Revision: I-ZQYRA (08-19) PN260414R9

Supersedes: I-ZQYRA (05-16) PN260414R8

INSTALLATION/OPERATION/MAINTENANCE INSTRUCTIONS FOR Z SERIES VENTILATION UNIT

MODEL ZQYRA

⚠ DANGER ⚠

- **This unit contains R-410A high pressure refrigerant. Hazards exist that could result in personal injury or death. Installation, maintenance, and service should be performed only by an HVAC technician qualified in R-410A refrigerant and using proper tools and equipment. Due to much higher pressure of R-410A refrigerant, DO NOT USE service equipment or tools designed for R22 refrigerant.**
- **IMPORTANT: *Do not release refrigerant to the atmosphere!* If required service procedures include the adding or removing of refrigerant, the service technician must comply with all federal, state, and local laws. The procedures discussed in this manual should only be performed by a qualified HVAC technician.**
- **IMPORTANT: Failure to maintain, misuse of the unit, use of replacement parts not factory-approved, or wrong startup procedures will void the warranty.**

DO NOT DESTROY. PLEASE READ CAREFULLY. KEEP IN A SAFE PLACE FOR FUTURE REFERENCE.

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GENERAL INFORMATION

This booklet includes installation, operation, maintenance, and service information. Before beginning any procedure, carefully review the information, paying particular attention to the warnings. All installations must be in compliance with all codes and requirements of authorities having jurisdiction.

References

Table 1. Related Technical Manuals Available from Factory Distributor

Type	Form	Part/Document No,
Replacement parts	P-ZYQRA	262961
Remote mounted display (option RB5) installation	I-RB5 Display	260737
Roof curb (option CJ) installation	—	D303068
Retrofit kit installation for units manufactured ***before*** OCT 2012	CP-Z Retrofit Kit	269983

Important Safety Information

Please read all information in this manual thoroughly and become familiar with the capabilities and use of your appliance before attempting to operate or maintain this unit. Pay attention to all dangers, warnings, cautions, and notes highlighted in this manual. Safety markings should not be ignored and are used frequently throughout to designate a degree or level of seriousness.

DANGER: A danger statement describes a potentially hazardous situation that if not avoided, will result in severe personal injury or death and/or property damage.

WARNING: A warning statement describes a potentially hazardous situation that if not avoided, can result in severe personal injury and/or property damage.

CAUTION: A caution statement describes a potentially hazardous situation that if not avoided, can result in minor or moderate personal injury and/or property damage.

NOTE: A note provides important information that should not be ignored.

⚠ DANGER ⚠

- **Improper installation, adjustment, alteration, service, or maintenance can cause property damage, personal injury, or death. A qualified installer or service agency must perform installation and service.**
- **The heat pump in this ventilation unit is designed to use R-410A high pressure refrigerant only. Hazards exist that could result in personal injury or death. Installation, maintenance, and service should be performed only by an HVAC technician qualified in R-410A refrigerant and using proper tools and equipment. Due to much higher pressure of R-410A refrigerant, DO NOT USE service equipment or tools designed for R22 refrigerant.**
- **Never use oxygen to pressurize a refrigeration system. Oxygen can explode on contact with oil and result in personal injury or death. When using high pressure gas such as nitrogen for pressurizing a refrigeration system, ALWAYS USE A PRESSURE REGULATOR that can control the pressure down to 1 or 2 psig.**
- **Before installing or servicing, always turn off the main power to the system and install a lock-out on the disconnect switch.**

⚠ WARNING ⚠

For your safety, wear eye protection, gloves, and protective clothing when handling R-410A refrigerant or POE oil and when brazing. Have a fire extinguisher nearby when brazing.

Codes and Requirements

All installations must be in compliance with the National Electric Code ANSI/NFPA No. 70 (latest edition) or, in Canada, the Canadian Electrical Code, Part I-C.S.A. Standard C 22.1. Check any local ordinances or utility company requirements that apply. The installation must be in compliance with all authorities having jurisdiction. Local code requirements supersede national requirements.

Warranty

Refer to limited warranty information on the Warranty Form in the literature bag shipped with this system.

Unit Location

This ventilation unit is designed to be mounted outdoors on a level surface but could be mounted indoors. The supporting structure must be able to support the operating weight of the unit and maintain a level plane during continued operation. Water should drain away from the unit. Location must comply with free space clearances for unrestricted airflow.

NOTE: For indoor installations, refer to the Ductwork Connections section for special ductwork requirements.

Receiving, Storage, Moving, and Uncrating

Receiving

Check for any damage that may have occured during shipment. If damage is found, document the damage with the transporting agency and immediately contact your distributor. If you are an authorized Distributor, follow the FOB freight policy procedures.

Storage and Moving

⚠ CAUTION ⚠

If the unit is going to be stored, take precautions to prevent condensation inside the electrical compartment and motors. To prevent damage to the unit, do not store sitting on the ground.

With the shipping skid attached, the unit may be moved with a fork lift or an overhead crane. After the shipping skid has been removed, the unit must be lifted from overhead. The heavy gauge base of the ventilation unit has a lifting lug on each corner. Always use spreader bars when rigging to prevent damage to the cabinet.

Uncrating

Immediately upon uncrating, check the electrical characteristics to verify that the unit is suitable for the installation site. Also, verify the following:

- **Shipped-with Items:** A carton shipped inside the unit contains the vertical supply air opening cover and parts to assemble and install the inlet and exhaust hoods. The hoods will be attached after the unit is in the installed location.
- **Shipped-Separate Items:** Before beginning installation, ensure that all shipped-separate options ordered are available at the site. Shipped-separate options could include a roof curb, a wall-mounted control, and/or a disconnect switch.
- **Supply Air (Discharge) and Return Air Openings:** To enable the installer to adapt to either vertical or horizontal ductwork, the cabinet has both vertical and horizontal supply and return air openings. Both the horizontal supply air and return air openings are capped during shipping.

NOTE: There are no vertical duct connections on the unit; duct flange connections are part of the roof curb. The curb is designed to slide the ductwork into the vertical duct openings from the roof before the unit is lifted to the curb.

Dimensions

Unit dimensions are listed in **Table 2** and shown in **Figure 1**.

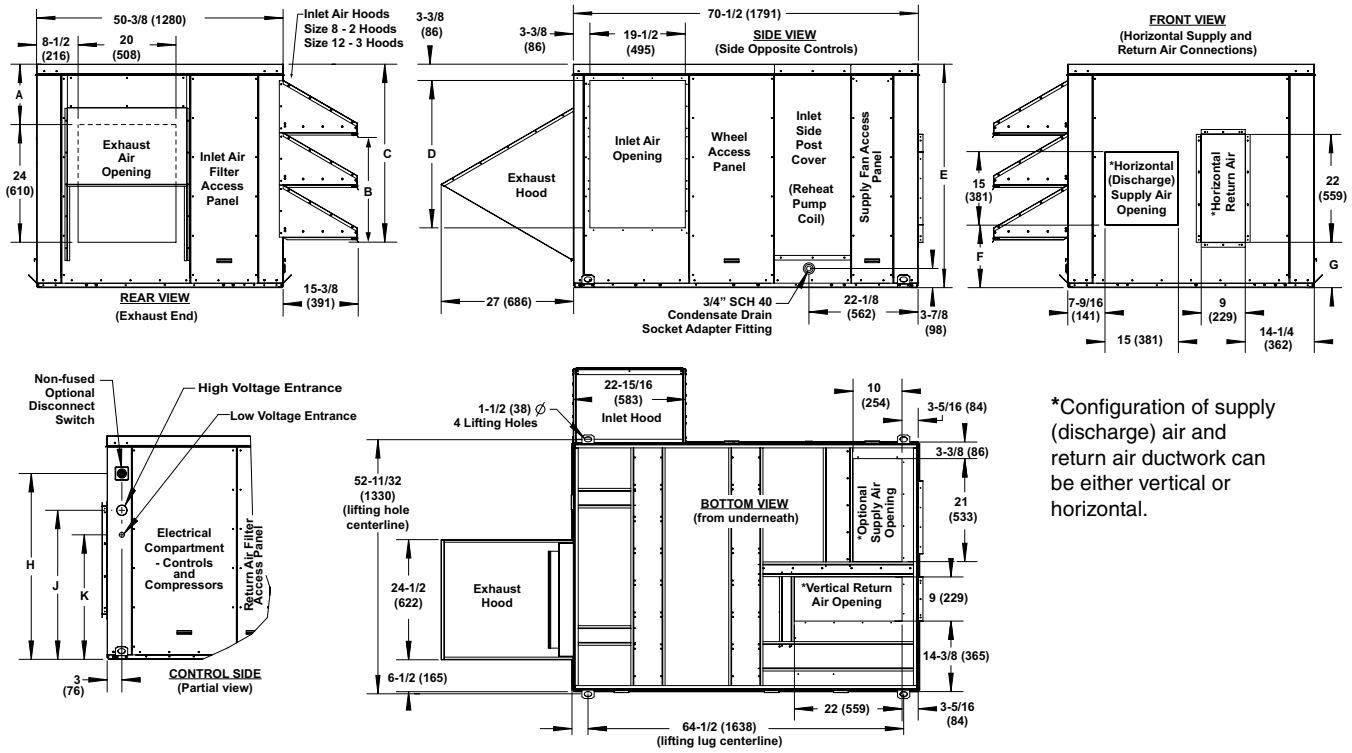
Table 2. Unit Dimensions

Unit Size**	Alphanumeric Designation*									
	A	B	C	D	E	F	G	H	J	K
	Dimension (Inches (Millimeters))									
8	9-1/4 (235)	14-5/16 (364)	32-15/16 (837)	24 (610)	39-1/2 (1003)	9-3/4 (248)	6-1/4 (159)	34-7/8 (886)	27-3/8 (695)	22-3/8 (568)
12	12-1/4 (311)	21-3/8 (543)	36-5/16 (922)	30 (762)	45-1/2 (1156)	12-3/4 (324)	9-1/4 (235)	37-7/8 (962)	30-3/8 (772)	25-3/8 (645)

*See **Figure 1**.

**Size 8 has two inlet air hoods. Size 12 has three inlet air hoods.

Dimensions—Continued



*Configuration of supply (discharge) air and return air ductwork can be either vertical or horizontal.

Figure 1. Unit Dimensions (Refer to Table 2)

Clearances

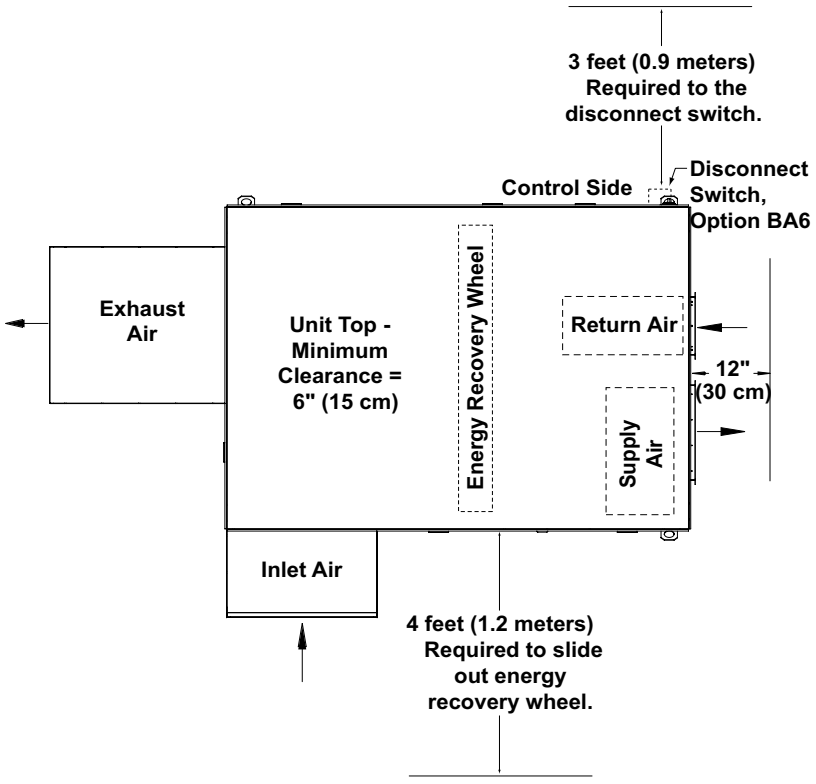


Figure 2. Minimum Service Clearances

Weights

Unit weights are listed in **Table 3** and shown in **Figure 3**.

NOTE: Corner weights are provided for lifting and operation.

Table 3. Unit Weights, Length, Width, and Center of Gravity

Unit Size	Operating Weight*	Corner Weight*				Length	Width	Center of Gravity*		
		Alphanumeric Designation**								
		A	B	C	D	L	W	X	Y	Z
	Pounds (Kilograms)					Inches (Millimeters)				
8	858 (389)	210 (95)	197 (89)	219 (99)	232 (105)	70-1/2 (1791)	50-3/8 (1278)	26-1/2 (673)	34-3/16 (868)	16 (407)
12	1003 (455)	239 (108)	233 (106)	262 (119)	269 (122)			26-11/16 (678)	34-13/16 (884)	18-13/16 (479)

*Values are approximate.

See **Figure 3.

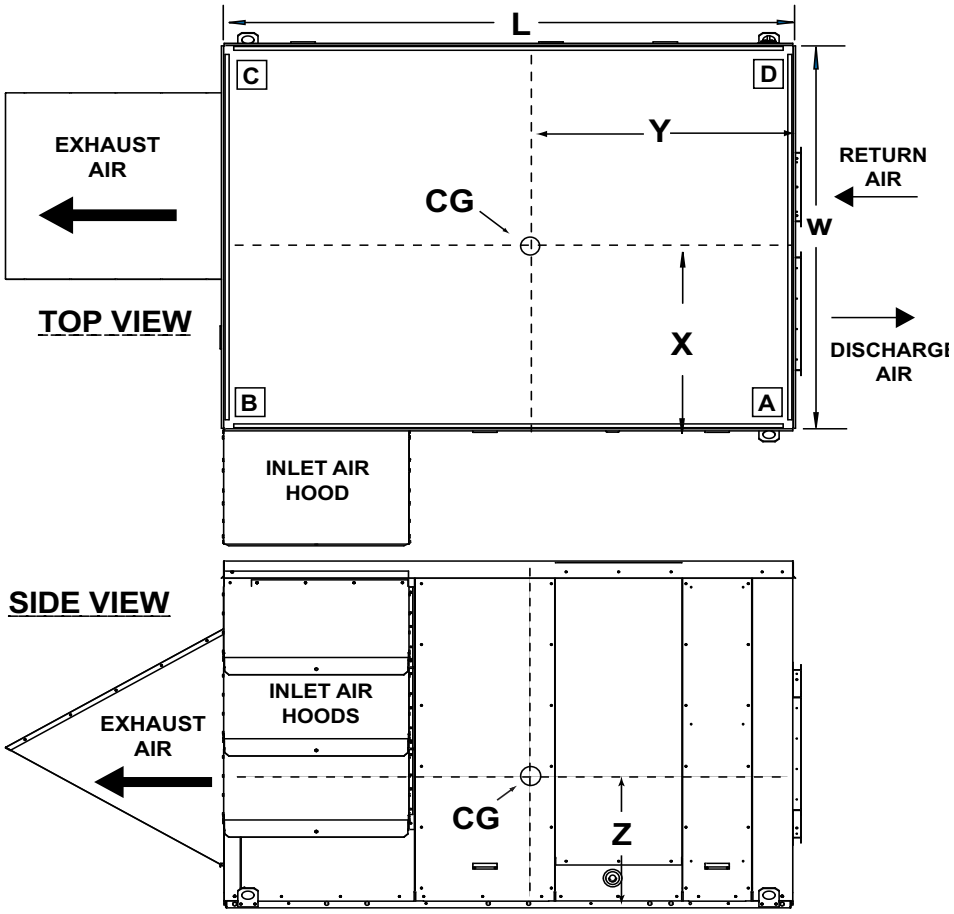


Figure 3. Unit Weights, Length, Width, and Center of Gravity

INSTALLATION

NOTE: Mounting, rigging, and lifting are the responsibility of the installer.

⚠ CAUTION ⚠

Before installing, check the supporting structure to be sure that it has sufficient load-bearing capacity to support the operating weight (refer to Table 3) of the unit.

Rigging and Lifting

⚠ DANGER ⚠

To prevent equipment damage, injury, or death, ensure that the hoist used for lifting is rated for the weight (refer to Table 3) of the unit. Test-lift the unit to ensure that it is secure. Adjust cables so that the unit will remain horizontal throughout the lift. Lift slowly, following safe lifting procedures.

At each corner, the heavy gauge base of the ventilation unit has a lifting lug with a 1-1/2-inch diameter hole for rigging, as shown in **Figure 4**. When attaching rigging, insert a clevis in each lifting lug. Use spreader bars in the rigging. Lift the unit straight up with vertical force.

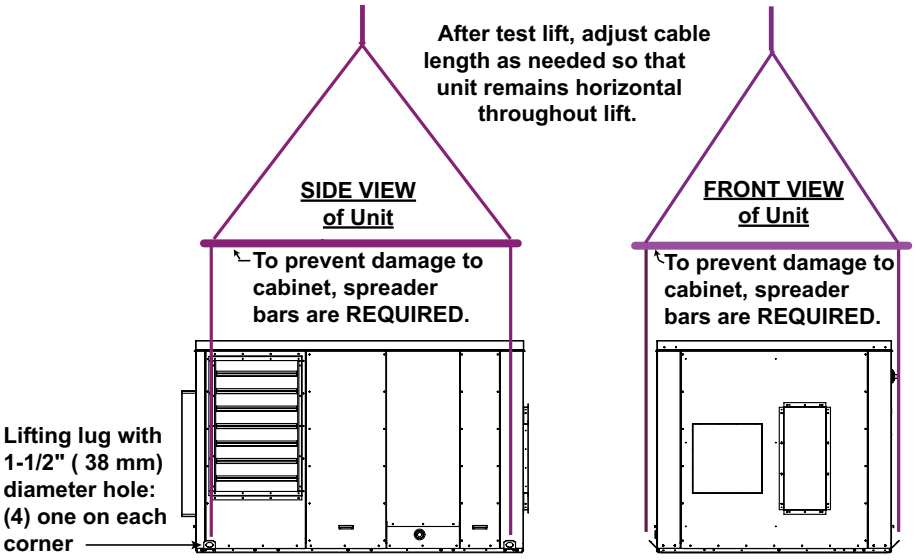


Figure 4. Rigging and Lifting

Mounting

NOTE:

- **Because of condensate drain requirements, setting this unit directly on a flat surface (cement slab) is not recommended.**
- **Be sure to comply with clearances (see Figure 2).**
- **It is recommended that this ventilation unit be positioned so that the outside air inlet hood is not facing into the prevailing wind.**

⚠ CAUTION ⚠

IMPORTANT: Unit must be level.

Curb Cap Base

This unit is equipped with a load-bearing curb cap. The curb cap has bolted seams and is designed so that it may be set on perpendicular supports or over a roof curb. A curb is required if the application uses vertical (down) discharge and or vertical (down) return air.

Mounting Without Roof Curb

- Prior to installation, ensure that the method of support is in agreement with all local building codes and is suited to the climate. If considering an installation without a roof curb in snow areas, it is recommended that the support under the system be at least 12 inches (305 mm) higher than the roof surface.
- If setting cross-supports (see **Figure 5**) on the roof surface and not decking, be sure to have sufficient tread material under the supports to adequately spread the load and prevent *sinking* into the roofing material. The field-supplied, weather-resistant, cross-support structure must be secure and adequate for the weight (refer to **Table 3**) of the unit.

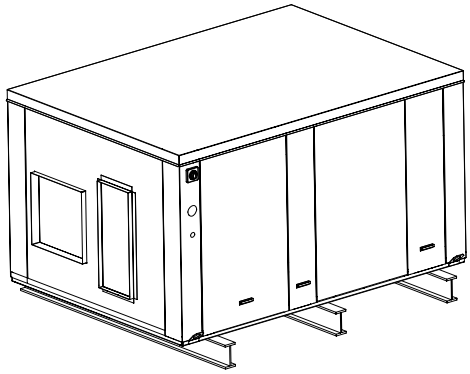


Figure 5. Locations for Field-Supplied Cross-Support Rails

Mounting with Roof Curb

- The roof curb (option CJ3C) is a 16-inch (406-mm) high, fully-enclosed, insulated curb. If the application is sound-sensitive, consider installing a field-supplied vibration isolation curb or a specialty sound-attenuation curb. Whether using the optional roof curb available with the system or a field-supplied curb, the curb must be secure, square, and level.
- When using a field-supplied curb with vertical ductwork, field-fabricated custom duct connections will be required, as there are no duct flanges on the unit.
- The top surface of the roof curb must be caulked with sealant tape (1/4 × 1-1/4 inches) or with two 1/4-inch beads of a suitable sealant. The unit must be sealed to the curb to minimize sound transmission and prevent air leakage and to prevent water leakage into the curb area from wind-blown rain and/or capillary action.
- The roof curb is designed for ductwork to be installed from the top prior to setting the unit. If ductwork is installed after the unit, field-fabricated custom connections will be required as the unit does not have duct flanges.
- The roof curb (option CJ3C, refer to **Table 4**) is shipped separately for field-installation. The roof curb designed for this system includes integral duct connections for supply air and return air, making it very important to know the orientation of the unit when installing the curb (see **Figure 6**).

Table 4. Roof Curb (Option CJ3C) Components (Package PN 260418)

Item (See Figure 6)	Component	PN	Quantity
A	Side, front	260215	1
B	End, right	260216	1
C	End, left	260217	1
D	Side, rear	260218	1
E	Support, center	259636	1
F	Cross-support, return air	259637	1
G	Cross-support, discharge air	259638	1
H	Cross-support, return air)	259639	1
J	Support, center, discharge air	259640	1
K	Duct angle support, right end, discharge air	259641	1
L	Duct angle support, front side, discharge air	259642	1
M	Duct angle support, right end, return air	259643	1
NOTE: Items A through E are ALWAYS used. Items F through M are required if the application has vertical supply and return air—installation of these parts is optional if installing a unit using the horizontal supply and return air openings.			

Mounting—Continued

Mounting with Roof Curb—Continued

Table 4. Roof Curb (Option CJ3C) Components (Package PN 260418)—Continued

Item (See Figure 6)	Component	PN	Quantity
Hardware in Hardware Bag			
—	Lag bolt, hex head, 5/16 × 1-1/4	16243	10
	Lockwasher, 5/16	1333	18
	Capscrew, 5/16 × 3/4	16247	8
	Nut, hex	1035	8
	Sheet metal screw, #10-16 × 1/2, AB point, Stalgard-coated	11813	31
	Tape, sealant, 1/4 × 1-1/4 roll	66302	1

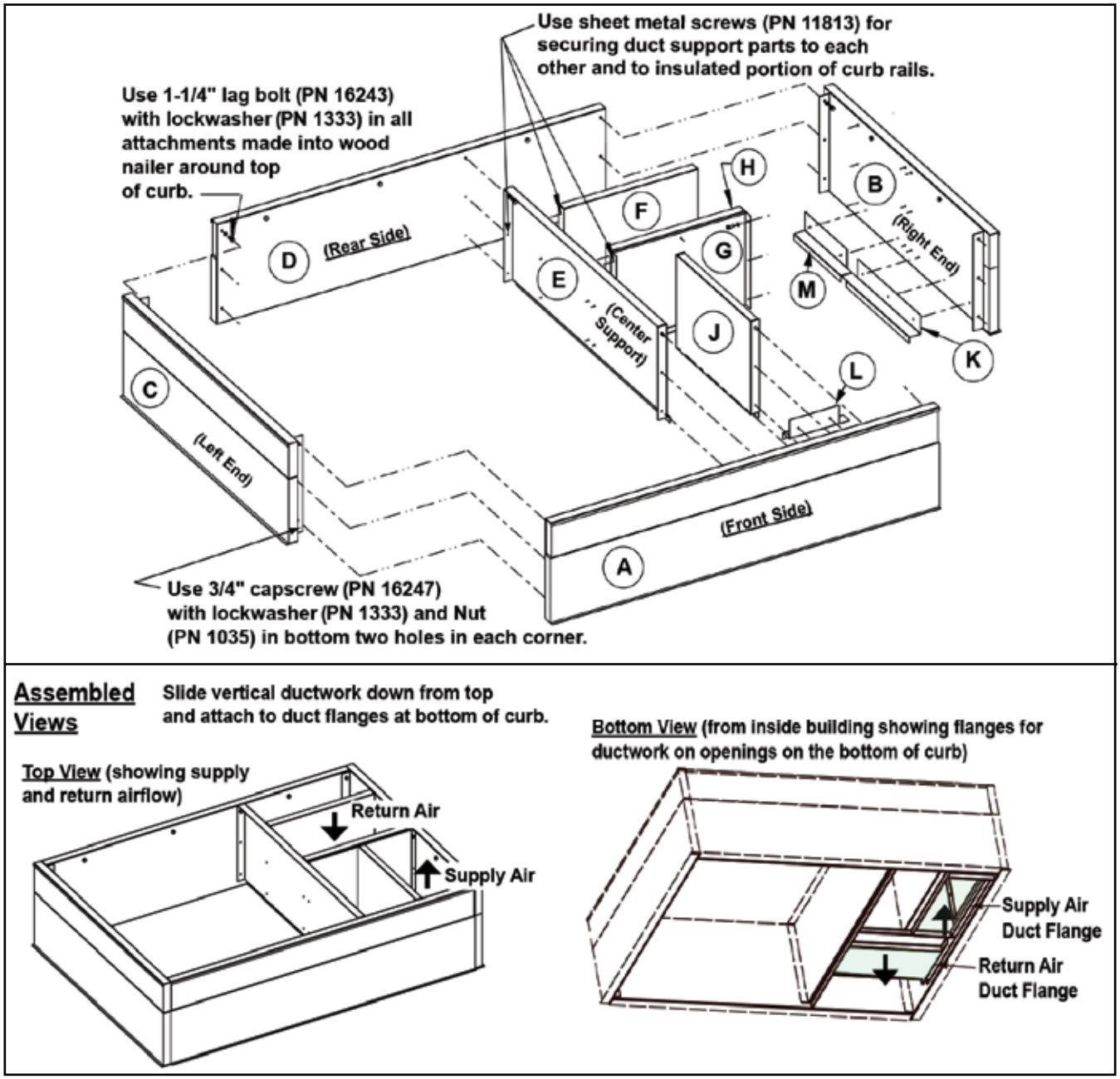


Figure 6. Roof Curb Assembly

Assemble and install the roof curb (option CJ3C) as follows:

1. Verify that roof curb parts and hardware match those listed in **Table 4**.
2. Verify that location has adequate support for unit weight (refer to **Table 3**).
3. Position roof curb end and side assemblies as shown in **Figure 6**. Fasten each corner using lag bolts with lockwashers in top holes and capscrews with lockwashers and nuts in each other hole.
4. Install center support and verify that airflow orientation is correct.

NOTE: If the system is not using the vertical duct openings, the duct support parts are not required but may be installed.

5. Identify duct supports that create integral supply and return air ductwork.
6. Position duct support parts as shown in **Figure 6**. Secure duct supports to top portion of curb rail with wood nailer using lag bolts with lockwashers. Use sheet metal screws in all other locations.
7. Adjust roof curb for squareness as necessary. Curb must be adjusted so that diagonal measurements are equal (within tolerance of ±1/8-inch (3-mm)).
8. Level roof curb. To ensure good weatherproof seal between cabinet curb cap and roof curb, curb must be leveled in both directions with no twist end-to-end. Shim as required and secure curb to roof deck before installing flashing (see **Figure 7**).

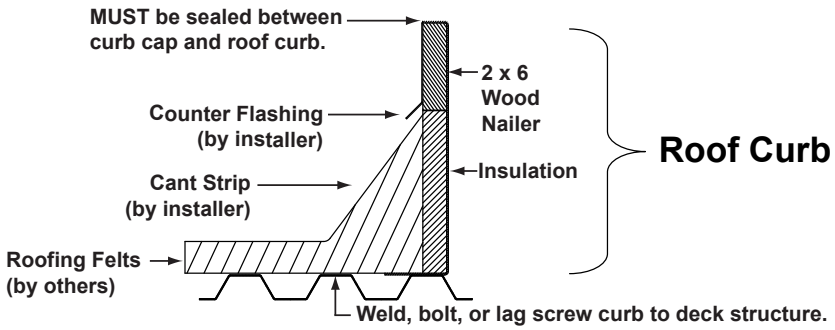


Figure 7. Cross-Section of Roof Curb Showing Construction Detail

9. Install field-supplied flashing.
10. Before lifting and placing unit on curb, check following:

❑ The curb is designed for ductwork to be installed from the top BEFORE the unit is in place. Slide the ductwork down into the discharge and return air openings and attach to duct flanges. See the dimensions in **Figure 8**. The ductwork should be sized slightly smaller with a minimum 3/4-inch duct flange that will attach to all sides of the duct connection in the curb. Refer to the **Ductwork Connections** section for connecting ductwork.

❑ Apply 1/4 × 1-1/4 foam sealant tape to both the top surface of all curb rails and the top surface of the duct connection supports, being sure to make good butt joints at all corners. The sealant tape must be applied to the rails to prevent water leakage into the curb area due to blown rain and capillary action.

❑ The unit has field-convertible (either vertical or horizontal) supply and return air opening locations. Depending on whether the ductwork is vertical or horizontal, verify that the discharge and return air openings being used are uncovered and that the openings ***not*** being used are covered.

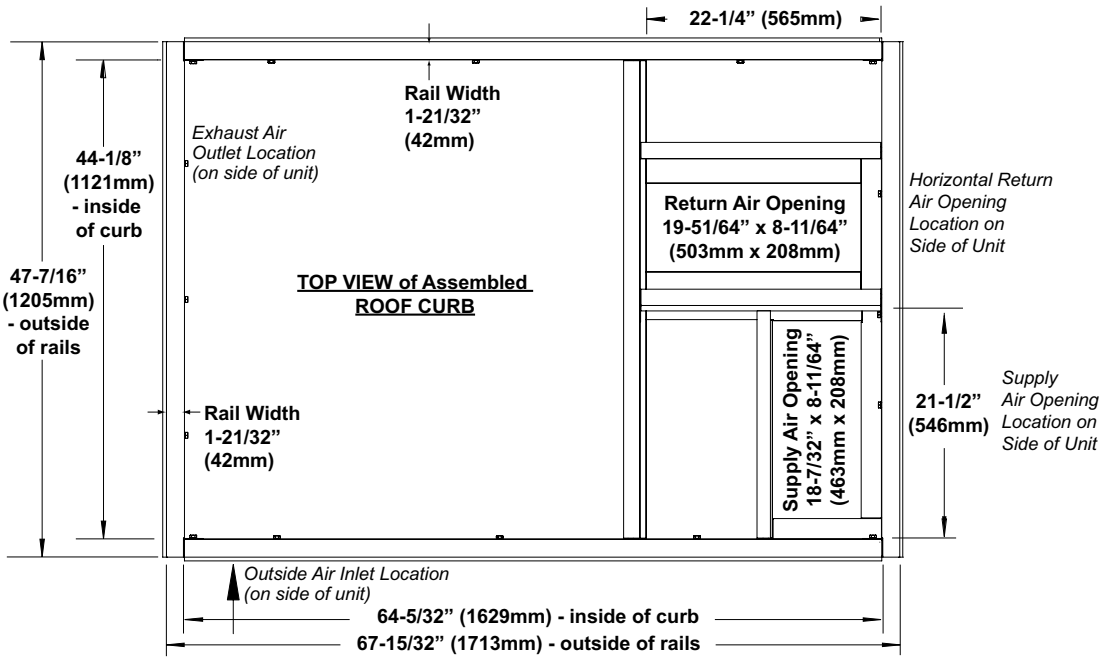
NOTE: IMPORTANT: Verify that the unit is being placed on the curb in the correct airflow orientation. See Figure 8 for the required orientation when installing a unit with vertical ductwork.

❑ When it is time to lift the unit onto the prepared curb (refer to **Rigging and Lifting** section), ensure that all of the above preparations have been made.

Mounting—Continued

Mounting with Roof Curb—Continued

Roof Curb (Option CJ3C) and Duct Opening Dimensions



Correct Orientation of Unit to Roof Curb When Using Vertical Ductwork

NOTE:

Curb is designed for ductwork to be installed from top prior to setting unit on curb.

Always apply sealant tape to top of curb rails before placing unit.

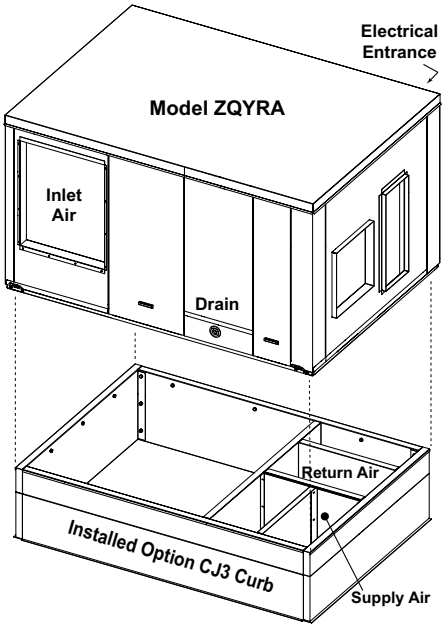


Figure 8. Roof Curb Dimensions and Orientation

Mechanical Connections

Instructions for making mechanical connections (see **Figure 9**), which include inlet air and exhaust hoods, inlet and exhaust dampers, ductwork, and the condensate drain, are found in the following paragraphs.

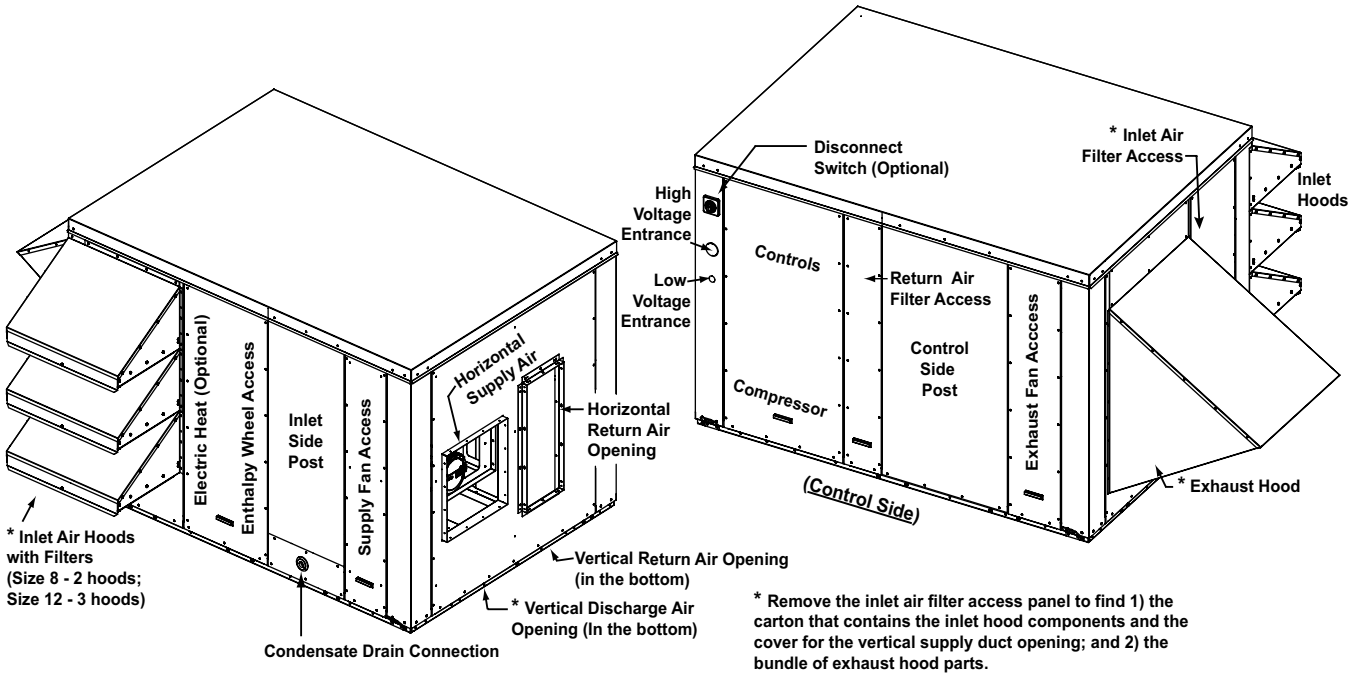


Figure 9. Mechanical Connections

Unpacking Inlet Air and Exhaust Hood Components

All model ZQYRA ventilation units require field-installation of the inlet air hood and the exhaust hood. All hood components plus the vertical supply duct cover are shipped inside the cabinet. Remove the inlet filter access panel (see **Figure 9**) and find a carton and a bundle of parts. First, slide out the carton and then remove the bundle of parts that is attached to brackets. DO NOT remove the brackets or the carton stop. The bundled parts and the screws in the hardware bag in the carton are used to install the exhaust hood.

Installing Inlet Air Hood

Install the inlet air hood assembly as follows:

NOTE:

- **The following steps apply to both unit sizes unless otherwise noted.**
- **The installed hoods attached to the cabinet corner post are shown in Figure 10.**

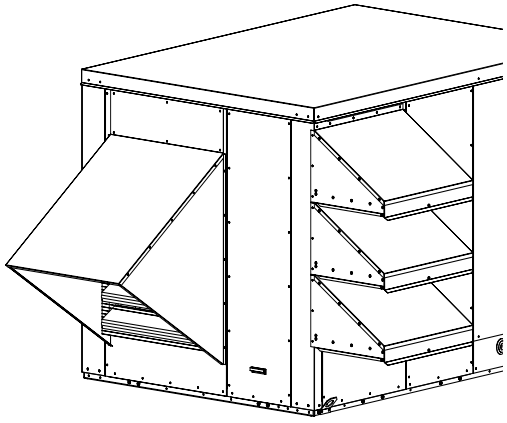


Figure 10. Installed Inlet Air Hoods

Mechanical Connections—Continued

Installing Inlet Air Hood—Continued

1. Identify inlet air hood components listed in **Table 5**.

Table 5. Inlet Air Hood Components

Item (See Figure 11)	Component	Description	Unit Size	
			8	12
			PN (Quantity)	
A	Gasket strip	23-inch (584-mm), for across top and bottom	103604 (2 strips)	
B		Size 8: 28-1/2-inch (724-mm), for sides		
		Size 12: 32-inch (812-mm), for sides		
C	Inlet hood top	For top hood, with wider flange across back (not shown)	262662 (1)	262662 (1)
D		For middle and bottom hoods	262663 (1)	262663 (2)
E	Side panel	Right	262665 (2)	262664 (3)
F		Left	262667 (2)	262666 (3)
G	Cross-bracket	Front hood, 21-15/16 × 1-1/16 inches (557 × 27 mm)	262668 (2)	262668 (3)
H		Rear hood, 22-13/16 × 2-1/16 inches (579 × 52 mm)	262669 (2)	262669 (3)
J	Filter bracket	Side	262671 (4)	262671 (6)
K	Access panel	Filter access	262670 (2)	262670 (3)
M	Filter	Permanent, aluminum, 1 × 14-1/2 × 22-1/2 inches	262673 (2)	262673 (3)
N	Filler plate	Front	262672 (1)	—
—	Screw	Not shown—in hardware bag	11813 (107)	
		For both inlet hoods and exhaust hood (not shown—in hardware bag)	260354 (as required)	

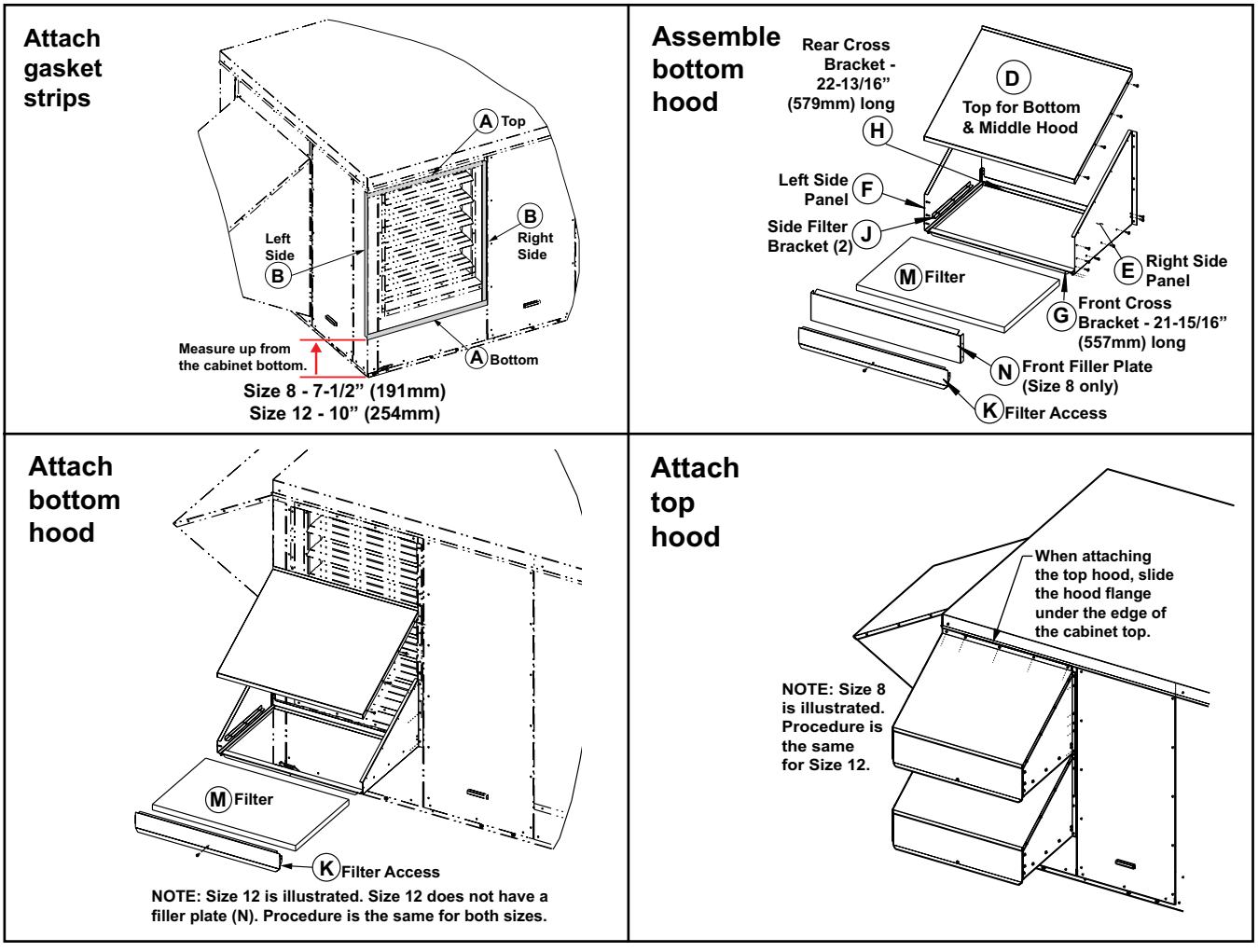


Figure 11. Inlet Air Hood Assembly

2. Prepare cabinet inlet:
   a. Remove shipping cover.

NOTE: For additional information on the damper, refer to the Inlet and Exhaust Dampers (Option AR2Y) section.

   b. If inlet has factory-installed damper, check damper for any damage. If damper blades are operating properly, remove screws (refer to **Table 6**) that hold damper frame (if inlet does not have damper, there are no screws to remove).

Table 6. Inlet Air Hood Damper Screws

Screw Location (Facing Inlet Opening)	Unit Size	
	8	12
	Screw Quantity	
Across top	4	
Right side	5	8
Left side	1	2 (in oblong holes)

   c. Determine gasket strip location (see **Figure 11**) and clean surface. Carefully attach each gasket strip in order as follows:
      (1) BOTTOM gasket strip (item A, **Table 5**): at corner, measure up from bottom of cabinet: 7-1/2 inches (191 mm) for unit size 8 or 10 inches (254 mm) for unit size 12. At that point (starting at corner), mark straight, horizontal line. Position gasket strip with bottom edge on line and adhere gasket.
      (2) SIDE gasket strips (item B, **Table 5**):
      Left side—starting even with bottom of horizontal gasket strip, position side strip on edge of corner post (around corner from opening). Clean surface and, starting at bottom, adhere gasket strip.
      Right side—on post or damper frame on right of opening, clean surface and, starting at bottom, adhere gasket strip vertically up side of opening.
      (3) TOP gasket strip (item A, **Table 5**): position top strip horizontally across top (connecting two side strips). Clean surface and adhere gasket.

3. Assemble and install bottom hood using screws from hardware bag:
   a. Assemble hood as shown in **Figure 11**, except for installing filter (item M) and filter access panel (item K).
   b. Attach assembled hood as shown in **Figure 11**:
      (1) Position hood so that rear cross-bracket is on bottom gasket strip, left side is on gasket strip on corner post, and right side is on other gasket strip.
      (2) On right side, align holes under gasket strip with holes in hood side panel. Adjust hood location slightly as needed and attach using screws.
      (3) On left side, ensure that holes align and attach left side of hood to corner post.
   c. Slide filter (item M) in place and attach filter access panel (item K).
4. For unit size 12 only:
   a. Repeat step 3a (see **Figure 11**) to assemble middle hood. Position it above bottom hood.
   b. On right side, align holes and attach hood.
   c. On left side, attach left side to corner post.
   d. Slide filter (item M) in place and attach filter access panel (item K).
5. Assemble and install top hood (item C) with wider flange:
   a. Repeat step 3a (see **Figure 11**) to assemble hood.
   b. When positioning hood on cabinet (see **Figure 11**), slide hood top flange under edge of cabinet top. If needed, loosen screw in cabinet top.
   c. Align holes and attach hood on both sides and across top.
   d. Slide filter (item M) in place and attach filter access panel (item K).

Mechanical Connections—Continued

Installing Exhaust Hood

1. Identify exhaust hood components listed in **Table 7**.

Table 7. Exhaust Hood Components

Item No. (See Figure 12)	Component	Description	Unit Size	
			8	12
			PN (Quantity)	
1	Side panel	Left	260210 (1)	
2		Right	260211 (1)	
3	Exhaust hood top		261138 (1)	261855 (1)
4	Screw	In hardware bag (PN 260354) that is in carton with inlet hood parts*	11813 (26)	

*The hardware bag includes enough screws for both inlet hoods and the exhaust hood.

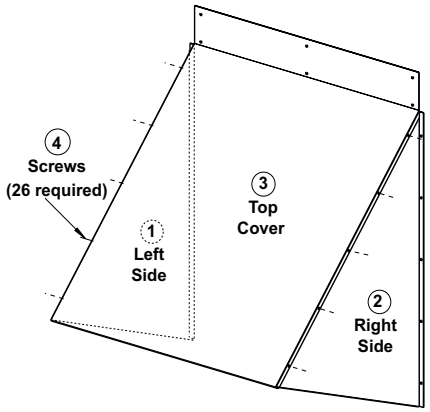


Figure 12. Exhaust Hood Assembly

2. Undo exhaust hood component bundle and identify items 1, 2, and 3 shown in **Figure 12**.
3. If exhaust opening has shipping cover, remove it. If exhaust opening has factory-installed damper, check damper blade operation.
4. Position hood side panel (item 1 or 2) with flange out as shown in **Figure 12**. Align panel holes with holes in cabinet. Attach side panel to cabinet with screws (item 4).
5. Repeat with opposite side panel (item 1 or 2).
6. Position hood top (item 3) UNDER edge of cabinet top and OVER installed side panels. Using six screws, attach hood top to cabinet and to both side panels as shown in **Figure 12**.

Inlet and Exhaust Dampers (Option AR2Y)

If equipped with optional intake and exhaust dampers (option AR2Y), the intake damper has a motorized actuator and the exhaust damper has a barometric control. The intake damper has a 24V, two-position, spring return actuator that is directly-interlocked with the supply fan. The actuator opens the damper whenever the supply fan is commanded to operate. When the supply fan is OFF, the actuator's spring drives the damper closed. The exhaust hood features a low-leak, gravity-operated back-draft damper. The exhaust damper starts to open at 0.03 IN WC and is fully-opened at 0.10 IN WC.

Ductwork Connections

NOTE: If installing this ventilation unit indoors, exhaust and supply airflow will be double. Ductwork and louvers must be sized accordingly: airflow range is 500–1,100 cfm for unit size 8, airflow range is is 900–1,500 cfm for unit size 12. For example, a size 12 model ZQYRA installed indoors and operating at 1,500 cfm will require supply and exhaust ductwork sized for 3000 cfm.

This unit has both vertical and horizontal supply and return air duct opening locations, so which ductwork connection openings that are used is dependent on the installation as follows:

- **Installation using horizontal ductwork:** See **Figure 9** for the locations of the horizontal duct openings (dimensions are shown in **Figure 8**). Remove the cover from the horizontal return air opening and relocate it to cover the vertical return air opening in the bottom of the cabinet. Remove and discard the cover from the horizontal supply (discharge) air opening. In the carton with the hood parts (refer to **Unpacking Inlet Air and Exhaust Hood Components** section), find the cover for the vertical supply air opening. Install the cover to close the vertical supply air opening.
- **Installation using vertical ductwork:** Vertical ductwork connection flanges are in the roof curb (see dimensions in **Figure 8**). If vertical ductwork was not installed from the top or if a field-supplied curb is used, a transition may be required for attaching ductwork. When using vertical ductwork, the horizontal duct opening covers should not be removed and the vertical supply duct cover shipped in the hood carton will not be used.

Requirements and suggestions for ductwork design and installation are as follows:

NOTE: Before operating the unit, ensure that the unused supply and return air openings are closed with the covers provided.

⚠ CAUTION ⚠

An external duct system static pressure not within the limits shown on the rating plate may overload the motors.

- **Type of ductwork:** The type of duct installation to be used depends in part on the construction of the roof (whether wood joist, steel bar joist, steel truss, or pre-cast concrete) and the ceiling (whether hung, flush, etc.).
- **Ductwork material:** Rectangular duct should be constructed of not lighter than #26 US gauge galvanized iron or #24 B&S gauge aluminum.
- **Ductwork structure:** All duct sections 24 inches (610 mm) or wider and over 48 inches (1219 mm) in length should be cross-broken on top and bottom and should have standing seams or angle-iron braces. Joints should be S and drive strip or locked.
- **Through masonry walls:** No supply air duct should come in contact with masonry walls. Insulate around all air ducts through masonry walls with not less than 1/2 inch (13 mm) of insulation (1 inch (25 mm) is recommended).
- **Through uncooled/unheated space:** Insulate all exposed supply air ducts passing through an uncooled or unheated space with at least 1/2 inch (13 mm) of insulation (1 inch (25 mm) is recommended).
- **Duct supports:** Suspend all ducts securely from buildings members. Do not support ducts solely by the unit duct connections.
- **Duct sizing:** Proper sizing of the supply air ductwork is necessary to ensure a satisfactory installation. The recognized authority for such information is the Air Conditioning Contractors Association, 2800 Shirlington Road, Suite 300, Arlington, VA 22206 (**www.acca.org**). A manual covering duct sizing in detail may be purchased directly from them.
- **Duct connections:** To minimize sound and vibration transmission, use flexible duct connections. Ducts must be attached and sealed to provide airtight connections.
- **Return air duct/grill size:** Ensure that return air ducting or grill has a free area equal to the return duct size connection.

Installing Condensate Drain

All systems require a condensate drain. Install the condensate drain as follows:

NOTE: Ensure that the system is level before connecting the drain line. Do not reduce the drain diameter.

1. A non-corrosive drain pan with a 3/4-inch schedule 40 PVC socket-adapter fitting is located on the non-control side of the cabinet. When connecting the drain line, provide a means of disconnecting the line at or near the cabinet connection to allow for cleaning.
2. Install a trap in the drain line as follows:

NOTE: The design of the drain trap is important. The trap height must account for this static pressure difference. Maximum negative static can be determined by reading the negative pressure at the blower inlet and adding 0.2 IN WC to allow for dirty filters.

Mechanical Connections—Continued

Installing Condensate Drain—Continued

a. As shown in **Figure 13**, dimension A = 1 inch (25 mm) for each 1 inch (25 mm) of maximum static pressure + 1 inch (25 mm). Dimension B = A + A/2.

b. If dimension B in **Figure 13** is not tall enough, the water seal will not hold, and air will be drawn through the drain pipe into the system. If the outlet leg of the trap is too tall, water will back up into the drain pan. As condensate forms during normal operation, the water level in the trap rises until there is a constant outflow. See **Figure 13** for the appropriate dimensions for trapping a negative pressure system.

c. Improper trap design accounts for some condensate drainage system failures, but incorrect use and maintenance of condensate drain trap can also cause problems. The combination of airborne particles and moisture in the air handler can result in algae formation in the drain pan and trap. The trap must be cleaned regularly to avoid blockage that can slow or stop water flow, resulting in backup into the system.

d. If the drain has a cleanout opening (see **Figure 13**), be sure to close the opening after cleaning.

3. Pitch the drain line at least 1/2 inch (13 mm) for every 10 feet (3 meters) of horizontal run. Drain lines must not interfere with drain pan or access panels.

⚠ CAUTION ⚠

An obstruction in the drain or a poorly designed drain can cause the condensate pan to overflow. Do not reduce the drain piping diameter. Overflow could result in damage to the unit and/or the building.

4. If the installation or local code requires, run the drain into a waste water system.

NOTE: Because the heat pump operates year round, more frequent inspections of the condensate drain may be required. Freeze protection of the trap will be required when the outside temperature is below freezing.

5. At the beginning of the cooling and heating season, inspect and clean the condensate drain pan and line. Thoroughly clean dirt, algae, grease, and other contaminants. Inspect the condensate drain pan, trap, and piping and fill the trap with water to ensure proper operation.

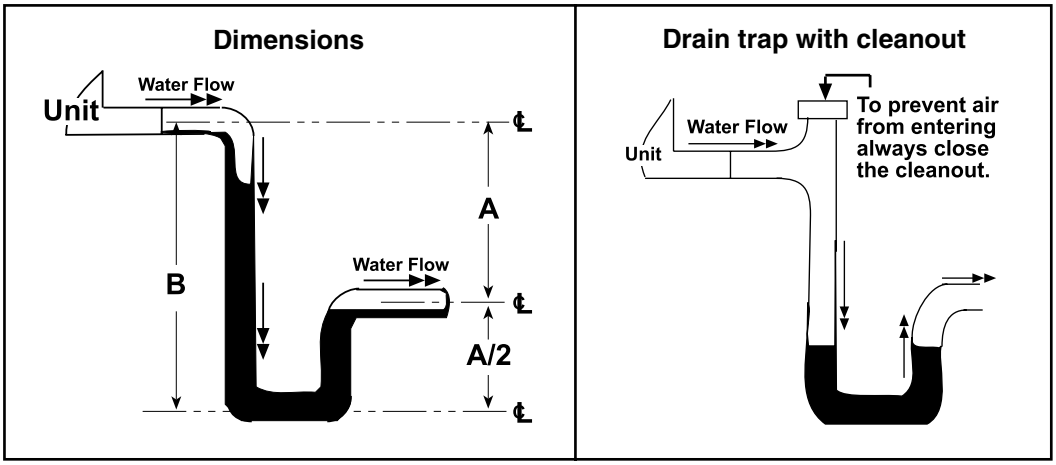


Figure 13. Condensate Drain Trap

Electrical Connections

NOTE:

- **All electrical wiring and connections, including electrical grounding MUST be made in accordance with the National Electric Code ANSI/NFPA No. 70 (latest edition). In addition, the installer should be aware of any local ordinances or electric company requirements that might apply.**
- **The entrance locations for the high voltage and low voltage wiring are shown in Figure 1.**

Disconnect Switch

- The system may be factory-equipped with a built-in, non-fusible, lockable disconnect switch (see **Figure 1** for location). The built-in disconnect switch (option BA6) requires copper wiring with ampere rating based on 75°C maximum temperature rating at the line side terminals.
- If the system does not have a built-in disconnect switch, a field-provided or optional shipped-separate, wall-mounted disconnect switch is required. It is recommended that there be at least 4 feet (1.2 meters) of service room between the wall-mounted switch and unit access panels. All external wiring must be within approved conduit and have a minimum temperature rise rating of 60°C. Run conduit so that it does not interfere with unit access panels. When providing or replacing fuses in a fusible disconnect, use dual-element time delay fuses sized according to the rating plate.

Supply Voltage

Check the rating plate for the supply voltage and current requirements. The electric supply to the unit must meet stringent requirements for the system to operate properly. Voltage supply should be within ±10% or as stated on the rating plate. Maximum imbalance on a three-phase system is 2%. Measure and record supply voltage and current tolerances as follows.

NOTE: If the power supply is not within stated tolerances, contact the power company prior to operating the system.

⚠ CAUTION ⚠

If this unit is allowed to operate on an electric supply that is not within the specified tolerances, the product warranty shall be void.

- **Check voltage supply:** Refer to the voltage use range on the rating plate. Measure (and record) each supply leg voltage at all line disconnect switches. Readings must fall within the allowable range.
- **Check voltage imbalance:** In a three-phase system, excessive voltage imbalance between phases will cause compressor motors to overheat and eventually fail. The maximum allowable imbalance is 2%. To determine voltage imbalance, use recorded voltage measurements taken above in the following formula:

$$\mathrm{V1, V2, V3} = \text{line voltages as measured}$$

$$\mathrm{VA\ (average)} = \frac{(\mathrm{V1} + \mathrm{V2} + \mathrm{V3})}{3}$$

$$\mathrm{VD} = \text{line voltage (V1, V2, or V3) that deviates farthest from average (VA)}$$

$$\%\ \text{line voltage imbalance} = \frac{[[100 \times (\mathrm{VA} - \mathrm{VD})]}{\mathrm{VA}}$$

⚠ CAUTION ⚠

There is a chance of unknowingly connecting three-phase power in such a way as to cause compressor rotation in reverse. To prevent damage to the components, it is important to check this at startup.

- Checking the rotation of the compressor requires connecting pressure gauges BEFORE startup. Connect refrigerant manifold pressure gauges rated for use with R410-A refrigerant to the compressor suction and discharge lines.

Electrical Connections—Continued

Supply Voltage—Continued

⚠ CAUTION ⚠

- **Connect pressure gauges to the suction and discharge lines BEFORE startup so that compressor rotation can be checked immediately. Scroll compressors will be destroyed if operated in the wrong direction.**
- **When checking compressor rotation to verify correct phasing, DO NOT use fan rotation to check phasing. ECM fans cannot run backwards.**
- **After several minutes of operation in reverse, the compressor's internal protector will trip. If compressors are repeatedly allowed to restart and run in reverse, the compressors will be permanently damaged.**

- At startup, observe the gauges. If suction pressure rises and discharge pressure drops, the compressor is operating in reverse and should be shut down. To correct, shut down the unit and turn off the power. At the incoming power connection, switch the three-phase line voltage wiring connections before restarting the unit. Recheck the pressure gauges.

Supply Wiring Connections

⚠ DANGER ⚠

To prevent injury or death due to electrocution or contact with moving parts when connecting supply wiring, lock disconnect switch open.

Depending on option selection, the unit is wired for 208V/3PH/60Hz (option AK5), 230V/3PH/60Hz (option AK6), or 460V/3PH/60Hz (option AK7). **Figure 14** shows the supply wiring connections with or without an option BA6 disconnect switch. **Table 8** lists supply voltage data for units equipped with 3PH direct-drive ECM supply and exhaust fan motors.

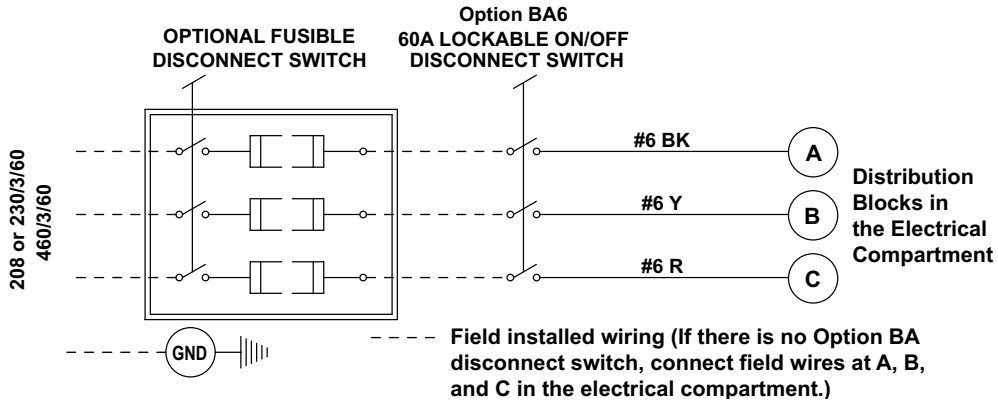


Figure 14. Supply Wiring Connections

Table 8. Supply Voltage Data											
V/PH/Hz (Option)	Unit Size	ECM Supply Fan	ECM Exhaust Fan	Compressor			Energy Wheel	Control Transformer		Supplemental Electric Heat (Standard)	
		FLA	FLA	MCC	LRA	RLA	FLA	VA	FLA	kW	FLA
208/3/60 (AK5)	8	3.0	5.2	18.2	88	11.7	0.70	150	0.7	10.0	27.8
	12	3.0	9.7	25.1	110	16.1	0.60	150	0.7	10.0	27.8
230/3/60 (AK6)	8	3.0	5.2	18.2	88	11.7	0.70	150	0.7	9.2	23.1
	12	3.0	9.7	25.1	110	16.1	0.60	150	0.7	9.2	23.1
460/3/60 (AK7)	8	1.7	2.6	9.6	44	6.2	0.35	150	0.3	9.2	11.5
	12	1.7	4.6	12.1	52	7.8	0.35	150	0.3	9.2	11.5

V/PH/Hz (Option)	Unit Size	Optional Electric PreHeat			Unit Without Optional Electric PreHeat (Standard)			Unit with Optional Electric PreHeat		
		Pre-Heat (PH) Option	kW	FLA	FLA	MCA	MOP	FLA	MCA	MOP
208/3/60 (AK5)	8	PH1A	3.8	10.4	37.4	46.7	50	47.8	59.8	60
		PH2A	7.5	20.9				58.3	72.9	80
	12	PH1A	3.8	10.4	41.9	52.4	60	52.3	65.4	70
		PH2A	7.5	20.9				62.8	78.5	80
230/3/60 (AK6)	8	PH1A	4.6	11.5	32.7	40.9	45	44.2	55.3	60
		PH2A	9.2	23.1				55.8	69.8	70
	12	PH1A	4.6	11.5	37.2	46.5	50	48.7	60.9	70
		PH2A	9.2	23.1				60.3	75.4	80
460/3/60 (AK7)	8	PH1A	4.6	5.8	16.9	21.1	25	22.7	28.3	30
		PH2A	9.2	11.5				28.4	35.4	40
	12	PH1A	4.6	5.8	18.9	23.6	25	24.7	30.8	35
		PH2A	9.2	11.5				30.4	37.9	40

NOTE: Where 240/3 and 480/3 rated electric coils are used, kW is derated to the nameplate voltage of 208, 230, or 460. Where 208/3 rated coils are used, there is no kW derate on 208/3 units.

KEY: MCA = maximum circuit ampacity, MCC = maximum continuous circuit, MOP = maximum overcurrent protection

Controls Compartment

Remove the controls compartment (see **Figure 15**) access panel to view the controls and compressor. Some components in the electrical compartment are common and some vary by options selected.

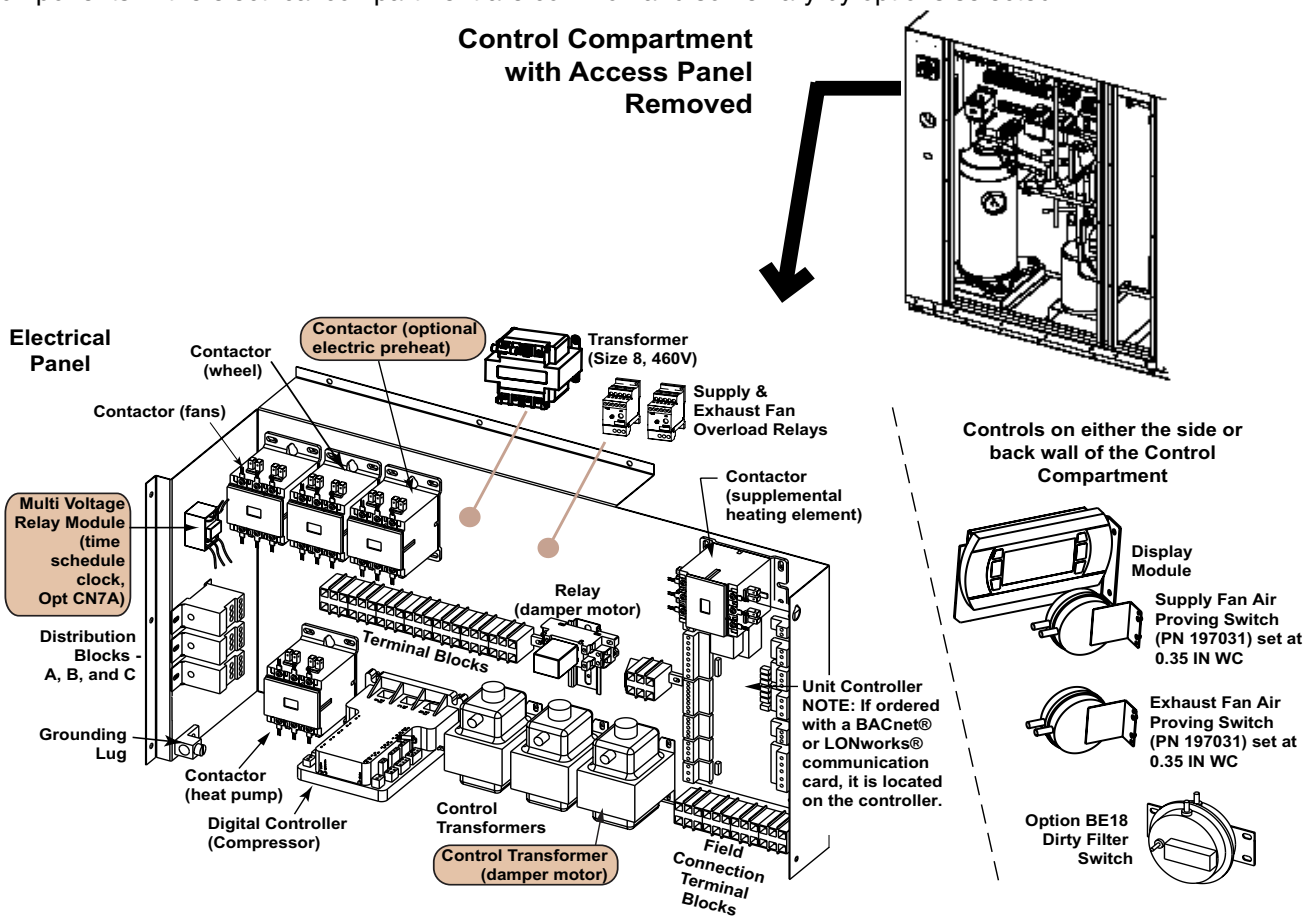


Figure 15. Controls Compartment

Electrical Connections—Continued

Electrical Components

Fan motors: The supply and exhaust fans are centrifugal, backward curve fans with integral electronically-commutated motors (ECM) that are directly controlled by the unit interface control. The unit uses a portion of the outside intake air as part of the return airflow as shown in **Figure 16**. At startup, the speed of each fan must be set (refer to **Setting Fan Speed to Test and/or Balance Airflow** section).

NOTE: If installing this ventilation unit indoors, exhaust and supply airflow will be double. Ductwork and louvers must be sized accordingly: airflow range is 500–1,100 cfm for unit size 8, airflow range is is 900–1,500 cfm for unit size 12. For example, a size 12 model ZQYRA installed indoors and operating at 1,500 cfm will require supply and exhaust ductwork sized for 3000 cfm.

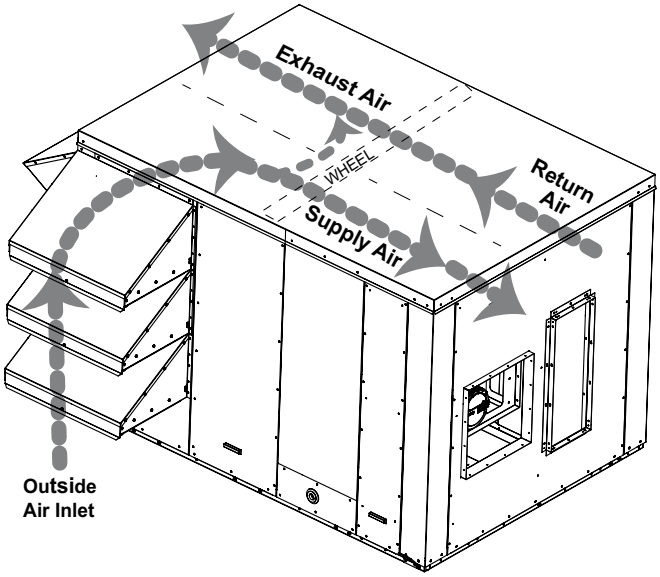


Figure 16. Unit Airflow

Energy recovery (enthalpy) wheel: The energy recovery wheel is equipped with a motor and belt drive. When the unit controller requires energy recovery, the wheel motor responds and rotates the wheel through both the inlet and return airstreams.

Heat pump (R-410A refrigerant): The system is factory-charged with environmentally-friendly R-410A refrigerant. The refrigerant charge is 6.5 pounds for unit size 8 and 13 pounds for unit size 12. The heat pump has a digital scroll compressor providing quieter, more efficient operation. The compressor has high and low pressure switches, a crankcase heater, a thermistor to protect against too high temperature, and a modulating solenoid valve for operation. The digital controller in the controls compartment is the electronic interface between the compressor and the system controller. The heat pump compressor and refrigerant piping with reversing valve shown in **Figure 17** are located directly under the controls compartment and are accessed through the same removable side panel. The heat pump also has highly-efficient evaporator and condenser coils and a cleanable condensate drain pan. When the heat pump is in a defrost state, electric heat coils (5kW for unit size 8 or 10kW for unit size 10) are activated to ensure that discharge air stays at a comfortable temperature. **Figure 18** shows the locations of the evaporator and condenser coils and their thermostatic expansion and check valves.

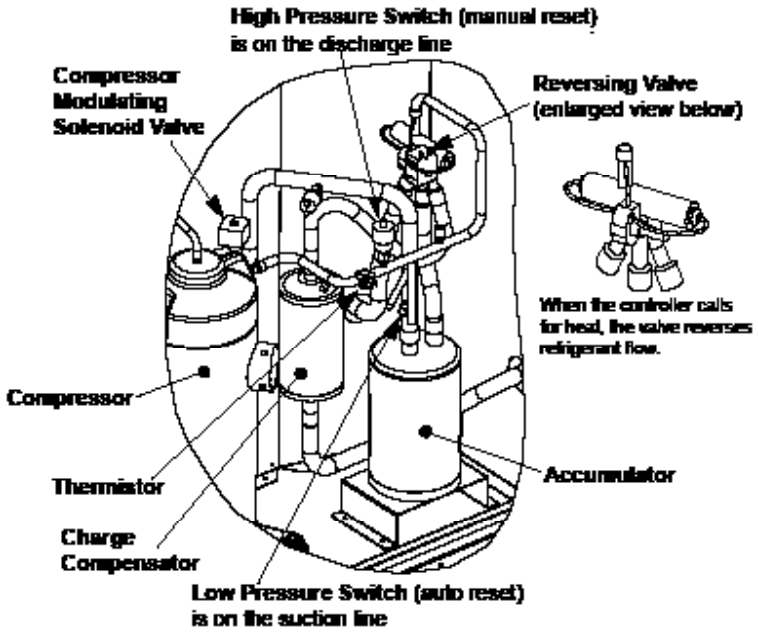


Figure 17. Heat Pump Compressor and Piping

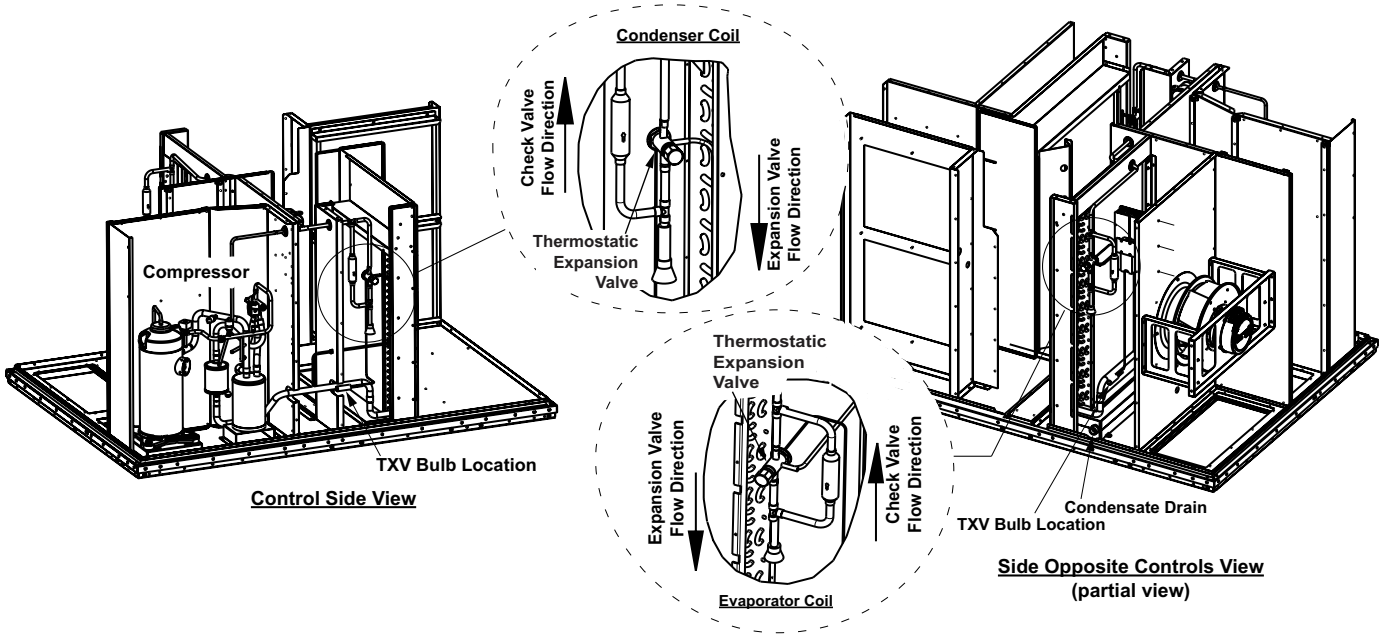


Figure 18. Heat Pump Coils

Compressor controller: Table 9 lists the LED indications for the digital compressor controller (see Figure 19), which is connected to the unit controller to provide protection and diagnostics for compressor operation. After a compressor shutdown, a 2-minute, anti-short cycle timer in the compressor controller delays compressor restart. The unit controller has a 5-minute compressor ON/OFF time. The delay times are concurrent so that total delay time is 5 minutes.

Table 9. Digital Compressor Controller LED Indications

LEDs		Indication
Color	State	
Green	Solid	24VAC power is present at power terminals
	Flashing	Anti-short cycle timer is active
Yellow	Solid	Unloader solenoid valve is energized and compressor capacity is 0
Red	Extinguished	No abnormal operation alerts
	Flashing	Refer to Table 51

Electrical Connections—Continued

Electrical Components—Continued

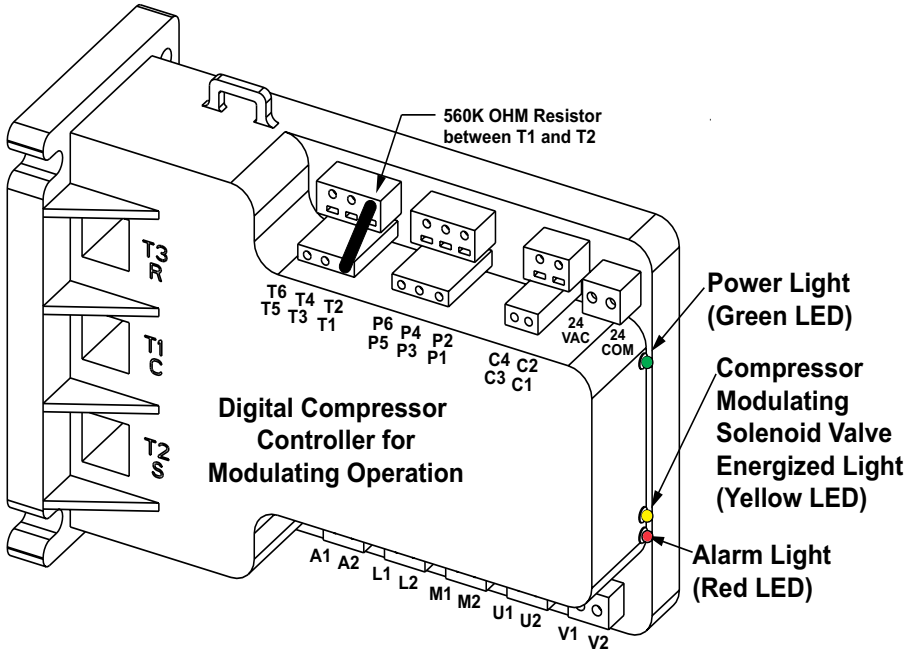


Figure 19. Digital Compressor Controller

⚠ CAUTION ⚠

The crankcase heater must be allowed to warm up for at least 24 hours prior to startup or after an 8-hour power outage. Either turn the unit off with a CN option switch if available or remove the jumper to break contact between terminals 3 and 8, BEFORE turning on power to warm up the crankcase heater.

Compressor crankcase heater: The scroll compressor also has a belly-band crankcase heater that straps around the bottom half of the compressor. The crankcase heater must be allowed to warm up for at least 24 hours prior to startup or after an 8-hour power outage.

Optional electric preheat (option PH1A for 5kW or PH2A for 10kW) elements: If ordered with optional electric preheat, electric elements will be installed in the cabinet between the inlet hood and the energy recovery wheel. Optional electric preheat provides frost protection for the wheel in extremely cold temperatures. For more detailed information on controls, refer to the **Supplemental Heating Mode** section. Both unit sizes 8 and 12 could have either option PH1A (5kW) or PH2A (10kW). If it is determined after installation that electric preheat is needed, contact your Distributor about field-installing heating elements (see **Figure 20**).

NOTE: Check the unit rating plate for the maximum circuit ampacity (MCA) and Maximum Overcurrent Protection (MOP) of a unit with optional electric preheat.

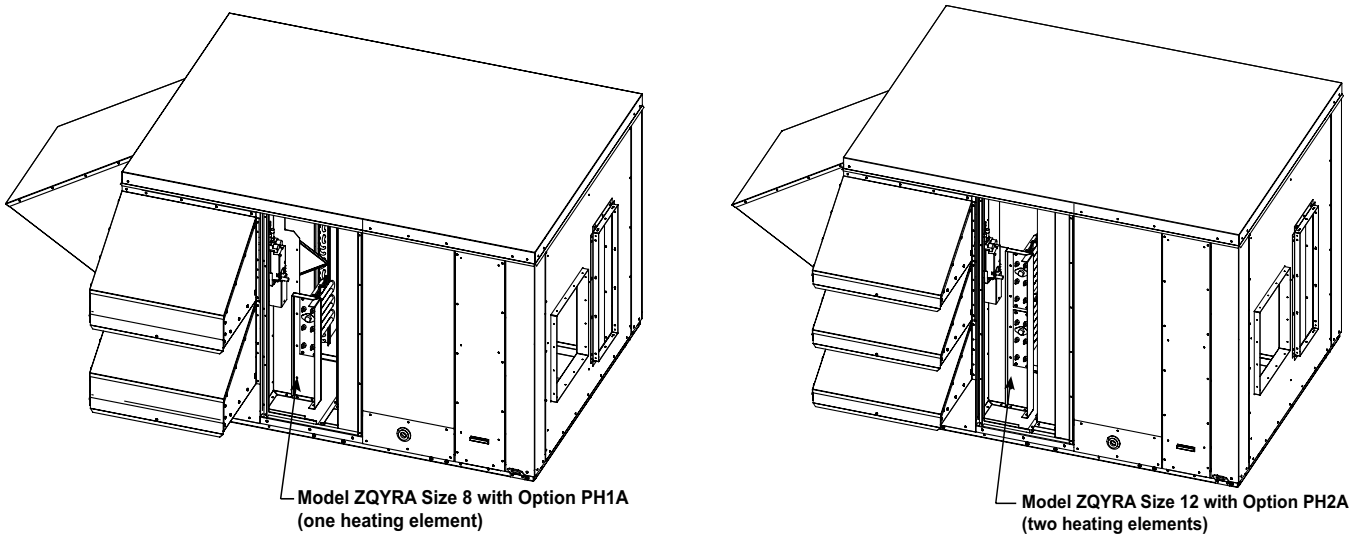


Figure 20. Location of Optional Electric Heating Elements

Field-Installed Option Connections

There are five wall-mounted control options and one duct-mounted temperature sensor that require field-installation and wiring. Follow the manufacturer's instructions for installation. For optimum temperature control performance, the manufacturer recommends that the analog and digital inputs (CO_2 and air quality sensors) that are connected to the unit controller have a <3% wattage drop and be routed to the unit in one of the following manners:

- in separate conduits isolated from 24VAC controls and line voltage power to the unit

OR

- if the digital sensor wires are to be run in the same conduit as the 24VAC control wiring, the CO_2, VOC, and display sensor wiring in options CN7B, CN7C, and RB5 must be completed using shielded cable that is bundled separately from the 24VAC control wiring—the shield must be drained at the unit and taped on the opposite end.

Refer to **Table 10** for wire sizing data and to the following descriptions and instructions for more detailed information about wiring and operation for each control option.

Table 10. Wiring Length and Size Requirements for Field-Installed Controls

Wire Type	Maximum Wire Length		Minimum Recommended Wire Gauge (AWG)
	Feet	Meters	
24VAC control	150	45	#18 (shielded)
	250	76	
	350	106	#14 (shielded)
Sensor*	800	244	#14
	500	152	#16
	310	94	#18

*Maximum length listed to ensure <1°F signal error.

Discharge Air Temperature Sensor

The discharge air temperature sensor (PN 222753, see **Figure 21**) is shipped with every unit and must be field-installed in the ductwork. The location and position of the sensor are important. Instructions for installing the discharge air sensor in the ductwork are as follows:

NOTE:

- **According to the latest edition of AMCA Standard 201, in straight ducts, the air is typically well mixed a minimum of five equivalent duct diameters from the discharge of the unit with equivalent duct diameter defined as equal to the square root of 4AB/3.14 (A and B are duct cross-sectional dimensions).**
- **Locate the sensor a minimum of 96 inches (2435 mm) from the outlet of the unit.**
- **If the length of the discharge duct is less than 8 feet (2.4 meters), a mixing vane is recommended for mixing the discharge air. Do not mount the sensor in the ductwork after a split in the supply as this will cause loss of control in the duct that does not house the sensor.**

Field-Installed Option Connections—Continued

Discharge Air Temperature Sensor—Continued

1. Determine appropriate distance from unit.
   a. Ensure that there is sufficient distance from outlet to have good mixture of discharge air temperature.
   b. Refer to following formula for calculating sensor placement. This example assumes cross-sectional dimensions for supply ductwork of 24 × 12 inches (610 × 305 mm):

$$5\ equivalent\ duct\ diameters \times \sqrt{\frac{4 \times 12 \times 24}{3.14}} = 96\ inches$$

$$5\ equivalent\ duct\ diameters \times \sqrt{\frac{4 \times 305 \times 610}{3.14}} = 2435\ millimeters$$

2. Determine location and orientation of sensor. Position of sensor in duct is also important.
   a. In horizontal ductwork, position sensor assembly in top-middle of duct, with sensor probe extending vertically down into center of air stream.
   b. In vertical ductwork, position sensor assembly in middle of side of duct that corresponds with top-middle of discharge outlet.
3. Attach sensor.
   a. Mark selected location and drill 7/16-inch hole.
   b. Insert probe into hole. Ensure that blue plastic fitting that holds probe is centered in hole.
   c. Attach sensor using two #8 sheet metal screws (do not overtighten).
   d. Check to ensure that hole is sealed.
4. Run field-supplied 14- to 18-gauge wire (two to three pairs) from sensor to unit controller and connect in accordance with unit wiring diagram. Digital control inputs are low-current, resistance-based signals.

Figure 21. Discharge Air Temperature Sensor Probe and Weatherproof Box

NOTE:

Depending on which field-installed control option (see below) has been ordered, the unit will operate whenever there is a call for fresh air (ventilation) from that control. Otherwise, the unit is OFF.

- **Option CN5: START/STOP wall switch**
- **Option CN7A: time clock wall switch with manual ON/OFF override**
- **Option CN7B: CO_2 sensor with unit control HAND/OFF/AUTO switch**
- **Option CN7C: indoor air quality (VOC and CO) sensor with HAND/OFF/AUTO switch**
- **Option CN7D: occupancy motion sensor with manual ON/OFF override**

START/STOP Wall Switch (Option CN5)

The wall-mounted, manual, two-position key switch (see **Figure 22**) will start or stop the unit. Install the two-wire, 24V switch as follows:

1. Mount switch in standard, field-supplied 2 × 4 electrical box.
2. Install cover plate.
3. Run wires and make electrical connections (refer to wiring diagram and **Figure 22**).
4. Mount START/STOP switch on wall.

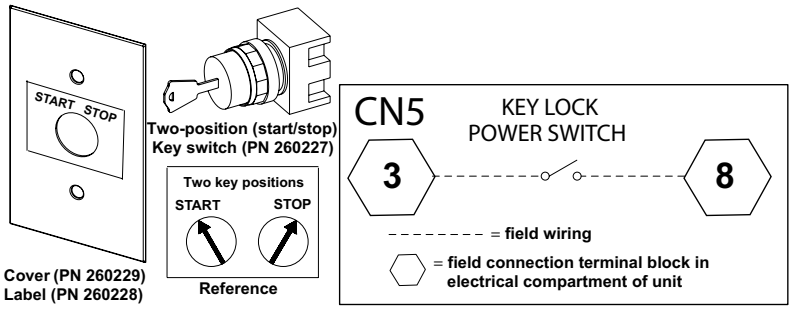


Figure 22. START/STOP Wall Switch (Option CN5) Components and Wiring Connections

Time Clock Wall Switch (Option CN7A)

The compact wall-mounted time clock (see **Figure 23**) with manual ON/OFF override will start or stop the unit. The 24-hour time clock schedule allows flexible weekday and weekend start/stop times with a convenient daylight savings update. A rechargeable battery maintains the programming in a temporary power outage. The unit requires a two-wire, 120V power supply external to the ventilation unit. As shown in the wiring diagram, a switch relay converts the time clock's 120V output to a set of dry contacts. Two dry contact wires are terminated to controller terminals 3 and 8, which activate the unit when closed. Install the time clock wall switch as follows:

1. Wall-mount switch in standard, field-supplied 2 × 4 electrical box.
2. Provide power to time clock and run control wires and make connections (refer to wiring diagram and **Figure 23**).
3. Install cover plate.
4. For programming, refer to instruction sheet provided by manufacturer. Follow instructions for programming Leviton Model VPT24-1P.

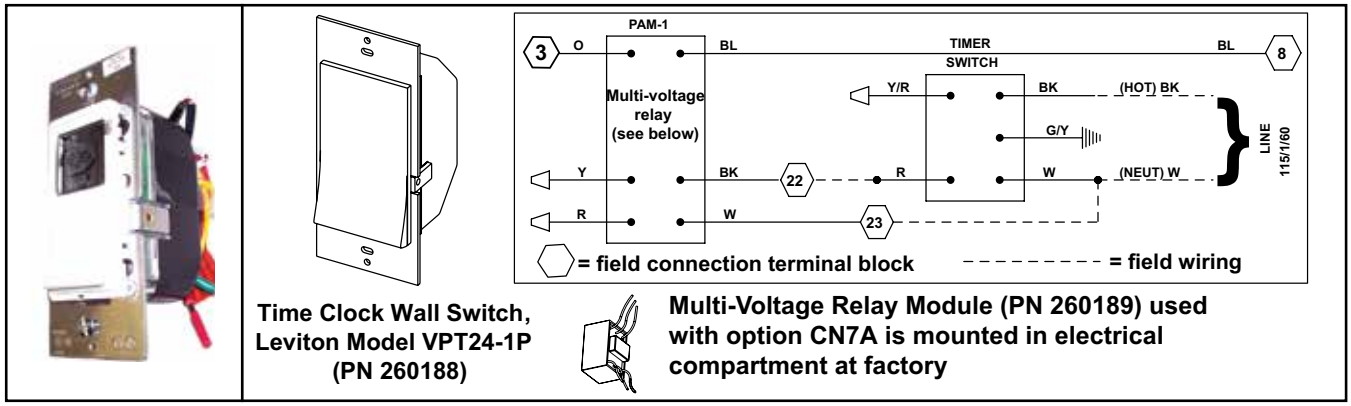


Figure 23. Time Clock Wall Switch (Option CN7A) with Wiring Connections

CO_2 Sensor (Option CN7B)

The CO_2 sensor (see **Figure 24**) with manual HAND/OFF/AUTO override switch will start or stop the unit. The infrared beam technology provides reliable and accurate sensing of the CO_2 level (±50 ppm). When in AUTO, the CO_2 sensor will activate the unit whenever carbon dioxide levels rise above the factory default value of 1000 ppm (0–2000 ppm range). The manual key switch bypasses the sensor and allows the unit to be directly commanded to HAND or OFF. Install the CO_2 sensor as follows:

1. Follow sensor manufacturer-provided instructions for mounting sensor.

Field-Installed Option Connections—Continued

CO_2 Sensor (Option CN7B)—Continued

2. Install switch in standard, field-supplied 2 × 4 electrical box to be mounted in wall.

NOTE: The sensor is powered from the control module 24VAC transformer.

3. Run wires and make connections (refer to wiring diagram and **Figure 24**). Use shielded 2/c cable for 0–10V digital signal.
4. Install HAND/OFF/AUTO cover plate.

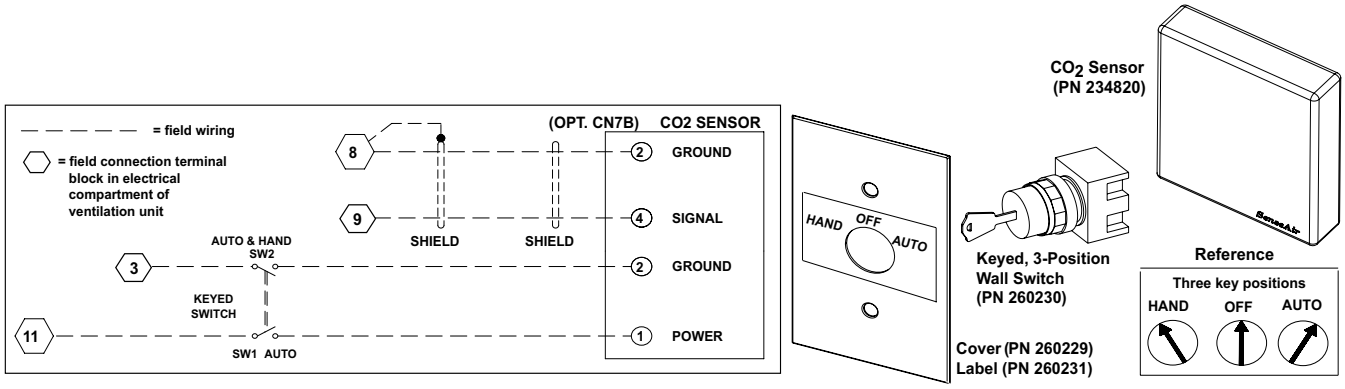


Figure 24. CO_2 Sensor (Option CN7B) Components and Wiring Connections

Indoor Air Quality (VOC and CO) Sensor (Option CN7C)

The volatile organic compound (VOC) indoor air quality (VOC and CO) sensor (see **Figure 25**) with manual HAND/OFF/AUTO override switch will start or stop the unit. When in AUTO, the unit will start whenever the air quality in the space environment exceeds the VOC level of the setpoint. This option also provides a three-position keyed, manual switch that is wired to the digital input. The three-position switch provides AUTO, HAND (manual on), and OFF modes. When the switch is in AUTO mode, the sensor is powered, the digital start/stop input is open, and the system monitors VOC levels. When the switch is in HAND mode, the contact is closed and the sensor is disabled. When the input is closed, the unit is ON. When the switch is in the manual OFF mode, the contact is open and the sensor is disabled. When the input is open, the unit is OFF. Install the air quality sensor as follows:

1. Follow sensor manufacturer-provided instructions for mounting sensor.
2. Install switch in standard, field-supplied 2 × 4 electrical box to be mounted in wall.

NOTE: The sensor is powered from the control module 24VAC transformer.

3. Run wires and make connections (refer to wiring diagram and **Figure 25**). Use shielded 2/c cable for 0–10V digital signal.
4. Install HAND/OFF/AUTO cover plate.

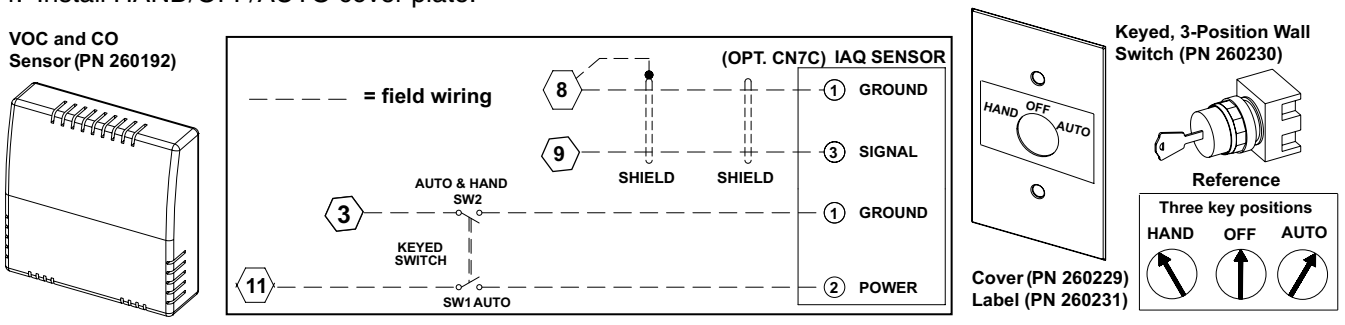


Figure 25. Air Quality Sensor Switch (Option CN7C) Components and Wiring Connections

Occupancy Motion Sensor (Option CN7D)

The space-mounted occupancy motion sensor (PN 260195, see **Figure 26**) with manual ON/OFF override switch is well suited for small enclosed spaces with a clear line of sight of the occupants. In AUTO-ON mode, the unit will start or stop based on occupancy. The passive infrared sensor features an adjustable 5- to 30-minute sensing window to prevent nuisance switching. The sensor has a manual ON/OFF override feature providing manual ON/OFF control. Install the occupancy motion sensor as follows:

1. Follow sensor manufacturer-provided instructions for mounting sensor.
2. Install switch in standard, field-supplied 2 × 4 electrical box to be mounted in wall.

NOTE: The sensor requires a separate power supply external to the ventilation unit.

3. Four wires are required from ventilation unit control panel to wall sensor. Refer to wiring diagram provided with ventilation unit and **Figure 26** to run wires and make necessary connections.

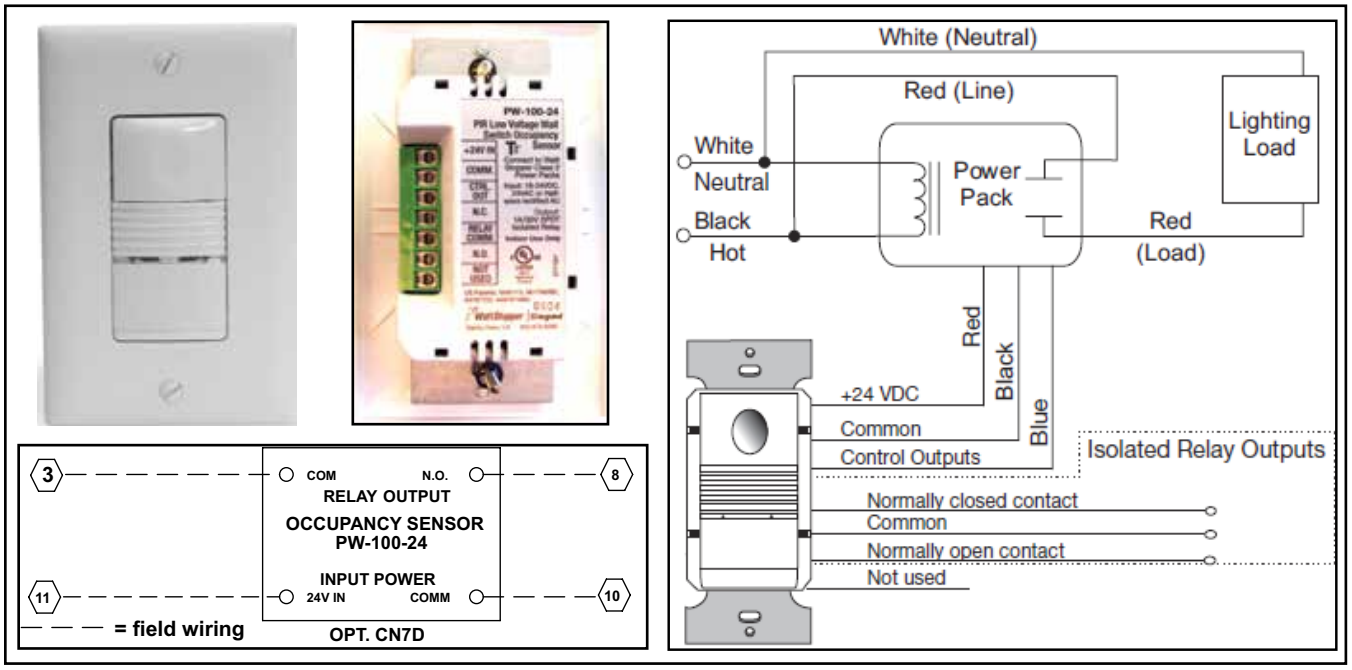


Figure 26. Occupancy Motion Sensor Switch (Option CN7D) with Wiring Connections

Remote-Mounted Display (Option RB5)

The factory-installed display (refer to **Unit-Mounted Display** section) allows complete access to unit-test features, schedules, discharge air setpoints, fan control, alarms, and other unit operational setpoints. Option RB5 (see **Figure 27**, components are listed in **Table 11**) is a second, remote-mounted display—allowing the same unit access—that can be field-installed up to 1,500 feet (457 meters) from the unit. The remote unit interface module is shipped separately or loose for field-mounting. Field-supplied 22 AWG to 18 AWG twisted pair wire (EIA 485) and an electrical junction box are required. Install and set up option RB5 as follows:

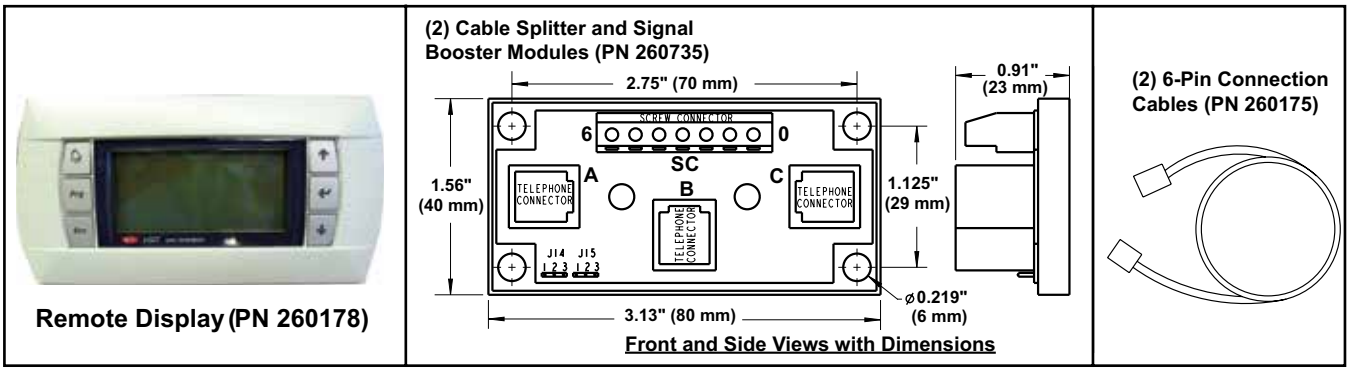


Figure 27. Remote-Mounted Display (Option RB5)

Field-Installed Option Connections—Continued

Remote-Mounted Display (Option RB5)—Continued

Table 11. Option RB5 Components		
Description	**PN**	**Quantity**
Remote display	260178	1
6-pin connection cable	260175	2
Cable splitter and signal booster module	260735	2
Screw	—	As required

1. Turn OFF power to unit and lock disconnect switch OPEN.
2. Install one cable splitter and signal booster module inside cabinet (see **Figure 28**).
   a. Remove controls compartment access panel.
   b. Position one cable splitter/signal booster module (PN 260735) on wall of control compartment as illustrated.
   c. Attach module using screws provided.

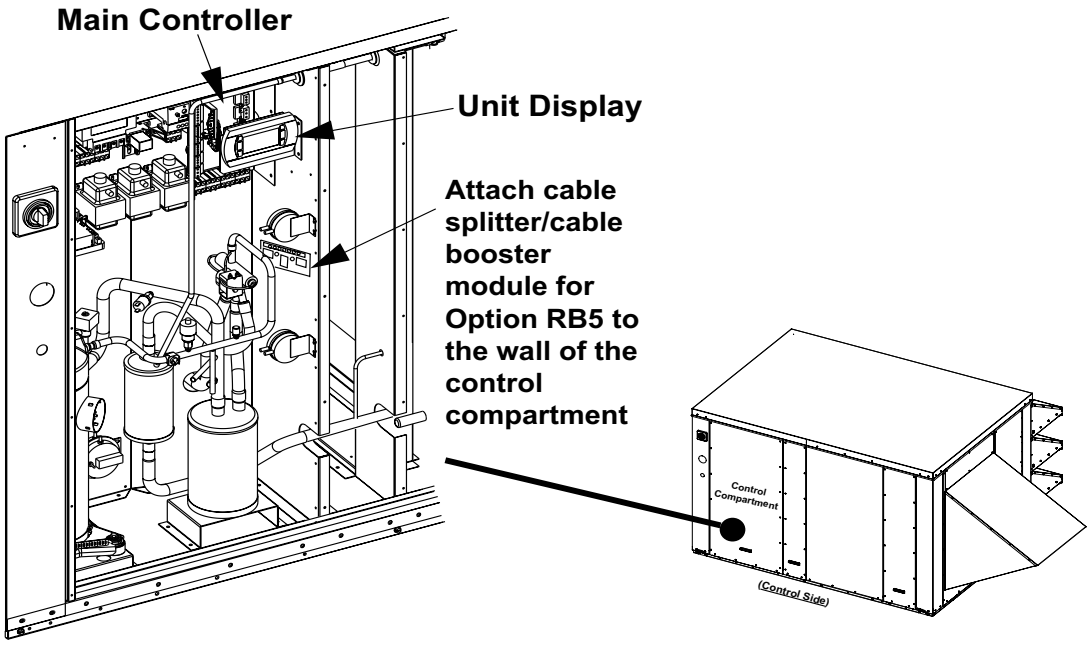


Figure 28. Cable Splitter and Signal Booster Modules Installed on Wall of Controls Compartment

3. Connect 6-pin connection cables.
   a. In controls compartment, locate unit display and main controller (see **Figure 28**) and unplug (from controller) existing 6-pin connection cable that connects unit display to controller.
   b. Connect cable to plug A of module installed in steps 2a through 2c. Module plugs and terminal screw connections are shown in **Figure 29** and identified in **Table 12**.

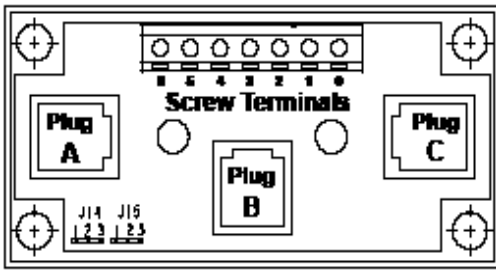


Figure 29. Wiring Connections on Cable Splitter and Signal Booster Module (PN 260735)

Table 12. Cable Splitter and Signal Booster Module Wiring Connection Descriptions		
Terminal Screw Connection	**Pin Telephone Connection**	**Circuit**
0	=	Earth
1	1	+VRL=30 Vdc
2	2	GND
3	3	Rx-/Tx-
4	4	Rx+/Tx+
5 (not used)	5 (not used)	GND
6 (not used)	6 (not used)	+VRL=30 Vdc

c. Connect one end of new 6-pin connection cable (PN 260175) to main controller and other end to plug C (see **Figure 30**) on module installed in steps 2a through 2c.

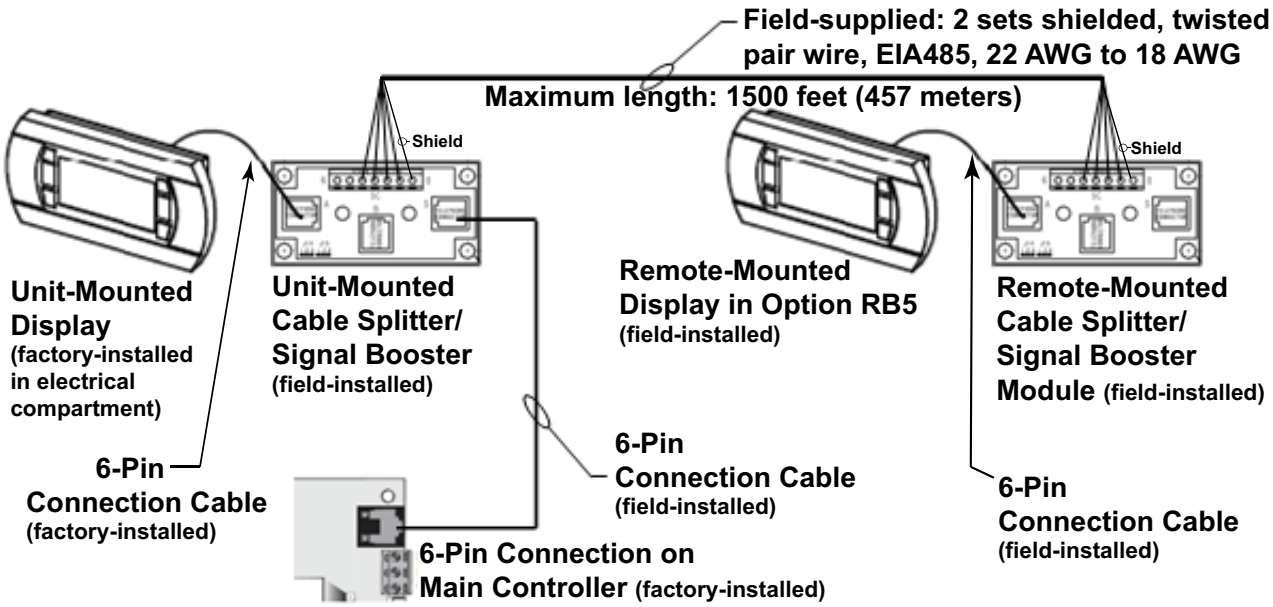


Figure 30. Overview of Option RB5 Wiring Connections

4. Install second cable splitter/signal booster module at remote location.
   a. Determine desired location for remote display unit. It can be located up to 656 feet (200 meters) from unit.
   b. Using field-supplied 22 AWG to 18 AWG shielded, twisted pair wire (EIA 485), run dedicated wires from remote location to unit. Two sets of twisted pair wire are required—one for power and one for communication—communication wire should be shielded to prevent noise.
   c. On module installed in step 2, connect shield to screw terminal 0. Connect power wires to screw terminals 1 and 2 and communication wires to terminals 3 and 4 (see **Figure 29**).
   d. Install second cable splitter/signal booster module (PN 260735) in field-supplied junction box to be recessed behind remote display.
   e. On second module, connect shield to screw terminal 0. Connect power wires to terminals 1 and 2 and communication wires to terminals 3 and 4 (see **Figure 29**), ensuring that power and communication polarity are maintained.

⚠ CAUTION ⚠

Improper wiring can damage the remote display as well as the main system controller.

   f. Connect second 6-pin connection cable (PN 260175) in kit to plug A on remote cable splitter/signal booster module (see **Figure 29**).

Field-Installed Option Connections—Continued

Remote-Mounted Display (Option RB5)—Continued

5. Install remote display.
   a. Remove screws that secure back cover plate of remote display (PN 260178) and position cover plate over module installed in step 4. Feed 6-pin connection cable out through hole in cover plate.
   b. Mount back cover plate on to wall covering cable splitter/signal booster module.
   c. Unsnap face cover from remote display and locate 6-pin wire connection. Connect cable from cable splitter/signal booster module. Using screws removed in step 5a, re-attach display to its back cover plate. Snap display face cover in place.
6. Verify power and communication polarity before re-powering unit.
7. Set up remote display.
   a. Turn ON power to unit.

NOTE: Because all displays have a factory-set address of 32, the address of the remote display must be changed. Dispay function keys (see Figure 31) are used to navigate through the display menus and options.

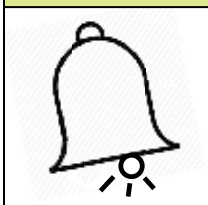
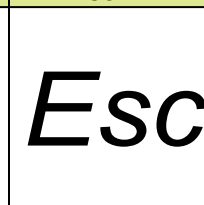
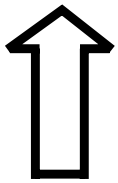
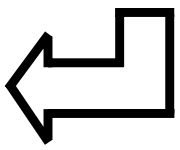
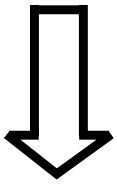
ALARM	PROGRAM	ESCAPE	UP ARROW	ENTER	DOWN ARROW
					
Used to move to active alarm screen When active alarm is present, button is **red**	Used to move to main menu when on **Home** page or in summary menu When in menu with question mark (?) in top right corner, brings up built-in **Help** screen When in test mode, resets time limit back to maximum time, thereby extending test mode	Used to cancel setpoint change before the **Enter** key is used to accept change Used to move back to previous screen	Used to move cursor up in menu list or to previous alarm or logged record Used to increase value of setpoint when setpoint is selected	Used to select line—indicated by brackets [ ] Makes changes effective	Used to move cursor down in menu list or to next alarm or logged record Used to decrease value of setpoint when setpoint is selected

Figure 31. Display Function Keys

b. Follow steps listed in Table 13 to set address of remote display.

Table 13. Setting Remote Display Address

Step	Description	Display Screen
1	Press **UP ARROW** key, **DOWN ARROW** key, and **ENTER** key and simultaneously hold down all three for at least 5 seconds	Display address setting . . . . . : 32
	Display address screen appears with cursor flashing in top left corner	I/O Board address: 01
2	Press **ENTER** key once (cursor moves to **Display address setting** field	Display address Changed
3	Change **Display address setting** field to 31 using **DOWN ARROW** key	
4	Press **ENTER** key to confirm setting and to save setting to permanent memory	

c. List of terminal addresses associated with main control module is set at factory and should not need to be adjusted. If access is needed, proceed in accordance with Table 14.

Table 14. Setting Remote Display Terminal Address		
Step	**Description**	**Display Screen**
1	Press **UP ARROW** key, **DOWN ARROW** key, and **ENTER** key and simultaneously hold down all three for at least 5 seconds	Display address setting . . . . . : 32
	Display address screen appears with cursor flashing in top left corner	I/O Board address: 01
NOTE: I/O Board Address field should remain at default setting of "01".		
2	Press **ENTER** key four times to move to terminal configuration screen	P:01 Adr Priv/Shared
	First terminal (**Trm1**) should be 32 and second terminal (**Trm2**) will be at 31	Trm1 32 Pr
3	Set **OK?** field to **Yes**	Trm2 31 Pr
4	Press **ENTER** key to confirm and save setting	Trm3 None Pr -- OK? No

8. Check remote display for proper operation.

OPERATION

Unit operation is controlled by a factory-mounted, microprocessor-based control module with custom-designed applications to optimize control of all components.

Unit Control Features

Unit control features include:

- Integrated local display mounted in controls compartment that provides complete access to system parameters without need of additional equipment
- Local and remote alarming
- Integrated time clock
- Compressor anti-cycle protection and minimum ON/OFF cycle rates
- Multiple protocol support: BacNet (MSTP) and LonWorks
- Alarm auto-reset and alarm shutdown features
- Commissioning and test mode functions
- Optional wall-mounted remote display
- Energy-conscious applications
- Fan option A24 provides speed control of both exhaust and supply fans via user display
- TAB menu for setting fan speeds and backing up setpoints
- Built-in help files

Unit-Mounted Display

An operator display (see **Figure 32**) is mounted on the wall of the controls compartment. This display provides the user with access to parameters and alarms. Additionally, it is used to monitor status, adjust setpoints, override points, and edit time schedules. All values are displayed with explanatory text in the alpha-numeric display window. Key features of the display include a backlit LCD that enhances readability even in poor light conditions, six backlit buttons, simple-to-use menus, password protection for security, and an eight-line × 22-character display. The unit-mounted display and the remote-mounted display (Option RB5) are equipped with six function keys shown and described in **Figure 31**.

Figure 32. Unit-Mounted Display

Unit Control Features—Continued

ON/OFF Control

The unit is shipped with one of the following factory-supplied, hard-wired switches:

- Manual ON/OFF switch (option CN5)
- Wall-mounted time clock with manual ON/OFF override (option CN7A)
- CO_2 sensor with HAND/OFF/AUTO switch (option CN7B)
- Indoor air quality (VOC) & CO with HAND/OFF/AUTO switch (option CN7C)
- Occupancy motion sensor with manual ON/OFF override (option CN7D)

Supply and Exhaust Fan Start/Stop Control

Upon a start command, the unit begins the following sequence:

- Startup is displayed in the mode status.
- Factory-installed optional outside air damper is energized (damper opens).
- The supply and exhaust fans are started and slowly ramp up to their speed setpoints. The fan with the highest setpoint starts ramping first to help maintain the desired pressure condition.
- The wheel starts 30 seconds after the fans.
- The heat pump starts 120 seconds after the wheel (if needed per sequence).
- During the ON mode, the supply fan runs continuously. There is an air proving switch for each fan that indicates proof of fan operation. The supply fan is allowed to run subject to all safety devices: duct high limit switches, fire alarm relays, smoke detectors, low temperature limits, etc.

Unit Occupancy Control

The unit is shipped pre-configured to the ordered CN option but can be configured in the field to meet several possible sequence configurations. There are eight pre-configured occupancy control types available. When setting the occupancy type, all required setpoints are available in the occupancy menu after setting the type. Adjustable setpoints are shown in the sequence below by the [ ] symbol around them. The [ ] symbol also defines the default setting. The unit occupancy control types are accessed under **Occ Config Menu** in the **Main** menu. Once **Occ Type** is set, the **DOWN ARROW** key allows the selection of a specific occupancy type configuration screen. See **Figure 33** for sample screen shots and configuration menus. **Table 15** lists each type along with its setpoints.

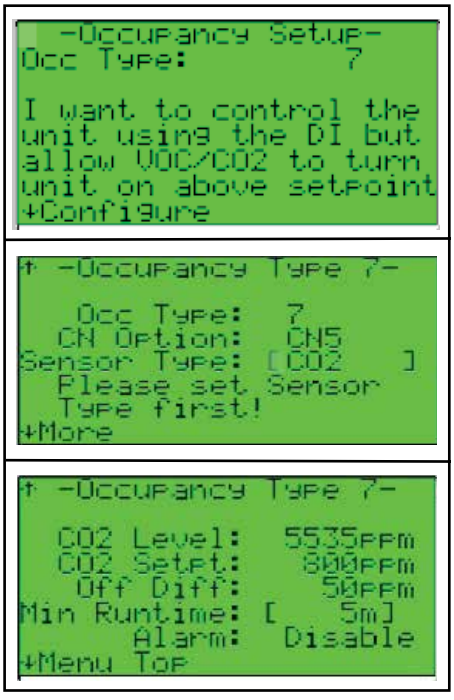


Figure 33. Sample Screen Shots and Configuration Menus

Table 15. Occupancy Types

Type	Option	Message	Control Description	Sequence	Required Setpoint Settings
1	CN5	***I want to control the unit using a manual on/off switch***	Unit control using wall-mounted keyed manual switch that is wired to digital input	When input is closed or open, unit is OFF	Occ Type: **1** CN Option: **CN5**
2	CN7D	***I want to control the unit using an occupancy sensor***	Unit control using wall-mounted occupancy sensor with integrated manual ON override that is wired to digital input	When input is closed, unit is ON; when input is open, unit is OFF	Occ Type: **2** CN Option: **CN7D**
3	CN7A	***I want to control the unit using an external time clock***	Unit control using wall-mounted time clock with integrated manual ON/OFF override that is wired to relay connected to digital input	When input is closed, unit is ON; when input is open, unit is OFF	Occ Type: **3** CN Option: **CN7A**
4	CN5, CN7D, or any field-supplied contact closure	***I want to control the unit using an internal or building automation schedule with digital input override***	Unit control using internal time clock or building automation schedule but allows for digital input (DI-3) to override schedule (allows system to be turned ON when unit is in unoccupied condition or turned OFF when unit is in occupied condition)	When DI Override point is set to **On** and input is closed, input sends occupied command; when DI Override point is set to **Off** and input is open, input sends unoccupied command	Occ Type: **4** CN Option: **CN5** DI Override: **[Off] or On** Schedule: **[Local] or BAS**
5	CN7B	***I want to control the unit using a CO2 sensor plus keyed hand/off/auto switch***	Unit control using wall-mounted CO_2 sensor (wired to AI-6) with manual HAND/OFF/AUTO switch (wired to digital input) that allows unit to be started/stopped automatically based on CO_2 setpoint or started/stopped manually (if sensor fails, fail-safe is for unit to run)	When switch is in AUTO mode, sensor is powered, digital start/stop input is closed, and system monitors CO_2 levels; when level is above setpoint, unit is ON; when level is below setpoint, unit is OFF; when switch is in HAND mode, input is closed, sensor is electrically disabled, and unit is ON; when switch is in OFF mode, input is open, sensor is electrically disabled, and unit is OFF	Occ Type: **5** CN Option: **CN7B** Sensor: **CO2** HOA Input: **Off/Hand/Auto** CO2 Level: ***current*** CO2 Setpoint: **[800]** Off Diff: **[50]** Minimum Run Time: **[5 min]** Alarm: **[Enable] or Disable**
6	CN7C	***I want to control the unit using a VOC sensor plus keyed hand/off/auto switch***	Unit control using wall-mounted indoor air quality sensor (VOC 0–100%, wired to AI-6) with HAND/OFF/AUTO switch (wired to digital input), that allows unit to be started/stopped automatically based on VOC setpoint or started/stopped manually (if sensor fails, fail-safe is for unit to run)	When switch is in AUTO mode, sensor is powered, input is closed, and system monitors VOC levels; when level is above setpoint, unit is ON; when level is below setpoint, unit is OFF; when switch is in HAND mode, input is closed, sensors are electrically disabled, and unit is ON; when switch is in OFF mode, input is open, sensors are electrically disabled, and unit is OFF	Occ Type: **6** CN Option: **CN7C** Sensor: **VOC** HOA Input: **Off/Hand/Auto** VOC Level: ***current*** VOC Setpoint: **[60]** Off Diff: **[15]** Minimum Run Time: **[5 min]** Alarm: **[Enable] or Disable**
7	CN5, CN7D, or any field-supplied contact closure	***I want to control the unit using a digital input (DI-3) but allow the VOC or CO2 sensor to override DI when levels are above setpoint***	Unit control using digital input (DI-3) but allows VOC or CO_2 sensor to override digital input when levels are above setpoint	When input is closed, unit is ON; when input is open, unit is OFF	Occ Type: **7** CN Option: **CN5** Sensor Type: **[C02] or VOC*** CO2/VOC Level: ***current*** CO2/VOC Setpoint: **[800]/60** CO2/VOC Off Dif: **[50]/15** Minimum Run Time: **[5 min]** Alarm: **[Enable] or Disable**
8	CN5, CN7D, or any field-supplied contact closure	***I want to control the unit using an internal or building automation schedule but allow the VOC or CO2 sensor to override the schedule and DI when levels are above setpoint***	Unit control using internal time clock or building automation schedule but allows digital input (DI-3) to override schedule and also allows VOC or CO_2 sensor to override schedule and digital input when levels are above setpoint	When input override point is set to **Ovrd On** and input is closed, input sends occupied command (allows override of timer, switch, occupancy sensor, or any other connection to turn ON unit when unoccupied); when input override point is set to **Ovrd Off** and input is open, input sends unoccupied command (allows unit to be turned OFF when occupied and also allows unit to monitor CO_2 or VOC level to override unit ON when level is above setpoint)**	Sch Cmd: **On/Off** Occ Type: **8** CN Option: **CN5** Schedule: **[Local] or BAS** DI Override: **[Off] or On** Sensor: **[CO2] or VOC** CO2/VOC Level: **current** CO2/VOC Setpoint: **[800]/60** CO2/VOC Off Dif: **[50]/15** Minimum Run Time: **[5 min]** Alarm: **[Enable] or Disable**

***Sensor is in option CN7B or CN7C or is a field-supplied sensor.

****Setting the sensor control setpoint to monitor allows the unit to monitor VOC and CO2 levels, but the unit does not react to the levels.

Unit Control Features—Continued

Energy Recovery Wheel Control

Upon proof of the supply air and exhaust air fans, the controller starts the energy recovery wheel. The unit controller monitors the wheel discharge air temperature and humidity and calculates the leaving air dewpoint.

Heat Pump Control

The heat pump is controlled to maintain discharge air temperature. There are four pre-configured types of control for the heat pump: dewpoint (default), dewpoint with heating/cooling setpoint with outside air changeover, dewpoint with heating/cooling setpoint with space temperature changeover, and dewpoint with outside air temperature reset. Upon proof of the supply and exhaust air fans, the unit controller monitors the wheel leaving air dewpoint for each control type. The heat pump control configuration is accessed from the **Main** menu under **Service Menu/Config/Edit Equipment Config**. The setpoint to adjust is called **Temp Cntrl** and the adjustable parameters are **Dp** (dewpoint), **HtgClgOa** (heating/cooling setpoint with outside air changeover), **HtgClgSpc** (heating/cooling setpoint with space temperature changeover), and **OAReset** (outside air temperature reset). Table 16 lists the sequences for each control type.

Table 16. Heat Pump Control Types

Type	Condition*	Sequence
Dewpoint (default configuration)	Dewpoint is > Dewpoint Changeover Setpoint (**DpCngOvrLt = 59°F/15°C**)	Unit enables heat pump and modulates system to maintain Discharge Temperature High Dewpoint Setpoint (**DatSpHiDp = 58°F/14°C**)
	Dewpoint is < Dewpoint Changeover Setpoint (**DpCngOvrLt = 59°F/15°C**)	Unit enables heat pump and modulates system to maintain Discharge Temperature Low Dewpoint Setpoint (**DatSpLoDp = 70°F/21°C**)
Dewpoint with heat/cool setpoints with ***outside air changeover*** (heating/cooling setpoints used only when dewpoint is < setpoint)	Dewpoint is > Dewpoint Changeover Setpoint (**DpCngOvrLt = 59°F/15°C**)	Unit enables heat pump and modulates system to maintain Discharge Temperature High Dewpoint Setpoint (**DatSpHiDp = 58°F/14°C**)
	Dewpoint is < Dewpoint Changeover Setpoint (**DpCngOvrLt = 59°F/15°C**)	Unit enables heat pump and modulates system to maintain Discharge Temperature Low Dewpoint Heating and Cooling Setpoint based on Outside Air (OA) conditions
	Outside Air Temperature (OAT) is > Outside Air Changeover Setpoint (**OaCngOvr = 65°F/18.3°C**)	Unit maintains Discharge Temperature Cooling Setpoint Low Dewpoint (**DatClgSpLoDp = 60°F/15.5°C**)
	OAT falls to < Outside Air Changeover Setpoint (**OaCngOvr = 65°F/18.3°C**) by difference of Outside Air Changeover Deadband (**OaCngOvrDb = 2°**)	Unit maintains Discharge Temperature Heating Setpoint Low Dewpoint (**DatHtgSpLoDp = 70°F/21°C**)
Dewpoint with heat/cool setpoints with ***space changeover*** (heating/cooling setpoints used only when dewpoint is < setpoint)	Dewpoint is > Dewpoint Changeover Setpoint (**DpCngOvrLt = 59°F/15°C**)	Unit enables heat pump and modulates system to maintain Discharge Temperature High Dewpoint Setpoint (**DatSpHiDp = 58°F/14°C**)
	Dewpoint is < Dewpoint Changeover Setpoint (**DpCngOvrLt = 59°F/15°C**)	Unit enables heat pump and modulates system to maintain Discharge Temperature Low Dewpoint Heating and Cooling Setpoint based on space conditions
	Zone temperature is > Zone Changeover Setpoint (**ZnCngOvr = 70°F/21°C**)	Unit maintains Discharge Temperature Cooling Setpoint Low Dewpoint (**DatClgSpLoDp = 60°F/15.5°C**)
	Zone temperature falls to < Zone Air Changeover Setpoint (**ZnCngOvr = 70°F/21°C**) by difference of Zone Changeover Deadband (**ZnCngOvrDb = 2°**)	Unit maintains Discharge Temperature Heating Setpoint Low Dewpoint (**DatHtgSpLoDp = 70°F/21°C**)
Dewpoint with outside air reset (reset setpoints used only when dewpoint is < setpoint)	Dewpoint is > Dewpoint Changeover Setpoint (**DpCngOvrLt = 59°F/15°C**)	Unit enables heat pump and modulates system to maintain Discharge Temperature High Dewpoint Setpoint (**DatSpHiDp = 58°F/14°C**)
	Dewpoint is < Dewpoint Changeover Setpoint (**DpCngOvrLt = 59°F/15°C**)	Unit enables heat pump and modulates system to maintain Discharge Temperature Low Dewpoint Heating and Cooling Setpoint based on OA reset conditions
	OAT is ≤ Outside Air Low Setpoint Low Dewpoint (**OaLoSpLoDp = 50°F/10°C**)	Unit maintains Discharge Air High Setpoint Low Dewpoint (**DaHiSpLoDp = 70°F/21°C**)
	OAT is ≥ Outside Air High Setpoint Low Dewpoint (**OaHiSpLoDp = 70°F/21°C**)	Unit maintains Discharge Air Low Setpoint Low Dewpoint (**DaLoSpLoDp = 60°F/15.5°C**)
	Discharge Air Setpoint is reset linearly from Discharge Air High Setpoint Low Dewpoint to Discharge Air Low Setpoint Low Dewpoint as OA changes	

***Upon proof of supply and exhaust air fans.

Reversing Valve Operation

Whenever the system calls for heating mode, the system energizes (close relay and power valve) the reversing valve. This reverses refrigerant flow and allows the system to provide heating. Whenever the system calls for cooling mode the reversing valve is de-energized (no power at valve).

Alarms

The system has two types of built-in alarms: service alarms and maintenance alarms. Service alarms include alarms like fan failure, low limit alarm, heat pump failure, and sensor failure. Maintenance alarms provide information such as dirty filter status, fan run time, and compressor run time. Units with an optional indoor air quality sensor set to monitor VOC/CO_2 levels will initiate a specific alarm when air quality has exceeded the setpoint limits (**CO2 Setpoint = 800 ppm / VOC Setpoint = 60%**). The unit will remain in the VOC/CO2 high alarm condition until the air has dropped below the alarm deadband.

Service Alarm Modes of Operation

During a service alarm condition, the system has three modes of operation: restart, cripple, and shutdown. This helps ensure optimum performance, limited down time, and equipment protection.

- **Restart mode:** The restart mode occurs when one of the following alarms occur: a fan failure alarm, a low limit alarm, or a heat pump restart alarm. During the restart sequence the unit mode is displayed as **Restart**. During this condition, the time remaining before auto restart is shown on the summary page and also on the restart alarm screen. The restart sequence is as follows: The unit shuts down for 60 minutes. After the restart timer has expired, the system restarts in normal mode. Resetting the alarm through the unit interface module or power cycling the unit clears the system restart mode, and the unit restarts in normal mode. The alarm(s) that caused the system restart are logged in the **Alarm** screen under the **Alarm History** menu.
- **Cripple mode:** The cripple mode occurs when one of the following alarms occur: a sensor failure alarm (Outside Air Temperature, Energy Recovery Wheel Discharge Temperature, or Energy Recovery Wheel Discharge Humidity), a Heat Pump General Alarm, a Unit Discharge Air Temperature Failure Alarm, or a Reversing Valve Failure Alarm. If at any time during cripple mode operation the alarm returns to normal or the system enters the supplemental heating mode, cripple mode will be reset. Once reset, the system automatically returns to the required operating mode and active alarms are automatically cleared and logged. The unit has the ability to operate in cripple mode to help limit the amount of system downtime. Cripple mode is allowed to run until one of the following four conditions have occurred: 1) wheel DAT falls to < Low Temperature Limit Setpoint (**Low Temp SP = 48°F/8.9°C**), 2) wheel Discharge Air Temperature (DAT) rises to > High Temperature Limit Setpoint (**Hi Temp SP = 85°F/29.4°C**), 3) wheel discharge air dewpoint rises to > Dewpoint High Limit (**Hi Dewpt SP = 68°F/20°C**), or 4) the run time exceeds the Cripple Time Setpoint (**Cripple Time = 72 hours**). The system then shuts down and requires a manual restart.
- **Shutdown mode:** The unit has the ability to shut down the system to protect individual components. The shutdown mode occurs when one of the following sequences occur: 1) shutdown digital input (DI-5) is active, 2) unit has exceeded allowed amount of time in cripple mode operation, 3) unit has exceeded allowed number of restarts, 4) there are multiple sensor failures, 5) OA is above High Outside Air Temperature Limit Setpoint, or 6) wheel defrost sequence has failed. Unless noted in the specific sequences below, when a shutdown alarm occurs, a manual restart is required to return the unit to normal operation. For a manual restart, reset the system shutdown alarm from the unit interface module, cycle power to the unit, or restart through a field-supplied building automation system.

Service Alarms

- **Supply and exhaust fan failure alarms:** The system monitors both the supply and exhaust fan status using dedicated pressure switches for each fan. Upon a start command, the system allows 120 seconds (**FanFailureTimer = 120 seconds**) to prove operation. If fan operation does not prove via the airflow switch, the controller shuts down the system and starts the auto-restart sequence. There is a specific alarm for the supply fan and another for the exhaust fan.
- **Low limit alarm:** If the unit DAT falls to < Low Limit (Freezestat) Setpoint (**LoLimitSP = 36°F/2°C**) for more than the Low Limit Timer (**LoLimitTmr = 10 minutes**), the controller shuts down the system, closes the OA damper, and starts the auto-restart sequence. The low limit sequence can be disabled by setting the Low Limit Enable Setpoint to no (**LoLimitEn = No**), which disables the sequence and prevents a shutdown on low discharge air temperature.
- **Heat pump restart alarm:** This alarm occurs when the heat pump has been shut down due to an alarm condition and DAT is outside allowable limits. The heat pump can be shut down due to a heat pump general alarm, a reversing valve failure, or the unit DAT sequence.
- **Outside air temperature failure alarm:** This alarm is initiated to indicate sensor failure, causing the display to read “Cripple”. The controller then stops the wheel and uses the wheel DAT to determine the correct OAT. The system holds the wheel discharge temperature and restarts the wheel. The controller stops the wheel every 2 hours to verify OAT and proper unit operation.
- **Wheel discharge temperature failure alarm:** This alarm is initiated to indicate sensor failure, causing the display to read “Cripple”. The controller then stops the heat pump and verifies wheel DAT. The controller holds this temperature and then restarts the heat pump. The controller stops the heat pump every hour to verify wheel DAT.

Alarms—Continued

Service Alarms—Continued

- **Wheel discharge air humidity failure alarm:** This alarm is initiated to indicate sensor failure, causing the display to read “Cripple”. The system will lock the humidity to 100%.
- **Heat pump general alarm:** The system has a hard-wired digital input (DI-4) that monitors a general alarm from the heat pump modulation controller. Whenever that contact closes, this alarm is initiated to indicate sensor failure, causing the display to read “Cripple”. The unit then runs in cripple mode until one of the following conditions occurs: 1) wheel discharge air dewpoint is > High Dewpoint Limit Setpoint (**Hi Dewpt SP = 68°F/20°C**), 2) wheel DAT is > High Discharge Air Temperature Limit Setpoint (**Hi Temp SP = 85°F/29.5°C**), or 3) wheel DAT is < Low Discharge Air Temperature Limit Setpoint (**Lo Temp SP = 48°F/9°C**). If any of these conditions occur, the unit will run the restart sequence.
- **Unit discharge air temperature sensor failure alarm:** If the discharge air sensor fails, this alarm is initiated, causing the display to read “Cripple”. The heat pump is then disabled, and the unit runs in cripple operation until one of the following conditions occurs: 1) wheel discharge air dewpoint is > High Dewpoint Limit Setpoint (**Hi Dewpt SP = 68°F/20°C**) 2) wheel DAT is > High Discharge Air Temperature Limit Setpoint (**Hi Temp SP = 85°F/29.5°C**), or 3) wheel DAT is < Low Discharge Air Temperature Limit Setpoint (**Lo Temp SP = 48°F/9°C**). If any of these conditions occur, the unit will run the restart sequence.
- **Reversing valve failure alarm:** The system verifies operation of the reversing valve by comparing actual operation to expected operation during the commanded mode of operation (heat/cool). If the system determines a reversing valve failure, the unit shuts down the heat pump for the minimum compressor off time and then tries to restart the compressor. The system initiates a specific alarm to indicate reversing valve failure. This alarm is automatically cleared and then logged. After the compressor restart sequence, if the reversing valve has a second failure, the system initiates another specific alarm to indicate reversing valve failure, shuts down the heat pump, and the display reads “Cripple”.
- **Shutdown digital input (DI-5) alarm:** Whenever the system controller sees the shutdown contact go into the alarm condition (open), the controller initiates a specific alarm and shuts down the unit. The unit remains OFF and in the alarm condition until the shutdown contact alarm condition is cleared (closed). Once the alarm is cleared, the unit automatically clears the alarm and restarts the system in normal mode.
- **Cripple mode time exceeded alarm:** If the unit exceeds the allowed cripple mode operation time limit, the unit shuts down, the controller initiates a specific alarm, and the display reads “Shutdown”. Once the unit is in this mode, it must be manually restarted. The alarm(s) that caused the system shutdown will be logged in the alarm screen under the **Alarm History** menu. For a more detailed sequence, refer to the cripple mode description in the **Service Alarm Modes of Operation** section.
- **Multiple restart shutdown alarm:** The system is allowed to go through the restart sequence a fixed number of times during a 24-hour period. Once the unit has gone through the auto-restart limit (Auto Restart = 3), the controller locks out the system and the display reads “Shutdown”. Once the unit is in this mode, it must be manually restarted. The alarm(s) that caused the system shutdown will be logged in the alarm screen under the **Alarm History** menu.
- **Multiple sensor failure:** If at any time the unit has multiple sensor failures, the unit shuts down, the controller initiates a specific alarm, and the display reads “Shutdown”. Once the unit is in this mode, it must be manually restarted. The alarm(s) that caused the system shutdown will either still be active in the active alarm screen or will be logged in the alarm screen under the **Alarm History** menu.
- **High outside air temperature limit alarm:** If OAT is > High Outside Air Alarm Setpoint (**Hi OAT Setpoint = 115°F/46°C**), the controller shuts down the unit and initiates a specific alarm. The unit remains shut down until OAT is < Outside Air Temperature High Lockout Setpoint by the High Outside Air Alarm Deadband (**Hi OAT Deadband = 5°F/3°C**).

- **Wheel defrost alarm:** The unit has a built-in wheel defrost sequence to prevent damage to the wheel. If wheel DAT falls to < Energy Recovery Wheel Discharge Air Temperature (**ERW DAT Limit = 32°F/0°C**) and the humidity is > Energy Recovery Wheel Discharge Air Humidity (**ERW DAH Limit = 90%**) for more than the High Limit Timer (**Limit Timer = 10 minutes**), the controller enables defrost control. The first stage of defrost control is to activate the preheat coil (if available). After the Stage One Timer (**Stage1Timer = 10 minutes**) has elapsed, if conditions do not rise above setpoints, the unit shuts down. If no preheat is available, the unit shuts down. The system will automatically restart after one of these defrost auto-reset conditions are met: 1) unit has been OFF for Minimum Defrost Time (**Time Reset = 6 hours**) or 2) OAT rises to > Reset Temperature (**OAT Reset = 34°F/1°C**). If three alarms occur within a 24-hour period, the unit will lockout and require a manual restart.

Maintenance Alarms

Maintenance alarms provide helpful information for maintaining equipment to ensure optimum performance. There are two types of maintenance alarms: the filter alarm and run time alarms. The filter alarm is activated only when the option is ordered. Run time alarms are built into the system but are disabled by default. They can be enabled through the unit interface under the **Service/Run Times** menus.

- **Filter alarm:** The system monitors filter pressure using a dedicated pressure switch. Adjusting the switch trip pressure is done manually at the pressure switch (refer to **Setting Dirty Filter Switch** section). Upon a switch closure, the system initiates a specific alarm. Once the alarm condition is corrected (switch opens), the alarm is automatically cleared and logged.
- **Run time alarms:** The system has the ability to monitor individual components and create specific alarms based on operational run times. These alarms are disabled by default and can easily be enabled through the unit interface under the **Service/Run Times** menus. Run time maintenance alarms are included for fans, energy recovery wheel, heat pump, preheat, and filters.

Supplemental Heating Mode

Units equipped with electric supplemental heating will activate or deactivate the supplemental heating mode based upon the five parameters listed in **Table 17**.

Table 17. Supplemental Heating Mode Conditions

Parameter	Activation Condition(s)	Deactivation Condition(s)
Suction temperature *vs.* energy recovery wheel exhaust air dew point	*Suction temperature is ≤32°F *Suction temperature is ≤ energy recovery wheel exhaust air dew point *Unit is commanded ON and is in compressor heating mode	2-hour time period has elapsed** Energy recovery wheel air temperature minus suction temperature is ≤3°F**
Low suction temperature	*Suction temperature is ≤9°F *Unit is commanded ON and is in compressor heating mode	2-hour time period has elapsed** Energy recovery wheel exhaust air temperature is ≥5°F of difference from when supplemental heating mode was activated**
DAT deviation from setpoint	*DAT is ≤5°F of difference from active DAT setpoint *Compressor capacity request = 100% *Unit is commanded ON and is in compressor heating mode	2-hour time period has elapsed** Energy recovery wheel exhaust air temperature is ≥5°F of difference from when supplemental heating mode was activated**
Low outside air temperature	OAT is ≤0°F	OAT is ≥5°F
DDC sensor failure(s)	Unit is commanded ON and is in compressor heating mode with failure of any of following: Suction temperature sensor Energy recovery wheel exhaust air humidity sensor Energy recovery wheel exhaust air temperature sensor	Any failed DDC sensor(s) has been corrected
*All must be true for 15 consecutive minutes to activate the supplemental heating mode.		
**All must be true to deactivate the supplemental heating mode.		

Supplemental Heating Mode Electric Heating Element Control

- When the supplemental heating mode is active on units with fixed capacity supplemental heating elements, the element will be energized for the duration of the supplemental heating mode.
- When the supplemental heating mode is active on units equipped with SCR modulated heating, the supplemental heating element capacity will be controlled based upon the active DAT setpoint.

Supplemental Heating Mode—Continued

Preheat (Option PH1A (5kW) or PH2A (10kW)) Supplemental Heat Staging Control

On units equipped with optional preheat, the preheat element will stage ON, in addition to the supplemental heating element, as required to maintain the active DAT setpoint.

Preheat Suction Temperature Control

The preheat element will be turned ON when suction temperature is ≤32°F and the mixed air dew point is within a 3°F range of the suction temperature. The 3°F range floats with the suction temperature and has a 2°F differential to turn OFF preheat (e.g., when suction temperature is 29°F and: 1) energy recovery exhaust air dewpoint is ≥29°F, preheat is OFF, 2) energy recovery exhaust air dewpoint is between 26°F and 28.9°F, preheat is ON, or 3) energy recovery exhaust air dewpoint is ≤24°F, preheat is OFF).

Preheat Outside Air Temperature Control

The unit controller monitors OAT and if the temperature is < Preheat Enable Setpoint (**PreHtEnSP = 0°F/-17.7°C**), the system enables the optional electric preheat elements. The optional preheat elements remain enabled until OAT is > OA enable temperature by the Preheat Enable Deadband (**PreHtEnDb = 5°F/3°C**).

Unit Controller Points and Display Menus

Unit Controller Points

Unit controller points for the small controller (Carel uPC, software version 1.05) are listed in **Table 18**.

Table 18. Unit Controller Points

Controller Point	Point Map	Point Type
DI1	SA Fan Status (NO)	Dry contact
DI2	EA Fan Status (NO)	
DI3	Fan Start/Stop (NO)	
DI4	Digital Compressor General Alarm (NO)	
DI5	Shutdown Contact (NC)	
DI6	SA/EA Alarm Contact (NC)	
DI7	Filter Alarm (NO)	
B1	Space Temperature	10K thermister
B2	Unit Discharge Air Temperature	
B3	Outside Air Temperature	
B4	Energy Wheel Discharge Air Temperature	
B5	Energy Wheel Discharge Air Humidity	4–20 mA
B6	VOC Sensor (0–100% Air Pollution or CO2 Sensor (0–2000 ppm))	0–5V ratiometric pressure
B7	Outdoor Coil Saturated Suction Temperature	
B8	Energy Wheel Exhaust Air Temperature	10K thermister
B10	Energy Wheel Exhaust Air Humidity	4–20 mA
NO1	Fan Contactor	Relay
NO2	Changeover Solenoid Valve	
NO3	Energy Wheel Contactor	
NO4	Electric Preheat Contactor	
NO5	Alarm Contactor	
NO6	Electric Supplement Heat Contactor	
NO7	***For future use***	
Y1	Compressor Modulation	1–5VDC
Y2	SA Fan Speed	0–10VDC
Y3	EA Fan Speed	
Y4	Electric Supplement Heat Modulation	

Unit Controller Main Menu

The controller's home screen is shown in **Figure 34**. To access the **Main** menu (refer to **Table 19**) from the home screen, press the **Prg** key and use the **UP** or **DOWN ARROW** key to navigate through the menu. Use the **ENTER** key to access the selection and the **Esc** key to exit. Press **Esc** again to return to the home screen.

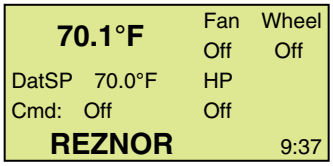


Figure 34. Unit Controller Home Screen

Table 19. Main Menu	
Display Item	**Description**
Quick Setpts	Opens **Quick Setpts** menu
Schedule (Internal)	Opens **Schedule (Internal)** menu (shown only when activated in **Occ Config** menu)
Service Menu	Opens **Service** menu
Occ Config Menu	Opens **Occ Config** menu
Fan Menu	Opens **Fan** menu
Wheel Menu	Opens **Wheel** menu
HP Menu	Opens **HP** (heat pump) menu
PreHeat Menu	Opens **PreHeat** menu (shown only when preheat is enabled)
Alarm History	Opens **Alarm History** menu
Alarm Help	Opens **Alarm Help** menu
User Display Help	Opens **User Display Help** menu
Login	Opens user **Login**

Summary Menu

The **Summary** menu (refer to **Table 20**) is accessed by pressing the **UP** or **DOWN ARROW** key. To start at the top of the selections, press the **DOWN ARROW**. To start at the bottom of the **Summary** menu, press the **UP ARROW**.

Table 20. Summary Menu			
Display Item	**Indication**	**Selectable Field**	**Description**
Page 1			
Unit	Current status of supply and exhaust air fan	**On**	Unit is commanded ON (ON status exists for both fans)
		Off	Unit is commanded OFF
ER Wheel	Current status of energy recovery wheel	**On**	Energy recovery wheel is commanded ON
		Off	Energy recovery wheel is commanded OFF
HP	Current status of heat pump	**Off**	Heat pump is commanded OFF
		Heat	Heat pump is commanded ON and changeover solenoid valve is energized (heating position)
		Cool	Heat pump is commanded ON and changeover solenoid valve is de-energized (cooling position)
Mode	Current status of unit running mode	**Off**	Unit is OFF
		Starting	Unit is in starting program
		Running	Unit is running in normal operation
		Test	Manual test or TAB mode is active (unit runs only on manual commands)
		Cripple	Unit is running in cripple mode (refer to **Table 38**)
		Restart	Unit is in restart sequence due to critical failure (refer to **Table 38**)
		Shutdown	Critical system has failed*
Command (Cmd)			**Description**
Page 1			
DI_Off			Unit commanded OFF via start/stop digital input (**DI3 - Fan Start/Stop**)
DI_On			Unit commanded ON via start/stop digital input (**DI3 - Fan Start/Stop**)
BAS_On			Unit commanded ON via building automation system
BAS_Off			Unit commanded OFF via building automation system
Local_On			Unit commanded ON via local schedule
Local_Off			Unit commanded OFF via local schedule
VOC/CO2 On			Unit commanded ON via VOC or CO_2 sensor
VOC/CO2 Off			Unit commanded OFF via VOC or CO_2 sensor
Test On			Unit commanded ON via test mode
Test Off			Unit commanded OFF via test mode
Alarm Off			Unit commanded OFF via critical alarm
Safety DI Off			Unit commanded OFF via safety input (**DI5 - Shutdown Contact**)
Manual On			Unit manually commanded ON
Manual Off			Unit manually commanded OFF
BAS Shutdown			Unit commanded SHUTDOWN via building automation system
↓ Next			Next page

*Correct the failure and manually-reset the unit using one of the following methods: **1)** cycle power to the unit, **2)** through the BACnet® MSTP point **BAS_AlmRst** (refer to **Table 45**) or the LONworks® point **BAS_AlmRst** (refer to **Table 46**), or **3)** through the active alarm screen.

Unit Controller Points and Display Menus—Continued

Summary Menu—Continued

Table 20. Summary Menu—Continued

Parameter/Command	Description
Page 2	
OA Temp:	Outside air temperature
ER Wheel Temp:	Energy recovery wheel discharge air temperature
ER Wheel Hum:	Energy recovery wheel discharge air humidity percentage
ER Wheel Dewp:	Energy recovery wheel discharge air dew point
VOC Level:	VOC reading (shown only when installed and activated)
VOC Setpt:	VOC setpoint to start unit (option CN7C, shown only when installed and activated)
CO2 Level:	CO_2 reading (shown only when installed and activated)
CO2 Setpt:	CO_2 setpoint to start unit (option CN7D, shown only when installed and activated)
↓ Next	Next page
Page 3	
SaFan Status:	Supply fan status (air proving switch DI1)
ExFan Status:	Exhaust fan status (air proving switch DI2)
Filtr Status:	Filter status (air proving switch DI7)
Unit DA Temp:	Unit discharge air temperature
ActDatSetpt:	Active unit discharge air temperature setpoint
HP Status:	Current status of heat pump
HP Output (%):	Heat pump modulation percentage
(Vdc):	Heat pump modulation DC control
↓ Next	Next page
Page 4	
PreHeat:	Preheat status (shown only when installed and activated)
St/St DI:	Fan start/stop input status
Shutdown DI:	Shutdown input status
HP Alm DI:	Hp alarm input status
Fan Alm DI:	Fan alarm input status
Alarm DO:	Alarm output status
BAS On/Off:	Current schedule command from BAS (shown only when OCC is set to BAS control)
↓ Next	Next page
Page 5	
NO6 Supp Heat:	Supplemental heat status
Y4 Supp Heat:	Supplemental heat modulation voltage
↓ Next	Next page
Page 6	
B8 ERWEA Temp:	Energy recovery wheel exhaust air temperature
B10 ERWEA Hum:	Energy recovery wheel exhaust air humidity
ERWEA DP:	Energy recovery wheel exhaust air dewpoint
B7 SST:	Outdoor coil suction temperature
↓ Next	Next page
Page 7	
Supp Heating Mode by Dewpoint vs SST:	ON/OFF status of supplemental heating control by energy recovery wheel exhaust air dewpoint *vs.* suction temperature comparison
Supp Heating Mode by OAT vs Setpoint	ON/OFF status of supplemental heating control by OAT *vs.* setpoint
Supp Heating Mode by Sensor Failure:	ON/OFF status of supplemental heating control by DDC sensor failure
↓ Next	Next page
Page 8	
Supp Heating Mode by Low SST:	ON/OFF status of supplemental heating control by low suction temperature
Supp Heating Mode by DAT SP Deviation:	ON/OFF status of supplemental heating control by DAT setpoint deviation
↓ Menu Top	Returns to top of menu

Quick Setpoints Menu

There are four different settings integral to temperature control that are listed in **Table 21**. **Temp Cntrl** (temperature control) is part of unit configuration and is accessed/adjusted from the **Service** menu→ **Config** → **Edit Equip Config**. To change the value of a setpoint, use the **UP** or **DOWN ARROW** key to find the desired setpoint. Press the **ENTER** key and then the **UP** or **DOWN ARROW** key to increase or decrease the setpoint. Press the **ENTER** key to confirm the desired value. Use the **UP** or **DOWN ARROW** key again to move to other setpoints or press **Esc** to exit the **Quick Setpoints** menu.

Table 21. Quick Setpoints Menu

Temp Cntrl Setting	Parameter	Description	Range	Factory Default
Dp	**DpCngOvrLt:**	Wheel Dewpoint Changeover Limit: point at which DAT swaps between **DatSpHiDp** and **DatSpLoDp** setpoints	55–65°F (13–18°C)	59°F (15°C)
	DatSpHiDp:	Discharge Air Temperature Setpoint with High Dewpoint: setpoint used when ER wheel dewpoint is > **DpCngOvrLt** setpoint	52–80°F (11–27°C)	58°F (14°C)
	DatSpLoDp:	Discharge Air Temperature Setpoint with Low Dewpoint: setpoint used when ER wheel dewpoint is < **DpCngOvrLt** setpoint	52–80°F (11–27°C)	70°F (21°C)
	ActDatSetpt:	Active Unit Discharge Air Temperature Setpoint	—	
HtgClgOa	**DpCngOvrLt:**	Wheel Dewpoint Changeover Limit: point at which DAT swaps between **DatSpHiDp** and **DatSpLoDp** setpoints	55–65°F (13–18°C)	59°F (15°C)
	DatSpHiDp:	Discharge Air Temperature Setpoint with High Dewpoint: setpoint used when ER wheel dewpoint is > **DpCngOvrLt** setpoint	52–80°F (11–27°C)	58°F (14°C)
	DatHtgSpLoDp:*	Discharge Air Temperature Heating Setpoint with Low Dewpoint: used when ER wheel dewpoint is < **DpCngOvrLt** setpoint and OAT is < **OaCngOvr** setpoint	52–80°F (11–27°C)	70°F (21°C)
	DatClgSpLoDp:*	Discharge Air Temperature Cooling Setpoint with Low Dewpoint: setpoint used when ER wheel dewpoint is < **DpCngOvrLt** setpoint and OAT is > **OaCngOvr** setpoint	52–80°F (11–27°C)	60°F (15.5°C)
	OaCngOvr:	Heating/Cooling Discharge Air Temperature Changeover Setpoint: point at which DAT setpoint swaps between **DatHtgSpLoDp** and **DatClgSpLoDp** setpoints	52–80°F (11–27°C)	65°F (18°C)
	OaCngOvrDb:	Heating/Cooling Discharge Air Temperature Changeover Deadband Setpoint: number of degrees OAT must drop once system swaps to **DatClgSpLoDp** setpoint	1–10°	2°
	ActDatSetpt:	Active Unit Discharge Air Temperature Setpoint	—	
HtgClgSpc	**DpCngOvrLt:**	Wheel Dewpoint Changeover Limit: point at which DAT swaps between **DatSpHiDp** and **DatSpLoDp** setpoints	52–65°F (11–18°C)	59°F (15°C)
	DatSpHiDp:	Discharge Air Temperature Setpoint with High Dewpoint: setpoint used when ER wheel dewpoint is > **DpCngOvrLt** setpoint	52–80°F (11–27°C)	58°F (14°C)
	DatHtgSpLoDp:*	Discharge Air Temperature Heating Setpoint with Low Dewpoint: setpoint used when ER wheel dewpoint is < **DpCngOvrLt** setpoint and zone temperature is < **ZnCngOvr** setpoint	52–80°F (11–27°C)	70°F (21°C)
	DatClgSpLoDp:*	Discharge Air Temperature Cooling Setpoint with Low Dewpoint: setpoint used when ER wheel dewpoint is < **DpCngOvrLt** setpoint and zone temperature is > **ZnCngOvr** setpoint	52–80°F (11–27°C)	60°F (15.5°C)
	ZnCngOvr:	Heating/Cooling Discharge Air Temperature Changeover Setpoint: point at which DAT setpoint swaps between **DatHtgSpLoDp** and **DatClgSpLoDp** setpoints	52–80°F (11–27°C)	65°F (18°C)
	ZnCngOvrDb:	Heating/Cooling Discharge Air Temperature Changeover Deadband Setpoint: number of degrees zone temperature must drop once system swaps to **DatClgSpLoDp** setpoint	1–10°	2°
	ActDatSetpt:	Active Unit Discharge Air Temperature Setpoint	—	
OaReset	**DpCngOvrLt:**	Wheel Dewpoint Changeover Limit: point at which DAT swaps between **DatSpHiDp** and reset output setpoints	55–65°F (13–18°C)	59°F (15°C)
	DatSpHiDp:	Discharge Air Temperature Setpoint with High Dewpoint: setpoint used when ER wheel dewpoint is > **DpCngOvrLt** setpoint	52–80°F (11–27°C)	58°F (14°C)
	OaLoSpLoDp:	Outside Air Temperature Low Setpoint with Low Dewpoint (Outside Air Low Limit Reset Setpoint): when OAT is = this setpoint, unit discharge air temperature setpoint = **DaHiSpLoDp**	0–80°F (−18–27°C)	50°F (10°C)
	OaHiSpLoDp:	Outside Air Temperature High Setpoint with Low Dewpoint (Outside Air High Limit Reset Setpoint): when OAT is = this setpoint, unit discharge air temperature setpoint = **DaLoSpLoDp**	0–80°F (−8–27°C)	70°F (21°C)
	DaHiSpLoDp:*	Discharge Air Temperature High Setpoint with Low Dewpoint: setpoint used when ER wheel dewpoint is < **DpCngOvrLt** setpoint and OAT is = **OaLoSpLoDp;** DAT setpoint is reset linearly between **DaHiSpLoDp** and **DaLoSpLoDp** setpoints	52–80°F (11–27°C)	70°F (21°C)
	DaLoSpLoDp:*	Discharge Air Temperature Low Setpoint with Low Dewpoint: setpoint used when ER wheel dewpoint is < **DpCngOvrLt** setpoint and OAT is = **OaHiSpLoDp;** DAT setpoint is reset linearly between **DaHiSpLoDp** and **DaLoSpLoDp** setpoints	52–80°F (11–27°C)	60°F (15.5°C)
	Reset Output:	Reset Temperature Setpoint	—	
	ActDatSp:	Active Unit Discharge Air Temperature Setpoint		

***These setpoints will replace the DatSpLoDP setpoint when the control type is changed.

Unit Controller Points and Display Menus—Continued

Schedule (Internal) Menu

The **Schedule** menu (refer to Table 22) is accessed by selecting **Schedule (Internal)** from the **Main** menu. Use the **UP** or **DOWN ARROW** key to navigate through the menu. Press the **ENTER** key to access the selection or press **Esc** to exit. Press **Esc** again to go back to the **Main** menu.

Table 22. Schedule (Internal) Menu

Selectable Parameter	Description	Range	Factory Default
Page 1			
Schedule Cmd:	Opens Menu	On/Off	Off
DI Override	Selects override command (0 = Off/1 = On)	0/1	0
# of Schedules	Selects number of schedules; advances to page 3 of menu	0–7	0
↓ More	More menu items	—	
TIMED OVERRIDE	Selects temporary override time; advances to page 2 of menu		
Schedule 1	Selects On/Off times and days for schedule 1 (shown only when # of schedule is 1-7)		
Schedule 2	Selects On/Off times and days for schedule 2 (shown only when # of schedule is 2-7)		
Schedule 3	Selects On/Off times and days for schedule 3 (shown only when # of schedule is 3-7)		
Schedule 4	Selects On/Off times and days for schedule 4 (shown only when # of schedule is 4-7)		
Schedule 5	Selects On/Off times and days for schedule 5 (shown only when # of schedule is 5-7)		
Schedule 6	Selects On/Off times and days for schedule 6 (shown only when # of schedule is 6-7)		
Schedule 7	Selects On/Off times and days for schedule 7 (shown only when # of schedule is 7)		
Page 2*			
Type:**	Selects temporary override type	None/Override Off/Override On	None
Time:**	Selects temporary override time in hour and minutes (hh:mm)	(0–5):(0–59)	0:00
Time Remaining:	Displays remaining time status	—	
Page 3*			
Schedule Cmd:	Selects schedule command (1–7)	On/Off	Off
Time On:	Selects schedule ON time (hh:mm)	(0–23):(0–59)	0:00
Time Off:	Selects schedule OFF time (hh:mm)	(0–23):(0–59)	0:00
Days Enabled:	Selects schedule days (N = No/Y = Yes)	N/Y	N
M	Monday	N/Y	N
T	Tuesday	N/Y	N
W	Wednesday	N/Y	N
T	Thursday	N/Y	N
F	Friday	N/Y	N
S	Saturday	N/Y	N
S	Sunday	N/Y	N

*Press the **Esc** key to go back to the **Schedule** menu.

**Adjusting time resets type. Set time first!

Service Menu

The **Service** menu (refer to Table 23) is accessed by selecting **Service Menu** from the **Main** menu. Use the **UP** or **DOWN ARROW** key to navigate through the menu. Press the **ENTER** key to access the selection or press **Esc** to exit. Press **Esc** again to go back to the **Main** menu.

Table 23. Service Menu

Menu Selections	Description
Page 1	
Test Menu:	Opens **Test** menu (refer to Table 24)
Input/Output:	Opens **Inputs/Outputs** menu
Run Times:	Opens **Run Times** menu
System:	Opens **System** menu
Config:	Opens **Configuration** menu
Calibration:	Opens **Calibration** menu
Setpt Defaults:	Opens **Setpt Defaults** menu
TAB Menu:	Opens **TAB** menu (should be used only when measuring and setting cfm for fans)

Test Menu

The **Test** menu (refer to **Table 24**) is accessed by selecting **Test Menu** from the **Service** menu. Use the **UP** or **DOWN ARROW** key to view the view the status of or select each menu item. Press the **Esc** key to go back to the **Service** menu.

Table 24. Test Menu

Selectable Parameter	Description	Range	Factory Default
Page 1			
Test Mode:	Selects test mode; there should be 30-minute return to **Main** screen from here	Off/Auto/Manual	Off
Auto Test Time Between Component Delay:*	Selectable time value	2–30 minutes	2 minutes
Testing:*	Current testing status: **None**, **Fans**, **ER Wheel**, **HP Cool**, **HP Heat**, or **Elec Heat**	—	
SaFan Speed:*	Supply air fan speed status		
ExFan Speed:*	Exhaust air fan speed status		
HP Output (%):*	Hp modulation output status		
HP Volts (Vdc):*	Modulation output voltage status		
OA Temp:*	OAT status		
ER Wheel Temp:*	Energy recovery wheel discharge temperature status		
Unit DA Temp:*	DAT status		
↓ Next*	Next menu		
Page 2			
Fan Relay:*	Fan relay status	—	
SaFan Speed:*	Supply air fan speed status		
EaFan Speed:*	Exhaust air fan speed status		
ER Wheel:*	Energy recovery wheel status		
Reversing Valve:*	Reversing valve status		
HP (%):*	HP modulation output status		
Elec Heat:*	Electric heat status (shown only when installed and activated)		
SCR:*	Supplemental heating modulation voltage status		
↓ Menu Top*	Returns to the top of menu		
Test Time Remaining:**	Manual test time limit is 3 hours; if more time is needed, press **Prg** button any time to reset back to 3 hours	3 hours	
SaF:**	Supply air fan status	—	
ExF:**	Exhaust air fan status		
Fan Relay:**	Supply air and exhaust air fan command	On/Off	Off
SaFanSpdSetpt:**	Supply air fan speed command	0–100%	18%
SaFan Vdc:**	Output voltage to supply air fan	—	
ExFanSpdSetpt:**	Exhaust air fan speed command	0–100%	29%
ExFan Vdc:**	Output voltage to exhaust air fan	—	
OA Temp:**	OAT status		
ER Wheel:**	Energy recovery wheel command	On/Off	Off
ERWheel Temp:**	Energy recovery wheel discharge temperature status	—	
Unit DA Temp:**	DAT status		
↓ Next**	Next menu		
Page 3**			
HP Mode:	Heat pump mode command	Off/Heat/Cool	Off
HP Enable:	Heat pump command (**HP Mode** should be set first)	On/Off	Off
HP Cmd Output:	Heat pump modulation output percentage	0–100%	0%
HP Volts (Vdc):	Modulation output voltage status	—	
ER Wheel Temp:	Energy recovery wheel discharge temperature status		
Unit DA Temp:	DAT status		
PreHeat:	Unit preheat command	On/Off	Off
↓ Next	Next menu	—	
Page 4***			
Suppl Heat:	Supplemental heat command (set **HP Mode** to **Off** before turning on supplemental heat)	On/Off	Off
SCR:	Supplemental heat modulation status	0–100%	0%
SCR:	Supplemental heat modulation voltage status	0–10VDC	0VDC
Unit DA Temp:	Unit DAT command	On/Off	Off

*Selectable only when test mode is **Auto**.

Selectable or viewable only when test mode is **Manual.

***Viewable only when test mode is **Manual** and **Fan Relay** is set to **ON** and **HP Enable** is set to **Off**.

Unit Controller Points and Display Menus—Continued

Input/Output Menu

The **Input/Output** menu (refer to **Table 25**) is accessed by selecting **Input/Output** from the **Service** menu. Use the **UP** or **DOWN ARROW** key to view the status of or select each menu item. Press the **Esc** key to go back to the **Service** menu.

Table 25. Input/Output Menu

Type	Selectable Parameter	Description	Range
Page 1			
Analog input	**B1 Zone Temp:**	Unit zone temperature	—
	B2 Unit DAT:	Unit DAT	
	B3 OA Temp:	OAT	
	B4 ERW Temp:	Energy recovery wheel DAT	
	B5 ERW Hum:	Energy recovery wheel discharge air humidity	
	↓ **Next**	Next menu	
Page 2			
Analog input	↑ **Prev**	Previous menu	—
	B6 Note:	Refer to **Summary** menu for option VOC or CO2 input B6 value	
	B7 Suction Temp:	Outdoor coil suction temperature	
	↓ **Next**	Next menu	
Page 3			
Analog input	↑ **Prev**	Previous menu	—
	B8 ERWEA TEMP:	Energy recovery wheel exhaust air temperature	
	B10 ERWEA Hum:	Energy recovery wheel exhaust air humidity	
	↓ **Next**	Next menu	
Page 4			
Analog input	↑ **Prev**	Previous menu	—
Binary input	**DI1 SaFan Sw:**	Supply fan air proving switch used to provide fan status	Off/On
	DI2 ExFan Sw:	Exhaust fan air proving switch used to provide fan status	Off/On
	DI3 ST/ST DI:	Dry contact closure to start and stop system	Stop/Start
	DI4 HP Alarm:	Alarm contact from heat pump controller	Alarm/Normal
	DI5 Shtdwn DI:	Dry contact closure to shut down unit; all timers and shutdown sequence are bypassed	Alarm/Normal
	↓ **Next**	Next menu	—
Page 5			
Binary input	↑ **Prev**	Previous menu	—
	DI6 Fan Alm:	Alarm contact from fan controller	Alarm/Normal
	DI7 Filter:	Filter pressure switch used to provide filter status	Clean/Dirty
	↓ **Next**	Next menu	—
Page 6			
Binary input	↑ **Prev**	Previous menu	—
Binary output	**NO1 Fan DO:**	Fan relay	Off/On
	NO2 Chngiver:	Changeover solenoid valve relay	Off/Cool/Heat
	NO3 ER Wheel:	Energy recovery wheel relay	Off/On
	NO4 Preheat:	Preheat relay	Off/On
	NO5 Gen Alm:	General alarm contact (24VAC)	Alarm/Normal
	↓ **Next**	Next menu	—
Page 7			
Binary output	↑ **Prev**	Previous menu	—
	NO6:	Supplement heat relay	Off/On
	NO7:	Not used	—
	↓ **Next**	Next menu	
Page 8			
Binary output	↑ **Prev**	Previous menu	—
Analog output	**Y1 Comp Voltage:**	Compressor output DC voltage	1–5V
	Y2 SaFan Output:	Supply fan output DC voltage	2–10V
	Y3 ExFan Output:	Exhaust fan output DC voltage	2–10V
	Y4 Supp Heat:	Supplemental heating output DC voltage	0–10V
	↓ **Menu Top**	Returns to top of menu	—

Run Times Menu

The **Run Times** menu (refer to Table 26) is accessed by selecting **Run Times** from the **Service** menu. Use the **UP** or **DOWN ARROW** key to make the desired selection and then press the **ENTER** key to open or change. Press the **Esc** key to go back to the **Service** menu.

Table 26. Run Times Menu

Selectable Parameter	Description	Range	Factory Default
Page 1			
Summary:	Opens **Run Times Summary** menu	—	
Fans:	Opens **Run Times Fans** menu		
ER Wheel:	Opens **Run Times ER Wheel** menu		
Heat Pump:	Opens **Run Times Heat Pump** menu		
Filter:	Opens **Run Times Filter** menu		
Preheat:	Opens **Run Times Preheat** menu		
Page 2: Run Times Summary Menu (Press Exc Key to Go Back to Page 1)			
Fans:	Fan run hours	—	
ER Wheel:	Energy recovery wheel run time hours		
Heat Pump:	Heat pump run time hours		
Filters:	Filter run time hours		
Preheat:	Preheat run time hours (shown only when installed and activated)		
Reset All?:	Resets all run times back to 0	No/Yes	No
Page 2: Run Times Fans, ER Wheel, Heat Pump, Filter, and Preheat Menus (Press Exc Key to Go Back to Page 1)			
Runtimes:	Component run hours	—	
Reset To Zero?:	Resets component run time to 0	No/Yes	No
Alarm Enabled?:	Enables component run time alarm	No/Yes	No
Setpoint:	Component run time alarm setpoint	—	

System Menu

The **System** menu (refer to Table 27) is accessed by selecting **System** from the **Service** menu. Use the **UP** or **DOWN ARROW** key to make the desired selection and then press the **ENTER** key to open or change. Press the **Esc** key to go back to the **Service** menu.

Table 27. System Menu

Selectable Parameter	Description	Range
Page 1		
Clockset	Opens **Clockset** menu	—
Support PH #	Opens **Support PH #** menu	
BAS Config	Opens **BAS Config** menu	
Controller	Opens **Controller** menu	
↓ Menu Top	Returns to top of menu	
Page 2: Clockset Menu (Press Exc Key to Go Back to Page 1)		
Week Day:	Day of week	Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday
Month:	Month	01–12
Day:	Day	01–31
Year:	Year	00–99
Hour:	Hour	00–23
Minute:	Minute	00–59
Page 2: Support PH # Menu (Press Exc Key to Go Back to Page 1)		
Area Code:	Telephone area code	000–999
Prefix:	Telephone prefix number (first three numbers)	000–999
Suffix:	Telephone suffix number (last four numbers)	0000–9999
Page 2: BAS Config Menu (Press Exc Key to Go Back to Page 1)		
BMS PORT 1		
Protocol:	Sets current protocol	N/A, CAREL, MODEM, MODBUS, PCOLOAD, BACnet MSTP, BACnet IP/Eth, LON, MODBUS EXT
BACnet PlugIn?:	Sets BACnet PlugIn command (shown only when protocol is **BACnet MSTP** or **BACnet IP/Eth**)	Yes/No
DHCP?:	Current DHCP Command (shown only when protocol is BACnet ID/Eth)	—
↓	Next page	

Unit Controller Points and Display Menus—Continued

System Menu—Continued

Table 27. System Menu—Continued

Selectable Parameter	Description	Range
Page 2: Controller Menu (Press Exc Key to Go Back to Page 1)		
Software Version:	Current Software version (Version number and date)	—
Hardware Info:		
Bios:	Bios Version (Version number and date)	
Boot:	Boot Version (Version number and date)	
↓	Next page	
Page 3: BAS Config Menu when Protocol Is N/A, CAREL, MODEM, MODBUS, or MODBUS EXT (Press Exc Key to Go Back to Page 1)		
BMS PORT 1		
Address:	Sets controller address	0–999
Baud Rate:	Sets baud rate	1200, 2400, 4800, 9600, 19200
Address:	Sets Address2	1–207
↓	Return to top of page 2	—
Page 3: BAS Config Menu when Protocol Is BACnet MSTP (Press Exc Key to Go Back to Page 1)		
Press ENTER key to retrieve current data		[0–4194] [0–999]
Instance:	Sets instance	9600, 19200, 38400, 76800
Baudrate:	Sets baud rate	0–127
MAC Addr:	Sets MAC address	0–127
MaxMasters	Sets MaxMasters	0–127
Press Prg key to save changes; when complete, cycle power		
↓	Return to top of page 2	—
Page 3: BAS Config Menu when Protocol Is BACnet IP/Eth (Press Exc Key to Go Back to Page 1)		
Press ENTER key to retrieve current data		[0–9999] [0–999]
Instance:	Sets instance	[0–255] [0–255] [0–255] [0–255]
STATIC IP:	Sets Static IP Address	0–127
SubNet:	Sets SubNet Address	000.000.000.00, 255.000.000.00, 255.255.000.00, 255.255.255.00
Gtwy:	Sets gateway	[0–255] [0–255] [0–255] [0–255]
DNS1:	Sets DNS2	[0–255] [0–255] [0–255] [0–255]
DNS2:	Sets DNS2	[0–255] [0–255] [0–255] [0–255]
Type:	Sets type	IP/Eth
Press Prg key to save changes; when complete, cycle power		
↓	Return to top of page 2	—
Page 3: Controller Menu (Press Exc Key to Go Back to Page 1)		
Board Type:	Current board type	—
Board Size:	Current board size	
Total Flash:	Total amount of installed flash	
RAM:	Total amount of installed RAM	
Built_In type:	Built in memory type	
Main Cycle:	Program cycles per second	
↓	Return to top of page 2	

Config Menu

The **Config** menu (refer to **Table 28**) is accessed by selecting **Config** from the **Service** menu. Use the **UP** or **DOWN ARROW** key to make the desired selection and then press the **ENTER** key to open or change. Press the **Esc** key to go back to the **Service** menu.

Table 28. Config Menu

Selectable Parameter	Description	Range	Factory Default
Page 1			
Current Config	Opens **Current Config** menu	—	
Current A.i.n	Opens **Current A.i.n** menu (not available)		
Edit Equip Config	Opens **Edit Equip Config** menu		
Edit Alarm Config	Open **Edit Alarm Config** menu		
Edit Sensor Config	Opens **Edit Sensor Config** menu		
Page 2: Current Config Menu (Press Exc Key to Go Back to Page 1)			
Units:	Current units	—	
Temp Control:	Current temperature control option		
Space Temp:	Space temperature control option	Enable/Disable	Disable

Table 28. Config Menu—Continued			
Selectable Parameter	**Description**	**Range**	**Factory Default**
Page 2: Edit Equip Config Menu (Press Exc Key to Go Back to Page 1)			
Unit Of Measure:	Sets unit of measurement	US or SI	SI
Temp Control:	Sets temperature control type	Dp, HtgClgOA, OAReset, HtgClgSpc	Dp
Space Temp:	Sets space temperature sensor	Disable/Enable	Disable
Page 2: Edit Alarm Config Menu (Press Exc Key to Go Back to Page 1)			
Fan Failure Alarm	Opens **Fan Failure Alarm** menu	—	
HP General Alarm	Opens **HP General Alarm** menu		
Unit Shutdown DI	Opens **Unit Shutdown DI** menu		
Cripple Mode	Opens **Cripple Mode** menu		
CO2/VOC Alarm	Opens **CO2/VOC Alarm** menu		
Low Limit Alarm	Opens **Low Limit Alarm** menu		
High OA Temp Alarm	Opens **High OA Temp Alarm** menu		
Defrost	Opens **Defrost** menu		
Reversing Vlv Alm	Opens **Reversing Vlv Alm** menu		
Restart/Shutdown	Opens **Restart/Shutdown** menu		
BAS Shutdown	Opens **BAS Shutdown** menu		
Alarm Output (DO)	Opens **Alarm Output (DO)** menu		
Page 3: Fan Failure Alarm Menu (Press Exc Key to Go Back to Page 2)			
FanFailureTimer:	Sets fan failure timer	60–600 seconds	120 seconds
DI1 SaFan Sw:	DI1 supply air fan switch status	Off/On	—
SaFan Alarm:	Supply air fan alarm status	Alarm/Normal	
DI2 ExFan Sw:	DI2 exhaust air fan switch status	Off/On	
ExFan Alarm:	Exhaust air fan alarm status	Alarm/Normal	
↓	Next page	—	
Page 4: Fan Alarm Menu (Press Exc Key to Go Back to Page 2)			
FanGenAlm Delay:	Sets fan general alarm delay timer	30–600 seconds	60 seconds
DI6 Fan Alm:	DI6 fan alarm status	Alarm/Normal	—
Alarm Status:	Alarm status	Alarm/Normal	
↓ **Menu Top**	Returns to top of menu	—	
Page 3: HP General Alarm Menu (Press Exc Key to Go Back to Page 2)			
HP GenAlm Delay:	Sets heat pump general alarm delay timer	60–600 seconds	80 seconds
DI4 HP Alarm:	DI4 heat pump alarm status	Alarm/Normal	—
Alarm Status:	Alarm status	Alarm/Normal	
Page 3: Unit Shutdown DI Menu (Press Exc Key to Go Back to Page 2)			
Shutdown Clear:	Sets shutdown clear timer	60–600 seconds	60 seconds
Shtdwn DI:	DI5 shutdown alarm status	Alarm/Normal	—
Remaining Time:	Remaining time status	60–600 seconds	
Page 3: Cripple Mode (Press Exc Key to Go Back to Page 2)			
Cripple Time:	Amount of time unit is allowed to run in cripple mode before shutting down	0–120 hours	72 hours
HP Stop Time:	Amount of time HP shuts down to calculate failed sensor readings	0–999 minutes	5 minutes
Unit DA Limits:	Unit discharge air limits	—	
Low Temp SP:	Low temperature setpoint	0–100°F (−17–38°C)	48°F (8.9°C)
↓	Next page	—	
Page 4: Cripple Mode Status Menu (Press Exc Key to Go Back to Page 2)			
Hi Temp SP:	High temperature setpoint	0–100°F (−17–38°C)	85°F (29.4°C)
Hi Dewpt SP:	High dewpoint setpoint	0–100°F (−17–38°C)	68°F (20°C)
Limit Timer:	—	1–60 minutes	15 minutes
↓ **Menu Top**	Returns to top of menu	—	
Page 3: CO2/VOC Alarm Menu (Press Exc Key to Go Back to Page 2)			
CO2 Level:	Current sensor level	0–9999 ppm	—
VOC Level:		0–999 ppm	
CO2 Setpoint:	Sets CO2 alarm setpoint	0–9999 ppm	800 ppm
VOC Setpoint:	Sets VOC alarm setpoint	0–100%	60%
Alm Off DB:	Sets CO2 alarm setpoint dry bulb	0–9999 ppm	50 ppm
	Sets VOC alarm setpoint dry bulb	0–100%	5%
Alarm Enabled:	Alarm enabled	Yes/No	Yes
Alm Delay:	Sets alarm delay timer	10–900 seconds	30 seconds
Page 3: Low Limit Alarm Menu (Press Exc Key to Go Back to Page 2)			
LoLimitSp:	Sets low limit on DAT	30–50°F (−1.1–10°C)	36°F (2.2°C)
LoLimitTmr:	Sets amount of time discharge must be < low limit setpoint before alarming	0–999	10 minutes
LoLimitEn:	Sets low limit alarm logic	Yes/No	Yes
Page 3: High OA Temp Alarm Menu (Press Exc Key to Go Back to Page 2)			
Setpoint:	Set High OA Temperature Limit Alarm Setpoint	90–120°F (32–49°C)	115°F (46°C)
Band:	Sets deadband at which unit returns to normal operation after high OAT alarm	1–10°F	5°F

Unit Controller Points and Display Menus—Continued

Config Menu—Continued

Table 28. Config Menu—Continued

Selectable Parameter	Description	Range	Factory Default
Page 3: Defrost Menu (Press Exc Key to Go Back to Page 2)			
ERW DAT Limit:	Sets Energy Recovery Wheel Discharge Air Temperature Defrost Setpoint	30–80°F (−1.1–27°C)	32°F (0°C)
ERW DAH Limit:	Sets Energy Recovery Wheel Discharge Air Humidity Defrost Setpoint	60–99%	90%
Limit Timer:	Sets defrost delay timer	1–99 minutes	10 minutes
Auto Reset Count:	Count number of auto-reset	0–9	—
Auto Reset Limit:	Sets count number limit of auto-reset	0–5	3
OAT Reset:	Sets OAT to stop defrost mode and restart	32–80°F (0–27°C)	34°F (1.1°C)
Page 4: Defrost Time Menu (Press Exc Key to Go Back to Page 2)			
Time Reset:	Sets time to stop defrost mode and restart	2–24 hours	6 hours
Stage1 Time:	Sets Stage 1 time	0–20 minutes	10 minutes
↓ Menu Top	Returns to top of menu	—	
Page 3: Reversing Vlv Alm Menu (Press Exc Key to Go Back to Page 2)			
Alarm:	Sets reversing valve alarm logic	Disable/Enable	Disable
Delay Timer:	Sets reversing valve alarm delay timer	1–20 minutes	1 minutes
Temp Offset:	Sets reversing valve alarm offset temperature	5–20°F	5°F
% Offset:	Sets reversing valve alarm offset percentage	5–30%	10%
↓ Menu Top	Returns to top of menu	—	
Page 3: Restart/Shutdown Menu (Press Exc Key to Go Back to Page 2)			
Restart Limit:	Sets number of restarts allowed in 24-hour period before manual restart is required	0–5	3
Restart Num:	Current number of restarts	—	
Clear Count:	Allows user to manually clear restart count	Yes/No	No
Page 3: BAS Shutdown Menu (Press Exc Key to Go Back to Page 2)			
Shutdown Cmd:	BAS shutdown command status	Normal/Shutdn	—
Min Time Off:	Sets BAS shutdown minimum time off	1–30 minutes	2 minutes
Override time:	Sets BAS shutdown override time	1–60 minutes	10 minutes
Override:	Clear BAS shutdown	Yes/No	No
Enable BAS Cmd:	Sets BAS shutdown command	Yes/No	No
↓ Menu Top	Returns to top of menu	—	
Page 3: Alarm Output (DO) Menu (Press Exc Key to Go Back to Page 2)			
Unit DAT Fail:	Sets DAT failure alarm	Yes/No	Yes
OAT Fail:	Sets OAT failure alarm	Yes/No	Yes
ER DAT Fail:	Sets energy recovery wheel discharge air temperature failure alarm	Yes/No	Yes
ER DA Hum Fail:	Sets energy recovery wheel discharge air humidity failure alarm	Yes/No	Yes
Sa Fan Fail:	Sets supply air fan failure alarm	Yes/No	Yes
EA Fan Fail:	Sets exhaust air fan failure alarm	Yes/No	Yes
Fan "DI" Alarm:	Sets fan DI alarm	Yes/No	Yes
HP "DI" Alrm:	Sets heat pump DI alarm	Yes/No	Yes
Reverse Vlv Alm:	Sets reversing valve alarm	Yes/No	Yes
Shutdown "DI":	Sets shutdown DI Alarm	Yes/No	Yes
VOC/CO2 Hi:	Sets VOC/CO2 alarm	Yes/No	Yes
Low Limit-Frz:	Sets low limit alarm	Yes/No	Yes
Filter:	Sets filter alarm	Yes/No	No
System Shutdown:	Sets system shutdown alarm	Yes/No	Yes
HI OAT Lockout:	Sets high outside air alarm	Yes/No	Yes
Space Temp Fail:	Sets space temperature failure alarm	Yes/No	Yes
Comp DA Limits:	Sets compressor discharge air limit alarm	Yes/No	No
BAS Shutdown Cmd:	Sets BAS shutdown command	Yes / No	Yes
↓ Menu Top	Returns to top of menu	—	
Page 2: Edit Sensor Config Menu (Press Exc Key to Go Back to Page 1)			
Sensor Type:	Sets sensor type	None/CO2/VOC	—
Sensor Cntrl:	Sensor control status	Cntl/Monitor	Monitor

Table 28. Config Menu—Continued			
Selectable Parameter	**Description**	**Range**	**Factory Default**
Page 3: Edit CO2 Sensor Menu Shown when Sensor Type Is CO2 (Press Exc Key to Go Back to Page 1)			
Sensor Type:	Sensor Type Installed	—	0–5 VDC
LoRange(PPM):	Sets sensor low range	0–32,767 ppm	0 ppm
HiRange(PPM):	Sets sensor high range	0–32,767 ppm	2000 ppm
Setpoint:	Sets CO2 setpoint	0–9999 ppm	800 ppm
Off Diff:	Sets CO2 setpoint offset differential	0–999 ppm	50 ppm
Sensor Alm:	Sets CO2 sensor alarm	Yes/No	No
↓	Returns to page 2	—	
Page 3: Edit VOC Sensor Menu Shown when Sensor Type Is VOC (Press Exc Key to Go Back to Page 1)			
Sensor Type:	Sensor type installed	—	0–5 VDC
LoRange(PPM):	Sets sensor low range	0–32,767 ppm	0 ppm
HiRange(PPM):	Sets sensor high range	0–32,767 ppm	100 ppm
Setpoint:	Sets VOC setpoint	0–100%	60%
Off Diff:	Sets VOC setpoint offset differential	0–99%	15%
Sensor Alm:	Sets VOC sensor alarm	Yes/No	No
↓	Returns to page 2	—	

Calibration Menu

The **Calibration** menu (refer to **Table 29**) is accessed by selecting **Calibration** from the **Service** menu. Use the **UP** or **DOWN ARROW** key to make the desired selection and then press the **ENTER** key to open or change. Press the **Esc** key to go back to the **Service** menu.

Table 29. Calibration Menu			
Selectable Parameter	**Description**	**Range**	**Factory Default**
Page 1			
OA Temp:	Current OAT status	—	
Offset:	OAT offset	±20°F	0°F
ER Wheel Temp:	Current energy recovery wheel DAT status	Status Only	
Offset:	Energy recovery wheel DAT offset	±20°F	0°F
↓ **Next**	Next page	—	
Page 2			
ER Wheel Hum:	Current energy recovery wheel humidity status	—	
Offset:	Energy recovery wheel humidity offset	±20°F	0°F
Unit DA Temp:	Current unit DAT status	—	
Offset:	DAT offset	±20°F	0°F
↓ **Next**	Next page	—	
Page 3*			
Zone Temp:**	Current zone space temperature status	—	
Offset:	Zone space temperature offset	±20°F	0°F
↓ **Next**	Next menu	—	
Page 3***			
CO2:**	Current carbon dioxide level status	—	
Offset:**	Carbon dioxide level offset	±200 ppm	0 ppm
VOC:**	Current VOC level status	—	
Offset:**	VOC level offset	±20%	0%
↓ **Menu Top**	Returns to top of menu	—	
***Shown only when space temperature sensor is installed and activated.			
****Shown only when applicable.			
*****Shown only when sensors are installed and activated.			

Unit Controller Points and Display Menus—Continued

Setpt Defaults Menu

The **Setpt Defaults** menu (refer to **Table 30**) is accessed by selecting **Setpt Defaults** from the **Service** menu. Use the **UP** or **DOWN ARROW** key to make the desired selection and then press the **ENTER** key to open or change. Press the **Esc** key to go back to the **Service** menu.

Table 30. Setpt Defaults Menu

Selectable Parameter	Description	Range	Factory Default
Page 1			
Save Current Setpts:	Allows user to save current setpoints to controller	No/Yes	No
Restore Saved Setpts:	This allows user to restore last saved setpoints in controller	No/Yes	No
↓ **Next**	Next page	—	
Page 2			
Restore Test and Balance (TAB) saved Fan Setpoints:	Allows user to restore supply air and exhaust air fan speed to last saved TAB fan setpoints in controller	No/Yes	No
↓ **Next**	Next page	—	
Page 3			
Restore all settings to "as-shipped" factory values:	Allows user to restore all setpoints back to their original factory settings	No/Yes	No
↓ **Menu Top**	Returns to top of menu	—	

TAB Menu

The **TAB** menu (refer to **Table 31**) is accessed by selecting **TAB Menu** from the **Service** menu. Use the **UP** or **DOWN ARROW** key to make the desired selection and then press the **ENTER** key to open or change. Press the **Esc** key to go back to the **Service** menu.

Table 31. TAB Menu

Selectable Parameter	Description	Range	Factory Default
Page 1			
Mode:*	Tab mode command	Off/TAB	Off
↓ **Next**	Next page	—	
Page 2**			
TAB Mode:	Current TAB Mode	—	
Fan Relay:	Supply air and exhaust air fan command	On/Off	Off
SaFanSpdSetpt:	Supply air fan speed command	0–100%	18%
ExFanSpdSetpt:	Exhaust air fan speed command	0–100%	29%
Write Fan TAB Speeds to Speed Setpts:	Writes temporary TAB setpoints to permanent speed setpoints and also creates backup copy of TAB setpoints	Yes/No	No
↓ **Next**	Next page	—	
Page 3***			
↑ **Previous**	Previous page	—	
ER Wheel:	Energy recovery wheel command	On/Off	Off
Comp Mode:	Heat pump mode command	Off/Heat/Cool	Off
Comp Enable:	Heat pump command (**HP mode** should be set first)	On/Off	Off
Comp Output:	Heat pump modulation output percentage	0–100%	0%
ER Wheel Temp	Energy recovery wheel discharge temperature	—	
Unit DA Temp:	DAT		
PreHeat:	Unit preheat command	On/Off	Off
↓ **Menu Top**	Returns to top of menu	—	

*Setting the mode to **TAB** starts the 3-hour override period.

Shown only when the mode is set to **TAB.

***Shown only when the unit is in the manual test mode.

Occ Config Menu

The **Occ Config** menu (refer to **Table 32**) is accessed by selecting **Occ Config** from the **Main** menu. Use the **UP** or **DOWN ARROW** key to make the desired selection and then press the **ENTER** key to open or change. Press the **Esc** key to go back to the **Main** menu.

Table 32. Occ Config Menu			
Selectable Parameter	**Description**	**Range**	**Factory Default**
Page 1			
Occ Type:	Current occupancy type	1–8	1
Page 2 (Shown when Occ Type Is 1, Refer to Table 15)			
↓ **Configure**	Next page	—	
Page 3 (Shown when Occ Type Is 1)			
Occ Type:	Current occupancy type	—	1
CN Option:	Current CN option		CN5
↓	Returns to page 1	—	
Page 2 (Shown when Occ Type Is 2, Refer to Table 15)			
↓ **Configure**	Next page	—	
Page 3 (Shown when Occ Type Is 2)			
Occ Type:	Current occupancy type	—	2
CN Option:	Current CN option		CN7D
↓	Returns to page 1	—	
Page 2 (Shown when Occ Type Is 3, Refer to Table 15)			
↓ **Configure**	Next page	—	
Page 3 (Shown when Occ Type Is 3)			
Occ Type:	Current occupancy type	—	3
CN Option:	Current CN option		CN7A
↓	Returns to page 1	—	
Page 2 (Shown when Occ Type Is 4, Refer to Table 15)			
↓ **Configure**	Next page	—	
Page 3 (Shown when Occ Type Is 4)			
Occ Type:	Current occupancy type	—	4
CN Option:	Current CN option		CN5
Schedule:	Sets schedule	None/Local/BAS	Local
DI Override:	Sets DI override	Off/On	Off
Schedule Cmd:	Current BAS schedule command status	—	
Control Display	Description	Range	Factory Default
↓	Returns to page 1	—	
Page 2 (Shown when Occ Type Is 5, Refer to Table 15)			
↓ **Configure**	Next page	—	
Page 3 (Shown when Occ Type Is 5)			
Occ Type:	Current occupancy type	—	5
CN Option:	Current CN option		CN7B
Sensor:	Current sensor type		CO2
HOA Input:	**Hand/Off/Auto** status	—	
CO2 Level:	Current CO_2 level reading		
CO2 Setpt:	Sets CO_2 setpoint	0–9999 ppm	800 ppm
Off Diff:	Sets CO_2 setpoint offset differential	0–9999 ppm	50 ppm
Min Runtime:	Sets minimum runtime	3–240 minutes	5 minutes
Alarm:	Sets alarm	Disable/Enable	Enable
↓	Returns to page 1	—	
Page 2 (Shown when Occ Type Is 6, Refer to Table 15)			
↓ **Configure**	Next page	—	
Page 3 (Shown when Occ Type Is 6)			
Occ Type:	Current occupancy type	—	6
CN Option:	Current CN option		CN7C
Sensor:	Current sensor type		VOC
HOA Input:	**Hand/Off/Auto** status	—	
VOC Level:	Current VOC level reading		
VOC Setpt:	Sets VOC setpoint	0–100%	60%
Off Diff:	Sets VOC setpoint offset differential	0–100%	15%
Min Runtime:	Sets minimum runtime	3–240 minutes	5 minutes
Alarm:	Sets alarm	Disable/Enable	Enable
↓	Returns to page 1	—	

Unit Controller Points and Display Menus—Continued

Occ Config Menu—Continued

Table 32. Occ Config Menu—Continued

Selectable Parameter	Description	Range	Factory Default
Page 2 (Shown when Occ Type Is 7, Refer to Table 15)			
↓ Configure	Next page	—	
Page 3 (Shown when Occ Type Is 7)			
Occ Type:	Current occupancy type	—	7
CN Option:	Current CN option		CN5
Sensor:	Current sensor type (set first)		CO2
↓ More	More menu items	—	
Page 4 (Shown when Occ Type Is 7)			
Occ Type:	Current occupancy type	—	7
CN Option:	Current CN option		CN5
Sensor:	Current sensor type (set first)	CO2/VOC	CO2
↓ More	More menu items	—	
Page 5 (Shown when Occ Type Is 7 and Sensor Is CO2)			
Sensor:	Current sensor type	—	CO2
CO2 Level:	Current CO_2 level reading	—	
CO2 Setpt:	Sets CO_2 setpoint	0–9999 ppm	800 ppm
Off Diff:	Sets CO_2 setpoint offset differential	0–9999 ppm	50 ppm
Min Runtime:	Sets minimum runtime	3–240 minutes	5 minutes
Alarm:	Sets alarm	Disable/Enable	Enable
↓	Returns to page 1	—	
Page 5 (Shown when Occ Type Is 7 and Sensor Is VOC)			
Sensor:	Current sensor type	—	CO2
VOC Level:	Current VOC level reading	—	
VOC Setpt:	Sets VOC setpoint	0–100%	60%
Off Diff:	Sets VOC setpoint offset differential	0–100%	15%
Min Runtime:	Sets minimum runtime	3–240 minutes	5 minutes
Alarm:	Sets alarm	Disable/Enable	Enable
↓	Returns to page 1	—	
Page 2: (Shown when Occ Type Is 8 , Refer to Table 15)			
↓ Configure	Next page	—	
Page 3: (Shown when Occ Type Is 8)			
Sch Cmd:	Current sensor type	—	
Occ Type:	Current occupancy type	—	8
CN Option:	Current CN option		CN5
Schedule:	Sets schedule	None/Local/BAS	Local
DI Override:	Sets DI override	Off/On	Off
Sensor:	Current sensor type (set first)	CO2/VOC	CO2
↓ More	More menu items	—	
Page 4: (Shown when Sensor Is CO2)			
Sensor:	Current sensor type	—	CO2
CO2 Level:	Current CO_2 level reading	—	
CO2 Setpt:	Sets CO_2 setpoint	0–9999 ppm	800 ppm
Off Diff:	Sets CO_2 setpoint offset differential	0–9999 ppm	50 ppm
Min Runtime:	Sets minimum runtime	3–240 minutes	5 minutes
Alarm:	Sets alarm	Disable/Enable	Enable
↓	Returns to page 1	—	
Page 4: (Shown when Sensor Is VOC)			
Sensor:	Current sensor type	—	CO2
VOC Level:	Current VOC level reading	—	
VOC Setpt:	Sets VOC setpoint	0–100%	60%
Off Diff:	Sets VOC setpoint offset differential	0–100%	15%
Min Runtime:	Sets minimum runtime	3–240 minutes	5 minutes
Alarm:	Sets alarm	Disable/Enable	Enable
↓	Returns to page 1	—	

Fan Menu

The **Fan** menu (refer to Table 33) is accessed by selecting **Fan Menu** from the **Main** menu. Use the **UP** or **DOWN ARROW** key to make the desired selection and then press the **ENTER** key to open or change. Press the **Esc** key to go back to the **Main** menu.

Table 33. Fan Menu

Selectable Parameter	Description	Range	Factory Default
Fan Relay Cmd:	Current fan command	—	
SaFan Status:	Current supply fan status		
ExFan Status:	Current exhaust fan status		
SaFan Voltage:	Current supply fan voltage output		
ExFan Voltage:	Current exhaust fan voltage output		
SaFanSpdSetpt:	Supply fan speed setpoint	0–100%	50%
ExFanSpdSetpt:	Exhaust fan speed setpoint	0–100%	50%

Wheel Menu

The **Wheel** menu (refer to Table 34) is accessed by selecting **Wheel Menu** from the **Main** menu. Use the **UP** or **DOWN ARROW** key to make the desired selection and then press the **ENTER** key to open or change. Press the **Esc** key to go back to the **Main** menu.

Table 34. Wheel Menu

Selectable Parameter	Description
ERWheel Cmd:	Current command of energy recovery wheel
ER Wheel Temp:	Current energy recovery wheel DAT
ER Wheel Hum:	Current energy recovery wheel discharge air humidity
ER Wheel Dewp:	Current energy recovery wheel discharge air dewpoint

HP Menu

The **HP** (heat pump) menu (refer to Table 35) is accessed by selecting **HP Menu** from the **Main** menu. Use the **UP** or **DOWN ARROW** key to make the desired selection and then press the **ENTER** key to open or change. Press the **Esc** key to go back to the **Main** menu.

Table 35. HP Menu

Selectable Parameter	Description	Range	Factory Default
Page 1			
HP Mode:	Current heat pump mode status	Off/Heat/Cool	—
Unit DA Temp:	Current DAT	—	
ActDatSp:	Current active DAT setpoint		
HP Ouput %:	Current modulation percentage output to heatpump (100% = full capacity)		
HP Ouput Volt:	Current modulation voltage output to heatpump (5.0 Vdc = full capacity)		
↓ **Next**	Next page		
Page 2 (Shown when Temp Control Is Dp, Refer to Table 21)			
↑ **Previous**	Previous page	—	
DpCngOvrLt:	Energy Recovery Wheel Dewpoint Changeover Limit: point at which DAT swaps between **DatSpHiDp** and **DatSpLoDp** setpoints	52–65°F (11–18°C)	59°F (15°C)
DatSpHiDp:	Discharge Air Temperature Setpoint with High Dewpoint: setpoint used when Energy Recovery Wheel Dewpoint is > **DpCngOvrLt** setpoint	52–75°F (11–24°C)	58°F (14°C)
DatSpLoDp:	Discharge Air Temperature Setpoint with Low Dewpoint: setpoint used when Energy Recovery Wheel Dewpoint is < **DpCngOvrLt** setpoint	52–75°F (11–24°C)	70°F (21°C)
DatSpDb:	Sets Discharge Air Temperature Setpoint Deadband	1–10°F	5°F
ModeCngTmr:	Sets Changeover Mode Timer	5–20 minutes	10 minutes
ActDatSp:	Current Active Unit Discharge Air Temperature Setpoint	—	
↓ **Menu Top**	Returns to top of menu (page 1)		
Page 2: (Shown when Temp Control Is HtgClgOA, Refer to Table 21)			
↑ **Previous**	Previous page	—	
DpCngOvrLt:	Wheel Dewpoint Changeover Limit: point at which DAT swaps between **DatSpHiDp** and **DatSpLoDp** setpoints	52–65°F (11–18°C)	59°F (15°C)
DatSpHiDp:	Discharge Air Temperature Setpoint with High Dewpoint: setpoint used when Energy Recovery Wheel Dewpoint is > **DpCngOvrLt** setpoint	52–75°F (11–24°C)	58°F (14°C)
DatClgSpLoDp:*	Discharge Air Temperature Cooling Setpoint with Low Dewpoint: setpoint used when Energy Recovery Wheel Dewpoint is < **DpCngOvrLt** setpoint and OAT is > **OaCngOvr** setpoint	52–75°F (11–24°C)	60°F (15.5°C)
DatHtgSpLoDp:*	Discharge Air Temperature Heating Setpoint with Low Dewpoint: setpoint used when Energy Recovery Wheel Dewpoint is < **DpCngOvrLt** setpoint and OAT is < **OaCngOvr** setpoint	52–75°F (11–24°C)	70°F (21°C)
DatSpDb:	Sets Discharge Air Temperature Setpoint Deadband	1–10°F	5°F

***These setpoints will replace the **DatSpLoDP** setpoint when the control type is changed.

Unit Controller Points and Display Menus—Continued

HP Menu—Continued

Table 35. HP Menu—Continued

Selectable Parameter	Description	Range	Factory Default
Page 2: (Shown when Temp Control Is HtgClgOA, Refer to Table 21)—Continued			
OaCngOvr:	Sets Outside Air Changeover Setpoint	52–75°F (11–24°C)	65°F (18°C)
OaCngOvrDb:	Sets Outside Air Changeover Setpoint Deadband	1–10°F	2°F
ModeCngTmr:	Sets the Changeover Mode Timer	5–20 minutes	10 minutes
ActDatSp:	Current Active Unit Discharge Air Temperature Setpoint	—	
↓ **Menu Top**	Returns to top of menu (page 1)		
Page 2: (Shown when Temp Control Is OAReset, Refer to Table 21)			
↑ **Previous**	Previous menu	—	
DpCngOvrLt:	Wheel Dewpoint Changeover Limit: point at which DAT swaps between **DatSpHiDp** and reset output setpoints	52–65°F (11–18°C)	59°F (15°C)
DatSpHiDp:	Discharge Air Temperature Setpoint with High Dewpoint: setpoint used when Energy Recovery Wheel Dewpoint is > **DpCngOvrLt** setpoint	52–75°F (11–24°C)	58°F (14°C)
OaLoSpLoDp:*	Outside Air Temperature Low Setpoint with Low Dewpoint (Outside Air Low Limit Reset Setpoint) when OAT = this setpoint, Unit Discharge Air Temperature Setpoint = **DaHiSpLoDp**	0–80°F (−13–27°C)	50°F (10°C)
OaHiSpLoDp:*	Outside Air Temperature High Setpoint with Low Dewpoint (Outside Air High Limit Reset Setpoint): when OAT = this setpoint, Unit Discharge Air Temperature Setpoint = **DaLoSpLoDp**	0–80°F (−13–27°C)	70°F (21°C)
DaHiSpLoDp:*	Discharge Air Temperature High Setpoint with Low Dewpoint: setpoint used when Energy Recovery Wheel Dewpoint is < **DpCngOvrLt** setpoint and OAT = **OaLoSpLoDp (**DAT setpoint is reset linearly between **DaHiSpLoDp** and **DaLoSpLoDp** setpoints)	52–75°F (11–24°C)	70°F (21°C)
DaLoSpLoDp:*	Discharge Air Temperature Low Setpoint with Low Dewpoint: setpoint used when Energy Recovery Wheel Dewpoint is < **DpCngOvrLt** setpoint and OAT = **OaHiSpLoDp (**DAT setpoint is reset linearly between **DaHiSpLoDp** and **DaLoSpLoDp** setpoints)	52–75°F (11–24°C)	60°F (15.5°C)
DatSpDb:	Sets Discharge Air Temperature Setpoint Deadband	1–10°F	5°F
ModeCngTmr:	Sets te Changeover Mode Timer	5–20 minutes	10 minutes
DatResetOutput:	Current Discharge Air Temperature Reset Output	—	
ActDatSp:	Current Active Unit Discharge Air Temperature Setpoint		
↓ **Menu Top**	Returns to top of menu (page 1)		
Page 2: (Shown when Temp Control Is HtgClgSpc, Refer to Table 21)			
↑ **Previous**	Previous menu	—	
DpCngOvrLt:	Wheel Dewpoint Changeover Limit: point at which DAT swaps between **DatSpHiDp** and **DatSpLoDp** setpoints	52–65°F (11–18°C)	59°F (15°C)
DatSpHiDp:	Discharge Air Temperature Setpoint with High Dewpoint: setpoint used when Energy Recovery Wheel Dewpoint is > **DpCngOvrLt** setpoint	52–75°F (11–24°C)	58°F (14°C)
DatClgSpLoDp:*	Discharge Air Temperature Cooling Setpoint with Low Dewpoint: setpoint used when Energy Recovery Wheel Dewpoint is lower than **DpCngOvrLt** setpoint and OAT is > **ZnCngOvr** setpoint	52–75°F (11–24°C)	60°F (15.5°C)
DatHtgSpLoDp:*	Discharge Air Temperature Heating Setpoint with Low Dewpoint: setpoint used when Energy Recovery Wheel Dewpoint is < **DpCngOvrLt** setpoint and OAT is < **ZnCngOvr** setpoint	52–75°F (11–24°C)	70°F (21°C)
DatSpDb:	Sets Discharge Air Temperature Setpoint Deadband	1–10°F	5°F
ZnCngOvr:	Sets Zone Changeover Setpoint	52–75°F (11–24°C)	70°F (21°C)
ZnCngOvrDb:	Sets Zone Changeover Setpoint Deadband	1–10°F	2°F
ModeCngTmr:	Sets Changeover Mode Timer	5–20 minutes	10 minutes
ActDatSp:	Current Active Unit Discharge Air Temperature Setpoint	—	
↓ **Menu Top**	Returns to top of menu (page 1)		
***These setpoints will replace the **DatSpLoDP** setpoint when the control type is changed.			

Alarm History Menu

The **Alarm History** menu (refer to Table 36) is accessed by selecting **Alarm History** menu from the **Main** menu. Use the **UP** or **DOWN ARROW** key to make the desired selection and then press the **ENTER** key to open or change. Press the **Esc** key to go back to the **Main** menu.

Table 36. Alarm History Menu

Selectable Parameter	Description
Alarm History	Shows alarm history; to clear, press **ALARM** and **Prg** key while on history page
Unit DAT:	Unit DAT at alarm
OAT:	Unit OAT at alarm
ER DAT:	Energy recovery wheel DAT at alarm
ER DAHum:	Energy recovery wheel discharge air humidity at alarm

Alarm Help Menu

The **Alarm Help** menu (refer to **Table 37**) is accessed by selecting **Alarm Help** menu from the **Main** menu. Use the **UP** or **DOWN ARROW** key to make the desired selection and then press the **ENTER** key to open or change. Press the **Esc** key to go back to the **Main** menu. The **Alarm Help** submenus (refer to **Table 38**) are accessed by selection from the **Alarm Help** menu. Use the **UP** or **DOWN ARROW** key to make the desired selection and then press the **ENTER** key to open or change.

Table 37. Alarm Help Menu

Display Item	Description
Page 1	
Unit DAT Fail	Opens **Unit DAT Fail** help menu
OAT Fail	Opens **OAT Fail** help menu
ER Wheel Temp Fail	Opens **ER Wheel Temp Fail** help menu
ER Wheel Hum Fail	Opens **ER Wheel Hum Fail** help menu
VOC/CO2 Alarm	Opens **VOC/CO2 Alarm** help menu
SA Fan Fail	Opens **SA Fan Fail** help menu
EA Fan Fail	Opens **EA Fan Fail** help menu
HP General Alarm	Opens **HP General Alarm** help menu
Fan General Alarm	Opens **Fan General Alarm** help menu
4way Valve Fail	Opens **4way Valve Fail** help menu
Hi OAT Lockout	Opens **Hi OAT Lockout** help menu
Dirty Filter Alarm	Opens **Dirty Filter Alarm** help menu
Shutdown DI Alarm	Opens **Shutdown DI Alarm** help menu
System Restart	Opens **System Restart** help menu
Unit Lockout Alarm	Opens **Unit Lockout Alarm** help menu
Low Limit Alarm	Opens **Low Limit Alarm** help menu
Cripple Mode Alarm	Opens **Cripple Mode Alarm** help menu
Wheel Maintenance	Opens **Wheel Maintenance** help menu
BAS Shutdown Alarm	Opens **BAS Shutdown Alarm** help menu
↓ Menu Top	Returns to top of menu

Table 38. Alarm Help Submenus

Submenu	Page*	Display Item	Description
Unit DAT Fail	2	**Unit discharge air temperature sensor has failed**	Heat pump will not operate with failed sensor
		↓ More	More items
	3	**Discharge air temp sensor has failed**	−60 sensor reading = open circuit
			225 sensor reading = shorted circuit
		↓ More	More items
	4	**1. Verify sensor wire integrity**	—
		2. Verify sensor resistance	Refer to **APPENDIX**
		↓ More	More items
	5	**3. See troubleshooting info**	Refer to **Troubleshooting** section
		4. Replace sensor	Replace DAT sensor
		5. Contact technical support	Phone: 1-800-695-1901
		↓ Menu Top	Returns to top of menu (page 2)
OAT Fail	2	**Outside air temperature sensor has failed**	−60 sensor reading = open circuit
			225 sensor reading = shorted circuit
		↓ More	More items
	3	**1. Verify sensor wire integrity**	—
		2. Verify sensor resistance	Refer to **APPENDIX**
		↓ More	More items
	4	**3. See troubleshooting info**	Refer to **Troubleshooting** section
		4. Replace sensor	Replace OAT sensor
		5. Contact technical support	Phone: 1-800-695-1901
		↓ Menu Top	Returns to top of menu (page 2)
ER Wheel Temp Fail	2	**ER wheel discharge air temperature sensor has failed**	−60 sensor reading = open circuit
			225 sensor reading = shorted circuit
		↓ More	More items
	3	**1. Verify sensor wire integrity**	—
		2. Verify sensor resistance	Refer to **APPENDIX**
		↓ More	More items
	4	**3. See troubleshooting info**	Refer to **Troubleshooting** section
		4. Replace sensor	Replace ER wheel DAT sensor
		5. Contact technical support	Phone: 1-800-695-1901
		↓ Menu Top	Returns to top of menu (page 2)

***Press the **Esc** key to return to page 1 (**Alarm Help** menu, refer to **Table 37**).

Unit Controller Points and Display Menus—Continued

Alarm Help Menu—Continued

Table 38. Alarm Help Submenus—Continued

Submenu	Page*	Display Item	Description
ER Wheel Hum Fail	2	**ER wheel discharge air humidity sensor has failed**	System sets default reading to 100%
		↓ More	More items
	3	**1. Verify sensor wire integrity**	—
		2. Verify DC voltage from sensor	DC voltage should be between 0VDC and 5VDC
		↓ More	More items
	4	**3. See troubleshooting info**	Refer to **Troubleshooting** section
		4. Replace sensor	Replace ER wheel discharge air humidity sensor
		5. Contact technical support	Phone: 1-800-695-1901
		↓ Menu Top	Returns to top of menu (page 2)
VOC/CO2 Alarm	2	**VOC/CO2 reading is above alarm setpoint**	—
SA Fan Fail	2	**Supply air fan is commanded ON but there is no status from pressure switch**	ON status is shown with closed contact on DI-1
		↓ More	More items
	3	**First reset unit! If fan does not start:**	—
		1. Verify ON command from controller	
		↓ More	More items
	4	**2. Verify contactor is closed**	Check pressure switch
		3. If OA damper is installed, verify end switch is closed	
		↓ More	More items
	5	**4. See troubleshooting info**	Refer to **Troubleshooting** section
		5. Contact technical support	Phone: 1-800-695-1901
		↓ More	More items
	6	**IF fan starts:**	—
		1. Verify pressure switch wire integrity	Check pressure switch
		2. Verify contact closure on switch	
		↓ More	More items
	7	**3. See troubleshooting info**	Refer to **Troubleshooting** section
		4. Replace sensor	Replace supply fan air proving switch
		5. Contact technical support	Phone: 1-800-695-1901
		↓ Menu Top	Returns to top of menu (page 2)
EA Fan Fail	2	**Exhaust air fan is commanded ON but there is no status from pressure switch**	ON status is shown with closed contact on DI-1
		↓ More	More items
	3	**First reset unit! If fan does not start:**	—
		1. Verify ON command from controller	
		↓ More	More items
	4	**2. Verify contactor is closed**	Check pressure switch
		3. If OA damper is installed, verify end switch is closed	
		↓ More	More items
	5	**4. See troubleshooting info**	Refer to **Troubleshooting** section
		5. Contact technical support	Phone: 1-800-695-1901
		↓ More	More items
	6	**IF fan starts:**	—
		1. Verify pressure switch wire integrity	Check pressure switch
		2. Verify contact closure on switch	
		↓ More	More items
	7	**3. See troubleshooting info**	Refer to **Troubleshooting** section
		4. Replace sensor	Replace exhaust fan air proving switch
		5. Contact technical support	Phone: 1-800-695-1901
		↓ Menu Top	Returns to top of menu (page 2)

***Press the **Esc** key to return to page 1 (**Alarm Help** menu, refer to **Table 37**).

Table 38. Alarm Help Submenus—Continued			
Submenu	**Page***	**Display Item**	**Description**
HP General Alarm	2	**HP controller is sending general alarm**	Alarm is monitored with contact closure where closure = alarm condition
		↓ More	More items
	3	**1. Verify alarm condition has occurred**	Note compressor LED code
		↓ More	More items
	4	**Flash codes:**	—
		2 = high compressor discharge temperature	
		↓ More	More items
	5	**3 = compressor protector trip**	—
		4 = locked rotor alert	
		5 = demand signal loss	
		↓ Menu Top	Returns to top of menu (page 2)
HP General Alarm (continued)	6	**6 = discharge thermistor fault**	—
		7 = unloader solenoid valve fault	
		↓ More	More items
	7	**8 = compressor contactor fault**	—
		9 = low 24VAC supply to controller	
		↓ More	More items
	8	**Solid = compressor controller failure**	—
		2. If no alarm is at HP controller, verify wire integrity	
		↓ More	More items
	9	**3. See troubleshooting info**	Refer to **Troubleshooting** section
		↓ More	More items
	10	**4. Contact technical support**	Phone: 1-800-695-1901
		↓ Menu Top	Returns to top of menu (page 2)
Fan General Alarm	2	**Fan controller is sending general alarm**	Alarm is monitored with contact closure where closure = alarm condition
	3	**1. Verify alarm condition has occurred**	—
		↓ More	More items
	4	**2. If no alarm is at Fan controller, verify wire integrity.**	
		3. If there is active alarm at fan, see troubleshooting info	Refer to **Troubleshooting** section
		↓ More	More items
	5	**5. Contact technical support**	Phone: 1-800-695-1901
		↓ Menu Top	Returns to top of menu (page 2)
4way Valve Fail	2	**Reversing valve alarm occurs when request for mode is issued and expected temperature change does not occur**	
		↓ More	More items
	3	**Heating mode = there should be increase in temperature**	—
		Cooling mode = there should be decrease in temperature	
		↓ More	More items
	4	**1. Verify valve wire intergrity**	Check valve
		2. Verify power at four-way valve	
		↓ More	More items
	5	**3. Verify valve operation in test mode**	Check valve operation
		4. See troubleshooting info	Refer to **Troubleshooting** section
		↓ More	More items
	6	**5. Contact technical support**	Phone: 1-800-695-1901
		↓ Menu Top	Returns to top of menu (page 2)
Hi OAT Lockout	2 & 3	**OA has exceeded allowed high limit**	Unit auto-restarts once OA is < high limit
		↓ Menu Top	Returns to top of menu (page 2)
Dirty Filter Alarm	2	**Pressure limit for filter is above setpoint**	Alarm is monitored with contact closure where closure = alarm condition
		↓ More	More items
	3	**1. Change filters**	Refer to **Inlet and Exhaust Hood Maintenance** section
		2. Manually adjust pressure high limit setpoint at pressure sensor	
		↓ More	More items
	4	**3. See troubleshooting info**	Refer to **Troubleshooting** section
		↓ Menu Top	Returns to top of menu (page 2)
Shutdown DI Alarm	2	**Manual shutdown DI is in alarm condition**	Alarm is monitored with contact closure where closure = alarm condition
		↓ More	More items
	3	**1. Correct manual alarm condition**	Refer to **Troubleshooting** section
		↓ More	More items
	4	**2. See troubleshooting info**	Refer to **Troubleshooting** section
		3. Contact technical support	Phone: 1-800-695-1901
		↓ Menu Top	Returns to top of menu (page 2)

*Press the **Esc** key to return to page 1 (**Alarm Help** menu, refer to **Table 37**).

Unit Controller Points and Display Menus—Continued

Alarm Help Menu—Continued

Table 38. Alarm Help Submenus—Continued

Submenu	Page*	Display Item	Description
System Restart	2 & 3	**System is in automatic restart mode**	Unit will restart after 1 hour
			Alarm history shows alarm that caused restart
			Reset alarm or cycle power to clear mode
		↓ Menu Top	Returns to top of menu (page 2)
Unit Lockout Alarm	2 & 3	**Unit is locked out due to multiple restarts**	Alarm history shows alarm that caused lockout
			Reset alarm or cycle power to clear mode
		↓ Menu Top	Returns to top of menu (page 2)
Low Limit Alarm	2 & 3	**Unit discharge air is < minimum setpoint for > allowed time**	—
		1. Verify operation of heating equipment	Check HP and preheat
		2. See troubleshooting info	Refer to **Troubleshooting** section
		3. Contact technical support	Phone: 1-800-695-1901
		↓ Menu Top	Returns to top of menu (page 2)
Cripple Mode Alarm	2 & 3	**Unit is currently running in cripple mode**	System continues to operate despite failure
		1. Review current alarm history	Verify cause and correct failure
		2. Contact technical support	Phone: 1-800-695-1901
		↓ Menu Top	Returns to top of menu (page 2)
Wheel Maintenance	2 & 3	**ER wheel performance is < acceptable range**	Check for broken belt
			Check for dirty wheel media
			Check if return air and outside air are equal
		1. Verify proper ER wheel operation	Check ER wheel
		2. See troubleshooting info	Refer to **Troubleshooting** section
		3. Contact technical support	Phone: 1-800-695-1901
		↓ Menu Top	Returns to top of menu (page 2)
BAS Shutdown Alarm	2, 3, & 4	**BAS Shutdown command is in alarm condition**	Unit will not start until alarm is cleared
			Unit can be overridden for set amount of time under or shutdown can be disabled (**Config** menu → **BAS Shutdown** menu)
		↓ Menu Top	Returns to top of menu (page 2)

*Press the **Esc** key to return to page 1 (**Alarm Help** menu, refer to **Table 37**).

User Display Help Menu

The **User Display Help** menu (refer to **Table 39**) is accessed by selecting **User Display Help** menu from the **Main** menu. Use the **UP** or **DOWN ARROW** key to make the desired selection and then press the **ENTER** key to open or change. Press the **Esc** key to go back to the **Main** menu.

Table 39. User Display Help Menu

Menu	Page	Display Item	Description
User Help Display	1	**Quickkey Shortcuts**	Opens **Quickkey Shortcuts** menu
		Buttons	Opens **Buttons** menu
		↓ More	More items
Quickkey Shortcuts	2*	**1. While on the Home / Summary page, holding "←" down for 5 seconds will take you to the Test Mode.**	
		↓ More	More items
	3*	**2. While on the Home / Summary page, holding down the "←" and "Prg" for 5 seconds will allow manual override of the unit start/stop.**	
		↓ More	More items
	4*	**3. While navigating the menu, if a ? is at the top right corner, pressing the "Prg" button will take you to the built-in help menu.**	
		↓ More	More items
	5 & 6*	**4. While on the the alarm history screen, holding down the "Alarm" and "Prg" will clear the Alarm History.**	
		↓ Menu Top	Returns to top of menu (page 2)

*Press the **Esc** key to return to page 1.

Table 39. User Display Help Menu—Continued			
Menu	**Page**	**Display Item**	**Description**
Buttons	2*	**1. Bell "Alarm" Button is used to move you to the active alarm screen. Button will be illuminated when an alarm is present.**	
		↓ More	More items
	3, 4, & 5*	**2. PRG Button has multiple functions. When on the Home or Summary screens, the button moves you to the main menu. When there is a "?" mark in the top right corner, the button moves you to the built-in help screens. When on the manual test screens, the button will reset the maximum test time back to 3 hours.**	
		↓ More	More items
	6 & 7*	**3. ESC Button is used to cancel a setpoint before accepting it. The button also is used to move back to the previous menu.**	
		↓ More	More items
	8*	**4. Up Arrow Button (↑) is used to move the cursor upwards and change screens. It is also used to increase the value of a setpoint.**	
		↓ More	More items
	9*	**5. Enter Button (←) is used to select a line or setpoint indicated by brackets [ ]. It also is used to accept the setpoint change.**	
		↓ More	More items
	10, 11, & 12*	**6. Down Arrow Button (↓) is used to move the cursor downwards and change screens. It is also used to decrease the value of a setpoint.**	
		↓ Menu Top	Returns to top of menu (page 2)
*Press the **Esc** key to return to page 1.			

Startup

NOTE: IMPORTANT: Failure to maintain the unit, misuse of the unit, or wrong startup procedures will void the warranty.

Pre-Startup Considerations

Before actual startup, ensure the following:

- Become familiar with the applicable control information previously-listed in the **Operation** section of this manual. Also become familiar with the test mode (refer to **Test Mode** section) and fan setting procedures (refer to **Setting Fan Speed to Test and/or Balance Airflow** section).
- Perform all of the preparation checks on the startup form in the **APPENDIX**.

⚠ CAUTION ⚠

Check compressor rotation to verify correct phasing. DO NOT use fan rotation to check phasing. ECM fans cannot run backwards.

- At startup, be prepared to check compressor rotation to verify correct three-phase wiring connection (refer to **Supply Voltage** section).
- At startup, be prepared to set the fan speeds (refer to **Setting Fan Speed to Test and/or Balance Airflow** section).
- If installation includes an optional remote display, be sure to follow the instructions in the **Remote-Mounted Display (Option RB5)** section (or the control instruction sheet) to reset the display address.

Test Mode

- **Test mode access:** Under the **Service** menu (refer to **Table 23**), there are manual and automatic test modes that allow the user to test each component of the system. To access and use the test mode, refer to **Table 40**, which lists the test mode sequence.
- **Manual test mode:** The manual test mode is used to assist in the startup procedure. Manual test mode allows each component to be staged individually to allow for startup of the system, allowing fans to be started and modulated, the wheel to be started, the reversing valve to be set (heat/cool) and the heat pump to be started and modulated. The manual test mode has a 3-hour limit, after which elapsing the system automatically resets back to normal.
- **Automatic test mode:** The automatic test mode is used to demonstrate the operation of the unit. There is a single, adjustable timer (2-minute default) that is used to set the time for how long each component runs. In automatic test mode, the unit turns on the fans, then the wheel, then the heat pump, and finally the electric heat. The heat pump will first start in the cooling mode and will modulate from the minimum position to 30% capacity. The heat pump will then stop and restart in the heating mode and modulate from the minimum position to 30% capacity.

Startup—Continued

Test Mode—Continued

Table 40. Test Mode Sequence

Step	Description	Display Screen
	NOTE: **While on the home screen or summary screens, pressing and holding the ENTER key for 5 seconds will move you directly to the Test menu and will bypass steps 1 through 5.** **In the display screens that follow, brackets [ ] appear around the current selection. See Figure 31 for a guide to key functions.**	
1	Press **Prg** key to advance to **Main** menu	↑ **-Main Menu-** **Quick Setpoints** **[SERVICE MENU]** **Occ Config Menu** **Fan Menu** **Wheel Menu** ↓ **HP Menu**
2	Press **DOWN ARROW** key to scroll down to **SERVICE MENU**	
3	Press **ENTER** key to select and advance to **Service** menu	↑ **-Service Menu-** **[TEST MENU]** **input/output** **Run Times** **Loop Tuning** **System** ↓ **Config**
4	Press **DOWN ARROW** key to scroll down to **TEST MENU**	
4	Press **ENTER** key to select and advance to **Test Mode** menu	**Test Mode** **Test Mode: [Manual]** **Auto Test Time Between Component Delay: 2m** ↓
5	Press **DOWN ARROW** key to scroll down to **Test Mode:**	
6	Press **ENTER** key to select **Test Mode:** field and press **DOWN** or **UP ARROW** key to change field from **Off** to **Manual**	
7	Press **ENTER** key to select **Manual** test mode	
NOTE: In manual test mode, the user has the ability to stage the unit manually to test individual components. The unit is allowed a maximum of three hours in test mode. The remaining time is displayed on the test menus.		↑ **Manual Test 2:59:27** **Fan Relay: [Off]** **SaFanSpdSetpt: 36%** **SaFan Vdc: 4.88V** **ExFanSpdSetpt: 40%** **ExFan Vdc: 5.20V** ↓ **OA Temp: 58.4°F**
8	Press **DOWN** or **UP ARROW** key to access desired menu to test individual component	
9	Use **DOWN** or **UP ARROW** and **ENTER** keys to select and test component	
10	If additional time is needed, press **Prg** key while on test screen to reset time to three hours	
11	When testing is complete, press **Esc** key to go back to **Test Mode** menu and use **DOWN** or **UP ARROW** and **ENTER** keys to set **Test Mode:** field to **Off**	

Return to Factory Setpoints

The system has the ability to save and restore local user setpoints, save fan speed TAB setpoints, and also to return the unit to factory default setpoints. To return to factory setpoints (refer to **Table 30**), proceed as follows:

1. Advance to **Setpt Defaults** menu from **Service** menu. First menu allows all current setpoints to be saved and also to then be restored from that point.

NOTE: The menu for restoring the TAB fan speed setpoints will restore only the last saved TAB setpoints. Therefore, when the setpoints are not saved through the TAB process, the unit returns to the factory-saved setpoints.

2. Next menu allows TAB fan speed setpoints to be restored.
3. Next menu will restore the unit to as-shipped factory setpoints. This applies to all unit setpoints.

Setting Fan Speed to Test and/or Balance Airflow

NOTE: Use the TAB menu when setting, measuring, and verifying fan cfm. The TAB menu allows the setting of supply and exhaust fan values as well as the ability to create and store a backup copy of the values.

To set fan speed, first determine cfm by measuring the pressure drops in both supply and exhaust airflow and then use the TAB menu (refer to **TAB Menu** section) to set the desired speed(s) as follows:

1. Measure supply side as follows:
   a. Open electrical compartment access panel (see **Figure 15**).
   b. Locate two air proving switches and determine which switch is for supply air side.
   c. Disconnect both pieces of tubing from selected switch and connect them to manometer.
2. Operate unit in manual test mode (refer to **Table 40**) and record manometer reading (supply side pressure drop).
3. Refer to **Table 41** to convert pressure drop to cfm. Record supply airflow cfm.

Table 41. Supply Airflow Pressure Drop

Pressure Drop (IN WC)	Pressure Drop (Pascal)	Unit Size 8		Unit Size 12	
		cfm	Liter per Second	cfm	Liter per Second
0.10	25	108	50.97	376	177.45
0.20	50	181	85.42	483	227.95
0.30	75	252	118.93	573	270.43
0.40	100	321	151.50	649	306.29
0.50	124	388	183.12	715	337.44
0.60	149	451	212.85	774	365.29
0.70	174	512	241.64	827	390.30
0.80	199	569	268.54	876	413.43
0.90	224	624	294.50	922	435.14
1.00	249	674	318.09	965	455.43
1.10	274	722	340.75	1007	475.25
1.20	299	766	361.51	1047	494.13
1.30	323	808	381.33	1086	512.53
1.40	348	847	399.74	1123	530.00
1.50	373	883	416.73	1158	546.52
1.60	398	917	432.78	1192	562.53
1.70	423	949	447.88	1224	577.66
1.80	448	980	462.51	1255	592.29
1.90	473	1011	477.14	1285	606.45
2.00	498	1041	491.30	1313	619.67
2.10	523	1072	505.93	1340	632.41
2.20	547	1104	521.03	1366	644.68
2.30	572	1139	537.55	1392	656.95
2.40	597	1176	555.01	1417	668.75
2.50	622	1218	574.83	1443	681.02
2.60	647	—		1468	692.82
2.70	672			1494	705.09
2.80	697			1519	716.89
2.90	722			1544	728.69
3.00	747			1567	739.54

NOTE:

- **Do not reconnect the yellow tubing to the air proving switch. The air differential of this tubing might cause an alarm from the controller.**
- **Do not use electrical tape to reconnect tubing.**

4. Disconnect both pieces of tubing from manometer and reconnect clear tubing to low side of air proving switch. Secure unconnected piece of tubing to cabinet.

Startup—Continued

Setting Fan Speed to Test and/or Balance Airflow—Continued

5. Repeat steps 1 through 4 with other air proving switch to measure exhaust airflow side and refer to **Table 42** to convert pressure drop to cfm. Record exhaust airflow cfm.

Table 42. Exhaust Airflow Pressure Drop

Pressure Drop (IN WC)	Pressure Drop (Pascal)	Unit Size 8		Unit Size 12	
		cfm	Liter per Second	cfm	Liter per Second
0.50	124	558	263.35	1018	480.44
0.60	149	752	354.90	1120	528.58
0.70	174	902	425.70	1210	571.06
0.80	199	1019	480.91	1292	609.76
0.90	224	1111	524.33	1366	644.68
1.00	249	1186	559.73	1434	676.77
1.10	274	1249	589.46	1497	706.51
1.20	299	1303	614.95	1555	733.88
1.30	323	1353	638.54	1611	760.31
1.40	348	1401	661.20	1664	785.32
1.50	373	1448	683.38	1715	809.39
1.60	398	1494	705.09	1765	832.99
1.70	423	1541	727.27	1814	856.11
1.80	448	1589	749.92	1862	878.77
1.90	473	1637	772.58	1909	900.95
2.00	498	1686	795.70	1957	923.60
2.10	523	1734	818.36	2004	945.78
2.20	547	1781	840.54	2050	967.49
2.30	572	1828	862.72	2097	989.67
2.40	597	1873	883.96	2144	1011.86
2.50	622	1917	904.72	2190	1033.56
2.60	647	1958	924.07	2236	1055.27
2.70	672	1998	942.95	2282	1076.98
2.80	697	2036	960.89	2327	1098.22
2.90	722	2071	977.40	2372	1119.46
3.00	747	2105	993.45	2416	1140.23
3.10	771	2137	1008.55	2460	1160.99
3.20	796	2167	1022.71	2502	1180.81
3.30	821	2197	1036.87	2544	1200.63
3.40	846	2226	1050.56	2584	1219.51
3.50	871	2254	1063.77	2624	1238.39
3.60	896	2282	1076.98	2662	1256.32
3.70	921	2311	1090.67	2700	1274.26
3.80	946	2339	1103.89	2736	1291.25
3.90	970	2369	1118.04	2771	1307.77
4.00	995	2398	1131.73	2805	1323.81
4.10	1020	2429	1146.36	2837	1338.91
4.20	1045	2460	1160.99	2869	1354.02
4.30	1070	2491	1175.62	2900	1368.65
4.40	1095	2523	1190.72	2930	1382.81
4.50	1120	2554	1205.35	2959	1396.49
4.60	1145	2584	1219.51	2987	1409.71
4.70	1170	2613	1233.20	3015	1422.92
4.80	1194	2641	1246.41	3043	1436.14
4.90	1219	2668	1259.16	3070	1448.88
5.00	1244	2693	1270.95	3097	1461.62
5.10	1269	2716	1281.81	3125	1474.84
5.20	1294	2738	1292.19	3152	1487.58
5.30	1319	2760	1302.57	3179	1500.32
5.40	1344	2782	1312.96	3207	1513.54
5.50	1369	2808	1325.23	3234	1526.28
5.60	1394	—		3262	1539.49
5.70	1418			3290	1552.71
5.80	1443			3318	1565.92
5.90	1468			3346	1579.14

6. Set fan speed in accordance with sequence listed in **Table 43**. See **Figure 31** for guide to key functions. Use values recorded in step 3 (supply airflow cfm) and step 5 (exhaust airflow cfm).

Table 43. Setting Fan Speed

Step	Description	Display Screen
	NOTE: **This adjustment process may take two or three iterations. When setting the ECM fans to balance airflow, proceed as follows:** **1) Set supply air cfm by using the control panel to directly set fan rpm.** **2) After supply air cfm is relatively close, adjust exhaust air fan cfm/rpm.** **3) After setting exhaust fan airflow, check and re-adjust supply fan airflow.** **Until the new TAB Speeds to Speed Setpoint is written (step 9), the values are temporary and will be reset to previous values upon a restart. There is a 3-hour time limit on TAB mode. If still in TAB mode after 3 hours, the unit automatically return to Auto mode.**	
1	Press **Prg** key to advance to **Main** Menu	↑ **-Main Menu-** **Quick Setpoints** **[SERVICE MENU]** **Occ Config Menu** **Fan Menu** **Wheel Menu** ↓ **HP Menu**
2	Press **DOWN ARROW** key to scroll down to **SERVICE MENU**	
3	Press **ENTER** key to select and advance to **Service** menu	
4	Press **DOWN ARROW** key to scroll down to **TAB MENU**	↑ **-Service Menu-** **System** **Config** **Calibration** **Setpt Defaults** **[TAB MENU]** ↓ **Menu Top**
5	Press **ENTER** key to select and advance to **TAB** menu	
6	Press **DOWN ARROW** key to scroll down to **Mode:** field	**-TAB MENU-** **To Start the TAB Process set the mode to "TAB". This will allow 3hrs of override** **Mode: [TAB]** ↓ **Next**
7	Press **ENTER** key to select **TAB** and to advance to next screen	
8	Use **UP** or **DOWN ARROW** key to make desired selection(s) and/or to advance to next screen(s) and **ENTER** key to accept new setpoint(s) and/or to enable fans, wheel, and compressor	↑ **Prev** **ER Wheel: [Off]** **Comp Mode: Off** **Comp Output: 0.0%** **ER Wheel Temp: 56.4°** **Unit DA Temp 60.0** ↓ **Next**
9	Set **Write Fan TAB Speeds Speed Setpts** field to **Yes** **NOTE: This will move the current TAB fan setpoints over to the fan permanent setpoints and also create a backup copy of the current TAB setpoints.**	**-TAB MENU-** **TAB Mode: TAB** **Fan Relay: [On]** **SaFanSpdSetpt: 75%** **ExFanSpdSetpt: 75%** **Write Fan TAB Speeds to Speed Setpts? No** ↓ **Next**
10	As alternate way to save setpoints, press **Esc** key to advance to this menu and change field to **Yes**	**-TAB MENU-** **Do you want to save Fan TAB speeds to Speed Setpts and save TAB backup? [No]** **Press Esc to return!**

Startup—Continued

Setting Schedule

The local schedule consists of seven daily events and a timed override. Each daily event consists of a start and stop time. Each daily event can then be applied to any or all weekdays and weekends. A schedule of 8:00 AM to 5:00 PM, Monday through Friday, uses only one daily event. The timed override events consist of an override condition (ON/OFF) and the amount of time on override. This is a one-time override occurrence.

Optional Communication Cards

The currently-supported building automation protocols are BACnet® MSTP (option BHB8) and LonWorks® (option BHB7). With the addition of an optional Building Maintenance System (BMS) communication card (see **Figure 35**), the building automation system can remotely-adjust setpoints and view status points and alarms. Contact the Factory if additional protocol support is needed.

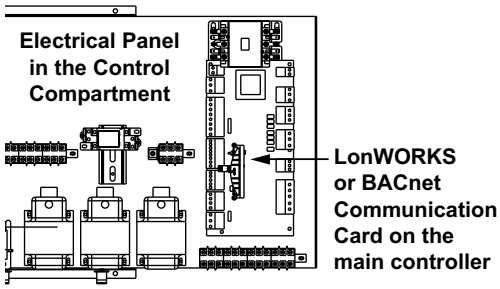


Figure 35. Optional Communication Card

BACnet® MSTP (Option BHB8) Communication

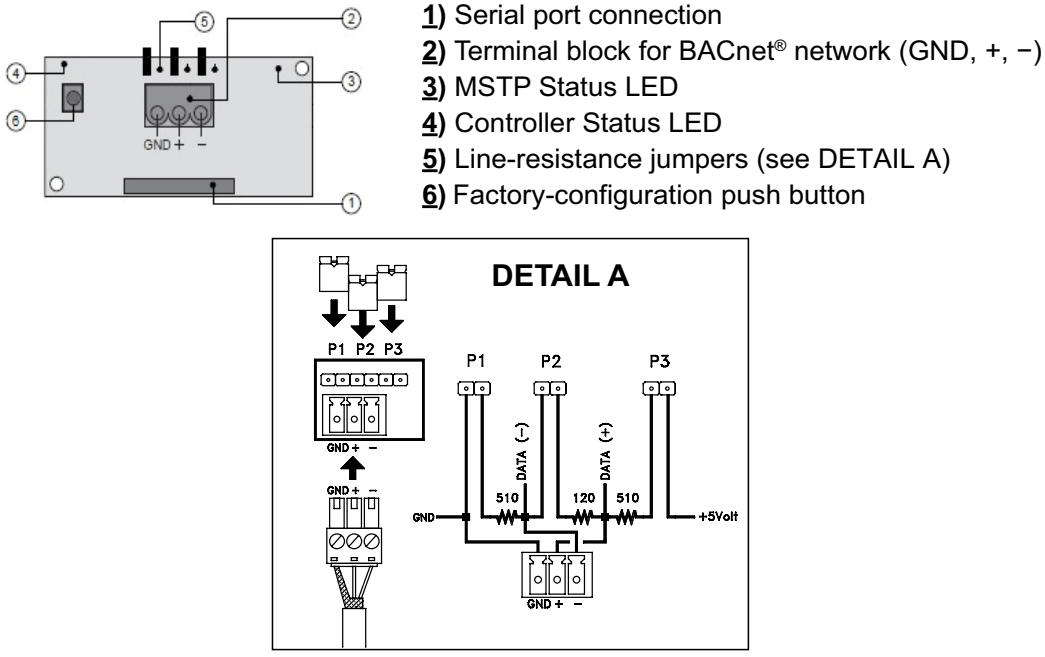
BACnet® MSTP communication allows access to all unit function parameters. The standard communication protocol in these units is identified as BACnet® over MS/TP (Master Slave/Token Passing). This protocol is used for communicating BACnet® over a network of BACnet® only controllers. The network is considered open communication, whereas any device on the network has the capability to receive input from any other controller on the network. For all of these units included on a BACnet® network, there are certain configuration parameters that need to be met before communication can be established with other devices. These settings and configuration parameters must be set properly or the device will not respond when prompted by other devices in the network. To view and adjust these parameters, advance to the **BMS Config** menu located under **Service Menu/System**. The protocol must be set to **BACnet® MSTP** and the **BACnet® Plugin** field must be set to **Yes**. From the **MSTP SETUP** screen, press the **ENTER** key to pull current data from the communication card. Now go to each parameter that needs adjusting and make the necessary changes. When changes are complete and while still on the **MSTP SETUP** screen, press the **Prg** key to save the changes to the BACnet® communication card. After saving the new setpoints, the controller must be power-cycled to complete the process. Once the power has been restored and the BACnet® card has initialized, go back to the **MSTP SETUP** screen to confirm that changes were accepted. Refer to **Table 44** for a listing of MSTP parameters and their ranges and default settings. The protocol must be set to **BACnet MSTP**.

Table 44. MSTP Config Menu

Display Item	Description	Range	Factory Default
Instance:	Allows device instance for controller to be modified	0–4,194,303	77,000
Baudrate:	Allows connection speed for MSTP network to be modified	9600, 19,200, 38,400, 76,800	38,400
MAC Addr:	Defines MAC address of BACnet® card	—	0
MaxMasters:	Defines highest MS/TP master address that will participate in token-passing	0–127	127
MaxInfoFrames:	Indicates largest number of frames sent by controller before it releases token	0–255	20

Operation information for BACnet® MSTP communication is as follows:

- **BACnet® communication initialization:** The power must be on for several minutes to allow the BACnet® communication to properly initialize.
- **Communication card components:** The BACnet® communication card (see **Figure 36**) has two LEDs (Controller Status and MSTP Status), a push button and three jumpers.
- **Controller Status LED:** The Controller Status LED indicates the status of communication between the card and the controller. It is located above the push button and has two indications: 1) communication with controller is established and working (quick green-OFF-green) and 2) communication is not established and no data is passing to card (slow red-OFF-red): in this case, confirm that card is firmly plugged in and that BMS protocol is set to BACnet MSTP.
- **MSTP Status LED:** The MSTP Status LED is located on the bottom side of the communication card below the Controller Status LED. Wait at least 1 minute after setting the communication parameters and plugging in the communication cable before determining the status of the network communication. The MSTP Status LED indicates the status of communication between the card and the network and has two indications: 1) communication with network is established and working (green with occasional red) and 2) communication is not established and no data is passing to the card (green and red both on): in this case, confirm that system and card baud rate are the same and that card Max Master is equal to or greater than the Station (MAC) Address of the Master with the highest address.
- **Push button:** The push button on the communication card is used to return the card to factory configuration. Reset the card as follows:
  1) with the controller OFF, depress and hold the push button located on the BACnet board while powering the controller back ON. Continue to hold the button, while watching the status LEDs. Wait at least 20 seconds (status LED will flash SLOWLY three times, red-OFF).
  2) Once the flashing begins, release the push button. After three red flashes, the LED comes on green. The LED then confirms recognition of the button by flashing QUICKLY three times red-OFF and then comes on green again.
  3) Wait for about 1 minute for the factory parameters to be loaded.
- **Jumpers:** The jumpers (see **Figure 36**, DETAIL A) are used to create built-in, end-of-line resistance for a BACnet® MSTP network. Jumper P1 adds a 510-ohm polarization resistance between the negative data line (−) and GND. Jumper P2 adds a 120-ohm terminal resistance between the two data lines (+) and (−). Jumper P3 adds a 510-ohm polarization resistance between the positive data line (+) and the +5VDC internal voltage. Insert all three jumpers on the unit at the start of network and the unit at the end of the network. DO NOT insert the jumpers on the intermediate units.
- **BACnet® MSTP Points:** The BACnet® MSTP points are listed in **Table 45**.



1) Serial port connection
2) Terminal block for BACnet® network (GND, +, −)
3) MSTP Status LED
4) Controller Status LED
5) Line-resistance jumpers (see DETAIL A)
6) Factory-configuration push button

Figure 36. BACnet® Board Layout

Startup—Continued

BACnet® MSTP (Option BHB8) Communication—Continued

Table 45. BACnet® MSTP Points List

Point	Description	Read (R)/ Write (W)	Address	Range	Factory Default
Analog Values					
DpCngOvrLt	Wheel Dewpoint Changeover Limit	R/W	AV1	55–65°F	59
DatSpHiDp	Discharge Air Temperature Setpoint with High Dewpoint		AV2		58
DatSpLoDp	Discharge Air Temperature Setpoint with Low Dewpoint (used only when control set to **Dewpoint** (see **TempCntrl** = **0**)		AV3	55–75°F	70
ActDatSp	Active DA setpoint	R	AV4	—	
DatHtgLoDp	Discharge Air Temperature Heating Setpoint with Low Dewpoint*,**	R/W	AV5	55–75°F	70
DatClgLoDp	Discharge Air Temperature Cooling Setpoint with Low Dewpoint*,**		AV6		60
OaLoSpLoDp	Outside Air Temperature Low Setpoint with Low Dewpoint***		AV7	55–80°F	65
OaHiSpLoDp	Outside Air Temperature High Setpoint with Low Dewpoint***		AV8		70
DaLoSpLoDp	Discharge Air Temperature Low Setpoint with Low Dewpoint***		AV9	55–75°F	58
DaHiSpLoDp	Discharge Air Temperature High Setpoint with Low Dewpoint***		AV10		70
Zone	Zone temperature (AI_1)	R	AV11	—	—
ZnCngOv	Heating/Cooling Zone Temperature Changeover Setpoint**	R/W	AV12	55–80°F	
ZnCngOvDb	Heating/Cooling Zone Temperature Changeover Deadband Setpoint**		AV13	—	
OaCngOvr	Heating/Cooling OA Temperature Changeover Setpoint*		AV14	55–80°F	65
OaCngOvrDb	Heating/Cooling OA Temperature Changeover Deadband Setpoint*		AV15	—	
Oat	Outside air temperature (AI_3)	R	AV16		
ErDat	Energy Recovery DAT (AI_4)		AV17		
ErDaDp	Energy Recovery DA dewpoint		AV19		
UnitDat	Unit DAT (AI_2)		AV20		
Suction_Temp	Suction Line Temperature		AV21		
ErEat	Energy Recovery Exhaust Air Temperature		AV22		
ErEah	Energy Recovery Exhaust Air Humidty		AV23		
ErEadp	Energy Recovery Exhaust Air Dewpoint		AV24		
Integer Values					
UnitMode	Unit Operation Mode (0 = **Off**, 1 = **Starting**, 2 = **Running**, 3 = **Test**, 4 = **Cripple**, 5 = **SysRestart**, 6 = **SysShutdwn**)	R	AV1001	—	
UnitCmd	Unit On/Off Command Status (0 = **DI Off**, 1= **DI On**, 2 = **BAS On**, 3 = **BAS OFF**, 4 = **Local Sch On**, 5 = **Local Sch Off**, 6 = **VOC/CO2 On**, 7 = **VOC/CO2 Off**, 8 = **Test On**, 9 = **Test Off**, 10 = **Alarm Off**, 11 = **Shtdwn DI Off**, 12 = **Manual On**, 13 = **Manual Off**, 14 = **BAS Shutdown**)		AV1002		
CompPerc	Modulation Compressor Output Percentage		AV1003		
VocCo2	VOC or CO2 Sensor Output		AV1004		
FanRunTm	Fan Runtime		AV1005		
CompRunTm	Compressor Runtime		AV1006		
ErwRunTm	Energy Recovery Wheel Runtime		AV1007		
PreHtRunTm	Preheat Runtime Time		AV1008		
FiltrRunTm	Filter Runtime		AV1009		
TempCntrl	Temp Control Type (0 = **Dewpoint (Default)**, 1 = **Dewpoint with OA changeover of Htg/Clg Setpoint**, 2 = **Dewpoint with OA reset of Htg/Clg Setpoint**, 3 = **Dewpoint with Space changeover of Htg/Clg Setpoint**)		AV1010		
HP_Status	Heatpump Status (0 = **Off**, 1 = **Heating**, 2 = **Cooling**)		AV1011		
HOA_Stat	HOA Status (0 = **Off**, 1 = **Auto**, 2 = **Hand**, 3 = **Off**)		AV1012		
Supp_Htg_Perc	Supplemental Heating Percentage		AV1013		

***Point used only when control set to Dewpoint with OA Changeover Setpoint (see **TempCntrl** = **1**).

****Point used only when control set to Dewpoint with Space Changeover Setpoint (see **TempCntrl** = **3**).

*****Point used only when control set to Dewpoint with OA Reset (see **TempCntrl** = **2**).

Table 45. BACnet® MSTP Points List—Continued					
Point	**Description**	**Read (R)/ Write (W)**	**Address**	**Range**	**Factory Default**
Digital Values					
BAS_OffOn	BAS OffOn command	R/W	BV1	On/Off	Off
SafStatus	Supply Fan Pressure Switch Status (DI_1)		BV2		
EafStatus	Exhaust Fan Pressure Switch Status (DI_2)		BV3		
DiOffOn	DI On/Off Switch Status (DI_3)		BV4		
CompAlmDi	Digital Compressor General Alarm DI Status (DI_4)		BV5		
SafetyDI	Safety Input DI Status (DI_5)		BV6		
FanGenAlDi	Fan General Alarm DI Status (DI_6)		BV7		
FilterDi	Filter DI Status (DI_7)		BV8		
FanCmd	Fan Relay (DO-1)		BV9		
ErwCmd	Energy Recovery Wheel Relay (DO-3)		BV10		
CompCmd	Compressor Command		BV11		
RevVlvCmd	Reversing Valve Cmd Relay (DO-2)		BV12		
PreHtCmd	Auxiliary heat stage output Relay (DO-4)		BV13		
AlarmLight	Alarm output Relay (DO-5)		BV14		
SafFailAlm	Supply Air Fan Failure Alarm (critical alarm)	R	BV15	—	
EafFailAlm	Exhaust Air Fan Failure Alarm (critical alarm)		BV16		
SafetyAlm	Safety Input Alarm (critical alarm)		BV17		
OatAlm	Outside air temperature sensor failure Alarm (cripple)		BV18		
UnitDatAlm	Unit discharge air temperature sensor failure Alarm (critical alarm)		BV19		
ErDatAlm	Energy Recovery DAT sensor failure (cripple)		BV20		
ErDahAlm	ER DA Humidity failure (cripple)		BV21		
RevVlvAlm	Reversing Valve Failure Alarm (cripple)		BV22		
DirtyFiltr	Dirty Filter Alarm (General)		BV23		
FanGenAlm	Fan General Alarm (critical alarm)		BV24		
CompGenAlm	Digital Compressor General Alarm (cripple)		BV25		
TestMode	Unit in Test Mode (General)		BV26		
RestartAlm	System in Restart Mode (system will auto-restart after 60 minutes)		BV27		
ShutdnAlm	System in Shutdown Mode (manual restart required)		BV28		
RstAllRts	Reset All Runtimes	R/W	BV29	—	
RstPhtRts	Reset PreHt Runtimes		BV30		
RstFanRts	Reset Fan Runtimes		BV31		
RstCompRts	Reset Comp Runtimes		BV32		
RstFltrRts	Reset Filter Runtm		BV33		
RstErwRts	Reset ERW Runtimes		BV34		
FanHrsAlm	Fan Run Hours Alarm (general)	R	BV35		
CompHrsAlm	Compressor Run Hours Alarm (general)		BV36		
ErwHrsAlm	Wheel Run Hours Alarm (general)		BV37		
PhtHrsAlm	Preheat Run Hours Alarm (general)		BV38		
FiltHrsAlm	Filter Run Hours Alarm (general)		BV39		
BAS_Shtdwn	BAS Unit Shutdown	R/W	BV40		
BAS_AlmRst	BAS Alarm Reset		BV41		
Supp_Htg_Cmd	Supplemental Heating Command	R	BV42		

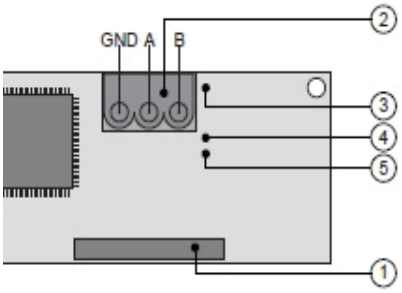
Startup—Continued

LONworks® (Option BHB7) Communication

LonWorks® is an open protocol that was originally developed by Echelon Corporation. It is now maintained by Echelon in collaboration with members of the LonMark® Interoperability Association. It requires the use of Echelon's Neuron microprocessor to encode and decode the LonWorks packets. The LonWorks protocol is based on the concept of using standardized functional profiles to control similar pieces of equipment. LonWorks® communication allows access to all unit function parameters. The network is considered open communication, whereas any device on the network has the capability to receive input from any other controller on the network. For all these units included on a LonWorks® network, the unit protocol configuration parameter must be set before communication can be established with other devices. To view and adjust this parameter, advance to the **BMS Config** menu located under **Service Menu/System**. The protocol must be set to **LON**.

Operation information for LonMark® communication is as follows:

- **Communication card components:** The LonMark® communication card (see **Figure 37**) has a serial port connection, a terminal block, a service pin, and two LEDs (Service and Anomaly), a push button and three jumpers.
- **Service pin:** To activate the service pin, simply short-circuit the two pins for an instant using the tip of a screwdriver or similar tool. The activation is confirmed by the lighting of the Service LED.
- **Service LED:** The green Service LED has the following functions:
  1. Signals the status of the mode per LonWorks protocol
  2. Remains ON during activation of the service pin
  3. Remains ON for a second when receiving a WINK command from the network
- **Anomaly LED:** The red Anomaly LED indicates the status of communication between the card and the controller with two indications: 1) communication with the controller is established and working (LED OFF) and 2) communication is not established and no data is passing to the card (red): in this case, confirm that the card is firmly plugged in and that **BMS Protocol** is set to **LON**.
- **LONworks® Points:** The LONworks® points are listed in **Table 46**.



1) Serial port connection
2) Terminal block for LonWorks® network (GND, A, B)
3) Service pin
4) Service green LED
5) Anomaly red LED

Figure 37. LONworks® Board Layout

Table 46. LONworks® Point List

Point	Description	Read (R)/ Write (W)	LonWorks® FTT-10A				Range	Factory Default
			Index	Name NV	Bit No.	Type NV		
Analog Values								
DpCngOvrLt	Wheel Dewpoint Changeover Limit	R/W	ANL 1	**nviDpCngOvrLt**	—	**SNVT_temp_p**	55–65°F	59
DpCngOvrLt	Wheel Dewpoint Changeover Limit	R		**nvoDpCngOvrLt**			—	
DatSpHiDp	Discharge Air Temperature Setpoint with High Dewpoint	R/W	ANL 2	**nviDatSpHiDp**			52–80°F	58
DatSpHiDp	Discharge Air Temperature Setpoint with High Dewpoint	R		**nvoDatSpHiDp**			—	
DatSpLoDp	Discharge Air Temperature Setpoint with Low Dewpoint (used only when control set to **Dewpoint** (see **TempCntrl** = **0**)	R/W	ANL 3	**nviDatSpLoDp**			52–80°F	70
DatSpLoDp	Discharge Air Temperature Setpoint with Low Dewpoint (used only when control set to **Dewpoint** (see **TempCntrl** = **0**)	R		**nvoDatSpLoDp**			—	
ActDatSp	Active DA Setpoint		ANL 4	**nvoActDatSp**				
DatHtgLoDp	Discharge Air Temperature Heating Setpoint with Low Dewpoint*,**	R/W	ANL 5	**nviDatHtgLoDp**			52–80°F	70
DatHtgLoDp	Discharge Air Temperature Heating Setpoint with Low Dewpoint*,**	R		**nvoDatHtgLoDp**			—	
DatClgLoDp	Discharge Air Temperature Cooling Setpoint with Low Dewpoint*,**	R/W	ANL 6	**nviDatClgLoDp**			52–80°F	60
DatClgLoDp	Discharge Air Temperature Cooling Setpoint with Low Dewpoint*,**	R		**nvoDatClgLoDp**			—	
OaLoSpLoDp	Outside Air Temperature Low Setpoint with Low Dewpoint***	R/W	ANL 7	**nviOaLoSpLoDp**			0–80°F	50
OaLoSpLoDp	Outside Air Temperature Low Setpoint with Low Dewpoint***	R		**nvoOaLoSpLoDp**			—	
OaHiSpLoDp	Outside Air Temperature High Setpoint with Low Dewpoint***	R/W	ANL 8	**nviOaHiSpLoDp**			0–80°F	70
OaHiSpLoDp	Outside Air Temperature High Setpoint with Low Dewpoint***	R		**nvoOaHiSpLoDp**			—	
DaHiSpLoDp	Discharge Air Temperature High Setpoint with Low Dewpoint***	R/W	ANL 9	**nviDaHiSpLoDp**			52–80°F	70
DaHiSpLoDp	Discharge Air Temperature High Setpoint with Low Dewpoint***	R		**nvoDaHiSpLoDp**			—	
DaLoSpLoDp	Discharge Air Temperature Low Setpoint with Low Dewpoint***	R/W	ANL 10	**nviDaLoSpLoDp**			52–80°F	60
DaLoSpLoDp	Discharge Air Temperature Low Setpoint with Low Dewpoint***	R		**nvoDaLoSpLoDp**			—	
Zone	Zone temperature (AI_1)**	R	ANL 11	**nvoZone**		**SNVT_temp_p**	—	
ZnCngOvr	Heating/Cooling Zone Temperature Changeover Setpoint**	R/W	ANL 12	**nviZnCngOvr**			55–80°F	—
ZnCngOvr	Heating/Cooling Zone Temperature Changeover Setpoint**	R		**nvoZnCngOvr**			—	
ZnCngOvDb	Heating/Cooling Zone Temperature Changeover Deadband Setpoint**	R/W	ANL 13	**nviZnCngOvrDb**		**SNVT_count**	1–10	2
ZnCngOvDb	Heating/Cooling Zone Temperature Changeover Deadband Setpoint**	R		**nvoZnCngOvrDb**			—	

***Point used only when control set to Dewpoint with OA Changeover Setpoint (see **TempCntrl** = **1**).

****Point used only when control set to Dewpoint with Space Changeover Setpoint (see **TempCntrl** = **3**).

*****Point used only when control set to Dewpoint with OA Reset (see **TempCntrl** = **2**).

Startup—Continued

LONworks® (Option BHB7) Communication—Continued

Table 46. LONworks® Point List—Continued

Point	Description	Read (R)/ Write (W)	LonWorks® FTT-10A				Range	Factory Default
			Index	Name NV	Bit No.	Type NV		
Analog Values—Continued								
OaCngOvr	Heating/Cooling OA Temperature Changeover Setpoint*	R/W	ANL 14	**nviOaCngOvr**	—	**SNVT_temp_p**	55–80°F	65
OaCngOvr	Heating/Cooling OA Temperature Changeover Setpoint*	R		**nvoOaCngOvr**			—	
OaCngOvrDb	Heating/Cooling OA Temperature Changeover Deadband Setpoint*	R/W	ANL 15	**nviOaCngOvrDb**		**SNVT_count**	1–10	2
OaCngOvrDb	Heating/Cooling OA Temperature Changeover Deadband Setpoint*	R		**nvoOaCngOvrDb**			—	
Oat	Outside Air Temperature (AI_3)		ANL 16	**nvoOat**		**SNVT_temp_p**	—	
ErDat	Energy Recovery DAT (AI_4)		ANL 17	**nvoErDat**				
ErDah	Energy Recovery DA Hum (AI_5)		ANL 18	**nvoErDah**		**SNVT_lev_percent**		
ErDaDp	Energy Recovery DA Dewpoint		ANL 19	**nvoErDadp**		**SNVT_temp_p**		
UnitDat	Unit DAT (AI_2)		ANL 20	**nvoUnitDat**				
Suction_Temp	Suction Line Temperature		ANL 21	**nvoSuction_Temp**				
ErEadp	Energy Recovery EA Dewpoint		ANL 24	**nvo ErEadp**				
Integer Values								
UnitMode	Unit Operation Mode (0 = **Off**, 1 = **Starting**, 2 = **Running**, 3 = **Test**, 4 = **Cripple**, 5 = **SysRestart**, 6 = **SysShutdwn**)	R	INT 1	**nvoUnitMode**	—	**SNVT_count**	—	
UnitCmd	Unit On/Off Command Status (0 = **DI Off**, 1= **DI On**, 2 = **BAS On**, 3 = **BAS OFF**, 4 = **Local Sch On**, 5 = **Local Sch Off**, 6 = **VOC/CO2 On**, 7 = **VOC/CO2 Off**, 8 = **Test On**, 9 = **Test Off**, 10 = **Alarm Off**, 11 = **Shtdwn DI Off**, 12 = **Manual On**, 13 = **Manual Off**, 14 = **BAS Shutdown**)		INT 2	**nvoUnitCmd**				
CompPerc	Modulation Compressor Output Percentage		INT 3	**nvoCompPerc**		**SNVT_lev_percent**		
VocCo2	VOC or CO2 Sensor Output		INT 4	**nvoVocCo2**		**SNVT_count**		
FanRunTm	Fan Runtime		INT 5	**nvoFanRunTm**				
CompRunTm	Compressor Runtime		INT 6	**nvoCompRunTm**				
ErwRunTm	Energy Recovery Wheel Runtime		INT 7	**nvoErwRunTm**				
PreHtRunTm	Preheat Runtime Time		INT 8	**nvoPreHtRunTm**				
FiltrRunTm	Filter Runtime		INT 9	**nvoFiltrRunTm**				

*Point used only when control set to Dewpoint with OA Changeover Setpoint (see **TempCntrl** = **1**).

Point used only when control set to Dewpoint with Space Changeover Setpoint (see **TempCntrl = **3**).

***Point used only when control set to Dewpoint with OA Reset (see **TempCntrl** = **2**).

Table 46. LONworks® Point List—Continued

Point	Description	Read (R)/ Write (W)	LonWorks® FTT-10A				Range	Factory Default
			Index	Name NV	Bit No.	Type NV		
Integer Values—Continued								
TempCntrl	Temp Control Type (0 = **Dewpoint (Default)**, 1 = **Dewpoint with OA changeover of Htg/Clg Setpoint**, 2 = **Dewpoint with OA reset of Htg/Clg Setpoint**, 3 = **Dewpoint with Space changeover of Htg/Clg Setpoint**)	R	INT 10	**nvoTempCntrl**	—	**SNVT_count**	—	
HP_Status	Heatpump Status (0 = **Off**, 1 = **Heating**, 2 = **Cooling**)		INT 11	**nvoHP_Status**				
HOA_Stat	HOA Status (0 = **Off**, 1 = **Auto**, 2 = **Hand**, 3 = **Off**)		INT 12	**nvoHOA_Stat**				
Supp_Htg_Perc	Supplemental Heating Percentage		INT 13	**nvoSupp_Htg_Perc**				
Digital Values								
BAS_OffOn	BAS OffOn Command	R/W	DGT 1	**nviBAS_OffOn**	—	**SNVT_Switch**	On/Off	Off
SafStatus	Supply Fan Pressure Switch Status (DI_1)	R	—	**nvoDiStat1**	0	**Snvt_state**	—	
EafStatus	Exhaust Fan Pressure Switch Status (DI_2)				1			
DiOffOn	DI On/Off Switch Status (DI_3)				2			
CompAlmDi	Digital Compressor General Alarm DI Status (DI_4)				3			
SafetyDI	Safety Input DI Status (DI_5)				4			
FanGenAlDi	Fan General Alarm DI Status (DI_6)				5			
FilterDi	Filter DI Status (DI_7)				6			
FanCmd	Fan Relay (DO-1)			**nvoDoStat1**	0			
ErwCmd	Energy Recovery Wheel Relay (DO-3)				1			
CompCmd	Compressor Command				2			
RevVlvCmd	Reversing Valve Cmd Relay (DO-2)				3			
PreHtCmd	Auxiliry Heat Stage Output Relay (DO-4)				4			
AlarmLight	Alarm Output Relay (DO-5)				5			
Supp_Htg_Cmd	Supplemental Heating Command				6			
SafFailAlm	Supply Air Fan Failure Alarm (critical alarm)			**nvoAlmStat1**	0			
EafFailAlm	Exhaust Air Fan Failure Alarm (critical alarm)				1			
SafetyAlm	Safety Input Alarm (critical alarm)				2			
OatAlm	Outside Air Temperature Sensor Failure Alarm (cripple)				3			
UnitDatAlm	Unit discharge air temperature sensor failure Alarm (critical alarm)				4			
ErDatAlm	Energy Recovery DAT sensor failure (cripple)				5			
ErDahAlm	ER DA Humidity failure (cripple)				6			
RevVlvAlm	Reversing Valve Failure Alarm (cripple)				7			
DirtyFiltr	Dirty Filter Alarm (general)				8			

Startup—Continued

LONworks® (Option BHB7) Communication—Continued

Table 46. LONworks® Point List—Continued

Point	Description	Read (R)/ Write (W)	LonWorks® FTT-10A				Range	Factory Default
			Index	Name NV	Bit No.	Type NV		
Digital Values—Continued								
FanGenAlm	Fan General Alarm (critical alarm)	R	—	**nvoAlmStat1**	9	**Snvt_state**	—	
CompGenAlm	Digital Compressor General Alarm (cripple)				10			
TestMode	Unit in Test Mode (general)				11			
RestartAlm	System in Restart Mode (system will auto-restart after 60 minutes)				12			
ShutdnAlm	System in Shutdown Mode (manual restart required)				13			
RstPhtRts	Reset PreHt Runtimes	R/W	DGT 30	**nviRstPhtRts**	—	**SNVT_Switch**		
RstFanRts	Reset Fan Runtimes		DGT 31	**nviRstFanRts**				
RstCompRts	Reset Comp Runtimes		DGT 32	**nviRstCompRts**				
RstErwRts	Reset ERW Runtimes		DGT 34	**nviRstErwRts**				
FanHrsAlm	Fan Run Hours Alarm (general)	R	—	**nvoRtmAlmStat**	0	**Snvt_state**		
CompHrsAlm	Compressor Run Hours Alarm (general)				1			
ErwHrsAlm	Wheel Run Hours Alarm (general)				2			
PhtHrsAlm	Preheat Run Hours Alarm (general)				3			
FiltHrsAlm	Filter Run Hours Alarm (general)				4			
BAS_Shtdwn	BAS Unit Shutdown	R/W	DGT 40	**nviBAS_Shtdwn**	—	**SNVT_Switch**		
BAS_AlmRst	BAS Alarm Reset		DGT 41	**nviBAS_AlmRst**				

Setting Dirty Filter Switch

If the unit has a dirty filter alarm (option BE18, outside air filters only), it has a dirty filter switch (PN 105507, see **Figure 15**). After the unit is started but before continuous operation, the dirty filter switch must be manually-adjusted as follows:

1. Ensure that clean filters are in place, all doors are closed (except for electrical compartment), and fan is operating.
2. Turn setscrew on dirty filter switch (see **Figure 38**) clockwise to increase pressure setting until filter light is energized or until setscrew is bottomed out.
3. Turn setscrew (see **Figure 38**) three full turns counter-clockwise or until setscrew is top ended. At this setpoint, filter light will be activated at approximately 50% filter blockage.

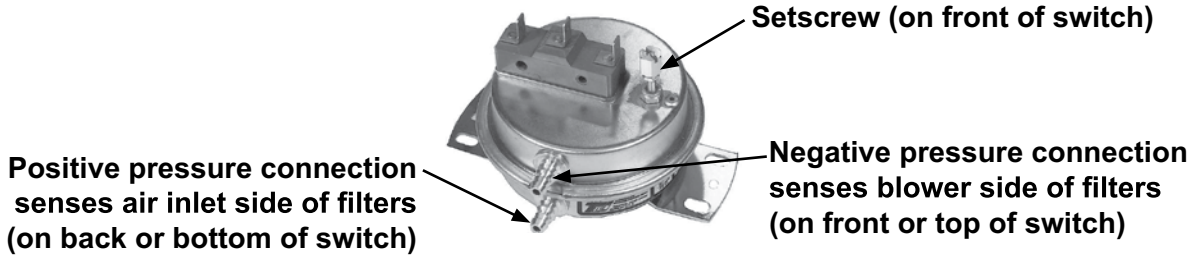


Figure 38. Dirty Filter Switch

MAINTENANCE

Maintenance Schedule

Perform all maintenance procedures at least once a year or more frequently if the installation requires it.

Maintenance Procedures

⚠ WARNING ⚠

Turn off the power and lock the disconnect switch before performing maintenance or service.

See **Figure 39** for access locations for the following maintenance procedures.

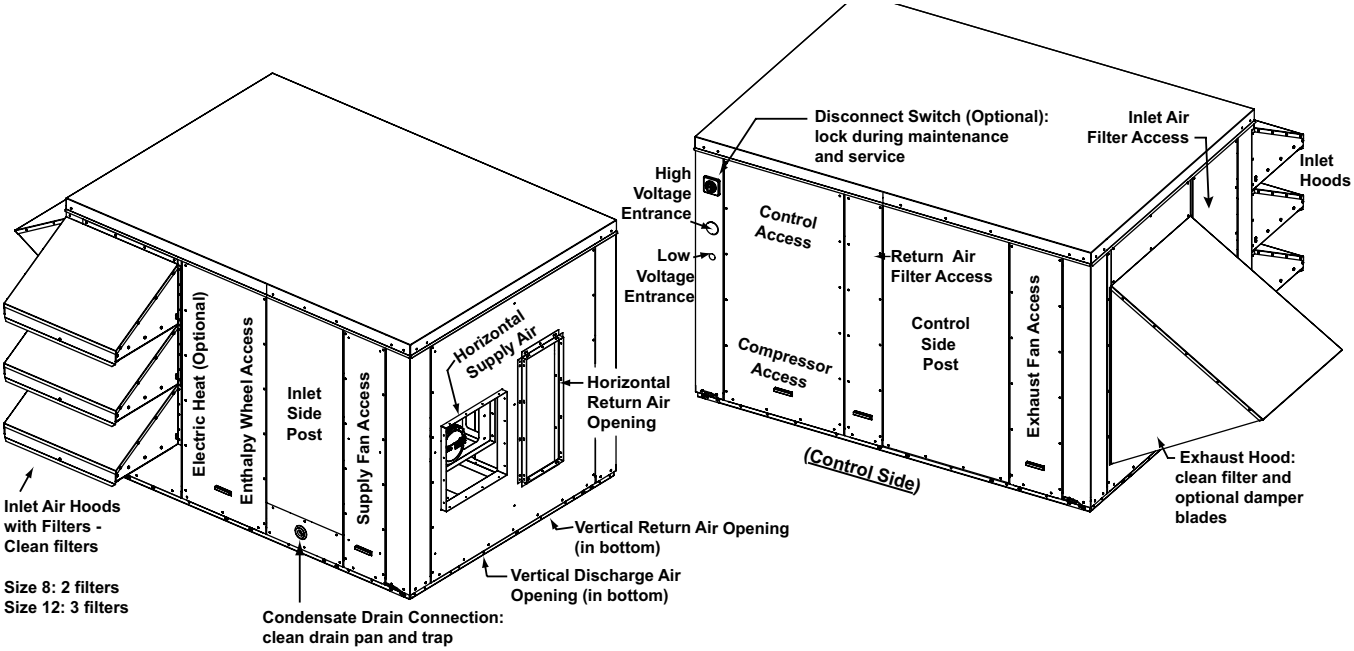


Figure 39. Maintenance Access

Inlet and Exhaust Hood Maintenance

- Remove and clean the filters.
- If equipped, clean the screen. Remove all dirt that will obstruct airflow.
- If there are optional dampers, carefully remove dirt from the blades.

Inlet and Exhaust Fan Maintenance

- Fan motors are permanently lubricated—lubrication is not required.
- Carefully remove any accumulation of dirt and grease.
- If equipped with an option A23 fan, the exhaust fan motor is belt driven. Check the condition and tension of the belt. Belt tension should allow a 1/2-inch depression of the belt. If the belt needs to be replaced, use a factory-authorized replacement.

Inlet and Return Air Filter Maintenance

Check the inlet and return air filters (refer to **Table 47**) and replace as needed.

Table 47. Inlet and Return Air Filters

Type	Unit Size	Size	Location	PN	Qty
Pleated	8	16 × 20 × 2	Inlet air	104110	2
			Return air		1
	12	16 × 20 × 2	Inlet air	104110	2
		16 × 25 × 2	Return air	104112	1

Maintenance Procedures—Continued

Energy Recovery Wheel Maintenance

The wheel should rotate approximately five rotations in 15 seconds. If rotation is not normal, perform wheel maintenance as follows.

NOTE:

- **How often the wheel needs to be cleaned depends on its environment.**
- **According to the manufacturer, a wheel operating in a *clean* environment may not require annual cleaning, but a wheel in a *contaminated* environment may require multiple cleanings a year to maintain airflow and recovery. The segmented design of the wheel provides not only for easier cleaning but also allows for replacement of individual dirty segments. Replacement part numbers are available from your distributor.**
- **Because the wheel rotates between two opposing airstreams, it is self-cleaning of most dry dirt and dust and will remain efficient for a long period of time. However, when the wheel is exposed to oils, tars, or greases in either the supply or exhaust airstream, the surface will become *sticky* and will hold the dirt and dust. Over time the air passages will become blocked causing loss of recovery, excessive pressure drop, and loss of energy savings.**

1. Turn OFF power to unit.
2. Remove wheel cassette (see **Figure 40**) as follows:

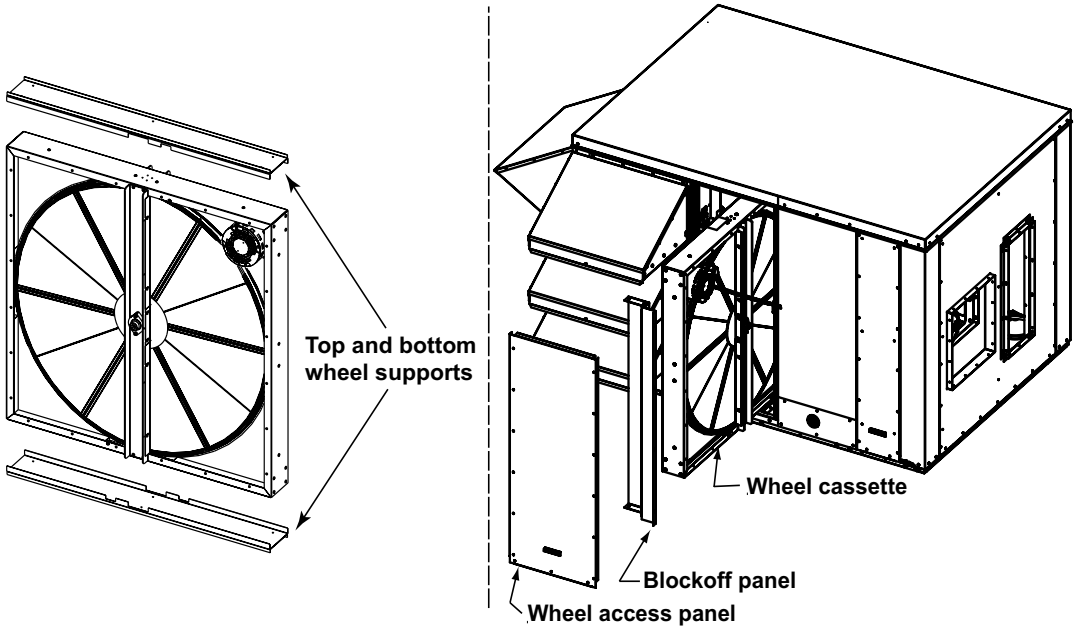


Figure 40. Energy Recovery Wheel Cassette Removal

a. Remove wheel access panel.

b. For unit size 12 only, remove screws holding outside air sensor on post (to right of wheel). Move sensor out of way of wheel cassette access.

c. Remove blockoff panel.

d. Disconnect wheel motor wiring plug.

e. Slide entire wheel cassette (with top and bottom supports) out of cabinet.

⚠ CAUTION ⚠

The wheel segments are the *heat exchangers* of the energy recovery wheel. Segments must be handled with care and should NEVER be dropped. Segments may require slight *persuasion* during installation and removal but should NEVER be forced or banged with a hammer or similar tool.

3. Remove wheel segments (from pulley side of wheel) as follows:
   a. Rotate wheel to position first segment to be removed at top.
   b. On both sides of segment, unlock and open two retaining straps.
   c. Using only hand pressure while supporting wheel segment, push segment from motor side.
   d. On pulley side, lift wheel segment out of spokes and lay (DO NOT DROP) segment on flat surface.
   e. Rotate wheel so that wheel segment on opposite side is on top. Repeat steps b, c, and d to remove segment. Continue with this procedure, keeping balanced open and filled segments opposite each other, to remove all segments.
4. Clean wheel segments as follows:
   a. Gently brush off any loose dirt and dust.

⚠ CAUTION ⚠

To prevent damage to the wheel, DO NOT clean wheel segments using acid-based cleaner, aromatic solvent, steam, temperatures in excess of 170°F, or a pressure washer. A non-acid based coil cleaner concentrate in a 5% solution is recommended by the manufacturer.

   b. Wash segments, using non-acid based (evaporator) coil cleaner or alkaline detergent solution. Soak segments in cleaning solution until grease and tar deposits are loosened. An overnight soak may be required to adequately loosen heavy deposits of oil-based contaminants.

NOTE: Some staining of the desiccant may remain after wheel segment cleaning and is not harmful to performance. A small amount of water will dry out in the airflow.

   c. Rinse dirty solution from each segment until water runs clear. Allow excess water to drain from segments before reinstalling them in wheel.
5. Remove any dirt or dust from wheel and cassette and from slide-in area of cabinet.
6. Reinstall cleaned wheel segments (from pulley side of wheel) as follows:

⚠ WARNING ⚠

The weight of the installed segments will cause the wheel to accelerate in rotation. Failure to maintain control of wheel rotation while reinstalling all segments could cause severe injury to fingers or hand caught between revolving spokes and the bearing support beam. Insert the handle of a hammer or other such tool through the spokes as a stop.

   a. Position one segment opening at top of wheel cassette and insert handle of hammer or other such tool through spokes, above or below bearing support, as stop to limit rotation of unbalanced wheel and hold wheel in place.
   b. Unlock and open segment retaining brackets on both sides of opening.
   c. Position clean wheel segment with imbedded stiffeners toward motor side of wheel. While holding segment as vertically as possible and centered between spokes, insert nose of segment downward between hub plates. Ease segment down until its outer rim clears inside of wheel rim and press it inward against spoke flanges.
   d. Close and latch retaining brackets. Ensure that each retaining bracket is fully engaged under catch.

Maintenance Procedures—Continued

Energy Recovery Wheel Maintenance—Continued

e. Remove stop and slowly rotate installed segment to bottom of wheel. Reinsert stop and repeat steps b, c, and d to install segment in top position. Continue with this procedure, balancing wheel by installing opposite segments, until all segments are in place.

7. Check and adjust (as necessary) wheel seals (see **Figure 41**) as follows:

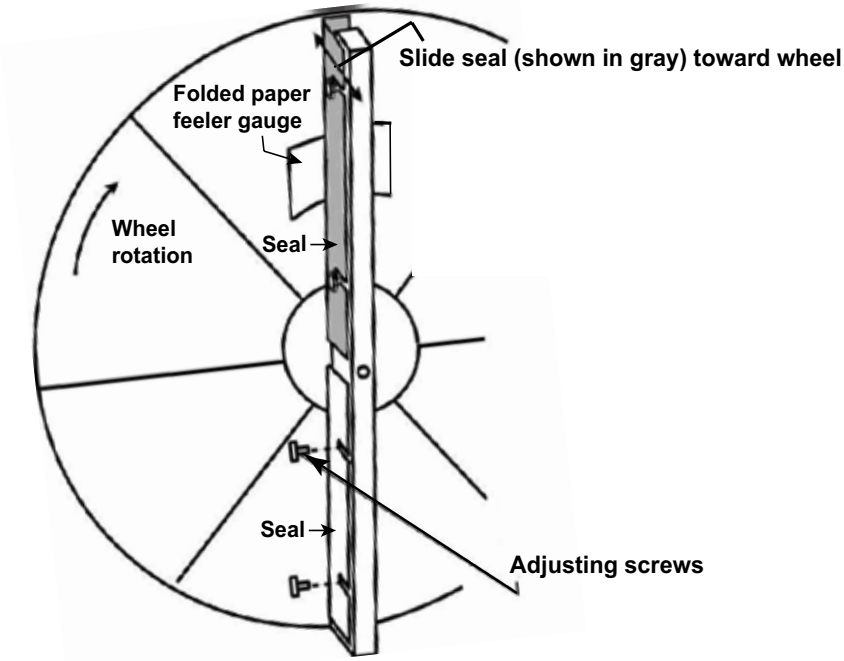


Figure 41. Seal Adjustment on Energy Recovery Wheel

NOTE: The seals are on the center support that goes across the diameter of the wheel. There are two seals on each side of the wheel with one seal on each side of the hub. Seals are metal strips with insulation on the surface closest to the wheel. The purpose of the seals is to minimize the transfer of air between the counter-flowing airstreams. Check seal adjustment after any wheel service and during maintenance. Adjusting the seals will require a screwdriver and a piece of paper.

a. Each seal strip has adjusting screws that allow insulation to move toward or away from wheel. On one seal strip, loosen screws (DO NOT REMOVE) just enough to slide seal strip.

b. Use folded piece of paper as feeler gauge. Position folded paper between wheel surface and seal and turn wheel so that seal is aligned with one segment spoke.

c. Adjust seal toward wheel surface and slide paper feeler gauge along length of spoke. When slight friction is detected on paper feeler gauge, tighten adjusting screws.

d. Recheck clearance with paper feeler gauge.

e. Repeat steps a through d with other seal on same side and with two seals on other side of wheel.

8. Check wheel drive components as follows:

NOTE: The motor bearings are pre-lubricated and do not need additional lubrication.

a. Clean any dirt from air cooling ports in motor housing.

b. Pulley is secured to drive motor shaft with setscrew, which is coated with removable Locktite to prevent loosening. Ensure that setscrew is secure.

9. Reinstall wheel cassette (see **Figure 40**) as follows:
   a. Reconnect wheel motor wiring plug.
   b. Position wheel supports on top and bottom of wheel cassette and carefully slide all three pieces back into cabinet. Ensure that notches in top and bottom supports align with notches in bearing supports.
   c. Reinstall blockoff panel, outside air sensor (unit size 12 only), and wheel access panel.
10. Turn ON power to unit.
11. When unit is started, start and stop wheel several times to verify seal adjustment and to inspect belt for proper tracking and tension. If belt is not tracking properly on wheel rim (belt should be approximately 1/4-inch from outer edge of rim), replace belt.

NOTE:

- **The belt is made of urethane stretch material and is designed to provide constant tension. There is no type of adjustment. If a belt needs replaced, it must be replaced with a factory-authorized replacement (PN 262488 for unit size 8 or PN 262489 for unit size 12).**
- **A properly-tensioned belt will turn the wheel immediately after power is applied with no visible slippage during startup. The belt should track approximately 1/4-inch from the outer edge of the rim.**

12. If belt or any other component needs replacing, use only factory-authorized replacement(s). Follow instructions provided by wheel manufacturer.

Heat Pump Maintenance

Compressor: Refer to **Table 51** to troubleshoot the compressor.

Coils and tubing: Inspect the coils for debris, dirt, grease, lint, mold, or any element that might obstruct heat transfer or airflow. Inspect coils and tubing for physical damage. Inspect feeders, piping connections, coil headers, and return bends for signs of fatigue, rubbing, and physical damage. Clean the coils as follows, using proper tools and following instructions carefully to avoid damaging the coil.

⚠ CAUTION ⚠

To avoid damaging the coil, use a non-acid based coil cleaner and avoid high-pressure spray.

1. Verify that electrical power has been turned OFF and that disconnect switch is locked.
2. Open coil cabinet door.
3. Use soft brush to remove any dirt and debris from both sides of coil.
4. Spray coils with cold or warm (not hot) water and cleaning solution (non-acid based coil cleaner is recommended). Due to possible damage to coil, high pressure spray is not recommended. First spray leaving airflow side and then inlet airflow side. As much as possible, spray solution perpendicular to face of coil. Follow cleaning solution instructions.
5. When cleaning process is complete, rinse both sides of coil with cool, clean water.

Condensate pan and drain: The combination of airborne particles and moisture can result in algae formation in the drain pan and trap. The drain pan and trap must be cleaned regularly to avoid blockage that can slow or stop water flow, resulting in backup into the cabinet. Clean the drain pan, trap, and piping. After cleaning, reinstall all parts and fill the trap with water to ensure proper operation.

Checking and Adjusting Subcooling and Superheat

⚠ DANGER ⚠

This unit contains R-410A high-pressure refrigerant. Hazards exist that could result in personal injury or death. Installation, maintenance, and service should be performed only by an HVAC technician qualified in R-410A refrigerant and using proper tools and equipment. Due to much higher pressure of R-410A refrigerant, DO NOT USE service equipment or tools designed for R22 refrigerant.

Subcooling is the measurement of liquid refrigerant stored in the condenser coil. Too much subcooling indicates a system overcharge. Too little subcooling indicates a system undercharge and may not provide the thermal expansion valve with a full column of liquid refrigerant for proper operation. ***Superheat*** is the verification that the evaporator coil is properly using the refrigerant supplied. Too much superheat indicates that the coil is undercharged. Too little superheat indicates that the coil is overcharged and potentially flooding liquid refrigerant to the compressor. At startup and during service, checking subcooling and superheat is required to verify proper operation of the thermal expansion valve and to verify proper refrigerant charge.

Checking and Adjusting Subcooling

Check and adjust subcooling as follows. Measure refrigerant temperature and pressure in the liquid line at the condenser coil outlet.

1. Record measurements: temperature = _____°F (°C) and pressure = _____ psig.
2. Refer to **Table 48** to convert pressure recorded in step 1 to corresponding temperature: _____°F (°C).
3. Subtract temperature recorded in step 1 from temperature recorded in step 2 to determine degrees of subcooling: _____°F (°C) − _____°F (°C) = _____°F (°C).

NOTE: The recommended subcooling range is 10–14°F (5.5–7.8°C).

4. Adjust subcooling (as needed) as follows:

⚠ WARNING ⚠

Do not release refrigerant to the atmosphere. When adding or removing refrigerant, the qualified technician must comply with all national, state/province, and local laws.

   a. Too much subcooling indicates refrigerant overcharge. To reduce subcooling, remove excess refrigerant.
   b. Too little subcooling indicates refrigerant undercharge. To increase subcooling, slowly add R-410A refrigerant.

Checking and Adjusting Superheat

Check and adjust superheat as follows. Measure refrigerant temperature (insulate the probe from the surrounding air temperature) and pressure in the suction line at the compressor inlet.

1. Record measurements: temperature = _____°F (°C) and pressure = _____ psig.
2. Refer to **Table 48** to convert pressure recorded in step 1 to corresponding temperature: _____°F (°C).
3. Subtract temperature recorded in step 1 from temperature recorded in step 2 to determine degrees of superheat: _____°F (°C) − _____°F (°C) = _____°F (°C).

NOTE: The recommended superheat range is 8–12°F (4.5–6.7°C).

4. Adjust superheat (as needed) as follows:
   a. Too much superheat typically indicates that evaporator coil is undercharged. To reduce superheat, adjust the thermal expansion valve by turning its adjusting stem counterclockwise.
   b. Too little superheat typically indicates that evaporator coil is overcharged and may potentially flood liquid refrigerant to compressor. To increase superheat, adjust thermal expansion valve by turning its adjusting stem clockwise.

Table 48. Temperature/Pressure Conversion for R-410A Refrigerant														
Pressure (psi)	Temperature		Pressure (psi)	Temperature		Pressure (psi)	Temperature		Pressure (psi)	Temperature		Pressure (psi)	Temperature	
	°F	°C		°F	°C		°F	°C		°F	°C		°F	°C
1.8	−55	−48.3	49.5	1	−17.2	77.0	19	−7.2	112.2	37	2.8	218.2	75	23.9
4.3	−50	−45.6	50.9	2	−16.7	78.7	20	−6.7	114.4	38	3.3	235.9	80	26.7
7.0	−45	−42.8	52.2	3	−16.1	80.5	21	−6.1	116.7	39	3.9	254.6	85	29.4
10.1	−40	−40.0	53.6	4	−15.6	82.3	22	−5.6	118.9	40	4.4	274.3	90	32.2
13.5	−35	−37.2	55.0	5	−15.0	84.1	23	−5.0	121.2	41	5.0	295.0	95	35.0
17.2	−30	−34.4	56.4	6	−14.4	85.9	24	−4.4	123.6	42	5.6	316.9	100	37.8
21.4	−25	−31.7	57.9	7	−13.9	87.8	25	−3.9	125.9	43	6.1	339.9	105	40.6
25.9	−20	−28.9	59.3	8	−13.3	89.7	26	−3.3	128.3	44	6.7	364.1	110	43.3
27.8	−18	−27.8	60.8	9	−12.8	91.6	27	−2.8	130.7	45	7.2	389.6	115	46.1
29.7	−16	−26.7	62.3	10	−12.2	93.5	28	−2.2	133.2	46	7.8	416.4	120	48.9
31.8	−14	−25.6	63.9	11	−11.7	95.5	29	−1.7	135.6	47	8.3	444.5	125	51.7
33.9	−12	−24.4	65.4	12	−11.1	97.5	30	−1.1	138.2	48	8.9	474.0	130	54.4
36.1	−10	−23.3	67.0	13	−10.6	99.5	31	−0.6	140.7	49	9.4	505.0	135	57.2
38.4	−8	−22.2	68.6	14	−10.0	101.6	32	0.0	143.3	50	10.0	537.6	140	60.0
40.7	−6	−21.1	70.2	15	−9.4	103.6	33	0.6	156.6	55	12.8	571.7	145	62.8
43.1	−4	−20.0	71.9	16	−8.9	105.7	34	1.1	170.7	60	15.6	607.6	150	65.6
45.6	−2	−18.9	73.5	17	−8.3	107.9	35	1.7	185.7	65	18.3	645.2	155	68.3
48.2	0	−17.8	75.2	18	−7.8	110.0	36	2.2	201.5	70	21.1			

Checking and Adjusting Refrigerant Charge

The unit is factory-charged with refrigerant and should require no further adjustment at startup. Check and adjust the refrigerant charge (as necessary) as follows:

NOTE: System charging is not recommended below 70°F (21°C).

1. Attach gauge manifolds and operate unit in test mode (refer to **Test Mode** section).
2. Set unit to its nominal airflow: 800 cfm supply and 1,600 cfm exhaust for unit size 8 and 1,200 cfm supply and 2,400 cfm exhaust for unit size 12.
3. Turn wheel off and operate unit in cooling mode until system stabilizes (approximately 5 minutes).

⚠ WARNING ⚠

Do not release refrigerant to the atmosphere. When adding or removing refrigerant, the qualified technician must comply with all national, state/province, and local laws.

4. Compare normal operating pressures in **Table 49** to pressure readings on gauges. Minor pressure variations may be expected due to differences in installations. Significant differences could mean that system is not properly charged or that system problem exists. Correct any system problems before proceeding.
5. Add or remove refrigerant charge in small increments as follows:
   a. If discharge pressure is high, remove refrigerant from system.
   b. If discharge pressure is low, add refrigerant to system.
   c. Continue check until pressures are determined to be correct.

Checking and Adjusting Refrigerant Charge—Continued

Table 49. Normal Operating Pressures

Outside Air Temperature (°F)	Return Air Temperature (°F)	Unit Size			
		8		12	
		Suction Pressure (±5 psig)	Discharge Pressure (±10 psig)	Suction Pressure (±5 psig)	Discharge Pressure (±10 psig)
70	75	86	344	104	307
	80	87	357	105	317
	85	88	370	106	329
75	75	93	363	111	323
	80	94	376	112	334
	85	95	390	113	345
80	75	100	383	119	339
	80	101	396	121	351
	85	102	410	121	363
85	75	108	404	128	357
	80	109	417	129	369
	85	110	431	130	381
90	75	117	425	138	375
	80	118	439	139	387
	85	118	453	140	399
95	75	126	447	148	394
	80	127	461	149	406
	85	128	475	151	418
100	75	136	469	159	413
	80	137	484	160	426
	85	138	498	162	438
105	75	147	493	171	433
	80	148	507	173	446
	85	149	522	174	459

TROUBLESHOOTING

- **General troubleshooting:** Refer to **Table 50** for general troubleshooting symptoms, probable causes, and remedies.
- **Troubleshooting using digital compressor controller:** To troubleshoot the unit using the digital compressor controller LEDs, refer to **Table 51**. The digital controller is located in the electrical compartment and acts as the interface between the compressor and the unit controller. If the unit interface display indicates critical ***Alarm Code 17, Heat Pump Failure***, check the LED lights on the digital controller. The alert code (red LED flashes) on the digital controller remains active and the compressor remains deenergized until the reset conditions have been met or 24VAC power is cycled OFF and ON. All codes except 6 result in the compressor (contactor and unloader valve) being deenergized.
- **Replacement parts:** If replacement parts are required, refer to the replacement parts manual listed in **Table 1**.

⚠ DANGER ⚠

This unit contains R-410A high-pressure refrigerant. Hazards exist that could result in personal injury or death. Installation, maintenance, and service should be performed only by an HVAC technician qualified in R-410A refrigerant and using proper tools and equipment. Due to much higher pressure of R-410A refrigerant, DO NOT USE service equipment or tools designed for R22 refrigerant.

⚠ WARNING ⚠

Do not release refrigerant to the atmosphere! If required service procedures include the adding or removing of refrigerant, the service technician must comply with all federal, state and local laws. The procedures discussed in this manual should only be performed by a qualified HVAC technician.

Table 50. General Troubleshooting

Symptom	Probable Cause	Remedy
A. Compressor will not run or does not try to start	1. Open disconnect switch or circuit breaker	Close switch and/or breaker
	2. Compressor contactor not closing	Check voltage to contactor coil, transformer, relay, and system; replace parts as necessary
	3. Blown fuse or tripped breaker	Repair cause and replace fuse
	4. Low line voltage	Check line voltage; correct if more than 10% from compressor marking
	5. Compressor motor protector open	Motor thermal protector automatically resets; allow time (2 hours) for compressor to cool down so protector will reset
		Restart compressor and check for reason overheat occurred
	6. Compressor defective	Check motor for open circuit, short circuit, grounded windings, or burn-out
		Compressor may be seized; check refrigerant
		Replace compressor as necessary
	7. High or low pressure switch open or defective	If high pressure switch, reset switch (switch opens at 600 psi and will not reset above 420 psi for R-410A)
		If high pressure switch does not reset and everything else is OK, replace switch
		If low pressure switch (auto-reset) does not reset and everything else is OK, replace switch
	8. Open room thermostat or control (no cooling required)	Check room temperature: if temperature is within accepted range, wait for thermostat to close
	9. Loose wiring	Check all wire terminals and tighten as necessary
B. Compressor starts but cuts out on low pressure (low pressure switch activates at 50 psig for R-410A)	1. Low refrigerant charge	Check refrigerant pressures
		If refrigerant pressure is low, check for leaks
	2. Airflow restricted	Check for dirty evaporator coil, dirty filters, dampers closed, iced evaporator coil, or improper belt
		Check motor amps
		Check duct design
	3. Restriction in refrigerant line	Check refrigerant pressure
		Check and adjust thermal expansion valve—if not functioning properly, check for pressure drop across filter drier
	4. Defective low pressure switch	Replace switch
C. Compressor starts but cuts out on high pressure (high pressure switch activates at 600 psig for R-410A)	1. Refrigerant overcharge	Check subcooling; adjust as necessary
	2. Low air flow over air coil in heating mode	Change filter or clean air coil
	3. Air or non-condensibles in system	Check high side equalized pressure reading with equivalent outdoor temperature
	4. Defective high pressure switch	Replace switch
	5. Restriction in discharge or liquid line	Check subcooling and superheat; adjust as necessary
		Check operation of thermal expansion valves
	6. Reheat valve and bypass valve not opening	Check valves or valve circuit board
D. Compressor cuts out on thermal overload	1. Low voltage	Check voltage
	2. Sustained high discharge pressure	Check running amperage and conditions described for symptom I
	3. High suction and discharge pressures	Check thermal expansion valve setting
		Check for air in system
	4. Defective compressor overload	If compressor is hot, allow compressor to cool for 2 hours and Recheck for open circuit
	5. Improper refrigerant charge	Check subcooling; adjust as necessary
	6. Improperly wired	Ensure that wiring is in accordance with wiring diagram
	7. Loose wiring	Check all connections and wires
	8. Defective start relay	Replace relay
	9. Motor windings damaged	Verify amp draw
E. Compressor hums, but will not start	1. Improperly wired	Ensure that wiring is in accordance with wiring diagram
	2. Low line voltage	Check voltage
	3. Loose wiring	Check all connections
	4. Defective start or run capacitor	Check run capacitor for compressor and fan motor
	5. Defective relay start	Replace relay
	6. Motor winding damaged	Verify amp draw
	7. Internal compressor mechanical damage	Replace compressor
F. Compressor noisy or vibrating	1. Refrigerant overcharge	Check pressures and subcooling; adjust as necessary
	2. Liquid floodback	Check thermal expansion valve setting
		Check for refrigerant overcharge
	3. Tubing rattle	Dampen tubing vibration by taping or clamping (carefully bend tubing away from contact where possible)
	4. Scroll compressor rotating in reverse (three- phase)	Rewire for opposite rotation
	5. Worn or damaged compressor	Replace compressor
	6. Improper mounting on unit base	Ensure that compressor is properly isolated

Table 50. General Troubleshooting—Continued

Symptom	Probable Cause	Remedy
G. High suction pressure	1. Excessive load on evaporator coil	Check for high entering wet bulb temperature
		Check for excessive air
	2. Compressor is unloaded	Check head pressure
		Check thermal expansion valve if not functioning properly
		Check pressure drop across filter drier
	3. Expansion valve not secured to suction line	Check thermal expansion valve; ensure that bulb is insulated
		Check superheat—if high, valve is out of control and pegged wide open—check bulb for contact; adjust valve for superheat; replace valve powerhead or valve as necessary
	4. Thermostatic expansion valve pressure limit feature incorrect or inoperative (overfeeding)	Check bulb location and clamping
		Adjust superheat
		Replace expansion valve power head as necessary
	5. Room load too large	Reduce load or add more equipment
	6. Overcharged	Check pressures and subcooling; adjust as necessary
H. High discharge pressure	1. Thermal expansion valve setting	Check thermal expansion setting and calibrate superheat
	2. Too much refrigerant	Remove excess refrigerant
	3. Non-condensable in system	Remove non-condensable from system
	4. Discharge service valve partially closed	Open valve
	5. High load conditions	Add more equipment or reduce load
I. Low suction pressure	1. Refrigerant undercharge	Check pressures and subcooling
	2. Compressor rotation backward	Interchange any two wires from three-phase disconnect (refer to **Supply Voltage** section)
	3. Loose blower, pulley, or belts	Check drive pulley alignment and belt tension
	4. Low entering air temperature (low load condition)	Check entering air wet bulb conditions
	5. Refrigerant leak	Check system for leak(s); repair leak(s) and add refrigerant as necessary
	6. Evaporator dirty or iced up or airflow restricted	Check defrost system
		Clean coil
		Check fan operation
		Check airflow
	7. Plugged liquid line filter drier	Replace filter drier
	8. Improper suction pressure regulator setting	Check setting and correct as necessary
	9. Expansion valve defective, superheat too high, or valve too small	Adjust valve for proper superheat or replace expansion valve if too small or defective
	10. Moisture in system	Reclaim refrigerant, check for leaks, and recharge
J. Low discharge pressure	1. Insufficient refrigerant charge	Check subcooling; adjust as necessary
		Check system for leak(s); repair leak(s) and add refrigerant as necessary
	2. Defective or improperly adjusted expansion valve	Check superheating and adjust thermal expansion valve
	3. Low suction pressure	Check conditions described for symptom I
K. Compressor short cycles	1. Thermostat location or malfunction	Check thermostat; replace as necessary
	2. Improper refrigerant charge	Check subcooling and verify superheat; adjust as necessary
	3. Defective high or low pressure control	Check high or low pressure switch
	4. Liquid floodback	Possible tight bearings
	5. Defective expansion valve	Check thermal expansion valve and superheat
	6. Poor air distribution	Check ductwork for recirculating
	7. High discharge pressure	Check conditions described for symptom H
	8. Leaking discharge valves in compressor	Check conditions described for symptom G
	9. Low airflow at evaporator(s)	Check blower operation
		Check for airstream restrictions
	10. Incorrect unit selection (oversized)	Contact factory
L. Compressor loses oil	1. Refrigerant leak	Check system for leak(s); repair leak(s) and add refrigerant as necessary
	2. Short cycling	Check low pressure control settings
	3. Refrigerant floodback	Check thermal expansion valve setting
		Check for refrigerant overcharge
	4. Improper piping or traps	Ensure proper piping slopes
	5. Reheat flush cycle inadequate	Contact factory
M. Running cycle is too long or unit operates continuously	1. Refrigerant undercharge	Check subcooling; adjust as necessary
	2. Dirty filter or evaporator coil	Check filter, coil, and airflow
	3. Dirty or clogged condenser coil	Check coil and airflow
	4. Air or other non-condensibles in system	Check equalized high side pressure with equivalent outdoor temperature
	5. Defective compressor	Check conditions described for symptom G
	6. Restriction in suction and liquid line	Check for restrictions in refrigerant circuit
	7. Control contacts stuck	Check wiring
	8. Excessive load	Add more equipment or reduce room load
	9. System thermostat setting is too low or thermostat is defective	Adjust or replace thermostat as necessary

Table 50. General Troubleshooting—Continued		
Symptom	**Probable Cause**	**Remedy**
N. Liquid line is too hot	1. Refrigerant undercharge	Check subcooling; adjust as necessary
	2. High discharge pressure	Check conditions described for symptom H
O. Liquid line is frosted or wet	1. Restriction in liquid line	Clear restriction upstream of point of frosting
P. Suction line is frosting	1. Insufficient evaporator airflow	Check airflow
		Check filters
		Check drive for loose parts or belts
	2. Restriction in suction or liquid line	Restriction upstream of point of frosting
	3. Malfunctioning or defective expansion valve	Check thermal expansion valve bulb; replace valve as necessary
Q. Frost on evaporator coil	1. Hot gas bypass valve not functioning properly	Check valve; replace as necessary
	2. Manual hot gas bypass valve closed	Open valve
R. Wheel not operating	1. Wheel binding	Adjust wheel; clear restriction
	2. Wheel motor defective or belt loose	Adjust or replace belt
		Replace motor as necessary
S. Fan will not start	1. Loose wiring	Check all wiring connections
T. Unit will not start	2. Improperly wired	Ensure that wiring is in accordance with wiring diagram

Table 51. Troubleshooting Using Digital Compressor Controller			
LED Color	**LED State**	**Indicated Condition**	**Notes**
GREEN	Solid	24VAC power is present at power terminals	Compressor starts only when demand signal input is above 1.45 VDC and no ALERTS (red LED flashes) are active.
	Flashing	Anti-short cycle timer is active	—
YELLOW	Solid	Unloader solenoid valve is energized and compressor capacity is 0	Compressor always unloads for 0.1-second at startup
RED	Not lit	No abnormal operation alerts	—
	Two flashes	High discharge temperature alert: thermistor temperature is >268°F or thermistor is short circuited	Compressor will be allowed to restart after 30-minute delay and after thermistor temperature is <250°F
			Compressor will lockout after five alerts within 4 hours and can be reset only by cycling 24VAC power OFF and ON
	Three flashes	Compressor protector trip: demand signal >1.44VDC and no compressor current	Possible causes: internal overload, fuse or breaker, or compressor wiring
			After 2-minute anti-short cycle timer controller attempts to restart compressor as long as demand is >1.44VDC
			No lockout feature
	Four flashes	Locked rotor alert	Locked rotor is sensed by controller on four consecutive startups
			Lockout occurs and can only be reset by cycling 24VAC power OFF and ON
	Five flashes	Demand signal loss: <0.5VDC	When demand signal input rises to >0.5VDC, alarm code is reset
			When demand reaches above rises to >1.44VDC and anti-short cycle timer has timed out, compressor restarts
	Six flashes	Discharge thermistor fault: no signal being received	Compressor capacity is limited to 50%
			Reconnect or replace thermistor
	Seven flashes	Unloader solenoid valve fault	—
	Eight flashes	Compressor contactor fault: compressor is running on <1.44VDC demand signal	Compressor runs unloaded
			Alarm is reset when current is no longer detected while system demand signal is <1.44VDC
	Nine flashes	Low 24VAC supply to controller (below 18.5VAC)	Alarm is reset when supply voltage to controller rises to >19.5VAC
ALL	Solid	Compressor controller failure	Digital compressor controller can be tested to verify that it is working properly; in each test, 24VAC must be supplied to 24VAC and 24COM; for output test, 24–250VAC must be supplied to L1 and L2*
	Flashing	24VAC supply too low for operation	

***Test the digital compressor controller as follows:**

Input Tests:
1) Thermistor Input: Disconnect thermistor (T1 and T2). The red LED should display six flashes.
2) Demand Input: Disconnect unit controller (C1 and C2). The red LED should display five flashes unless a previous alert code was present.

Output Tests:
1) Contactor Output: While the controller is powered OFF (no supply voltage to 24VAC and 24COM), disconnect the signal wire from C1 and C2. Add jumper wires from P3 to C2 and from P1 to C1. Restore power to 24VAC and 24COM. If function is normal, the same voltage should be read across M1 and M2 as across L1 and L2, unless an LED alert is present.
2) Unloader Output: While the controller is modulating the unloader solenoid (indicated by solid yellow LED), the voltage across U1 and U2 should be the same as L1 and L2.

APPENDIX

Temperature Sensor Resistance						
Sensor Type	Temperature		Type 24 Resistance (K)*	Temperature		Type 24 Resistance (K)*
	°F	°C		°F	°C	
Disvharge Air Temperatur (DAT), Outside Air Temperature (OAT), and Wheel DAT	−10.0	−23.3	118.0	75.0	23.9	10.50
	−5.0	−20.6	100.2	77.0	25.0	10.00
	0.0	−17.8	85.35	80.0	26.7	9.298
	5.0	−15.0	72.91	85.0	29.4	8.250
	10.0	−12.2	62.48	90.0	32.2	7.331
	15.0	−9.4	53.64	95.0	35.0	6.532
	20.0	−6.7	46.23	100.0	37.8	5.826
	25.0	−3.9	39.91	105.0	40.6	5.209
	30.0	−1.1	34.56	110.0	43.3	4.663
	35.0	1.7	30.00	115.0	46.1	4.182
	40.0	4.4	26.10	120.0	48.9	3.757
	45.0	7.2	22.76	125.0	51.7	3.381
	50.0	10.0	19.90	130.0	54.4	3.047
	55.0	12.8	17.44	135.0	57.2	2.750
	60.0	15.6	15.31	140.0	60.0	2.486
	65.0	18.3	13.48	145.0	62.8	2.251
	70.0	21.1	11.88			
*As measured between the yellow wires of the sensor.						

Wiring Diagram Option Identification	
Option Code*	Description
A24	High-efficiency backward-curved impeller fan with ECM motor
AK5	Supply voltage: 208V/3PH/60Hz
AK6	Supply voltage: 230V/3PH/60Hz
AK7	Supply voltage: 460V/3PH/60Hz
BA6	Unit-mounted, non-fused disconnect switch
BE18	Dirty filter alarm
BHB7	LON communication module
BHB8	BACNet communication module
CN5	Manual ON/OFF switch (24V)
CN7A	Time schedule clock with integral ON/OFF override switch
CN7B	CO_2 sensor (0–2000 ppm) with unit control switch (AUTO/ON/OFF)
CN7C	Indoor air quality sensors (VOC and CO) with unit switch (AUTO/ON/OFF)
CN7D	Occupancy motion switch with integral ON/OFF override switch
CP5	30A/240V non-fusible disconnect switch (field-installed in US)
CP6	30A/240V fusible disconnect switch (field-installed in US)
CP7	30A/600V non-fusible disconnect switch (field-installed in US)
CP7	30A/600V non-fusible disconnect switch (field-installed in US)
CP8	30A/600V fusible disconnect switch (field-installed in US)
CP17	60A/240V fusible disconnect switch (field-installed in US)
CP20	60A/600V fusible disconnect switch (field-installed in US)
CP30	60A/240V non-fusible disconnect switch (field-installed in US)
CP38	60A/600V non-fusible disconnect switch (field-installed in US)
CP42	30A/600V fusible disconnect switch (field-installed in Canada)
CP44	60A/600V fusible disconnect switch (field-installed in Canada)
CP59	30A/600V non-fusible disconnect switch (field-installed in Canada)
CP61	60A/600V non-fusible disconnect switch (field-installed in Canada)
PH1A	Nominal 5kW-resistive electric pre-heat
PH2A	Nominal 10kW-resistive electric pre-heat
RB5	Remote display
*The codes for these electrical options are shown on the wiring diagram. The custom diagram lists only the option(s) ordered.	

Model ZQYRA Startup Form

Job Name:	**Contractor Contact:**
Street Address:	**Contractor Phone:**
City, State, Zip:	**Unit Size:**
Date:	**Unit Serial No.:**
Contractor:	**Tag:**

Startup Checklist

Preparation Checks

❑ Inspect unit for damage	❑ Voltage imbalance checked
❑ Unit clearances as required	❑ 230V conversion wiring completed (if required)
❑ Curb level and installed correctly	❑ Manual high pressure switch reset
❑ Two unused duct connection openings sealed	❑ External control wiring verified
❑ Exhaust air hood installed	❑ Verify inlet and return air filters in place
❑ Inlet air hood with filter installed	❑ Check inlet and exhaust dampers (optional)
❑ Condensate trap installed	❑ Check wheel for alignment and free rotation
❑ All electrical entrances sealed	❑ Check wheel for cleanliness, position of seals, and belt tension
❑ Electrical disconnect switch installed	❑ Ensure that crankcase heater has been energized for 24 hours before startup
❑ All electrical terminals tightened	

Startup Procedures/Checks

- ❑ Check compressor rotation (NOT fan rotation) to verify correct 3-phase wiring connection
- ❑ If using optional remote display, reset address
- ❑ Set up unit parameters in test mode
- ❑ Set fan speeds
- ❑ Check subcooling and superheat; adjust as necessary
- ❑ If equipped with dirty filter alarm, set dirty filter pressure switch

Functional Testing Records

Outside air db/wb			**Energy Recovery Wheel**		
Return air db/wb			Motor amperage		
Unit voltage (rating plate)			Wheel rpm		
Unit MOP/MCA (rating plate)			Discharge air temperature		
Air Management Systems	**Supply**	**Exhaust**	**Air Management Systems**	**Supply**	**Exhaust**
Motor speed control setting			Motor amps (L1)		
External duct static pressure			Motor amps (L2)		
Unit cfm			Motor amps (L3)		
Optional Electric Pre-Heat			**Optional Electric Supplemental Heat**		
Electric heat amps			Electric heat amps		

Heat Pump System*

Compressor	**L1**	**L2**	**L3**	**Compressor %**	**Subcooling**	**Superheat**
Heating mode				Ramp up to 30%		
Cooling mode				Ramp up to 100%		

Comments/Notes:

***Test for 1 hour maximum run time. DO NOT test heating mode above 80°F (24°C).

INSTALLATION RECORD (TO BE COMPLETED BY INSTALLER)

Installer: Name _____

Company _____

Address _____

_____

Phone _____

Distributor (company from which the unit was purchased):

Contact _____

Company _____

Address _____

_____

Phone _____

Model No. _____ Serial No._____Date of Installation _____

SPECIFIC INSTALLATION NOTES: (i.e. Location, CFM, HP, Static Pressure, Amps, Temperature, Voltage, Adjustments, Warranty, etc.)

_____

_____

_____

BUILDING OWNER OR MAINTENANCE PERSONNEL:

For service or repair:

- Contact the installer listed above.
- If you need additional assistance, contact the Distributor listed above.
- For more information, contact your Factory Representative.

R-410A Refrigerant

I-ZQYRA (08-19) PN260414R9

260414