

Installation Instructions

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

NOTE: Installer: Make sure the Owner's Manual and Service Instructions are left with the unit after installation.

TABLE OF CONTENTS

	Page
SAFETY CONSIDERATIONS	2
INTRODUCTION	2
RECEIVING AND INSTALLATION	2-16
Check Equipment	2
Identify Unit	2
Inspect Shipment	2
Provide Unit Support	2
Roof Curb	2
Slab Mount	2
Ground Mount	2
Provide Clearances	2
Rig and Place Unit	7
Inspection	7
Introduction	7
Use of Rigging Bracket	7
Select and Install Ductwork	9
Converting Horizontal Discharge Units to Downflow (VERTICAL) Discharge Units	9
Provide for Condensate Disposal	9
Install Electrical Connections	11
High-Voltage Connections	11
Routing Power Leads Into Unit	11
Connecting Ground Lead to Ground Screw	11
Routing Control Wires	11
Accessory Installation	16
Special Procedures for 208-v Operation	16
PRE-START-UP	17
START-UP	17
Unit Start-Up	17-23
Sequence of Operation	20
Check for Refrigerant Leaks	20
Start-Up Adjustments	20
Checking Cooling and Heating Control Operation	20
Checking and Adjusting Refrigerant Charge	22
Refrigerant Charge	22
No Charge	22
Low Charge Cooling	22
To Use Cooling Charging Charts	22
Indoor Airflow and Airflow Adjustments	22
Defrost Control	22
Quiet Shift	22
Defrost	22
Emergency Heat/Cool Mode	22

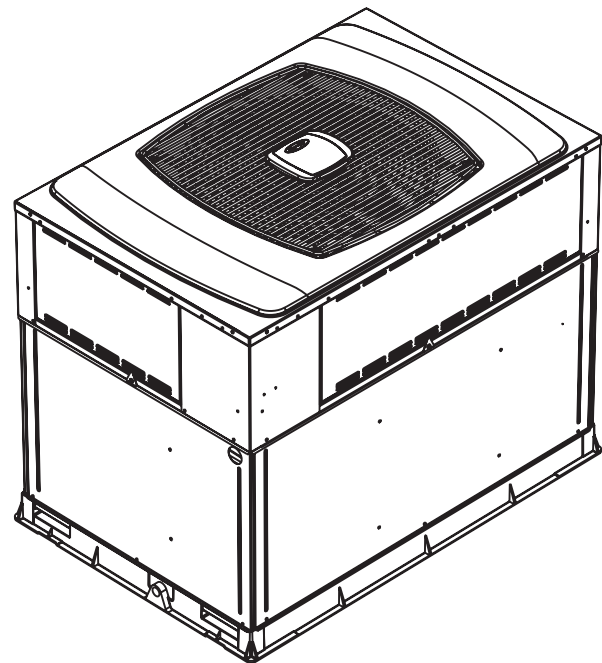


Fig. 1 - Unit 50CR

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MAINTENANCE	24-28
Air Filter	25
Indoor Blower and Motor	25
Outdoor Coil, Indoor Coil, and Condensate Drain Pan	25
Outdoor Fan	25
Electrical Controls and Wiring	26
Refrigerant Circuit	26
Indoor Airflow	26
Metering Devices-TXV & AccuRater® Piston	26
Pressure Switches	26
Loss-of-Charge Switch	27
High-Pressure Switch	27
Copeland Scroll Compressor (Puron® Refrigerant)	27
Refrigerant System	27
Refrigerant	27
Compressor Oil	27
Servicing Systems on Roofs with Synthetic Materials	27
Liquid-Line Filter Drier	28
Puron (R-410A) Refrigerant Charging	28
System Information	28
Loss-of-Charge Switch	28
Check Defrost Thermostat	28
TROUBLESHOOTING	28
START-UP CHECKLIST	28

SAFETY CONSIDERATIONS

Installation and servicing of this equipment can be hazardous due to mechanical and electrical components. Only trained and qualified personnel should install, repair, or service this equipment.

Untrained personnel can perform basic maintenance functions such as cleaning and replacing air filters. All other operations must be performed by trained service personnel. When working on this equipment, observe precautions in the literature, on tags, and on labels attached to or shipped with the unit and other safety precautions that may apply.

Follow all safety codes. Installation must be in compliance with local and national building codes. Wear safety glasses, protective clothing, and work gloves. Have fire extinguisher available. Read these instructions thoroughly and follow all warnings or cautions included in literature and attached to the unit.

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

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

WARNING

ELECTRICAL SHOCK HAZARD

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

Before installing or servicing system, always turn off main power to system. There may be more than one disconnect switch. Turn off accessory heater power switch if applicable.

CAUTION

EQUIPMENT DAMAGE HAZARD

Failure to follow this caution may result in unit component damage.

Puron (R-410A) systems operate at higher pressures than standard R-22 systems. DO NOT use R-22 service equipment or components on Puron (R-410A) equipment. Ensure service equipment is rated for Puron (R-410A).

INTRODUCTION

The 50CR heat pump is fully self-contained and designed for outdoor installation. Standard units are shipped in a horizontal-discharge configuration for installation on a ground-level slab. Standard units can be converted to downflow (vertical) discharge configurations for rooftop applications.

RECEIVING AND INSTALLATION

Step 1—Check Equipment

IDENTIFY UNIT

The unit model number and serial number are printed on the unit informative plate. Check this information against shipping papers.

INSPECT SHIPMENT

Inspect for shipping damage while unit is still on shipping pallet. If unit appears to be damaged or is torn loose from its anchorage, have it examined by transportation inspectors before removal. Forward claim papers directly to transportation company. Manufacturer is not responsible for any damage incurred in transit. Check all items against shipping list. Immediately notify the nearest Carrier Air Conditioning office if any item is missing. To prevent loss or damage, leave all parts in original packages until installation.

Step 2—Provide Unit Support

For hurricane tie downs, contact distributor for details and PE Certificate (Professional Engineering) if required.

ROOF CURB

Install accessory roof curb in accordance with instructions shipped with curb (See Fig. 2). Install insulation, cant strips, roofing, and flashing. Ductwork must be attached to curb.

IMPORTANT: The gasketing of the unit to the roof curb is critical for a water tight seal. Install gasketing material supplied with the roof curb. Improperly applied gasketing also can result in air leaks and poor unit performance.

Curb should be level to within 1/4 in. (See Fig. 3). This is necessary for unit drain to function properly. Refer to accessory roof curb installation instructions for additional information as required.

SLAB MOUNT

Place the unit on a solid, level concrete pad that is a minimum of 4 in. thick with 2 in. above grade. The slab should extend approximately 2 in. beyond the casing on all 4 sides of the unit (See Fig. 4). Do not secure the unit to the slab *except* when required by local codes.

GROUND MOUNT

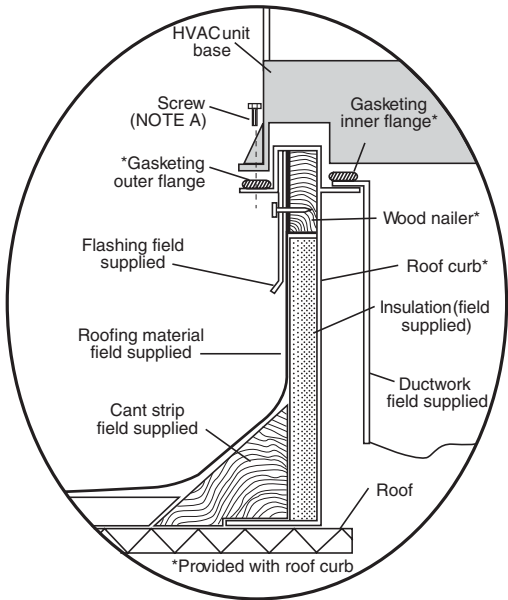
The unit may be installed either on a slab or placed directly on the ground if local codes permit. Place the unit on level ground prepared with gravel for condensate discharge.

Step 3—Provide Clearances

The required minimum service clearances are shown in Fig. 6 and 7. Adequate ventilation and outdoor air must be provided. The outdoor fan draws air through the outdoor coil and discharges it through the top fan grille. Be sure that the fan discharge does not recirculate to the outdoor coil. Do not locate the unit in either a corner or under an overhead obstruction. The minimum clearance under a partial overhang (such as a normal house overhang) is 48 in. above the unit top. The maximum horizontal extension of a partial overhang must not exceed 48 in.

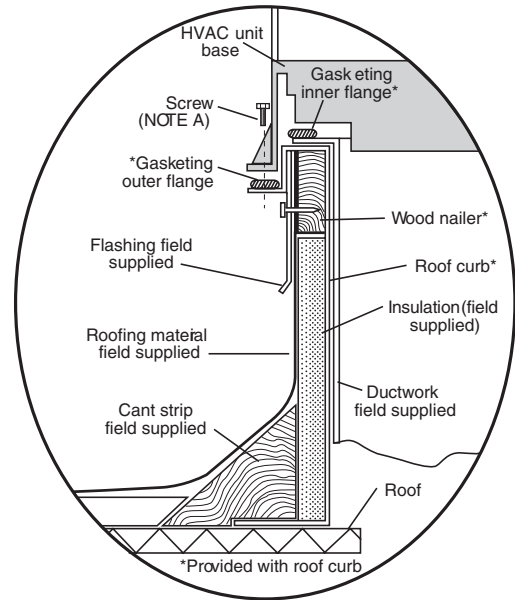
IMPORTANT: Do not restrict outdoor airflow. An air restriction at either the outdoor-air inlet or the fan discharge may be detrimental to compressor life.

Do not place the unit where water, ice, or snow from an overhang or roof will damage or flood the unit. Do not install the unit on carpeting or other combustible materials. Slab-mounted units should be at least 4 in. above the highest expected water and runoff levels. Do not use unit if it has been under water.



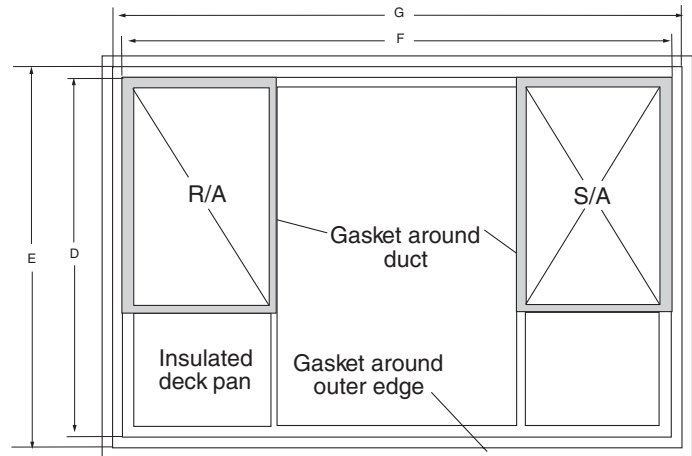
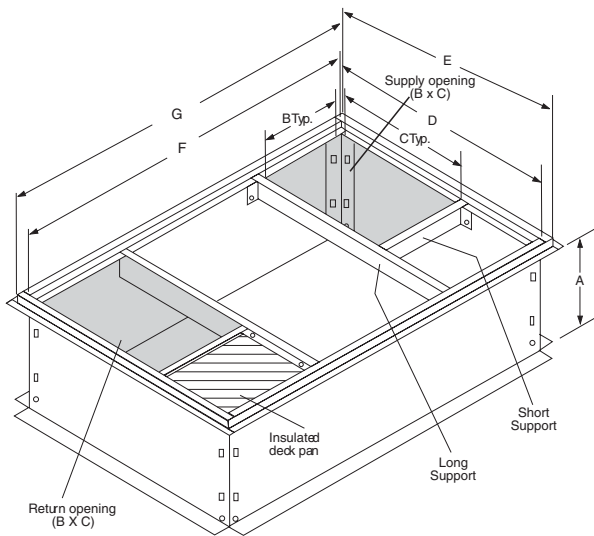
Roof Curb for Small Cabinet

Note A: When unit mounting screw is used, retainer bracket must also be used.



Roof Curb for Large Cabinet

Note A: When unit mounting screw is used, retainer bracket must also be used.



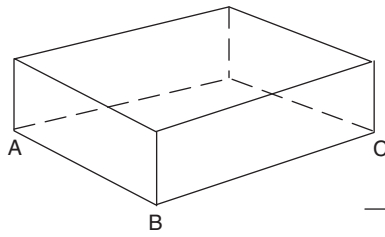
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UNIT SIZE	ODS CATALOG NUMBER	A IN. (MM)	B IN. (MM)	C IN. (MM)	D IN. (MM)	E IN. (MM)	F IN. (MM)	G IN. (MM)
50CR024-036	CPRFCURB006A00	8 (203)	11 (279)	16-1/2 (419)	28-3/4 (730)	30-3/8 (771)	44-5/16 (1126)	45-15/16 (1167)
	CPRFCURB007A00	14 (356)	11 (279)	16-1/2 (419)	28-3/4 (730)	30-3/8 (771)	44-5/16 (1126)	45-15/16 (1167)
50CR042-060	CPRFCURB008A00	8 (203)	16-3/16 (411)	17-3/8 (441)	40-1/4 (1022)	41-15/16 (1065)	44-7/16 (1129)	46-1/16 (1169)
	CPRFCURB009A00	14 (356)	16-3/16 (411)	17-3/8 (441)	40-1/4 (1022)	41-15/16 (1065)	44-7/16 (1129)	46-1/16 (1169)

NOTES:

- Roof curb must be set up for unit being installed.
- Seal strip must be applied, as required, to unit being installed.
- Dimension in () are in millimeters.
- Roof curb is made of 16-gauge steel.
- Table lists only the dimensions, per part number, that have changed.
- Attach ductwork to curb (flanges of duct rest on curb).
- Insulated panels: 1-in. thick fiberglass 1 lb. density.
- Dimensions are in inches.
- When unit mounting screw is used (see Note A), a retainer bracket must be used as well. This bracket must also be used when required by code for hurricane or seismic conditions. This bracket is available through Micrometl.

Fig. 2 - Roof Curb Dimensions



MAXIMUM ALLOWABLE DIFFERENCE (in.)		
A-B	B-C	A-C
1/4	1/4	1/4

Fig. 3 - Unit Leveling Tolerances

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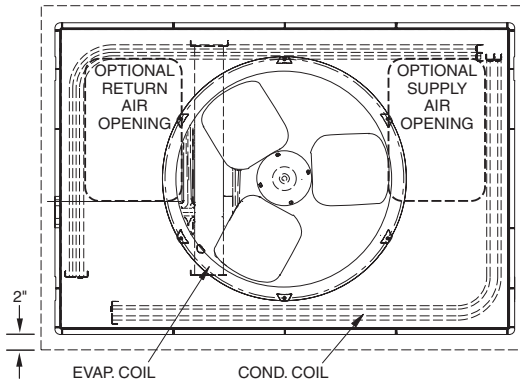


Fig. 4 - Slab Mounting Detail

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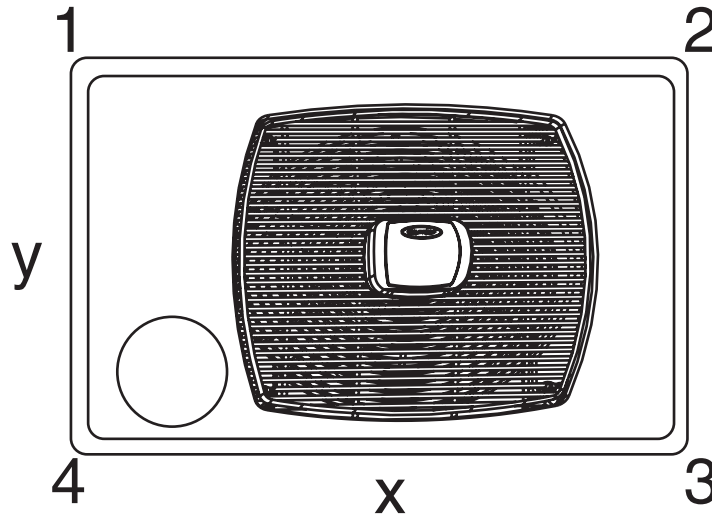


Fig. 5 - Corner Weights (Lbs.)

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Model 50CR	CORNER WEIGHTS (SMALL CABINET)				Model 50CR	CORNER WEIGHTS (LARGE CABINET)			
	Unit	024	030	036		Unit	042	048	060
	Total Weight	349	349	373		Total Weight	438	463	499
	Corner Weight 1	70	70	75		Corner Weight 1	88	98	107
	Corner Weight 2	54	54	58		Corner Weight 2	68	61	70
	Corner Weight 3	84	84	90		Corner Weight 3	106	127	136
	Corner Weight 4	141	141	150		Corner Weight 4	177	177	186

50CR

UNIT	ELECTRICAL CHARACTERISTICS		UNIT WT.				CENTER OF GRAVITY MM/IN			
	LBS.	KG.	"A"	X	Y	Z				
50CR024	349	158.3	991.1 (39.02)	508.0 (20.0)	489.0 (19.3)	447.0 (17.6)				
50CR030	349	158.3	991.1 (39.02)	508.0 (20.0)	489.0 (19.3)	447.0 (17.6)				
50CR036	373	169.2	1041.9 (41.02)	508.0 (20.0)	355.6 (14.0)	330.2 (13.0)				

REQUIRED CLEARANCES TO COMBUSTIBLE MATL.

	MILLIMETERS (IN)
TOP OF UNIT	355.6 (14.00)
DUCT SIDE OF UNIT	355.6 (14.00)
DUCT SIDE OF DUCTS	508.0 (20.00)
BOTTOM OF UNIT	355.6 (14.00)
ELECTRIC HEAT PANEL	914.4 (36.00)

NEC REQUIRED CLEARANCES.

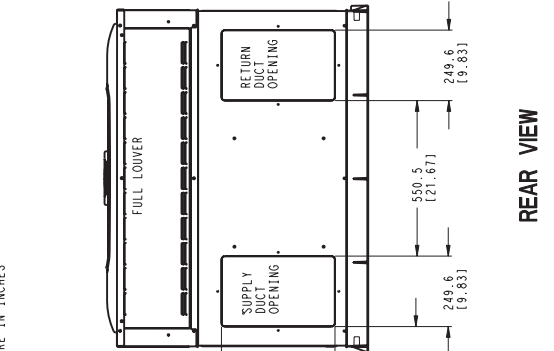
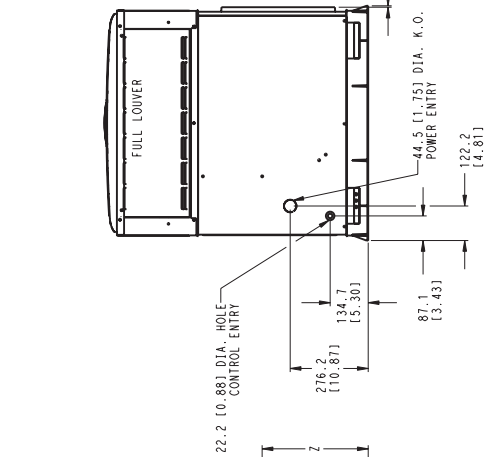
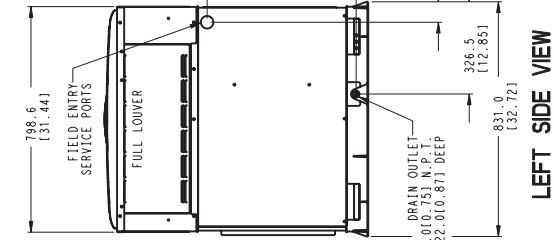
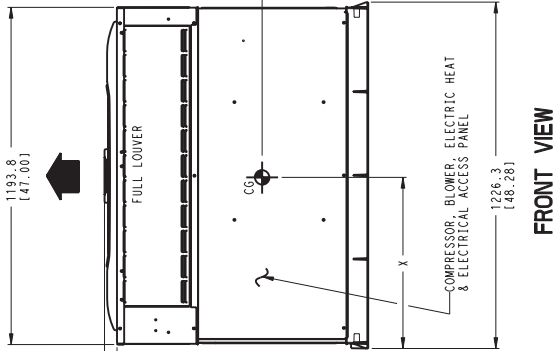
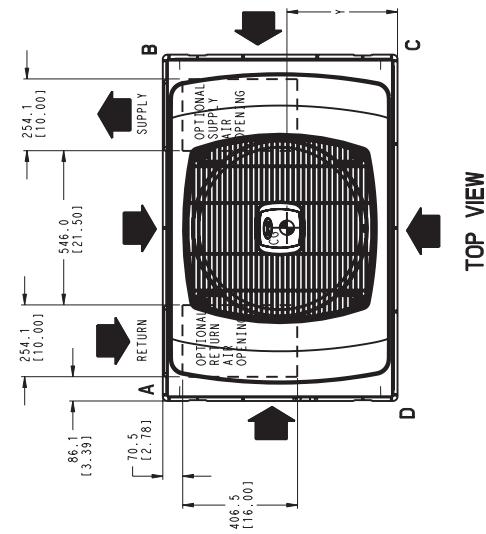
	MILLIMETERS (IN)
BETWEEN UNITS, POWER ENTRY SIDE	1066.8 (42.00)
UNIT AND UNGROUNDED SURFACES, POWER ENTRY SIDE	1066.8 (42.00)
UNIT AND BLOCK OR CONCRETE WALLS AND OTHER GROUNDED SURFACES, POWER ENTRY SIDE	1066.8 (42.00)

REQUIRED CLEARANCE FOR OPERATION AND SERVICING

	MILLIMETERS (IN)
EVAP. COIL ACCESS SIDE	914.4 (36.00)
POWER ENTRY SIDE	914.4 (36.00)
(EXCEPT FOR NEC REQUIREMENTS)	914.4 (36.00)
UNIT TOP	914.4 (36.00)
SIDE OPPOSITE DUCTS	914.4 (36.00)
DUCT PANEL	304.8 (12.00)

*MINIMUM DISTANCES-IF UNIT IS PLACED LESS THAN 304.8 (12.00) FROM WALL SYSTEM, THEN SYSTEM PERFORMANCE MAYBE COMPROMISED.

CORNER WEIGHT LBS./KG.			
A	B	C	D
024	70/31.7	54/24.5	84/38.1
030	70/31.7	54/24.5	84/38.1
036	75/34.2	58/26.3	90/40.8



DIMENSIONS IN () ARE IN INCHES

Fig. 6 - 50CR024-036 Unit Dimensions

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50CR

UNIT	ELECTRICAL CHARACTERISTICS			CENTER OF GRAVITY MM/IN		
	LBS.	KG.	"A"	X	Y	Z
50CR042	208-230-1-60, 208/230-3-60	439	199.3	1091.7(42.48)	553.4(21.0)	520.7(20.5)
50CR048	208-230-1-60, 208/230-3-60	463	210.0	1142.5(44.98)	495.3(19.5)	539.8(21.3)
50CR060	208-230-1-60, 208/230-3-60	499	226.3	1193.3(46.98)	553.4(21.0)	508.0(20.0)

CORNER WEIGHT LBS./KG.	CORNER WEIGHT LBS./KG.		
	A	B	C
042	88/39.9	68/30.8	106/40.1
048	98/44.5	61/27.7	127/57.6
060	107/48.5	70/31.0	136/61.7

REQUIRED CLEARANCES TO COMBUSTIBLE MATL.

TOP OF UNIT: UNIT.....355.6 (114.00)
 SIDE OPPOSITE DUCTS.....355.6 (114.00)
 BOTTOM OF UNIT.....127.0 (5.00)
 ELECTRIC HEAT PANEL.....914.4 (36.00)

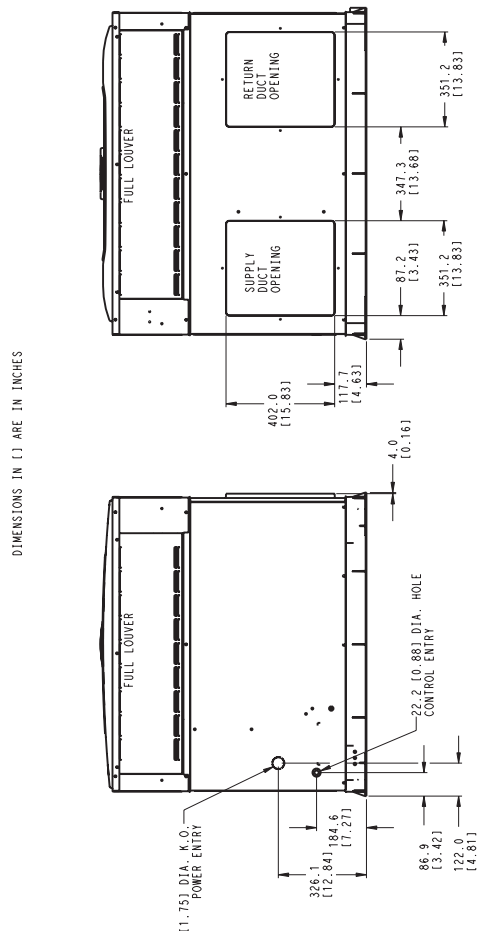
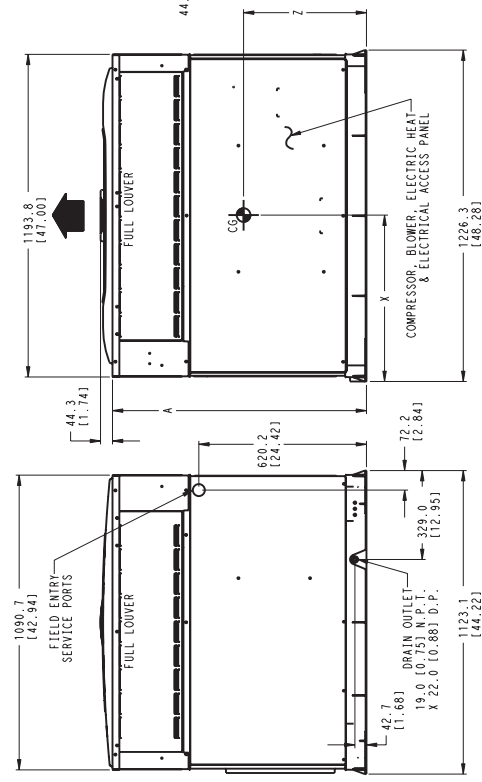
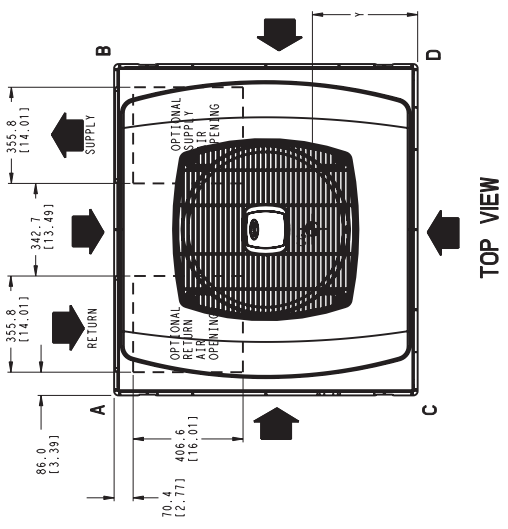
NEC. REQUIRED CLEARANCES.

BETWEEN UNITS, POWER ENTRY SIDE.....1066.8 (42.00)
 UNIT AND UNGRADED SURFACES, POWER ENTRY SIDE.....914.0 (36.00)
 UNIT AND BLOCK OR CONCRETE WALLS AND OTHER GROUNDED SURFACES, POWER ENTRY SIDE.....1066.8 (42.00)

REQUIRED CLEARANCE FOR OPERATION AND SERVICING

EMV. COIL ACCESS SIDE.....MILLIMETERS (IN)
 POWER ENTRY SIDE.....914.0 (36.00)
 UNIT TOP FOR NEC REQUIREMENTS.....914.0 (36.00)
 UNIT TOP.....914.0 (36.00)
 SIDE OPPOSITE DUCTS.....914.0 (36.00)
 DUCT PANEL.....304.8 (112.00)

*MINIMUM DISTANCES: IF UNIT IS PLACED LESS THAN 304.8 (112.00) FROM WALL SYSTEM, THEN SYSTEM PERFORMANCE MAY BE COMPROMISED.



DIMENSIONS IN () ARE IN INCHES

Fig. 7 - 50CR042-060 Unit Dimensions

A05900

Step 4—Rig and Place Unit

Rigging and handling of this equipment can be hazardous for many reasons due to the installation location (roofs, elevated structures, etc.).

Only trained, qualified crane operators and ground support staff should handle and install this equipment.

When working with this equipment, observe precautions in the literature, on tags, stickers, and labels attached to the equipment, and any other safety precautions that might apply.

Training for operators of the lifting equipment should include, but not be limited to, the following:

1. Application of the lifter to the load, and adjustment of the lifts to adapt to various sizes or kinds of loads.
2. Instruction in any special operation or precaution.
3. Condition of the load as it relates to operation of the lifting kit, such as balance, temperature, etc.

Follow all applicable safety codes. Wear safety shoes and work gloves.

INSPECTION

Prior to initial use, and at monthly intervals, all rigging brackets and straps should be visually inspected for any damage, evidence of wear, structural deformation, or cracks. Particular attention should be paid to excessive wear at hoist hooking points and load support areas. Brackets or straps showing any kind of wear in these areas must not be used and should be discarded.

WARNING

ELECTRICAL SHOCK HAZARD

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

Before installing or servicing system, always turn off main power to system. There may be more than one disconnect switch. Turn off accessory heater power switch if applicable. Tag disconnect switch with a suitable warning label.

WARNING

UNIT FALLING HAZARD

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

Never stand beneath rigged units or lift over people.

INTRODUCTION

The lifting/rigging bracket is engineered and designed to be installed only on Small Packaged Products. This bracket is to be used to rig/lift a Small Packaged Product onto roofs or other elevated structures.

WARNING

PROPERTY DAMAGE HAZARD

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

Rigging brackets for one unit use only. When removing a unit at the end of its useful life, use a new set of brackets.

USE OF RIGGING BRACKET

Field Installation of Rigging Bracket

1. If applicable, remove unit from shipping carton. Leave top shipping skid on the unit for use as a spreader bar to prevent the rigging straps from damaging the unit. If the skid is not available, use a spreader bar of sufficient length to protect the unit from damage.
2. Remove 4 screws in unit corner posts.
3. Attach each of the 4 metal rigging brackets under the panel rain lip (See Fig. 8). Use the screws removed in step 2 above to secure the brackets to the unit.

WARNING

PROPERTY DAMAGE HAZARD

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

Rigging bracket **MUST** be under the rain lip to provide adequate lifting.

WARNING

PROPERTY DAMAGE HAZARD

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

Do not strip screws when re-securing the unit. If a screw is stripped, replace the stripped one with a larger diameter screw (included).

Rigging/Lifting of Unit

1. Bend top of brackets down approximately 30 degrees from the corner posts.
2. Attach straps of equal length to the rigging brackets at opposite ends of the unit. Be sure straps are rated to hold the weight of the unit (See Fig. 9).
3. Attach a clevis of sufficient strength in the middle of the straps. Adjust the clevis location to ensure unit is lifted level with the ground.
4. After unit is securely in place detach rigging straps. Remove corner posts, screws, and rigging brackets then reinstall screws.

WARNING

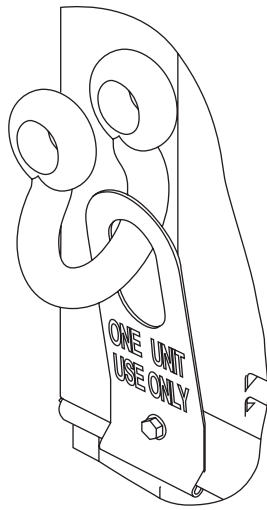
UNIT FALLING HAZARD

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

When straps are taut, the clevis should be a minimum of 36 inches above the unit top cover.

After the unit is placed on the roof curb or mounting pad, remove the top crating. On 50CR060 units only, 2 wire ties fastened to the outdoor coils and reversing valve/accumulator assembly must be cut. Remove the left and front louvered panels and corner post to access wire ties. The wire tie to be cut on the left is located approximately 4 in. down the tube sheet. The wire tie to be cut on the right is located approximately 6 in. down the tube sheet.

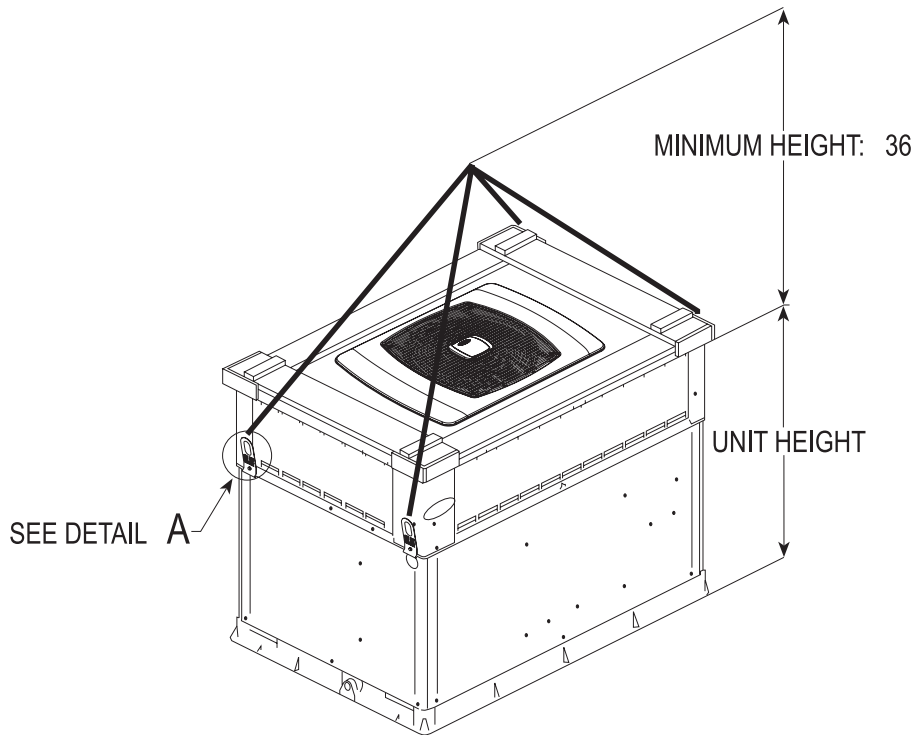
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DETAIL A

Fig. 8 - Rigging Bracket Under Unit Rain Lip

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UNIT SIZE	MAXIMUM SHIPPING WEIGHT	
	Lb	Kg
50CR024	372	169
50CR030	372	169
50CR036	395	179
50CR042	462	210
50CR048	485	220
50CR060	521	236

Fig. 9 - Suggested Rigging

Step 5—Select and Install Ductwork

The design and installation of the duct system must be in accordance with the standards of the NFPA for installation of non-residence type air conditioning and ventilating systems, NFPA 90A or residence type, NFPA 90B and/or local codes and ordinances.

Select and size ductwork, supply-air registers, and return air grilles according to ASHRAE (American Society of Heating, Refrigeration, and Air Conditioning Engineers) recommendations.

The unit has duct flanges on the supply- and return-air openings on the side of the unit.

WARNING

ELECTRICAL OPERATION HAZARD

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

For vertical supply and return units, tools or parts could drop into ductwork, therefore, install a 90 degree turn in the return ductwork between the unit and the conditioned space. If a 90 degree elbow cannot be installed, then a grille of sufficient strength and density should be installed to prevent objects from falling into the conditioned space. Units with electric heaters require 90 degree elbow in supply duct.

When designing and installing ductwork, consider the following:

1. All units should have field-supplied filters or accessory filter rack installed in the return-air side of the unit. Recommended sizes for filters are shown in Table 1.
2. Avoid abrupt duct size increases and reductions. Abrupt change in duct size adversely affects air performance.

IMPORTANT: Use flexible connectors between ductwork and unit to prevent transmission of vibration. Use suitable gaskets to ensure weather tight and airtight seal. When electric heat is installed, use fireproof canvas (or similar heat resistant material) connector between ductwork and unit discharge connection. If flexible duct is used, insert a sheet metal sleeve inside duct. Heat resistant duct connector (or sheet metal sleeve) must extend 24-in. from electric heater element.

3. Size ductwork for max cooling air quantity (400 cfm/ton).
4. Seal, insulate, and weatherproof all external ductwork. Seal, insulate and cover with a vapor barrier all ductwork passing through conditioned spaces. Follow latest Sheet Metal and Air Conditioning Contractors National Association (SMACNA) and Air Conditioning Contractors Association (ACCA) minimum installation standards for residential heating and air conditioning systems.
5. Secure all ducts to building structure. Flash, weatherproof, and vibration-isolate duct openings in wall or roof according to good construction practices.

CONVERTING HORIZONTAL DISCHARGE UNITS TO DOWNFLOW (VERTICAL) DISCHARGE UNITS

WARNING

ELECTRICAL SHOCK HAZARD

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

Before installing or servicing system, always turn off main power to system. There may be more than one disconnect switch. Turn off accessory heater power switch if applicable.

1. Open all electrical disconnects and install lockout tag before starting any service work.
2. Remove side duct covers to access bottom return and supply knockouts.

NOTE: These panels are held in place with tabs similar to an electrical knockout.

3. Use a screwdriver and hammer to remove the panels in the bottom of the composite unit base.
4. Ensure the side duct covers are in place to block off the horizontal air openings (See Fig. 11).

Step 6—Provide for Condensate Disposal

NOTE: Ensure that condensate-water disposal methods comply with local codes, restrictions, and practices.

The units dispose of condensate through a 3/4 in. NPT female fitting that exits on the compressor end of the unit. Condensate water can be drained directly onto the roof in rooftop installations (where permitted) or onto a gravel apron in ground level installations. Install a field-supplied condensate trap at end of condensate connection to ensure proper drainage. Make sure that the outlet of the trap is at least 1 in. lower than the drain-pan condensate connection to prevent the pan from overflowing. Prime the trap with water. When using a gravel apron, make sure it slopes away from the unit.

If the installation requires draining the condensate water away from the unit, install a field-supplied 2-in. trap at the condensate connection to ensure proper drainage. Condensate trap is available as an accessory or is field-supplied. Make sure that the outlet of the trap is at least 1 in. lower than the unit drain-pan condensate connection to prevent the pan from overflowing. Connect a drain trough using a minimum of field-supplied 3/4 -in. PVC or field-supplied 3/4 -in. copper pipe at outlet end of the 2 -in. trap (See Fig. 12). Do not undersize the tube. Pitch the drain trough downward at a slope of at least 1 in. for every 10 ft. of horizontal run. Be sure to check the drain trough for leaks. Prime the trap at the beginning of the cooling season start-up.

Table 1—Physical Data - Unit 50CR

UNIT SIZE	024	030	036	042	048	060
NOMINAL CAPACITY (ton)	2	2-1/2	3	3-1/2	4	5
OPERATING WEIGHT (lb.)	350	350	373	440	463	499
Compressor	Scroll					
Refrigerant (R-410A) Quantity (lb.)	7.5	8	9.5	10.8	11.5	14.0
REFRIGERANT METERING DEVICE	TXV					
ORIFICE OD (in.)	0.035 (2)	0.035 (2)	0.038 (2)	0.038 (2)	0.038 (Left OD Coil) 0.046 (Right OD Coil)	0.042 (Left OD Coil) 0.052 (Right OD Coil)
OUTDOOR COIL						
Rows...Fins/in.	2...21	2...21	2...21	2...21	2...21	2...21
Face Area (sq. ft.)	12.3	12.3	13.6	15.4	17.2	19.4
OUTDOOR FAN						
Nominal Cfm	2700	2700	2800	2800	3300	3300
Diameter	22	22	22	22	22	22
Motor HP (RPM)	1/8 (825)	1/8 (825)	1/8 (825)	1/8 (825)	1/4 (1100)	1/4 (1100)
INDOOR COIL						
Rows...Fins/in.	3...15	3...15	4...15	3...15	4...15	4...17
Face Area (sq. ft.)	3.7	3.7	3.7	4.7	4.7	5.7
INDOOR BLOWER						
Nominal Airflow (Cfm)						
Comfort Efficiency Max	Variable based on Comfort Roll back (see User Interface instructions for more information).					
Size (in.)	700	875	1050	1225	1400	1750
Motor HP (RPM)	800	1000	1200	1400	1600	2000
Size (in.)	10x10	10x10	11x10	11x10	11x10	11x10
Motor HP (RPM)	1/2	1/2	3/4	3/4	3/4	1
HIGH-PRESSURE SWITCH (psig)						
Cutout	650 ± 15					
Reset (Auto)	420 ± 25					
LOSS-OF-CHARGE/LOW-PRESSURE SWITCH (Liquid Line) (psig)						
Cutout	20 ± 5					
Reset (Auto)	45 ± 10					
Return-Air Filters (in.)*						
Throwaway	20x24x1	20x24x1	24x30x1	24x36x1	24x36x1	24x36x1

*Required filter sizes shown are based on the larger of the ARI (Air Conditioning and Refrigeration Institute) rated cooling airflow or the heating airflow velocity of 300 ft/minute for throwaway type or 450 ft/minute for high-capacity type. Air filter pressure drop for non-standard filters must not exceed 0.08 in. wg.

50CR

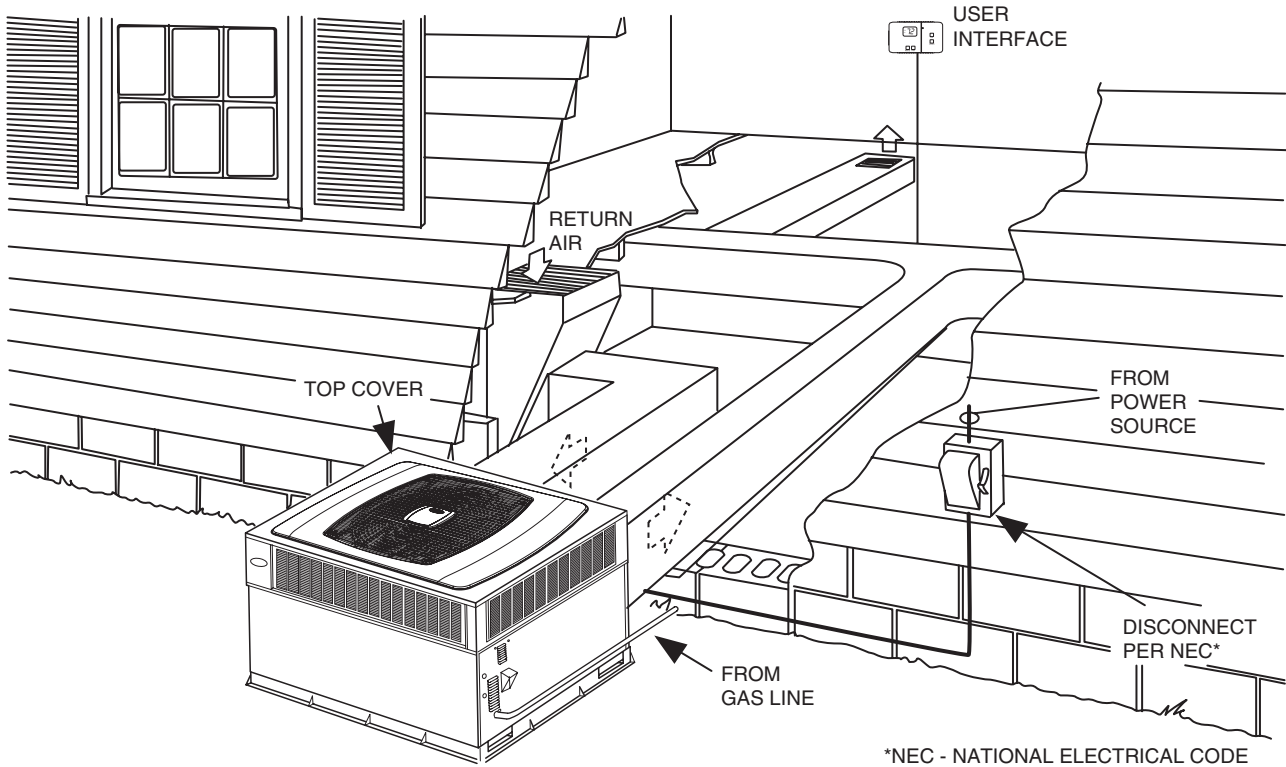


Fig. 10 - Typical Installation

A06091

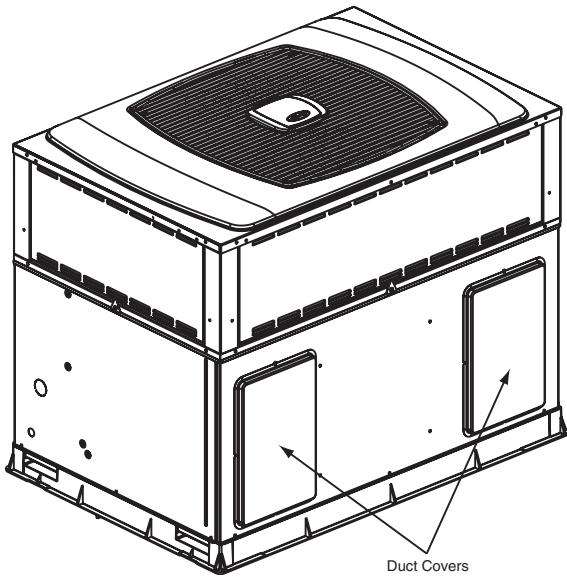


Fig. 11 - 50CR with Duct Covers On

A05301

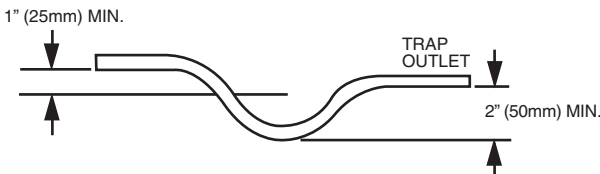


Fig. 12 - Condensate Trap

C99013

Step 7—Install Electrical Connections

⚠ WARNING

ELECTRICAL SHOCK HAZARD

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

The unit cabinet must have an uninterrupted, unbroken electrical ground to minimize the possibility of personal injury if an electrical fault should occur. This ground may consist of an electrical wire connected to the unit ground screw in the control compartment, or conduit approved for electrical ground when installed in accordance with NEC, ANSI/NFPA American National Standards Institute/National Fire Protection Association (latest edition) (in Canada, Canadian Electrical Code CSA C22.1) and local electrical codes.

HIGH-VOLTAGE CONNECTIONS

The unit must have a separate electrical service with a field-supplied, waterproof disconnect switch mounted at, or within sight from the unit. Refer to the unit rating plate, NEC and local codes for maximum fuse/circuit breaker size and minimum circuit amps (ampacity) for wire sizing (See Table 2 for electrical data).

The field-supplied disconnect may be mounted on the unit over the high-voltage inlet hole (See Fig. 6 and 7).

If the unit has an electric heater, a second disconnect may be required. Consult the Installation, Start-Up, and Service Instructions provided with the accessory for electrical service connections.

Operation of unit on improper line voltage constitutes abuse and may cause unit damage that could affect warranty.

⚠ CAUTION

UNIT COMPONENT DAMAGE HAZARD

Failure to follow this caution may result in damage to the unit being installed.

1. Make all electrical connections in accordance with NEC ANSI/NFPA (latest edition) and local electrical codes governing such wiring. In Canada, all electrical connections must be in accordance with CSA standard C22.1 Canadian Electrical Code Part 1 and applicable local codes. Refer to unit wiring diagram.
2. Use only copper conductor for connections between field-supplied electrical disconnect switch and unit. **DO NOT USE ALUMINUM WIRE.**
3. Be sure that high-voltage power to unit is within operating voltage range indicated on unit rating plate. On 3-phase units, ensure phases are balanced within 2 percent. Consult local power company for correction of improper voltage and/or phase imbalance.
4. Insulate low-voltage wires for highest voltage contained within conduit when low-voltage control wires are in same conduit as high-voltage wires.
5. Do not damage internal components when drilling through any panel to mount electrical hardware, conduit, etc.

50CR

ROUTING POWER LEADS INTO UNIT

Use only copper wire between disconnect and unit. The high voltage leads should be in a conduit until they enter the duct panel; conduit termination at the duct panel must be watertight. Run the high-voltage leads through the power entry knockout on the power entry side panel. See Fig. 6 and 7 for location and size. For single-phase units, connect leads to the black and yellow wires; for 3-phase units, connect the leads to the black, yellow, and blue wires.

CONNECTING GROUND LEAD TO GROUND SCREW

Connect the ground lead to the chassis using the ground screw in the wiring splice box (See Fig. 14 and 17).

ROUTING CONTROL POWER WIRES

For detailed instruction on the low voltage connections to the User Interface (UI), refer to the UI installation guide.

Form a drip-loop with the control leads before routing them into the unit. Route the low voltage control leads through grommets, low-voltage hole provided into unit (See Fig. 6 and 7). Connect user interface leads to unit control power leads as shown in Fig. 14.

The unit transformer supplies 24-v power for complete system including accessory electrical heater. A fuse is provided in the 24-v circuit on the control board (See Fig. 19); see the caution label on the transformer. Transformer is factory wired for 230-v operation. If supply voltage is 208-v, rewire transformer primary as described in Special Procedures for 208-v Operation section.

Table 2—Electrical Data—50CR

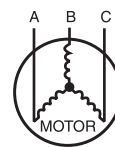
UNIT SIZE	V-PH-HZ	VOLTAGE RANGE		COMPRESSOR		OFM FLA	IFM FLA	ELECTRIC HEAT		SINGLE POINT POWER SUPPLY	
		MIN	MAX	RLA	LRA			NOMINAL KW*	FLA	MCA	MOCP
024	208/230-1-60	187	253	13.5	61.0	0.9	4.3	-/-	-/-	22.1/22.1	30/30
								3.8/5	18.1/20.8	44.6/48.1	50/50
								5.4/7.2	26.0/30.0	54.6/59.6	60/60
								7.5/10.0	36.1/41.7	67.2/74.2	70/80
030	208/230-1-60	187	253	15.9	73.0	0.9	4.3	-/-	-/-	25.1/25.1	30/30
								3.8/5	18.1/20.8	47.6/51.1	50/60
								5.4/7.2	26.0/30.0	57.6/62.6	60/70
								7.5/10.0	36.1/41.7	70.2/77.2	80/80
036	208/230-1-60	187	253	16.9	83.0	0.9	6.8	-/-	-/-	29.5/29.5	35/35
								3.8/5	18.1/20.8	52.1/55.6	60/60
								5.4/7.2	26.0/30.0	62.0/67.0	70/70
								7.5/10.0	36.1/41.7	74.7/81.6	80/90
	208/230-3-60	187	253	12.2	77.0	1.6	6.8	-/-	-/-	23.7/23.7	30/30
								3.8/5.0	10.4/12.0	36.7/38.7	45/45
								7.5/10.0	20.8/24.1	49.7/53.7	50/60
								11.3/15.0	31.3/36.1	62.7/68.8	70/70
042	208/230-1-60	187	253	22.4	105.0	0.9	6.8	-/-	-/-	35.7/35.7	45/45
								3.8/5.0	18.1/20.8	58.3/61.7	70/70
								5.4/7.2	26.0/30.0	68.2/73.2	80/80
								7.5/10.0	36.1/41.7	80.8/87.8	90/90
	208/230-3-60	187	253	15.4	88.0	0.9	6.8	-/-	-/-	27.0/27.0	35/35
								3.8/5.0	10.4/12.0	40.0/42.0	50/50
								7.2/10.0	20.8/24.1	53.0/57.0	60/60
								11.3/15.0	31.3/36.1	66.0/72.1	70/80
048	208/230-1-60	187	253	21.3	109.0	1.6	6.8	-/-	-/-	35.0/35.0	45/45
								3.8/5.0	18.1/20.8	57.6/61.1	70/70
								5.4/7.2	26.0/30.0	67.5/72.5	80/80
								7.5/10.0	36.1/41.7	80.2/87.1	90/90
	208/230-3-60	187	253	14.7	91.0	1.6	6.8	-/-	-/-	26.8/26.8	35/35
								3.8/5.0	10.4/12.0	39.8/41.8	50/50
								7.5/10.0	20.8/24.1	52.8/56.8	60/60
								11.3/15.0	31.3/36.1	65.9/71.9	70/80
060	208/230-1-60	187	253	26.9	145.0	1.5	9.1	-/-	-/-	44.2/44.2	60/60
								3.8/5.0	18.1/20.8	66.8/70.3	80/90
								5.4/7.2	26.0/30.0	76.7/81.7	90/100
								7.5/10.0	36.1/41.7	89.4/96.3	100/110
	208/230-3-60	187	253	17.6	123.0	1.5	9.1	-/-	-/-	34.6/34.6	40/40
								3.8/5.0	10.4/12.0	47.6/49.6	60/60
								7.5/10.0	20.8/24.1	60.7/64.7	70/70
								11.3/15.0	31.3/36.1	73.7/79.7	80/80
								15.0/20.0	41.6/48.0	86.6/94.6	90/100

50CR

- LEGEND**
- FLA — Full Load Amps
 - LRA — Locked Rotor Amps
 - MCA — Minimum Circuit Amps
 - MOCP — Maximum Overcurrent Protection
 - RLA — Rated Load Amps



EXAMPLE: Supply voltage is 230-3-60.



AB = 228 v
 BC = 231 v
 AC = 227 v

$$\begin{aligned} \text{Average Voltage} &= \frac{228 + 231 + 227}{3} \\ &= \frac{686}{3} \\ &= 229 \end{aligned}$$

Determine maximum deviation from average voltage.

(AB) 229 - 228 = 1 v
 (BC) 231 - 229 = 2 v
 (AC) 229 - 227 = 2 v

Maximum deviation is 2 v.

Determine percent of voltage imbalance

$$\begin{aligned} \% \text{ Voltage Imbalance} &= 100 \times \frac{2}{229} \\ &= 0.8\% \end{aligned}$$

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

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

NOTES:

1. In compliance with NEC (National Electrical Code) requirements for multimotor and combination load equipment (refer to NEC Articles 430 and 440), the overcurrent protective device for the unit shall be Power Supply fuse. The CGA (Canadian Gas Association) units may be fuse or circuit breaker.
2. Minimum wire size is based on 60 C copper wire. If other than 60 C wire is used, or if length exceeds wire length in table, determine size from NEC.
3. Unbalanced 3-Phase Supply Voltage
Never operate a motor where a phase imbalance in supply voltage is greater than 2%. Use the following formula to determine the percentage of voltage imbalance

% Voltage imbalance

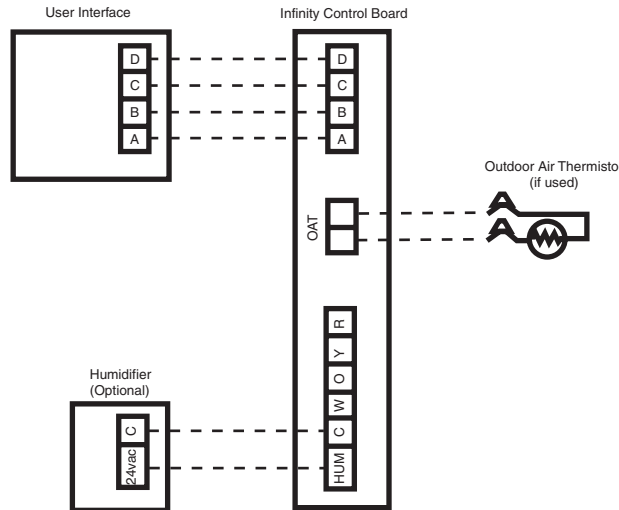
$$= 100 \times \frac{\text{max voltage deviation from average voltage}}{\text{average voltage}}$$

- * Heater capacity (kW) based on heater voltage of 208v & 240v. If power distribution voltage to unit varies from rated heater voltage, heater kW will vary accordingly.

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Fig. 13 - Electrical Data Legend



LEGEND

Field Control-Voltage Wiring - - - - -

Fig. 14 - Control Voltage Wiring Connections

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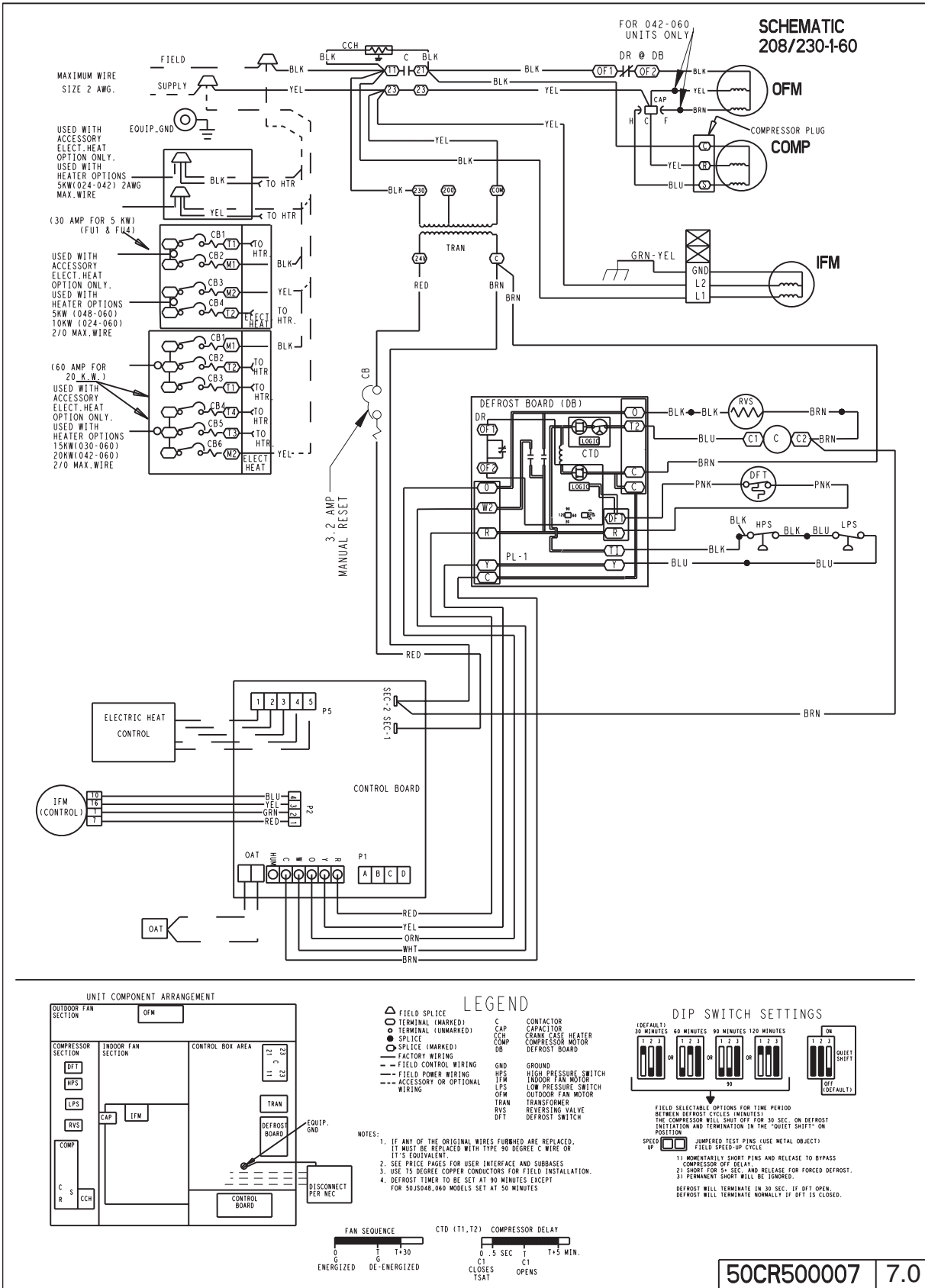
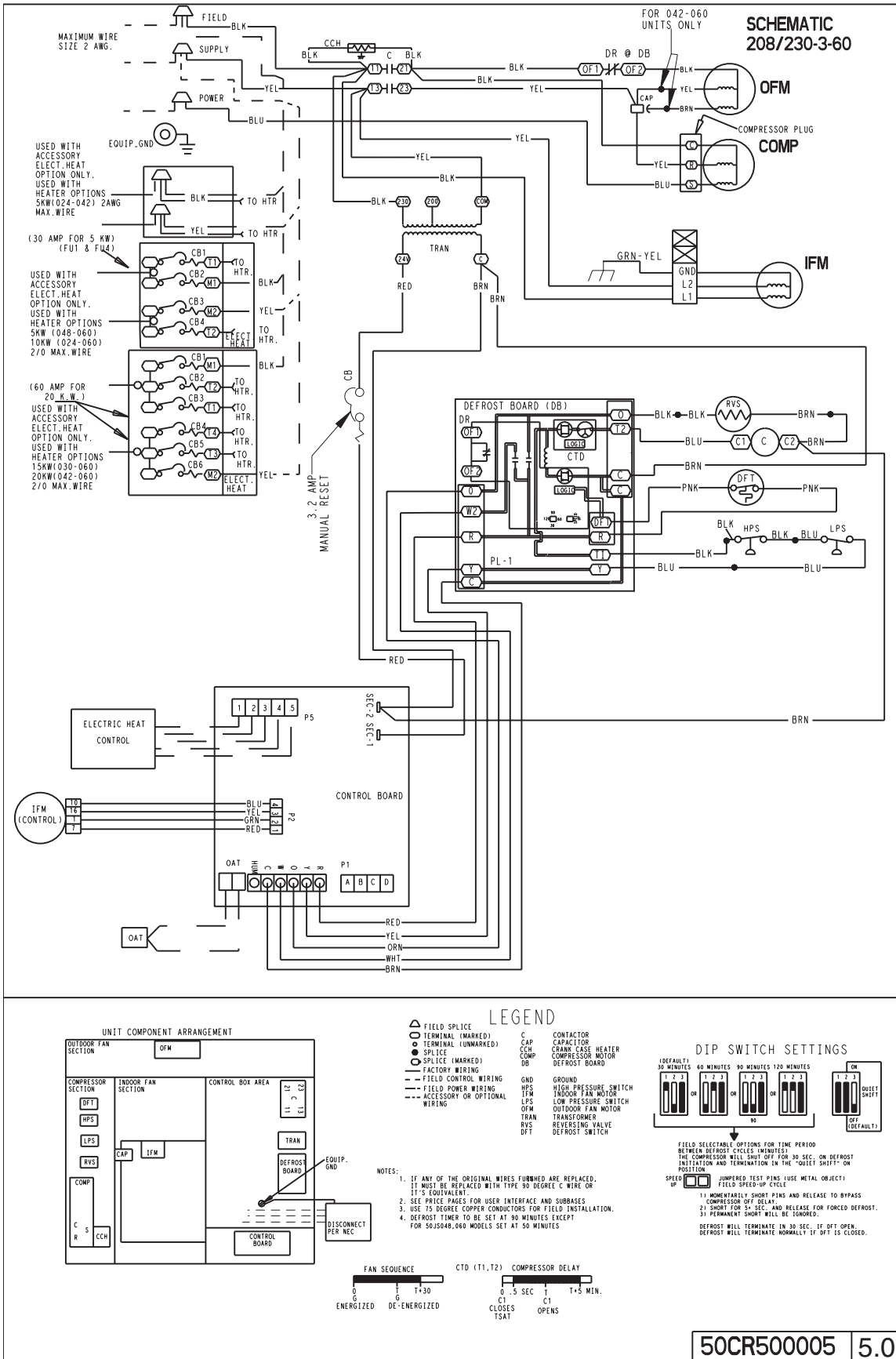


Fig. 15 - Wiring Schematics-50CR Single Phase

A05304



50CR

Fig. 16 - Wiring Schematics-50CR Three Phase

A05259

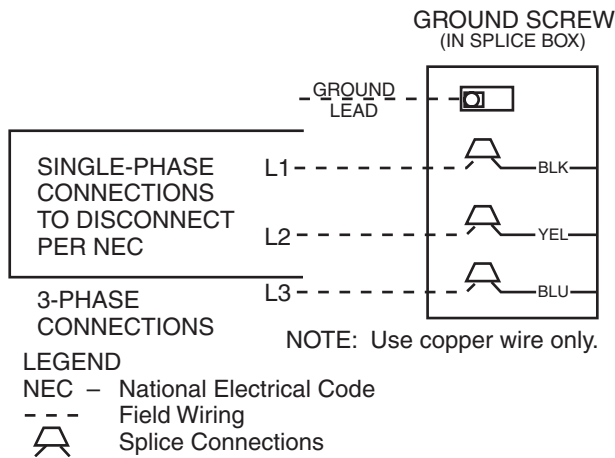


Fig. 17 - Line Power Connections

C99057

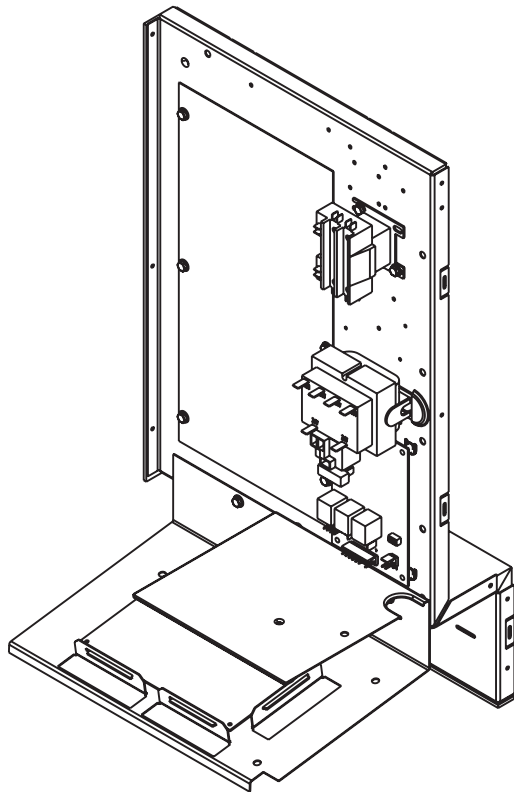


Fig. 18 - Control Plate

A05303

The low-voltage circuit is fused by a board-mounted automotive fuse placed in series with transformer SEC1 and R circuit. The C circuit of transformer circuit is referenced to chassis ground through a printed circuit run at SEC2 and metal control board mounting eyelets. Check to be sure control board is mounted securely using both factory-installed screws.

ACCESSORY INSTALLATION

A. Accessory Electric Heaters

Electric heaters may be installed in 50CR per instructions supplied with electric heater package. See unit rating plate for factory-approved electric heater kits.

NOTE: Units installed without electric heat should have a factory-supplied sheet metal block-off plate installed over heater opening. This reduces air leakage and formation of exterior condensation.

B. Outdoor Air Thermistor (OAT)

A 2-screw terminal strip is provided for connection of an outdoor temperature thermistor. This strip is marked OAT.

NOTE: While the installation of an outdoor temperature sensor using the Infinity control board OAT terminals is optional, certain Infinity features (ComfortHeat, electric heat lockout, auto humidity control) will be lost.

OAT input is used to supply outdoor temperature data for system level functions and for temperature display on User Interface.

Using two wires of field-supplied thermostat wire cable, wire one lead of thermistor to one screw terminal and the other lead to remaining screw terminal; there is no polarity to be observed. It is strongly recommended that two wires be used to connect the thermistor to eliminate noise interference in temperature reading. If there are not two spare wires available in cable, one wire may be used to connect thermistor to OAT screw terminal 1 and the other lead of the thermistor can be wired to 24-vac COM (C) wire. OAT screw terminal 1 is terminal located closest to the ABCD system communications and is marked with a small number 1 next to the terminal strip.

NOTE: Mis-wiring OAT inputs will not cause damage to either Infinity control or thermistor. If the thermistor is wired incorrectly, no reading will appear at User Interface. Re-wire thermistor correctly for normal operation.

C. Humidifier Connections

The Infinity control board terminal marked HUM is provided for low voltage (24-vac) control of a humidifier. No humidistat is required as User Interface monitors indoor humidity. When commanded to operate humidifier, the unit control will energize the HUM output to turn humidifier on and de-energize HUM output to turn humidifier off. Wire HUM and C terminals directly to humidifier as shown in Fig. 14.

SPECIAL PROCEDURES FOR 208-V OPERATION

Be sure unit disconnect switch is open.

Disconnect the yellow primary lead from the transformer. See unit wiring label. (See Fig. 15, 16 and 18)

Connect the yellow primary lead to the transformer terminal labeled 200-v.

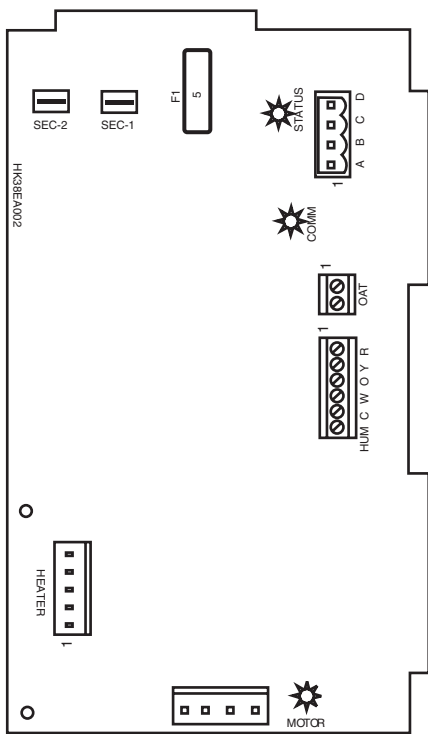


Fig. 19 - Detail of Printed Circuit Board

A03169

PRE-START-UP

⚠ WARNING

FIRE, EXPLOSION, ELECTRICAL SHOCK HAZARD

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

1. Follow recognized safety practices and wear protective goggles when checking or servicing refrigerant system.
2. Do not operate compressor or provide any electric power to unit unless compressor terminal cover is in place and secured.
3. Do not remove compressor terminal cover until all electrical sources are disconnected and tagged.
4. Relieve and recover all refrigerant from system before touching or disturbing anything inside terminal box if refrigerant leak is suspected around compressor terminals.
5. Never attempt to repair soldered connection while refrigerant system is under pressure.
6. Do not use torch to remove any component. System contains oil and refrigerant under pressure.
7. To remove a component, wear protective goggles and proceed as follows:
 - a. Shut off electrical power to unit and install lockout tag.
 - b. Relieve and reclaim all refrigerant from system using both high- and low-pressure ports.
 - c. Cut component connecting tubing with tubing cutter and remove component from unit.
 - d. Carefully unsweat remaining tubing stubs when necessary. Oil can ignite when exposed to torch flame.

Use the Start-Up Checklist supplied at the end of this book and proceed as follows to inspect and prepare the unit for initial start-up:

1. Remove all access panels.
2. Read and follow instructions on all DANGER, WARNING, CAUTION, and INFORMATION labels attached to, or shipped with unit.

3. Make the following inspections:

- a. Inspect for shipping and handling damages, such as broken lines, loose parts, disconnected wires, etc.
- b. Inspect for oil at all refrigerant tubing connections and on unit base. Detecting oil generally indicates a refrigerant leak. Leak test all refrigerant tubing connections using electronic leak detector, or liquid-soap solution. If a refrigerant leak is detected, see following Check for Refrigerant Leaks section.
- c. Inspect all field- and factory-wiring connections. Be sure that connections are completed and tight.
- d. Ensure wires do not touch refrigerant tubing or sharp sheet metal edges.
- e. Inspect coil fins. If damaged during shipping and handling, carefully straighten fins with a fin comb.

4. Verify the following conditions:

- a. Make sure that outdoor fan blade is correctly positioned in fan orifice (See Fig. 24).
- b. Make sure that condensate drain pan and trap are filled with water to ensure proper drainage.
- c. Make sure that all tools and miscellaneous loose parts have been removed.

5. Compressors are internally spring mounted. Do not loosen or remove compressor holddown bolts.

6. Each unit system has two Schrader-type ports, one low-side Schrader fitting located on the suction line, and one high-side Schrader fitting located on the compressor discharge line. Be sure that caps on the ports are tight.

START-UP

Step 1—Unit Start-Up

NOTE: Always check high- and low-voltage supply to the unit components. Check the integrity of the plug receptacle connections and unit wiring harness prior to assuming a component failure.

A. LED Description:

LEDs built into Infinity™ control board provide installer or service person information concerning operation and/or fault condition of the unit control and ECM motor. This information is also available at the system user interface in text with basic troubleshooting instructions. Careful use of information displayed will reduce the need for extensive manual troubleshooting.

The amber LED located at bottom center of control adjacent to motor harness plug is Motor Status LED and it is labeled MOTOR. A second amber LED located in upper right center of control adjacent to System Communications connector (A,B,C,D) is the System Status LED and it is labeled STATUS. The green LED labeled COMM is also located adjacent to System Communications connector, below STATUS LED, and is used as an indicator of system communications status. Status Codes will be displayed on the STATUS LED using the following protocol:

1. The number of short flashes indicates first digit of code.
2. The number of long flashes indicates second digit of code.
3. A short flash is 0.25 seconds on. A long flash is 1 second on.
4. The time between flashes is 0.25 seconds.
5. The time between last short flash and first long flash is 1 second.
6. The LED will be off for 2.5 seconds before repeating code.

B. Control Start-Up and System Communications Troubleshooting:

On power up, green COMM LED will be turned off until successful system communications are established (this should happen within

50CR

10 seconds). Once communications with User Interface are successful, COMM LED will be lit and held on. At the same time, amber STATUS LED will be lit and held continuously on until a request for operating mode is received. The STATUS LED will be on any time unit is in idle mode.

If, at any time, communications are not successful for a period exceeding 2 minutes, the Infinity control will only allow emergency heating or cooling operation using a common thermostat and the R, C, Y, O, W terminal strip connections and will display Status Code 16, System Communication Fault, on amber STATUS LED. No further troubleshooting information will be available at User Interface until communications are re-established.

If COMM LED does not light within proper time period and status code is not displayed;

1. Check system transformer high- and low-voltage to be sure the system is powered.
2. Check fuse on control board to be sure it is not blown. If fuse is open, check system wiring before replacing it to be sure a short does not cause a failure of replacement fuse.

If COMM LED does not light within proper time period and status code is displayed,

1. Check system wiring to be sure User Interface is powered and connections are made A to A, B to B, etc. and wiring is not shorted. Mis-wiring or shorting of the ABCD communications wiring will not allow successful communications.

NOTE: Shorting or mis-wiring low-voltage system wiring will not cause damage to unit control or user interface but may cause low voltage fuse to open.

C. ECM Motor Troubleshooting

The ECM motor used in this product consists of two parts: the control module and the motor winding section. Do not assume motor or module is defective if it will not start. Use the designed-in LED information aids and follow troubleshooting steps described below before replacing motor control module or entire motor. Motor control module is available as a replacement part.

VERIFY MOTOR WINDING SECTION

WARNING

ELECTRICAL SHOCK HAZARD

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

After disconnecting power from the ECM motor, wait at least 5 minutes before removing the control section. Internal capacitors require time to discharge.

Before proceeding to replace a motor control module:

1. Check motor winding section to be sure it is functional.
2. Remove motor control module section and unplug winding plug. Motor shaft should turn freely, resistance between any two motor leads should be similar and resistance between any motor lead and unpainted motor end should exceed 100,000 ohms.
3. Failing any of these tests, entire ECM motor must be replaced.
4. Passing all of the tests, motor control module alone can be replaced.

MOTOR TURNS SLOWLY

1. Low static pressure loading of blower while access panel is removed will cause blower to run slowly. Particularly at low airflow requests. This is normal, do not assume a fault exists.

2. Recheck airflow and system static pressure using User Interface service screens with access panel in place.

NOTE: Blower motor faults will not cause a lockout of blower operation. The unit control will attempt to run the blower motor as long as User Interface maintains a demand for airflow. The unit control will not operate electric heaters while a fault condition exists. The unit control communicates with the motor at least once every five seconds, even when the motor is idle. If, during operation, the unit control does not communicate with the motor for more than 25 seconds, the motor will shut itself down and wait for communications to be reestablished.

D. Using Motor LED in Troubleshooting

The MOTOR LED is connected to the blower motor communication line and works with the unit control microprocessor and the STATUS LED to provide unit operation and troubleshooting information. When the motor is commanded to operate, the MOTOR LED will be turned on and will flash each time instructions are sent to the motor. When the motor is commanded to stop, the MOTOR LED will be turned off.

If the MOTOR LED is lit, flashing, and the motor is running, or if the MOTOR LED is off and the motor is stopped, operation is normal and no motor fault exists.

If the MOTOR LED is lit, flashing, and the motor does not run, or if the MOTOR LED is off and the motor is running, check the STATUS LED for the Status Code. Refer to the troubleshooting instructions for the indicated Status Code in Section E, Unit Troubleshooting.

E. Unit Troubleshooting

Unit faults indicated by flashing codes on the amber system STATUS LED can be resolved using troubleshooting information provided below. Codes are listed in order of their priority, highest to lowest. Though multiple faults can exist at any time, only the highest priority code will be displayed on STATUS LED. Clearing the indicated fault when multiple faults exist will cause the next highest priority Status Code to be flashed. All existing faults, as well as a fault history, can be viewed at User Interface.

STATUS CODE 45, CONTROL BOARD TEST FAULT

Unit control has failed internal start-up tests and must be replaced. No other service procedure will correct.

STATUS CODE 37, HEATER OUTPUT SENSED "ON" WHEN NOT ENERGIZED:

Unit control is provided with circuitry to detect presence of a 24-vac signal on electric heater stage 1 and stage 2 outputs.

If unit control detects a 24-vac signal on either heater stage output and it is not supplying signal, Status Code 37 will be displayed on STATUS LED. Unit control will turn off output and command blower motor to supply an airflow determined to be safe for current operation mode with electric heaters energized.

To find the fault:

1. Stop all system operations at User Interface and check heater stage 24-vac outputs.
2. Disconnect electric heater at power and check heater wiring for faults. See Status Code 36 for more information.

STATUS CODE 44, MOTOR COMMUNICATION FAULT

The MOTOR LED is connected to the blower motor communication line and works with the unit control microprocessor and STATUS LED to provide unit operation and troubleshooting information.

When motor is commanded to operate, the MOTOR LED will be turned on and will flash each time instructions are sent to the motor.

When the motor is commanded to stop, the MOTOR LED will be turned off. The MOTOR LED will not flash to indicate communications when it is turned off.

Unit control is constantly communicating with the motor, even when the motor and MOTOR LED are off. If motor does not acknowledge receipt of communications, the control will display Status Code 44 on STATUS LED and continue to try to communicate with the motor. If motor acknowledges communication, status code will be cleared.

If MOTOR LED is lit and flashing and motor does not run:

1. Check the STATUS LED. If STATUS LED is indicating a Status 44 code, check the motor wiring harness for proper connection to control and motor receptacles.
2. Check motor wiring harness to be sure all wiring complies with wiring diagram description, makes a complete circuit from connector to connector, and is not shorted.
3. Check 12-vdc low voltage supply to motor at pins 1 (+) and 2 (-) of motor header connection to unit control.

If all checks are normal, unit control is good and control module on motor may need replacement. Check motor and Motor Control Module following the instructions in Section C, ECM Motor Troubleshooting.

Shorted or mis-wiring of the low voltage motor harness wiring will not cause damage to unit control or to motor control module.

If the MOTOR LED is off, STATUS LED is indicating a Status Code 44 and motor is running:

1. Disconnect the motor harness at the unit control. If motor continues to run, unit control is good and control module on motor may need replacement.

STATUS CODE 25, INVALID MOTOR / MODEL SELECTION

On initial start-up, unit control shall poll motor for its size data and check unit size data stored in unit control memory.

1. If motor size is incorrect for unit size or size data is invalid, Status Code 25 will be displayed on STATUS LED.
2. If model size data is missing (as is the case when a replacement control board is installed), system User Interface will prompt installer to enter correct model size from a list of valid sizes.
3. If motor size is incorrect for model size, motor must be replaced with proper size motor. Unit control will not respond to operation requests until this fault condition is resolved.

STATUS CODE 26, INVALID HEATER SIZE

On initial power-up, unit control will write into memory electric heater size as read from heater if heater is provided with Identifier Resistor (IDR). Heater size must be valid for combination of indoor and outdoor components installed. Unit control will read IDR value connected to pins 1 and 2 of heater harness connector. If no resistor is found, system User Interface will prompt installer to verify that no heater is installed. Verifying that this is correct will establish that the unit is operating without an electric heater accessory. Upon choosing negative option, installer will be prompted to select heater size installed from a list of valid heater sizes for unit size installed.

If heater ID resistor value read is invalid, Status Code 26 will be displayed on STATUS LED.

If heater installed is equipped with a resistor connected to pins 1 and 2 of heater harness connector and status code 26 is displayed on STATUS LED:

1. Check wiring harness connections to be sure connections are secure.

2. If symptoms persist, disconnect wiring harness at unit control board and check for a resistance value greater than 5000 ohms.
3. Check for proper wiring of resistor assembly.
4. Make sure heater size installed is an approved size for unit and size installed.

NOTE: Unit control will not operate electric heater until this Status Code is resolved. If the heater size is set through the User Interface, the heater will be operated as a single stage heater. If staging is desired, the IDR value must be read in by the unit control.

STATUS CODE 36, HEATER OUTPUT NOT SENSED WHEN ENERGIZED

Unit control is provided with circuitry to detect presence of a 24-vac signal on electric heater stage 1 and stage 2 outputs.

If unit control energizes either heater stage and does not detect the 24-vac signal on output, Status Code 36 will be displayed on the STATUS LED, unit control will continue to energize heater output(s) and adjust blower operation to a safe airflow level for energized electric heat stage(s).

To find the fault:

1. Check for 24-vac on heater stage outputs. Unit control or sensing circuit may be bad.

NOTE: It may be useful as an electric heater troubleshooting procedure to disconnect the system communications to force Status Code 16 enabling of emergency heat mode. It is difficult to know which heater output is energized or not energized in normal operation. When unit is operated in emergency heat mode using electric heaters, both outputs are energized and de-energized together. Terminal strip inputs to control can then be connected R to W to turn on both electric heat outputs. Heater output sensing circuits can then be checked to resolve Status Code 36 or 37 problems.

STATUS CODE 41, BLOWER MOTOR FAULT

If MOTOR LED is lit and flashing and motor does not run:

1. Check STATUS LED. If STATUS LED is indicating Status Code 41, motor control has detected that the motor will not come up to speed within 30 seconds of being commanded to run or that the motor has been slowed to below 250 rpm for more than 10 seconds after coming up to speed. Motor wiring harness and unit control are operating properly, do not replace.
2. Check to be sure that the blower wheel is not rubbing the housing.
3. Check motor to be sure that the motor shaft is not seized (motor control module must be removed and electronics disconnected from windings to perform this check properly).
4. Check motor windings section following instructions in Section C, ECM Motor Troubleshooting.

If all these checks are normal, the motor control module may need replacement.

STATUS CODE 16, SYSTEM COMMUNICATION FAULT

If, at any time, system communications are not successful for a period exceeding 2 minutes, the unit control will only allow emergency heating or cooling operation using a common thermostat, and the R, C, Y, O, W terminal strip connections and will display Status code 16 on the amber STATUS LED (see section E, Emergency Heating and Cooling Modes). No further unit troubleshooting information will be available at the User Interface until communications are re-established.

Check system wiring to be sure the User Interface is powered and connections are made A to A, B to B, etc., and wiring is not shorted. Mis-wiring or shorting of the ABCD communications wiring will not allow successful communications. Correcting wiring faults will clear the code and re-establish communications.

Shorting or mis-wiring the low voltage system wiring will not cause damage to unit control or to User Interface but may cause the low voltage fuse to open.

STATUS CODE 46, BROWNOUT CONDITION

If the secondary voltage of the transformer falls below 15-vac for a period exceeding 4 seconds, Status Code 46 will be displayed on STATUS LED and the User Interface will command the control board to turn off Y output controlling compressor.

When secondary voltage rises above 17-vac for more than 4 seconds, the brownout condition is cleared and normal system operation will resume subject to any minimum compressor off-delay function which may be in effect. Brownout does not affect blower or electric heater operation.

STATUS CODE 53, OUTDOOR AIR TEMPERATURE SENSOR FAULT

If an OAT sensor is found at power-up, input is constantly checked to be within a valid temperature range. If sensor is found to be open or shorted at any time after initial validation, Status Code 53 will be displayed at amber STATUS LED.

Check for faults in wiring connecting sensor to OAT terminals. Using an Ohm meter, check resistance of thermistor for a short or open condition.

If thermistor is shorted or open, replace it to return the system to normal operation. If fault is in the wiring connections, correcting the fault will clear the code and return the system to normal operation.

NOTE: If fault condition is an open thermistor or a wiring problem that appears to be an open thermistor and the power to the unit is cycled off, the fault code will be cleared on the next power-up but the fault will remain and system operation will not be as expected. **This is because on power-up, the unit control cannot discern the difference between an open sensor or if a sensor is not installed.**

Step 2—Sequence of Operation

The packaged heat pump is designed for installation with a communicating User Interface. This unit will not respond to commands provided by a common thermostat except under certain emergency situations described in Step 1—Start-Up.

The User Interface uses temperature, humidity and other data supplied from indoor and outdoor system components to control heating or cooling system for optimum comfort. The unit will be commanded by User Interface to supply airflow. The unit will operate the indoor blower at requested airflow for most modes.

The nominal requested airflow will be 350 cfm per ton of nominal cooling capacity as defined by unit size. Actual airflow request will be adjusted from nominal using indoor and outdoor temperature and indoor humidity data to optimize the system operation for occupant comfort and system efficiency. Refer to User Interface literature for further system control details.

Airflow during electric heater operation must be greater than a minimum level for safe operation. If User Interface instructs unit to turn on electric heat and the requested airflow is less than the minimum level the unit control will override requested value.

NOTE: Once the compressor has started and then has stopped, it should not be started again until 4 minutes have elapsed. The cooling cycle remains “on” until the room temperature drops to point that is slightly below the cooling control setting of the user interface. Additionally, there is a 5-minute compressor delay built into the control for heat pump heating mode.

Step 3—Check for Refrigerant Leaks

Locate and repair refrigerant leaks and charge the unit as follows:

1. Use both high- and low-pressure ports to relieve system pressure and reclaim remaining refrigerant.
2. Repair leak following accepted practices.

NOTE: Install a bi-flow filter drier whenever the system has been opened for repair.

3. Check system for leaks using an approved method.
4. Evacuate refrigerant system and reclaim refrigerant if no additional leaks are found.
5. Charge unit with Puron (R-410A) refrigerant, using a volumetric-charging cylinder or accurate scale. Refer to unit rating plate for required charge.

Step 4—Start-Up Adjustments

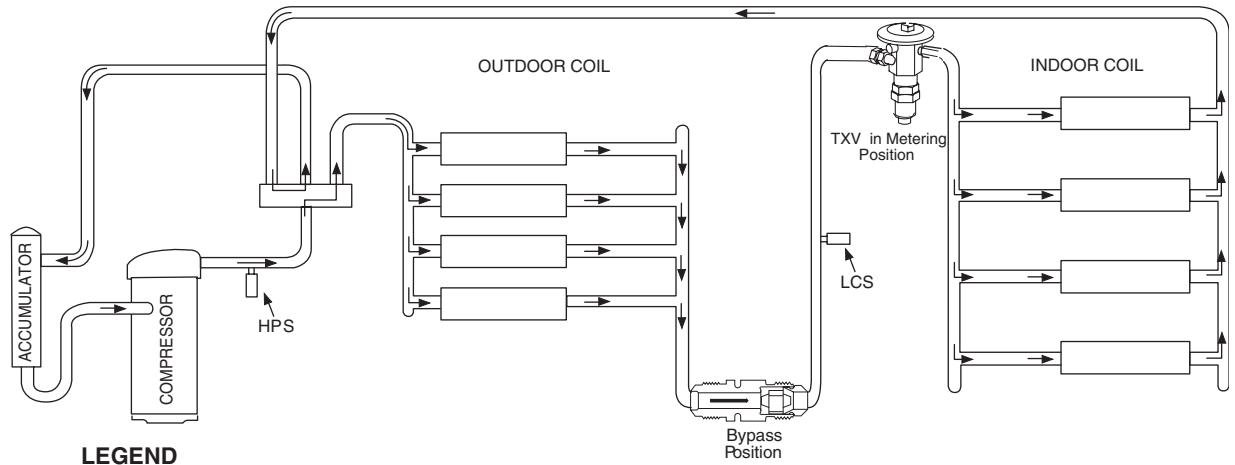
Complete the required procedures given in the Pre-Start-Up section before starting the unit. Do not jumper any safety devices when operating the unit. Do not operate the unit in cooling mode when the outdoor temperature is below 40°F (unless accessory low-ambient kit is installed). Do not rapid cycle the compressor. Allow 5 min. between “on” cycles to prevent compressor damage.



CHECKING COOLING AND HEATING CONTROL OPERATION

Start and check the unit for proper control operation as follows:

1. Place room UI SYSTEM switch or MODE control in OFF position. Observe that blower motor starts when FAN mode is placed in FAN ON position and shuts down within 60 sec (030-060 size) or 30 sec (024 size) when FAN MODE switch is placed in AUTO position.
2. Place system switch or MODE control in HEAT position. Set control above room temperature. Observe that compressor, outdoor fan, and indoor blower motors start. Observe that heating cycle shuts down when control setting is satisfied.
3. When using an automatic changeover room thermostat, place both SYSTEM or MODE control and FAN mode switches in AUTO positions. Observe that unit operates in cooling mode when temperature control is set to “call for cooling” (below room temperature), and unit operates in heating mode when temperature control is set to “call for heating” (above room temperature).

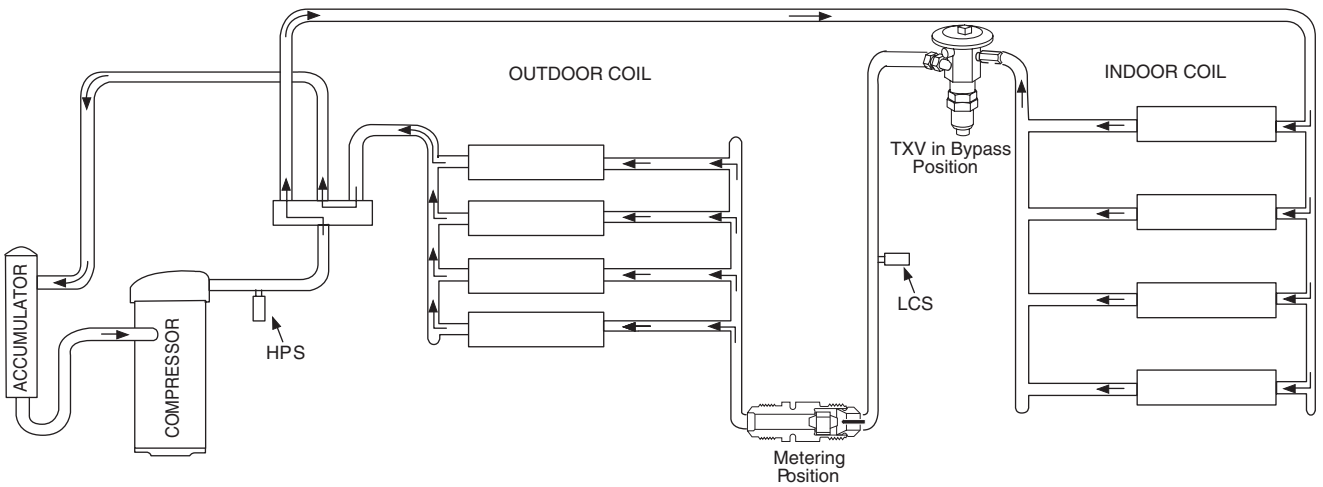
IMPORTANT: Three-phase, scroll compressors are direction oriented. Unit must be checked to ensure proper compressor 3-phase power lead orientation. If not corrected within 5 minutes, the internal protector will shut off the compressor. The 3-phase power leads to the unit must be reversed to correct rotation. When turning backwards, the difference between compressor suction and discharge pressures may be dramatically lower than normal.





- LEGEND**
 HPS – High Pressure Switch
 LCS – Loss of Charge Switch
 Accurater® Metering Device
 Arrow indicates direction of flow

C03011

Fig. 20 - Typical Heat Pump Operation, Cooling Mode



- LEGEND**
 HPS – High Pressure Switch
 LCS – Loss of Charge Switch
 Accurater® Metering Device
 Arrow indicates direction of flow

C03012

Fig. 21 - Typical Heat Pump Operation, Heating Mode

CHECKING AND ADJUSTING REFRIGERANT CHARGE

The refrigerant system is fully charged with Puron (R-410A) refrigerant and is tested and factory sealed.

NOTE: Adjustment of the refrigerant charge is not required unless the unit is suspected of not having the proper R-410A charge. The charging label and the tables shown refer to system temperatures and pressures in cooling mode only. A refrigerant charging label is attached to the outside of the service access door. If charge level is suspect in heating mode, reclaim all refrigerant and charge to informative plate amount. (This information may be obtained from the physical data table also.) The charging label and the tables shown refer to system temperatures and pressures in cooling mode only. A refrigerant charging label is attached to the outside of the service access door.

IMPORTANT: When evaluating the refrigerant charge, an indicated adjustment to the specified factory charge must always be very minimal. If a substantial adjustment is indicated, an abnormal condition exists somewhere in the cooling system, such as insufficient airflow across either coil or both coils.

REFRIGERANT CHARGE

The amount of refrigerant charge is listed on the unit rating plate and/or the physical data table. Refer to the Refrigeration Service Techniques Manual, Refrigerants Section.

NO CHARGE

Check for leak. Use standard evacuating techniques. After evacuating system, weigh in the specified amount of refrigerant (refer to system rating plate).

LOW CHARGE COOLING

Use Cooling Charging Chart (Fig. 22). Vary refrigerant until the conditions of the chart are met. Note that charging charts are different from type normally used. Charts are based on charging the units to correct subcooling for the various operating conditions. Accurate pressure gauge and temperature sensing devices are required. Connect the pressure gauge to the service port on the suction line. Mount the temperature sensing device on the suction line and insulate it so that the outdoor ambient does not affect the reading. Indoor air CFM must be within the normal operating range of the unit.

TO USE COOLING CHARGING CHARTS

Take the liquid line temperature and read the manifold pressure gauges. Refer to the chart to determine what the liquid line temperature should be.

NOTE: If the problem causing the inaccurate readings is a refrigerant leak, refer to Check for Refrigerant Leaks section.

INDOOR AIRFLOW AND AIRFLOW ADJUSTMENTS

NOTE: Be sure that all supply- and return-air grilles are open, free from obstructions, and adjusted properly.

Unit 50CR utilizes state of the art ECM (Electronic Computed Motor) ID Blower Motors. See user interface instructions for detailed information on adjusting airflow.

Step 5—Defrost Control

QUIET SHIFT

Quiet Shift is a field-selectable defrost mode, which will eliminate occasional noise that could be heard at the start of defrost cycle and restarting of heating cycle. It is selected by placing DIP switch 3 (on defrost board) in ON position.

When Quiet Shift switch is placed in ON position, and a defrost is initiated, the following sequence of operation will occur. Reversing valve will energize, outdoor fan will turn off, compressor will turn off for 30 sec and then turn back on to complete defrost. At the start of heating after conclusion of defrost reversing valve will de-energize, compressor will turn off for another 30 sec, and the outdoor fan will stay off for 40 sec, before starting in the heating mode.

DEFROST

The defrost control is a time/temperature control which includes a field-selectable time period (DIP switch 1 and 2 on the board) between defrost cycles of 30, 60, 90, or 120 minutes (factory set at 30 minutes).

To initiate a forced defrost, two options are available depending on the status of the defrost thermostat.

If defrost thermostat is closed, speedup pins (J1) must be shorted by placing a flat head screw driver in between for 5 sec and releasing, to observe a complete defrost cycle. When the Quiet Shift switch is selected, compressor will be turned off for two 30 sec intervals during this complete defrost cycle, as explained previously. When Quiet Shift switch is in factory default OFF position, a normal and complete defrost cycle will be observed.

If defrost thermostat is in open position, and speedup pins are shorted (with a flat head screw driver) for 5 sec and released, a short defrost cycle will be observed (actual length is dependent upon the selected Quiet Shift position). When Quiet Shift switch is in ON position, the length of defrost is 1 minute (30 sec compressor off period followed by 30 sec of defrost with compressor operation). On return to heating operation, compressor will again turn off for an additional 30 sec and the outdoor fan for 40 sec. When the Quiet Shift is in OFF position, only a brief 30 sec cycle will be observed.

If it is desirable to observe a complete defrost in warmer weather, the defrost thermostat must be closed as follows:

1. Turn off power to outdoor unit.
2. Disconnect outdoor fan motor lead from OF2 on control board (See Fig. 23). Tape to prevent grounding.
3. Restart unit in heating mode, allowing frost to accumulate on outdoor coil.
4. After a few minutes in heating mode, liquid-line temperature should drop below closing point of defrost thermostat (approximately 30°F).

NOTE: Unit will remain in defrost until defrost thermostat reopens at approximately 80°F coil temperature at liquid line or remainder of defrost cycle time.

5. Turn off power to outdoor and reconnect fan motor lead to OF2 on control board after above forced defrost cycle.

NON-COMMUNICATING EMERGENCY COOLING / HEATING MODE

This mode of operation is provided only in the case where the UI has failed or is otherwise unavailable. If communications cannot be established with the UI, the Infinity control board will enable the following thermostat input terminals to allow simple thermostatic control of the 50CR unit:

- a. Y & O for cooling
- b. W for electric heat (if applicable)
- c. Y for heat pump heat

The Infinity control will respond to cooling and heating demands with the maximum safe airflow based on electric heat size (if applicable) and unit capacity.

Model Size	Required Subcooling of (oC)					Pressure (psig)	Required Liquid Line Temperature for a Specific Subcooling (R-410A)					Pressure (kPa)	Required Subcooling (°C)				
	Outdoor Ambient Temperature						Required Subcooling (°F)						Required Subcooling (°C)				
	75 (24)	82 (28)	85 (29)	95 (35)	105 (41)		5	10	15	20	25		3	6	8	11	14
024	10.3 (5.7)	9.8 (5.4)	9.4 (5.2)	9 (5)	8.6 (4.7)	189	61	56	51	46	41	1303	16	13	11	8	5
030	9.3 (5.2)	8.8 (4.9)	8.6 (4.8)	7.8 (4.3)	7 (3.9)	196	63	58	53	48	43	1351	17	15	12	9	6
036	17.6 (9.8)	16.8 (9.3)	16.5 (9.2)	15.4 (8.6)	14.3 (7.9)	203	66	61	56	51	46	1399	19	16	13	10	8
042	12.8 (7.1)	12.7 (7.1)	12.7 (7.1)	12.6 (7)	12.6 (7)	210	68	63	58	53	48	1448	20	17	14	11	9
048	17.5 (9.7)	16.9 (9.4)	16.6 (9.2)	15.7 (8.7)	14.8 (8.2)	217	70	65	60	55	50	1496	21	18	15	13	10
060	13.7 (7.6)	13 (7.2)	13 (7.2)	14.5 (8.1)	11.5 (6.4)	224	72	67	62	57	52	1544	22	19	16	14	11
Charging Procedure						231	74	69	64	59	54	1593	23	20	18	15	12
1- Measure Discharge line pressure by attaching a gauge to the service port.						238	76	71	66	61	56	1641	24	21	19	16	13
2- Measure the Liquid line temperature by attaching a temperature sensing device to it.						245	77	72	67	62	57	1689	25	22	20	17	14
3- Insulate the temperature sensing device so that the Outdoor Ambient doesn't affect the reading.						252	79	74	69	64	59	1737	26	23	21	18	15
4- Refer to the required Subcooling in the table based on the model size and the Outdoor Ambient temperature.						260	81	76	71	66	61	1792	27	25	22	19	16
5- Interpolate if the Outdoor ambient temperature lies in between the table values. Extrapolate if the temperature lies beyond the table range.						268	83	78	73	68	63	1848	29	26	23	20	17
6- Find the Pressure Value in the table corresponding to the measured Pressure of the Compressor Discharge line.						276	85	80	75	70	65	1903	30	27	24	21	19
7- Read across from the Pressure reading to obtain the Liquid line temperature for a required Subcooling						284	87	82	77	72	67	1958	31	28	25	22	20
8- Add Charge if the measured temperature is higher than the table value.						292	89	84	79	74	69	2013	32	29	26	23	21
						300	91	86	81	76	71	2068	33	30	27	24	22
						309	93	88	83	78	73	2130	34	31	28	26	23
						318	95	90	85	80	75	2192	35	32	29	27	24
						327	97	92	87	82	77	2254	36	33	31	28	25
						336	99	94	89	84	79	2316	37	34	32	29	26
						345	101	96	91	86	81	2378	38	35	33	30	27
						354	103	98	93	88	83	2440	39	36	34	31	28
						364	105	100	95	90	85	2509	40	38	35	32	29
						374	107	102	97	92	87	2578	41	39	36	33	30
						384	108	103	98	93	88	2647	42	40	37	34	31
						394	110	105	100	95	90	2716	44	41	38	35	32
						404	112	107	102	97	92	2785	45	42	39	36	33
						414	114	109	104	99	94	2854	46	43	40	37	34
						424	116	111	106	101	96	2923	47	44	41	38	35
						434	118	113	108	103	98	2992	48	45	42	39	36
						444	119	114	109	104	99	3061	48	46	43	40	37
						454	121	116	111	106	101	3130	49	47	44	41	38
						464	123	118	113	108	103	3199	50	48	45	42	39
						474	124	119	114	109	104	3268	51	48	46	43	40
						484	126	121	116	111	106	3337	52	49	47	44	41
						494	127	122	117	112	107	3406	53	50	47	45	42
						504	129	124	119	114	109	3475	54	51	48	46	43
						514	131	126	121	116	111	3544	55	52	49	46	44
						524	132	127	122	117	112	3612	56	53	50	47	45
						534	134	129	124	119	114	3681	56	54	51	48	45

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Fig. 22 - Cooling Charging Table-Subcooling

Table 3—ECM Wet Coil Pressure Drop (in. wg)

UNIT SIZE	STANDARD CFM (SCFM)															
	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100
024	0.005	0.007	0.010	0.012	0.015	-	-	-	-	-	-	-	-	-	-	-
030	-	0.007	0.010	0.012	0.015	0.018	0.021	0.024	-	-	-	-	-	-	-	-
036	-	-	-	0.019	0.023	0.027	0.032	0.037	0.042	0.047	-	-	-	-	-	-
042	-	-	-	-	0.014	0.017	0.020	0.024	0.027	0.031	0.035	0.039	0.043	-	-	-
048	-	-	-	-	-	-	0.027	0.032	0.036	0.041	0.046	0.052	0.057	0.063	0.068	-
060	-	-	-	-	-	-	-	-	-	0.029	0.032	0.036	0.040	0.045	0.049	0.053

Table 4—Filter Pressure Drop Table (in. wg)

FILTER SIZE	CFM																		
	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300
20X20X1	0.05	0.07	0.08	0.1	0.12	0.13	0.14	0.15	-	-	-	-	-	-	-	-	-	-	-
24X30X1	-	-	-	-	0.05	0.6	0.07	0.07	0.08	0.09	0.1	-	-	-	-	-	-	-	-
24X36X1	-	-	-	-	-	-	-	0.06	0.07	0.07	0.08	0.09	0.09	0.10	0.11	0.12	0.13	0.14	0.14

Table 5—Electric Heat Pressure Drop Table
Small Cabinet: 024-036

	CFM											
	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600
5 kw	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.04	0.06	0.07
7.2 kw	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.03	0.05	0.07	0.09
10 kw	0.00	0.00	0.00	0.00	0.00	0.02	0.04	0.06	0.07	0.09	0.10	0.11
15 kw	0.00	0.00	0.00	0.02	0.04	0.06	0.08	0.10	0.12	0.14	0.16	0.18
20 kw	0.00	0.00	0.02	0.04	0.06	0.08	0.09	0.11	0.13	0.15	0.17	0.19

Table 6—Electric Heat Pressure Drop Table
Large Cabinet: 042-060

	CFM														
	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	2500
5kw	0.00	0.00	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	0.11	0.12
7.2 kw	0.00	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	0.11	0.12	0.13
10 kw	0.00	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	0.11	0.12	0.13
15 kw	0.00	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	0.11	0.12	0.13	0.14	0.15
20 kw	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	0.11	0.12	0.13	0.14	0.15	0.16

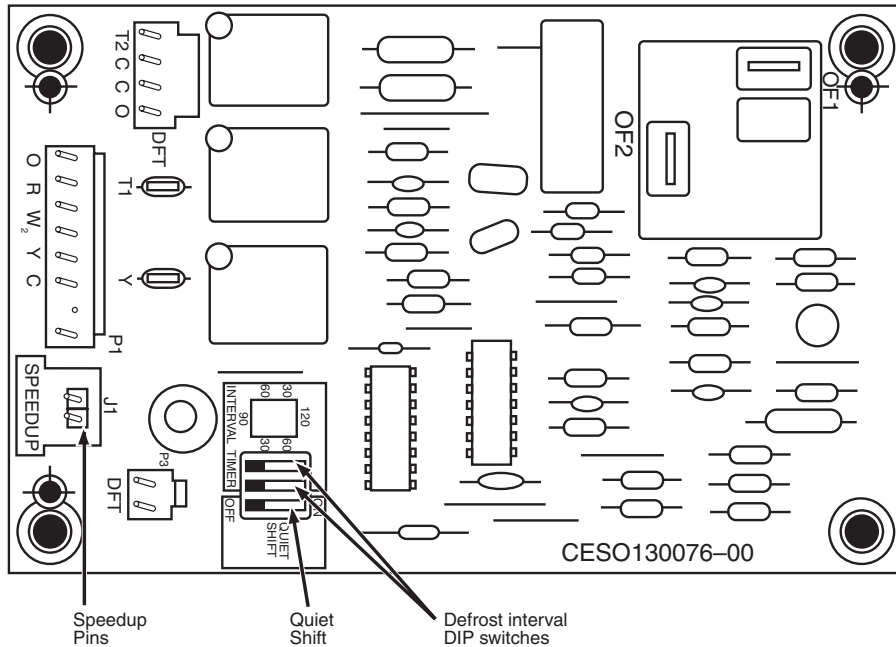


Fig. 23 - Defrost Control

MAINTENANCE

To ensure continuing high performance, and to minimize the possibility of premature equipment failure, periodic maintenance must be performed on this equipment. This heat pump unit should be inspected at least once each year by a qualified service person. To troubleshoot unit, refer to Table 8, Troubleshooting Chart.

NOTE TO EQUIPMENT OWNER: Consult your local dealer about the availability of a maintenance contract.

⚠ WARNING

PERSONAL INJURY AND UNIT DAMAGE HAZARD

Failure to follow this warning could result in personal injury or death and possible unit component damage.

The ability to properly perform maintenance on this equipment requires certain expertise, mechanical skills, tools and equipment. If you do not possess these, do not attempt to perform any maintenance on this equipment, other than those procedures recommended in the Owner's Manual.

⚠ WARNING

ELECTRICAL SHOCK HAZARD

Failure to follow these warnings could result in serious injury or death:

1. Turn off electrical power to the unit before performing any maintenance or service on this unit.
2. Use extreme caution when removing panels and parts.
3. Never place anything combustible either on or in contact with the unit.

⚠ CAUTION

UNIT OPERATION HAZARD

Failure to follow this caution may result in equipment damage or improper operation.

Errors made when reconnecting wires may cause improper and dangerous operation. Label all wires prior to disconnecting when servicing.

50CR

The minimum maintenance requirements for this equipment are as follows:

1. Inspect air filter(s) each month. Clean or replace when necessary.
2. Inspect indoor coil, drain pan, and condensate drain each cooling season for cleanliness. Clean when necessary.
3. Inspect blower motor and wheel for cleanliness each cooling season. Clean when necessary.
4. Check electrical connections for tightness and controls for proper operation each cooling season. Service when necessary.

Step 1—Air Filter

IMPORTANT: Never operate the unit without a suitable air filter in the return-air duct system. Always replace the filter with the same dimensional size and type as originally installed. See Table 1 for recommended filter sizes.

Inspect air filter(s) at least once each month and replace (throwaway-type) or clean (cleanable-type) at least twice during each cooling season and twice during the heating season, or whenever the filter becomes clogged with dust and lint.

Step 2—Indoor Blower and Motor

NOTE: All motors are pre-lubricated. Do not attempt to lubricate these motors.

For longer life, operating economy, and continuing efficiency, clean accumulated dirt and grease from the blower wheel and motor annually.

⚠ **WARNING**

ELECTRICAL SHOCK HAZARD

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

Disconnect and tag electrical power to the unit before cleaning and lubricating the blower motor and wheel.

Step 3—Outdoor Coil, Indoor Coil, and Condensate Drain Pan

Inspect the condenser coil, evaporator coil, and condensate drain pan at least once each year.

The coils are easily cleaned when dry; therefore, inspect and clean the coils either before or after each cooling season. Remove all obstructions, including weeds and shrubs, that interfere with the airflow through the condenser coil. Straighten bent fins with a fin comb. If coated with dirt or lint, clean the coils with a vacuum cleaner, using the soft brush attachment. Be careful not to bend the fins. If coated with oil or grease, clean the coils with a mild detergent and water solution. Rinse coils with clear water, using a garden hose. Be careful not to splash water on motors, insulation, wiring, or air filter(s). For best results, spray condenser coil fins from inside to outside the unit. On units with an outer and inner condenser coil, be sure to clean between the coils. Be sure to flush all dirt and debris from the unit base.

Inspect the drain pan and condensate drain line when inspecting the coils. Clean the drain pan and condensate drain by removing all foreign matter from the pan. Flush the pan and drain trough with clear water. Do not splash water on the insulation, motor, wiring, or air filter(s). If the drain trough is restricted, clear it with a “plumbers snake” or similar probe device.

Step 4—Outdoor Fan

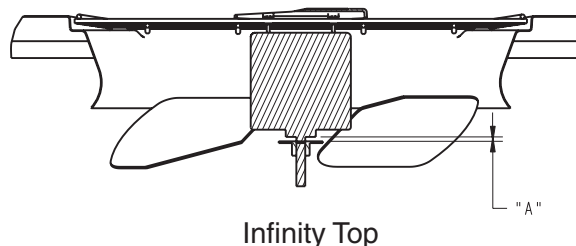
⚠ **CAUTION**

UNIT OPERATION HAZARD

Failure to follow this caution may result in damage to unit components.

Keep the condenser fan free from all obstructions to ensure proper cooling operation. Never place articles on top of the unit.

1. Remove 6 screws holding outdoor grille and motor to top cover.
2. Turn motor/grille assembly upside down on top cover to expose fan blade.
3. Inspect the fan blades for cracks or bends.
4. If fan needs to be removed, loosen setscrew and slide fan off motor shaft.
5. When replacing fan blade, position blade so that the hub is 1/8 in. away from the motor end (1/8 in. of motor shaft will be visible) (See Fig. 24).
6. Ensure that set screw engages the flat area on the motor shaft when tightening.
7. Replace grille.



A06035

UNIT SIZE	“A” DIMENSION
	Infinity
024	25
030	25
036	24
042	24
048	24
060	19

Fig. 24 - Fan Blade Clearance

Step 5—Electrical Controls and Wiring

Inspect and check the electrical controls and wiring annually. Be sure to turn off the electrical power to the unit.

Remove access panel to locate all the electrical controls and wiring. Check all electrical connections for tightness. Tighten all screw connections. If any smoky or burned connections are noticed, disassemble the connection, clean all the parts, re-strip the wire end and reassemble the connection properly and securely.

After inspecting the electrical controls and wiring, replace all the panels. Start the unit, and observe at least one complete cooling cycle to ensure proper operation. If discrepancies are observed in operating cycle, or if a suspected malfunction has occurred, check each electrical component with the proper electrical instrumentation. Refer to the unit wiring label when making these checks.

50CR

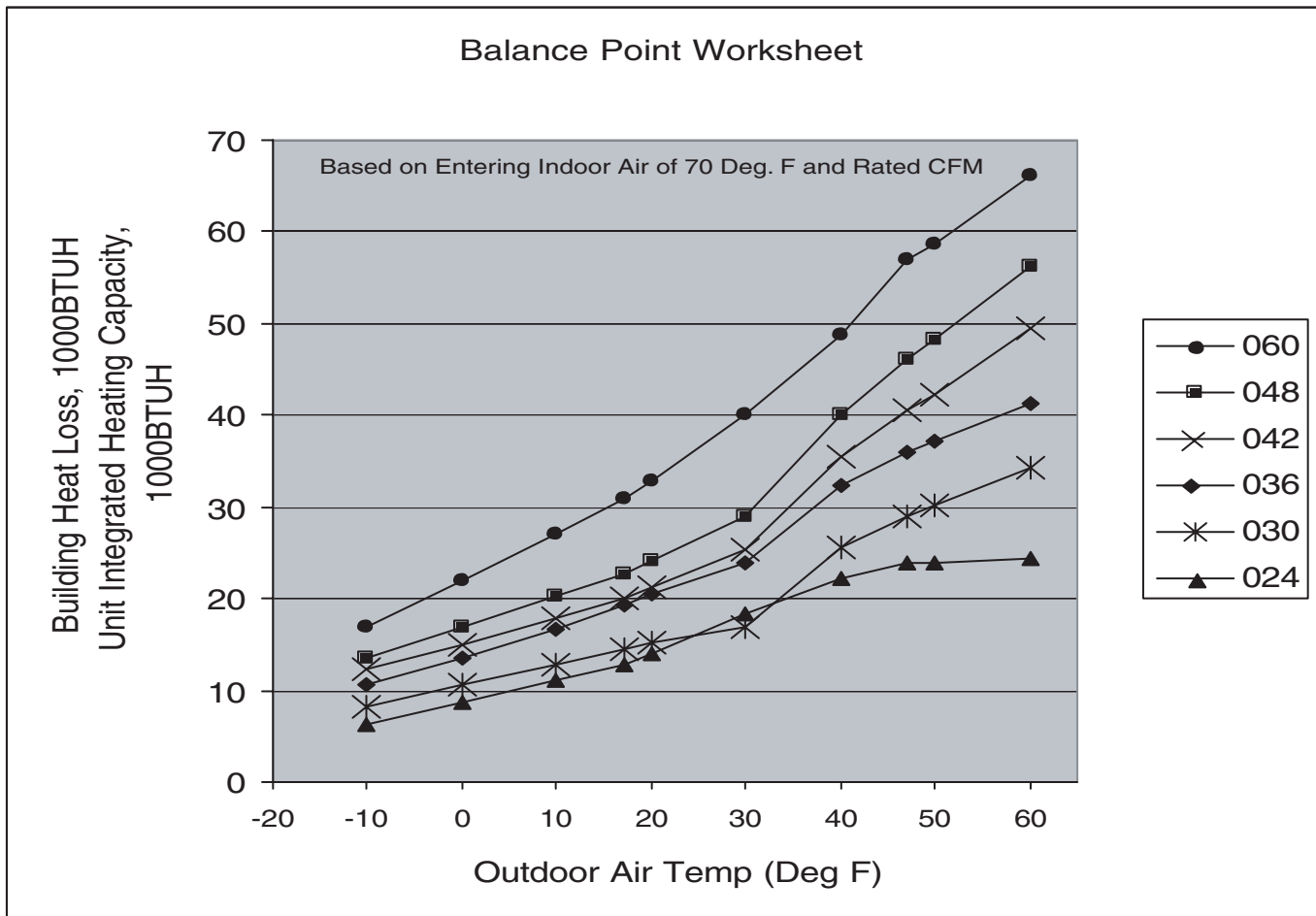


Fig. 25 - 50CR Balance Point Worksheet

C03008

Step 6—Refrigerant Circuit

Inspect all refrigerant tubing connections and the unit base for oil accumulation annually. Detecting oil generally indicates a refrigerant leak.

If oil is detected or if low performance is suspected, leak test all refrigerant tubing using an electronic leak detector, or liquid-soap solution. If a refrigerant leak is detected, refer to Check for Refrigerant Leaks section.

If no refrigerant leaks are found and low performance is suspected, refer to Checking and Adjusting Refrigerant Charge section.

Step 7—Indoor Airflow

The heating and/or cooling airflow does not require checking unless improper performance is suspected. If a problem exists, be sure that all supply- and return-air grilles are open and free from obstructions, and that the air filter is clean.

Step 8—Metering Devices-TXV & Accurater Piston

This unit uses 2 types of metering devices. The outdoor metering device is a fixed orifice and is contained in the brass-hex body in the liquid line feeding the outdoor coils. The indoor metering device is a TXV-type device.

Step 9—Pressure Switches

Pressure switches are protective devices wired into control circuit (low voltage). They shut off compressor if abnormally high or low pressures are present in the refrigeration circuit. These pressure switches are specifically designed to operate with Puron (R-410A) systems. R-22 pressure switches must not be used as replacements for the Puron (R-410A) system.

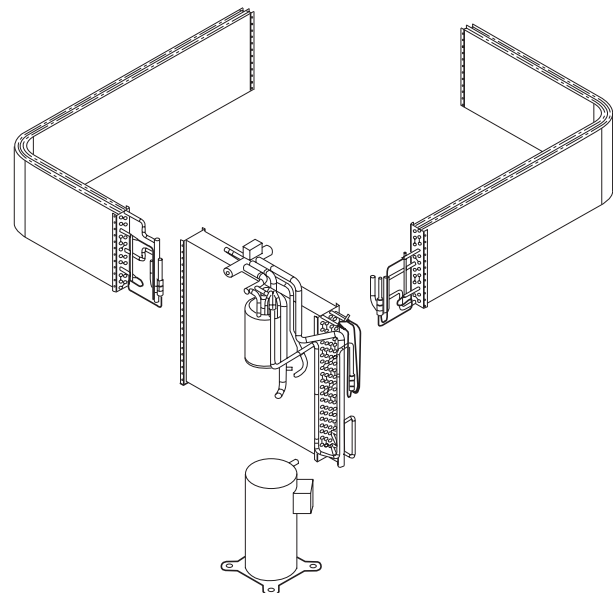


Fig. 26 - Refrigerant Circuit

C99097

Step 10—Loss-of-Charge Switch

This switch is located on the liquid line and protects against low suction pressures caused by such events as loss of charge, low

airflow across indoor coil, dirty filters, etc. It opens on a pressure drop at about 20 psig. If system pressure is above this, switch should be closed. To check switch:

1. Turn off all power to unit.
2. Disconnect leads on switch.
3. Apply ohm meter leads across switch. You should have continuity on a good switch.

NOTE: Because these switches are attached to refrigeration system under pressure, it is not advisable to remove this device for troubleshooting unless you are reasonably certain that a problem exists. If switch must be removed, remove and recover all system charge so that pressure gauges read 0 psi. Never open system without breaking vacuum with dry nitrogen.

Step 11—High-Pressure Switch

The high-pressure switch is located in the discharge line and protects against excessive condenser coil pressure. It opens at 650 psig.

High pressure may be caused by a dirty outdoor coil, failed fan motor, or outdoor air recirculation.

To check switch:

1. Turn off all power to unit.
2. Disconnect leads on switch.
3. Apply ohm meter leads across switch. You should have continuity on a good switch.

Step 12—Copeland Scroll Compressor (Puron Refrigerant)

The compressor used in this product is specifically designed to operate with Puron (R-410A) refrigerant and cannot be interchanged.

The compressor is an electrical (as well as mechanical) device. Exercise extreme caution when working near compressors. Power should be shut off, if possible, for most troubleshooting techniques. Refrigerants present additional safety hazards.

⚠ WARNING

EXPLOSION, FIRE, ELECTRICAL SHOCK HAZARD

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

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

The scroll compressor pumps refrigerant throughout the system by the interaction of a stationary and an orbiting scroll. The scroll compressor has no dynamic suction or discharge valves, and it is more tolerant of stresses caused by debris, liquid slugging, and flooded starts. The compressor is equipped with an anti-rotational device and an internal pressure-relief port. The anti-rotational device prevents the scroll from turning backwards and replaces the need for a cycle protector. The pressure-relief port is a safety device, designed to protect against extreme high pressure. The relief port has an operating range between 550 and 625 psi differential pressure.

The Copeland scroll compressor uses Mobil 3MA POE oil. This is the only oil allowed for oil recharge.

Step 13—Refrigerant System

This step covers the refrigerant system of the 50CR, including the compressor oil needed, servicing systems on roofs containing synthetic materials, the filter drier, and refrigerant charging.

REFRIGERANT

⚠ CAUTION

PERSONAL INJURY, UNIT OPERATION HAZARD

Failure to follow this caution may result in personal injury, equipment damage or improper operation.

This system uses Puron (R-410A) refrigerant which has higher operating pressures than R-22 and other refrigerants. No other refrigerant may be used in this system. Gauge set, hoses, and recovery system must be designed to handle Puron. If you are unsure, consult the equipment manufacturer.

COMPRESSOR OIL

The compressor in this system uses a polyolester (POE) oil, Mobil 3MA POE. This oil is extremely hygroscopic, meaning it absorbs water readily. POE oils can absorb 15 times as much water as other oils designed for HCFC and CFC refrigerants. Take all necessary precautions to avoid exposure of the oil to the atmosphere.

SERVICING SYSTEMS ON ROOFS WITH SYNTHETIC MATERIALS

POE (polyolester) compressor lubricants are known to cause long term damage to some synthetic roofing materials.

Exposure, even if immediately cleaned up, may cause embrittlement (leading to cracking) to occur in one year or more. When performing any service that may risk exposure of compressor oil to the roof, take appropriate precautions to protect roofing. Procedures which risk oil leakage include, but are not limited to, compressor replacement, repairing refrigerant leaks, and replacing refrigerant components such as filter drier, pressure switch, metering device, coil, accumulator, or reversing valve.

Synthetic Roof Precautionary Procedure

1. Cover extended roof working area with an impermeable polyethylene (plastic) drip cloth or tarp. Cover an approximate 10 X 10 ft area.
2. Cover area in front of the unit service panel with a terry cloth shop towel to absorb lubricant spills and prevent run-offs, and protect drop cloth from tears caused by tools or components.
3. Place terry cloth shop towel inside unit immediately under component(s) to be serviced and prevent lubricant run-offs through the louvered openings in the unit base.
4. Perform required service.
5. Remove and dispose of any oil-contaminated material per local codes.

LIQUID-LINE FILTER DRIER

The biflow filter drier is specifically designed to operate with Puron. Use only factory-authorized components. Filter drier must be replaced whenever the refrigerant system is opened. When removing a filter drier, use a tubing cutter to cut the drier from the system. Do not unsweat a filter drier from the system. Heat from unsweating will release moisture and contaminants from drier into system.

PURON (R-410A) REFRIGERANT CHARGING

Refer to unit information plate and charging chart. **Some R-410A refrigerant cylinders contain a dip tube to allow liquid refrigerant to flow from cylinder in upright position.** For cylinders equipped with a dip tube, charge Puron® units with cylinder in upright position and a commercial metering device in manifold hose. Charge refrigerant into suction line.

50CR

Step 14—System Information

LOSS-OF-CHARGE SWITCH

The loss of charge switch is a protective device wired into control circuit (low voltage). It shuts off the compressor if abnormally low pressures are present in the refrigeration circuit.

NOTE: Because these switches are attached to refrigeration system under pressure, it is not advisable to remove this device for troubleshooting unless you are reasonably certain that a problem exists. If switch must be removed, remove and recover all system charge so that pressure gauges read 0 psi. Never open system without breaking vacuum with dry nitrogen.

CHECK DEFROST THERMOSTAT

There is a liquid header with a brass distributor and feeder tube going into outdoor coil. At the end of one of the feeder tubes, there is a 3/8-in. OD stub tube approximately 3 in. long (See Fig. 27). The defrost thermostat should be located on stub tube.

NOTE: There is only one stub tube used with liquid header, and on most units it is the bottom circuit.

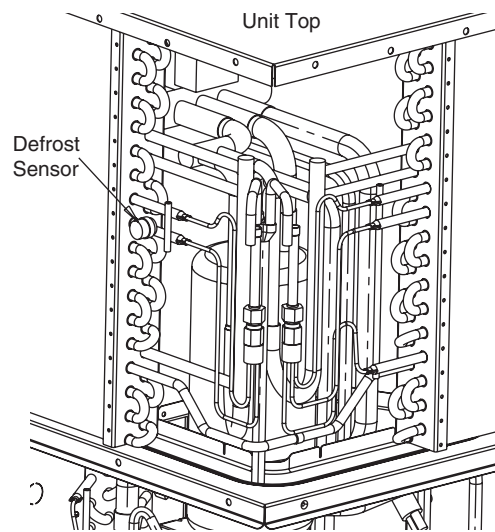
The defrost thermostat signals heat pump that conditions are right for defrost or that conditions have changed to terminate defrost. It is a thermally-actuated switch clamped to outdoor coil to sense its temperature. Normal temperature range is closed at $30^{\circ} \pm 3^{\circ}\text{F}$ and open at $80^{\circ} \pm 5^{\circ}\text{F}$.

TROUBLESHOOTING

Refer to the Cooling and Heating Troubleshooting Chart (Table 7) for troubleshooting information.

START-UP CHECKLIST

Use the Start-Up Checklist at the back of this manual.



Detail A

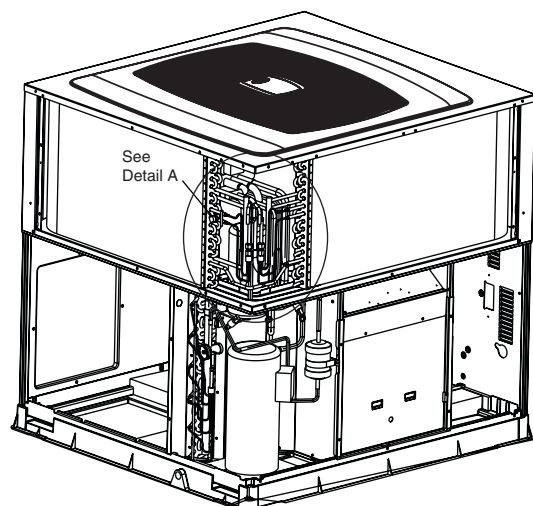


Fig. 27 - Defrost Sensor Location

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HEAT PUMP WITH PURON

REFRIGERATION SECTION QUICK-REFERENCE GUIDE

Puron refrigerant operates at 50–70 percent higher pressures than R-22. Be sure that servicing equipment and replacement components are designed to operate with Puron. Puron refrigerant cylinders are rose colored.

- Puron refrigerant cylinders manufactured prior to March 1, 1999, have a dip tube that allows liquid to flow out of cylinder in upright position. Cylinders manufactured March 1, 1999 and later DO NOT have a dip tube and MUST be positioned upside down to allow liquid to flow.
- Recovery cylinder service pressure rating must be 400 psig. DOT 4BA400 or DOT BW400.
- Puron systems should be charged with liquid refrigerant. Use a commercial-type metering device in the manifold hose.
- Manifold sets should be 750 psig high side and 200 psig low side with 520 psig low side retard.
- Use hoses with 750 psig service pressure rating.
- Leak detectors should be designed to detect HFC refrigerant.
- Puron, as with other HFCs, is only compatible with POE oils.
- Vacuum pumps will not remove moisture from oil.
- Only use factory-specified liquid-line filter driers with rated working pressures no less than 600 psig.
- Do not install a suction-line filter drier in liquid line.
- POE oils absorb moisture rapidly. Do not expose oil to atmosphere.
- POE oils may cause damage to certain plastics and roofing materials.
- Wrap all filter driers and service valves with wet cloth when brazing.
- A Puron liquid-line filter drier is required on every unit.
- Do not use an R-22 TXV.
- **Never** open system to atmosphere while it is under a vacuum.
- When system must be opened for service, break vacuum with dry nitrogen and replace filter driers.
- Do not vent Puron into the atmosphere.
- Observe all **warnings, cautions, and bold** text.
- Do not leave Puron suction line driers in place for more than 72 hrs.

Table 7—Troubleshooting Chart

SYMPTOM	CAUSE	REMEDY
Compressor and outdoor fan will not start	Power failure	Call power company
	Fuse blown or circuit breaker tripped	Replace fuse or reset circuit breaker
	Defective contactor, transformer, control relay, defrost board, or high-pressure, loss-of-charge or low-pressure switch	Replace component
	Insufficient line voltage	Determine cause and correct
	Incorrect or faulty wiring	Check wiring diagram and rewire correctly
	User Interface setting too low/too high	Reset UI setting
	Units have a 5-minute time delay	DO NOT bypass this compressor time delay—wait for 5 minutes until time-delay relay is de-energized
Compressor will not start but condenser fan runs	Faulty wiring or circuit Loose connections in compressor	Check wiring and repair or replace
	Compressor motor burned out, seized, or internal overload open	Determine cause Replace compressor
	Defective run capacitor, overload, or PTC (positive temperature coefficient) thermistor	Determine cause and replace
	One leg of 3-phase power dead	Replace fuse or reset circuit breaker Determine cause
	Low input voltage (20 percent low)	Determine cause and correct
Three-phase scroll compressor (size 030-060 unit) has a low pressure differential	Scroll compressor is rotating in the wrong direction	Correct the direction of rotation by reversing the 3-phase power leads to the unit
Compressor cycles (other than normally satisfying) cooling/heating calls	Refrigerant overcharge or undercharge	Recover refrigerant, evacuate system, and recharge to capacities shown on rating plate
	Defective compressor	Replace and determine cause
	Insufficient line voltage	Determine cause and correct
	Blocked outdoor coil	Determine cause and correct
	Defective run/start capacitor, overload or start relay	Determine cause and replace
	Faulty outdoor fan motor or capacitor	Replace
	Damaged reversing valve	Determine cause and correct
	Restriction in refrigerant system	Locate restriction and remove
Compressor operates continuously	Dirty air filter	Replace filter
	Unit undersized for load	Decrease load or increase unit size
	UI temperature set too low/too high	Reset UI setting
	Low refrigerant charge	Locate leak, repair, and recharge
	Frosted coil with incorrect defrost operation	Check defrost time settings Reset as necessary Check defrost temperature switch Replace as necessary
	Air in system	Recover refrigerant, evacuate system, and recharge
	Outdoor coil dirty or restricted	Clean coil or remove restriction
	Dirty air filter	Replace filter
Excessive head pressure	Dirty indoor or outdoor coil	Clean coil
	Refrigerant overcharged	Recover excess refrigerant
	Air in system	Recover refrigerant, evacuate system, and recharge
	(Heat) Indoor air restricted or recirculating	Determine cause and correct
	Indoor or outdoor air restricted or air short-cycling	Determine cause and correct

(Continued next page)

50CR

Table 7—Troubleshooting Chart (Cont'd)

SYMPTOM	CAUSE	REMEDY
Head pressure too low	Low refrigerant charge	Check for leaks, repair and recharge
	Restriction in liquid tube	Remove restriction
Excessive suction pressure	(Cool) High Heat load	Check for source and eliminate
	Reversing valve hung up or leaking internally	Replace valve
	Refrigerant overcharged	Recover excess refrigerant
Suction pressure too low	(Cool) Dirty air filter	Replace filter
	(Heat) Outdoor coil frosted	Move timer on control board to 30 minutes between defrost cycles
	Low refrigerant charge	Check for leaks, repair and recharge
	Metering device or low side restricted	Remove source of restriction
	(Cool) Insufficient coil airflow	Increase air quantity Check filter—replace if necessary
	(Cool) Temperature too low in conditioned area	Reset UI setting
	(Cool) Outdoor ambient below 55°F	Install low-ambient kit
	Filter drier restricted	Replace
Compressor runs but outdoor fan does not	NC (normally closed) contacts on defrost board open	Check condition of relay on board Replace if necessary
	Blower wheel not secured to shaft	Properly tighten blower wheel to shaft
IFM does not run	Insufficient voltage at motor	Determine cause and correct
	Power connectors not properly sealed	Connectors should snap easily; do not force
	Water dripping into motor	Verify proper drip loops in connector wires
IFM operation is intermittent	Connectors not firmly sealed	Gently pull wires individually to be sure they are crimped into the housing

IFM—Indoor Fan Motor

50CR

START-UP CHECKLIST
(Remove and Store in Job File)

I. Preliminary Information

MODEL NO.: _____
SERIAL NO.: _____
DATE: _____
TECHNICIAN: _____

II. PRE-START-UP (Insert checkmark in box as each item is completed)

- VERIFY THAT ALL PACKING MATERIALS HAVE BEEN REMOVED FROM UNIT
- REMOVE ALL SHIPPING HOLD DOWN BOLTS AND BRACKETS PER INSTALLATION INSTRUCTIONS
- CHECK ALL ELECTRICAL CONNECTIONS AND TERMINALS FOR TIGHTNESS
- CHECK GAS PIPING FOR LEAKS (WHERE APPLICABLE)
- CHECK THAT INDOOR (EVAPORATOR) AIR FILTER IS CLEAN AND IN PLACE
- VERIFY THAT UNIT INSTALLATION IS LEVEL
- CHECK FAN WHEEL, AND PROPELLER FOR LOCATION IN HOUSING/ORIFICE AND SETSCREW TIGHTNESS
- MAKE SURE THAT - (If Applicable) ON 060 SIZE PURON HEATPUMP ONLY, THE TWO WIRE TIES FASTEN TO THE OUTDOOR COILS AND REVERSING VALVE/ACCUMULATOR HAVE BEEN REMOVED

III. START-UP

ELECTRICAL

SUPPLY VOLTAGE _____
COMPRESSOR AMPS _____
INDOOR (EVAPORATOR) FAN AMPS _____

TEMPERATURES

OUTDOOR (CONDENSER) AIR TEMPERATURE _____ DB
RETURN-AIR TEMPERATURE _____ DB _____ WB
COOLING SUPPLY AIR _____ DB _____ WB
HEAT PUMP SUPPLY AIR _____
ELECTRIC HEAT SUPPLY AIR _____

PRESSURES

REFRIGERANT SUCTION _____ PSIG SUCTION LINE TEMP* _____
REFRIGERANT DISCHARGE _____ PSIG DISCHARGE TEMP† _____
 VERIFY REFRIGERANT CHARGE USING CHARGING CHARTS

*Measured at suction inlet to compressor

†Measured at liquid line leaving condenser.

50CR

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