INSTALLATION MANUAL - 50 Hz

PREDATOR®

SINGLE PACKAGE HEAT PUMP
HIGH EFFICIENCY
BP090 and 120
(7-1/2 and 10 TON)

CONTENTS

See following pages for a complete Table of Contents.

NOTES, CAUTIONS AND WARNINGS

The installer should pay particular attention to the words: *NOTE*, *CAUTION*, and *WARNING*. Notes are intended to clarify or make the installation easier. Cautions are given to prevent equipment damage. Warnings are given to alert installer that personal injury and/or equipment damage may result if installation procedure is not handled properly.

CAUTION: READ ALL SAFETY GUIDES BEFORE YOU BEGIN TO INSTALL YOUR UNIT.

SAVE THIS MANUAL

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

GENERAL

YORK® Predator® Heat Pump units are single package, reverse cycle air conditioners designed for outdoor installation on a rooftop or slab and for non-residential use. These units can be equipped with factory or field installed electric heaters for heating applications.

These units are completely assembled on rigid, permanently attached base rails. All piping, refrigerant charge, and electrical wiring is factory installed and tested. The units require electric power and duct connections. The electric heaters have nickel-chrome elements and utilize single-point power connection.

SAFETY CONSIDERATIONS

Due to system pressure, moving parts, and electrical components, installation and servicing of air conditioning equipment can be hazardous. Only qualified, trained service personnel should install, repair, or service this equipment. Untrained personnel can perform basic maintenance functions of cleaning coils and filters and replacing filters.

Observe all precautions in the literature, labels, and tags accompanying the equipment whenever working on air conditioning equipment. Be sure to follow all other applicable safety precautions and codes including National Electric Code, ANSI/NFPA No. 70 - latest edition U.S.A. and Canadian Electric Code, CSA C22.1 in Canada.

Wear safety glasses and work gloves. Use quenching cloth and have a fire extinguisher available during brazing operations.

INSPECTION

As soon as a unit is received, it should be inspected for possible damage during transit. If damage is evident, the extent of the damage should be noted on the carrier's freight bill. A separate request for inspection by the carrier's agent should be made in writing.

⚠WARNING

This furnace is not to be used for temporary heating of buildings or structures under construction.

Before performing service or maintenance operations on unit, turn off main power switch to unit. Electrical shock could cause personal injury. Improper installation, adjustment, alteration, service or maintenance can cause injury or property damage. Refer to this manual. For assistance or additional information consult a qualified installer, service agency or the gas supplier.

REFERENCE

Additional information is available in the following reference forms:

- Technical Guide - 259336
- General Installation - 66307
- Pre-start & Post-start Check List
- Economizer Accessory -
  Downflow Factory Installed
  Downflow Field Installed
  Horizontal Field Installed
- Motorized Outdoor Air Damper
- Manual Outdoor Air Damper (0-100%)
- Manual Outdoor Air Damper (0-35%)
- Electric Heater Accessory
- Unit Renewal Parts List

RENEWAL PARTS

Contact your local York® parts distribution center for authorized replacement parts.

APPROVALS

Design certified by CSA as follows:

1. For use as a cooling only unit, cooling unit with supplemental electric heat forced air furnace.
2. *For outdoor installation only.*
3. For installation on combustible material and may be installed directly on combustible flooring or, in the U.S., on wood flooring or Class A, Class B or Class C roof covering materials.

⚠ CAUTION

This product must be installed in strict compliance with the enclosed installation instructions and any applicable local, state, and national codes including, but not limited to, building, electrical, and mechanical codes.

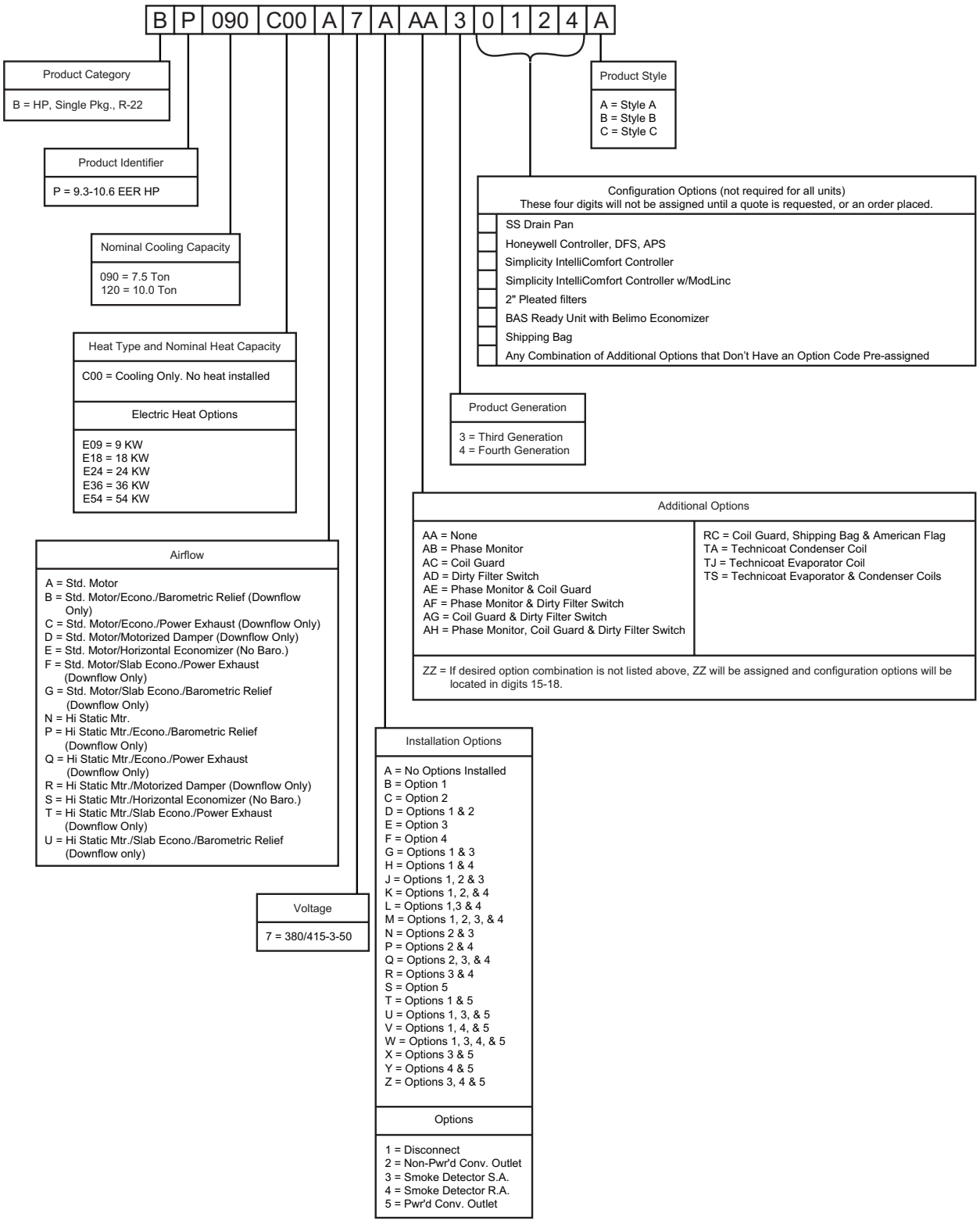
⚠ WARNING

Incorrect installation may create a condition where the operation of the product could cause personal injury or property damage.

The installer should pay particular attention to the words: NOTE, CAUTION, and WARNING. NOTES are intended to clarify or make the installation easier. CAUTIONS are given to prevent equipment damage. WARNINGS are given to alert installer that personal injury and/or equipment damage may result if installation procedure is not handled properly.

NOMENCLATURE

7.5-10.0 Ton York® Model Number Nomenclature



INSTALLATION

INSTALLATION SAFETY INFORMATION

Read these instructions before continuing this appliance installation. This is an outdoor combination heating and cooling unit. The installer must assure that these instructions are made available to the consumer and with instructions to retain them for future reference.

1. This equipment is not to be used for temporary heating of buildings or structures under construction.

PRECEDING INSTALLATION

1. Remove the two screws holding the brackets in the front, rear and compressor side fork-lift slots.

FIGURE 1 - UNIT SHIPPING BRACKET

2. Turn each bracket toward the ground and the protective plywood covering will drop to the ground.
3. Remove the condenser coil external protective covering prior to operation.
4. Remove the toolless doorknobs and instruction packet prior to installation.

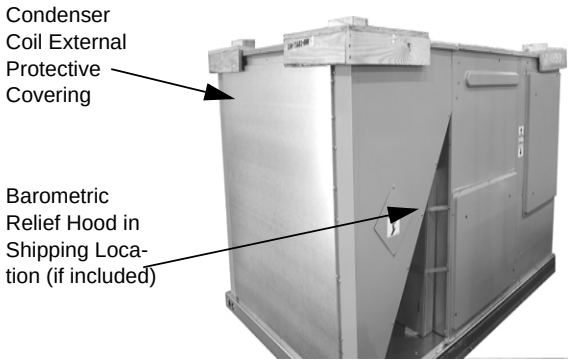


FIGURE 2 - CONDENSER COIL COVERING

⚠ CAUTION

This product must be installed in strict compliance with the enclosed installation instructions and any applicable local, state and national codes including, but not limited to, building, electrical, and mechanical codes.

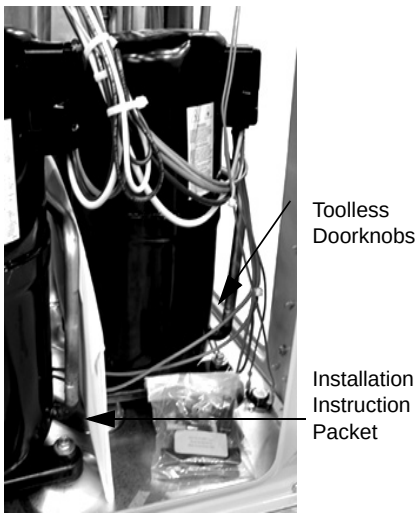


FIGURE 3 - COMPRESSOR SECTION

LIMITATIONS

These units must be installed in accordance with the following:

In U.S.A.:

1. National Electrical Code, ANSI/NFPA No. 70 - Latest Edition
2. Local building codes
3. Local electric utility requirements

In Canada:

1. Canadian Electrical Code, CSA C22.1
2. Installation Codes, CSA - B149.1.
3. Local plumbing and waste water codes, and
4. Other applicable local codes.

Refer to Tables 2 & 3 for unit application data.

If components are to be added to a unit to meet local codes, they are to be installed at the dealer's and/or customer's expense.

Size of unit for proposed installation should be based on heat loss/heat gain calculation made according to the methods of Air Conditioning Contractors of America (ACCA).

This furnace is not to be used for temporary heating of buildings or structures under construction.

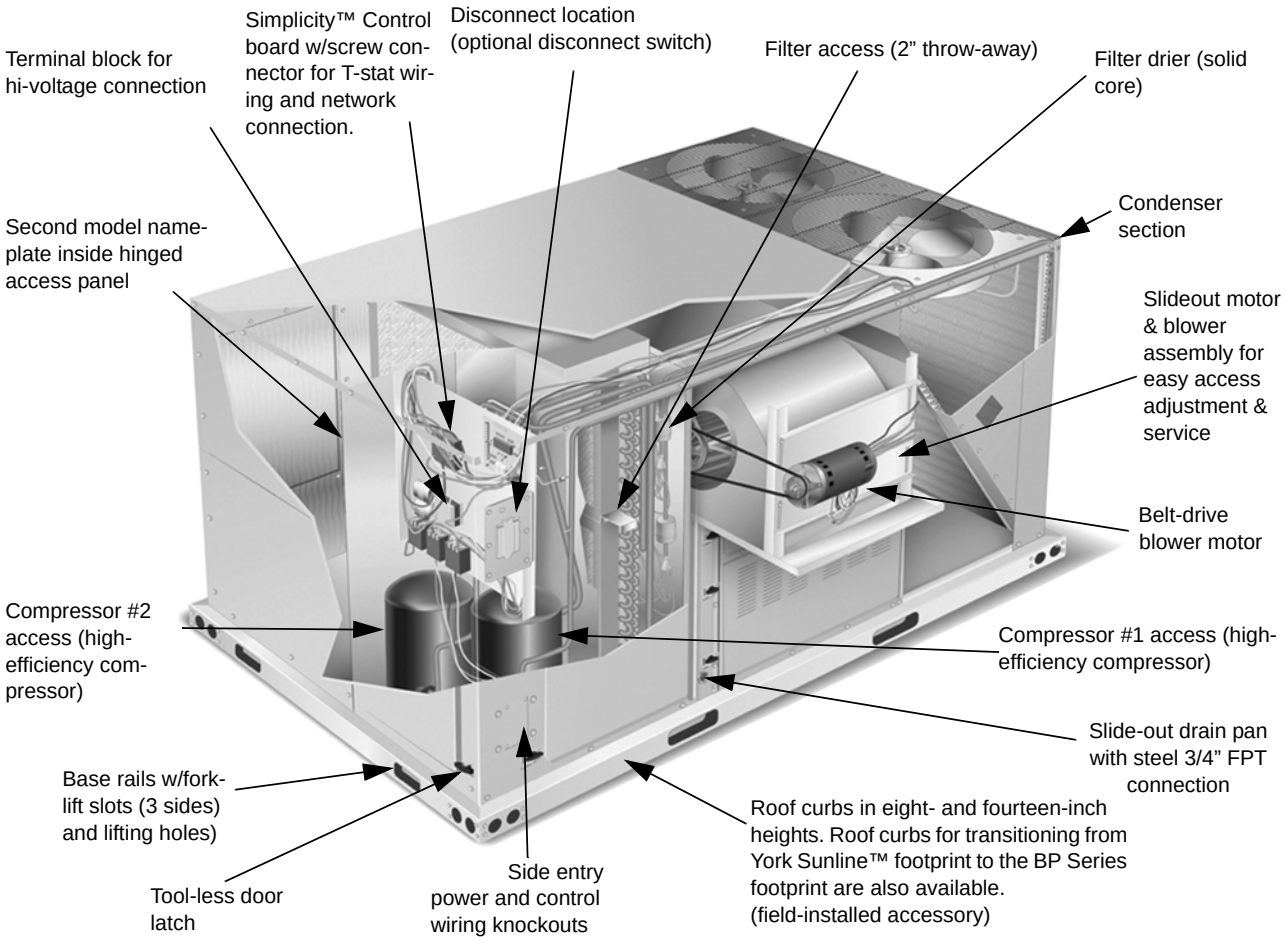


FIGURE 4 - PREDATOR® COMPONENT LOCATION

TABLE 1: UNIT TEMPERATURE LIMITATIONS

Temperature	Min.	Max.
Wet Bulb Temp °F (°C) of Air on Evap Coil	57 (14)	72 (22)
Dry Bulb Temp °F (°C) of Air on Cond Coil	0 (-18)	125 (52)

TABLE 2: UNIT VOLTAGE LIMITATIONS

Power Rating*	Minimum	Maximum
380/415-3-50	342	456

*. Utilization range "A" in accordance with ARI Standard 110.

LOCATION

Use the following guidelines to select a suitable location for these units:

1. Unit is designed for *outdoor installation only.*
2. Condenser coils must have an unlimited supply of air. Where a choice of location is possible, position the unit on either north or east side of building.
3. Suitable for mounting on roof curb.
4. For ground level installation, use a level concrete slab with a minimum thickness of 4 inches (102 mm). The length and width should be at least 6 inches (152 mm) greater than the unit base rails. Do not tie slab to the building foundation.
5. Roof structures must be able to support the weight of the unit and its options/accessories. Unit must be installed on a solid, level roof curb or appropriate angle iron frame.
6. Maintain level tolerance to 1/2" (13 mm) across the entire width and length of unit.

RIGGING AND HANDLING

Exercise care when moving the unit. Do not remove any packaging until the unit is near the place of installation. Rig the unit by attaching chain or cable slings to the lifting holes provided in the base rails. Spreader bars, whose length exceeds the largest dimension across the unit, **MUST** be used across the top of the unit.

⚠ CAUTION

If a unit is to be installed on a roof curb other than a YORK roof curb, gasketing must be applied to all surfaces that come in contact with the unit underside.

⚠ CAUTION

Before lifting, make sure the unit weight is distributed equally on the rigging cables so it will lift evenly.

Units may be moved or lifted with a forklift. Slotted openings in the base rails are provided for this purpose.

LENGTH OF FORKS MUST BE A MINIMUM OF 60 INCHES (1524 mm).

⚠ CAUTION

All panels must be secured in place when the unit is lifted.

The condenser coils should be protected from rigging cable damage with plywood or other suitable material.

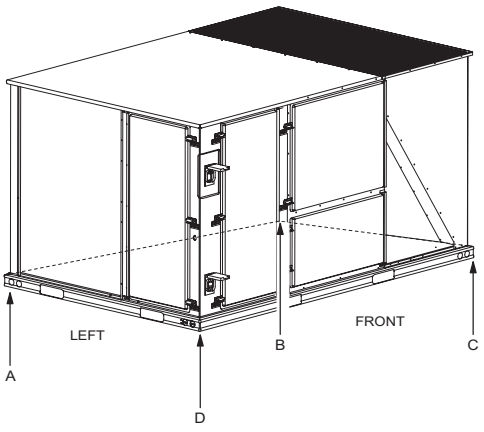


FIGURE 5 - UNIT 4 POINT LOAD

TABLE 3: UNIT WEIGHTS

Model	Shipping Weight lb. (kg)	Operating Weight lb. (kg)
BP090	1108 (503)	1103 (500)
BP120	1212 (550)	1207 (547)
Econ.	85 (39)	84 (38)
w/ PE	150 (68)	148 (67)
Elec. Heat*	49 (22)	49 (22)

*. 54kW heater.

TABLE 4: 4 POINT LOAD WEIGHT

Model	Location lbs. (kg)			
	A	**B**	**C**	**D**
BP090	242 (109)	207 (94)	301 (137)	353 (160)
BP120	265 (120)	226 (103)	330 (150)	386 (175)

TABLE 5: 6 POINT LOAD WEIGHT

Model	Location lbs. (kg)					
	A	**B**	**C**	**D**	**E**	**F**
BP090	166 (75)	149 (68)	134 (61)	196 (89)	217 (98)	242 (110)
BP120	181 (82)	163 (80)	147 (67)	214 (97)	237 (108)	264 (120)

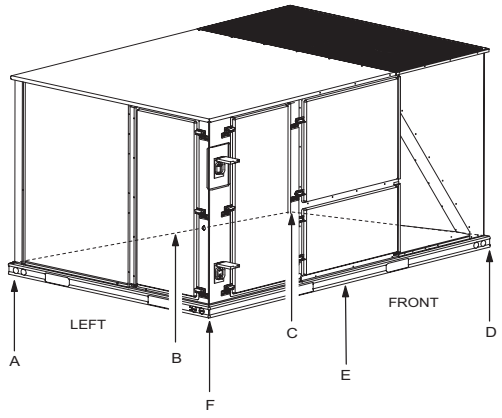


FIGURE 6 - UNIT 6 POINT LOAD

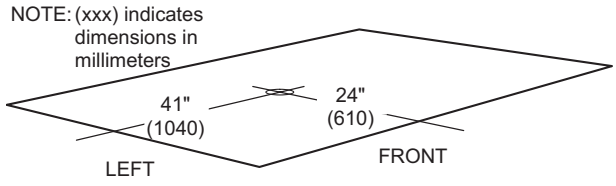


FIGURE 7 - UNIT CENTER OF GRAVITY

CLEARANCES

All units require particular clearances for proper operation and service. Refer to Table 6 for clearances required for construction, servicing, and proper unit operation.

⚠WARNING

Do not permit overhanging structures or shrubs to obstruct condenser air discharge outlet, combustion air inlet or vent outlets.

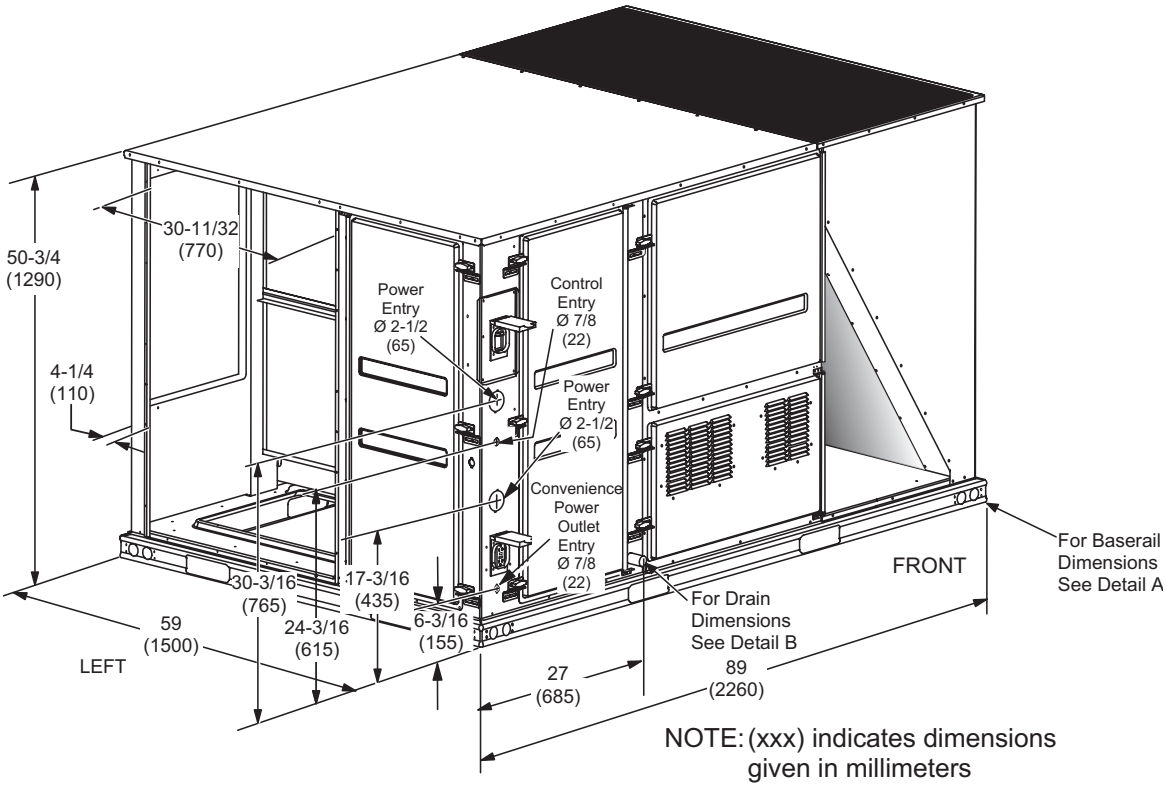


FIGURE 8 - UNIT DIMENSIONS

TABLE 6: UNIT CLEARANCES *

Top†	72 (1830)	**Right**	12 (305)
Front	36 (915)	**Left**	36 (915)
Rear‡	36 (915)	**Bottom****	0 (0)

*. In inches and millimeters, in.(mm).

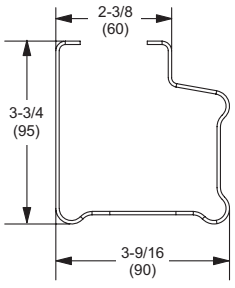
†. Units must be installed outdoors. Overhanging structure or shrubs should not obstruct condenser air discharge outlet.

‡. To remove the slide-out drain pan, a rear clearance of 60" (1525 mm) is required. If space is unavailable, the drain pan can be removed through the front by separating the corner wall.

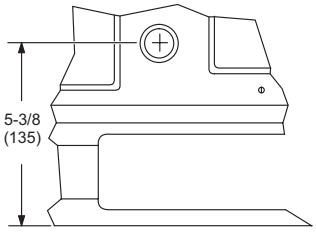
**. Units may be installed on combustible floors.

NOTE: A one-inch clearance must be provided between any combustible material and the supply ductwork for a distance of 3 feet from the unit.

DETAIL A



DETAIL B



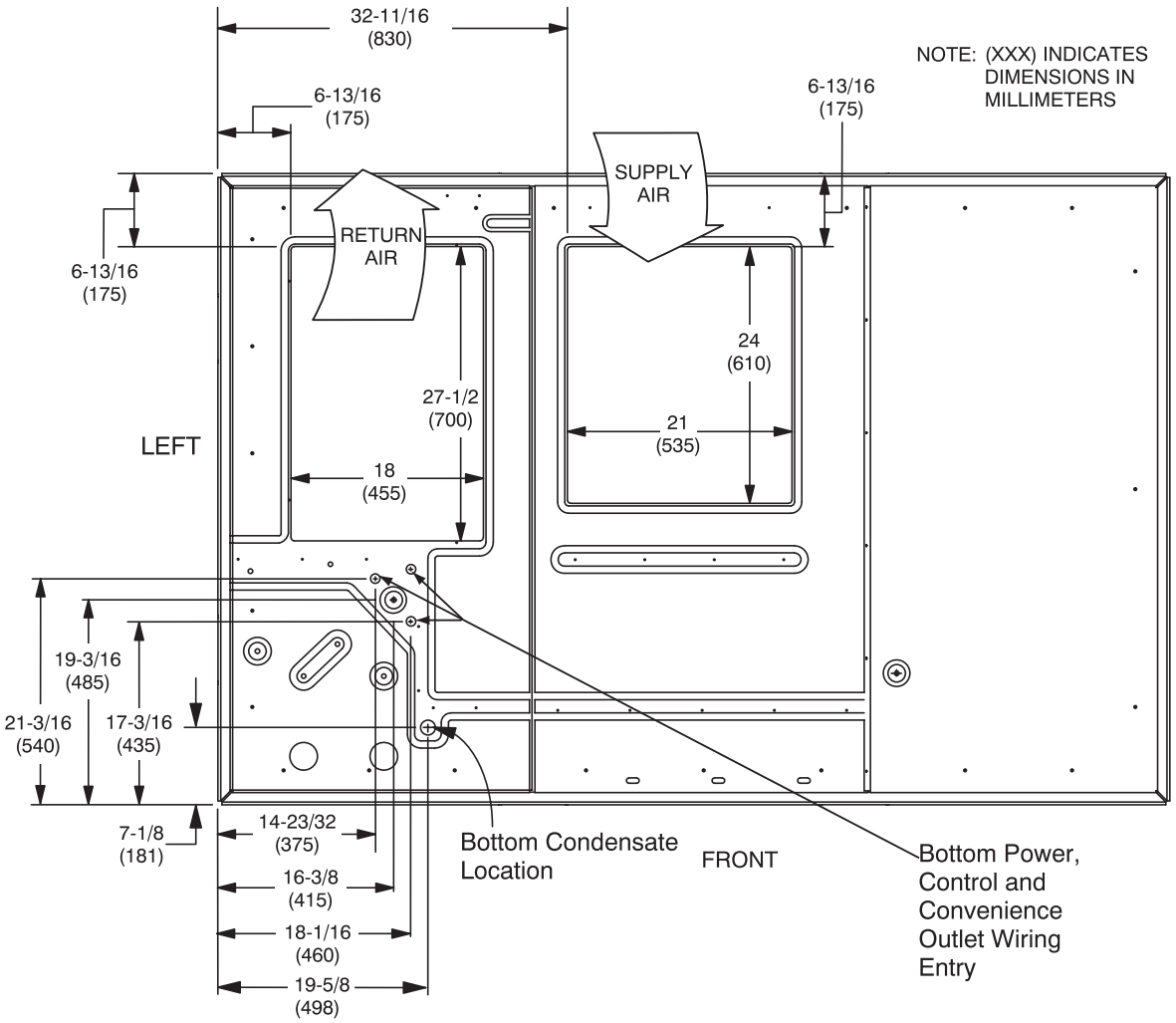


FIGURE 9 - BOTTOM DUCT OPENINGS (FROM ABOVE)

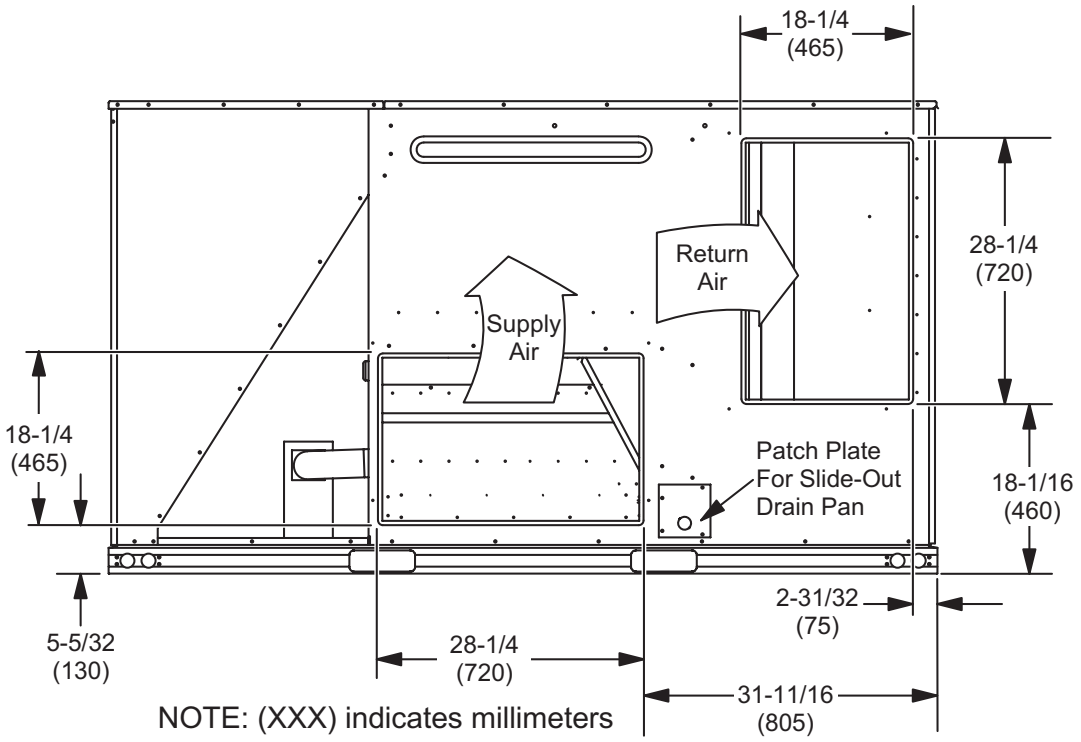


FIGURE 10 - REAR DUCT DIMENSIONS

DUCTWORK

Ductwork should be designed and sized according to the methods in Manual D of the Air Conditioning Contractors of America (ACCA) or as recommended by any other recognized authority such as ASHRAE or SMACNA.

A closed return duct system should be used. This will not preclude use of economizers or outdoor fresh air intake. The supply and return air duct connections at the unit should be made with flexible joints to minimize noise.

The supply and return air duct systems should be designed for the CFM and static pressure requirements of the job. They should NOT be sized to match the dimensions of the duct connections on the unit.

Refer to Figure 9 for bottom air duct openings. Refer to Figure 10 for rear air duct openings.

DUCT COVERS

Units are shipped with the side duct openings covered and a covering over the bottom of the unit. For bottom duct application, no duct cover changes are necessary. For side duct application, remove the side duct covers and install over the bottom duct openings. The panels removed from the side duct connections are designed to be reused by securing each panel to its respective downflow opening. But keep in mind that the supply panel is installed with the painted surface UP, facing the heat exchanger, while the return panel is installed with the painted surface DOWN, facing the downflow duct opening. The supply panel is secured with the bracket (already in place from the factory) and two screws. It's a snug fit for the panel when sliding it between the heat exchanger and unit bottom, but there is room. The return panel is secured with four screws.

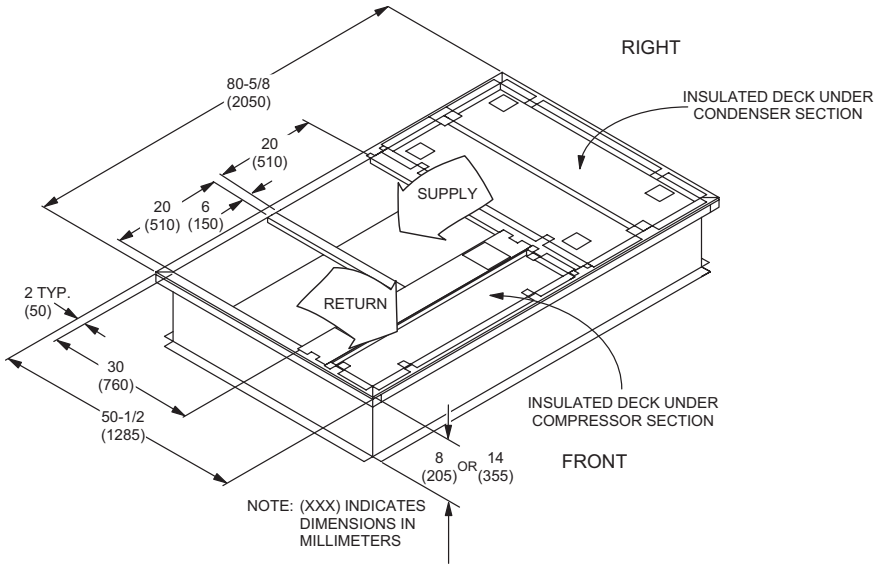


FIGURE 11 - PREDATOR® ROOF CURB DIMENSIONS

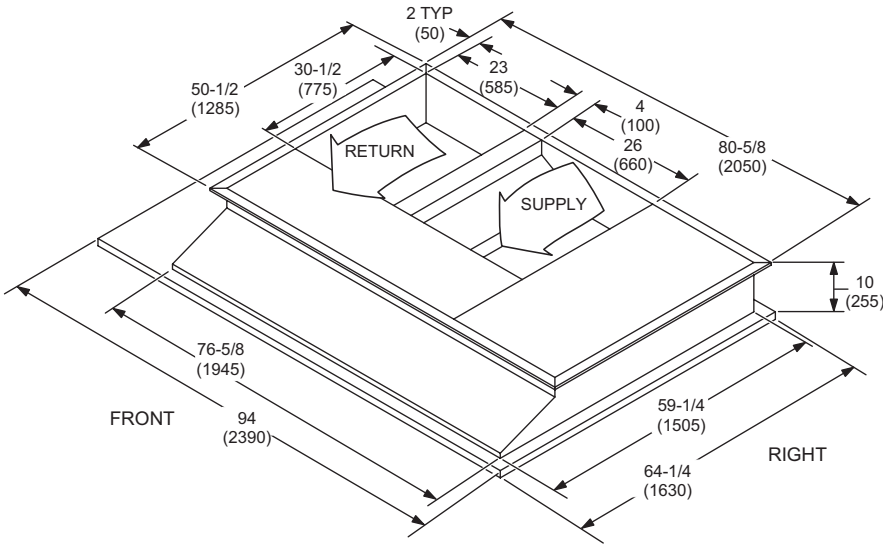


FIGURE 12 - SUNLINE™ TO PREDATOR® TRANSITION ROOF CURBS

⚠ CAUTION

When fastening ductwork to side duct flanges on unit, insert screws through duct flanges only. DO NOT insert screws through casing. Outdoor ductwork must be insulated and water-proofed.

FIGURE 13 - SIDE PANELS WITH HOLE PLUGS

Note orientation. Panel is “insulation” side up.

FIGURE 14 - RETURN DOWNFLOW PLENUM WITH PANEL

FIGURE 15 - DISCHARGE PANEL IN PLACE

CONDENSATE DRAIN

The side condensate drain is reversible and maybe re-oriented to the rear of the cabinet to facilitate condensate piping. A condensate drain connection is available through the base pan for piping inside the roof curb. Trap the connection per Figure 16. The trap and drain lines should be protected from freezing.

Plumbing must conform to local codes. Use a sealing compound on male pipe threads. Install condensate drain line from the 3/4 inch NPT female connection on the unit to an open drain.

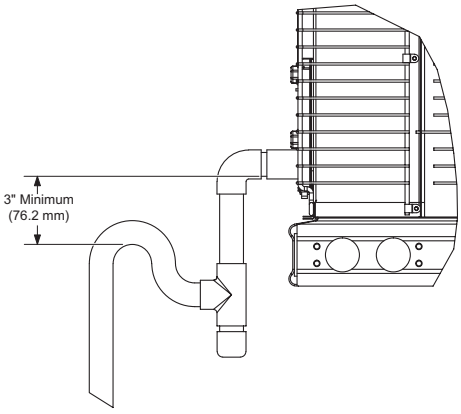


FIGURE 16 - CONDENSATE DRAIN

COMPRESSORS

The compressors are mounted on elastomer insulators. The mounting bolts have been fully tightened for shipping.

⚠ CAUTION

Do not loosen the compressor mounting bolts.

FILTERS

Two-inch filters are supplied with each unit. One-inch filters may be used with no modification to the filter racks. Filters must always be installed ahead of evaporator coil and must be kept clean or replaced with same size and type. Dirty filters reduce the capacity of the unit and result in frosted coils or safety shutdown. All units use four (4) 20”x25”x2” filters. The unit should not be operated without filters properly installed.

⚠ CAUTION

Make sure that panel latches are properly positioned on the unit to maintain an airtight seal.

THERMOSTAT WIRING

The thermostat should be located on an inside wall approximately 56 inches above the floor where it will not be subject to drafts, sun exposure or heat from electrical fixtures or appliances. Follow the manufacturer's instructions enclosed with thermostat for general installation procedure. Seven (7) color-coded, insulated wires should be used to connect the thermostat to the unit. Refer to Table 7 for control wire sizing and maximum length.

TABLE 7: CONTROL WIRE SIZES

Wire Size	Maximum Length*
18 AWG	150 Feet (45.72 meters)

*. From the unit to the thermostat and back to the unit.

POWER AND CONTROL WIRING

Field wiring to the unit, fuses, and disconnects must conform to provisions of National Electrical Code (NEC), ANSI/NFPA No. 70 – Latest Edition (in U.S.A.), current Canadian Electrical Code CSA C22.1, and/or local ordinances. The unit must be electrically grounded in accordance with NEC and CEC as specified above and/or local codes.

Voltage tolerances which must be maintained at the compressor terminals during starting and running conditions are indicated on the unit Rating Plate and Table 2.

The internal wiring harnesses furnished with this unit are an integral part of the design certified unit. Field alteration to

comply with electrical codes should not be required. If any of the wire supplied with the unit must be replaced, replacement wire must be of the type shown on the wiring diagram and the same minimum gauge as the replaced wire.

A disconnect must be utilized for these units. When installing a disconnect, refer to Figure 4 for the recommended mounting location.

⚠ CAUTION

Avoid damage to internal components if drilling holes for disconnect mounting.

NOTE: Since not all local codes allow the mounting of a disconnect on the unit, please confirm compliance with local code before mounting a disconnect on the unit.

Electrical line must be sized properly to carry the load. USE COPPER CONDUCTORS ONLY. Each unit must be wired with a separate branch circuit fed directly from the meter panel and properly fused.

Refer to Figures 17, 18 and 19 for typical field wiring and to the appropriate unit wiring diagram mounted inside control doors for control circuit and power wiring information.

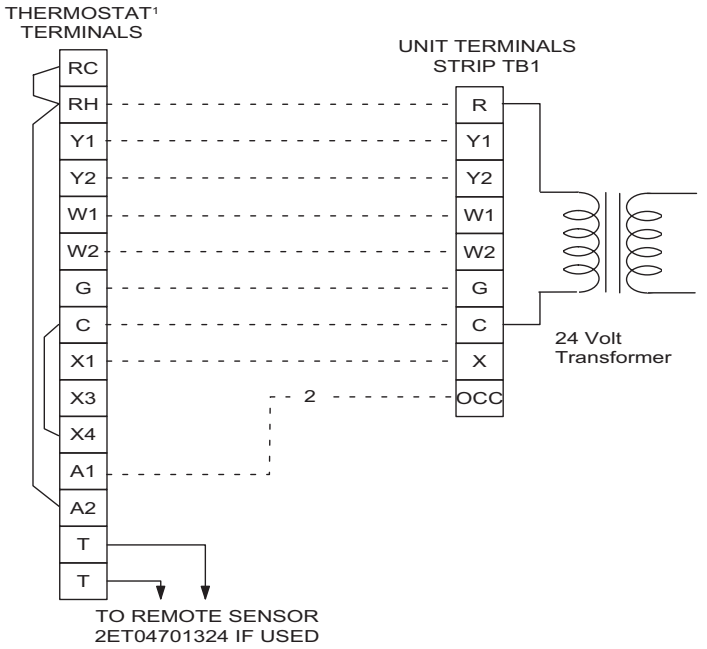
⚠ CAUTION

When connecting electrical power and control wiring to the unit, water-proof connectors must be used so that water or moisture cannot be drawn into the unit during normal operation. The above water-proofing conditions will also apply when installing a field supplied disconnect switch.

POWER WIRING DETAIL

Units are factory wired for the voltage shown on the unit nameplate. Refer to Electrical Data Tables 8 and 9 to size power wiring, fuses, and disconnect switch.

Power wiring is brought into the unit through the side of the unit or the basepan inside the curb.



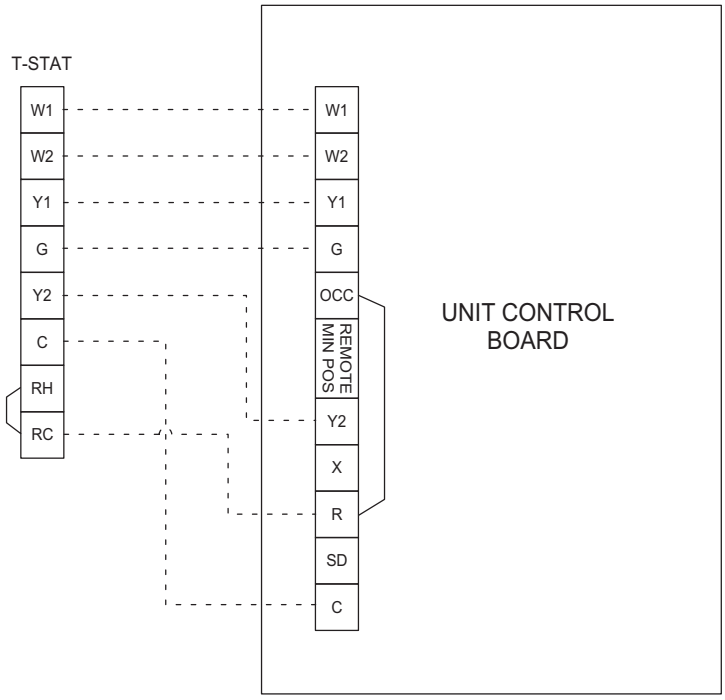
[1] Electronic programmable Thermostat 2ET0770010024 (includes subbase).
[2] Terminals A1 and A2 provide a relay output to close the outdoor economizer dampers when the thermostat switches to the set-back position.

FIGURE 17 - ELECTRONIC THERMOSTAT FIELD WIRING

NOTE: This unit does not require a heat pump thermostat. It is designed to work with a standard two-stage cool, two-stage heat thermostat; however, the thermostat must provide a “G” signal when there is a call for “W1”.

⚠ CAUTION

The thermostat must provide a “G” signal when there is a call for “W1.”The unit control board will energize the indoor blower when the compressors are energized; however, if the thermostat calls for “W2” during the anti-short-cycle delay, the electric heat (when installed) will be energized immediately upon the call for “W2.”



⚠ CAUTION

The thermostat must provide a “G” signal when there is a call for “W1.”The unit control board will energize the indoor blower when the compressors are energized; however, if the thermostat calls for “W2” during the anti-short-cycle delay, the electric heat (when installed) will be energized immediately upon the call for “W2.”

FIGURE 18 - FIELD WIRING 24 VOLT THERMOSTAT

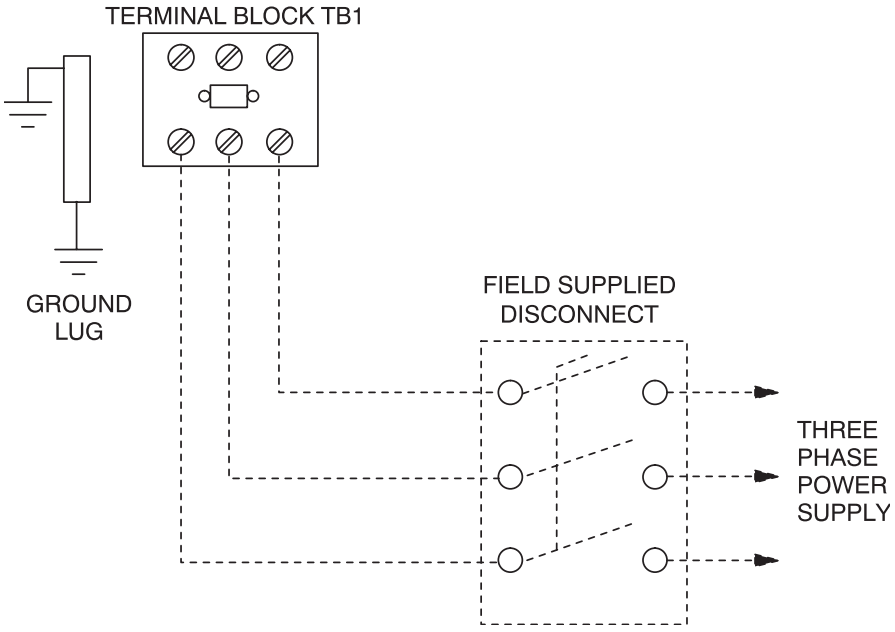


FIGURE 19 - FIELD WIRING DISCONNECT

TABLE 8: ELECTRICAL DATA - 7-1/2 TON HP

Voltage	Compressors		OD Fan Motors	Supply Air BLower Motor FLA		Pwr Exh Motor	Electric Heater Model No.	Actual Kw	Heater Amps	Minimum Circuit Ampacity (Amps)		MCA with Power Exhaust (Amps)		Max Fuse Size* (Amps)		Max Fuse Size w/Pwr. Exh.* (Amps)	
	RLA ea	LRA ea	FLA ea	1.5 HP (1.1 kW)	2 HP (1.5 kW)	FLA				1.5 HP (1.1 kW)	2 HP (1.5 kW)	1.5 HP (1.1 kW)	2 HP (1.5 kW)	1.5 HP (1.1 kW)	2 HP (1.5 kW)	1.5 HP (1.1 kW)	2 HP (1.5 kW)
380	8.3	62	1.1	4.3	5.2	2.2	None	-	-	25.2	26.1	27.4	28.3	30	30	35	35
							2TP04520950	5.6	8.5	35.8	36.7	38.0	38.9	40	40	40	45
							2TP04521850	11.3	17.2	46.6	47.5	48.8	49.7	50	50	50	50
							2TP04522450	15.0	22.8	53.7	54.6	55.9	56.8	60	60	60	60
							2TP04523650	21.3	32.4	65.6	66.5	67.8	68.7	70	70	70	70
415	8.3	62	1.1	4.3	5.2	2.2	None	-	-	25.2	26.1	27.4	28.3	30	30	35	35
							2TP04520950	6.7	9.3	36.8	37.7	39.0	39.9	40	40	40	45
							2TP04521850	13.5	18.8	48.7	49.6	50.9	51.8	50	50	60	60
							2TP04522450	17.9	24.9	56.3	57.2	58.5	59.4	60	60	60	60
							2TP04523650	25.4	35.3	69.3	70.2	71.5	72.4	70	80	80	80

*. Maximum HACR breaker of the same amp size is acceptable.

TABLE 9: ELECTRICAL DATA - 10 TON HP

Voltage	Compressors		OD Fan Motors	Supply Air BLower Motor FLA		Pwr Exh Motor	Electric Heater Model No.	Actual Kw	Heater Amps	Minimum Circuit Ampacity (Amps)		MCA with Power Exhaust (Amps)		Max Fuse Size* (Amps)		Max Fuse Size w/Pwr. Exh.* (Amps)	
	RLA ea	LRA ea	FLA ea	2 HP (1.5 kW)	4HP (3 kW)	FLA				2 HP (1.5 kW)	4 HP (3 kW)	2 HP (1.5 kW)	4 HP (3 kW)	2 HP (1.5 kW)	4 HP (3 kW)	2 HP (1.5 kW)	4 HP (3 kW)
380	8.1	73.0	1.1	5.2	7.5	2.2	None	--	--	25.6	27.9	27.8	30.1	30	35	35	35
							2TP04521850	11.3	17.2	47.1	49.4	49.3	51.6	50	50	50	60
							2TP04522450	15.0	22.8	54.1	56.4	56.3	58.6	60	60	60	60
							2TP04523650	21.3	32.4	66.1	68.4	68.3	70.6	70	70	70	80
							2HP04535450†	33.8	51.4	70.7	73.6	73.4	76.3	80	80	80	80
415	8.1	73.0	1.1	5.2	7.5	2.2	None	--	--	25.6	27.9	27.8	30.1	30	35	35	35
							2TP04521850	13.5	18.8	49.1	51.4	51.3	53.6	50	60	60	60
							2TP04522450	17.9	24.9	56.8	59.1	59.0	61.3	60	60	60	70
							2TP04523650	25.4	35.3	69.8	72.1	72.0	74.3	70	80	80	80
							2HP04535450†	40.4	56.2	76.8	79.6	79.5	82.4	80	80	80	90

*. Maximum HACR breaker of the same amp size is acceptable.

†. Only 25.4 kW of electric heat can be simultaneously energized with the mechanical heating. The full 40.4 kW operates only if both compressors are locked out.

TABLE 10: PHYSICAL DATA

Component		Models	
		090	120
Evaporator Blower	Blower, Centrifugal Dia. X Wd. in. (Dia. X Wd. mm)	15 x 15 (381 x 381)	15 x 15 (381 x 381)
	Motor, Standard HP (kW)	1-1/2 (1.1)	2 (1.5)
	Motor, Optional HP (kW)	2 (1.5)	4 (3)
Evaporator Coil	Rows	3	4
	Fins per Inch (2.54 cm.)	15	15
	Height in. (mm)	40 (1020)	40 (1020)
	Face Area ft.^{2} each (m^2)	13.2 (1.23)	13.2 (1.23)
Condenser Fan (2 per Unit)	Propeller Dia. in., each (mm)	24 (610)	24 (610)
	Motor HP, each (kW)	3/4 (.56)	3/4 (.56)
	CFM, Nominal (each)	4000	4000
Condenser Coil (2 per unit)	Rows (each)	1	2
	Fins per Inch (2.54 cm)	20	20
	Height in., each (mm)	44 (1120)	44 (1120)
	Face Area ft.^{2} each (mm)	14.5 (1.35)	14.5 (1.35)
Refrigerant Charge	System 1 lb./oz. (kg)	9 lbs. 4 oz. (4.20)	15 lbs. 4 oz. (6.92)
	System 2 lb./oz. (kg)	9 lbs. 0 oz. (4.06)	15 lbs. 0 oz. (6.80)
Compressors	Quantity	2	2
	Type	Recip	Scroll
Air Filters	Size Wd. x Ht. x Thickness in. (Wd. x Ht x Thickness mm)	25x20x2 (635 x 508 x 51)	25x20x2 (635 x 508 x 51)
	Number Per Unit	4	4

FACTORY INSTALLED OPTIONS/ FIELD INSTALLED ACCESSORIES

ELECTRIC HEAT ACCESSORY

Electric heaters are available as field installed accessories. Refer to electric heat instructions for installation. These heaters mount in the heat compartment with the heating elements extending into the supply air chamber. All electric heaters are fused and intended for use with single point power supply.

ELECTRIC HEAT OPTION

The factory-installed heaters are wired for single point power supply. Power supply need only be brought into the single point terminal block.

These CSA approved heaters are located within the central compartment of the unit with the heater elements extending into the supply air chamber.

Fuses are supplied, where required, by the factory. Some kW sizes require fuses and other do not. Refer to Table 11 for minimum CFM limitations and to Tables 8 and 9 for electrical data.

TABLE 11: ELECTRIC HEAT MINIMUM SUPPLY AIR

IMPERIAL

HEATER		UNIT MODEL SIZE, NOMINAL TONS	
kW	VOLTAGE	7.5	10
		MINIMUM SUPPLY AIR CFM	
9	380/415	2250	N/A
18		2250	3000
24		2250	3000
36		2250	3000
54		N/A	3000

METRIC

HEATER		UNIT MODEL SIZE, NOMINAL TONS	
kW	VOLTAGE	7.5	10
		MINIMUM SUPPLY AIR M^3S	
9	380/415	1.06	N/A
18		1.06	1.42
24		1.06	1.42
36		1.06	1.42
54		N/A	1.42

MOTORIZED OUTDOOR DAMPER

The Motorized Outdoor Damper can be a factory installed option or a field installed accessory. If factory installed, refer to the instructions included with the outdoor air hood to complete the assembly. Field installed Motorized Outdoor Damper accessories include complete instructions for installation.

ECONOMIZER

The Economizer can be a factory installed option or a field installed accessory. If factory installed, refer to the instructions included with the outdoor air hood to complete the assembly. Field installed Economizer accessories include complete instructions for installation.

There are two Economizer options:

1. Down Flow application with barometric relief hood standard.
2. Horizontal Flow application that requires the purchase of a barometric relief hood.

POWER EXHAUST

The Power Exhaust can be a factory installed option or a field installed accessory. If factory installed, refer to the instructions included with the outdoor air hood to complete the assembly. Field installed Power Exhaust accessories include complete instructions for installation.

The Power Exhaust factory installed option is for Down Flow application only.

There are two field installed Power Exhaust accessories:

1. Down Flow application.
2. Horizontal Flow application that requires the purchase of a barometric relief hood.

RAIN HOOD

All of the hood components, including the filters, the gasketing and the hardware for assembling, are packaged and located between the condenser coil section and the main unit cabinet, if the unit has factory installed options. If field installed accessories are being installed all parts necessary for the installation comes in the accessory.

ECONOMIZER AND POWER EXHAUST SET POINT ADJUSTMENTS AND INFORMATION

Remove the top rear access panel from the unit. Locate the economizer control module, where the following adjustments will be made.

⚠ CAUTION

Extreme care must be exercised in turning all set point, maximum and minimum damper positioning adjustment screws to prevent twisting them off.

MINIMUM POSITION ADJUSTMENT

- Check that the damper blades move smoothly without binding; carefully turn the Minimum Position Adjust screw (found on the damper control module) fully clockwise and then set the thermostat indoor fan switch to the ON position and then OFF or energize and de-energize terminals “R” to “G”.
- With the thermostat set to the indoor fan ON position or terminals “R” to “G” energized, turn the Minimum Position Adjusting screw (located on the damper control module) counterclockwise until the desired minimum damper position has been attained.

ENTHALPY SET POINT ADJUSTMENT

The enthalpy set point may now be set by selecting the desired set point shown in the Enthalpy Set Point Adjustment Figure 20. Adjust as follows:

- For a single enthalpy operation carefully turn the set point adjusting screw (found on the damper control module) to the "A", "B", "C" or "D" setting corresponding to the lettered curve of the Enthalpy Set Point Adjustment Figure 20.

- For a dual enthalpy operation, carefully turn the set point adjusting screw fully clockwise past the "D" setting.

POWER EXHAUST DAMPER SET POINT (WITH OR WITHOUT POWER EXHAUST)

- With no power exhaust option, adjust the Exhaust Air Adjustment Screw fully clockwise. This will allow 2nd stage cooling to operate.

- With power exhaust option, each building pressurization requirement will be different. The point at which the power exhaust comes on is determined by the economizer damper position (Percent Open). The Exhaust Air Adjustment Screw should be set at the Percent Open of the economizer damper at which the power exhaust is needed. It can be set from 0 to 100% damper open.

INDOOR AIR QUALITY AQ

Indoor Air Quality (indoor sensor input): Terminal AQ accepts a +2 to +10 Vdc signal with respect to the (AQ1) terminal. When the signal is below it's set point, the actuator is allowed to modulate normally in accordance with the enthalpy and mixed air sensor inputs. When the AQ signal exceeds it's set point setting and there is no call for free cooling, the actuator is proportionately modulated from the 2 to 10 Vdc signal, with 2 Vdc corresponding to full closed and 10 Vdc corresponding to full open. When there is no call for free cooling, the damper position is limited by the IAQ Max damper position setting. When the signal exceeds it's set point (Demand Control Ventilation Set Point) setting and there is a call for free cooling, the actuator modulates from the minimum position to the full open position based on the highest call from either the mixed air sensor input or the AQ voltage input.

- Optional CO_2 Space Sensor Kit Part # 2AQ04700324

- Optional CO_2 Sensor Kit Part # 2AQ04700424

Replace the top rear access panel on the unit.

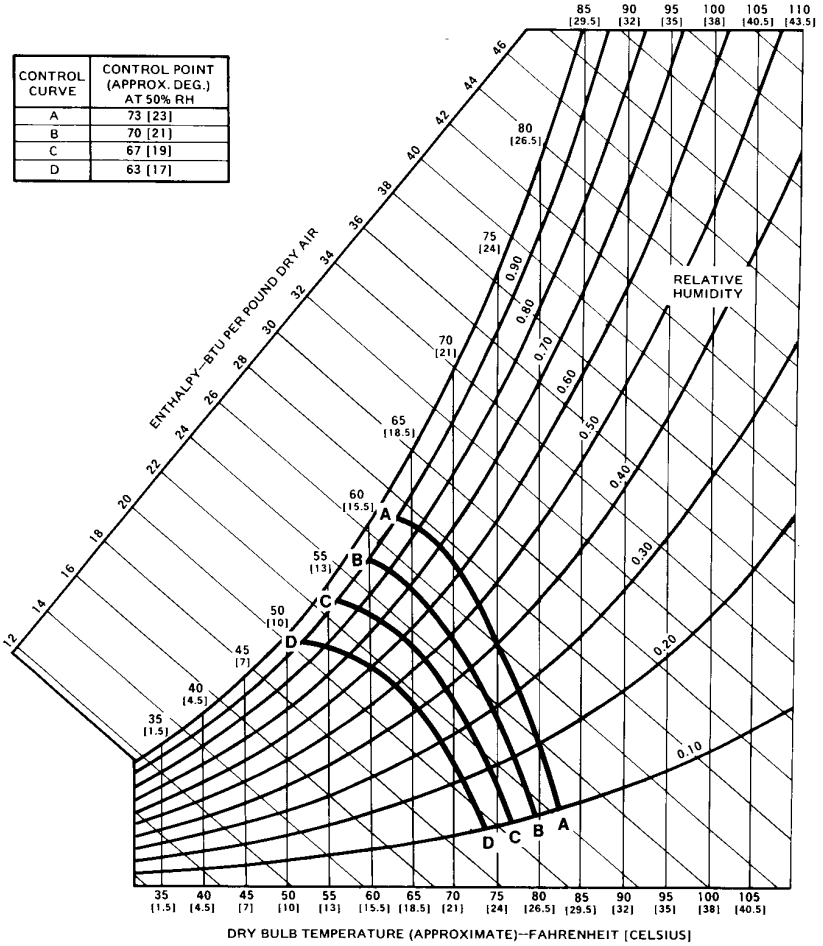


FIGURE 20 - ENTHALPY SET POINT CHART

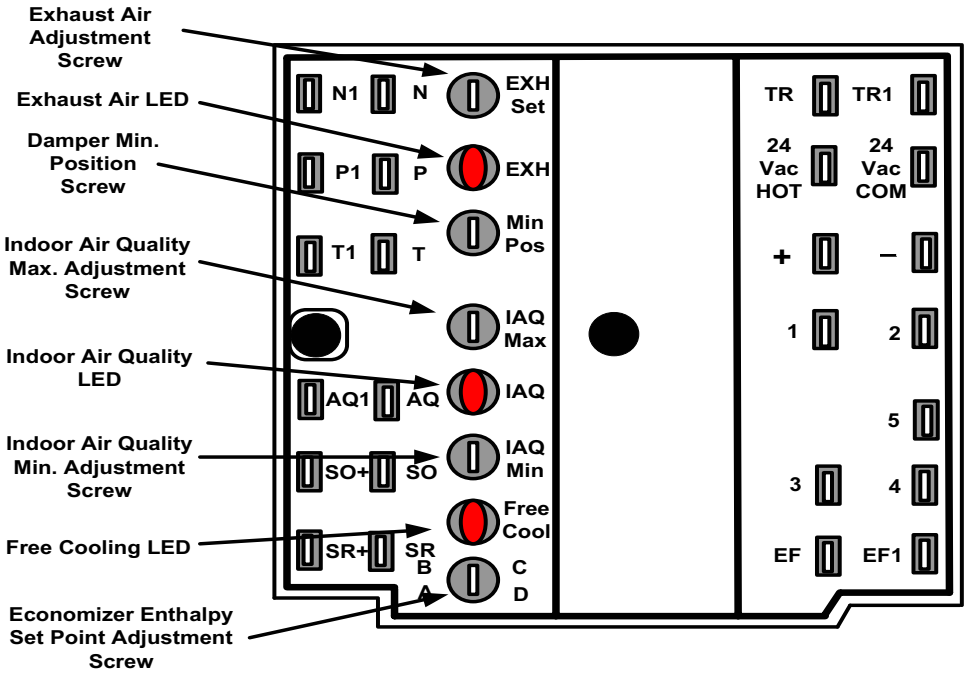


FIGURE 21 - HONEYWELL ECONOMIZER CONTROL W7212

PHASING

Predator® units are properly phased at the factory. Check for proper compressor rotation. If the blower or compressors rotate in the wrong direction at start-up, the electrical connection to the unit is misphased. Change the phasing of the **field line connection at the field supplied disconnect** to obtain proper rotation. (Scroll compressors operate in only one direction. If the scroll is drawing low amperage, has similar suction and discharge pressures, or producing a high noise level, the scroll is misphased). Units with scroll compressors have a phase monitor as standard equipment. This phase monitor will prevent unit operation under misphased conditions by breaking the 24 volt power.

⚠ CAUTION

Scroll compressors require proper rotation to operate correctly. Units are properly phased at the factory. Do not change the internal wiring to make the blower condenser fans, or compressor rotate correctly.

BLOWER ROTATION

Check for proper supply air blower rotation. If the blower is rotating backwards, the line voltage at the unit point of power connection is misphased (See 'PHASING').

TABLE 12: SUPPLY AIR LIMITATIONS

Unit Size	Minimum CFM (m^3/sec.)	Maximum CFM (m^3/sec.)
090	2250 (1)	3750 (1.7)
120	3000 (1.4)	5000 (2.3)

BELT TENSION

The tension on the belt should be adjusted as shown in Figure 22.

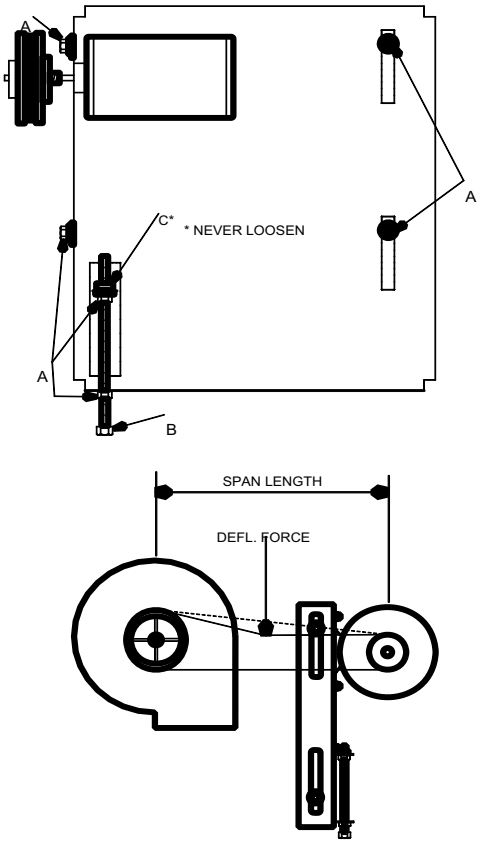


FIGURE 22 - BELT ADJUSTMENT

⚠ CAUTION

Procedure for adjusting belt tension:

1. Loosen six nuts (top and bottom) A.
2. Adjust by turning (B).
3. Never loosen nuts (C).
4. Use belt tension checker to apply a perpendicular force to one belt at the midpoint of the span as shown. Deflection distance of 4mm (5/32”) is obtained.

To determine the deflection distance from normal position, use a straight edge from sheave to sheave as reference line. The recommended deflection force is as follows:

Tension new belts at the max. deflection force recommended for the belt section. Check the belt tension at least two times during the first 24 hours of operation. Any retensioning should fall between the min. and max. deflection force values.

5. After adjusting retighten nuts (A).

TABLE 13: BLOWER PERFORMANCE 7-1/2 TON STANDARD MOTOR - SIDE DUCT (IMPERIAL)

ESP (iwg)	Turns Open																	
	0			1			2			3			4			5		
	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP
0.2	-	-	-	-	-	-	-	-	-	-	-	-	3698	1382	1.48	3527	1249	1.34
0.4	-	-	-	-	-	-	-	-	-	3591	1424	1.53	3288	1242	1.33	3093	1120	1.20
0.6	-	-	-	-	-	-	3430	1451	1.56	3183	1276	1.37	2819	1104	1.18	2550	977	1.05
0.8	-	-	-	3312	1490	1.60	2975	1287	1.38	2593	1101	1.18	-	-	-	-	-	-
1.0	3086	1480	1.59	2679	1269	1.36	2154	1059	1.14	-	-	-	-	-	-	-	-	-

TABLE 14: BLOWER PERFORMANCE 7-1/2 TON STANDARD MOTOR - SIDE DUCT (METRIC)

ESP (Pa)	Turns Open																	
	0			1			2			3			4			5		
	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)
50	-	-	-	-	-	-	-	-	-	-	-	-	1.75	1.38	1.11	1.66	1.25	1.00
100	-	-	-	-	-	-	-	-	-	1.69	1.42	1.14	1.55	1.24	0.99	1.46	1.12	0.90
149	-	-	-	-	-	-	1.62	1.45	1.16	1.50	1.28	1.02	1.33	1.10	0.88	1.20	0.98	0.78
199	-	-	-	1.56	1.49	1.19	1.40	1.29	1.03	1.22	1.10	0.88	-	-	-	-	-	-
249	1.46	1.48	1.18	1.26	1.27	1.02	1.02	1.06	0.85	-	-	-	-	-	-	-	-	-

TABLE 15: BLOWER PERFORMANCE 7-1/2 TON OPTIONAL MOTOR - SIDE DUCT (IMPERIAL)

ESP (iwg)	Turns Open																	
	0			1			2			3			4			5		
	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP
0.4	-	-	-	-	-	-	-	-	-	-	-	-	4052	1830	1.96	3715	1559	1.67
0.6	-	-	-	-	-	-	-	-	-	4016	1933	2.07	3677	1667	1.79	3342	1422	1.52
0.8	-	-	-	-	-	-	3991	2032	2.18	3639	1745	1.87	3270	1504	1.61	2858	1261	1.35
1.0	-	-	-	3953	2151	2.31	3576	1833	1.97	3191	1573	1.69	2702	1307	1.40	-	-	-
1.2	3802	2195	2.35	3544	1941	2.08	3040	1626	1.74	2327	1290	1.38	-	-	-	-	-	-
1.4	3379	2001	2.15	2913	1674	1.80	-	-	-	-	-	-	-	-	-	-	-	-
1.6	2552	1642	1.76	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

TABLE 16: BLOWER PERFORMANCE 7-1/2 TON OPTIONAL MOTOR - SIDE DUCT (METRIC)

ESP (Pa)	Turns Open																	
	0			1			2			3			4			5		
	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)
100	-	-	-	-	-	-	-	-	-	-	-	-	1.91	1.83	1.46	1.75	1.56	1.25
149	-	-	-	-	-	-	-	-	-	1.90	1.93	1.55	1.74	1.67	1.33	1.58	1.42	1.14
199	-	-	-	-	-	-	1.88	2.03	1.63	1.72	1.75	1.40	1.54	1.50	1.20	1.35	1.26	1.01
249	-	-	-	1.87	2.15	1.72	1.69	1.83	1.47	1.51	1.57	1.26	1.28	1.31	1.05	-	-	-
299	1.79	2.20	1.76	1.67	1.94	1.55	1.43	1.63	1.30	1.10	1.29	1.03	-	-	-	-	-	-
349	1.59	2.00	1.60	1.37	1.67	1.34	-	-	-	-	-	-	-	-	-	-	-	-
399	1.20	1.64	1.31	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

TABLE 17: BLOWER PERFORMANCE 10 TON STANDARD MOTOR - SIDE DUCT (IMPERIAL)

ESP (iwg)	Turns Open																	
	0			1			2			3			4			5		
	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP
0.4	4820	2675	2.87	4582	2362	2.53	4319	2080	2.23	4086	1842	1.98	3863	1648	1.77	3590	1430	1.53
0.6	4522	2496	2.68	4307	2215	2.38	4025	1941	2.08	3713	1678	1.80	3464	1499	1.61	3149	1291	1.38
0.8	4223	2332	2.50	3973	2062	2.21	3656	1783	1.91	3363	1550	1.66	3026	1350	1.45	-	-	-
1.0	3913	2174	2.33	3679	1923	2.06	3262	1619	1.74	2721	1330	1.43	-	-	-	-	-	-
1.2	3521	1978	2.12	3104	1693	1.82	-	-	-	-	-	-	-	-	-	-	-	-
1.4	2790	1660	1.78	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

TABLE 18: BLOWER PERFORMANCE 10 TON STANDARD MOTOR - SIDE DUCT (METRIC)

ESP (Pa)	Turns Open																	
	0			1			2			3			4			5		
	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)
100	2.27	2.68	2.14	2.16	2.36	1.89	2.04	2.08	1.66	1.93	1.84	1.47	1.82	1.65	1.32	1.69	1.43	1.14
149	2.13	2.50	2.00	2.03	2.22	1.77	1.90	1.94	1.55	1.75	1.68	1.34	1.63	1.50	1.20	1.49	1.29	1.03
199	1.99	2.33	1.87	1.88	2.06	1.65	1.73	1.78	1.43	1.59	1.55	1.24	1.43	1.35	1.08	-	-	-
249	1.85	2.17	1.74	1.74	1.92	1.54	1.54	1.62	1.30	1.28	1.33	1.06	-	-	-	-	-	-
299	1.66	1.98	1.58	1.46	1.69	1.35	-	-	-	-	-	-	-	-	-	-	-	-
349	1.32	1.66	1.33	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

TABLE 19: BLOWER PERFORMANCE 10 TON OPTIONAL MOTOR - SIDE DUCT (IMPERIAL)

ESP (iwg)	Turns Open																	
	0			1			2			3			4			5		
	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP
0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4960	2495	2.68
0.6	-	-	-	-	-	-	-	-	-	-	-	-	5091	2745	2.94	4646	2314	2.48
0.8	-	-	-	-	-	-	-	-	-	5078	2937	3.15	4839	2584	2.77	4347	2153	2.31
1.0	-	-	-	-	-	-	5075	3117	3.34	4767	2730	2.93	4487	2377	2.55	3946	1942	2.08
1.2	-	-	-	5068	3308	3.55	4742	2881	3.09	4427	2513	2.69	4108	2159	2.32	3501	1723	1.85
1.4	5079	3595	3.86	4787	3105	3.33	4452	2713	2.91	4012	2259	2.42	3665	1926	2.07	-	-	-
1.6	4739	3316	3.56	4482	2892	3.10	4098	2474	2.65	3543	2006	2.15	3057	1642	1.76	-	-	-
1.8	4461	3111	3.34	4070	2621	2.81	3552	2160	2.32	-	-	-	-	-	-	-	-	-
2.0	3997	2782	2.98	3400	2219	2.38	-	-	-	-	-	-	-	-	-	-	-	-
2.2	3496	2480	2.66	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

TABLE 20: BLOWER PERFORMANCE 10 TON OPTIONAL MOTOR - SIDE DUCT (METRIC)

ESP (Pa)	Turns Open																	
	0			1			2			3			4			5		
	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)
100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.34	2.50	2.00
149	-	-	-	-	-	-	-	-	-	-	-	-	2.40	2.75	2.20	2.19	2.31	1.85
199	-	-	-	-	-	-	-	-	-	2.40	2.94	2.35	2.28	2.58	2.07	2.05	2.15	1.72
249	-	-	-	-	-	-	2.40	3.12	2.49	2.25	2.73	2.18	2.12	2.38	1.90	1.86	1.94	1.55
299	-	-	-	2.39	3.31	2.65	2.24	2.88	2.30	2.09	2.51	2.01	1.94	2.16	1.73	1.65	1.72	1.38
349	2.40	3.60	2.88	2.26	3.11	2.48	2.10	2.71	2.17	1.89	2.26	1.81	1.73	1.93	1.54	-	-	-
399	2.24	3.32	2.65	2.12	2.89	2.31	1.93	2.47	1.98	1.67	2.01	1.60	1.44	1.64	1.31	-	-	-
448	2.11	3.11	2.49	1.92	2.62	2.10	1.68	2.16	1.73	-	-	-	-	-	-	-	-	-
498	1.89	2.78	2.23	1.60	2.22	1.78	-	-	-	-	-	-	-	-	-	-	-	-
548	1.65	2.48	1.98	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

TABLE 21: BLOWER PERFORMANCE 7-1/2 TON STANDARD MOTOR - DOWNSHOT (IMPERIAL)

ESP (iwg)	Turns Open																	
	0			1			2			3			4			5		
	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP
0.2	-	-	-	3838	1772	1.90	3530	1491	1.60	3487	1385	1.49	3260	1234	1.32	3091	1119	1.20
0.4	3299	1485	1.592	3589	1670	1.79	3361	1425	1.53	3173	1275	1.37	2846	1111	1.19	2667	1006	1.08
0.6	3355	1506	1.62	3240	1535	1.65	3012	1301	1.40	2707	1131	1.21	2333	980	1.05	2151	887	0.95
0.8	3095	1409	1.51	2791	1380	1.48	2484	1141	1.22	2088	978	1.05	-	-	-	-	-	-
1.0	2519	1219	1.31	2241	1216	1.30	-	-	-	-	-	-	-	-	-	-	-	-

TABLE 22: BLOWER PERFORMANCE 7-1/2 TON STANDARD MOTOR - DOWNSHOT (METRIC)

ESP (Pa)	Turns Open																	
	0			1			2			3			4			5		
	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)
50	-	-	-	1.81	1.77	1.42	1.67	1.49	1.19	1.65	1.39	1.11	1.54	1.23	0.99	1.46	1.12	0.90
100	1.56	1.48	1.19	1.69	1.67	1.34	1.59	1.43	1.14	1.50	1.27	1.02	1.34	1.11	0.89	1.26	1.01	0.80
149	1.58	1.51	1.21	1.53	1.54	1.23	1.42	1.30	1.04	1.28	1.13	0.90	1.10	0.98	0.78	1.01	0.89	0.71
199	1.46	1.41	1.13	1.32	1.38	1.10	1.17	1.14	0.91	0.99	0.98	0.78	-	-	-	-	-	-
249	1.19	1.22	0.98	1.06	1.22	0.97	-	-	-	-	-	-	-	-	-	-	-	-

TABLE 23: BLOWER PERFORMANCE 7-1/2 TON OPTIONAL MOTOR - DOWNSHOT (IMPERIAL)

ESP (iwg)	Turns Open																	
	0			1			2			3			4			5		
	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP
0.2	-	-	-	-	-	-	-	-	-	-	-	-	3884	1754	1.88	3611	1520	1.63
0.4	-	-	-	-	-	-	-	-	-	3837	1843	1.98	3576	1624	1.74	3282	1400	1.50
0.6	-	-	-	4054	2201	2.36	3766	1926	2.07	3491	1691	1.81	3183	1473	1.58	2862	1263	1.35
0.8	-	-	-	3735	2037	2.18	3412	1769	1.90	3083	1530	1.64	2707	1311	1.41	2352	1119	1.20
1.0	3626	2112	2.27	3362	1861	2.00	3014	1611	1.73	2614	1372	1.47	2146	1151	1.23	-	-	-
1.2	3227	1931	2.07	2938	1682	1.80	2572	1457	1.56	2082	1227	1.32	-	-	-	-	-	-
1.4	2778	1733	1.86	2461	1506	1.61	-	-	-	-	-	-	-	-	-	-	-	-
1.6	2279	1522	1.63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

TABLE 24: BLOWER PERFORMANCE 7-1/2 TON OPTIONAL MOTOR - DOWNSHOT (METRIC)

ESP (Pa)	Turns Open																	
	0			1			2			3			4			5		
	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)
50	-	-	-	-	-	-	-	-	-	-	-	-	1.83	1.75	1.40	1.70	1.52	1.22
100	-	-	-	-	-	-	-	-	-	1.81	1.84	1.47	1.69	1.62	1.30	1.55	1.40	1.12
149	-	-	-	1.91	2.20	1.76	1.78	1.93	1.54	1.65	1.69	1.35	1.50	1.47	1.18	1.35	1.26	1.01
199	-	-	-	1.76	2.04	1.63	1.61	1.77	1.42	1.46	1.53	1.22	1.28	1.31	1.05	1.11	1.12	0.90
249	1.71	2.11	1.69	1.59	1.86	1.49	1.42	1.61	1.29	1.23	1.37	1.10	1.01	1.15	0.92	-	-	-
299	1.52	1.93	1.54	1.39	1.68	1.35	1.21	1.46	1.17	0.98	1.23	0.98	-	-	-	-	-	-
349	1.31	1.73	1.39	1.16	1.51	1.20	-	-	-	-	-	-	-	-	-	-	-	-
399	1.08	1.52	1.22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

TABLE 25: BLOWER PERFORMANCE 10 TON STANDARD MOTOR - DOWNSHOT (IMPERIAL)

ESP (iwg)	Turns Open																	
	0			1			2			3			4			5		
	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP
0.2	4543	2511	2.69	4362	2250	2.41	4139	1996	2.14	3911	1766	1.89	3719	1594	1.71	3518	1407	1.51
0.4	4311	2381	2.55	4115	2127	2.28	3862	1871	2.01	3611	1644	1.76	3386	1471	1.58	3153	1293	1.39
0.6	4032	2232	2.39	3804	1982	2.13	3508	1720	1.84	3246	1506	1.61	2971	1332	1.43	-	-	-
0.8	3706	2068	2.22	3428	1818	1.95	3078	1548	1.66	-	-	-	-	-	-	-	-	-
1.0	3333	1892	2.03	2989	1644	1.76	-	-	-	-	-	-	-	-	-	-	-	-
1.2	2914	1711	1.83	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

TABLE 26: BLOWER PERFORMANCE 10 TON STANDARD MOTOR - DOWNSHOT (METRIC)

ESP (Pa)	Turns Open																	
	0			1			2			3			4			5		
	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)
50	2.14	2.51	2.01	2.06	2.25	1.80	1.95	2.00	1.60	1.85	1.77	1.41	1.75	1.59	1.27	1.66	1.41	1.13
100	2.03	2.38	1.91	1.94	2.13	1.70	1.82	1.87	1.50	1.70	1.64	1.31	1.60	1.47	1.18	1.49	1.29	1.03
149	1.90	2.23	1.79	1.80	1.98	1.59	1.66	1.72	1.38	1.53	1.51	1.20	1.40	1.33	1.07	-	-	-
199	1.75	2.07	1.65	1.62	1.82	1.45	1.45	1.55	1.24	-	-	-	-	-	-	-	-	-
249	1.57	1.89	1.51	1.41	1.64	1.32	-	-	-	-	-	-	-	-	-	-	-	-
299	1.38	1.71	1.37	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

TABLE 27: BLOWER PERFORMANCE 10 TON OPTIONAL MOTOR - DOWNSHOT (IMPERIAL)

ESP (iwg)	Turns Open																	
	0			1			2			3			4			5		
	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP
0.2	-	-	-	-	-	-	-	-	-	-	-	-	4966	2666	2.86	4605	2290	2.46
0.4	-	-	-	-	-	-	-	-	-	4919	2473	2.65	4721	2515	2.70	4344	2145	2.30
0.6	-	-	-	-	-	-	4929	3022	3.24	4665	2324	2.49	4450	2353	2.52	4048	1991	2.13
0.8	-	-	-	4908	3197	3.43	4668	2841	3.05	4391	2171	2.33	4151	2183	2.34	3717	1829	1.96
1.0	4915	3456	3.71	4651	3013	3.23	4388	2656	2.85	4096	2015	2.16	3825	2008	2.15	3352	1664	1.78
1.2	4653	3253	3.49	4377	2823	3.03	4089	2467	2.65	3779	1858	1.99	3471	1830	1.96	2951	1499	1.61
1.4	4372	3046	3.27	4087	2631	2.82	3771	2277	2.44	3442	1703	1.83	3090	1652	1.77	-	-	-
1.6	4070	2837	3.04	3780	2437	2.61	3434	2089	2.24	3084	1552	1.66	-	-	-	-	-	-
1.8	3748	2629	2.82	3455	2243	2.41	3078	1904	2.04	-	-	-	-	-	-	-	-	-
2.0	3406	2425	2.60	3114	2051	2.20	-	-	-	-	-	-	-	-	-	-	-	-
2.2	3044	2228	2.39	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

TABLE 28: BLOWER PERFORMANCE 10 TON OPTIONAL MOTOR - DOWNSHOT (METRIC)

ESP (Pa)	Turns Open																	
	0			1			2			3			4			5		
	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)
50	-	-	-	-	-	-	-	-	-	-	-	-	2.34	2.67	2.13	2.17	2.29	1.83
100	-	-	-	-	-	-	-	-	-	2.32	2.47	1.98	2.23	2.51	2.01	2.05	2.15	1.72
149	-	-	-	-	-	-	2.33	3.02	2.42	2.20	2.32	1.86	2.10	2.35	1.88	1.91	1.99	1.59
199	-	-	-	2.32	3.20	2.56	2.20	2.84	2.27	2.07	2.17	1.74	1.96	2.18	1.75	1.75	1.83	1.46
249	2.32	3.46	2.76	2.20	3.01	2.41	2.07	2.66	2.12	1.93	2.01	1.61	1.81	2.01	1.61	1.58	1.66	1.33
299	2.20	3.25	2.60	2.07	2.82	2.26	1.93	2.47	1.97	1.78	1.86	1.49	1.64	1.83	1.46	1.39	1.50	1.20
349	2.06	3.05	2.44	1.93	2.63	2.10	1.78	2.28	1.82	1.62	1.70	1.36	1.46	1.65	1.32	-	-	-
399	1.92	2.84	2.27	1.78	2.44	1.95	1.62	2.09	1.67	1.46	1.55	1.24	-	-	-	-	-	-
448	1.77	2.63	2.10	1.63	2.24	1.79	1.45	1.90	1.52	-	-	-	-	-	-	-	-	-
498	1.61	2.43	1.94	1.47	2.05	1.64	-	-	-	-	-	-	-	-	-	-	-	-
548	1.44	2.23	1.78	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

TABLE 29: INDOOR BLOWER SPECIFICATIONS

MODEL	MOTOR					MOTOR SHEAVE			BLOWER SHEAVE			BELT
	HP	RPM	Eff.	SF	Frame	Datum Dia. (in.)	Bore (in.)	Model	Datum Dia. (in.)	Bore (in.)	Model	
BP090	1-1/2	1725	80%	1.15	56	3.4 - 4.4	7/8	1VM50	7.5	1	AK79	A55
	2	1725	80%	1.15	56	3.4 - 4.4	7/8	1VM50	6.5	1	AK69	A53
BP120	2	1725	80%	1.15	56	3.4 - 4.4	7/8	1VM50	7	1	AK74	A54
	4	1725	80%	1.15	184T	4.3-5.3	1-1/8	1VP56	6.2	1	BK72	BX56

AIR BALANCE

Start the supply air blower motor. Adjust the resistances in both the supply and the return air duct systems to balance the air distribution throughout the conditioned space. The job specifications may require that this balancing be done by someone other than the equipment installer.

CHECKING AIR QUANTITY

METHOD ONE

1. Remove the dot plugs from the duct panel (for location of the dot plugs see Figure 10).
2. Insert eight-inches of 1/4 inch metal tubing into the airflow on both sides of the indoor coil.

NOTE: The tubes must be inserted and held in a position perpendicular to the air flow so that velocity pressure will not affect the static pressure readings.

3. Use an Inclined Manometer or Magnehelic to determine the pressure drop across a dry evaporator coil. Since the moisture on an evaporator coil can vary greatly, measuring the pressure drop across a wet coil under field conditions could be inaccurate. To assure a dry coil, the compressors should be de-activated while the test is being run.

NOTE: De-energize the compressors before taking any test measurements to assure a dry evaporator coil.

4. The CFM through the unit can be determined from the pressure drop indicated by the manometer by referring to Figure 23. In order to obtain an accurate measurement, be certain that the air filters are clean.
5. To adjust Measured CFM to Required CFM, see 'SUPPLY AIR DRIVE ADJUSTMENT'.
6. After readings have been obtained, remove the tubes and replace the dot plugs.

⚠WARNING

Failure to properly adjust the total system air quantity can result in extensive blower damage.

METHOD TWO

1. Drill two 5/16 inch holes, one in the return air duct as close to the inlet of the unit as possible, and another in the supply air duct as close to the outlet of the unit as possible.
2. Using the holes drilled in step one, insert eight inches of 1/4 inch metal tubing into the airflow of both return and supply air ducts of the unit.

NOTE: The tubes must be inserted and held in position perpendicular to the airflow so that velocity pressure will not affect the static pressure readings.

3. Use an Inclined Manometer or Magnehelic to determine the pressure drop across the unit. This is the External Static Pressure (ESP). In order to obtain an accurate measurement, be certain that the air filters are clean.
4. Determine the number of turns the variable motor sheave is open.
5. Select the correct blower performance table for the unit from Tables 13 - 28. Tables are presented for horizontal and downflow configurations.
6. Determine the unit Measured CFM from the Blower Performance Table by utilizing the measured External Static Pressure and the number of turns the variable motor sheave is open.
7. To adjust Measured CFM to Required CFM, see 'SUPPLY AIR DRIVE ADJUSTMENT'.
8. After readings have been obtained, remove the tubes and seal holes.

NOTE: With the addition of field installed accessories repeat this procedure.

⚠WARNING

Failure to properly adjust the total system air quantity can result in extensive blower damage.

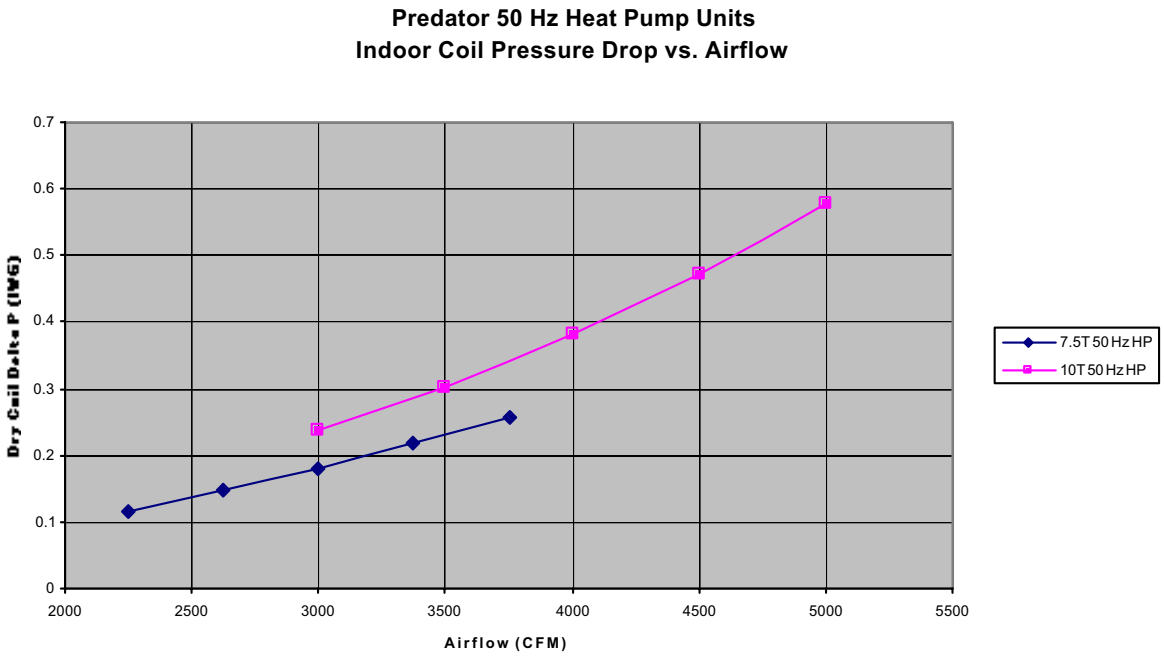


FIGURE 23 - DRY COIL DELTA P

SUPPLY AIR DRIVE ADJUSTMENT

⚠ CAUTION

Before making any blower speed changes review the installation for any installation errors, leaks or undesirable systems effects that can result in loss of airflow.

Even small changes in blower speed can result in substantial changes in static pressure and BHP. BHP and AMP draw of the blower motor will increase by the cube of the blower speed. Static pressure will increase by the square of the blower speed. Only qualified personnel should make blower speed changes, strictly adhering to the fan laws.

At unit start-up, the measured CFM may be higher or lower than the required CFM. To achieve the required CFM, the speed of the drive may have adjusted by changing the datum diameter (DD) of the variable pitch motor sheave as described below:

$$\left(\frac{\text{Required CFM}}{\text{Measured CFM}}\right) \bullet \text{Existing DD} = \text{New DD}$$

Use the following tables and the DD calculated per the above equation to adjust the motor variable pitch sheave.

EXAMPLE

A 12.5 ton unit was selected to deliver 4,000 CFM with a 3 HP motor, but the unit is delivering 3,800 CFM. The variable pitch motor sheave is set at 2 turns open.

Use the equation to determine the required DD for the new motor sheave,

$$\left(\frac{\text{4,000 CFM}}{\text{3,800 CFM}}\right) \bullet \text{4.0 In.} = \text{4.21 In.}$$

Use Table 32 to locate the DD nearest to 4.21 in. Close the sheave to 1 turn open.

New BHP

= (Speed increase)^3 • BHP at 3,800 CFM

= (Speed increase)^3 • Original BHP

= New BHP

New motor Amps

= (Speed increase)^3 • Amps at 3,800 CFM

= (Speed increase)^3 • Original Amps

= New Amps

TABLE 30: ADDITIONAL STATIC RESISTANCE - IMPERIAL

CFM	Cooling Only*	Economizer† ‡	Electric Heat KW†				
			9	18	24	36	54
2300	0.08	0.02	0.07	0.08	0.09	0.10	0.13
2500	0.09	0.02	0.08	0.09	0.10	0.11	0.14
2700	0.11	0.03	0.09	0.10	0.12	0.13	0.16
2900	0.12	0.03	0.10	0.11	0.13	0.14	0.18
3100	0.14	0.03	0.12	0.13	0.15	0.16	0.20
3300	0.16	0.03	0.13	0.14	0.17	0.18	0.22
3500	0.18	0.04	0.15	0.16	0.19	0.20	0.24
3700	0.20	0.04	0.17	0.18	0.21	0.22	0.26
3900	0.23	0.04	0.19	0.20	0.23	0.24	0.28
4100	0.25	0.04	0.21	0.22	0.25	0.26	0.31
4300	0.28	0.05	0.23	0.24	0.28	0.29	0.34
4500	0.30	0.05	0.25	0.26	0.30	0.31	0.37
4700	0.33	0.05	0.28	0.29	0.33	0.34	0.40
4900	0.36	0.05	0.30	0.31	0.35	0.37	0.43
5100	0.39	0.06	0.33	0.34	0.38	0.40	0.46
5300	0.42	0.06	0.35	0.37	0.41	0.43	0.49

*. Add these resistance values to the available static resistance in the respective Blower Performance Tables.

†. Deduct these resistance values from the available external static pressure shown in the respective Blower Performance Table.

‡. The pressure drop through the economizer is greater for 100% outdoor air than for 100% return air. If the resistance of the return air duct system is less than 0.25 IWG, the unit will deliver less CFM during full economizer operation.

TABLE 31: ADDITIONAL STATIC RESISTANCE - METRIC

M^3S	Cooling Only*	Economizer† ‡	Electric Heat KW†				
			9	18	24	36	54
1.08	19.9	5.0	17.4	19.9	22.4	24.8	32.3
1.18	22.4	5.0	19.9	22.4	24.8	27.3	34.8
1.27	27.3	7.5	22.4	24.8	29.8	32.3	39.7
1.36	29.8	7.5	24.8	27.3	32.3	34.8	44.7
1.46	34.8	7.5	29.8	32.3	37.3	39.7	49.7
1.55	39.7	7.5	32.3	34.8	42.2	44.7	54.6
1.65	44.7	9.9	37.3	39.7	47.2	49.7	59.6
1.74	49.7	9.9	42.2	44.7	52.2	49.7	64.6
1.83	57.1	9.9	47.2	49.7	56.1	59.6	69.5
1.93	62.1	9.9	52.2	54.6	62.1	64.6	77.0
2.02	69.5	12.4	57.1	59.6	69.5	72.0	88.4
2.12	74.5	12.4	62.1	64.6	74.5	77.0	91.9
2.21	82.0	12.4	69.5	72.0	82.0	84.4	99.3
2.30	89.4	12.4	74.5	77.0	86.9	91.9	106.8
2.40	96.9	14.9	82.0	84.4	94.4	99.3	114.2
2.49	104.3	14.9	86.9	91.9	101.8	106.8	121.7

*. Add these resistance values to the available static resistance in the respective Blower Performance Tables.

†. Deduct these resistance values from the available external static pressure shown in the respective Blower Performance Table.

‡. The pressure drop through the economizer is greater for 100% outdoor air than for 100% return air. If the resistance of the return air duct system is less than 0.25 IWG, the unit will deliver less CFM during full economizer operation.

TABLE 32: MOTOR SHEAVE DATUM

1VM50x7/8 (1-1/2 & 2 HP Motor)		1VP56x1-1/8 (4 HP Motor)	
Turns Open	**Datum Dia. in. (mm)**	**Turns Open**	**Datum Dia. in. (mm)**
0	4.4 (111.7)	**1**	5.3 (134.6)
1/2	4.3 (109.2)	**1-1/2**	5.2 (132)
1	4.2 (106.6)	**2**	5.1 (129.5)
1-1/2	4.1 (104.1)	**2-1/2**	5.0 (127)
2	4.0 (101.6)	**3**	4.9 (124.4)
2-1/2	3.9 (99)	**3-1/2**	4.8 (121.9)
3	3.8 (96.5)	**4**	4.7 (119.3)
3-1/2	3.7 (94)	**4-1/2**	4.6 (116.8)
4	3.6 (91.4)	**5**	4.5 (114.3)
4-1/2	3.5 (88.9)	**5-1/2**	4.4 (111.7)
5	3.4 (86.3)	**6**	4.3 (109.2)

OPERATION

SEQUENCE OF OPERATIONS OVERVIEW

For the Predator® series of units, the thermostat makes a circuit between "R" and "Y1" for the first stage of cooling.

The call is passed to the **Unit Control Board (UCB)**, which then determines whether the requested operation is available and, if so, which components to energize.

For heating, the thermostat makes a circuit between “R” and “W1” for the first stage heating. The UCB energizes the compressors #1 and #2 and their condenser fans. The “W1” call also energizes a separate relay (RY1), de-energizing the reversing valve allowing the unit to run in the heating mode. A time/temperature control operates the defrost cycle.

The thermostat makes a circuit between “R” and “W2” for the second stage of heating. The UCB passes the “W2” signal on to the electric heaters if available. In both cases, when the “W1” call is sensed, the indoor blower is energized.

If at any time a call for both heating and cooling are present, the heating operation will be performed. If operating, the cooling system is halted as with a completion of a call for cooling. Heating always takes priority.

COOLING SEQUENCE OF OPERATION

CONTINUOUS BLOWER

By setting the room thermostat fan switch to "ON," the supply air blower will operate continuously.

INTERMITTENT BLOWER

With the room thermostat fan switch set to "AUTO" and the system switch set to either the "AUTO" or "HEAT" settings, the blower is energized whenever a cooling or heating operation is requested. The blower is energized after any specified delay associated with the operation.

When energized, the indoor blower has a minimum run time of 30 seconds. Additionally, the indoor blower has a delay of 10 seconds between operations.

NO OUTDOOR AIR OPTIONS

When the thermostat calls for the first stage of cooling, the low-voltage control circuit from “R” to “Y1” and “G” is completed. The UCB energizes the economizer (if installed and free cooling is available) or the first available compressor* and the condenser fans. For first stage cooling, compressor #1 is energized. If compressor #1 is unavailable, compressor #2 is energized. After completing the specified fan on delay for cooling, the UCB will energize the blower motor.

When the thermostat calls for the second stage of cooling, the low-voltage control circuit from “R” to “Y2” is completed. The control board energizes the first available compressor. If free cooling is being used for the first stage of cooling, compressor #1 is energized. If compressor #1 is active for first stage cooling or the first compressor is locked-out, compressor #2 is energized. In free-cooling mode, if the call for the second stage of cooling continues for 20 minutes, compressor #2 is energized, provided it has not been locked-out.

If there is an initial call for both stages of cooling, the UCB will delay energizing compressor #2 by 30 seconds in order to avoid a power rush.

Once the thermostat has been satisfied, it will de-energize Y1 and Y2. If the compressors have satisfied their minimum run times, the compressors and condenser fans are de-energized. Otherwise, the unit operates each cooling system until the minimum run times for the compressors have been completed. Upon the final compressor de-energizing, the blower is stopped following the elapse of the fan off delay for cooling.

* To be available, a compressor must not be locked-out due to a high or low-pressure switch or freezestat trip and the anti-short cycle delay (ASCD) must have elapsed.

ECONOMIZER WITH SINGLE ENTHALPY SENSOR -

When the room thermostat calls for "first-stage" cooling, the low voltage control circuit from "R" to "G" and "Y1" is completed. The UCB energizes the blower motor (if the fan switch on the room thermostat is set in the "AUTO" position) and drives the economizer dampers from fully closed to their minimum position. If the enthalpy of the outdoor air is below the set point of the enthalpy controller (previously determined),

"Y1" energizes the economizer. The dampers will modulate to maintain a constant supply air temperature as monitored by the discharge air sensor. If the outdoor air enthalpy is above the set point, "Y1" energizes compressor #1.

When the thermostat calls for "second-stage" cooling, the low voltage control circuit from "R" to "Y2" is completed. The UCB energizes the first available compressor If the enthalpy of the outdoor air is below the set point of the enthalpy controller (i.e. first stage has energized the economizer), "Y2" will energize compressor #1. If the outdoor air is above the set point, "Y2" will energize compressor #2.

Once the thermostat has been satisfied, it will de-energize Y1 and Y2. If the compressors have satisfied their minimum run times, the compressors and condenser fans are de-energized. Otherwise, the unit operates each cooling system until the minimum run times for the compressors have been completed. Upon the final compressor de-energizing, the blower is stopped following the elapse of the fan off delay for cooling, and the economizer damper goes to the closed position. If the unit is in continues fan operation the economizer damper goes to the min. position.

ECONOMIZER WITH DUAL ENTHALPY SENSORS -

The operation with the dual enthalpy sensors is identical to the single sensor except that a second enthalpy sensor is mounted in the return air. This return air sensor allows the economizer to choose between outdoor air and return air, whichever has the lowest enthalpy value, to provide maximum operating efficiency.

ECONOMIZER (SINGLE OR DUAL) WITH POWER EXHAUST -

This system operates as specified above with one addition. The power exhaust motor is energized 45 seconds after the actuator position exceeds the exhaust fan set point on the economizer control. When the power exhaust is operating, the second stage of mechanical cooling will not operate. As always, the "R" to "G" connection provides minimum position but does not provide power exhaust operation.

MOTORIZED OUTDOOR AIR DAMPERS -

This system operation is the same as the units with no outdoor air options with one exception. When the "R" to "G" circuit is complete, the motorized damper drives open to a position set by the thumbwheel on the damper motor. When the "R" to "G" circuit is opened, the damper spring returns fully closed.

COOLING OPERATION ERRORS

Each cooling system is monitored for operation outside of the intended parameters. Errors are handled as described below. All system errors override minimum run times for compressors.

HIGH-PRESSURE LIMIT SWITCH

During cooling operation, if a high-pressure limit switch opens, the UCB will de-energize the associated compressor, initiate the ASCD (Anti-short cycle delay), and, if the other compressor is idle, stop the condenser fans. If the call for cooling is still present at the conclusion of the ASCD, the UCB will re-energize the halted compressor.

Should a high-pressure switch open three times within two hours of operation, the UCB will lock-out the associated compressor and flash a code (see Table 38). If the other compressor is inactive, the condenser fans will be de-energized.

LOW-PRESSURE LIMIT SWITCH

The low-pressure limit switch is not monitored during the initial 30 seconds of a cooling system's operation. For the following 30 seconds, the UCB will monitor the low-pressure switch to ensure it closes. If the low-pressure switch fails to close after the 30-second monitoring phase, the UCB will de-energize the associated compressor, initiate the ASCD, and, if the other compressor is idle, stop the condenser fans.

Once the low-pressure switch has been proven (closed during the 30-second monitor period described above), the UCB will monitor the low-pressure limit switch for any openings. If the low-pressure switch opens for greater than 5 seconds, the UCB will de-energize the associated compressor, initiate the ASCD, and, if the other compressor is idle, stop the condenser fans.

If the call for cooling is still present at the conclusion of the ASCD, the UCB will re-energize the halted compressor.

Should a low-pressure switch open three times within one hour of operation, the UCB will lock-out the associated compressor and flash a code (Table 38). If the other compressor is inactive, the condenser fans will be de-energized.

FREEZESTAT

During cooling operation, if a freezestat opens, the UCB will de-energize the associated compressor, initiate the ASCD, and, if the other compressor is idle, stop the condenser fans. If the call for cooling is still present at the conclusion of the ASCD, the UCB will re-energize the halted compressor.

Should a freezestat open three times within two hours of operation, the UCB will lock-out the associated compressor and flash a code (Table 38). If the other compressor is inactive, the condenser fans will be de-energized.

LOW AMBIENT COOLING

To determine when to operate in low ambient mode, the UCB has a pair of terminals connected to a temperature-activated switch set at 45ºF. When the low ambient switch is closed

and the thermostat is calling for cooling, the UCB will operate in the low ambient mode.

Low ambient mode operates the compressors in this manner: 10 minutes on, 5 minutes off. The indoor blower is operated throughout the cycle. The 5-minute off period is necessary to defrost the indoor coil.

Low ambient mode always begins with compressor operation. Compressor minimum run time may extend the minutes of compressor operation. The defrost cycle will begin immediately following the elapse of the minimum run time.

When operating in low ambient mode, the UCB will not lockout the compressors due to a freezestat trip. However, a freezestat trip will de-energize the associated compressor. If the call for cooling is still present at the end of the ASCD and the freezestat has closed, the unit will resume operation.

SAFETY CONTROLS

The unit control board monitors the following inputs for each cooling system:

1. A suction line freezestat to protect against low evaporator temperatures due to a low airflow or a low return air temperature, (opens at 26 ± 5 °F and resets at 38 ± 5°F).
2. A high-pressure switch to protect against excessive discharge pressures due to a blocked condenser coil or a condenser motor failure, (opens at 405 ± 10 psig or 440 ± 10 psig, depending on model).
3. A low-pressure switch to protect against loss of refrigerant charge, (opens at 7 ± 3 psig and resets at 22 ± 5 psig).

The above pressure switches are hard-soldered to the unit. The refrigeration systems are independently monitored and controlled. On any fault, only the associated system will be affected by any safety/preventive action. The other refrigerant system will continue in operation unless it is affected by the fault as well.

The unit control board monitors the temperature limit switch of electric heat units and the temperature limit switch and the gas valve of gas furnace units.

COMPRESSOR PROTECTION

In addition to the external pressure switches, the compressors also have inherent (internal) protection. If there is an abnormal temperature rise in a compressor, the protector will open to shut down the compressor. The UCB incorporates features to minimize compressor wear and damage. An **Anti-Short Cycle Delay (ASCD)** is utilized to prevent operation of a compressor too soon after its previous run. Additionally, a minimum run time is imposed any time a compressor is energized.

The ASCD is initiated on unit start-up and on any compressor reset or lock-out.

FLASH CODES

The UCB will initiate a flash code associated with errors within the system. Refer to UNIT CONTROL BOARD FLASH CODES Table 38.

RESET

Remove the call for cooling, by raising thermostat setting higher than the conditioned space temperature. This resets any pressure or freezestat flash codes.

HEATING SEQUENCE OF OPERATION

When the thermostat calls for the first stage of heating, the low voltage control circuit is completed between “R” and “W1”. This 24vac signal is passed through the UCB to the RY1 Relay. Contacts RY1-1 open, assuring the reversing valve cannot be energized, except during defrost. Contacts RY1-2 close, completing the circuit to Y on the defrost control (DC). After its five minute ASCD timer is satisfied, the DC closes it’s internal compressor relay contacts, sending a 24vac signal to the MV terminal on the UCB. If its ASCD timer is satisfied the UCB will energize compressor #1 relay. After a two second delay, it then energizes compressor #2 relay (if applicable). Therefore, on a call for heat from W1, both compressors are always energized, unless one or the other is locked out by the UCB. Also on the call for heat, the DC energizes the M4 contactor which brings on both condenser fans.

A second stage call from the thermostat completes the circuit between R and W2. This 24vac signal is passed through the UCB to the defrost control board. If the unit is equipped with an optional electric heater it would be energized through a set of normally closed contacts on the defrost board. Take note that the MV terminal on the UCB is constantly monitored while there is a demand for heat. If the UCB does not see 24vac at terminal MV after six minutes, it initiates a fault code 9, indicating a heating problem.

As mentioned earlier, the defrost control (DC) utilizes a time/temperature defrost scheme. The following two conditions must be met before the DC will enter a defrost mode:

1. The DC must first satisfy its accumulated minimum run time. This is factory set at 60 minutes, but is field adjustable to 30, 60 or 90 minutes.
2. Either of the two defrost thermostats (DF1 or DF2) must be closed. These normally open thermostats are mounted on the respective liquid lines and are set to close at 31 degrees (+/-3).

If neither defrost thermostat is closed at the completion of it’s minimum accumulated run time cycle, the DC initiates another run time cycle, which it must complete before it looks

at the position of the defrost thermostats. This action is repeated until, at the completion of a run time cycle, one of the defrost thermostats is found to be closed and the DC enters defrost mode.

When the DC enters the defrost mode, it's on-board defrost relay is powered. This energizes both reversing valves, de-energizes both condenser fan motors and energizes the unit's optional electric heater. The DC remains in defrost mode until either of the following two conditions is met:

1. Both of the liquid line thermostats are open. Each is set to open at 55 degrees (+/- 3).
2. The maximum defrost run time of 10 minutes is met.

The DC also contains a set of test pins. Placing a jumper across these pins will result in the following actions:

- If the ASCD timer is active, it is now by-passed, allowing the compressor to run.
- If the DC is in a lockout condition, the lockout is reset.
- If the compressor is running, the DC is forced into defrost mode. The control will remain in defrost mode for as long as the jumper is in place. When the jumper is removed, the control will terminate the defrost mode in the normal manor as described above.

NOTE: The DC has two flashing codes which are only initiated if the two pressure switch terminals are open. As used in the Predator®, there is a jumper across the pressure switch terminals. Therefore the field should never experience a DC lockout mode unless that jumper is removed or broken.

ELECTRIC HEAT OPERATION ERRORS

TEMPERATURE LIMIT

If the UCB senses zero volts from the high temperature limit, the indoor blower motor is immediately energized.

This limit is monitored regardless of unit operation status, i.e. the limit is monitored at all times.

If the temperature limit opens three times within one hour, it will lock-on the indoor blower motor and a flash code is initiated (See Table 38).

SAFETY CONTROLS

The UCB monitors the temperature limit switch of electric heat units.

The control circuit includes the following safety controls:

LIMIT SWITCH (LS)

This control is located inside the heater compartment and is set to open at the temperature indicated in the Electric Heat Limit Setting Table 33. It resets automatically. The limit switch operates when a high temperature condition, caused by inadequate supply air flow occurs, thus shutting down the heater and energizing the blower.

TABLE 33: ELECTRIC HEAT LIMIT SETTING

UNIT (TONS	VOLTAGE	HEATER kW	LIMIT SWITCH OPENS °F
7.5	380/415	9	150
7.5,10		18	150
7.5,10		24	150
7.5,10		34	150
10		54	140

FLASH CODES

The UCB will initiate a flash code associated with errors within the system. Refer to UNIT CONTROL BOARD FLASH CODES Table 38.

RESET

Remove the call for heating by lowering the thermostat setting lower than the conditioned space temperature.This resets any flash codes.

ELECTRIC HEAT ANTICIPATOR SETPOINTS

It is important that the anticipator setpoint be correct. Too high of a setting will result in longer heat cycles and a greater temperature swing in the conditioned space. Reducing the value below the correct setpoint will give shorter "ON" cycles and may result in the lowering of the temperature within the conditioned space. Refer to Table 34 for the required electric heat anticipator setting.

TABLE 34: HEAT PUMP ANTICIPATOR SETPOINTS

SETTING, AMPS	
W1	W2
0.13	0.1

START-UP

PRESTART CHECK LIST

After installation has been completed:

1. Check the electrical supply voltage being supplied. Be sure that it is the same as listed on the unit nameplate.
2. Set the room thermostat to the off position.
3. Turn unit electrical power on.
4. Set the room thermostat fan switch to on.
5. Check indoor blower rotation.

- If blower rotation is in the wrong direction. Refer to Phasing Section in general information section.
- Check blower drive belt tension.

6. Check the unit supply air (CFM).
7. Measure evaporator fan motor's amp draw.
8. Set the room thermostat fan switch to off.
9. Turn unit electrical power off.

OPERATING INSTRUCTIONS

1. Turn unit electrical power on.

NOTE: Prior to initial operation, the crankcase heaters must be energized at least 8 hours before the system is put into operation.

2. Set the room thermostat setting to lower than the room temperature.
3. First stage compressors will energize after the built-in time delay (five minutes).
4. The second stage of the thermostat will energize second stage compressor if needed.

POST START CHECK LIST

1. Verify proper system pressures for both circuits.
2. Measure the temperature drop across the evaporator coil.

SUPERHEAT CHARGING METHOD

(Use this method if the unit is equipped with an orifice-type metering device). To determine if the system is properly charged, connect a gauge set to the high and low service ports in the compressor compartment. A temperature probe should be attached to the suction line near the compressor so that suction superheat can be calculated. The probe must be insulated so the higher surrounding temperatures will not affect the reading. A measurement of the outdoor ambient and the indoor wet bulb temperature is also required. (When using a digital temperature probe it is not necessary to insulate the probe because only the probe “tip” is used for sensing.)

Operate system until temperatures and pressures stabilize (minimum of 15 minutes). Then measure and record indoor wet bulb (WB) temperature at the indoor coil. Insert a thermometer with a “wet sock” attached to it into the coil section. Record the outdoor dry bulb (DB) temperature using a thermometer.

Measure and record the suction pressure at the suction service port. Using the Superheat table, note the superheat value corresponding to the intersection of the indoor wet bulb and the outdoor dry bulb. With the superheat value obtained from the table and the suction pressure value previously recorded, find the intersection of the values in Suction Tube Temperature Table. This is the required suction tube temperature at the suction service valve.

To bring the tube temperature in line with the required value, add refrigerant to the service port to cause the tube temperature to fall and reclaim refrigerant to cause the temperature to rise.

TABLE 35: SUPERHEAT CHARGING

SUCTION PRESSURE PSIG (Service Port)	SUCTION TUBE TEMPERATURE																	
	0*	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34
61.5	35	37	39	41	43	45	47	49	51	53	55	57	59	61	63	65	67	69
64.2	37	39	41	43	45	47	49	51	53	55	57	59	61	63	65	67	69	71
67.1	39	41	43	45	47	49	51	53	55	57	59	61	63	65	67	69	71	73
70	41	43	45	47	49	51	53	55	57	59	61	63	65	67	69	71	73	75
73	43	45	47	49	51	53	55	57	59	61	63	63	67	69	71	73	75	77
76	45	47	49	51	53	55	57	59	61	63	65	67	69	71	73	75	77	79
79.2	47	49	51	53	55	57	59	61	63	65	67	69	71	73	75	77	79	81
82.4	49	51	53	55	57	59	61	63	65	67	69	71	73	75	77	79	81	83
84.1	50	52	54	56	58	60	62	64	66	68	70	72	74	76	78	80	82	84
92.6	55	57	59	71	73	65	67	69	71	73	75	77	79	81	83	85	87	89

*. From TMP chart.

TABLE 36: COOLING SUPERHEAT 7-1/2 TON

OUTDOOR TEMP °F	SUCTION SUPERHEAT °F										
	INDOOR WB TEMP °F										
	55	57	59	61	63	65	67	69	71	73	75
65	34.5	34.8	35.1	35.4	35.6	35.9	36.2	37.0	37.7	38.5	39.2
70	32.5	32.9	33.3	33.7	34.1	34.5	34.9	35.8	36.7	37.5	38.4
75	30.4	31.0	31.5	32.0	32.5	33.0	33.6	34.6	35.6	36.6	37.6
80	28.4	29.0	29.7	30.3	30.9	31.6	32.2	33.4	34.5	35.7	36.8
85	26.3	27.1	27.9	28.6	29.4	30.1	30.9	32.2	33.5	34.7	36.0
90	22.0	23.0	23.9	24.9	25.8	26.8	27.8	29.5	31.2	33.0	34.7
95	17.7	18.9	20.0	21.2	22.3	23.5	24.6	26.8	29.0	31.2	33.4
100	13.9	14.9	15.9	17.0	18.0	19.0	20.1	22.5	24.9	27.3	29.8
105	10.0	10.9	11.8	12.8	13.7	14.6	15.5	18.2	20.8	23.5	26.1
110	6.2	7.0	7.8	8.6	9.4	10.2	11.0	13.8	16.7	19.6	22.5
115	-	-	-	-	5.0	5.7	6.4	9.5	12.6	15.8	18.9

TABLE 37: COOLING SUPERHEAT 10 TON

OUTDOOR TEMP °F	SUCTION SUPERHEAT °F										
	INDOOR WB TEMP °F										
	55	57	59	61	63	65	67	69	71	73	75
65	41.0	40.9	40.7	40.6	40.5	40.4	40.3	40.1	40.0	39.9	39.8
70	38.3	38.2	38.2	38.2	38.1	38.1	38.1	38.0	38.0	38.0	37.9
75	35.6	35.6	35.7	35.7	35.8	35.8	35.9	35.9	36.0	36.0	36.1
80	25.7	26.7	27.6	28.5	29.5	30.4	31.3	32.3	33.2	34.1	35.1
85	15.9	17.7	19.5	21.3	23.2	25.0	26.8	28.6	30.4	32.3	34.1
90	14.4	16.1	17.8	19.5	21.1	22.8	24.5	26.2	27.9	29.5	31.2
95	13.0	14.5	16.0	17.6	19.1	20.7	22.2	23.7	25.3	26.8	28.4
100	9.8	11.4	13.0	14.5	16.1	17.7	19.3	20.9	22.5	24.0	25.6
105	6.6	8.2	9.9	11.5	13.1	14.8	16.4	18.0	19.6	21.3	22.9
110	4.6	5.9	7.2	8.5	9.8	11.1	12.4	13.7	14.9	16.2	17.5
115	2.5	3.5	4.5	5.4	6.4	7.4	8.3	9.3	10.3	11.2	12.2

TROUBLESHOOTING

⚠WARNING

Troubleshooting of components may require opening the electrical control box with the power connected to the unit. **Use extreme care when working with live circuits!** Check the unit nameplate for the correct line voltage and set the voltmeter to the correct range before making any connections with line terminals.

When not necessary, shut off all electric power to the unit prior to any of the following maintenance procedures so as to prevent personal injury.

⚠ CAUTION

Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation which could cause injury to person and/or damage unit components. Verify proper operation after servicing.

PREDATOR® FLASH CODES

Various flash codes are utilized by the unit control board (UCB) to aid in troubleshooting. Flash codes are distinguished by the short on and off cycle used (approximately 200ms on and 200ms off). To show normal operation, the control board flashes a 1 second on, 1 second off "heartbeat" during normal operation. This is to verify that the UCB is functioning correctly. Do not confuse this with an error flash code. To prevent confusion, a 1-flash, flash code is not used.

Alarm condition codes are flashed on the UCB lower left Red LED, See Figure 23. While the alarm code is being flashed, it will also be shown by the other LEDs: lit continuously while the alarm is being flashed. The total of the continuously lit LEDs equates to the number of flashes, and is shown in the table. Pressing and releasing the LAST ERROR button on the UCB can check the alarm history. The UCB will cycle through the last five (5) alarms, most recent to oldest, separating each alarm flash code by approximately 2 seconds. In all cases, a flashing Green LED will be used to indicate non-alarm condition.

In some cases, it may be necessary to "zero" the ASCD for the compressors in order to perform troubleshooting. To reset all ASCDs for one cycle, press and release the UCB TEST/ RESET button once.

Flash codes that do and do not represent alarms are listed in Table 38.

TABLE 38: UNIT CONTROL BOARD FLASH CODES

FLASH CODE	DESCRIPTION	GREEN LED 16	RED LED 8	RED LED 4	RED LED 2	RED LED 1
On Steady	This is a Control Failure	-	-	-	-	-
1 Flash	Not Applicable	-	-	-	-	-
2 Flashes	Control waiting ASCD*	Flashing	Off	Off	On	Off
3 Flashes	HPS1 Compressor Lockout	Off	Off	Off	On	On
4 Flashes	HPS2 Compressor Lockout	Off	Off	On	Off	Off
5 Flashes	LPS1 Compressor Lockout	Off	Off	On	Off	On
6 Flashes	LPS2 Compressor Lockout	Off	Off	On	On	Off
7 Flashes	FS1 Compressor Lockout	Off	Off	On	On	On
8 Flashes	FS2 Compressor Lockout	Off	On	Off	Off	Off
9 Flashes	Ignition Control Locked Out / Ignition Control Failure	Off	On	Off	Off	On
10 Flashes	Compressors Locked Out on Low Outdoor Air Temperature[1]	Flashing	On	Off	On	Off
11 Flashes	Compressors locked out because the Economizer is using free Cooling[1]	Flashing	On	Off	On	On
12 Flashes	Unit Locked Out due to Fan Overload Switch Failure	Off	On	On	Off	Off
13 Flashes	Compressor Held Off due to Low Voltage[1]	Flashing	On	On	Off	On
14 Flashes	EEPROM Storage Failure	Off	On	On	On	Off
OFF	No Power or Control Failure	Off	Off	Off	Off	Off

*. Non-alarm condition.

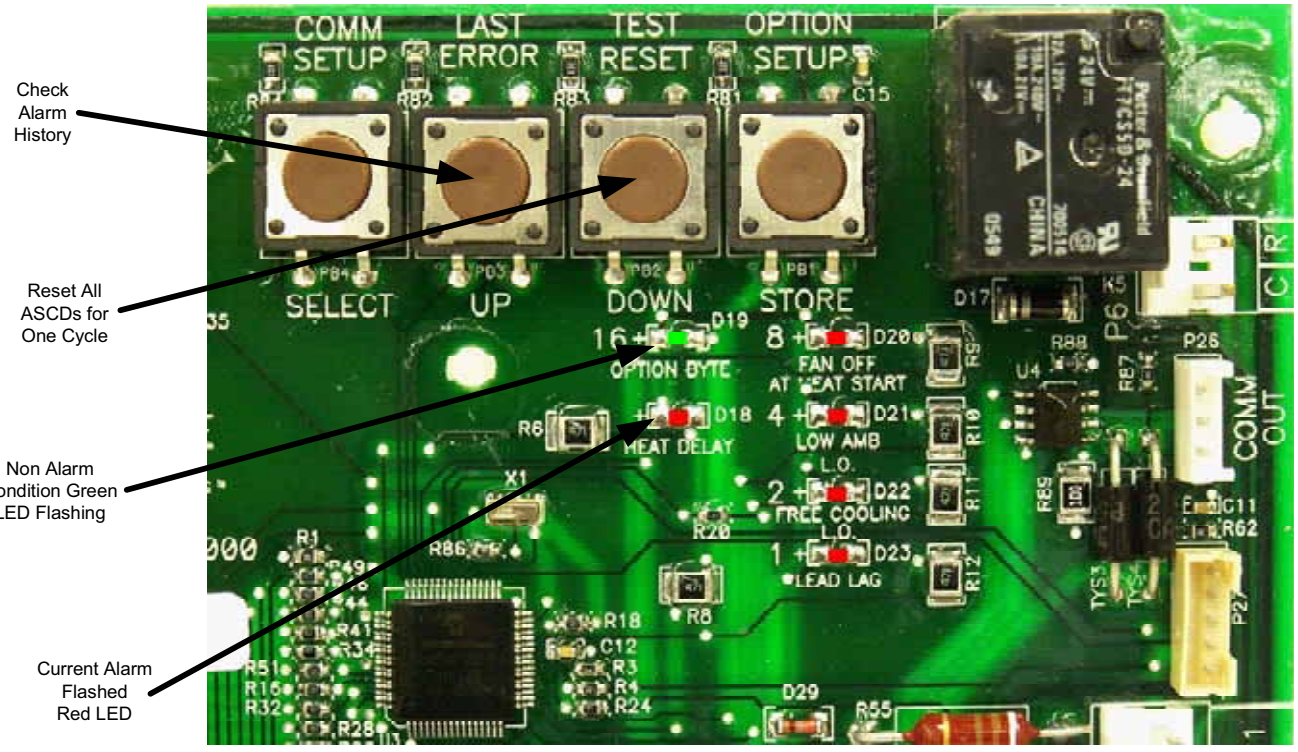


FIGURE 24: UNIT CONTROL BOARD

COOLING TROUBLESHOOTING GUIDE

On calls for cooling, if the compressors are operating but the supply air blower motor does not energize after a short delay (the room thermostat fan switch is in the “AUTO” position):

1. Turn the thermostat fan switch to the ON position. If the supply air blower motor does not energize, go to Step 3.
2. If the blower motor runs with the fan switch in the ON position but will not run after the first compressor has energized when the fan switch is in the AUTO position, check the room thermostat for contact between R and G in the AUTO position during calls for cooling.
3. If the supply air blower motor does not energize when the fan switch is set to ON, check that line voltage is being supplied to the contacts of the M3, contactor, and that the contactor is pulled in. Check for loose wiring between the contactor and the supply air blower motor.
4. If M3 is pulled in and voltage is supplied to M3, lightly touch the supply air blower motor housing. If it is hot, the motor may be off on internal protection. Cancel any thermostat calls and set the fan switch to AUTO. Wait for the internal overload to reset. Test again when cool.
5. If M3 is not pulled in, check for 24 volts at the M3 coil. If 24 volts are present at M3 but M3 is not pulled in, replace the contactor.
6. Failing the above, if there is line voltage supplied at M3, M3 is pulled in, and the supply air blower motor still does not operate, replace the motor.
7. If 24 volts is not present at M3, check that 24 volts is present at the UCB supply air blower motor terminal, “FAN”. If 24 volts is present at the FAN, check for loose wiring between the UCB and M3.
8. If 24 volts is not present at the “FAN” terminal, check for 24 volts from the room thermostat. If 24 volts are not present from the room thermostat, check for the following:
    a. Proper operation of the room thermostat (contact between R and G with the fan switch in the ON position and in the AUTO position during operation calls),
    b. Proper wiring between the room thermostat and the UCB, and
    c. Loose wiring from the room thermostat to the UCB.
9. If 24 volts is present at the room thermostat but not at the UCB, check for proper wiring between the thermostat and the UCB, i.e. that the thermostat G terminal is connected to the G terminal of the UCB, and for loose wiring.
10. If the thermostat and UCB are properly wired, replace the UCB.

On calls for cooling, the supply air blower motor is operating but compressor #1 is not (the room thermostat fan switch is in the “AUTO” position):

1. If installed, check the position of the economizer blades. If the blades are open, the economizer is providing free cooling and the compressors will not immediately operate. If both stages of cooling are requested simultaneously and the economizer provides free cooling, following a short delay compressor #1 will be energized unless it is locked out. If compressor #1 is locked out, compressor #2 is energized. Compressor #2 is always energized in place of compressor #1 when compressor #1 is requested but locked out.
2. If no economizer is installed or the economizer is not opening to provide free cooling and compressor #1 does not energize on a call for cooling, check for line voltage at the compressor contactor, M1, and that the contactor is pulled in. Check for loose wiring between the contactor and the compressor.
3. If M1 is pulled in and voltage is supplied at M1, lightly touch the compressor housing. If it is hot, the compressor may be off on inherent protection. Cancel any calls for cooling and wait for the internal overload to reset. Test again when cool.
4. If M1 is not pulled in, check for 24 volts at the M1 coil. If 24 volts are present and M1 is not pulled in, replace the contactor.
5. Failing the above, if voltage is supplied at M1, M1 is pulled in, and the compressor still does not operate, replace the compressor.
6. If 24 volts is not present at M1, check for 24 volts at the UCB terminal, C1. If 24 volts is present, check for loose wiring between C1 and the compressor contactor.
7. If 24 volts is not present at the C1 terminal, check for 24 volts from the room thermostat at the UCB Y1 terminal. If 24 volts is not present from the room thermostat, check for the following:
    a. 24 volts at the thermostat Y1 terminal,
    b. Proper wiring between the room thermostat and the UCB, i.e. Y1 to Y1, Y2 to Y2, and
    c. Loose wiring from the room thermostat to the UCB.
8. If 24 volts is present at the UCB Y1 terminal, the compressor may be out due to an open high-pressure switch, low-pressure switch, or freezestat. Check for 24 volts at the HPS1, LPS1, and FS1 terminals of the UCB. If a switch has opened, there should be a voltage potential between the UCB terminals, e.g. if LPS1 has opened, there will be a 24-volt potential between the LPS1 terminals.
9. If 24 volts is present at the UCB Y1 terminal and none of the protection switches have opened, the UCB may have

locked out the compressor for repeat trips. The UCB should be flashing an alarm code. If not, press and release the ALARMS button on the UCB. The UCB will flash the last five alarms on the LED. If the compressor is locked out, cancel any call for cooling. This will reset any compressor lock outs.

NOTE: While the above step will reset any lockouts, compressor #1 may be held off for the ASCD. See the next step.

10. If 24 volts is present at the UCB Y1 terminal and none of the switches are open and the compressor is not locked out, the UCB may have the compressor in an ASCD. Check the LED for an indication of an ASCD cycle. The ASCD should time out within 5 minutes. Press and release the TEST button to reset all ASCDs.

11. If 24 volts is present at the UCB Y1 terminal and the compressor is not out due to a protective switch trip, repeat trip lock out, or ASCD, the economizer terminals of the UCB may be improperly wired. Check for 24 volts at the Y1 “OUT” terminal of the UCB. If 24 volts is present, trace the wiring from Y1 “OUT” for incorrect wiring. If 24 volts is not present at the Y1 “OUT” terminal, the UCB must be replaced.

12. *For units without economizers*:If 24 volts is present at the Y1 OUT terminal, check for 24 volts at the Y1 “ECON” terminal. If 24 volts is not present, check for loose wiring from the Y1 “OUT” terminal to the Mate-N-Lock plug, the jumper in the Mate-N-Lock plug, and in the wiring from the Mate-N-Lock plug to the Y1 “ECON” terminal.

13. *For units with economizers*: If 24 volts is present at the Y1 “OUT” terminal, check for 24 volts at the Y1 “ECON” terminal. If 24 volts is not present, check for loose wiring from the Y1 “OUT” terminal to the Mate-N-Lock plug, a poor connection between the UCB and economizer Mate-N-Lock plugs, loose wiring from the Mate-N-Lock plug to the economizer, back to the Mate-N-Lock plug, and from the Mate-N-Lock plug to the Y1 “ECON” terminal. If nothing is found, the economizer control may have faulted and is failing to return the 24-volt “call” to the Y1 “ECON” terminal even though the economizer is not providing free cooling. To test, disconnect the Mate-N-Locks and jumper between the WHITE and YELLOW wires of the UCB’s Mate-N-Lock plug. If compressor #1 energizes, there is a fault in the economizer wiring or the economizer control.

14. The UCB can be programmed to lock out compressor operation during free cooling and in low ambient conditions. These options are not enabled by default. Local distributors can test the UCB for this programming.

    For units with factory installed economizers, the UCB is programmed to lock out compressor operation when the LAS set point is reached.

    For units without factory installed or with field installed economizers, the UCB allows compressor operation all the time. This programming can be checked or changed by the local distributor.

15. If none of the above corrected the error, test the integrity of the UCB. Disconnect the C1 terminal wire and jumper it to the Y1 terminal. DO NOT jump the Y1 to C1 terminals. If the compressor engages, the UCB has faulted.

16. If none of the above correct the error, replace the UCB.

On calls for the second stage of cooling, the supply air blower motor and compressor #1 are operating but compressor #2 is not (the room thermostat fan switch is in the “AUTO” position):

1. If installed, check the position of the economizer blades. If the blades are open, the economizer is providing free cooling. If the second stage of cooling is requested, following a short delay, compressor #1 will be energized unless it is locked out. Typically, compressor #2 is energized only during free cooling if the call for the second stage of cooling persists for 20 minutes.

2. Compressor #2 will not energize simultaneously with compressor #1 if a call for both stages of cooling is received. The UCB delays compressor #2 by 30 seconds to prevent a power surge. If after the delay compressor #2 does not energize on a second stage call for cooling, check for line voltage at the compressor contactor, M2, and that the contactor is pulled in. Check for loose wiring between the contactor and the compressor.

3. If M2 is pulled in and voltage is supplied at M2, lightly touch the compressor housing. If it is hot, the compressor may be off on inherent protection. Cancel any calls for cooling and wait for the internal overload to reset. Test again when cool.

4. If M2 is not pulled in, check for 24 volts at the M2 coil. If 24 volts is present and M2 is not pulled in, replace the contactor.

5. Failing the above, if voltage is supplied at M2, M2 is pulled in, and the compressor still does not operate, replace the compressor.

6. If 24 volts is not present at M2, check for 24 volts at the UCB terminal, C2. If 24 volts are present, check for loose wiring between C2 and the compressor contactor.

7. If 24 volts is not present at the C2 terminal, check for 24 volts from the room thermostat at the UCB Y2 terminal. If 24 volts is not present from the room thermostat, check for the following:

    a. 24 volts at the thermostat Y2 terminal,

    b. Proper wiring between the room thermostat and the UCB, i.e. Y1 to Y1, Y2 to Y2, and

    c. Loose wiring from the room thermostat to the UCB.

8. If 24 volts is present at the UCB Y2 terminal, the compressor may be out due to an open high-pressure switch,

low-pressure switch, or freezestat. Check for 24 volts at the HPS2, LPS2, and FS2 terminals of the UCB. If a switch has opened, there should be a voltage potential between the UCB terminals, e.g. if LPS2 has opened, there will be 24 volts of potential between the LPS2 terminals.

9. If 24 volts is present at the UCB Y2 terminal and none of the protection switches have opened, the UCB may have locked out the compressor for repeat trips. The UCB should be flashing a code. If not, press and release the ALARMS button on the UCB. The UCB will flash the last five alarms on the LED. If the compressor is locked out, remove any call for cooling at the thermostat or by disconnecting the thermostat wiring at the Y2 UCB terminal. This will reset any compressor lock outs.

NOTE: While the above step will reset any lock outs, compressor #1 will be held off for the ASCD, and compressor #2 may be held off for a portion of the ASCD. See the next step.

10. If 24 volts is present at the UCB Y2 terminal and none of the switches are open and the compressor is not locked out, the UCB may have the compressor in an ASCD. Check the LED for an indication of an ASCD cycle. The ASCD should time out within 5 minutes. Press and release the TEST button to reset all ASCDs.

11. The UCB can be programmed to lock out compressor operation during free cooling and in low ambient conditions. These options are not enabled by default. Local distributors can test the UCB for this programming.

    For units with factory installed economizers, the UCB is programmed to lock out compressor operation when the LAS set point is reached.

    For units without factory installed or with field installed economizers, the UCB allows compressor operation all the time. This programming can be checked or changed by the local distributor.

12. If none of the above corrected the error, test the integrity of the UCB. Disconnect the C2 terminal wire and jumper it to the Y2 terminal. DO NOT jump the Y2 to C2 terminals. If the compressor engages, the UCB has faulted.

13. If none of the above correct the error, replace the UCB.

On a call for cooling, the supply air blower motor and compressor #2 are operating but compressor #1 is not (the room thermostat fan switch is in the “AUTO” position).

1. Compressor #2 is energized in place of compressor #1 when compressor #1 is unavailable for cooling calls. Check the UCB for alarms indicating that compressor #1 is locked out. Press and release the ALARMS button if the LED is not flashing an alarm.

2. Check for line voltage at the compressor contactor, M1, and that the contactor is pulled in. Check for loose wiring between the contactor and the compressor.

3. If M1 is pulled in and voltage is supplied at M1, lightly touch the compressor housing. If it is hot, the compressor may be off on inherent protection. Cancel any calls for cooling and wait for the internal overload to reset. Test again when cool.

4. If M1 is not pulled in, check for 24 volts at the M1 coil. If 24 volts is present and M1 is not pulled in, replace the contactor.

5. Failing the above, if voltage is supplied at M1, M1 is pulled in, and the compressor still does not operate, replace the compressor.

6. If 24 volts is not present at M1, check for 24 volts at the UCB terminal, C1. If 24 volts is present, check for loose wiring between C1 and the compressor contactor.

7. If 24 volts is not present at the C1 terminal, check for 24 volts from the room thermostat at the UCB Y1 terminal. If 24 volts are not present at the UCB Y1 terminal, the UCB may have faulted. Check for 24 volts at the Y1 ECON terminal. If 24 volts is not present at Y1 “ECON”, the UCB has faulted. The UCB should de-energize all compressors on a loss of call for the first stage of cooling, i.e. a loss if 24 volts at the Y1 terminal.

8. If 24 volts are present at the UCB Y1 terminal, the compressor may be out due to an open high-pressure switch, low-pressure switch, or freezestat. Check for 24 volts at the HPS1, LPS1, and FS1 terminals of the UCB. If a switch has opened, there should be a voltage potential between the UCB terminals, e.g. if LPS1 has opened, there will be a 24-volt potential between the LPS1 terminals.

9. If 24 volts is present at the UCB Y1 terminal and none of the protection switches have opened, the UCB may have locked out the compressor for repeat trips. The UCB should be flashing a code. If not, press and release the ALARMS button on the UCB. The UCB will flash the last five alarms on the LED. If the compressor is locked out, remove any call for cooling. This will reset any compressor lock outs.

NOTE: While the above step will reset any lock outs, compressor #2 will be held off for the ASCD, and compressor #1 may be held off for a portion of the ASCD. See the next step.

10. If 24 volts is present at the UCB Y1 terminal and none of the switches are open and the compressor is not locked out, the UCB may have the compressor in an ASCD. Check the LED for an indication of an ASCD cycle. The ASCD should time out within 5 minutes. Press and release the TEST button to reset all ASCDs.

11. If 24 volts is present at the UCB Y1 terminal and the compressor is not out due to a protective switch trip, repeat trip lock out, or ASCD, the economizer terminals of the UCB may be improperly wired. Check for 24 volts at the Y1 “OUT” terminal of the UCB. If 24 volts is

present, trace the wiring from Y1 “OUT” for incorrect wiring. If 24 volts is not present at the Y1 “OUT” terminal, the UCB must be replaced.

12. *For units without economizers*: If 24 volts is present at the Y1 “OUT” terminal, check for 24 volts at the Y1 “ECON” terminal. If 24 volts is not present, check for loose wiring from the Y1 “OUT” terminal to the Mate-N-Lock plug, the jumper in the Mate-N-Lock plug, and in the wiring from the Mate-N-Lock plug to the Y1 “ECON” terminal.

    For units with economizers:If 24 volts is present at the Y1 “OUT” terminal, check for 24 volts at the Y1 “ECON” terminal. If 24 volts is not present, check for loose wiring from the Y1 “OUT” terminal to the Mate-N-Lock plug, a poor connection between the UCB and economizer Mate-N-Lock plugs, loose wiring from the Mate-N-Lock plug to the economizer, back to the Mate-N-Lock plug, and from the Mate-N-Lock plug to the Y1 “ECON” terminal. The economizer control may have faulted and is not returning the 24 volts to the Y1 “ECON” terminal even though the economizer is not providing free cooling. To test the economizer control, disconnect the Mate-N-Locks and jumper between the WHITE and YELLOW wires of the UCB’s Mate-N-Lock plug.

13. The UCB can be programmed to lock out compressor operation during free cooling and in low ambient conditions. These options are not enabled by default. They can be checked by local distributors.

    For units with factory installed economizers, the UCB is programmed to lock out compressor operation when the LAS set point is reached.

    For units without factory installed or with field installed economizers, the UCB allows compressor operation all the time. This programming can be checked or changed by the local distributor.

14. If none of the above corrected the error, test the integrity of the UCB. Disconnect the C1 terminal wire and jumper it to the Y1 terminal. DO NOT jump the Y1 to C1 terminals. If the compressor engages, the UCB has faulted.

15. If none of the above correct the error, replace the UCB.

66307-YIM-B-0606
Supersedes: 66307-YIM-A-0704/035-17277-004-A-0704