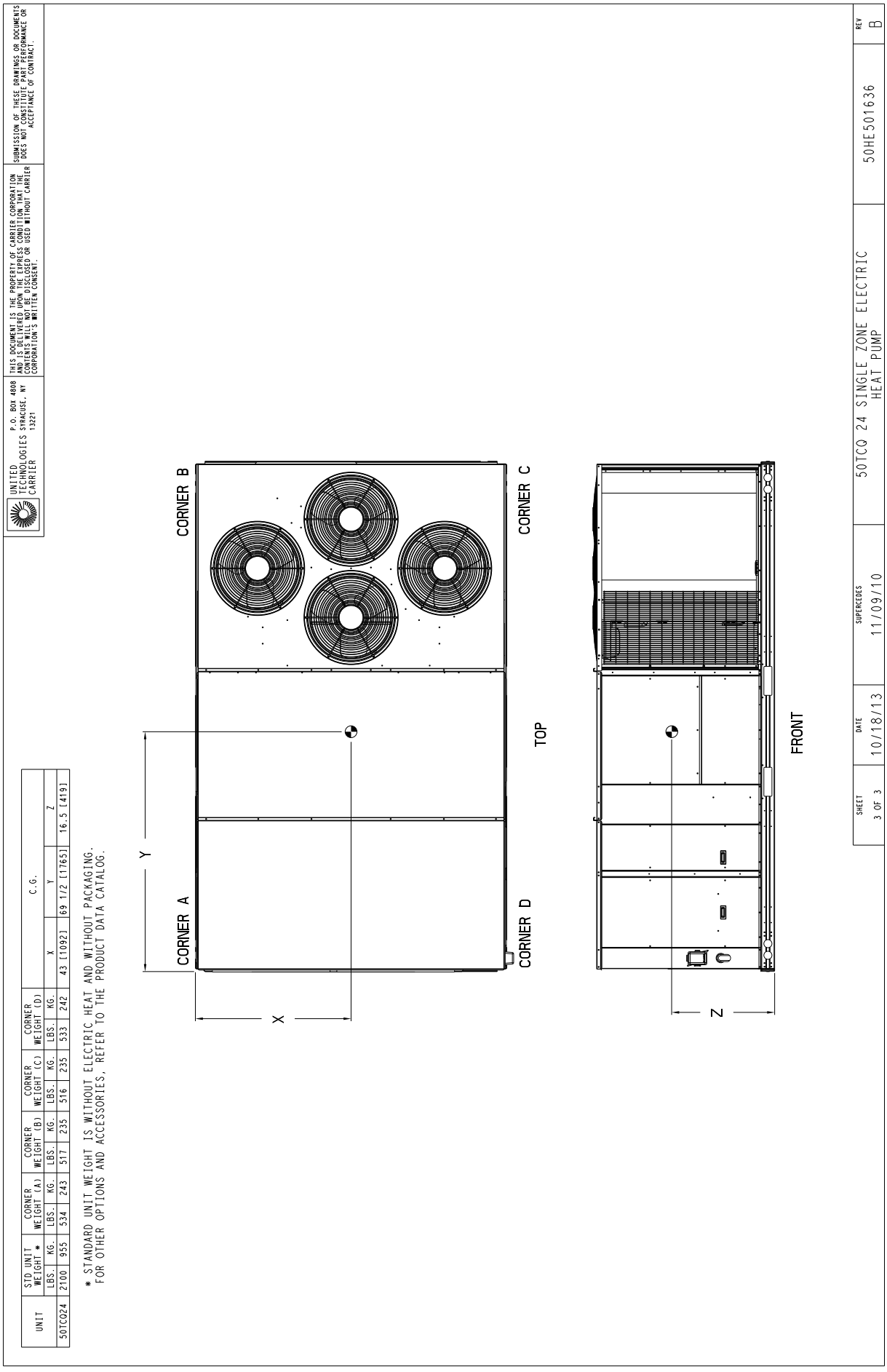
Fig. 3 - Unit Dimensional Drawing – Size 24 Units, Sheet 2 of 3



UNIT	STD UNIT WEIGHT *		CORNER WEIGHT (A)		CORNER WEIGHT (B)		CORNER WEIGHT (C)		CORNER WEIGHT (D)		C.G.		
	LBS.	KG.	LBS.	KG.	LBS.	KG.	LBS.	KG.	LBS.	KG.	X	Y	Z
50TCQ24	2100	955	534	243	517	235	516	235	533	242	43 [10921	69 1/2 [1765]	16.5 [419]

* STANDARD UNIT WEIGHT IS WITHOUT ELECTRIC HEAT AND WITHOUT PACKAGING.
FOR OTHER OPTIONS AND ACCESSORIES, REFER TO THE PRODUCT DATA CATALOG.

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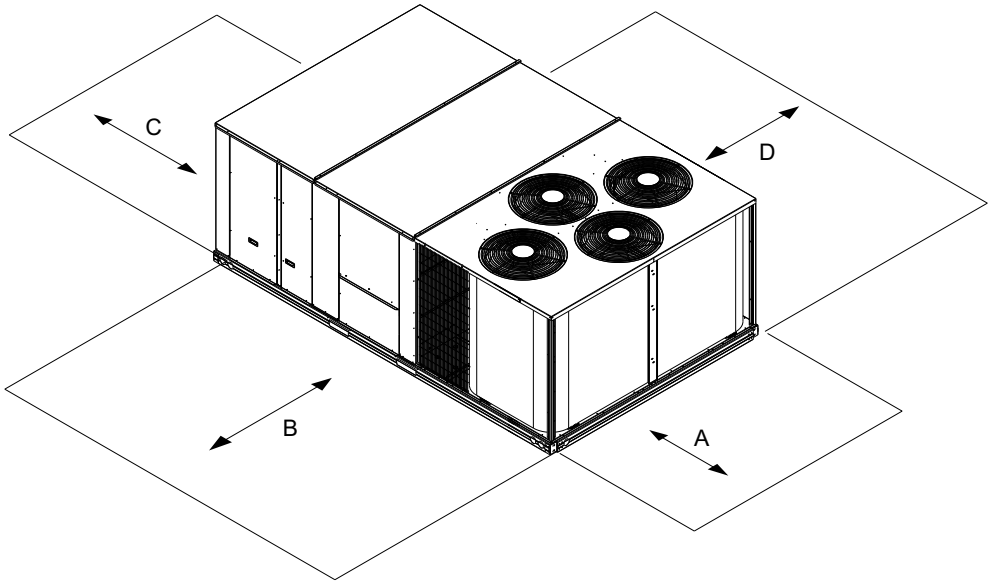
Fig. 3 - Unit Dimensional Drawing – Size 24 Units, Sheet 3 of 3



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LOCATION	DIMENSION	CONDITION
A	36–in (914 mm)	• Recommended clearance for air flow and service
B	42–in (1067 mm)	• Recommended clearance for air flow and service
C	18–in (457 mm)	• No Convenience Outlet • No Economizer • No field installed disconnect on economizer hood side (Factory–installed disconnect installed).
	36–in (914 mm)	• Convenience Outlet installed. • Vertical surface behind servicer is electrically non–conductive (e.g.: wood, fiberglass).
	42–in (1067 mm)	• Convenience Outlet installed. • Vertical surface behind servicer is electrically conductive (e.g.: metal, masonry).
	96–in (2438 mm)	• Economizer and/or Power Exhaust installed. • Check for sources of flue products with 10 feet (3 meters) of economizer fresh air intake.
D	42–in (1067 mm)	• Recommended clearance for service.

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 17 and 24 units have two compressor-circuits. See Fig. 5 for typical unit piping schematic (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 12) 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 $^1/_4$-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 12. 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

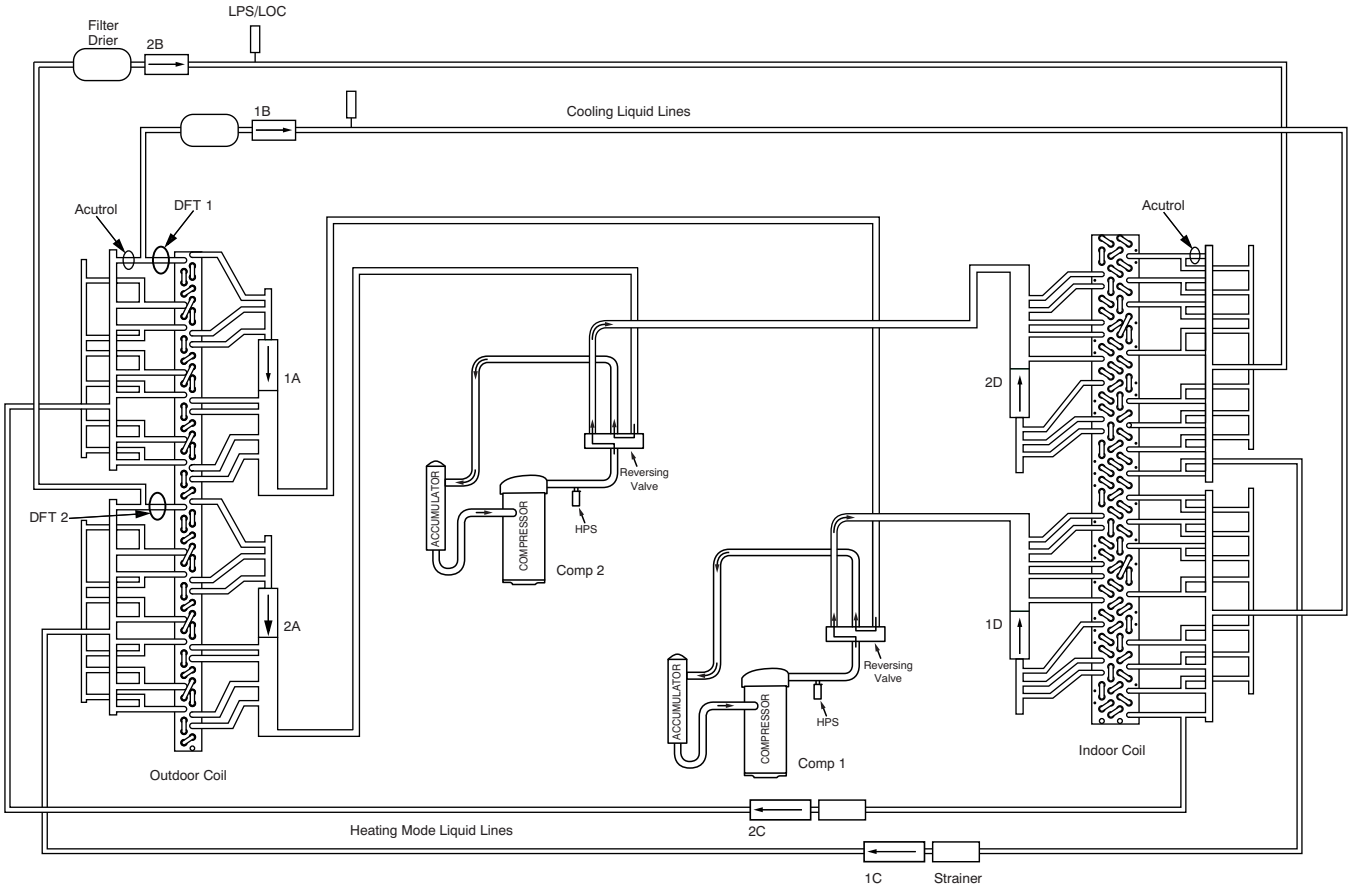

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Fig. 5 - Typical Unit Piping Schematic

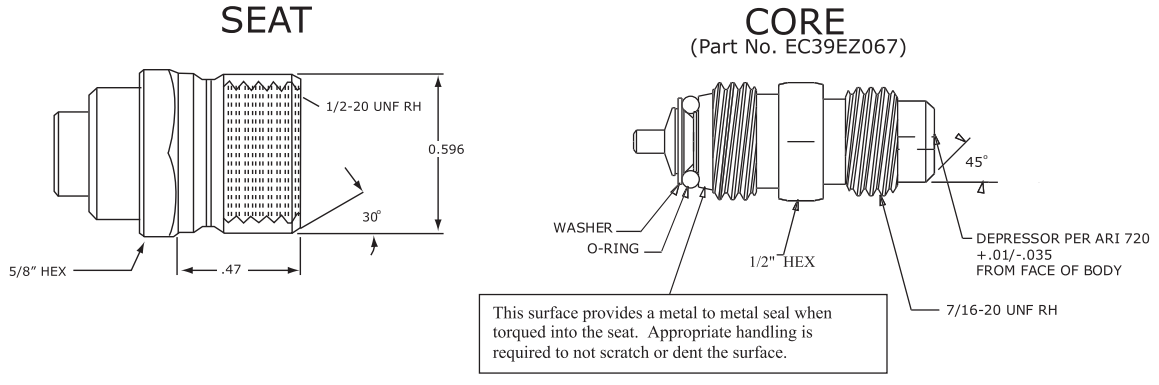

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Fig. 6 - CoreMax* Access Port Assembly

* CoreMax is a registered trademark of Fastest, Inc.

INSTALLATION

50TCQ size 17 and 24 units are shipped with dedicated air flow configuration, vertical or horizontal, and cannot be field converted.

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 on page 11.

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 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

50TCQD	UNITS LB (KG)	
	17	24
Base Unit	1775 (807)	2100 (955)
Economizer	246 (112)	246 (112)
Powered Outlet	35 (16)	35 (16)
Curb		
14 – in/356 mm	240 (109)	255 (116)
24 – in/610 mm	340 (154)	355 (161)

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 thru-base service connection fittings (affects curb and unit)
Rig and place unit
Remove top skid
Install condensate line trap and piping
Make electrical connections
Install other accessories

Pad-mounted installation —

Prepare pad and unit supports
Rig and place unit
Remove duct covers and top skid
Install field-fabricated ductwork at unit duct openings
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.

Step 4 — Provide Unit Support

Roof Curb Mount —

Accessory roof curb details and dimensions are shown in Fig. 7 (size 17) and Fig. 8 (size 24). 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. 7 and 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 show in Fig. 9 (on page 16). Refer to Accessory Roof Curb Installation Instructions for additional information as required.

UNIT SIZE	"A"	ROOF CURB ACCESSORY
17	1′-2" [356.0] 2′-0" [610.0]	CRRFCURB045A00 CRRFCURB046A00

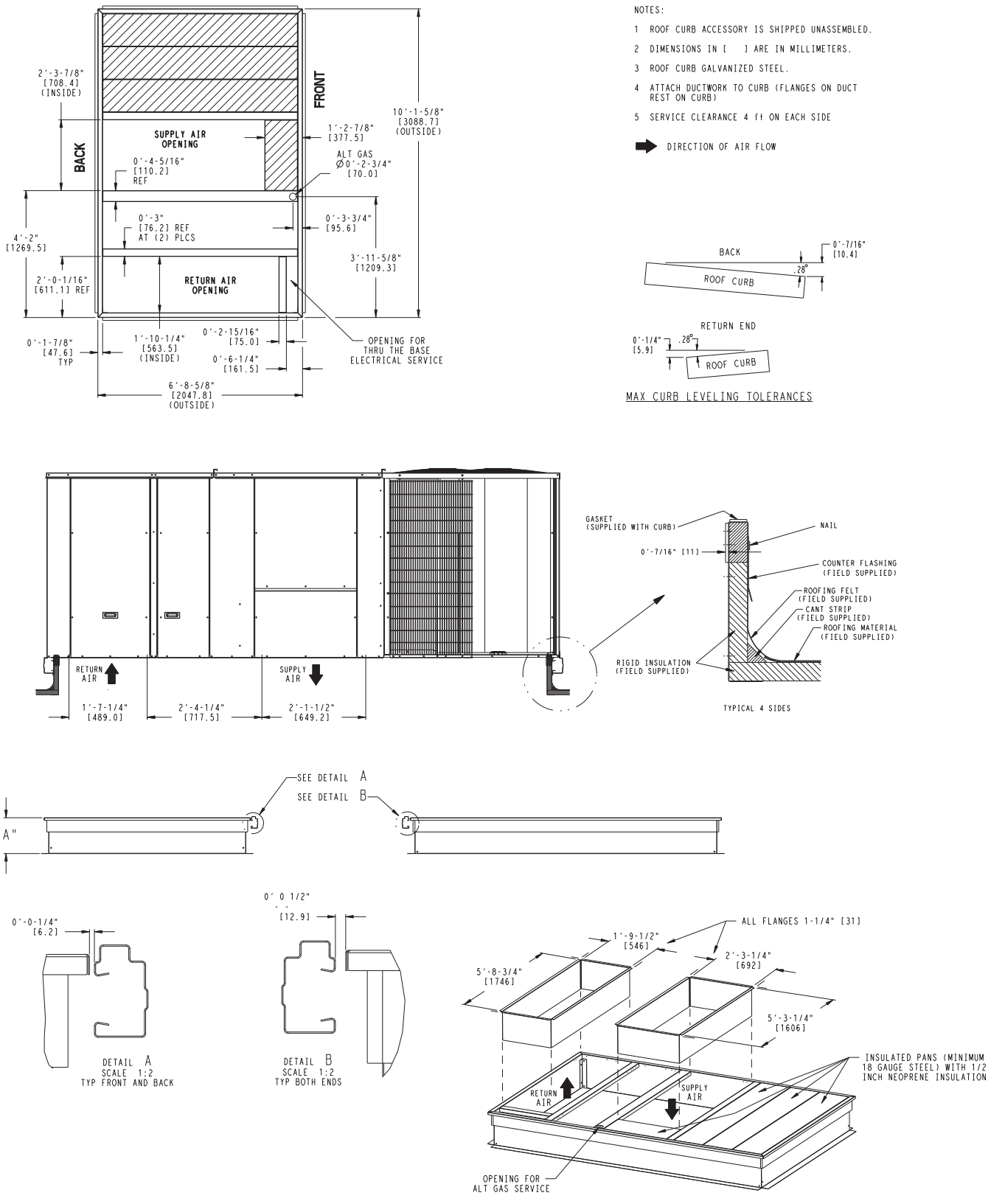


Fig. 7 - Roof Curb Details – Size 17 Units

UNIT SIZE	"A"	ROOF CURB ACCESSORY
24	1′-2" [356.0] 2′-0" [610.0]	CRRFCURB047A00 CRRFCURB048A00

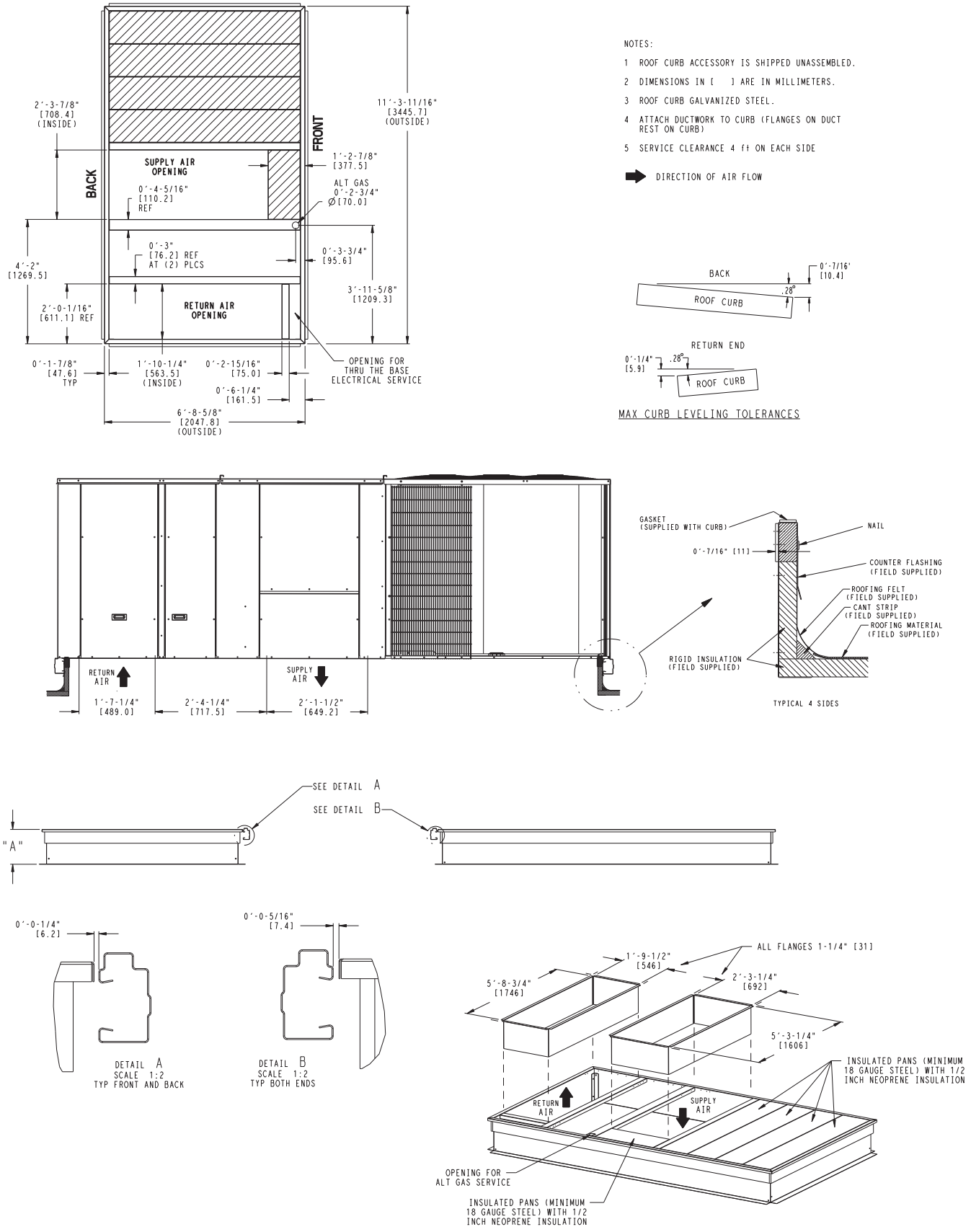
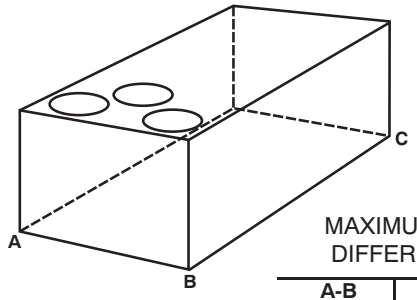


Fig. 8 - Roof Curb Details – Size 24 Units



MAXIMUM ALLOWABLE DIFFERENCE IN. (MM)

A-B	B-C	A-C
0.25" (6)	0.5" (12)	0.5" (12)

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Fig. 9 - 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. Thru-the-base power connection must be installed before the unit is set on the roof curb.*

If electric and control wiring is to be routed through the basepan remove knockouts in basepan located in control box area, see Fig. 10 for location. Attach the service connections to the basepans.

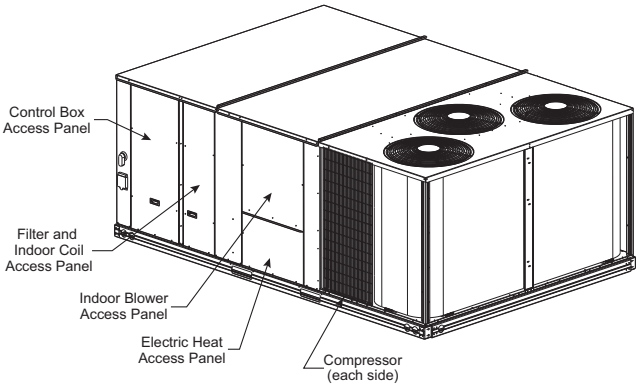

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Fig. 10 - Typical Access Panel and Compressor Locations

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 4 equally spaced 4-in. x 4-in. (102 mm x 102 mm) pads on each side. Locate pads so that they support the rails. Make sure to avoid the fork openings.

Step 5 — Field Fabricate Ductwork

Cabinet return-air static pressure (a negative condition) shall not exceed 0.5 in. wg (87 Pa) with economizer or without economizer.

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

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.

For units with accessory electric heaters, minimum clearance is not required around ductwork. One inch (25 mm) clearance to combustible materials must be maintained for the first 48 inches (1220 mm) of ductwork exiting the unit. This applies to horizontal and vertical applications.

Outlet grilles must not lie directly below unit discharge.

NOTE: A 90-degree elbow must be provided in the ductwork to comply with UL (Underwriters Laboratories) code for use with electric heat.

⚠ 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 (on page 13) and Fig. 11 for additional information.

Lifting holes are provided in base rails as shown in Fig. 11. Refer to rigging instructions on unit.

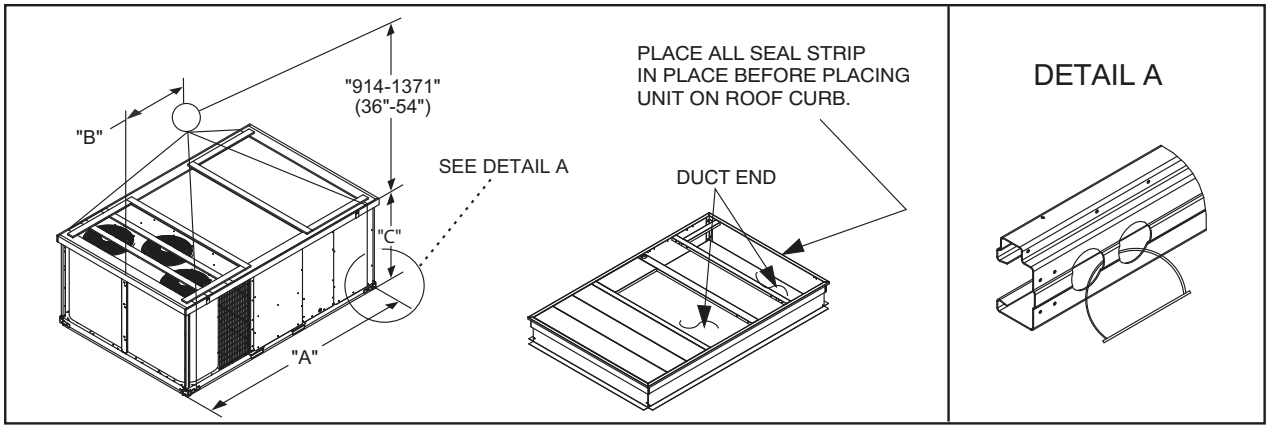
⚠ CAUTION

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.

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



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UNIT	MAX WEIGHT		DIMENSIONS					
			A		B		C	
	LB	KG	IN	MM	IN	MM	IN	MM
50TCQD17	2070	940	127.8	3249	58.7	1491	52.3	1328
50TCQD24	2358	1071	141.5	3595	58.7	1491	52.3	1328

NOTES:

1. Dimensions in ( ) are in 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. 11 - Rigging Details

Positioning on Curb —

Position unit on roof curb so that the following clearances are maintained: $^1/_4$ in. (6 mm) clearance between the roof curb and the base rail inside the right and left, $^1/_2$ in. (12 mm) clearance between the roof curb and the base rail inside the front and back. This will result in the distance between the roof curb and the base rail inside on the condenser end of the unit being approximately equal to Detail A in Fig. 7 and 8.

Do not attempt to slide unit on curb after unit is set. Doing so will result in damage to the roof curb seal.

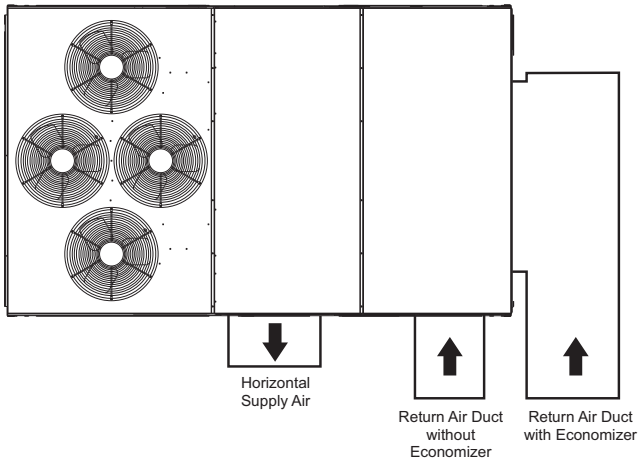
Although unit is weatherproof, guard against water from higher level runoff and overhangs.

After unit is in position, remove rigging skids and shipping materials.

Step 7 — Horizontal Duct Connection

Refer to Fig. 2 and 3 for locations and sizes of the horizontal duct connections. Note that there are two different return air duct connection locations – one for unit without an economizer (on back side of unit) and a different one for unit equipped with an economizer (on left end, under the economizer hood). The supply air duct connection is on the back side. See Fig. 12 for top view depicting typical horizontal duct arrangements.

Field-supplied ($^3/_4$-inch) flanges should be attached to horizontal duct openings (see Fig. 12) 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.



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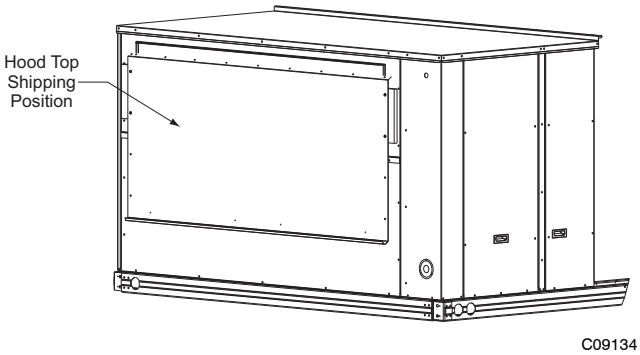
UNIT		Supply	Return without Economizer	Return with Economizer
	Location	Back	Back	Left end
50TCQ*17	Height – In. (mm)	$15^7/_8$ (402)	$41^3/_8$ (1051)	$18^3/_8$ (467)
	Width – in. (mm)	$29^3/_4$ (756)	$23^3/_8$ (593)	$61^5/_8$ (1564)
50TCQ*24	Height – In. (mm)	$15^7/_8$ (402)	$49^3/_8$ (1253)	$18^3/_8$ (467)
	Width – in. (mm)	$29^3/_4$ (756)	$23^3/_8$ (593)	$61^5/_8$ (1564)

Fig. 12 - Horizontal Duct Opening Dimensions

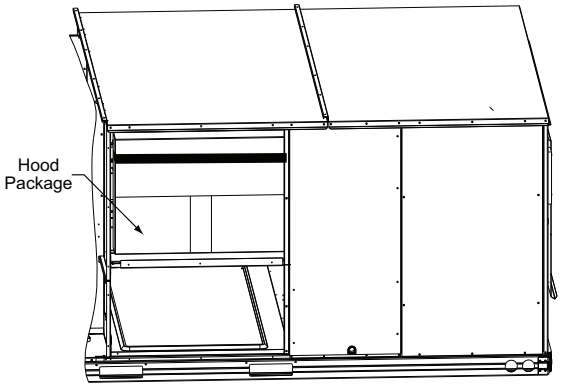
Step 8 — Install Outside Air Hood — Factory Option

The outside air hood for factory-option economizer and two-position damper is shipped in knock-down form and requires field assembly. The panel for the hood top is shipped on the end of the unit (see Fig. 13). The remaining parts for the hood assembly (including side panels, filters and tracks) are shipped in a carton that is secured to the rear of the blower assembly. Access the carton location through rear panel (see Fig. 14).



C09134

Fig. 13 - Hood Top – Shipping Position



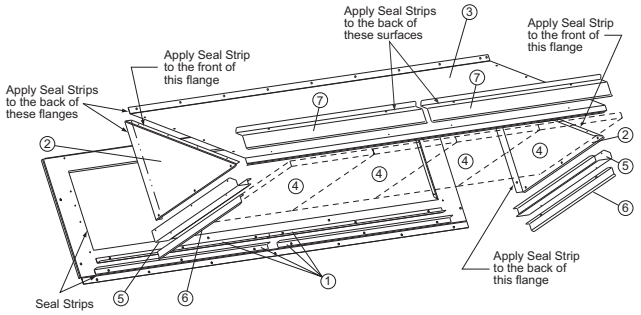
C13785

Fig. 14 - Hood Package – Shipping Location

To remove the hood parts package:

1. Remove the back blower access panel.
2. Locate and cut the strap, being careful to not damage any wiring.
3. Carefully lift the hood package carton through the back blower access opening.

See Fig. 15 for identification of the various parts of the hood assembly.



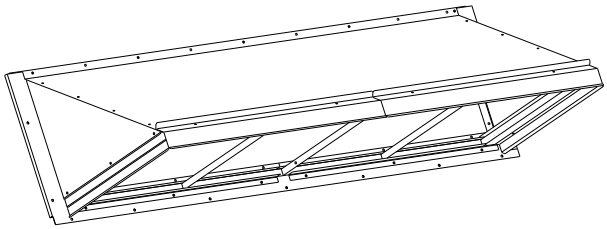
Item #	Description	Qty
1	Angles	4
2	Side Plates	2
3	Hood	1
4	Outdoor Air Screens	4
5	Side Filter Supports	2
6	Side Drip Angles	2
7	Top Diverters	2

C09079

Fig. 15 - Hood Part Identification and Seal Strip Application Areas

To assemble the outside air hood:

1. Remove hood top panel from shipping position on unit end.
2. Install four angles to the upper end panel using the screws provided
3. Apply seal strip to mating flanges on the side plates of the hood (see Fig. 15).
4. Secure side plates to panel using the screws provided.
5. Apply seal strip to mating flange of the hood (see Fig. 15).
6. Secure top flange using screws provided in kit.
7. Install outdoor air screens by sliding them into the channel formed by the four angles installed in Step 2. Make sure that the screens extend across the entire length of the hood.
8. Install side filter supports using the screws provided.
9. Install side drip angles using the screws provided.
10. Run a continuous length of seal strip across the hood covering the engagement holes in the lower hood.
11. Install top diverter using the screws provided.
12. On units with barometric relief, remove screws at bottom of relief damper. **Do not discard damper door**.

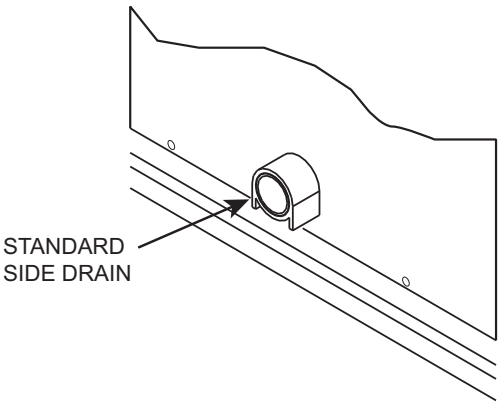


C09090

Fig. 16 - Hood Assembly – Completed

Step 9 — Install External Condensate Trap and Line

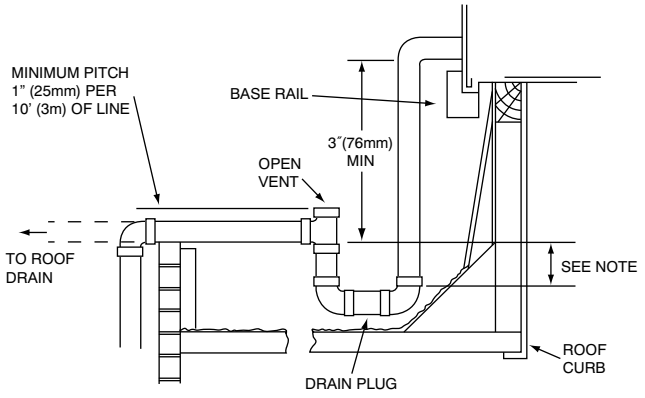
The unit has one $^{3}/_{4}$-in. condensate drain connection on the end of the condensate pan (see Fig. 17). See Fig. 2 (or Fig. 3), item “E”, in the view labeled “BACK” for the location of the condensate drain connection.



C09056

Fig. 17 - Condensate Drain Pan Connection

The piping for the condensate drain and external trap can be completed after the unit is in place. Hand tighten fittings to the drain pan fitting. Provide adequate support for the drain line. Failure to do so can result in damage to the drain pan. See Fig. 18.



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

a50-9660

Fig. 18 - 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 ($^3/_4$-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 the terminal block with unit field power leads.

Field power wires are connected to the unit at line-side pressure lugs on the terminal block (see wiring diagram label for control box component arrangement) or at factory-installed option non-fused disconnect switch. Use copper conductors only.

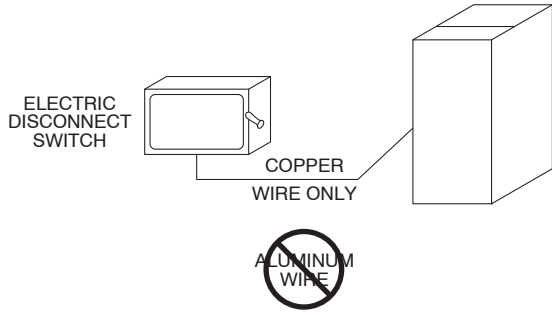
NOTE: Make field power connections directly to line connection pressure lugs only.

⚠ WARNING

FIRE HAZARD

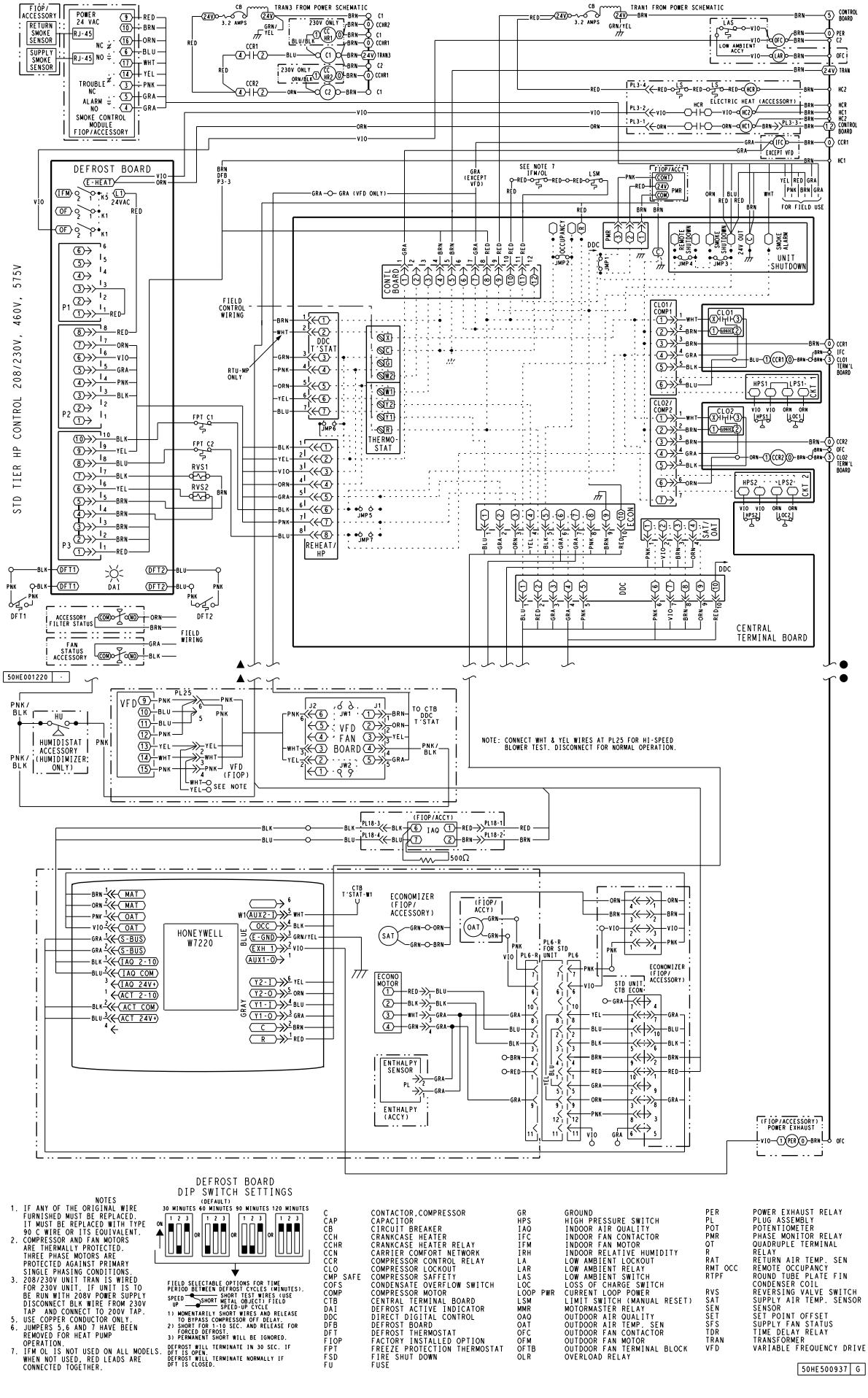
Failure to follow this warning could result in intermittent operation or performance satisfaction.

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



A93033

Fig. 19 - Disconnect Switch and Unit



a50-9696

Fig. 20 - 50TCQ 17-24 Control Wiring Diagram with VFD Option

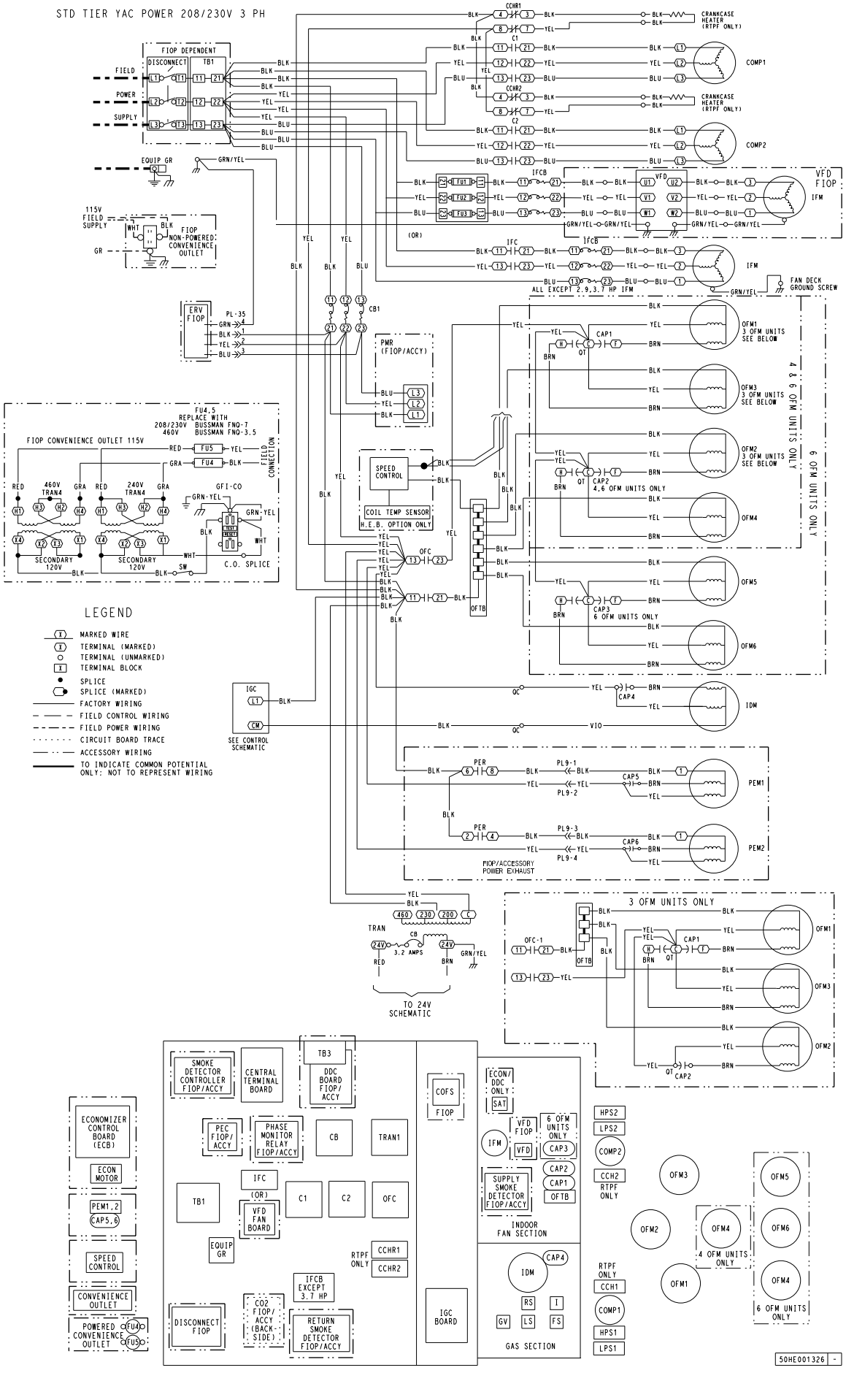


Fig. 21 - Typical 50TCQ 17-24 Power Wiring Diagram (208/230V 3 Phase 60Hz unit shown)

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.

Units With Factory-Installed Non-Fused Disconnect —

The factory-installed option non-fused disconnect switch (NFD) is located in the main control box. The manual switch handle and shaft are shipped in the control box and must be mounted on the corner post adjacent to the control box (see Fig. 22). Note that the tape covering the hole for the shaft in the corner post must be removed prior to handle and shaft installation.

To field install the NFD shaft and handle:

1. Open the control box panel.
2. Make sure the NFD shipped from the factory is at OFF position (the arrow on the black handle knob or on the silver metal collar is at OFF).
3. Insert the shaft with the cross pin on the top of the shaft in the horizontal position.
4. Measure the tip of the shaft to the outside surface of the corner post to be 0.88 inch.
5. Tighten the locking screw to secure the shaft to the NFD.
6. Turn the handle to OFF position with red arrow pointing at OFF.
7. Install the handle on to the corner post vertically with the red arrow pointing up.
8. Secure the handle to the corner post with (2) screws and lock washers supplied.

All Units -

All field wiring must comply with NEC and all local code requirements.

Size wire based on MCA (Minimum Circuit Amps) on the unit informative plate. See Fig. 23 for power wiring connections to the unit power terminal block and equipment ground.

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.

Voltage to compressor terminals during operation must be within voltage range indicated on unit nameplate. 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 29 - 31 (see Note 3 on page 61) to determine the percent of voltage imbalance.

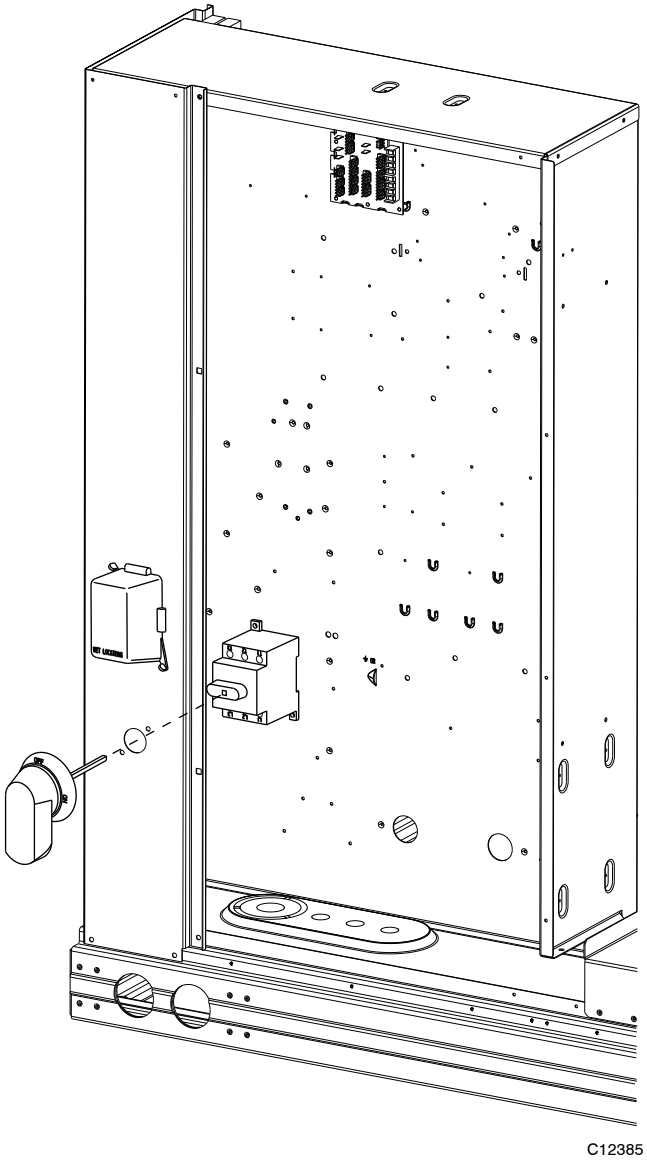


Fig. 22 - Handle and Shaft Assembly for NFD

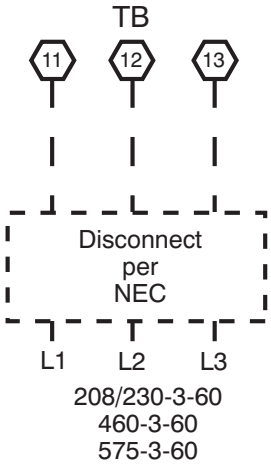
⚠ CAUTION

UNIT DAMAGE HAZARD

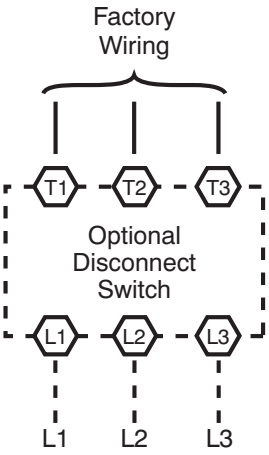
Failure to follow this caution may result in equipment damage.

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.

Units Without Disconnect Option



Units With Disconnect Option



C09057

Fig. 23 - Power Wiring Connections

Convenience Outlets —

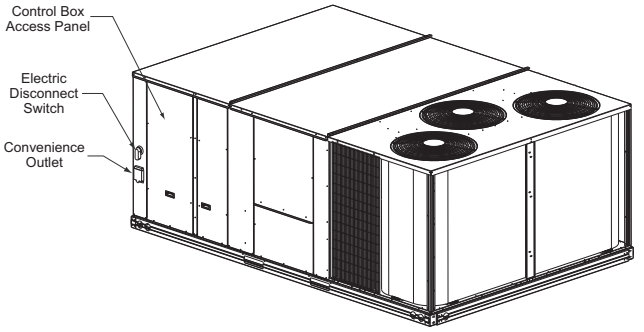
⚠ WARNING

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 48TC*D 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 access cover, located on the corner panel of the unit. See Fig. 24.



C09119

Fig. 24 - 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.

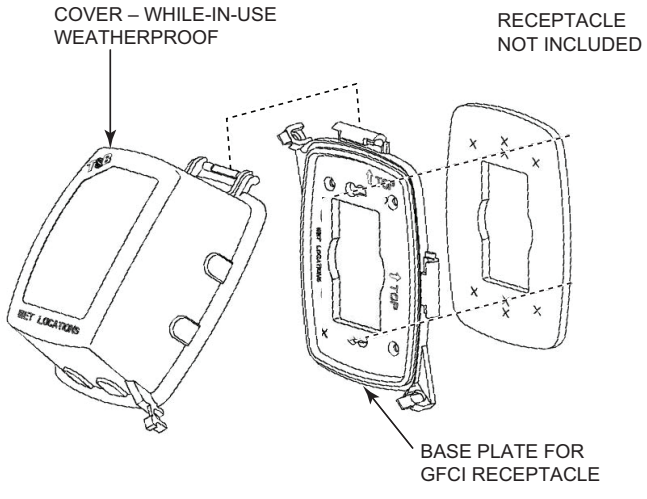
The weatherproof cover kit is shipped in the unit's control box. The kit includes the hinged cover, a backing plate and gasket.

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. 25. 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.



C09022

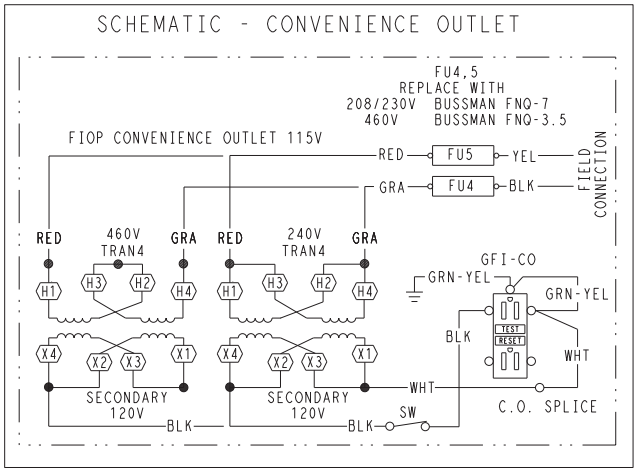
Fig. 25 - Weatherproof Cover Installation

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. 24.

The primary leads to the convenience outlet transformer are not factory-connected. If local codes permit, the transformer primary leads can be connected at the line-side terminals on the unit-mounted non-fused disconnect switch; this will provide service power to the unit when the unit disconnect switch is open. See Fig. 26.



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 Splice BLU + YEL L2: GRA	H1 H2 + H3 H4
575	600	L1: RED L2: GRA	H1 H2

Fig. 26 - Powered Convenience Outlet Wiring

Duty Cycle: The unit-powered convenience outlet has a duty cycle limitation. The transformer is intended to provide power on an intermittent basis for service tools, lamps, etc; it is not intended to provide 15-amps loading for continuous duty loads (such as electric heaters for overnight use). Observe a 50% limit on circuit loading above 8-amps (i.e., limit loads exceeding 8-amps to 30 minutes of operation every hour).

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.

Fuse on power type: The factory fuse is a Bussman FNQ-7 dual element time delay fuse.

Using unit-mounted convenience outlets: Units with unit-mounded 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.

Factory-Option Thru-Base Connections —

All units are equipped with the ability to bring utilities through the base.

The electrical entrance is located in the control box area can can be accessed through the control box access panel. An embossed area is provided with three knock outs. High voltage is brought through the multi knock out by removing the appropriate size for the size of the fitting required. A $^{7}/_{8}$-in. knock out is provided for low voltage. An additional $^{7}/_{8}$-in. knock out is provided for a 115 volt line which is used when the unit is equipped with the non-powered convenience outlet option.

All required fittings are field supplied. Install fittings when access to both top and bottom of the base pan is available.

Units Without Thru-Base Connections —

1. Install conduit, liquid tight, between disconnect and control box.
2. Pull correctly rated high voltage wires through the conduit.
3. Install power lines to terminal connections as shown in Fig. 23.

Field Control Wiring —

The 50TCQD 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 for Building Management Systems using non-CCN protocols (RTU Open controller is available as a factory-installed option only).

Thermostat —

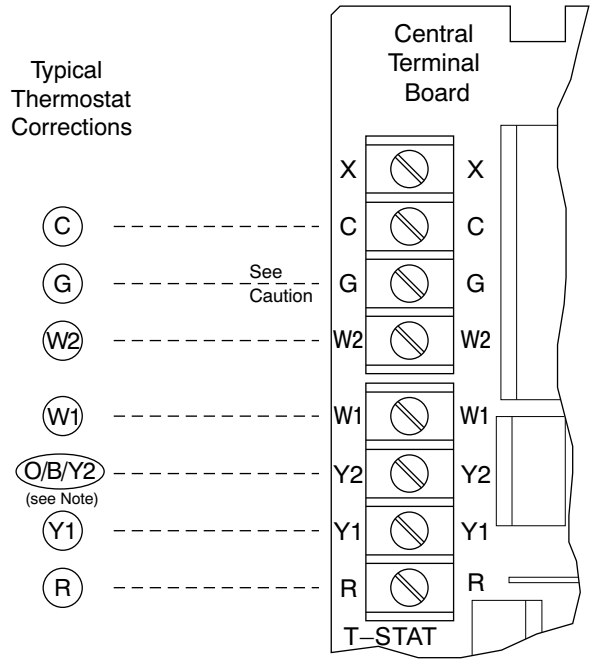
Select a Carrier-approved accessory thermostat. The 50TCQ models do not require a thermostat with an O function to control the reversing valve operation. When electric heat is installed in the 50TCQ unit, the thermostat must be capable of energizing the G terminal (to energize the Indoor Fan Contactor) whenever there is a space call for heat (energizing the W1 terminal). The accessory thermostats listed on the unit price pages can provide this signal but they are not configured to enable this signal as shipped.

Install the accessory thermostat according to installation instructions included with the accessory.

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

– – – Field Wiring

⚠ CAUTION

UNIT DAMAGE HAZARD

Failure to follow this caution may cause a short circuit.

Carefully check the connection of control coductor for indoor fan control at terminal G. Connecting the indoor fan lead to terminal C will cause a short circuit condition which can cause component damage inside the unit or at thermostat.

C14067

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.

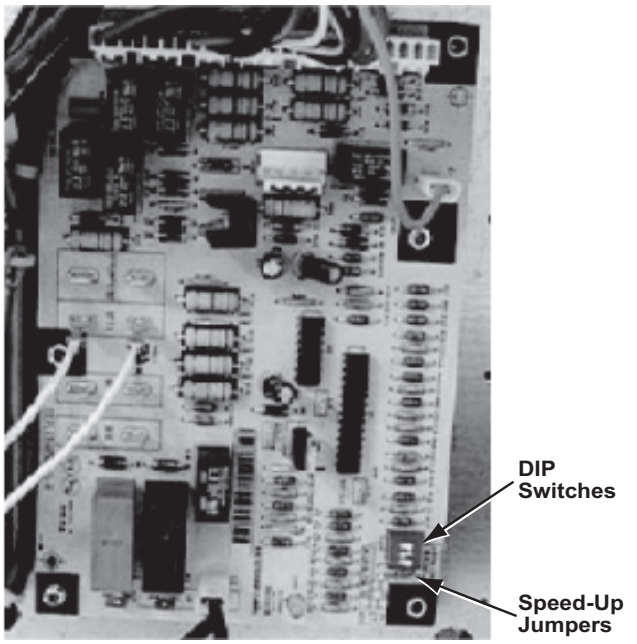


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Fig. 28 - Defrost Control Board Arrangement

The DFB is located in the 50TCQ unit's main control box (see Fig. 29 on page 26). 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 (on page 26) 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 runs), Stage 2 Cooling (both compressors run) or Stage 1 Heating (both compressors run).

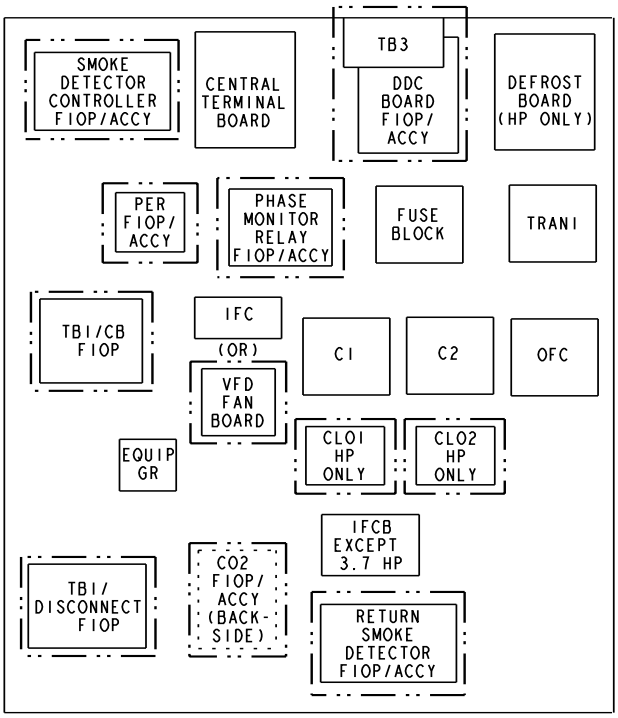

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Fig. 29 - Defrost Control Board Location

Table 5 – 50TCQ 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/HP–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	FPT1 – REHEAT/HP–6	
COMP 2	DO, 24Vac	P3–8	FPT2 – REHEAT/HP–8	
HEAT 2	DO, 24Vac	E–HEAT	TB4–1	
COM	24Vac	P3–3	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 50TCQD

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 — The defrost interval timing is reduced by a factor of 0.1 seconds/minute based on the positions of DIP switches SW1 and SW2 (i.e. 90 minutes will be reduced to 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
	30 minutes			60 minutes (Factory default)			90 minutes			120 minutes			Fan Delay	

Auxiliary (Electric) Heat control — The 50TCQ 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) 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. 30 and Table 6). The default run period is 60 minutes for size 17 and 24 units.

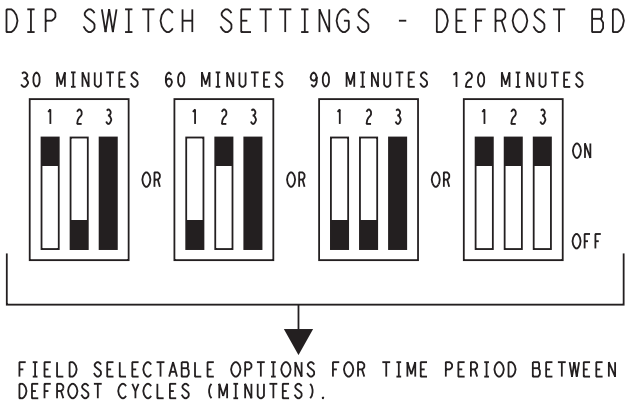


Fig. 30 - DIP Switch Settings — Defrost Board

Shorting the jumpers for a period of 5 to 20 seconds 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 seconds. Both modes end at the end of the Defrost cycle.

Unit Without Thru-Base Connection Kit —

Correctly rated low voltage wire can be routed through the rubber grommet located on the corner post adjacent to the control box access panel. Route wire through the grommet and then route the wire behind the corner post utilizing the factory provided wire ties secured to the control box. This will insure separation of the field low voltage wire and the high voltage circuit. Route the low voltage wire to the central terminal board. See Fig. 31.

NOTE: If utilizing the through the base connections, route the low voltage wire through the wire ties to the central terminal board.

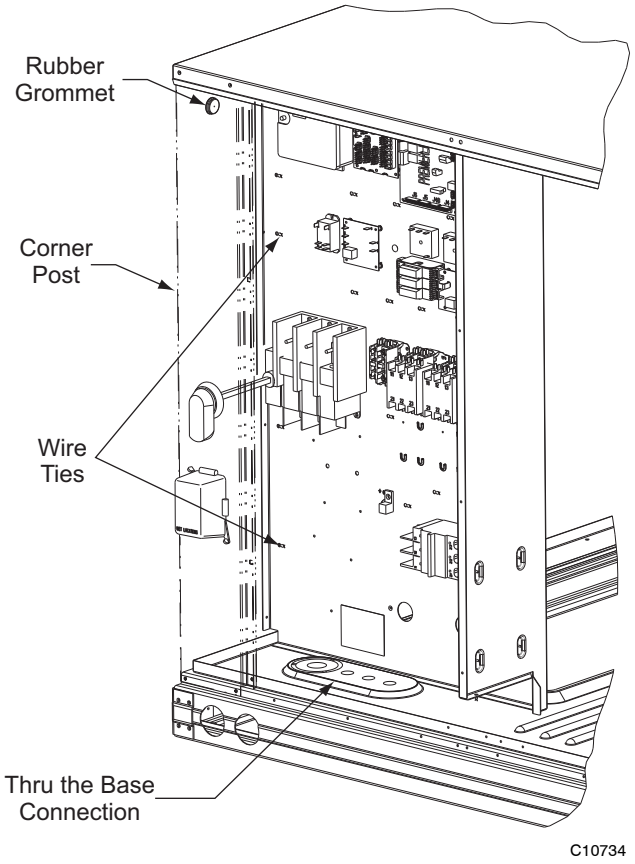


Fig. 31 - Field Control Wiring Raceway

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.

Transformer Connection for 208-v Power Supply —

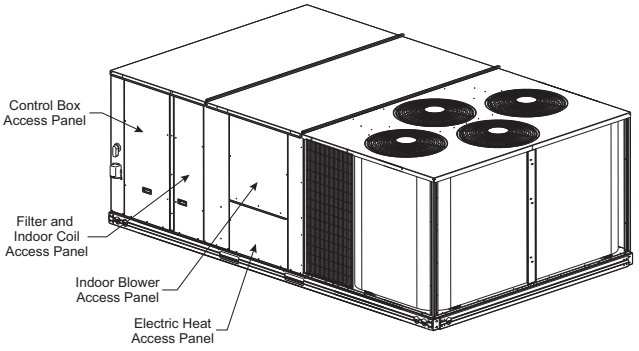
All units except 208/230-v units are factory wired for the voltage shown on the nameplate. *If the 208/230-v unit is to be connected to a 208-v power supply, the control transformer must be rewired by moving the black wire with the $^1/_4$-in. female spade connector from the 230-v connection and moving 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.

Electric Heaters

50TCQD units may be equipped with field-installed accessory electric heaters. The heaters are modular in design.

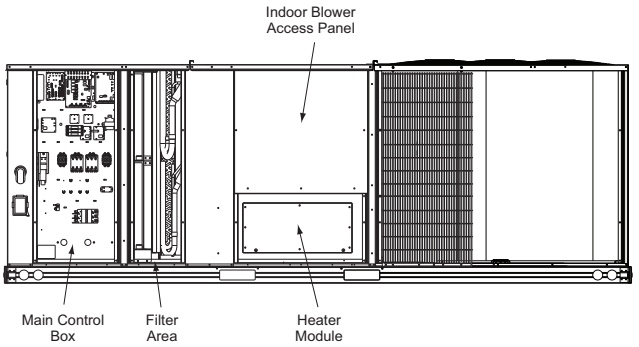
Heater modules are installed in the compartment below the indoor blower access panel. Access is through the electric heat access panel. Heater modules slide into the compartment on tracks along the bottom of the heater opening. See Fig. 32 - 34. Refer to the Electric Heater Kit Installation Instructions for complete details.

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



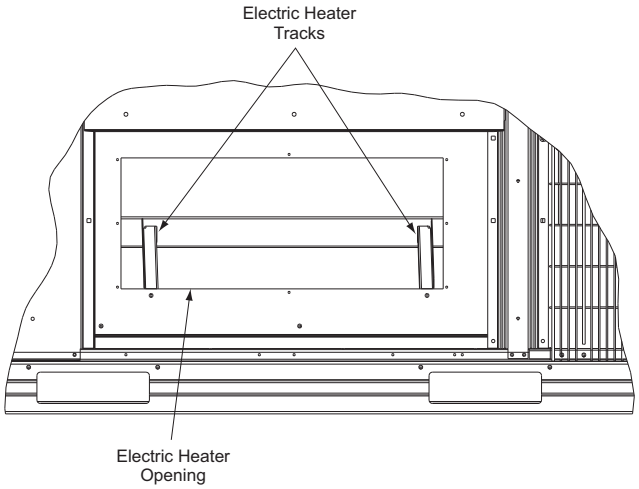
C10631

Fig. 32 - Typical Access Panel Location



C10632

Fig. 33 - Typical Component Location

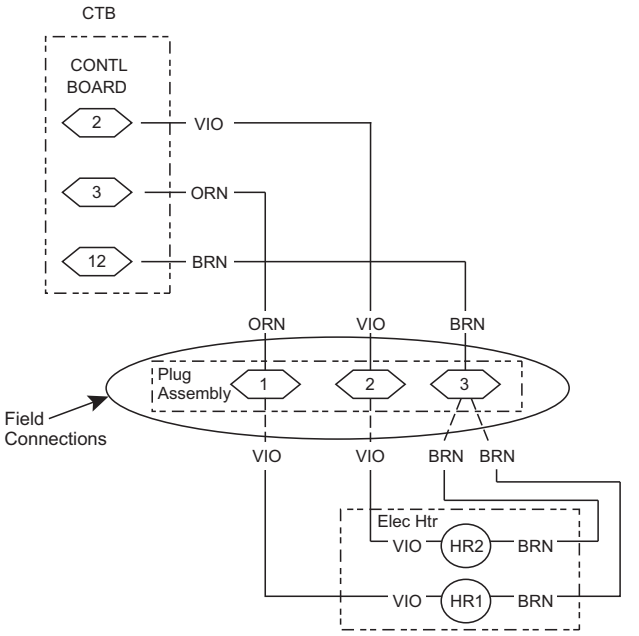


C09142

Fig. 34 - Electric Heater Compartment (Cover Removed)

Low-Voltage Control Connections —

Locate the plug assembly in the electric heater section of the main unit. Connect the plug with the mating low voltage plug located on the heater.



HR1: On Heater 1 in Position #1
HR2: On Heater 2 in Position #2 (if installed)

C09149

Fig. 35 - Accessory Electric Heater Control Connections

EconoMi$er® X (Factory-Installed Option)

C14154

Fig. 36 - W7220 Economizer Module

Product Description —

The EconoMi$er X system is an expandable economizer control system, which includes a W7220 economizer module (controller) with an LCD and keypad. The W7220 can be configured with optional sensors.

The W7220 economizer module can be used as a stand-alone economizer module wired directly to a commercial set-back space thermostat and sensors to provide outside air dry-bulb economizer control.

The W7220 economizer module can be connected to optional sensors for single or differential enthalpy control. The W7220 economizer module provides power and communications for the sensors.

The W7220 economizer module automatically detects sensors by polling to determine which sensors are present. If a sensor loses communications after it has been detected, the W7220 economizer controller indicates a device fail error on its LCD.

System Components —

The EconoMi$er X system includes an economizer module, 20k mixed air sensor, damper actuator, and either a 20k outdoor air temperature sensor or S-Bus enthalpy sensors.

Economizer Module: This is the core of the EconoMi$er X system, is mounted in the unit's control box, and includes the user interface for the system. The W7220 economizer module provides the basic inputs and outputs to provide simple economizer control. When used with the optional sensors, the economizer module provides more advanced economizer functionality.

S-Bus Enthalpy Control Sensors: The S-bus enthalpy control sensor is a combination temperature and humidity sensor which is powered by and communicates on the S-Bus. Up to three sensors may be configured with the W7220 economizer module. See page 30 for details.

CO_2 Sensor (optional): A CO_2 sensor can be added for Demand Controlled Ventilation (DCV).

Specifications

W7220 Economizer Module —

The module is designed for use with 2 to 10 Vdc or bus communicating actuator. The module includes terminals for CO_2 sensor, mixed air sensor, and an outdoor dry bulb sensor. Enthalpy and other options are available with bus sensors.

User Interface: Provides status for normal operation, setup parameters, checkout tests, and alarm and error conditions with a 2-line 16 character LCD display and four button keypad.

Electrical —

Rated Voltage: 20 to 30 Vac RMS, 50/60 Hz
Transformer: 100 va maximum system input

Nominal Power Consumption (at 24 Vac, 60 Hz):
11.5 VA without sensors or actuators

Relay Digital Output Rating at 30 Vac (maximum power from Class 2 input only): 1.5A run:
3.5A inrush at 0.45PF (200,000 cycles) or
7.5A inrush at 0.45PF (100,000 cycles)

External Sensors Power Output: 21 Vdc ± 5% at 48mA

IMPORTANT: All inputs and outputs must be Class 2 wiring.

Inputs —

Sensors:

NOTE: A mixed air (MA) analog sensor is required on all W7220 units; either an outdoor air (OA) sensor for dry bulb change over or an OA bus sensor for outdoor enthalpy change over is required in addition to the MA sensor. An additional return air (RA) bus sensor can be added to the system for differential enthalpy or dry bulb changeover. For differential dry bulb changeover a 20k ohm sensor is required in the OA and a bus sensor in the RA. DIP switch on RA bus sensor must be set in the RA position.

Dry Bulb Temperature (optional) and Mixed Air (required), 20k NTC:
2-wire (18 to 22 AWG);
Temperature range -40 to 150°F (-40 to 65°C).
Temperature accuracy -0°F/+2°F

Temperature and Humidity, C7400S1000 (optional):
S-Bus; 2-wire (18 to 22 AWG)
Temperature: range -40 to 150°F (-40 to 65°C)
Temperature accuracy -0°F/+2°F
Humidity: range 0 to 100% RH with 5% accuracy

NOTE: Up to three (3) S-Bus sensors may be connected to the W7220 economizer module. For outdoor air (OA), return air (RA) and discharge (supply) air (DA).

4 Binary inputs:
1-wire 24 Vac + common GND (see page 31 for wiring details). 24 Vac power supply: 20 to 30 Vac 50/60Hz; 100 VA Class 2 transformer.

Outputs —

Actuator signal: 2-10 Vdc; minimum actuator impedance is 2k ohm; bus two-wire output for bus communicating actuators.

Exhaust fan, Y1, Y2 and AUX1 O:
All Relay Outputs (at 30 Vac):
Running: 1.5A maximum
Inrush: 7.5A maximum

Environmental —

Operating Temperature: -40 to 150°F (-40 to 65°C). Exception of display operation down to -4°F with full recovery at -4°F from exposure to -40°F

Storage Temperature: -40 to 150°F (-40 to 65°C)

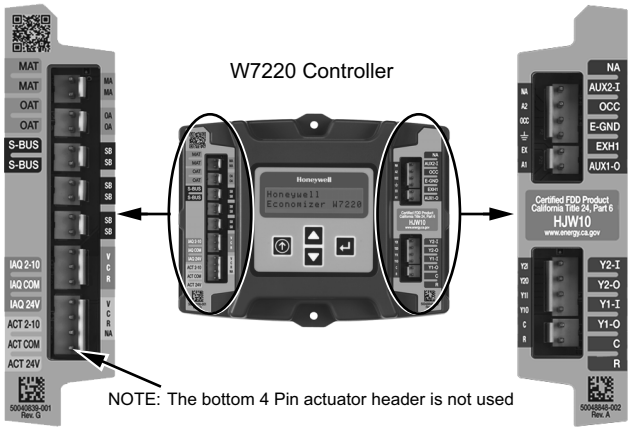
Shipping Temperature: -40 to 150°F (-40 to 65°C)

Relative Humidity: 5% to 95% RH non-condensing

Economizer Module Wiring Details —

Use Fig. 37 and Tables 7 and 8 to locate the wiring terminals for the economizer module.

NOTE: The four terminal blocks are removable. You can slide out each terminal block, wire it, and then slide it back into place.



C14156

Fig. 37 - W7220 Economizer Module Terminal Connection Labels

S-Bus Sensor Wiring —

The labels on the sensors and controller are color coded for ease of installation. Orange labeled sensors can only be wired to orange terminals on the controller. Brown labeled sensors can only be wired to S-bus (brown) terminals. Use Fig. 38 and Table 9 to locate the wiring terminals for each S-Bus sensor.

Use Fig. 38 and Table 10 to set the DIP switches for the desired use of the sensor.

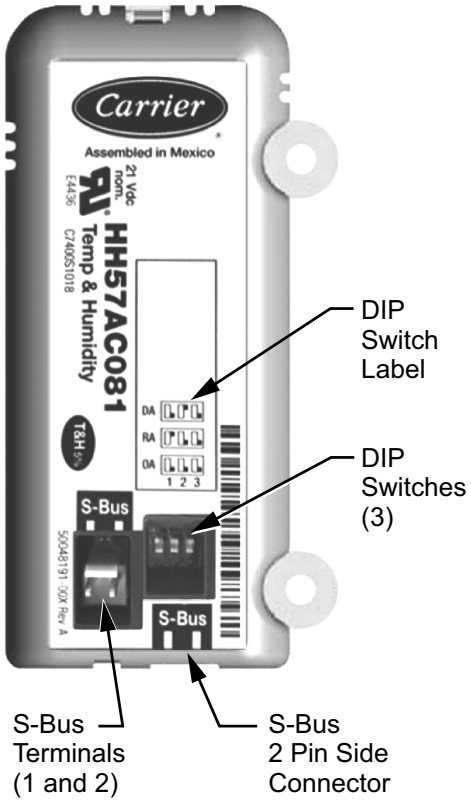
Table 7 – Economizer Module - Left Hand Terminal Blocks

Label	Type	Description
Top Left Terminal Block		
MAT MAT	20k NTC and COM	Supply Air Temperature Sensor (polarity insensitive connection)
OAT OAT	20k NTC and COM	Outdoor Air Temperature Sensor (polarity insensitive connection)
S–BUS S–BUS	S–Bus (Sylk* Bus)	Enthalpy Control Sensor (polarity insensitive connection)
Bottom Left Terminal Block		
IAQ 2–10	2–10 Vdc	Air Quality Sensor Input (e.g. CO_2 sensor)
IAQ COM	COM	Air Quality Sensor Common
IAQ 24V	24 Vac	Air Quality Sensor 24 Vac Source
ACT 2–10	2–10 Vdc	Damper Actuator Output (2–10 Vdc)
ACT COM	COM	Damper Actuator Output Common
ACT 24V	24 Vac	Damper Actuator 24 Vac Source
	n/a	The bottom pin is not used.

Table 8 – Economizer Module - Right Hand Terminal Blocks

Label	Type	Description
Top Right Terminal Block		
	n/a	The first pin is not used
AUX2 I	24 Vac IN	Shut Down (SD) or Heat (W) Conventional only or Heat Pump Changeover (O/B) in Heat Pump mode.
OCC	24 Vac IN	Occupied / Unoccupied Input
E–GND	E–GND	Earth Ground – System Required
EXH1	24 Vac OUT	Exhaust Fan 1 Output
AUX1 O	24 Vac OUT	Programmable: Exhaust fan 2 output or Erv or System Alarm output
Bottom Right Terminal Block		
Y2–I	24 Vac IN	Y2 in – Cooling Stage 2 Input from space thermostat
Y2–O	24 Vac OUT	Y2 out – Cooling Stage 2 Output to stage 2 mechanical cooling
Y1–I	24 Vac IN	Y1 in – Cooling Stage 1 Input from space thermostat
Y1–O	24 Vac OUT	Y1 out – Cooling Stage 1 Output to stage 1 mechanical cooling
C	COM	24 Vac Common
R	24 Vac	24 Vac Power (Hot)

* Sylk is a trademark of Honeywell International Inc.



C14157

Fig. 38 - S-Bus Sensor DIP Switches

Table 9 – Enthalpy Control Sensor Wiring Terminations*

Terminal		Type	Description
Nbr	Label		
1	S–BUS	S–BUS	S–Bus Communications (Enthalpy Control Sensor Bus)
2	S–BUS	S–BUS	S–Bus Communications (Enthalpy Control Sensor Bus)

* Terminals are polarity insensitive.

Table 10 – Enthalpy Control Sensor DIP Switch Settings

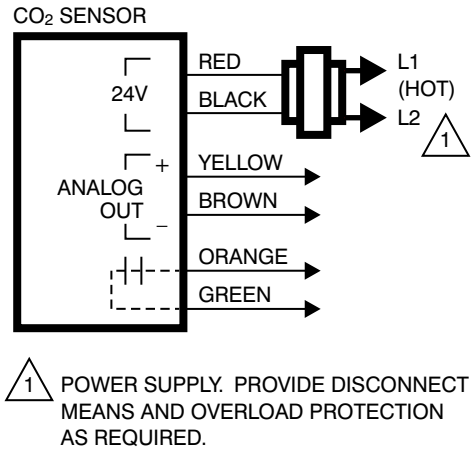
Use	DIP Switch Positions for Switches 1, 2, and 3		
	1	2	3
DA*	OFF	ON	OFF
RA†	ON	OFF	OFF
OA**	OFF	OFF	OFF

* DA = Discharge Air
† RA = Return Air
** OA = Outside Air

NOTE: When a S-bus sensor is connected to an existing network, it will take 60 minutes for the network to recognize and auto-configure itself to use the new sensor. During the 60 minute setup period, no alarms for sensor failures (except SAT) will be issued and no economizing function will be available.

CO_2 Sensor Wiring —

When using a CO_2 sensor the black and brown common wires are internally connected and only one is connected to "IAQ COM" on the W7220. Use the power from the W7220 to power the CO_2 sensor OR make sure the ground for the power supplies are common. See Fig. 39 for CO_2 sensor wiring.



C14158

Fig. 39 - Wiring for CO_2 Sensor

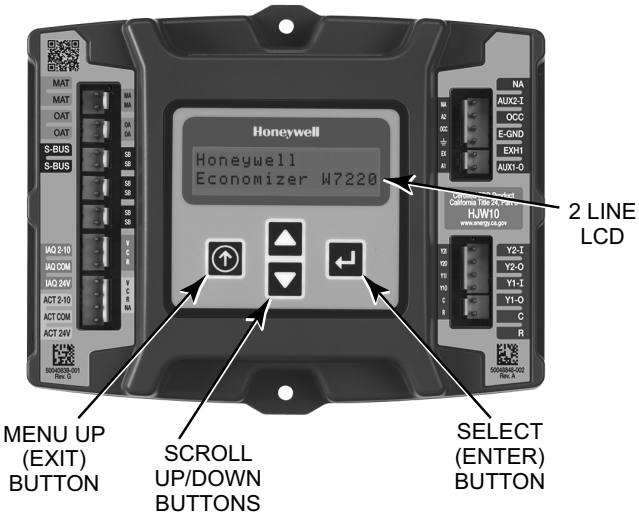
Interface Overview

This section describes how to use the economizer's user interface for:

- Keypad and menu navigation
- Settings and parameter changes
- Menu structure and selection

User Interface —

The user interface consists of a 2-line LCD display and a 4-button keypad on the front of the economizer controller.



C14206

Fig. 40 - W7220 Controller

Keypad —

The four navigation buttons (see Fig. 40) are used to scroll through the menus and menu items, select menu items, and to change parameter and configuration settings.

To use the keypad when working with menus:

- Press the ▲ (Up arrow) button to move to the previous menu.
- Press the ▼ (Down arrow) button to move to the next menu.
- Press the ↵ (Enter) button to display the first item in the currently displayed menu.
- Press the ⓣ (Menu Up/Exit) button to exit a menu's item and return to the list of menus.

To use the keypad when working with Setpoints, System and Advanced Settings, Checkout tests and Alarms:

1. Navigate to the desired menu.
2. Press the ↵ (Enter) button to display the first item in the currently displayed menu.
3. Use the ▲ and ▼ buttons to scroll to the desired parameter.
4. Press the ↵ (Enter) button to display the value of the currently displayed item.
5. Press the ▲ button to increase (change) the displayed parameter value.
6. Press the ▼ button to decrease (change) the displayed parameter value.

   NOTE: When values are displayed, pressing and holding the ▲ or ▼ button causes the display to automatically increment.
7. Press the ↵ (Enter) button to accept the displayed value and store it in nonvolatile RAM.
8. "CHANGE STORED" displays.
9. Press the ↵ (Enter) button to return to the current menu parameter.
10. Press the ⓣ (Menu Up/Exit) button to return to the previous menu.

Menu Structure

Table 11 illustrates the complete hierarchy of menus and parameters for the EconoMi$er® X system.

The Menus in display order are:

- STATUS
- SETPOINTS
- SYSTEM SETUP
- ADVANCED SETUP
- CHECKOUT
- ALARMS

IMPORTANT: Table 11 illustrates the complete hierarchy. Your menu parameters may be different depending on your configuration.

For example if you do not have a DCV (CO_2) sensor, then none of the DCV parameters appear and only MIN POS will display. If you have a CO_2 sensor, the DCV MIN and DCV MAX will appear AND if you have 2 speed fan DCV MIN (high and low speed) and DCV MAX (high and low speed will appear).

NOTE: Some parameters in the menus use the letters MA or MAT, indicating a mixed air temperature sensor location before the cooling coil. This unit application has the control sensor located after the cooling coil, in the fan section, where it is designated as (Cooling) Supply Air Temperature or SAT sensor.

Setup and Configuration

Before being placed into service, the W7220 economizer module must be setup and configured for the installed system.

IMPORTANT: During setup, the economizer module is live at all times.

The setup process uses a hierarchical menu structure that is easy to use. You press the ▲ and ▼ arrow buttons to move forward and backward through the menus and press the ↵ button to select and confirm setup item changes.

Time-out and Screensaver —

When no buttons have been pressed for 10 minutes, the LCD displays a screen saver, which cycles through the Status items. Each Status items displays in turn and cycles to the next item after 5 seconds.

Table 11 – Menu Structure*

Menu	Parameter	Parameter Default Value	Parameter Range and Increment†	EXPANDED PARAMETER NAME Notes
STATUS	ECON AVAIL	NO	YES/NO	ECONOMIZING AVAILABLE YES = economizing available; the system can use outside air for free cooling when required
	ECONOMIZING	NO	YES/NO	ECONOMIZING ACTIVE YES = Outside air being used for first stage cooling. NO = Economizing not active
	OCCUPIED	NO	YES/NO	OCCUPIED YES = OCC signal received from space thermostat or unitary controller. YES = 24 Vac on terminal OCC. NO = 0 Vac on terminal OCC.
	HEAT PUMP	n/a**	COOL HEAT	HEAT PUMP MODE Displays COOL or HEAT when system is set to heat pump (non–conventional)

Table 11 - Menu Structure* (cont)

Menu	Parameter	Parameter Default Value	Parameter Range and Increment†	EXPANDED PARAMETER NAME Notes
STATUS (cont)	COOL Y1 – IN	OFF	ON/OFF	FIRST STAGE COOLING DEMAND (Y1 – IN) Y1 – I signal from space thermostat or unitary controller for Cooling Stage 1. ON = 24 Vac on terminal Y1 – I OFF = 0 Vac on terminal Y1 – I
	COOL Y1 – OUT	OFF	ON/OFF	FIRST STAGE COOLING RELAY OUTPUT Cool Stage 1 Relay Output to mechanical cooling (Y1 – OUT terminal).
	COOL Y2 – IN	OFF	ON/OFF	SECOND STAVE COOLING DEMAND (Y2 – IN) Y2 – I signal from space thermostat or unitary controller for Cooling Stage 2. ON = 24 Vac on terminal Y2 – I OFF = 0 Vac on terminal Y2 – I
	COOL Y2 – OUT	OFF	ON/OFF	SECOND STAGE COOLING RELAY OUTPUT Cool Stage 2 Relay Output to mechanical cooling (Y2 – OUT terminal).
	MA TEMP	_ _._ °F (or _ _._ °C)	– 40 to 150°F (– 18 to 60°C)	SUPPLY AIR TEMPERATURE, Cooling Mode Displays value of measured mixed/cooled air from SAT sensor in fan section. Displays – –.– if not connected, short or out – of – range. See Menu Note 2
	DA TEMP	_ _._ °F (or _ _._ °C)	– 40 to 150°F (– 18 to 60°C)	DISCHARGE AIR TEMPERATURE, after Heating section (Accessory sensor required) Displays when Discharge Air sensor is connected and displays measured discharge temperature. Displays – –.– °F if sensor sends invalid value, if not connected, short or out – of – range.
	OA TEMP	_ _._ °F (or _ _._ °C)	– 40 to 140°F (– 40 to 60°C)	OUTSIDE AIR TEMPERATURE Displays measured value of outdoor air temperature. Displays – – °F if sensor sends invalid value, if not connected, short or out – of – range.
	OA HUM	_ _%	0 to 100%	OUTSIDE AIR RELATIVE HUMIDITY Displays measured value of outdoor humidity from OA enthalpy sensor.
	RA TEMP	_ _._ °F (or _ _._ °C)	0 to 140°F (– 18 to 60°C)	RETURN AIR TEMPERATURE (Accessory sensor required) Displays measured value of return air temperature from RAT sensor. Displays – – °F if sensor sends invalid value, if not connected, short or out – of – range.
	RA HUM	_ _%	0 to 100%	RETURN AIR RELATIVE HUMIDITY (Accessory enthalpy sensor required) Displays measured value of return air humidity from RA sensor. Displays – –% if sensor sends invalid value, if not connected, short or out – of – range.
	IN CO2	_ _ _ ppm	0 to 2000 ppm	SPACE/RETURN AIR CO2 (CO_2 sensor required, accessory or factory option) Displays value of measured CO_2 from CO_2 sensor. Invalid if not connected, short or out – of – range. May be adjusted in Advanced menu by Zero offset and Span.
	DCV STATUS	n/a	ON/OFF	DEMAND CONTROLLED VENTILATION STATUS (CO_2 sensor required, accessory or factory option) Displays ON if IN CO2 value above setpoint DCV SET and OFF if below setpoint DCV SET.
	DAMPER OUT	2.0V	2.0 to 10.0V	Displays output voltage or position to the damper actuator.***
	ACT POS	n/a	0 to 100%	Displays actual position of outdoor air damper actuator
	ACT COUNT	n/a	1 to 65535	Displays number of times actuator has cycled. 1 Cycle equals accrued 180° of actuator movement in any direction
	ACTUATOR	n/a	OK/Alarm (on Alarm menu)	Displays Error if voltage or torque is below actuator range
	EXH1 OUT	OFF	ON/OFF	EXHAUST STAGE 1 RELAY OUTPUT Output of EXH1 terminal. Displays On when damper position reaches programmed percentage setpoint. ON = 24 Vac Output; OFF = No Output.
	EXH2 OUT	OFF	ON/OFF	EXHAUST STAGE 2 RELAY OUTPUT Output of AUX1 O terminal Displays ON when damper position reaches programmed percentage setpoint ON = 24 Vac Output, OFF = No Output; displays only if AUX1 O = EXH2
	ERV	OFF	ON/OFF	ENERGY RECOVERY UNIT RELAY OUTPUT Output of AUX1 O terminal, ON = 24 Vac Output, OFF = No Output; displays only if AUX1 O = ERV
	MECH COOL ON or HEAT STAGES ON	0	0, 1, or 2	Displays stage of mechanical cooling that is active. Displays the stage of heat pump heating that is active
	FAN SPEED	n/a	LOW or HIGH	SUPPLY FAN SPEED Displays speed setting of fan on a 2 – speed fan unit.
	W (HEAT ON)	n/a	ON/OFF	HEAT DEMAND STATUS Displays status of heat demand on a 2 – speed fan unit.

Table 11 - Menu Structure* (cont)

Menu	Parameter	Parameter Default Value	Parameter Range and Increment†	EXPANDED PARAMETER NAME Notes
SETPOINTS	MAT SET	53°F (12°C)	38 to 70°F; (3 to 21°C) increment by 1	SUPPLY AIR SETPOINT Setpoint determines where the economizer will modulate the OA damper to maintain the mixed air temperature. See Menu Note 2.
	LOW T LOCK	32°F (0°C)	−45 to 80°F; (−43 to 27°C) increment by 1	COMPRESSOR LOW TEMPERATURE LOCKOUT Setpoint determines outdoor temperature when the mechanical cooling cannot be turned on. Commonly referred to as the Compressor lockout. At or below the setpoint the Y1−O and Y2−O will not be energized on the controller.
	DRYBLB SET	63°F (17°C)	48 to 80°F (9 to 27°C) increment by 1	OA DRY BULB TEMPERATURE CHANGEOVER SETPOINT Setpoint determines where the economizer will assume outdoor air temperature is good for free cooling; e.g.: at 63°F (17°C), unit will economize at 62°F (16.7°C) and below and not economize at 64°F (17.8°C) and above. There is a 2°F (1.1°C) deadband. See Menu Note 3
	ENTH CURVE	ES3	ES1, ES2, ES3, ES4, or ES5	ENTHALPY CHANGEOVER CURVE (Requires enthalpy sensor option) Enthalpy boundary “curves” for economizing using single enthalpy. See page 42 for description of enthalpy curves.
	DCV SET	1100ppm	500 to 2000 ppm; increment by 100	DEMAND CONTROLLED VENTILATION SETPOINT Displays only if CO_2 sensor is connected. Setpoint for Demand Controlled Ventilation of space. Above the setpoint, the OA dampers will modulate open to bring in additional OA to maintain a space ppm level below the setpoint.
	MIN POS	2.8 V	2 to 10 Vdc	VENTILATION MINIMUM POSITION Displays ONLY if a CO_2 sensor is NOT connected.
				With 2−speed fan units MIN POS L (low speed fan) and MIN POS H (high speed fan) settings are required. Default for MIN POS L is 3.2V and MIN POS H is 2.8V.
	VENTMAX	2.8 V	2 to 10 Vdc	DCV MAXIMUM DAMPER POSITION Displays only if a CO_2 sensor is connected. Used for Vbz (ventilation max cfm) setpoint. VENTMAX is the same setting as MIN POS would be if you did not have the CO_2 sensor.
			100 to 9990 cfm increment by 10	If OA, MA RA and CO_2 sensors are connected and DCV CAL ENABLE is set to AUTO mode, the OA dampers are controlled by CFM and displays from 100 to 9990 cfm.
			2 to 10 Vdc	With 2−speed fan units VENTMAX L (low speed fan) and VENTMAX H (high speed fan) settings are required. Default for VENTMAX L is 3.2V and VENTMAX H is 2.8V.
	VENTMIN	2.25 V	2 to 10 Vdc	DCV MINIMUM DAMPER POSITION Displays only if CO_2 sensor is connected. Used for Va (ventilation min cfm) setpoint. This is the ventilation requirement for less than maximum occupancy of the space.
			100 to 9990 cfm increment by 10	If OA, MA RA and CO_2 sensors are connected and DCV CAL ENABLE is set to AUTO mode, the OA dampers are controlled by CFM and displays from 100 to 9990 cfm.
			2 to 10 Vdc	With 2−speed fan units VENTMIN L (low speed fan) and VENTMIN H (high speed fan) settings are required. Default for VENTMIN L is 2.5V and VENTMIN H is 2.25V.
	ERV OAT SP††	32°F (0°C)	0 to 50°F; (−18 to 10°C) increment by 1	ENERGY RECOVERY VENTILATION UNIT OUTDOOR AIR TEMPERATURE SETPOINT Only when AUX1 O = ERV
	EXH1 SET	50%	0 to 100%; Increment by 1	EXHAUST FAN STAGE 1 SETPOINT Setpoint for OA damper position when exhaust fan 1 is powered by the economizer. With 2−speed fan units Exh1 L (low speed fan) and Exh1 H (high speed fan) settings are required. Default for Exh1 L is 65% and Exh1 H is 50%
	EXH2 SET	75%	0 to 100%; Increment by 1	EXHAUST FAN STAGE 2 SETPOINT Setpoint for OA damper position when exhaust fan 2 is powered by the economizer. Only used when AUX1 O is set to EHX2. With 2−speed fan units Exh2 L (low speed fan) and Exh2 H (high speed fan) settings are required. Default for Exh2 L is 80% and Exh2 H is 75%

Table 11 - Menu Structure* (cont)

Menu	Parameter	Parameter Default Value	Parameter Range and Increment†	EXPANDED PARAMETER NAME Notes
SYSTEM SETUP	INSTALL	01/01/10		Display order = MM/DD/YY Setting order = DD, MM, then YY.
	UNITS DEG	°F	°F or °C	Sets economizer controller in degrees Fahrenheit or Celsius.
	EQUIPMENT	CONV	Conventional or HP	CONV = conventional; HP O/B = Enable Heat Pump mode. Use AUX2 I for Heat Pump input from thermostat or controller. See Menu Note 4
	AUX2 IN	n/a	Shutdown (SD) Heat (W1) HP (O) HP (B)	In CONV mode: SD = Enables configuration of shutdown (default); W = Informs controller that system is in heating mode. **NOTE: If using 2−speed fan mode, you must program CONV mode for W. Shutdown is not available in 2−speed fan mode. See Menu Note 4.** In HP O/B mode: HP(O) = energize heat pump on Cool (default); HP(B) = energize heat pump on Heat.
	FAN SPEED	1speed	1 speed/ 2 speed	Sets economizer controller for operation of 1 speed or 2 speed supply fan. The controller does not control the fan but positions the OA and RA dampers to the heating or cooling mode. See page 36 for modes and position. **NOTE: 2−speed fan option also needs Heat (W1) programmed in AUX 2 In. See Menu Note 4.**
	FAN CFM	5000cfm	100 to 15000 cfm; increment by 100	UNIT DESIGN AIRFLOW (CFM) Enter ONLY if using DCVCAL ENA = AUTO The value is found the nameplate label for the specific RTU.
	AUX1 OUT	NONE	NONE ERV EXH2 SYS	Select OUTPUT for AUX1 O relay NONE = not configured (output is not used) ERV = Energy Recovery Ventilator †† EXH2 = second damper position 24 Vac out for second exhaust fan SYS = use output as an alarm signal
	OCC	INPUT	INPUT or ALWAYS	OCCUPIED MODE BY EXTERNAL SIGNAL When using a setback thermostat with occupancy out (24 Vac), the 24 Vac is input “INPUT” to the OCC terminal. If no occupancy output from the thermostat then change program to “ALWAYS” OR add a jumper from terminal R to OCC terminal. See Menu Note 2.
	FACTORY DEFAULT	NO	NO or YES	Resets all set points to factory defaults when set to YES. LCD will briefly flash YES and change to NO but all parameters will change to the factory default values. **NOTE: RECHECK AUX2 IN and FANTYPE for required 2−speed values.**
ADVANCED SETUP	MA LO SET	45°F (7°C)	35 to 65°F; (2 to 18°C) Incremented by 1°	SUPPLY AIR TEMPERATURE LOW LIMIT Temperature to activate Freeze Protection (close damper and alarm if temperature falls below setup value)
	FREEZE POS	CLO	CLO or MIN	FREEZE PROTECTION DAMPER POSITION Damper position when freeze protection is active CLO = closed MIN = MIN POS or VENTMAX
	CO2 ZERO	0ppm	0 to 500 ppm: Increment by 10	CO_2 ppm level to match CO_2 sensor start level.
	CO2 SPAN	2000ppm	1000 to 3000 ppm; Increment by 50	CO_2 ppm span to match CO_2 sensor. e.g.; 500−1500 sensor output would be 500 CO_2 zero and 1000 CO_2 span.
	STG3 DLY	2.0h	0 min, 5 min, 15 min, then 15 min intervals. Up to 4 h or OFF	COOLING STAGE 3 DELAY Delay after stage 2 for cool has been active. Turns on second stage of mechanical cooling when economizer is first stage call and mechanical cooling is second stage call. Allows three stages of cooling, 1 economizer and 2 mechanical. OFF = no Stage 3 cooling.
	SD DMPR POS	CLO	CLO or OPN	Indicates shutdown signal from space thermostat or unitary controller. When controller receives 24 Vac input on the SD terminal in conventional mode, the OA damper will open if programmed for OPN and OA damper will close if programmed for CLO. All other controls, e.g., Y1−O, Y2−O, EXH1, etc. will shut off. **NOTE: Function NOT AVAILABLE with 2−speed mode**
	DA LO ALM	45°F (7°C)	NONE 35 to 65°F; (2 to 18°C) Incremented by 5°	Used for alarm for when the DA air temperature is too low. Set lower range of alarm, below this temperature the alarm will show on the display.
	DA HI ALM	80°F (27°C)	NONE 70 to 180°F; (21 to 82°C) Incremented by 5°	Used for alarm for when the DA air temperature is too high. Set high range of alarm, above this temperature the alarm will show on the display
	DCVCAL ENA	MAN	MAN (manual) AUTO	Turns on the DCV automatic control of the dampers. Resets ventilation based on the RA, OA and MA sensor conditions. Requires all sensors (RA, OA, MA and CO_2). **NOTE: This operation is not operable with a 2−speed fan unit.**

Table 11 - Menu Structure* (cont)

Menu	Parameter	Parameter Default Value	Parameter Range and Increment†	EXPANDED PARAMETER NAME Notes
ADVANCED SETUP (cont)	MAT T CAL	0.0°F (or C)	+/−2.5°F (+/−1.4°C)	SUPPLY AIR TEMPERATURE CALIBRATION Allows for the operator to adjust for an out of calibration supply air temperature (SAT) sensor
	OAS T CAL	1.0°F (or C)	+/−2.5°F (+/−1.4°C)	OUTSIDE AIR TEMPERATURE CALIBRATION Allows for the operator to adjust for an out of calibration outside air temperature (OAT) sensor
	OAS H CAL	0% RH	+/−10% RH	OUTSIDE AIR HUMIDITY CALIBRATION Allows for the operator to adjust for an out of outside air enthalpy sensor
	RA T CAL	0.0°F (or C)	+/−2.5°F (+/−1.4°C)	RETURN AIR TEMPERATURE CALIBRATION Allows for the operator to adjust for an out of calibration return air temperature (RA) sensor
	RA H CAL	0% RH	+/−10% RH	RETURN AIR HUMIDITY CALIBRATION Allows for the operator to adjust for an out of calibration return air enthalpy sensor
	DA T CAL	0.0°F (or C)	+/−2.5°F (+/−1.4°C)	DISCHARGE AIR TEMPERATURE CALIBRATION Allows for the operator to adjust for an out of calibration discharge air temperature (DAT) sensor
	2SP FAN DELAY	5 Minutes	0 to 20 minutes in 1 minute increments	TIME DELAY ON 2nd STAGE ECONOMIZING When in economizing mode this is the delay for the high speed fan to try to satisfy the call for second stage cooling before the first stage mechanical cooling is enabled.
CHECKOUT †††	DAMPER MINIMUM POSITION	n/a	n/a	The checkout for the damper minimum positions is based on the system. See Table 12.
	DAMPER OPEN	n/a	n/a	Positions damper to the full open position. Exhaust fan contacts enable during the DAMPER OPEN test. Make sure you pause in this mode to allow for exhaust contacts to energize due to the delay in the system.
	DAMPER CLOSE	n/a	n/a	Positions damper to the fully closed position
	CONNECT Y1−O	n/a	n/a	Closes the Y1−O relay (Y1−O). See **CAUTION** on page 43.
	CONNECT Y2−O	n/a	n/a	Closes the Y2−O relay (Y2−O) See **CAUTION** on page 43.
	CONNECT AUX1−O	n/a	n/a	Energizes the AUX1−O output. If AUX1−O setting is: • NONE − not action taken • ERV − 24 Vac out. Turns on or signals an ERV that the conditions are not good for economizing but are good for ERV operation. †† • SYS − 24 Vac out. Issues a system alarm.
	CONNECT EXH1	n/a	n/a	Closes the power exhaust fan 1 relay (EXH1)

Table 11 - Menu Structure* (cont)

Menu	Parameter	Parameter Default Value	Parameter Range and Increment †	EXPANDED PARAMETER NAME Notes
ALARMS(#)				**Alarms display only when they are active. The menu title "ALARMS(#)" includes the number of active alarms in parenthesis ( ). When using S−bus sensors, "SYLK" will appear on the screen, and when using 20k OA temperature sensors, "SENS T" will appear on the screen.**
	MA T SENS ERR	n/a	n/a	SUPPLY AIR TEMPERATURE SENSOR ERROR Supply air sensor has failed or become disconnected − check wiring then replace sensor if the alarm continues
	CO2 SENS ERR	n/a	n/a	CO_2 SENSOR ERROR CO_2 sensor has failed, gone out of range or become disconnected − check wiring then replace sensor if the alarm continues
	OA SYLK T ERR	n/a	n/a	OUTSIDE AIR S−BUS SENSOR ERROR Outside air enthalpy sensor has failed or become disconnected − check wiring then replace sensor if the alarm continues
	OA SYLK H ERR	n/a	n/a	
	RA SYLK T ERR	n/a	n/a	RETURN AIR S−BUS SENSOR ERROR Return air enthalpy sensor has failed or become disconnected − check wiring then replace sensor if the alarm continues
	RA SYLK H ERR	n/a	n/a	
	DA SYLK T ERR	n/a	n/a	DISCHARGE AIR S−BUS SENSOR ERROR Discharge air sensor has failed or become disconnected − check wiring then replace sensor if the alarm continues
	OA SENS T ERR	n/a	n/a	OUTSIDE AIR TEMPERATURE SENSOR ERROR Outside air temperature sensor has failed or become disconnected − check wiring then replace sensor if the alarm continues
	ACT ERROR	n/a	n/a	ACTUATOR ERROR Actuator has failed or become disconnected − check for stall, over voltage, under voltage and actuator count. Replace actuator if damper is moveable and supply voltage is between 21.6 V and 26.4 V. Check actuator count on STATUS menu.
	FREEZE ALARM	n/a	n/a	Check if outdoor temperature is below the LOW Temp Lockout on setpoint menu. Check if Mixed air temperature on STATUS menu is below the Lo Setpoint on Advanced setup menu. When conditions are back in normal range then the alarm will go away.
	SHUTDOWN ACTIVE	n/a	n/a	AUX2 IN is programmed for SHUTDOWN and 24 V has been applied to AUX 2IN terminal
	DMP CAL RUNNING	n/a	n/a	DAMPER CALIBRATION ROUTINE RUNNING If DCV Auto enable has been programmed, when the W7220 is completing a calibration on the dampers, this alarm will display. Wait until the calibration is completed and the alarm will go away. Must have OA, MA and RA sensors for DCV calibration; set up is in the Advanced setup menu.
	DA SENS ALM	n/a	n/a	DISCHARGE AIR TEMPERATURE SENSOR ALARM Discharge air temperature is out of the range set in the ADVANCED SETUP Menu. Check the temperature of the discharge air.
	SYS ALARM	n/a	n/a	When AUX1−O is set to SYS and there is any alarm (e.g., failed sensors, etc.), the AUX1−O terminal has 24 Vac out.
	ACT UNDER V	n/a	n/a	ACTUATOR VOLTAGE LOW Voltage received at actuator is below expected range
	ACT OVER V	n/a	n/a	ACTUATOR VOLTAGE HIGH Voltage received at actuator is above expected range
	ACT STALLED	n/a	n/a	ACTUATOR STALLED Actuator stopped before reaching commanded position

* Table 11 illustrates the complete hierarchy. Your menu parameters may be different depending on your configuration. For example if you do not have a DCV (CO_2) sensor, then none of the DCV parameters appear.

† When values are displayed, pressing and holding the ▲ or ▼ button causes the display to automatically increment.

** n/a = not applicable

†† ERV Operation: When in Cooling mode AND the conditions are NOT OK for economizing − the ERV terminal will be energized. In the Heating mode the ERV terminal will be energized when the OA is below the ERV OAT setpoint in the setpoint menu.

*** When used with communicating actuator the damper out is reported in XX.X% open verses XX.X Vdc.

††† After 10 minutes without a command or mode change, the controller will change to normal operation.

Menu Notes

1 ***STATUS −> OCCUPIED −*** The factory-standard Occupancy signal originates with a thermostat or other controller call for indoor fan operation at CTB terminal G. This signal passes through the Central Terminal Board's OCCUPIED jumper JMP1 to the ECONO connector and to the W7220's OCC input terminal. An external timeclock or relay is required to implement an Occupancy schedule on the economizer damper position.

2 ***STATUS -> MA TEMP, SETPOINTS -> MAT SET −*** The W7220 menu parameters and labels include designations MA , MAT and Mixed Air for the economizer cooling control sensor. On these rooftop units, the economizer control sensor is located downstream of the evaporator/indoor coil in the supply fan section where this sensor is designated as Supply Air Temperature (SAT) sensor.

3 ***SETPOINTS -> DRYBLB SET −*** This point is not displayed if a Return Air (differential) temperature sensor or an Outdoor Air enthalpy sensor is connected.

4 ***SYSTEM SETUP*** parameters must be configured as noted for 2-Speed unit operation:
EQUIPMENT = CONV
AUX2 I = W
FAN TYPE = 2SPEED

Table 12 – Damper Minimum Position Settings and Readings on Checkout Menu

Fan Speed	Demand Controlled Ventilation (CO_2 Sensor)	Setpoints	Checkout
1	NO	MIN POS	VMAX–HS
1	NO	N/A	N/A
2	NO	MIN POS H	VMAX–HS
2	NO	MIN POS L	VMAX–LS
1	YES	VENT MIN	VMIN–HS
1	YES	VENT MAX	VMAX–HS
2	YES	VENT MIN H	VMIN–HS
2	YES	VENT MAX H	VMAX–LS
2	YES	VENT MIN L	N/A
2	YES	VENT MAX L	N/A

Sequence of Operation

Table 13 – Dry Bulb Operation No DCV (CO_2 Sensor) - 1 Speed Fan

Demand Controlled Ventilation (DCV)	Outside Air – Good to economize?	Y1-I	Y2-I	Fan Speed	Y1-O	Y2-O	Occupied	Unoccupied
None	No	Off	Off	High	0-v/Off	0-v/Off	MIN POS	Closed
		On	Off	High	24-v/On	0-v/Off	MIN POS	Closed
		On	On	High	24-v/On	24-v/On	MIN POS	Closed
None	Yes	Off	Off	High	0-v/Off	0-v/Off	MIN POS	Closed
		On	Off	High	0-v/Off	0-v/Off	MIN POS to Full-Open	Closed to Full-Open
		On	On	High	24-v/On	0-v/Off*	MIN POS to Full-Open	Closed to Full-Open

* With stage 3 delay (STG3 DLY) in Advanced setup menu can turn on second stage of mechanical cooling Y2 –O after the delay if the call for Y1 –I and Y2 –I have not been satisfied.

Table 14 – Dry Bulb Operation With DCV (CO_2 Sensor) - 1 Speed Fan

Demand Controlled Ventilation (DCV)	Outside Air – Good to economize?	Y1-I	Y2-I	Fan Speed	Y1-O	Y2-O	Occupied	Unoccupied
Below CO_2 set	No	Off	Off	High	0-v/Off	0-v/Off	VENTMIN	Closed
		On	Off	High	24-v/On	0-v/Off	VENTMIN	Closed
		On	On	High	24-v/On	24-v/On	VENTMIN	Closed
	Yes	Off	Off	High	0-v/Off	0-v/Off	VENTMIN	Closed
		On	Off	High	0-v/Off	0-v/Off	VENTMIN to Full-Open	Closed to Full-Open
		On	On	High	24-v/On	0-v/Off*	VENTMIN to Full-Open	Closed to Full-Open
Above CO_2 set	No	Off	Off	High	0-v/Off	0-v/Off	VENTMIN to VENTMAX	Closed
		On	Off	High	24-v/On	0-v/Off	VENTMIN to VENTMAX	Closed
		On	On	High	24-v/On	24-v/On	VENTMIN to VENTMAX	Closed
	Yes	Off	Off	High	0-v/Off	0-v/Off	VENTMIN to VENTMAX	Closed
		On	Off	High	0-v/Off	0-v/Off	VENTMIN to Full-Open	Closed to Full-Open
		On	On	High	24-v/On	0-v/Off*	VENTMIN to Full-Open	Closed to Full-Open

* With stage 3 delay (STG3 DLY) in Advanced setup menu can turn on second stage of mechanical cooling Y2 –O after the delay if the call for Y1 –I and Y2 –I have not been satisfied.

Table 15 – Enthalpy Operation No DCV (CO_2 Sensor) - 1 Speed Fan

Demand Controlled Ventilation (DCV)	Outside Air – Good to economize?	Y1-I	Y2-I	Fan Speed	Y1-O	Y2-O	Occupied	Unoccupied
None	No	Off	Off	High	0-v/Off	0-v/Off	MIN POS	Closed
		On	Off	High	24-v/On	0-v/Off	MIN POS	Closed
		On	On	High	24-v/On	24-v/On	MIN POS	Closed
None	Yes	Off	Off	High	0-v/Off	0-v/Off	MIN POS	Closed
		On	Off	High	0-v/Off	0-v/Off	MIN POS to Full-Open	Closed to Full-Open
		On	On	High	24-v/On	0-v/Off*	MIN POS to Full-Open	Closed to Full-Open

* With stage 3 delay (STG3 DLY) in Advanced setup menu can turn on second stage of mechanical cooling Y2 –O after the delay if the call for Y1 –I and Y2 –I have not been satisfied.

Table 16 – Enthalpy Operation No DCV (CO_2 Sensor) - 1 Speed Fan

Demand Controlled Ventilation (DCV)	Outside Air – Good to economize?	Y1-I	Y2-I	Fan Speed	Y1-O	Y2-O	Occupied	Unoccupied
Below set	No	Off	Off	High	0-v/Off	0-v/Off	VENTMIN	Closed
		On	Off	High	24-v/On	0-v/Off	VENTMIN	Closed
		On	On	High	24-v/On	24-v/On	VENTMIN	Closed
	Yes	Off	Off	High	0-v/Off	0-v/Off	VENTMIN	Closed
		On	Off	High	0-v/Off	0-v/Off	VENTMIN to Full-Open	Closed to Full-Open
		On	On	High	24-v/On	0-v/Off*	VENTMIN to Full-Open	Closed to Full-Open
Above set	No	Off	Off	High	0-v/Off	0-v/Off	VENTMIN to VENTMAX	Closed
		On	Off	High	24-v/On	0-v/Off	VENTMIN L to VENTMAX	Closed
		On	On	High	24-v/On	24-v/On	VENTMIN H to VENTMAX	Closed
	Yes	Off	Off	High	0-v/Off	0-v/Off	VENTMIN L to VENTMAX	Closed
		On	Off	High	0-v/Off	0-v/Off	VENTMIN to Full-Open	Closed to Full-Open
		On	On	High	DELAY† 24-v/On	0-v/Off*	VENTMIN to Full-Open	Closed to Full-Open

* With stage 3 delay (STG3 DLY) in Advanced setup menu can turn on second stage of mechanical cooling Y2 –O after the delay if the call for Y1 –I and Y2 –I have not been satisfied.

† With 2SP FAN DELAY (Advanced Setup Menu) when in the economizing mode there is a delay for the high speed fan to try to satisfy the call for second stage cooling by turning on the fan to high and opening the OA damper 100% before the first stage mechanical cooling is enabled.

Table 17 – Dry Bulb Operation No DCV (CO_2 Sensor) - 2 Speed Fan

Demand Controlled Ventilation (DCV)	Outside Air – Good to economize?	Y1-I	Y2-I	Fan Speed	Y1-O	Y2-O	Occupied	Unoccupied
None	No	Off	Off	Low	0-v/Off	0-v/Off	MIN POS L	Closed
		On	Off	Low	24-v/On	0-v/Off	MIN POS L	Closed
		On	On	High	24-v/On	24-v/On	MIN POS H	Closed
None	Yes	Off	Off	Low	0-v/Off	0-v/Off	MIN POS L	Closed
		On	Off	Low	0-v/Off	0-v/Off	MIN POS L to Full-Open	Closed to Full-Open
		On	On	High	DELAY† 24-v/On	0-v/Off*	MIN POS H to Full-Open	Closed to Full-Open

* With stage 3 delay (STG3 DLY) in Advanced setup menu can turn on second stage of mechanical cooling Y2 –O after the delay if the call for Y1 –I and Y2 –I have not been satisfied.

† With 2SP FAN DELAY (Advanced Setup Menu) when in the economizing mode there is a delay for the high speed fan to try to satisfy the call for second stage cooling by turning on the fan to high and opening the OA damper 100% before the first stage mechanical cooling is enabled.

Table 18 – Dry Bulb Operation With DCV (CO_2 Sensor) - 2 Speed Fan

Demand Controlled Ventilation (DCV)	Outside Air – Good to economize?	Y1-I	Y2-I	Fan Speed	Y1-O	Y2-O	Occupied	Unoccupied
Below set	No	Off	Off	Low	0-v/Off	0-v/Off	VENTMIN L	Closed
		On	Off	Low	24-v/On	0-v/Off	VENTMIN L	Closed
		On	On	High	24-v/On	24-v/On	VENTMIN H	Closed
	Yes	Off	Off	Low	0-v/Off	0-v/Off	VENTMIN L	Closed
		On	Off	Low	0-v/Off	0-v/Off	VENTMIN L to Full-Open	Closed to Full-Open
		On	On	High	24-v/On	0-v/Off*	VENTMIN H to Full-Open	Closed to Full-Open
Above set	No	Off	Off	Low	0-v/Off	0-v/Off	VENTMIN L to VENTMAX	Closed
		On	Off	Low	24-v/On	0-v/Off	VENTMIN L to VENTMAX	Closed
		On	On	High	24-v/On	24-v/On	VENTMIN H to VENTMAX	Closed
	Yes	Off	Off	Low	0-v/Off	0-v/Off	VENTMIN L to VENTMAX	Closed
		On	Off	Low	0-v/Off	0-v/Off	VENTMIN L to Full-Open	Closed to Full-Open
		On	On	High	DELAY† 24-v/On	0-v/Off*	VENTMIN H to Full-Open	Closed to Full-Open

* With stage 3 delay (STG3 DLY) in Advanced setup menu can turn on second stage of mechanical cooling Y2 –O after the delay if the call for Y1 –I and Y2 –I have not been satisfied.

† With 2SP FAN DELAY (Advanced Setup Menu) when in the economizing mode there is a delay for the high speed fan to try to satisfy the call for second stage cooling by turning on the fan to high and opening the OA damper 100% before the first stage mechanical cooling is enabled.

Table 19 – Enthalpy Operation No DCV (CO_2 Sensor) - 2 Speed Fan

Demand Controlled Ventilation (DCV)	Outside Air – Good to economize?	Y1-I	Y2-I	Fan Speed	Y1-O	Y2-O	Occupied	Unoccupied
NO CO_2 SENSOR	No	Off	Off	Low	0-v/Off	0-v/Off	MIN POS L	Closed
		On	Off	Low	24-v/On	0-v/Off	MIN POS L	Closed
		On	On	High	24-v/On	24-v/On	MIN POS H	Closed
	Yes	Off	Off	Low	0-v/Off	0-v/Off	MIN POS L	Closed
		On	Off	Low	0-v/Off	0-v/Off	MIN POS L to Full-Open	Closed to Full-Open
		On	On	High	DELAY† 24-v/On	0-v/Off*	MIN POS H to Full-Open	Closed to Full-Open

* With stage 3 delay (STG3 DLY) in Advanced setup menu can turn on second stage of mechanical cooling Y2 –O after the delay if the call for Y1 –I and Y2 –I have not been satisfied.

† With 2SP FAN DELAY (Advanced Setup Menu) when in the economizing mode there is a delay for the high speed fan to try to satisfy the call for second stage cooling by turning on the fan to high and opening the OA damper 100% before the first stage mechanical cooling is enabled.

Table 20 – Enthalpy Operation With DCV (CO_2 Sensor) - 2 Speed Fan

Demand Controlled Ventilation (DCV)	Outside Air – Good to economize?	Y1-I	Y2-I	Fan Speed	Y1-O	Y2-O	Occupied	Unoccupied
Below set	No	Off	Off	Low	0-v/Off	0-v/Off	VENTMIN L	Closed
		On	Off	Low	24-v/On	0-v/Off	VENTMIN L	Closed
		On	On	High	24-v/On	24-v/On	VENTMIN H	Closed
	Yes	Off	Off	Low	0-v/Off	0-v/Off	VENTMIN L	Closed
		On	Off	Low	0-v/Off	0-v/Off	VENTMIN L to Full-Open	Closed to Full-Open
		On	On	High	24-v/On	0-v/Off*	VENTMIN H to Full-Open	Closed to Full-Open
Above set	No	Off	Off	Low	0-v/Off	0-v/Off	VENTMIN L to VENTMAX	Closed
		On	Off	Low	24-v/On	0-v/Off	VENTMIN L to VENTMAX	Closed
		On	On	High	24-v/On	24-v/On	VENTMIN H to VENTMAX	Closed
	Yes	Off	Off	Low	0-v/Off	0-v/Off	VENTMIN L to VENTMAX	Closed
		On	Off	Low	0-v/Off	0-v/Off	VENTMIN L to Full-Open	Closed to Full-Open
		On	On	High	DELAY† 24-v/On	0-v/Off *	VENTMIN H to Full-Open	Closed to Full-Open

* With stage 3 delay (STG3 DLY) in Advanced setup menu can turn on second stage of mechanical cooling Y2 –O after the delay if the call for Y1 –I and Y2 –I have not been satisfied.

† With 2SP FAN DELAY (Advanced Setup Menu) when in the economizing mode there is a delay for the high speed fan to try to satisfy the call for second stage cooling by turning on the fan to high and opening the OA damper 100% before the first stage mechanical cooling is enabled.

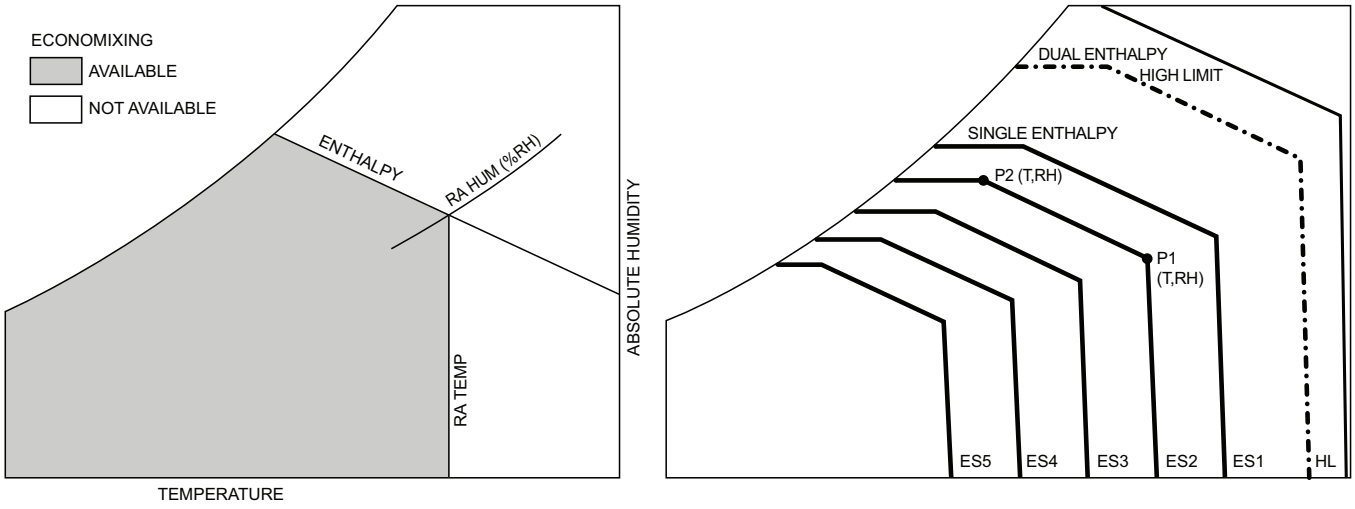


Fig. 41 - Single Enthalpy Curve and Boundaries

Table 21 – Single Enthalpy and Dual Enthalpy High Limit Curves (EN Units)

Enthalpy Curve	Temp. Dry–Bulb (°F)	Temp. Dewpoint (°F)	Enthalpy (btu/lb/da)	Point P1		Point P2	
				Temp. (°F)	Humidity %RH	Temp. (°F)	Humidity %RH
ES1	80.0	60.0	28.0	80.0	36.8	66.3	80.1
ES2	75.0	57.0	26.0	75.0	39.6	63.3	80.0
ES3	70.0	54.0	24.0	70.0	42.3	59.7	81.4
ES4	65.0	51.0	22.0	65.0	44.8	55.7	84.2
ES5	60.0	48.0	20.0	60.0	46.9	51.3	88.5
HL	86.0	66.0	32.4	86.0	38.9	72.4	80.3

Enthalpy Settings

When the OA temperature, enthalpy and dew point are below the respective setpoints, the outdoor air can be used for economizing. Fig. 41 shows the new single enthalpy boundaries in the W7220. There are 5 boundaries (setpoints ES1 through ES5), which are defined by dry bulb temperature, enthalpy and dew point.

Refer to Table 21 for ENTH CURVE setpoint values.

The W7220 calculates the enthalpy and dew point using the OA temperature and humidity input from the OA enthalpy sensor. When the OA temperature, OA humidity and OA dew point are all below the selected boundary, the economizer sets the economizing mode to YES, economizing is available.

When all of the OA conditions are above the selected boundary, the conditions are not good to economize and the mode is set to NO.

Fig. 41 shows the 5 current boundaries. There is also a high limit boundary for differential enthalpy. The high limit boundary is ES1 when there are no stages of mechanical cooling energized and HL (high limit) when a compressor stage is energized.

Table 21 provides the values for each boundary limit.

Two-Speed Fan Operation

The W7220 controller has the capability to work with a system using a 2-speed supply fan. The W7220 does not control the supply directly but uses the following input status to determine the speed of the supply fan and controls the OA damper to the required position.

State	Fan Speed
OCC	Low
Y1	Low
Y2	High
W	High

The W (heating mode) is not controlled by the W7220 but it requires the status to know where to position the OA damper for minimum position for the fan speed.

The 2 speed fan delay is available when the system is programmed for 2 speed fan (in the System Setup menu item). The 2 speed fan delay is defaulted to 5 minutes and can be changed in the Advanced Setup menu item. When the unit has a call for Y1 In and in the free cooling mode and there is a call for Y2 In, the 2-speed fan delay starts and the OA damper will modulate 100% open, the supply fan should be set to high speed by the unit controller. After the delay one of two actions will happen:

- The Y2 In call will be satisfied with the damper 100% open and fan on high speed and the call will turn off

OR

- If the call for additional cooling in the space has not been satisfied then the first stage of mechanical cooling will be enabled through Y1 Out or Y2 Out.

Checkout

Inspect all wiring connections at the economizer module's terminals, and verify compliance with the installation wiring diagrams.

For checkout, review the Status of each configured parameter and perform the Checkout tests.

NOTE: See "Interface Overview" on page 31 for information about menu navigation and use of the keypad.

⚠ WARNING

ELECTRICAL SHOCK HAZARD

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

Before performing service or maintenance operations on unit, always turn off main power switch to unit and install lock(s) and lockout tag(s). Unit may have more than one power switch. Ensure electrical service to rooftop unit agrees with voltage an amperage listed on the unit rating plate.

If any wiring changes are required, first be sure to remove power from the economizer module before starting work. Pay particular attention to verifying the power connection (24 Vac).

Power Up —

After the W7220 module is mounted and wired, apply power.

Initial Menu Display —

On initial start up, **Honeywell** displays on the first line and **Economizer W7220** on the second line. After a brief pause, the revision of the software appears on the first line and the second line will be blank.

Power Loss (Outage or Brownout) —

All setpoints and advanced settings are restored* after any power loss or interruption.

Status —

Use the Status menu (see Table 11) to check the parameter values for the various devices and sensors configured.

NOTE: See "Interface Overview" on page 31 for information about menu navigation and use of the keypad.

Checkout Tests —

Use the Checkout menu (on page 36) to test the damper operation and any configured outputs. Only items that are configured are shown in the Checkout menu.

* All settings are stored in non–volatile flash memory.

NOTE: See "Interface Overview" on page 31 for information about menu navigation and use of the keypad.

To perform a Checkout test:

1. Scroll to the desired test in the Checkout menu using the the ▲ and ▼ buttons.
2. Press the ↵ button to select the item.
3. RUN? appears.
4. Press the ↵ button to start the test.
5. The unit pauses and then displays IN PROGRESS.
6. When the test is complete, DONE appears.
7. When all desired parameters have been tested, press the ⓘ (Menu up) button to end the test.

The Checkout tests can all be performed at the time of installation or at any time during the operation of the system as a test that the system is operable.

⚠ CAUTION

EQUIPMENT DAMAGE HAZARD

Failure to follow this caution may result in equipment damage.

Be sure to allow enough time for compressor startup and shutdown between checkout tests so that you do not short-cycle the compressors.

Troubleshooting

Alarms —

The economizer module provides alarm messages that display on the 2-line LCD.

NOTE: Upon power up, the module waits 60 minutes before checking for alarms. This allows time for all the configured devices (e.g. sensors, actuator) to become operational. The exception is the SAT sensor which will alarm immediately.

If one or more alarms are present and there has been no keypad activity for at least 5 minutes, the Alarms menu displays and cycles through the active alarms.

You can also navigate to the Alarms menu at any time.

Clearing Alarms —

Once the alarm has been identified and the cause has been removed (e.g. replaced faulty sensor) the alarm can be cleared from the display.

To clear an alarm, perform the following:

1. Navigate to the desired alarm.
2. Press the ↵ button.
3. ERASE? displays.
4. Press the ↵ button.
5. ALARM ERASED displays.
6. Press the ⓘ (Menu up/Exit) button to complete the action and return to the previous menu.

NOTE: If the alarm still exists after you clear it, it is redisplayed within 5 seconds.

PremierLink™ Controller (Factory-Installed Option) —

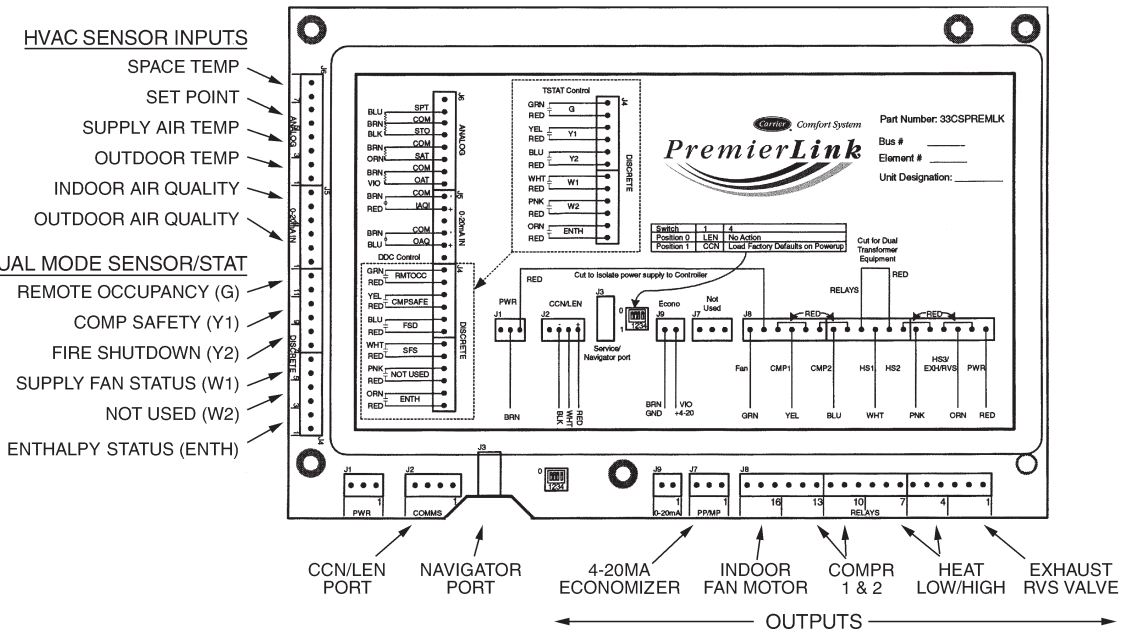


Fig. 42 - PremierLink Controller

The PremierLink controller (see Fig. 42) 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 control is factory-mounted in the 50TCQD unit's main control box to the right of the Control Terminal Board (CTB). Factory wiring is completed through harnesses connected to the CTB thermostat. Field connections are made at a 16-pole terminal block (TB3) located at the top of the unit control box in front of the PremierLink controller. The factory-installed PremierLink control includes the supply-air temperature (SAT) sensor. The outdoor air temperature (OAT) sensor is included in the FIOP/accessory EconoMi$er™2 package. (See page 60 for accessory enthalpy controls.)

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.

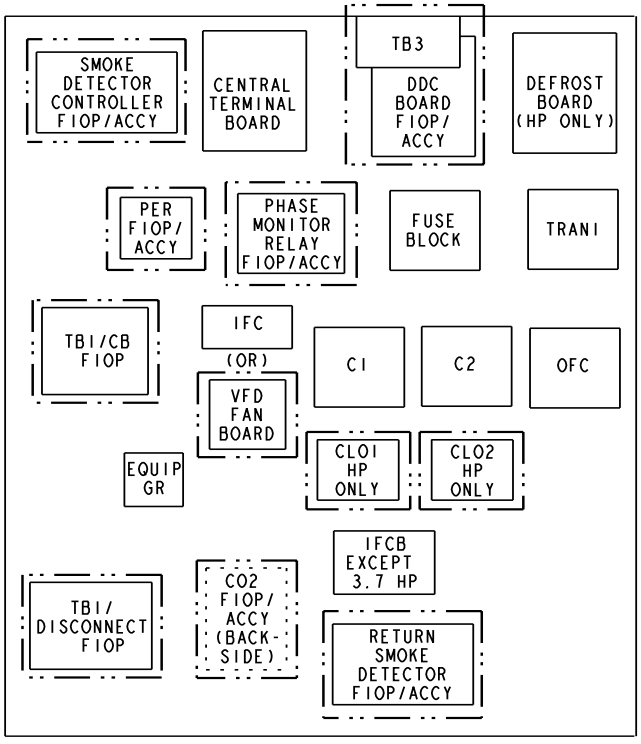
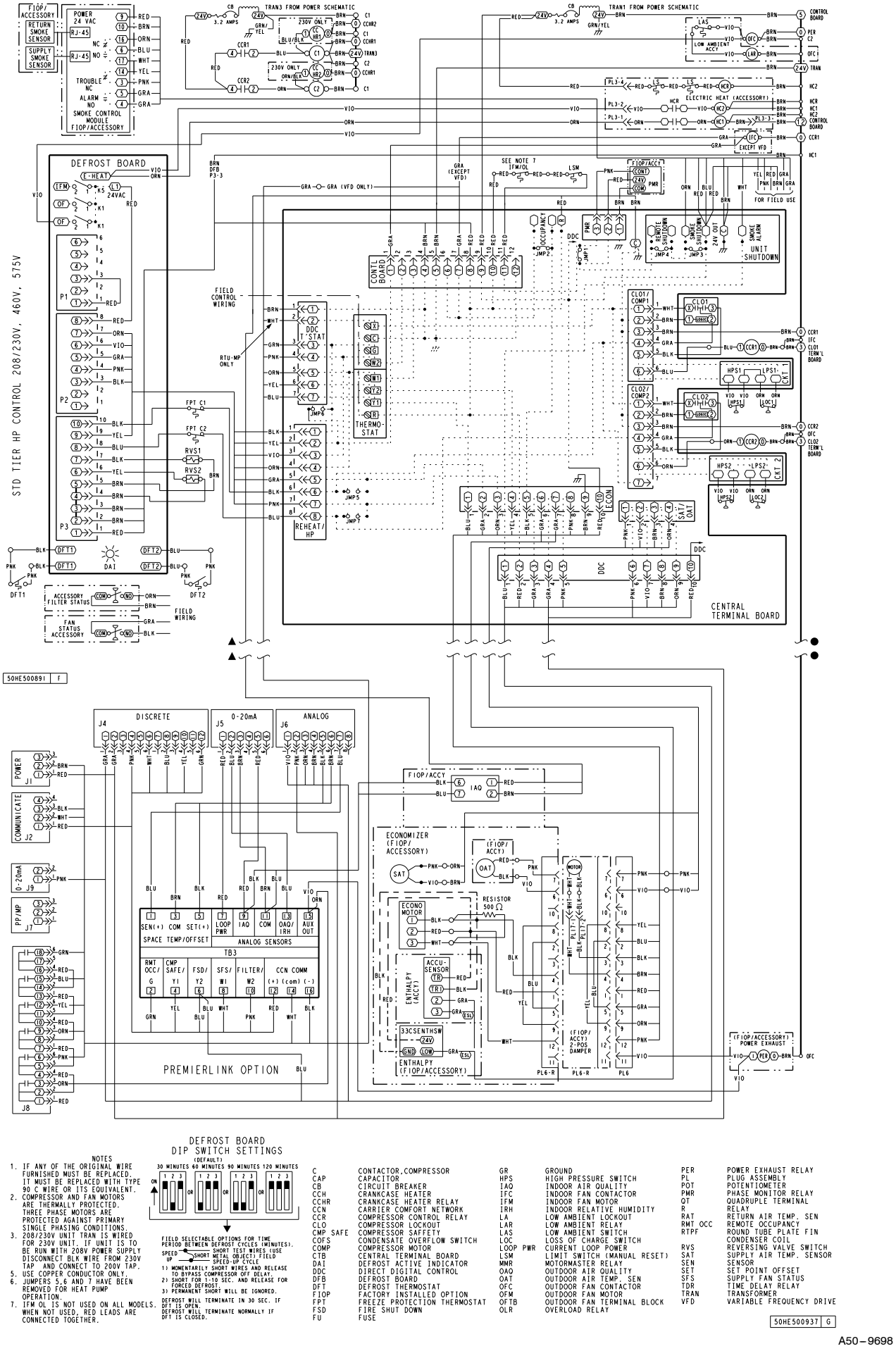


Fig. 43 - 50TCQ Control Box Component Locations



NOTES
1. IF ANY OF THE ORIGINAL WIRE FURNISHED MUST BE REPLACED, IT MUST BE REPLACED WITH TYPE 90 C WIRE OR ITS EQUIVALENT.
2. COMPRESSOR AND FAN MOTORS ARE THERMALLY PROTECTED. THREE PHASE MOTORS ARE PROTECTED AGAINST PRIMARY SINGLE PHASING CONDITIONS.
3. 208/230V UNIT TRAN IS WIRED FOR 230V UNIT. IF UNIT IS TO BE RUN WITH 208V POWER SUPPLY DISCONNECT BLK WIRE FROM 230V TAP AND CONNECT TO 200V TAP.
5. USE COPPER CONDUCTOR ONLY.
6. JUMPERS 5,6 AND 7 HAVE BEEN REMOVED FOR HEAT PUMP OPERATION.
7. IFM OL IS NOT USED ON ALL MODELS. WHEN NOT USED, RED LEADS ARE CONNECTED TOGETHER.

C	CONTACTOR,COMPRESSOR
CAP	CAPACITOR
CB	CIRCUIT BREAKER
CCH	CRANKCASE HEATER
CCHR	CRANKCASE HEATER RELAY
CCN	CARRIER COMFORT NETWORK
CCR	COMPRESSOR CONTROL RELAY
CLO	COMPRESSOR LOCKOUT
CMP SAFE	COMPRESSOR SAFFETY
COFS	CONDENSATE OVERFLOW SWITCH
COMP	COMPRESSOR MOTOR
CTB	CENTRAL TERMINAL BOARD
DAI	DEFROST ACTIVE INDICATOR
DDC	DIRECT DIGITAL CONTROL
DFB	DEFROST BOARD
DFT	DEFROST THERMOSTAT
FIOP	FACTORY INSTALLED OPTION
FPT	FREEZE PROTECTION THERMOSTAT
FSD	FIRE SHUT DOWN
FU	FUSE
GR	GROUND
HPS	HIGH PRESSURE SWITCH
IAQ	INDOOR AIR QUALITY
IFC	INDOOR FAN CONTACTOR
IFM	INDOOR FAN MOTOR
IRH	INDOOR RELATIVE HUMIDITY
LA	LOW AMBIENT LOCKOUT
LAR	LOW AMBIENT RELAY
LAS	LOW AMBIENT SWITCH
LOC	LOSS OF CHARGE SWITCH
LOOP PWR	CURRENT LOOP POWER
LSM	LIMIT SWITCH (MANUAL RESET)
MMR	MOTORMASTER RELAY
OAQ	OUTDOOR AIR QUALITY
OAT	OUTDOOR AIR TEMP. SEN
OFC	OUTDOOR FAN CONTACTOR
OFM	OUTDOOR FAN MOTOR
OFTB	OUTDOOR FAN TERMINAL BLOCK
OLR	OVERLOAD RELAY
PER	POWER EXHAUST RELAY
PL	PLUG ASSEMBLY
POT	POTENTIOMETER
PMR	PHASE MONITOR RELAY
QT	QUADRUPLE TERMINAL
R	RELAY
RAT	RETURN AIR TEMP. SEN
RMT OCC	REMOTE OCCUPANCY
RTPF	ROUND TUBE PLATE FIN CONDENSER COIL
RVS	REVERSING VALVE SWITCH
SAT	SUPPLY AIR TEMP. SENSOR
SEN	SENSOR
SET	SET POINT OFFSET
SFS	SUPPLY FAN STATUS
TDR	TIME DELAY RELAY
TRAN	TRANSFORMER
VFD	VARIABLE FREQUENCY DRIVE

A50-9698

Fig. 44 - PremierLink Wiring Schematic

Supply Air Temperature (SAT) Sensor —

Units with a factory-installed PremierLink™ controller include a supply-air temperature (SAT) sensor (33ZCSENSAT). This sensor is a tubular probe type, approx 6-inches (12.7 mm) in length. It is a nominal 10-k ohm thermistor.

The SAT is factory-wired. The SAT probe is mounted in the fan deck. It can ce removed or remounted per 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. 45). Ensure that the sensor wires do not contact the hot surface of the electric heaters.

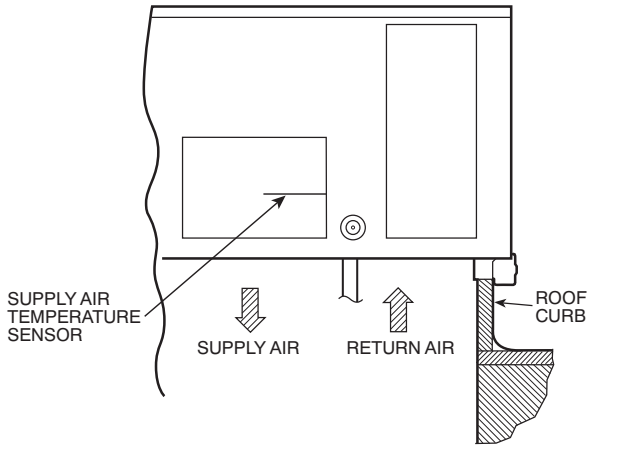


Fig. 45 - Mounting Location for Supply Air Temperature (SAT) Sensor on 50TCQD Units

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 EconoMi$er2 (FIOP or accessory). It is a nominal 10k ohm thermistor attached to an eyelet mounting ring.

EconoMi$er®2 —

The PremierLink controller is used with EconoMi$er2 (option or accessory) for outdoor air management. The damper position is controlled directly by the PremierLink controller; the EconoMi$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 CO_2 sensor

Outdoor air CO_2 sensor

Refer to Table 22 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 top in front of the PremierLink controller (see Fig. 44). 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 board inputs).

Table 23 provides a summary of field connections for units equipped with Space Sensor. Table 24 provides a summary of field connections for units equipped with space thermostat.

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.

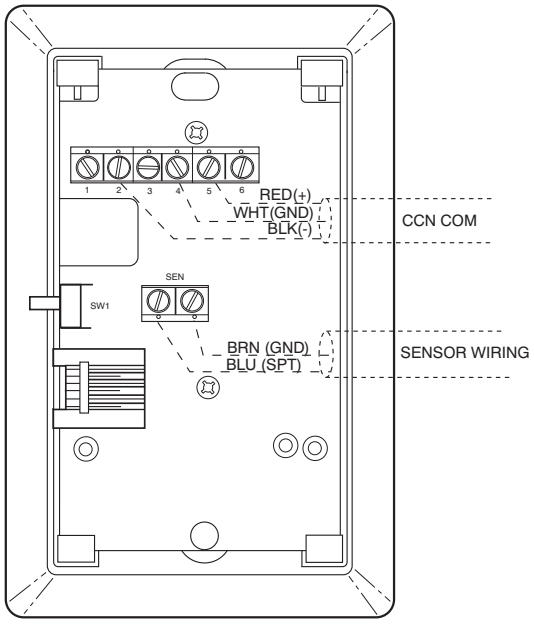


Fig. 46 - T-55 Space Temperature Sensor Wiring

Connect T-55: See Fig. 46 for typical T-55 internal connections. Connect the T-55 SEN terminals to TB1 terminals 1 and 3 (see Fig. 47).

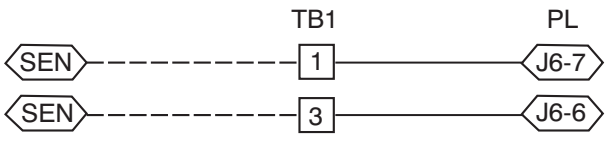


Fig. 47 - PremierLink Controller T-55 Sensor

Table 22 – PremierLink 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:
CO_2 Sensors (Optional):
33ZCSENCO2 – Room sensor (adjustable). Aspirator box is required for duct mounting of the sensor.
33ZCASPCO2 – Aspirator box used for duct–mounted CO_2 room sensor.
33ZCT55CO2 – Space temperature and CO_2 room sensor with override.
33ZCT56CO2 – Space temperature and CO_2 room sensor with override and setpoint.

Table 23 – 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 (CO_2)
OAQ – Outdoor Air Quality (CO_2)
RH – Relative Humidity
SFS – Supply Fan Status

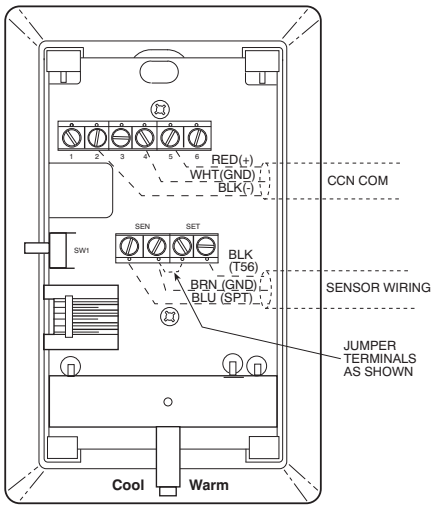
Table 24 – Thermostat Mode

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:

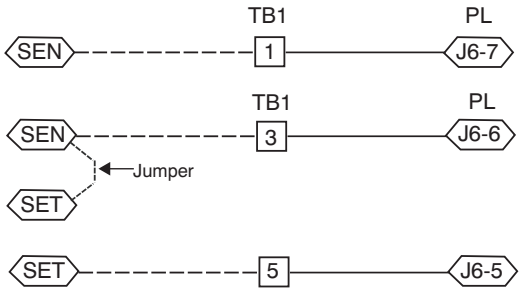
CCN – Carrier Comfort Network (communication bus)
G – Thermostat Fan
IAQ – Indoor Air Quality (CO_2)
OAQ – Outdoor Air Quality (CO_2)
RAT – Return Air Temperature
RH – Relative Humidity
W1 – Thermostat Heat Stage 1
W2 – Thermostat Heat Stage 2
Y1 – Thermostat Cool Stage 1
Y2 – Thermostat Cool Stage 2

Connect T-56: See Fig. 48 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. 49).



C08202

Fig. 48 - T-56 Internal Connections

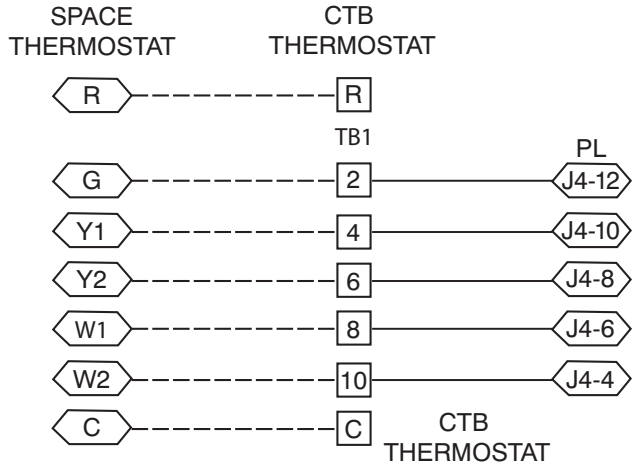


C08213

Fig. 49 - 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 the PremierLink controller at TB1 as shown in Fig. 50.



C08119

Fig. 50 - Space Thermostat Connections

If the 50TCQD 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 lead at TB1-6 remains connected to the PremierLink controller at J4-8.

If the 50TCQD 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. 44) 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. 47.

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.

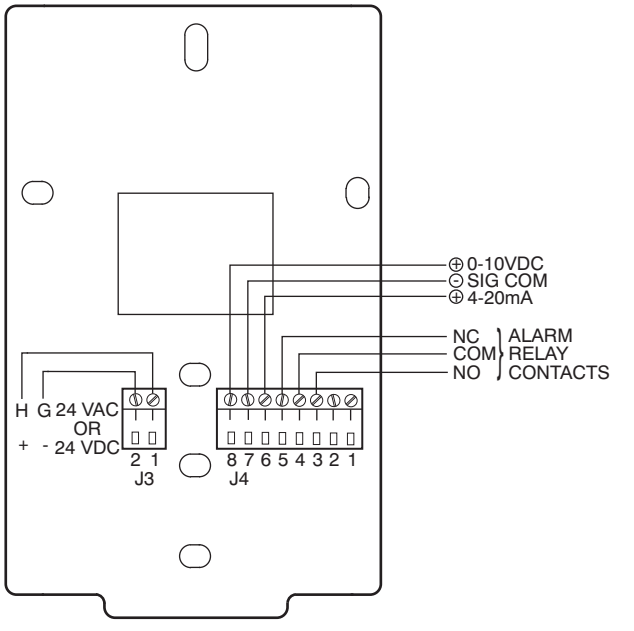
When the PremierLink controller is configured for Thermostat Mode, these functions are not available: Fire Shutdown (FSD), Remote Occupied (RMTOCC), Compressor Safety (CMPSAFE), Supply Fan Status (SFS), and Filter Pressure Switch (FILTER).

Economizer Controls

Indoor Air Quality (CO_2) Sensor —

The indoor air quality sensor accessory monitors space carbon dioxide (CO_2) 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 CO_2 present in the space air.

The CO_2 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 CO_2 sensor for electrical requirements and terminal locations. See Fig. 51 for typical CO_2 sensor wiring schematic.



C08635

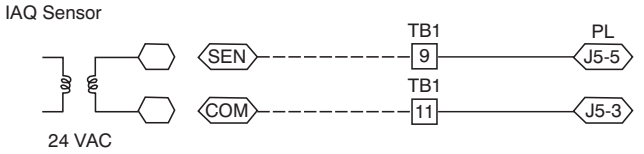
Fig. 51 - Indoor/Outdoor Air Quality (CO_2) Sensor (33ZCSENCO2) - Typical Wiring Diagram

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 CO_2 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 Gage) 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. 50. Connect the 4-20 mA terminal to terminal TB1-9 and connect the SIG COM terminal to terminal TB1-11. See Fig. 52.



C08636

Fig. 52 - Indoor CO_2 Sensor (33ZCSENCO2) Connections

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

Outdoor Air Quality Sensor (P/N 33ZCSENCO2 plus weatherproof enclosure) —

The outdoor air CO_2 sensor is designed to monitor carbon dioxide (CO_2) 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. 53. The outdoor air CO_2 sensor must be located in the economizer outside air hood.

Wiring the Outdoor Air CO_2 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. 51. Connect the 4 to 20 mA terminal to the TB1-13 terminal of the 50TCQD. Connect the SIG COM terminal to the TB1-11 terminal of the 50TCQD. See Fig. 54.

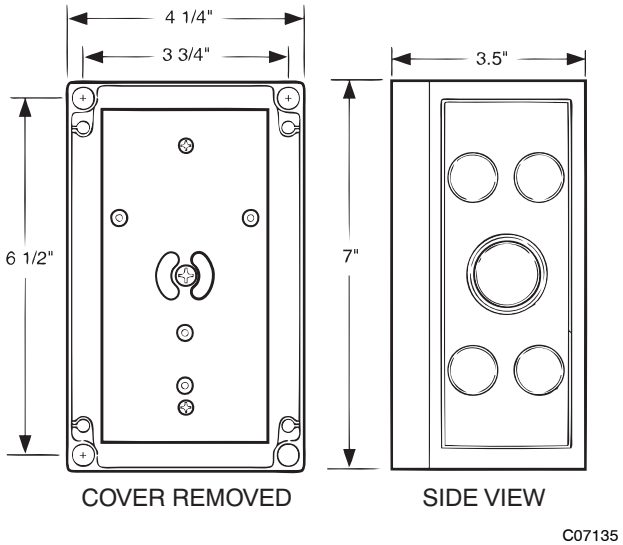


Fig. 53 - Outdoor Air Quality Sensor Cover

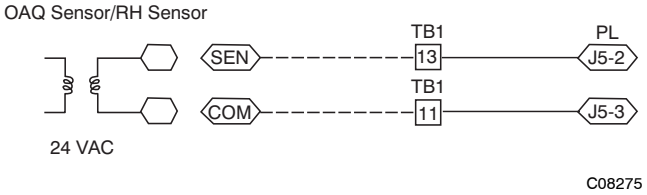


Fig. 54 - Outdoor CO_2 Sensor Connections

Space Relative Humidity Sensor —

The space relative humidity sensor is not used with 50TCQ models 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 50TCQD 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. 44, the PremierLink controller wiring schematic.

Filter Status Switch —

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

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. 55.

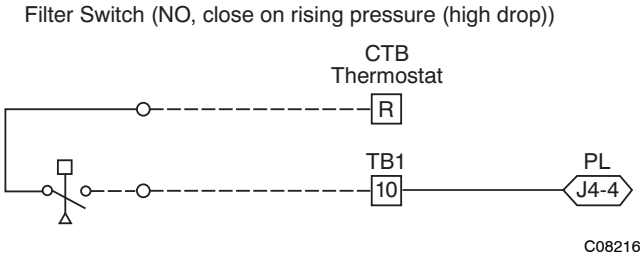


Fig. 55 - PremierLink Controller Filter Switch Connection

When the filter switch's NO contact set closes as filter pressure drop increases (indicating dirt-laden filters), the input signal to PremierLink 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. 56.

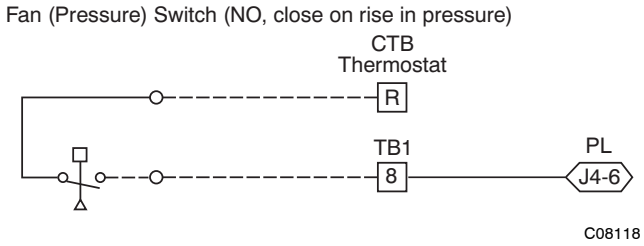


Fig. 56 - PremierLink Controller Wiring Fan Pressure Switch Connection

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 to 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.

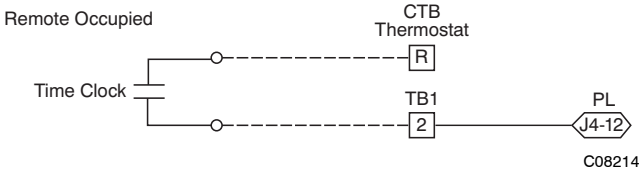


Fig. 57 - PremierLink™ Controller Wiring Remote Occupied

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. 58.

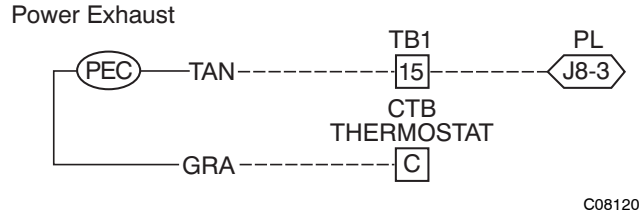


Fig. 58 - PremierLink Controller Power Exhaust Output Connection

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 25 for recommended cables.

Table 25 – 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 26 for the recommended color code.

Table 26 – 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. 59.

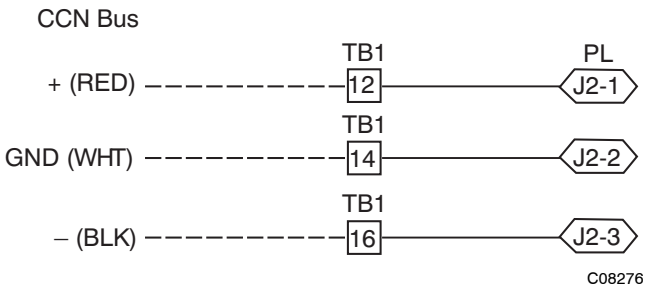


Fig. 59 - PremierLink Controller CCN Bus Connections

* Teflon is a registered trademark of DuPont.

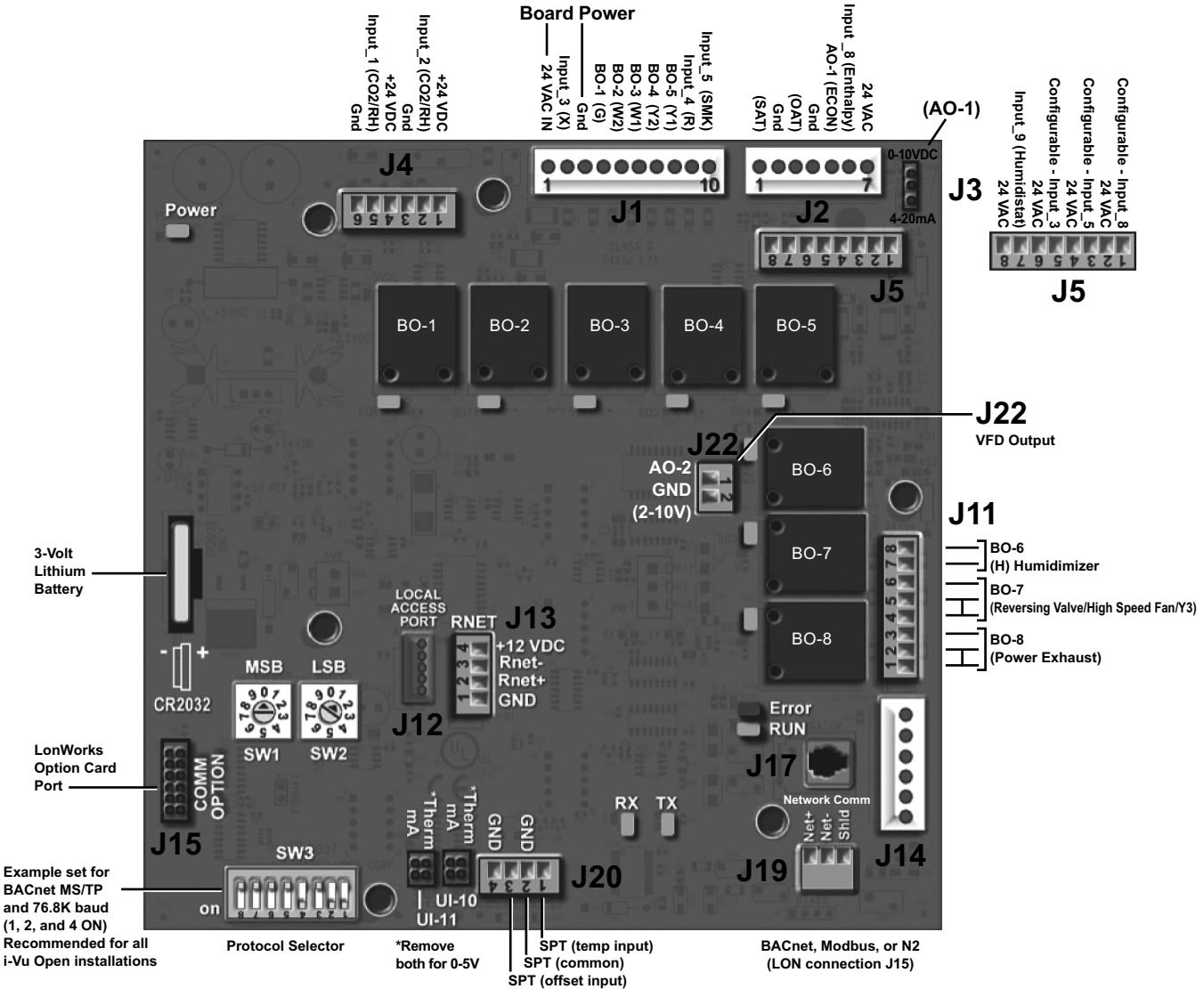
RTU Open Controller System

The RTU Open controller is factory-mounted in the 50TCQ unit's main control box, to the right of the CTB. See Fig. 43. 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. 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. 60.)

Refer to Table 27, 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.



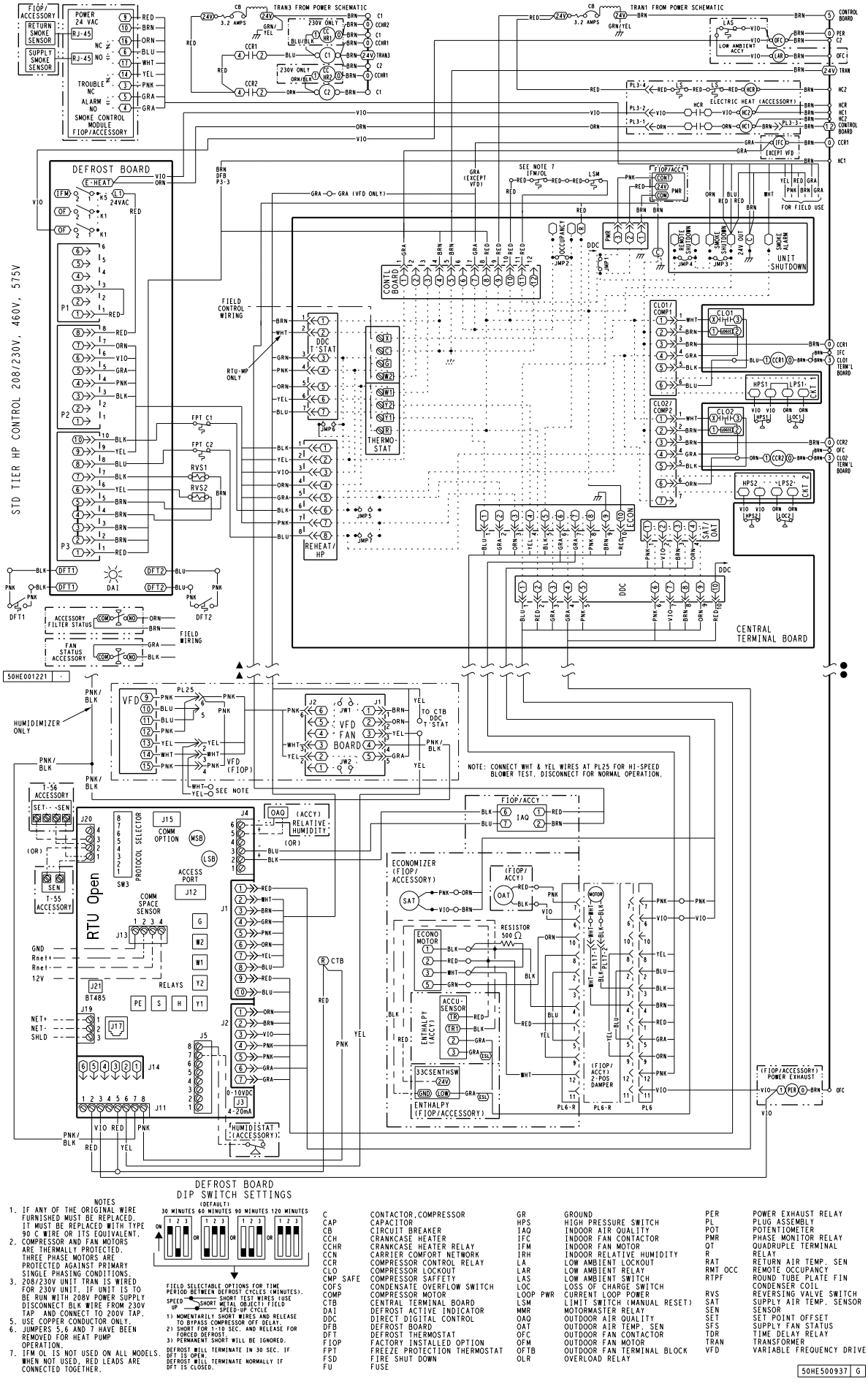
C14129

Fig. 60 - RTU Open Multi-Protocol Controller Board

* 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.



NOTES

1. IF ANY OF THE ORIGINAL WIRE FURNISHED MUST BE REPLACED, IT MUST BE REPLACED WITH TYPE 90 C WIRE OR ITS EQUIVALENT.
2. COMPRESSOR AND FAN MOTORS ARE THERMALLY PROTECTED. THREE PHASE MOTORS ARE PROTECTED AGAINST PRIMARY SINGLE PHASING CONDITIONS.
3. 208/230V UNIT TRAN IS WIRED FOR 230V UNIT. IF UNIT IS TO BE RUN WITH 208V POWER SUPPLY DISCONNECT BLK WIRE FROM 230V TAP AND CONNECT TO 200V TAP.
5. USE COPPER CONDUCTOR ONLY.
6. JUMPERS 5,6 AND 7 HAVE BEEN REMOVED FOR HEAT PUMP OPERATION.
7. IFM OL IS NOT USED ON ALL MODELS. WHEN NOT USED, RED LEADS ARE CONNECTED TOGETHER.

C	CONTACTOR,COMPRESSOR
CAP	CAPACITOR
CB	CIRCUIT BREAKER
CCH	CRANKCASE HEATER
CCHR	CRANKCASE HEATER RELAY
CCN	CARRIER COMFORT NETWORK
CCR	COMPRESSOR CONTROL RELAY
CLO	COMPRESSOR LOCKOUT
CMP SAFE	COMPRESSOR SAFFETY
COFS	CONDENSATE OVERFLOW SWITCH
COMP	COMPRESSOR MOTOR
CTB	CENTRAL TERMINAL BOARD
DAI	DEFROST ACTIVE INDICATOR
DDC	DIRECT DIGITAL CONTROL
DFB	DEFROST BOARD
DFT	DEFROST THERMOSTAT
FIOP	FACTORY INSTALLED OPTION
FPT	FREEZE PROTECTION THERMOSTAT
FSD	FIRE SHUT DOWN
FU	FUSE
GR	GROUND
HPS	HIGH PRESSURE SWITCH
IAQ	INDOOR AIR QUALITY
IFC	INDOOR FAN CONTACTOR
IFM	INDOOR FAN MOTOR
IRH	INDOOR RELATIVE HUMIDITY
LA	LOW AMBIENT LOCKOUT
LAR	LOW AMBIENT RELAY
LAS	LOW AMBIENT SWITCH
LOC	LOSS OF CHARGE SWITCH
LOOP PWR	CURRENT LOOP POWER
LSM	LIMIT SWITCH (MANUAL RESET)
MMR	MOTORMASTER RELAY
OAQ	OUTDOOR AIR QUALITY
OAT	OUTDOOR AIR TEMP. SEN
OFC	OUTDOOR FAN CONTACTOR
OFM	OUTDOOR FAN MOTOR
OFTB	OUTDOOR FAN TERMINAL BLOCK
OLR	OVERLOAD RELAY
PER	POWER EXHAUST RELAY
PL	PLUG ASSEMBLY
POT	POTENTIOMETER
PMR	PHASE MONITOR RELAY
QT	QUADRUPLE TERMINAL
R	RELAY
RAT	RETURN AIR TEMP. SEN
RMT OCC	REMOTE OCCUPANCY
RTPF	ROUND TUBE PLATE FIN CONDENSER COIL
RVS	REVERSING VALVE SWITCH
SAT	SUPPLY AIR TEMP. SENSOR
SEN	SENSOR
SET	SET POINT OFFSET
SFS	SUPPLY FAN STATUS
TDR	TIME DELAY RELAY
TRAN	TRANSFORMER
VFD	VARIABLE FREQUENCY DRIVE

a50-9699

Fig. 61 - RTU Open System Controller Wiring Diagram

Table 27 – 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: 24 vac 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 50TCQ 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 10-k ohm thermistor.

The SAT is factory-wired. The SAT probe is wire-tied to the supply-air opening 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. 45 on page 46.

Outdoor Air Temperature (OAT) Sensor —

The OAT is factory-mounted in the EconoMi$er®2 (FIOP 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 CO_2 sensor
Outdoor air CO_2 sensor

Field Connections

Field connections for accessory sensors and input devices are made 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.

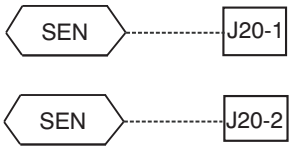
Space Temperature (SPT) Sensors —

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.

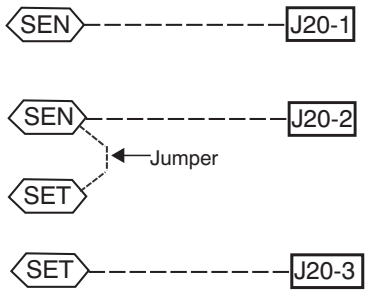
Connect T-55: See Fig. 46 for typical T-55 internal connections. Connect the T-55 SEN terminals to the RTU Open controller at J20-1 and J20-2. See Fig. 62.



C08460

Fig. 62 - RTU Open Controller T-55 Sensor Connections

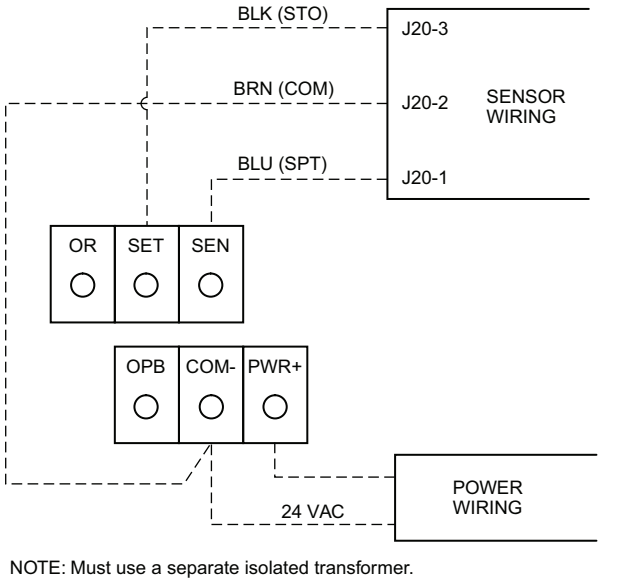
Connect T-56: See Fig. 48 for T-56 internal connections. Install a jumper between SEN and SET terminals as illustrated. Connect T-56 terminals to the RTU Open controller at J20-1, J20-2 and J20-3 per Fig. 63.



C08461

Fig. 63 - 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. 64 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.



C10291

Fig. 64 - Space Temperature Sensor Typical Wiring (33ZCT59SPT)

Indoor Air Quality (CO_2) Sensor —

The indoor air quality sensor accessory monitors space carbon dioxide (CO_2) 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 CO_2 present in the space air.

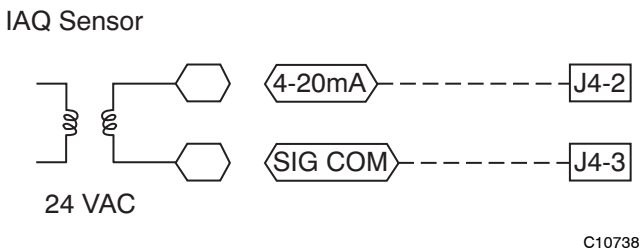
The CO_2 sensors are all factory set for a range of 0 to 2000 ppm and a linear mA output of 4 to 20. Refer to the instructions supplied with the CO_2 sensor for electrical requirements and terminal locations. See Fig. 51 for typical CO_2 sensor wiring schematic.

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 CO_2 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 Gage) twisted-pair cables (unshielded) to connect the separate isolated 24 vac power source to the sensor and to connect the sensor to the RTU Open controller 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. 51. Connect the 4-20 mA terminal to RTU Open J4-2 and connect the SIG COM terminal to RTU Open J4-3. See Fig. 65.



C10738

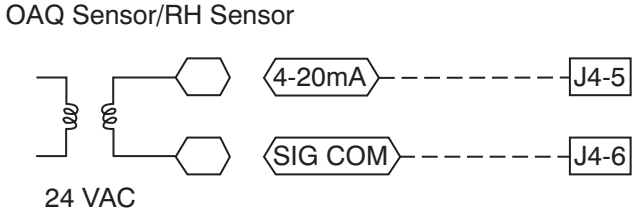
Fig. 65 - RTU Open Controller / Indoor CO_2 Sensor (33ZCSENCO2) Connections

Outdoor Air Quality Sensor (P/N 33ZCSENCO2 plus weatherproof enclosure) —

The outdoor air CO_2 sensor is designed to monitor carbon dioxide (CO_2) 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. 53. The outdoor air CO_2 sensor must be located in the economizer outside air hood.

Wiring the Outdoor Air CO_2 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. 51. 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. See Fig. 66.



C10739

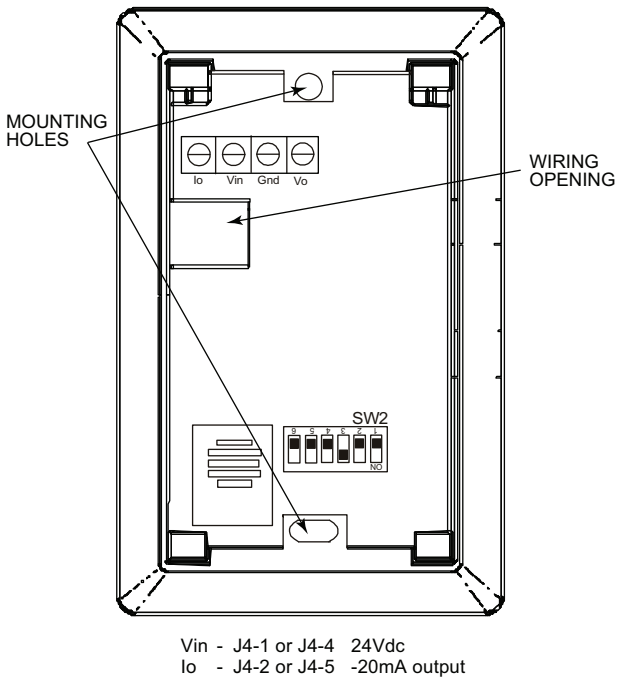
Fig. 66 - RTU Open Controller / Outdoor CO_2 Sensor (33ZCSENCO2) Connections

Space Relative Humidity Sensor or Humidistat —

Relative Humidity Sensors (Space or Duct Mounted): The accessory space humidity sensor (33ZCSENSRH-01) or duct humidity sensor (33ZCSENDRH-01) is used to measure the relative humidity of air within the space or return air duct. For wiring distances up to 500 ft (152 m), use a 3-conductor, 18 or 20 AWG shielded cable. The shield must be removed from the sensor end of the cable and grounded at the unit end. The current loop power for sensor is provided by the RTU Open controller as 24vdc. Refer to the instructions supplied with the RH sensor for the electrical requirements and terminal locations. RTU Open controller configurations must be changed after adding an RH sensor. See Fig. 67 and 68 for typical RH sensor wiring.

- J4-1 or J4-4 = 24vdc loop power
- J4-2 or J4-5 = 4-20mA signal input

NOTE: The factory default for dehumidification control is normally open humidistat.



C11087

Fig. 67 - Space Relative Humidity Sensor Typical Wiring

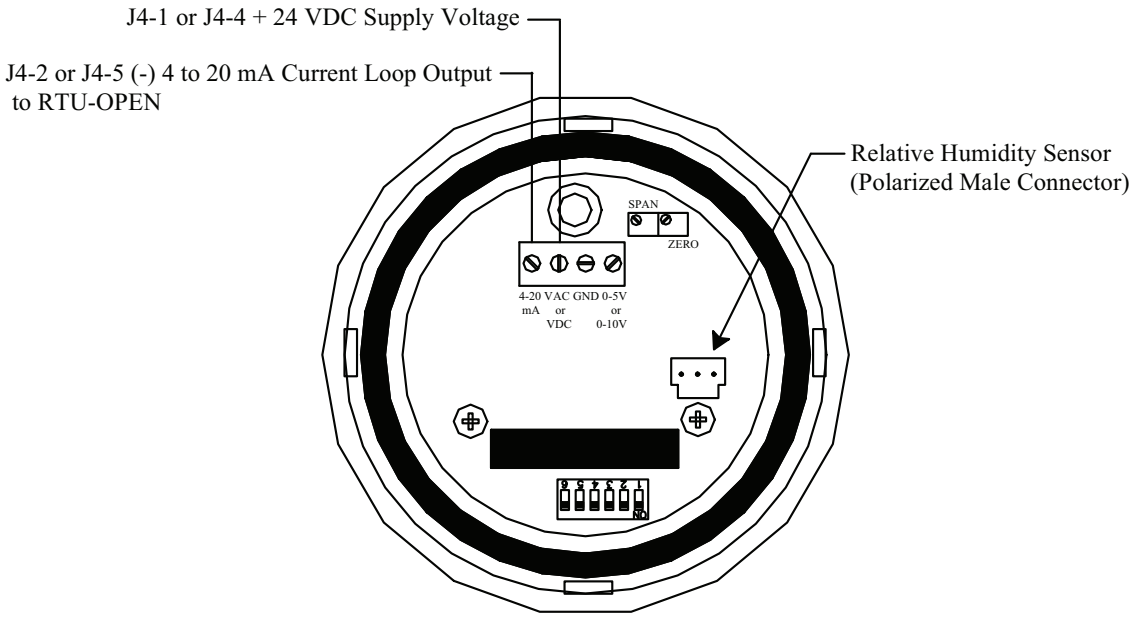


Fig. 68 - Duct Relative Humidity Sensor Typical Wiring

Humidistat: The accessory humidistat provides the RTU Open controller insight to the relative humidity in the space. The humidistat reads the RH level in the space and compares it to its setpoint to operate a dry contact. The humidistat is a dedicated input on the configurable input 9 and tells the RTU Open when the RH level is HIGH or LOW. The normal condition for humidity is LOW.

To wire in the field:

- J5-8 = 24 VAC source for dry contact
- J5-7 = Signal input

Smoke Detector/Fire Shutdown (FSD) —

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

On 50TCQ 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. 61, the RTU Open System Controller Wiring schematic.

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 ease of installation. Refer to Fig. 60 and 61 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 ease of installation. Refer to Fig. 60 and 61 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. 60 and Table 27 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 24 vac must be connected to the relay to allow it to operate the power exhaust relay in the PE accessory. A 24 vac 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. 60 and 61 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. 69 and 70 for protocol switch settings and address switches. The third party connection to the RTU Open controller is through plug J19. See Fig. 71 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.

Local Access —

Wall Mounted Equipment Touch™ Interface

The Equipment Touch interface is a wall mounted interface 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 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 in the guide for navigation and screen content.

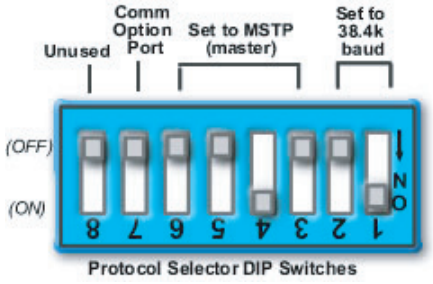
SW3 Protocol Selection

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

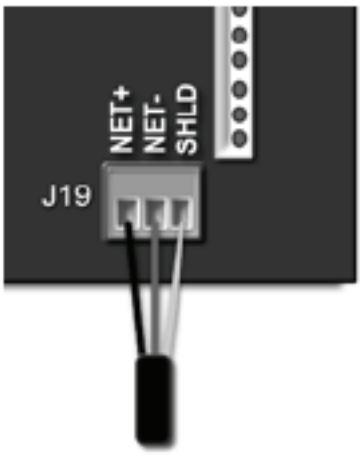


C07166

Fig. 69 - RTU Open Controller SW3 DIP Switch Settings

C10815

Fig. 70 - RTU Open Controller Address Switches



C10816

Fig. 71 - Network Wiring

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. 72.

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 28.

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.

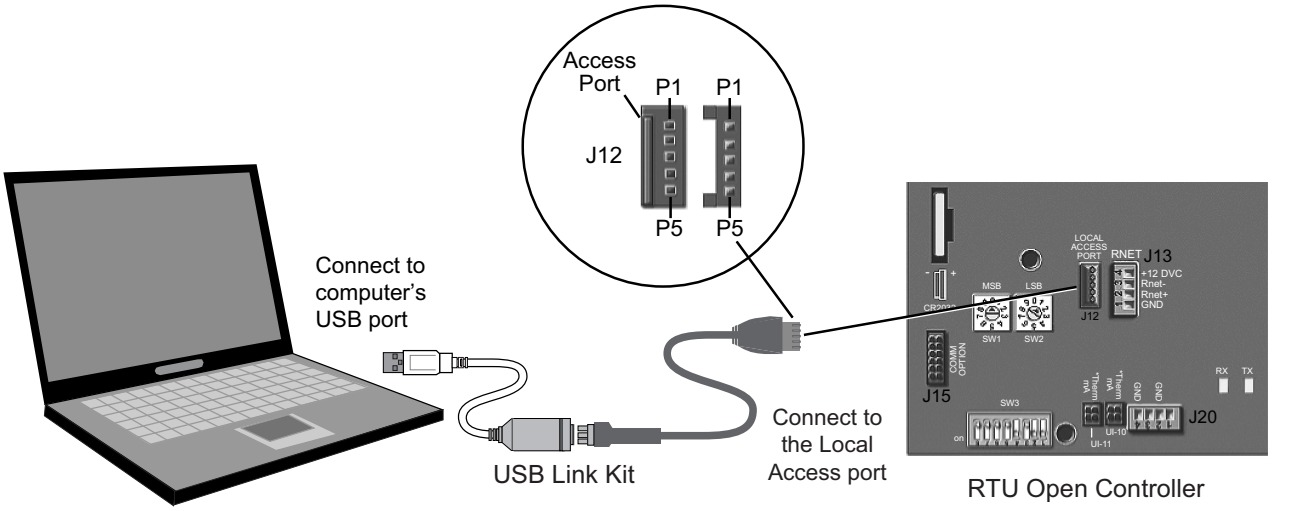


Fig. 72 - PC Running Field Assistant

Table 28 – 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

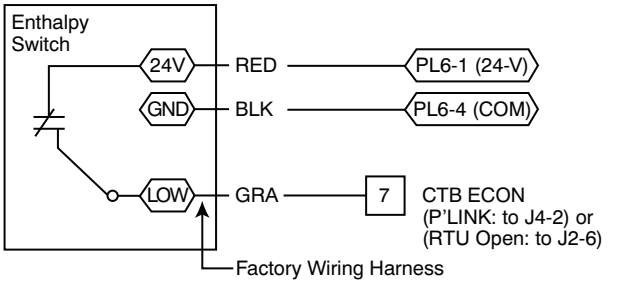
The **Run** and **Error** LEDs indicate control module and network status

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.

Outdoor Air Enthalpy Control (P/N 33CSENTHSW)1

The enthalpy control (33CSENTHSW) is available as a field-installed accessory to be used with the EconoMi$er®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. 73.)

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. 73. Connect the enthalpy control power input terminals to economizer actuator power leads RED (connect to 24V) and BLK (connect to GND).



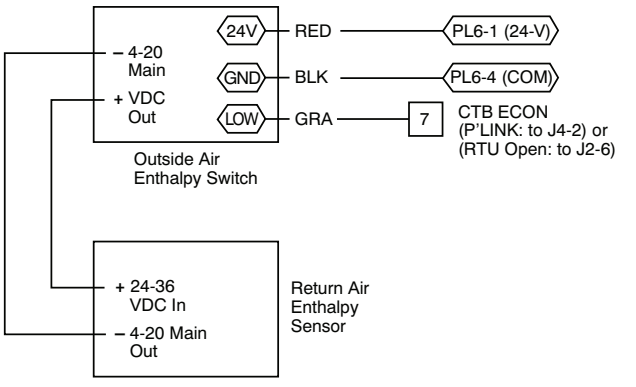
C11160

Fig. 73 - 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 (see Fig. 74).



C11161

Fig. 74 - Outside and Return Air Enthalpy Sensor Wiring

To wire the return air enthalpy sensor, perform the following:

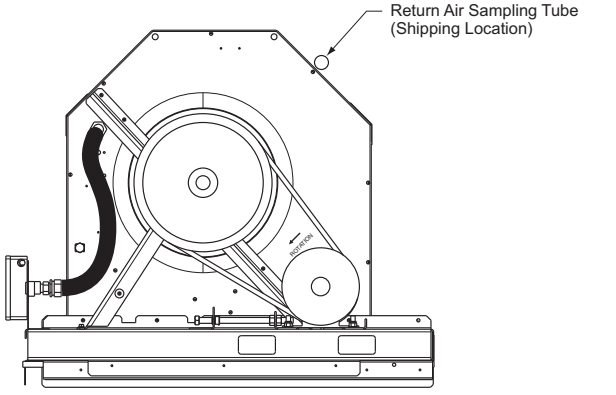
1. Use a 2-conductor, 18 or 20 AWG, twisted pair cable to connect the return air enthalpy sensor to the enthalpy controller.
2. Connect the field-supplied RED wire to (+) spade connector on the return air enthalpy sensor and the (+) terminal on the enthalpy controller. Connect the BLK wire to (-) spade connector on the return air enthalpy sensor and the (-) terminal on the enthalpy controller.

Smoke Detectors

Smoke detectors are available as factory-installed options on 50TCQ 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. 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.

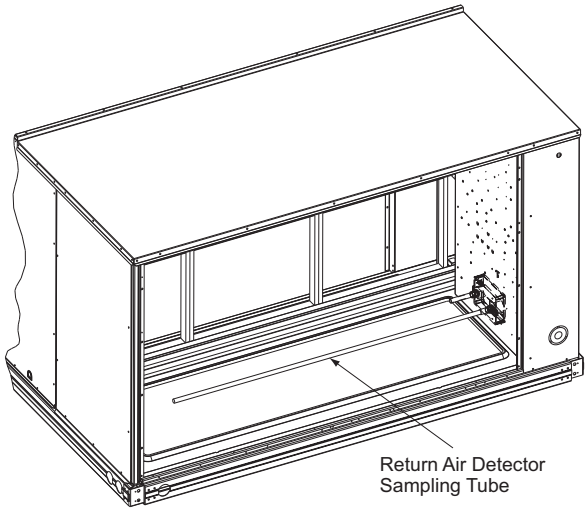
Return Air Sensor Tube Installation —

The return air sampling tube is shipped in the unit's supply fan section, attached to the blower housing (see Fig. 75). Its operating location is in the return air section of the unit (see Fig. 76, unit without economizer, or Fig. 77, unit with economizer), inserted into the return air sensor module housing which protrudes through the back of the control box.



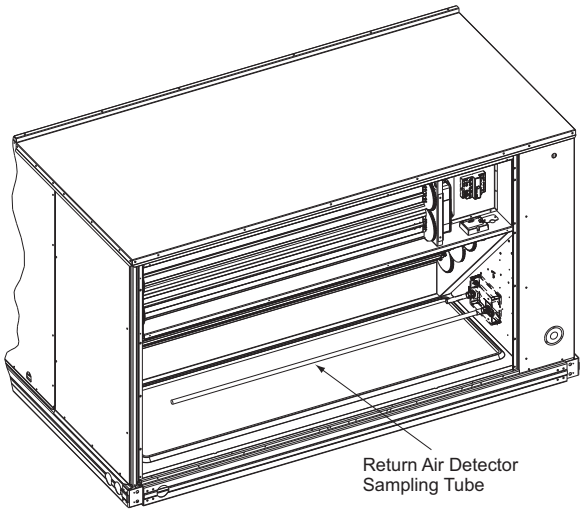
C09102

Fig. 75 - Typical Supply Air Smoke Detector Sensor Location



C09135

Fig. 76 - Return Air Sampling Tube Location in Unit without Economizer



C09136

Fig. 77 - Return Air Sampling Tube Location in Unit with Economizer

To install the return air sensor sampling tube:

1. Remove the tube from its shipping location.
2. Open the unit end to access the return air sensor (located on right-hand partition)
3. Orient the tube's sampling holes into the return air flow direction. Position the sampling holes on the bottom of the tube, facing into the bottom return duct opening for vertical unit's and on the side of the tube, facing the unit's end panel for horizontal units.
4. Insert the sampling tube into the return air sensor module until the tube snaps into position.
5. Replace end panel or outside air hood.

Smoke Detector Test Magnet —

Locate the magnet; it is shipped in the control box area.

Additional Application Data —

Refer to *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.

Legend and Notes for Tables 29 - 31

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
Pwrd 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

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

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.

$$\%\ \text{Voltage Imbalance} = 100 \times \frac{4}{227} = 1.76\%$$

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 29 – Unit Wire/Fuse or HACR Breaker Sizing Data - Single Speed Indoor Fan Motor - Vertical Units

UNIT	NO M. V–Ph–HZ	IFM TYPE	ELEC. HTR			NO C.O. or UNPWR C.O.								w/ PWRD C.O.							
						NO P.E.				w/ P.E. (pwrd fr/unit)				NO P.E.				w/ P.E. (pwrd fr/unit)			
			CRHEATER ***A00	Nom (kW)	FLA	MCA	MAX FUSE or HACR BRKR	DISC. SIZE		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
50TCQ*17	208/230–3–60	STD	NONE	–	–	68.3	90	71	393	80.1	100	85	413	73.1	90	77	398	84.9	100	90	418
			279A00	18.8/25.0	52.1/60.1	133.4/143.4	150/150	131/140	445/453	145.2/155.2	150/175	145/154	465/473	138.2/148.2	150/150	137/146	450/458	150.0/160.0	150/175	150/160	470/478
			280A00	37.6/50.0	104.2/120.3	198.5/188.6	200/200	191/210	497/513	210.3/200.4	225/225	205/223	517/533	203.3/193.4	225/200	197/215	502/518	215.1/205.2	225/225	210/229	522/538
			281A00	56.3/75.0	156.4/180.4	224.7/248.7	250/300	251/279	549/573	236.5/260.5	250/300	265/292	569/593	229.5/253.5	250/300	257/284	554/578	241.3/265.3	250/300	270/298	574/598
		MED	NONE	–	–	71.4	90	75	423	83.2	100	88	443	76.2	100	80	428	88.0	100	94	448
			279A00	18.8/25.0	52.1/60.1	136.5/146.5	150/150	135/144	475/483	148.3/158.3	150/175	148/158	495/503	141.3/151.3	150/175	140/150	480/488	153.1/163.1	175/175	154/163	500/508
			280A00	37.6/50.0	104.2/120.3	201.6/191.7	225/200	195/213	527/543	213.4/203.5	225/225	208/227	547/563	206.4/196.5	225/225	200/219	532/548	218.2/208.3	225/225	214/232	552/568
			281A00	56.3/75.0	156.4/180.4	227.8/251.8	250/300	255/282	579/603	239.6/263.6	250/300	268/296	599/623	232.6/256.6	250/300	260/288	584/608	244.4/268.4	300/300	274/301	604/628
		HIGH	NONE	–	–	74.4/73.5	90/90	78/77	425	86.2/85.3	100/100	92/91	445	79.2/78.3	100/100	84/83	430	91.0/90.1	100/100	97/96	450
			279A00	18.8/25.0	52.1/60.1	139.5/148.6	150/150	138/146	477/485	151.3/160.4	175/175	152/160	497/505	144.3/153.4	150/175	144/152	482/490	156.1/165.2	175/175	157/165	502/510
			280A00	37.6/50.0	104.2/120.3	204.6/193.8	225/225	198/216	529/545	216.4/205.6	225/225	212/229	549/565	209.4/198.6	225/225	204/221	534/550	221.2/210.4	225/225	217/235	554/570
			281A00	56.3/75.0	156.4/180.4	230.8/253.9	250/300	258/285	581/605	242.6/265.7	250/300	272/298	601/625	235.6/258.7	250/300	264/290	586/610	247.4/270.5	300/300	277/304	606/630
	460–3–60	STD	NONE	–	–	33.6	45	35	234	39.8	50	42	246	35.8	45	38	236	42.0	50	45	248
			282A00	25.0	30.1	71.2	80	70	264	77.4	80	77	276	73.4	80	72	266	79.6	80	79	278
			283A00	50.0	60.1	93.7	100	104	294	99.9	110	111	306	95.9	100	107	296	102.1	110	114	308
			284A00	75.0	90.2	123.8	150	139	324	130.0	150	146	336	126.0	150	141	326	132.2	150	148	338
		MED	NONE	–	–	35.5	45	37	249	41.7	50	44	261	37.7	45	40	251	43.9	50	47	263
			282A00	25.0	30.1	73.1	80	72	279	79.3	80	79	291	75.3	80	74	281	81.5	90	82	293
			283A00	50.0	60.1	95.6	100	106	309	101.8	110	114	321	97.8	110	109	311	104.0	110	116	323
			284A00	75.0	90.2	125.7	150	141	339	131.9	150	148	351	127.9	150	144	341	134.1	150	151	353
		HIGH	NONE	–	–	36.6	45	39	250	42.8	50	46	262	38.8	50	41	252	45.0	50	48	264
			282A00	25.0	30.1	74.2	80	73	280	80.4	90	80	292	76.4	80	76	282	82.6	90	83	294
			283A00	50.0	60.1	96.7	100	108	310	102.9	110	115	322	98.9	110	110	312	105.1	110	117	324
			284A00	75.0	90.2	126.8	150	142	340	133.0	150	149	352	129.0	150	145	342	135.2	150	152	354
	575–3–60	STD	NONE	–	–	24.9	30	26	184	29.7	35	32	192	26.6	30	28	186	31.4	40	33	194
			285A00	24.8	23.9	54.7	60	53	208	59.5	60	59	216	56.4	60	55	210	61.2	70	61	218
			286A00	49.6	47.7	84.5	90	81	232	89.3	90	86	240	86.2	90	83	234	91.0	100	88	242
			287A00	74.4	71.6	96.5	100	108	256	101.3	110	114	264	98.2	110	110	258	103.0	110	116	266
		MED	NONE	–	–	24.9	30	26	184	29.7	35	32	192	26.6	30	28	186	31.4	40	33	194
			285A00	24.8	23.9	54.7	60	53	208	59.5	60	59	216	56.4	60	55	210	61.2	70	61	218
			286A00	49.6	47.7	84.5	90	81	232	89.3	90	86	240	86.2	90	83	234	91.0	100	88	242
			287A00	74.4	71.6	96.5	100	108	256	101.3	110	114	264	98.2	110	110	258	103.0	110	116	266
		HIGH	NONE	–	–	27.7	30	29	198	32.5	40	35	206	29.4	35	31	200	34.2	40	37	208
			285A00	24.8	23.9	57.5	60	57	222	62.3	70	62	230	59.2	60	59	224	64.0	70	64	232
			286A00	49.6	47.7	87.3	90	84	246	92.1	100	90	254	89.0	90	86	248	93.8	100	92	256
			287A00	74.4	71.6	99.3	110	112	270	104.1	110	117	278	101.0	110	114	272	105.8	110	119	280

See: “Legend and Notes for Tables 29 – 31” on page 61.

Table 29 – Unit Wire/Fuse or HACR Breaker Sizing Data – Single Speed Indoor Fan Motor – Vertical Units (cont)

UNIT	NO M. V–Ph–HZ	IFM TYPE	ELEC. HTR			NO C.O. or UNPWR C.O.								w/ PWRD C.O.							
						NO P.E.				w/ P.E. (pwrd fr/unit)				NO P.E.				w/ P.E. (pwrd fr/unit)			
			CRHEATER ***A00	Nom (kW)	FLA	MCA	MAX FUSE or HACR BRKR	DISC. SIZE		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
50TCQ*24	208/230–3–60	STD	NONE	–	–	91.3/90.4	100/100	95/94	564	103.1/102.2	125/125	109/108	584	96.1/95.2	125/125	101/100	569	107.9/107.0	125/125	115/114	589
			279A00	18.8/25.0	52.1/60.1	156.5/165.6	175/175	155/164	616/624	168.3/177.4	175/200	169/177	636/644	161.3/170.4	175/175	161/169	621/629	173.1/182.2	175/200	174/183	641/649
			280A00	37.6/50.0	104.2/120.3	221.6/210.7	225/225	215/233	668/684	233.4/222.5	250/250	229/246	688/704	226.4/215.5	250/225	221/238	673/689	238.2/227.3	250/250	234/252	693/709
			281A00	56.3/75.0	156.4/180.4	247.7/270.8	300/300	275/302	720/744	259.5/282.6	300/300	289/315	740/764	252.5/275.6	300/300	281/307	725/749	264.3/287.4	300/300	294/321	745/769
		MED– High Efficiency	NONE	–	–	94.8	125	99	560	106.6	125	113	580	99.6	125	105	565	111.4	125	119	585
			279A00	18.8/25.0	52.1/60.1	160.0/170.0	175/175	159/169	612/620	171.8/181.8	175/200	173/182	632/640	164.8/174.8	175/175	165/174	617/625	176.6/186.6	200/200	178/188	637/645
			280A00	37.6/50.0	104.2/120.3	225.1/215.1	250/225	219/238	664/680	236.9/226.9	250/250	233/251	684/700	229.9/219.9	250/250	225/243	669/685	241.7/231.7	250/250	238/257	689/705
			281A00	56.3/75.0	156.4/180.4	251.2/275.2	300/300	279/307	716/740	263.0/287.0	300/300	293/321	736/760	256.0/280.0	300/300	285/312	721/745	267.8/291.8	300/350	298/326	741/765
		HIGH– High Efficiency	NONE	–	–	106.2	125	113	639	118.0	150	126	659	111.0	125	118	644	122.8	150	132	664
			279A00	18.8/25.0	52.1/60.1	171.4/181.4	175/200	173/182	691/699	183.2/193.2	200/200	186/195	711/719	176.2/186.2	200/200	178/187	696/704	188.0/198.0	200/200	192/201	716/724
			280A00	37.6/50.0	104.2/120.3	236.5/226.5	250/250	232/251	743/759	248.3/238.3	250/250	246/265	763/779	241.3/231.3	250/250	238/256	748/764	253.1/243.1	300/300	252/270	768/784
			281A00	56.3/75.0	156.4/180.4	262.6/286.6	300/300	292/320	795/819	274.4/298.4	300/350	306/334	815/839	267.4/291.4	300/300	298/326	800/824	279.2/303.2	300/350	312/339	820/844
	460–3–60	STD	NONE	–	–	49.1	60	51	291	55.3	60	58	303	51.3	60	54	293	57.5	70	61	305
			282A00	25.0	30.1	86.7	90	86	321	92.9	100	93	333	88.9	90	88	323	95.1	100	96	335
			283A00	50.0	60.1	109.2	125	120	351	115.4	125	128	363	111.4	125	123	353	117.6	125	130	365
			284A00	75.0	90.2	139.3	150	155	381	145.5	150	162	393	141.5	150	158	383	147.7	175	165	395
		MED– High Efficiency	NONE	–	–	51.3	60	54	289	57.5	70	61	301	53.5	60	56	291	59.7	70	63	303
			282A00	25.0	30.1	88.9	90	88	319	95.1	100	96	331	91.1	100	91	321	97.3	100	98	333
			283A00	50.0	60.1	111.4	125	123	349	117.6	125	130	361	113.6	125	125	351	119.8	125	133	363
			284A00	75.0	90.2	141.5	150	158	379	147.7	175	165	391	143.7	150	160	381	149.9	175	167	393
		HIGH– High Efficiency	NONE	–	–	57.0	70	60	329	63.2	80	68	341	59.2	70	63	331	65.4	80	70	343
			282A00	25.0	30.1	94.6	100	95	359	100.8	110	102	371	96.8	100	98	361	103.0	110	105	373
			283A00	50.0	60.1	117.1	125	129	389	123.3	150	137	401	119.3	125	132	391	125.5	150	139	403
			284A00	75.0	90.2	147.2	175	164	419	153.4	175	171	431	149.4	175	167	421	155.6	175	174	433
	575–3–60	STD	NONE	–	–	36.2	45	38	204	41.0	50	43	212	37.9	50	40	206	42.7	50	45	214
			285A00	24.8	23.9	66.1	70	65	228	70.9	80	71	236	67.8	70	67	230	72.6	80	73	238
			286A00	49.6	47.7	95.8	100	93	252	100.6	110	98	260	97.5	100	95	254	102.3	110	100	262
			287A00	74.4	71.6	107.8	125	120	276	112.6	125	126	284	109.5	125	122	278	114.3	125	128	286
		MED– High Efficiency	NONE	–	–	38.2	50	40	202	43.0	50	46	210	39.9	50	42	204	44.7	50	48	212
			285A00	24.8	23.9	68.1	70	68	226	72.9	80	73	234	69.8	70	70	228	74.6	80	75	236
			286A00	49.6	47.7	97.8	100	95	250	102.6	110	101	258	99.5	100	97	252	104.3	110	103	260
			287A00	74.4	71.6	109.8	125	123	274	114.6	125	128	282	111.5	125	125	276	116.3	125	130	284
		HIGH– High Efficiency	NONE	–	–	40.1	50	42	229	44.9	50	48	237	41.8	50	44	231	46.6	50	50	239
			285A00	24.8	23.9	70.0	70	70	253	74.8	80	75	261	71.7	80	72	255	76.5	80	77	263
			286A00	49.6	47.7	99.7	100	97	277	104.5	110	103	285	101.4	110	99	279	106.2	110	105	287
			287A00	74.4	71.6	111.7	125	125	301	116.5	125	130	309	113.4	125	127	303	118.2	125	132	311

See: “Legend and Notes for Tables 29 – 31” on page 61.

Table 30 – Unit Wire/Fuse or HACR Breaker Sizing Data - Single Speed Indoor Fan Motor - Horizontal Units

UNIT	NO M. V–Ph–HZ	IFM TYPE	ELEC. HTR			NO C.O. or UNPWR C.O.								w/ PWRD C.O.							
						NO P.E.				w/ P.E. (pwrd fr/unit)				NO P.E.				w/ P.E. (pwrd fr/unit)			
			CRHEATER ***A00	Nom (kW)	FLA	MCA	MAX FUSE or HACR BRKR	DISC. SIZE		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
50TCQ*17	208/230–3–60	STD	NONE	–	–	71.4	90	75	423	83.2	100	88	443	76.2	100	80	428	88.0	100	94	448
			270A00	18.8/25.0	52.1/60.1	136.5/146.5	150/150	135/144	475/483	148.3/158.3	150/175	148/158	495/503	141.3/151.3	150/175	140/150	480/488	153.1/163.1	175/175	154/163	500/508
			271A00	37.6/50.0	104.2/120.3	201.6/191.7	225/200	195/213	527/543	213.4/203.5	225/225	208/227	547/563	206.4/196.5	225/225	200/219	532/548	218.2/208.3	225/225	214/232	552/568
			272A00	56.3/75.0	156.4/180.4	227.8/251.8	250/300	255/282	579/603	239.6/263.6	250/300	268/296	599/623	232.6/256.6	250/300	260/288	584/608	244.4/268.4	300/300	274/301	604/628
		MED	NONE	–	–	71.4	90	75	423	83.2	100	88	443	76.2	100	80	428	88.0	100	94	448
			270A00	18.8/25.0	52.1/60.1	136.5/146.5	150/150	135/144	475/483	148.3/158.3	150/175	148/158	495/503	141.3/151.3	150/175	140/150	480/488	153.1/163.1	175/175	154/163	500/508
			271A00	37.6/50.0	104.2/120.3	201.6/191.7	225/200	195/213	527/543	213.4/203.5	225/225	208/227	547/563	206.4/196.5	225/225	200/219	532/548	218.2/208.3	225/225	214/232	552/568
			272A00	56.3/75.0	156.4/180.4	227.8/251.8	250/300	255/282	579/603	239.6/263.6	250/300	268/296	599/623	232.6/256.6	250/300	260/288	584/608	244.4/268.4	300/300	274/301	604/628
		HIGH	NONE	–	–	74.4/73.5	90/90	78/77	425	86.2/85.3	100/100	92/91	445	79.2/78.3	100/100	84/83	430	91.0/90.1	100/100	97/96	450
			270A00	18.8/25.0	52.1/60.1	139.5/148.6	150/150	138/146	477/485	151.3/160.4	175/175	152/160	497/505	144.3/153.4	150/175	144/152	482/490	156.1/165.2	175/175	157/165	502/510
			271A00	37.6/50.0	104.2/120.3	204.6/193.8	225/225	198/216	529/545	216.4/205.6	225/225	212/229	549/565	209.4/198.6	225/225	204/221	534/550	221.2/210.4	225/225	217/235	554/570
			272A00	56.3/75.0	156.4/180.4	230.8/253.9	250/300	258/285	581/605	242.6/265.7	250/300	272/298	601/625	235.6/258.7	250/300	264/290	586/610	247.4/270.5	300/300	277/304	606/630
	460–3–60	STD	NONE	–	–	35.5	45	37	249	41.7	50	44	261	37.7	45	40	251	43.9	50	47	263
			273A00	25.0	30.1	73.1	80	72	279	79.3	80	79	291	75.3	80	74	281	81.5	90	82	293
			274A00	50.0	60.1	95.6	100	106	309	101.8	110	114	321	97.8	110	109	311	104.0	110	116	323
			275A00	75.0	90.2	125.7	150	141	339	131.9	150	148	351	127.9	150	144	341	134.1	150	151	353
		MED	NONE	–	–	35.5	45	37	249	41.7	50	44	261	37.7	45	40	251	43.9	50	47	263
			273A00	25.0	30.1	73.1	80	72	279	79.3	80	79	291	75.3	80	74	281	81.5	90	82	293
			274A00	50.0	60.1	95.6	100	106	309	101.8	110	114	321	97.8	110	109	311	104.0	110	116	323
			275A00	75.0	90.2	125.7	150	141	339	131.9	150	148	351	127.9	150	144	341	134.1	150	151	353
		HIGH	NONE	–	–	36.6	45	39	250	42.8	50	46	262	38.8	50	41	252	45.0	50	48	264
			273A00	25.0	30.1	74.2	80	73	280	80.4	90	80	292	76.4	80	76	282	82.6	90	83	294
			274A00	50.0	60.1	96.7	100	108	310	102.9	110	115	322	98.9	110	110	312	105.1	110	117	324
			275A00	75.0	90.2	126.8	150	142	340	133.0	150	149	352	129.0	150	145	342	135.2	150	152	354
	575–3–60	STD	NONE	–	–	24.9	30	26	184	29.7	35	32	192	26.6	30	28	186	31.4	40	33	194
			276A00	24.8	23.9	54.7	60	53	208	59.5	60	59	216	56.4	60	55	210	61.2	70	61	218
			277A00	49.6	47.7	84.5	90	81	232	89.3	90	86	240	86.2	90	83	234	91.0	100	88	242
			278A00	74.4	71.6	96.5	100	108	256	101.3	110	114	264	98.2	110	110	258	103.0	110	116	266
		MED	NONE	–	–	24.9	30	26	184	29.7	35	32	192	26.6	30	28	186	31.4	40	33	194
			276A00	24.8	23.9	54.7	60	53	208	59.5	60	59	216	56.4	60	55	210	61.2	70	61	218
			277A00	49.6	47.7	84.5	90	81	232	89.3	90	86	240	86.2	90	83	234	91.0	100	88	242
			278A00	74.4	71.6	96.5	100	108	256	101.3	110	114	264	98.2	110	110	258	103.0	110	116	266
		HIGH	NONE	–	–	27.7	30	29	198	32.5	40	35	206	29.4	35	31	200	34.2	40	37	208
			276A00	24.8	23.9	57.5	60	57	222	62.3	70	62	230	59.2	60	59	224	64.0	70	64	232
			277A00	49.6	47.7	87.3	90	84	246	92.1	100	90	254	89.0	90	86	248	93.8	100	92	256
			278A00	74.4	71.6	99.3	110	112	270	104.1	110	117	278	101.0	110	114	272	105.8	110	119	280

See: “Legend and Notes for Tables 29 – 31” on page 61.

Table 30 – Unit Wire/Fuse or HACR Breaker Sizing Data – Single Speed Indoor Fan Motor – Horizontal Units (cont)

UNIT	NO M. V–Ph–HZ	IFM TYPE	ELEC. HTR			NO C.O. or UNPWR C.O.								w/ PWRD C.O.							
						NO P.E.				w/ P.E. (pwrd fr/unit)				NO P.E.				w/ P.E. (pwrd fr/unit)			
			CRHEATER ***A00	Nom (kW)	FLA	MCA	MAX FUSE or HACR BRKR	DISC. SIZE		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
50TCQ*24	208/230–3–60	MED–High Efficiency	NONE	–	–	94.8	125	99	560	106.6	125	113	580	99.6	125	105	565	111.4	125	119	585
			270A00	18.8/25.0	52.1/60.1	160.0/170.0	175/175	159/169	612/620	171.8/181.8	175/200	173/182	632/640	164.8/174.8	175/175	165/174	617/625	176.6/186.6	200/200	178/188	637/645
			271A00	37.6/50.0	104.2/120.3	225.1/215.1	250/225	219/238	664/680	236.9/226.9	250/250	233/251	684/700	229.9/219.9	250/250	225/243	669/685	241.7/231.7	250/250	238/257	689/705
			272A00	56.3/75.0	156.4/180.4	251.2/275.2	300/300	279/307	716/740	263.0/287.0	300/300	293/321	736/760	256.0/280.0	300/300	285/312	721/745	267.8/291.8	300/350	298/326	741/765
		HIGH–High Efficiency	NONE	–	–	106.2	125	113	639	118.0	150	126	659	111.0	125	118	644	122.8	150	132	664
			270A00	18.8/25.0	52.1/60.1	171.4/181.4	175/200	173/182	691/699	183.2/193.2	200/200	186/195	711/719	176.2/186.2	200/200	178/187	696/704	188.0/198.0	200/200	192/201	716/724
			271A00	37.6/50.0	104.2/120.3	236.5/226.5	250/250	232/251	743/759	248.3/238.3	250/250	246/265	763/779	241.3/231.3	250/250	238/256	748/764	253.1/243.1	300/300	252/270	768/784
			272A00	56.3/75.0	156.4/180.4	262.6/286.6	300/300	292/320	795/819	274.4/298.4	300/350	306/334	815/839	267.4/291.4	300/300	298/326	800/824	279.2/303.2	300/350	312/339	820/844
	460–3–60	MED–High Efficiency	NONE	–	–	51.3	60	54	289	57.5	70	61	301	53.5	60	56	291	59.7	70	63	303
			273A00	25.0	30.1	88.9	90	88	319	95.1	100	96	331	91.1	100	91	321	97.3	100	98	333
			274A00	50.0	60.1	111.4	125	123	349	117.6	125	130	361	113.6	125	125	351	119.8	125	133	363
			275A00	75.0	90.2	141.5	150	158	379	147.7	175	165	391	143.7	150	160	381	149.9	175	167	393
		HIGH–High Efficiency	NONE	–	–	57.0	70	60	329	63.2	80	68	341	59.2	70	63	331	65.4	80	70	343
			273A00	25.0	30.1	94.6	100	95	359	100.8	110	102	371	96.8	100	98	361	103.0	110	105	373
			274A00	50.0	60.1	117.1	125	129	389	123.3	150	137	401	119.3	125	132	391	125.5	150	139	403
			275A00	75.0	90.2	147.2	175	164	419	153.4	175	171	431	149.4	175	167	421	155.6	175	174	433
	575–3–60	MED–High Efficiency	NONE	–	–	38.2	50	40	202	43.0	50	46	210	39.9	50	42	204	44.7	50	48	212
			276A00	24.8	23.9	68.1	70	68	226	72.9	80	73	234	69.8	70	70	228	74.6	80	75	236
			277A00	49.6	47.7	97.8	100	95	250	102.6	110	101	258	99.5	100	97	252	104.3	110	103	260
			278A00	74.4	71.6	109.8	125	123	274	114.6	125	128	282	111.5	125	125	276	116.3	125	130	284
		HIGH–High Efficiency	NONE	–	–	40.1	50	42	229	44.9	50	48	237	41.8	50	44	231	46.6	50	50	239
			276A00	24.8	23.9	70.0	70	70	253	74.8	80	75	261	71.7	80	72	255	76.5	80	77	263
			277A00	49.6	47.7	99.7	100	97	277	104.5	110	103	285	101.4	110	99	279	106.2	110	105	287
			278A00	74.4	71.6	111.7	125	125	301	116.5	125	130	309	113.4	125	127	303	118.2	125	132	311

NOTE: STD IFM not available on horizontal 50TCQ*24 units.

See: “Legend and Notes for Tables 29 – 31” on page 61.

Table 31 – Unit Wire/Fuse or HACR Breaker Sizing Data with Factory Installed Two-Speed Indoor Fan Option

UNIT	NO M. V–Ph–HZ	IFM TYPE	ELEC. HTR			NO C.O. or UNPWR C.O.								w/ PWRD C.O.							
						NO P.E.				w/ P.E. (pwrd fr/unit)				NO P.E.				w/ P.E. (pwrd fr/unit)			
			CRHEATER ***A00	Nom (kW)	FLA	MCA	MAX FUSE or HACR BRKR	DISC. SIZE		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
50TCQ*17	208/230–3–60	STD	NONE	–	–	69.4/68.6	90/90	73/72	390	81.2/80.4	100/100	86/85	410	74.2/73.4	90/90	78/77	395	86.0/85.2	100/100	92/91	415
			279A00	18.8/25.0	52.1/60.1	134.5/143.7	150/150	132/141	442/450	146.3/155.5	150/175	146/154	462/470	139.3/148.5	150/150	138/146	447/455	151.1/160.3	175/175	152/160	467/475
			280A00	37.6/50.0	104.2/120.3	199.6/188.9	200/200	192/210	494/510	211.4/200.7	225/225	206/224	514/530	204.4/193.7	225/200	198/216	499/515	216.2/205.5	225/225	211/229	519/535
			281A00	56.3/75.0	156.4/180.4	225.8/249.0	250/300	252/279	546/570	237.6/260.8	250/300	266/293	566/590	230.6/253.8	250/300	258/285	551/575	242.4/265.6	250/300	272/298	571/595
		MED	NONE	–	–	71.6/70.6	90/90	75/74	414	83.4/82.4	100/100	89/88	434	76.4/75.4	100/100	81/79	419	88.2/87.2	100/100	94/93	439
			279A00	18.8/25.0	52.1/60.1	136.7/145.7	150/150	135/143	466/474	148.5/157.5	150/175	149/157	486/494	141.5/150.5	150/175	141/149	471/479	153.3/162.3	175/175	154/162	491/499
			280A00	37.6/50.0	104.2/120.3	201.8/190.9	225/200	195/212	518/534	213.6/202.7	225/225	208/226	538/554	206.6/195.7	225/225	200/218	523/539	218.4/207.5	225/225	214/231	543/559
			281A00	56.3/75.0	156.4/180.4	228.0/251.0	250/300	255/281	570/594	239.8/262.8	250/300	269/295	590/614	232.8/255.8	250/300	260/287	575/599	244.6/267.6	300/300	274/300	595/619
		HIGH	NONE	–	–	74.4/73.5	90/90	78/77	425	86.2/85.3	100/100	92/91	445	79.2/78.3	100/100	84/83	430	91.0/90.1	100/100	97/96	450
			279A00	18.8/25.0	52.1/60.1	139.5/148.6	150/150	138/146	477/485	151.3/160.4	175/175	152/160	497/505	144.3/153.4	150/175	144/152	482/490	156.1/165.2	175/175	157/165	502/510
			280A00	37.6/50.0	104.2/120.3	204.6/193.8	225/225	198/216	529/545	216.4/205.6	225/225	212/229	549/565	209.4/198.6	225/225	204/221	534/550	221.2/210.4	225/225	217/235	554/570
			281A00	56.3/75.0	156.4/180.4	230.8/253.9	250/300	258/285	581/605	242.6/265.7	250/300	272/298	601/625	235.6/258.7	250/300	264/290	586/610	247.4/270.5	300/300	277/304	606/630
	460–3–60	STD	NONE	–	–	34.0	45	36	233	40.2	50	43	245	36.2	45	38	235	42.4	50	45	247
			282A00	25.0	30.1	71.6	80	70	263	77.8	80	77	275	73.8	80	73	265	80.0	80	80	277
			283A00	50.0	60.1	94.1	100	105	293	100.3	110	112	305	96.3	100	107	295	102.5	110	114	307
			284A00	75.0	90.2	124.2	150	139	323	130.4	150	146	335	126.4	150	142	325	132.6	150	149	337
		MED	NONE	–	–	35.1	45	37	245	41.3	50	44	257	37.3	45	39	247	43.5	50	46	259
			282A00	25.0	30.1	72.7	80	71	275	78.9	80	79	287	74.9	80	74	277	81.1	90	81	289
			283A00	50.0	60.1	95.2	100	106	305	101.4	110	113	317	97.4	110	108	307	103.6	110	116	319
			284A00	75.0	90.2	125.3	150	141	335	131.5	150	148	347	127.5	150	143	337	133.7	150	150	349
		HIGH	NONE	–	–	36.6	45	39	250	42.8	50	46	262	38.8	50	41	252	45.0	50	48	264
			282A00	25.0	30.1	74.2	80	73	280	80.4	90	80	292	76.4	80	76	282	82.6	90	83	294
			283A00	50.0	60.1	96.7	100	108	310	102.9	110	115	322	98.9	110	110	312	105.1	110	117	324
			284A00	75.0	90.2	126.8	150	142	340	133.0	150	149	352	129.0	150	145	342	135.2	150	152	354
	575–3–60	STD	NONE	–	–	26.6	30	28	184	31.4	40	33	192	28.3	35	30	186	33.1	40	35	194
			285A00	24.8	23.9	56.4	60	55	208	61.2	70	61	216	58.1	60	57	210	62.9	70	63	218
			286A00	49.6	47.7	86.2	90	83	232	91.0	100	88	240	87.9	90	85	234	92.7	100	90	242
			287A00	74.4	71.6	98.2	110	110	256	103.0	110	116	264	99.9	110	112	258	104.7	110	118	266
		MED	NONE	–	–	26.6	30	28	184	31.4	40	33	192	28.3	35	30	186	33.1	40	35	194
			285A00	24.8	23.9	56.4	60	55	208	61.2	70	61	216	58.1	60	57	210	62.9	70	63	218
			286A00	49.6	47.7	86.2	90	83	232	91.0	100	88	240	87.9	90	85	234	92.7	100	90	242
			287A00	74.4	71.6	98.2	110	110	256	103.0	110	116	264	99.9	110	112	258	104.7	110	118	266
		HIGH	NONE	–	–	28.3	35	30	198	33.1	40	35	206	30.0	35	32	200	34.8	40	37	208
			285A00	24.8	23.9	58.1	60	57	222	62.9	70	63	230	59.8	60	59	224	64.6	70	65	232
			286A00	49.6	47.7	87.9	90	85	246	92.7	100	90	254	89.6	90	87	248	94.4	100	92	256
			287A00	74.4	71.6	99.9	110	112	270	104.7	110	118	278	101.6	110	114	272	106.4	110	120	280

See: “Legend and Notes for Tables 29 – 31” on page 61.

Table 31 - Unit Wire/Fuse or HACR Breaker Sizing Data with Factory Installed Two-Speed Indoor Fan Option (cont)

UNIT	NO M. V–Ph–HZ	IFM TYPE	ELEC. HTR			NO C.O. or UNPWR C.O.								w/ PWRD C.O.							
						NO P.E.				w/ P.E. (pwrd fr/unit)				NO P.E.				w/ P.E. (pwrd fr/unit)			
			CRHEATER ***A00	Nom (kW)	FLA	MCA	MAX FUSE or HACR BRKR	DISC. SIZE		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
50TCQ*24	208/230–3–60	STD**	NONE	–	–	91.3/90.4	100/100	95/94	564	103.1/102.2	125/125	109/108	584	96.1/95.2	125/125	101/100	569	107.9/107.0	125/125	115/114	589
			279A00	18.8/25.0	52.1/60.1	156.5/165.6	175/175	155/164	616/624	168.3/177.4	175/200	169/177	636/644	161.3/170.4	175/175	161/169	621/629	173.1/182.2	175/200	174/183	641/649
			280A00	37.6/50.0	104.2/120.3	221.6/210.7	225/225	215/233	668/684	233.4/222.5	250/250	229/246	688/704	226.4/215.5	250/225	221/238	673/689	238.2/227.3	250/250	234/252	693/709
			281A00	56.3/75.0	156.4/180.4	247.7/270.8	300/300	275/302	720/744	259.5/282.6	300/300	289/315	740/764	252.5/275.6	300/300	281/307	725/749	264.3/287.4	300/300	294/321	745/769
		MED	NONE	–	–	94.8	125	99	560	106.6	125	113	580	99.6	125	105	565	111.4	125	119	585
			279A00	18.8/25.0	52.1/60.1	160.0/170.0	175/175	159/169	612/620	171.8/181.8	175/200	173/182	632/640	164.8/174.8	175/175	165/174	617/625	176.6/186.6	200/200	178/188	637/645
			280A00	37.6/50.0	104.2/120.3	225.1/215.1	250/225	219/238	664/680	236.9/226.9	250/250	233/251	684/700	229.9/219.9	250/250	225/243	669/685	241.7/231.7	250/250	238/257	689/705
			281A00	56.3/75.0	156.4/180.4	251.2/275.2	300/300	279/307	716/740	263.0/287.0	300/300	293/321	736/760	256.0/280.0	300/300	285/312	721/745	267.8/291.8	300/350	298/326	741/765
		HIGH	NONE	–	–	106.2	125	113	639	118.0	150	126	659	111.0	125	118	644	122.8	150	132	664
			279A00	18.8/25.0	52.1/60.1	171.4/181.4	175/200	173/182	691/699	183.2/193.2	200/200	186/195	711/719	176.2/186.2	200/200	178/187	696/704	188.0/198.0	200/200	192/201	716/724
			280A00	37.6/50.0	104.2/120.3	236.5/226.5	250/250	232/251	743/759	248.3/238.3	250/250	246/265	763/779	241.3/231.3	250/250	238/256	748/764	253.1/243.1	300/300	252/270	768/784
			281A00	56.3/75.0	156.4/180.4	262.6/286.6	300/300	292/320	795/819	274.4/298.4	300/350	306/334	815/839	267.4/291.4	300/300	298/326	800/824	279.2/303.2	300/350	312/339	820/844
	460–3–60	STD**	NONE	–	–	49.1	60	51	291	55.3	60	58	303	51.3	60	54	293	57.5	70	61	305
			282A00	25.0	30.1	86.7	90	86	321	92.9	100	93	333	88.9	90	88	323	95.1	100	96	335
			283A00	50.0	60.1	109.2	125	120	351	115.4	125	128	363	111.4	125	123	353	117.6	125	130	365
			284A00	75.0	90.2	139.3	150	155	381	145.5	150	162	393	141.5	150	158	383	147.7	175	165	395
		MED	NONE	–	–	51.3	60	54	289	57.5	70	61	301	53.5	60	56	291	59.7	70	63	303
			282A00	25.0	30.1	88.9	90	88	319	95.1	100	96	331	91.1	100	91	321	97.3	100	98	333
			283A00	50.0	60.1	111.4	125	123	349	117.6	125	130	361	113.6	125	125	351	119.8	125	133	363
			284A00	75.0	90.2	141.5	150	158	379	147.7	175	165	391	143.7	150	160	381	149.9	175	167	393
		HIGH	NONE	–	–	57.0	70	60	329	63.2	80	68	341	59.2	70	63	331	65.4	80	70	343
			282A00	25.0	30.1	94.6	100	95	359	100.8	110	102	371	96.8	100	98	361	103.0	110	105	373
			283A00	50.0	60.1	117.1	125	129	389	123.3	150	137	401	119.3	125	132	391	125.5	150	139	403
			284A00	75.0	90.2	147.2	175	164	419	153.4	175	171	431	149.4	175	167	421	155.6	175	174	433
	575–3–60	STD**	NONE	–	–	36.8	45	39	204	41.6	50	44	212	38.5	50	41	206	43.3	50	46	214
			285A00	24.8	23.9	66.7	70	66	228	71.5	80	72	236	68.4	70	68	230	73.2	80	74	238
			286A00	49.6	47.7	96.4	100	93	252	101.2	110	99	260	98.1	100	95	254	102.9	110	101	262
			287A00	74.4	71.6	108.4	125	121	276	113.2	125	127	284	110.1	125	123	278	114.9	125	128	286
		MED	NONE	–	–	38.2	50	40	202	43.0	50	46	210	39.9	50	42	204	44.7	50	48	212
			285A00	24.8	23.9	68.1	70	68	226	72.9	80	73	234	69.8	70	70	228	74.6	80	75	236
			286A00	49.6	47.7	97.8	100	95	250	102.6	110	101	258	99.5	100	97	252	104.3	110	103	260
			287A00	74.4	71.6	109.8	125	123	274	114.6	125	128	282	111.5	125	125	276	116.3	125	130	284
		HIGH	NONE	–	–	40.1	50	42	229	44.9	50	48	237	41.8	50	44	231	46.6	50	50	239
			285A00	24.8	23.9	70.0	70	70	253	74.8	80	75	261	71.7	80	72	255	76.5	80	77	263
			286A00	49.6	47.7	99.7	100	97	277	104.5	110	103	285	101.4	110	99	279	106.2	110	105	287
			287A00	74.4	71.6	111.7	125	125	301	116.5	125	130	309	113.4	125	127	303	118.2	125	132	311

** STD IFM not available on horizontal 50TCQ*24 units.

See: “Legend and Notes for Tables 29 – 31” on page 61.

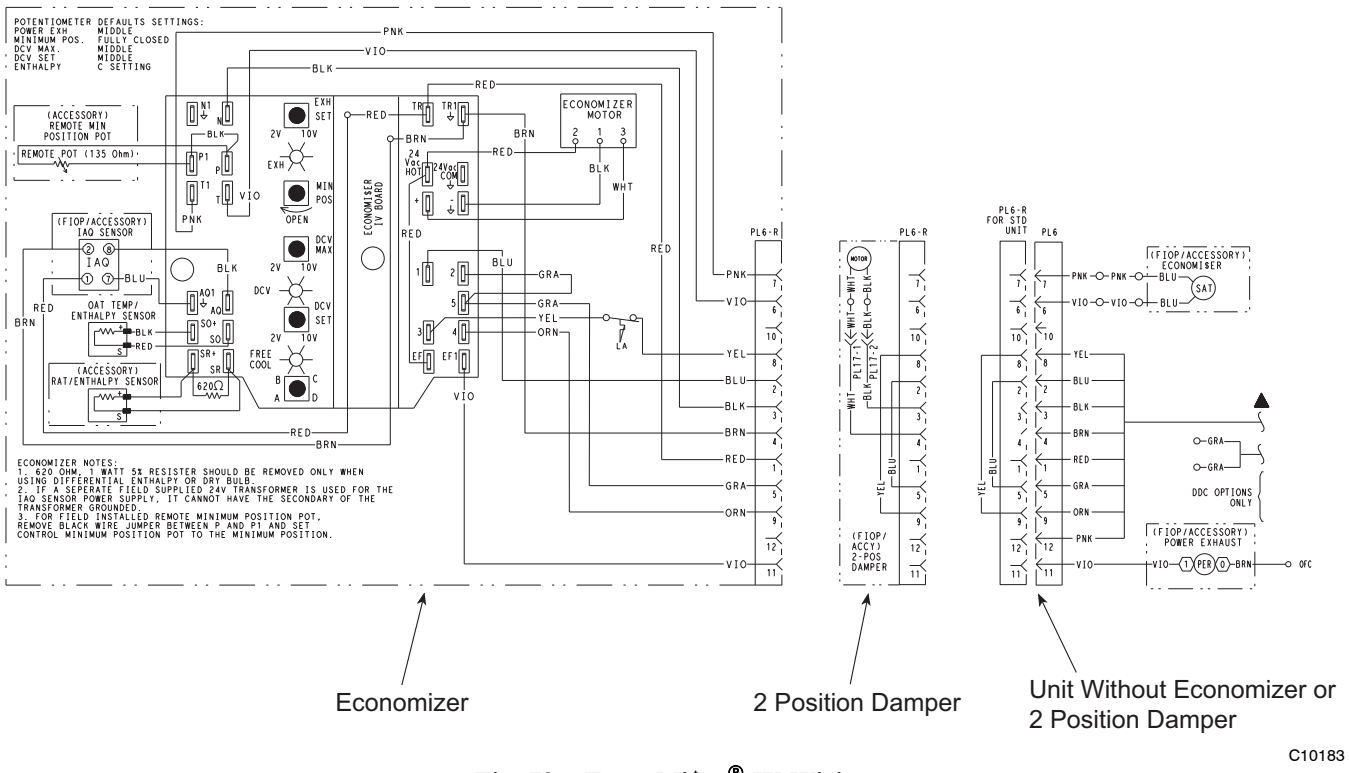


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Fig. 78 - EconoMi$er® IV Wiring

Step 11 — Adjust Factory-Installed Options

Smoke Detectors —

Smoke detector(s) will be connected at the Controls Connections Board, at terminals marked "Smoke Shutdown". Remove jumper JMP 3 when ready to energize unit.

EconoMi$er IV Occupancy Switch —

Refer to Fig. 78 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

Electric heaters

Single point kits

Low ambient controls

Thermostat / sensors

CO_2 sensor

DDC interface (PremierLink™ controller)

Louvered hail guard

Phase monitor control

Winter start kit

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

Step 13 — Check Belt Tension

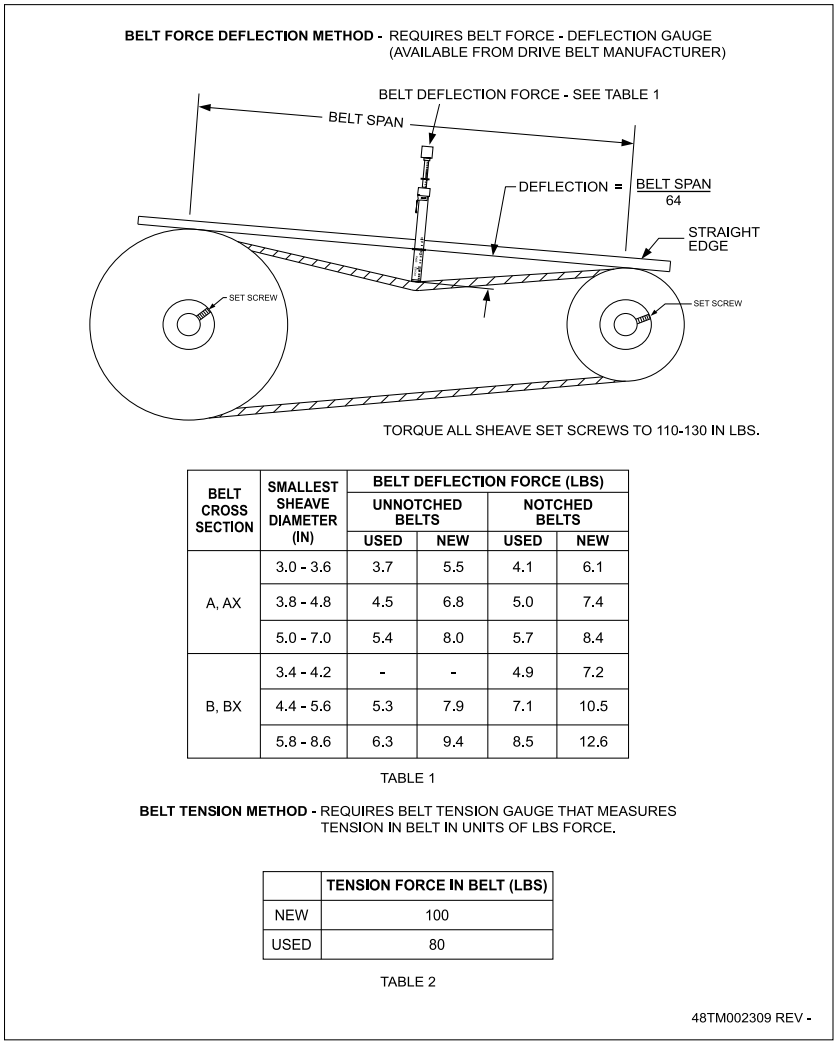
Measure the belt span length as shown in Fig. 79. Calculate the required deflection by multiplying the belt span length by $^1/_{64}$. For example, if the belt span length is 32 inches: 32 x $^1/_{64}$ = $^1/_2$ inch deflection.

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. 79). 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 loosing the motor mounting plate front bolts and rear bolt (see Fig. 80) and slide 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.



BELT CROSS SECTION	SMALLEST SHEAVE DIAMETER (IN)	BELT DEFLECTION FORCE (LBS)			
		UNNOTCHED BELTS		NOTCHED BELTS	
		USED	NEW	USED	NEW
A, AX	3.0 - 3.6	3.7	5.5	4.1	6.1
	3.8 - 4.8	4.5	6.8	5.0	7.4
	5.0 - 7.0	5.4	8.0	5.7	8.4
B, BX	3.4 - 4.2	-	-	4.9	7.2
	4.4 - 5.6	5.3	7.9	7.1	10.5
	5.8 - 8.6	6.3	9.4	8.5	12.6

TABLE 1

BELT TENSION METHOD - REQUIRES BELT TENSION GAUGE THAT MEASURES TENSION IN BELT IN UNITS OF LBS FORCE.

	TENSION FORCE IN BELT (LBS)
NEW	100
USED	80

TABLE 2

48TM002309 REV -

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Fig. 79 - V-Belt Force Label

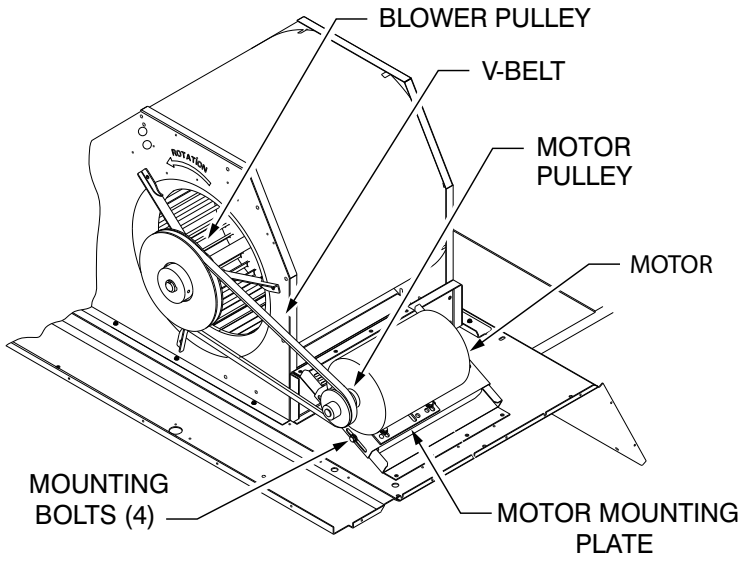

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Fig. 80 - Belt Drive Motor Mounting

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Replaces: 50TCQ−17−24−01SI

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 _____

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

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