

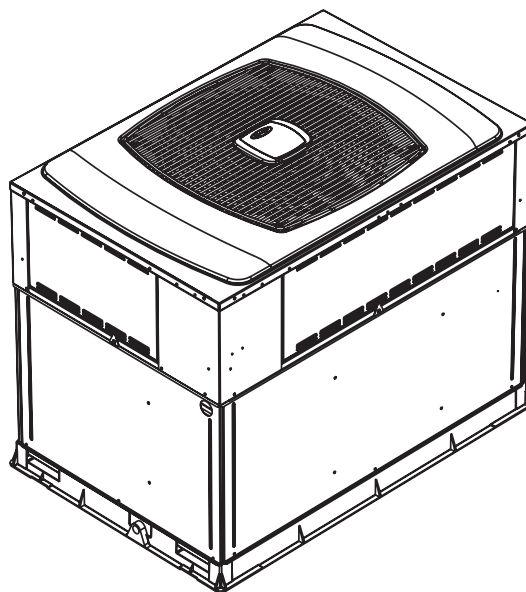
Installation Instructions

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.

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A05307

Fig. 1 - Unit 48CE

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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 48CE unit (see Fig. 1) is a fully self-contained, combination Category I gas heating/electric cooling unit designed for outdoor installation (See Fig. 5 and 6 for unit dimensions). All unit sizes have return and discharge openings for both horizontal and downflow configurations, and are factory shipped with all downflow duct openings covered. Units may be installed either on a rooftop, a cement slab, or directly on the ground if local codes permit (See Fig. 7 for roof curb dimensions).

Models with an N in the fifth position of the model number are dedicated Low NOx units designed for California installations. These models meet the California maximum oxides of nitrogen (NOx) emissions requirements of 40 nanograms/joule or less as shipped from the factory and must be installed in California Air Quality Management Districts or any other regions in North America where a Low NOx rule exists.

NOTE: Low NOx requirements apply only to natural gas installations.

RECEIVING AND INSTALLATION

Step 1—Check Equipment

IDENTIFY UNIT

The unit model number and serial number are stamped on the unit identification 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

ROOF CURB

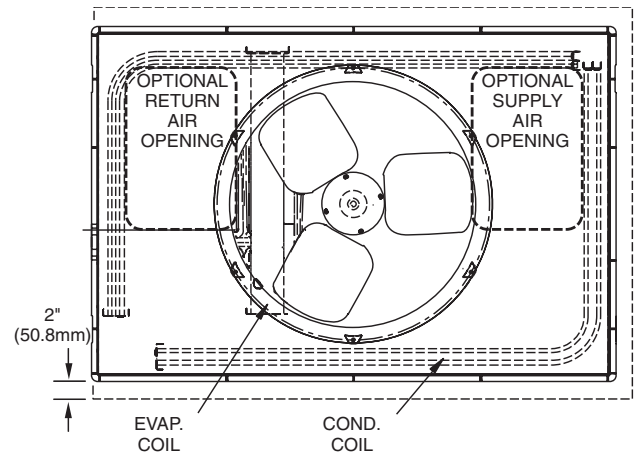
Install accessory roof curb in accordance with instructions shipped with curb (See Fig. 2). Install insulation, cant strips, roofing, and flashing. Ductwork must be attached to curb.

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. 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 (See Fig. 7). The slab should extend approximately 2 in. beyond the casing on all 4 sides of the unit. Do not secure the unit to the slab *except* when required by local codes.



C99014

Fig. 2 - Slab Mounting Details

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—Field Fabricate Ductwork

Secure all ducts to roof curb and building structure on vertical discharge units. Do not connect ductwork to unit. For horizontal applications, unit is provided with flanges on the horizontal openings. All ductwork should be secured to the flanges. Insulate and weatherproof all external ductwork, joints, and roof openings with counter flashing and mastic in accordance with applicable codes.

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

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

A minimum clearance is not required around ductwork. Cabinet return-air static shall not exceed -.25 in. wg.

Step 4—Provide Clearances

The required minimum operating and service clearances are shown in Fig. 5 and 6. Adequate combustion, ventilation and condenser air must be provided in accordance with section 5.3, Air for Combustion and Ventilation, of the National Fuel Gas Code ANSI (American National Standards Institute) Z223.1 or applicable provisions of local building code. In Canada, follow sections 7.2, 7.3, or 7.4 or Can/CGA. (Canadian Gas Association) B149 Installation Codes or applicable provisions of local building code.

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.

The condenser fan pulls air through the condenser coil and discharges it through the top cover. Be sure that the fan discharge does not recirculate to the condenser 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.

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.

Step 5—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

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.

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

UNIT FALLING HAZARD

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

Never stand beneath rigged units or lift over people.

⚠ 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 (if not already installed)

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

Rigging/Lifting of Unit

1. Bend top of brackets down approximately 30 degrees from the corner posts (See Fig. 4).
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. 4).
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.

After the unit is placed on the roof curb or mounting pad, remove the top crating. On 48CE060 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.

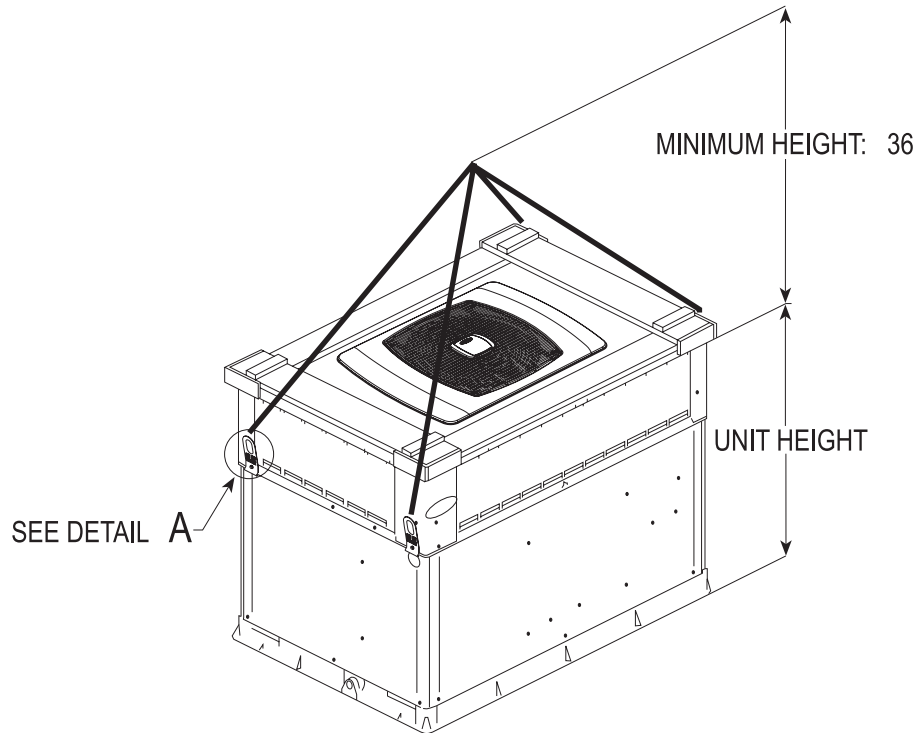
48CE



DETAIL A

Fig. 3 - Rigging Bracket Under Unit Rain Lip

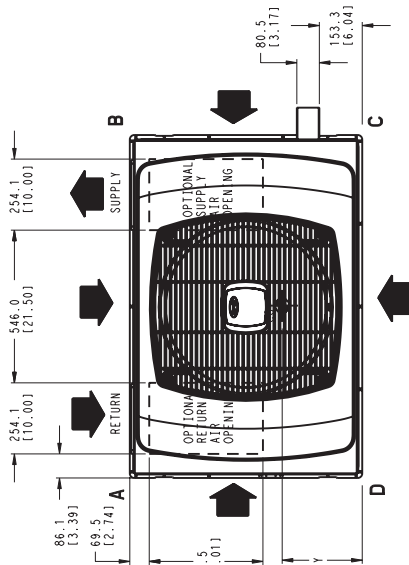
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UNIT SIZE	MAXIMUM SHIPPING WEIGHT	
	Lb	Kg
48CE024	384	174
48CE030	384	174
48CE036	406	184
48CE042	437	198
48CE048	487	220
48CE060	537	243

Fig. 4 - Suggested Rigging



TOP VIEW

UNIT	ELECTRICAL CHARACTERISTICS		UNIT WT. LBS. KG.	UNIT HEIGHT "A"	CENTER OF GRAVITY MM/IN		
					X	Y	Z
48CE024040/060	208/230-1-60	362 164.2	991.1	991.1	508.0	489.0	447.0
48CE030040/060	208/230-1-60	362 164.2	991.1	991.1	508.0	489.0	447.0
48CE036060/090	208/230-3-60	384 174.2	1041.9	1041.9	508.0	355.6	330.2

CORNER WEIGHT LBS./KG.			
A	B	C	D
024	78/35.4	72/32.7	134/60.8
030	78/35.4	72/32.7	134/60.8
036	79/35.8	89/40.4	144/65.3

REQUIRED CLEARANCES TO COMBUSTIBLE MATL.

TOP OF UNIT	MILLIMETERS [IN]
DUCT SIDE OF UNIT	355.6 [14.0]
DUCT OPPOSITE DUCTS	355.6 [14.0]
BOTTOM OF UNIT	12.7 [0.50]
ELECTRIC HEAT PANEL	914.4 [36.00]

NEC REQUIRED CLEARANCES

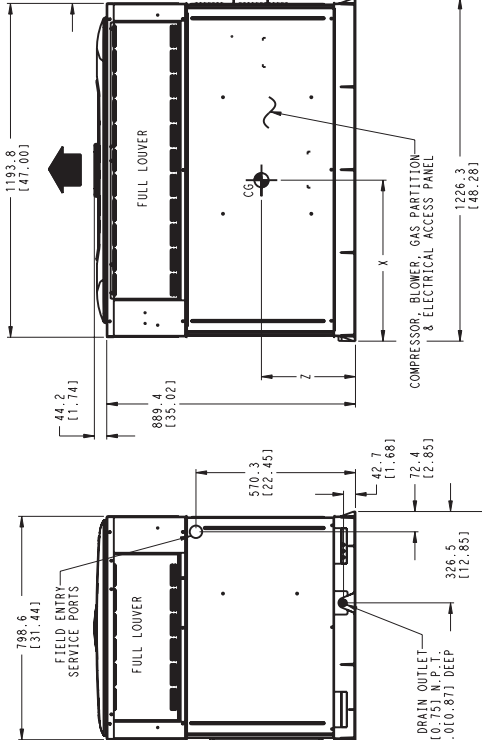
BETWEEN UNITS, POWER ENTRY SIDE	MILLIMETERS [IN]
UNIT AND UNGROUNDED SURFACES, POWER ENTRY SIDE	1066.8 [42.00]
UNIT AND BLOCK OR CONCRETE WALLS AND OTHER GROUNDED SURFACES, POWER ENTRY SIDE	914.0 [36.00]

REQUIRED CLEARANCE FOR OPERATION AND SERVICING

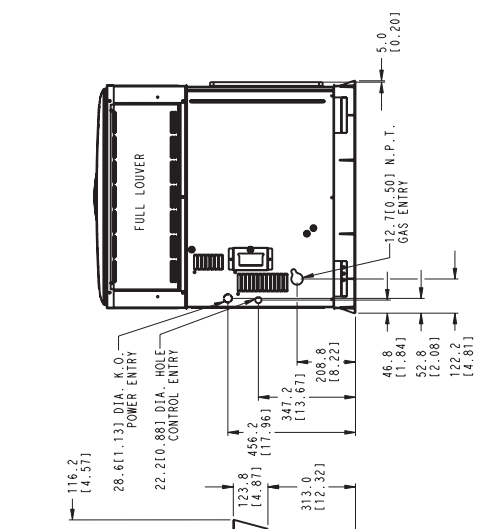
EVAP. COIL ACCESS SIDE	MILLIMETERS [IN]
POWER ENTRY SIDE	914.0 [36.00]
(EXCEPT FOR NEC REQUIREMENTS)	914.0 [36.00]
DUCT OPPOSITE DUCTS	914.0 [36.00]
DUCT PANEL	304.8 [12.00]

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

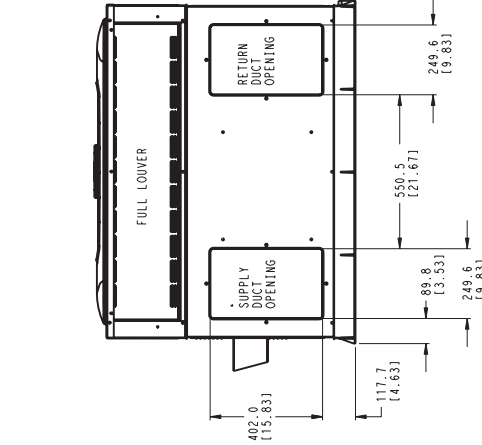
DIMENSIONS IN () ARE IN INCHES



FRONT VIEW



RIGHT SIDE VIEW



REAR VIEW

Fig. 5 - 48CE024-036 Unit Dimensions

A06019



Fig. 6 - 48CE042-060 Unit Dimensions

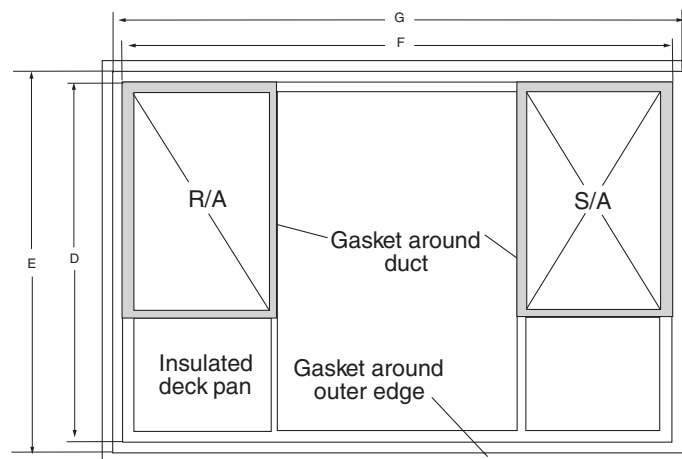
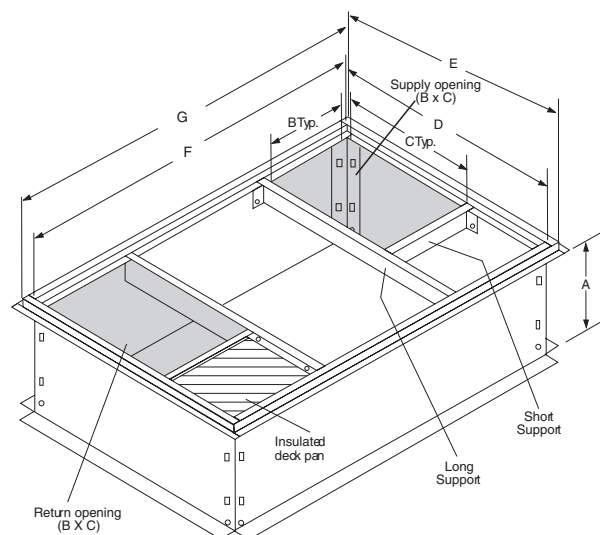
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Roof Curb for Small Cabinet

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.



A05165

UNIT SIZE	ODS CATALOG NUMBER	A IN. (MM)	B IN. (MM)	C IN. (MM)	D IN. (MM)
48CE024-036	CPRFCURB006A00	8 (203)	11 (279)	16-1/2 (419)	28-3/4 (730)
	CPRFCURB007A00	14 (356)	11 (279)	16-1/2 (419)	28-3/4 (730)
48CE042-060	CPRFCURB008A00	8 (203)	16-3/16 (411)	17-3/8 (441)	40-1/4 (1022)
	CPRFCURB009A00	14 (356)	16-3/16 (411)	17-3/8 (441)	40-1/4 (1022)

NOTES:

1. Roof curb must be set up for unit being installed.
2. Seal strip must be applied, as required, to unit being installed.
3. Dimension in () are in millimeters.
4. Roof curb is made of 16-gauge steel.
5. Table lists only the dimensions, per part number, that have changed.
6. Attach ductwork to curb (flanges of duct rest on curb).
7. Insulated panels: 1-in. thick fiberglass 1 lb. density.
8. Dimensions are in inches.
9. 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. 7 - Roof Curb Dimensions

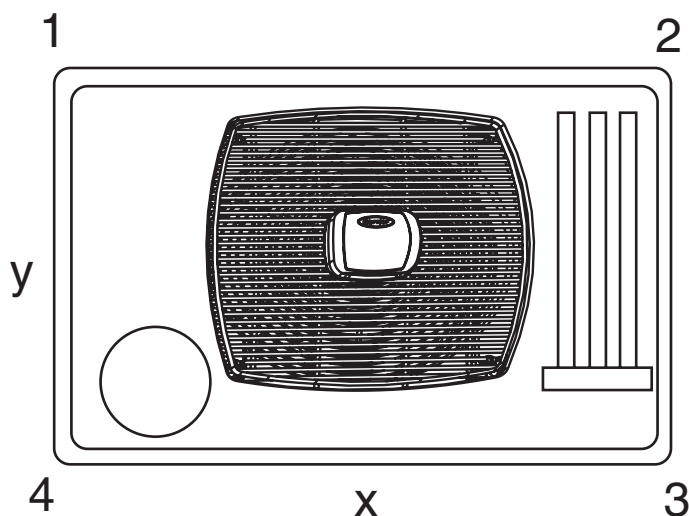


Fig. 8 - Corner Weights

A06129

Model 48CE	CORNER WEIGHTS (SMALL CABINET)				Model 48CE	CORNER WEIGHTS (LARGE CABINET)			
	Unit	024	030	036		Unit	042	048	060
	Total Weight	362	362	384		Total Weight	415	465	515
	Corner Weight 1	78	78	79		Corner Weight 1	91	103	113
	Corner Weight 2	78	78	89		Corner Weight 2	65	77	82
	Corner Weight 3	72	72	72		Corner Weight 3	111	123	138
	Corner Weight 4	134	134	144		Corner Weight 4	148	162	182

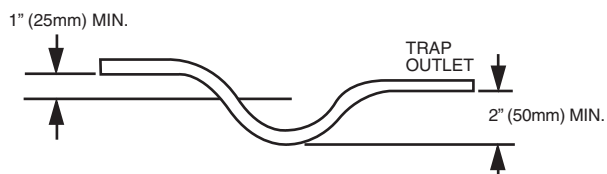
Step 6—Connect Condensate Drain

NOTE: When installing condensate drain connection be sure to comply with local codes and restrictions.

Model 48CE disposes of condensate water through a 3/4 in. NPT fitting which exits through the compressor access panel (See Fig. 5 and 6 for location).

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 2" 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 (See Fig. 9). Prime the trap with water. When using a gravel apron, make sure it slopes away from the unit.

Connect a drain tube - using a minimum of 3/4-in. PVC or 3/4-in. copper pipe (all field-supplied) - at the outlet end of the 2-in. trap. Do not undersize the tube. Pitch the drain tube downward at a slope of at least 1-in. for every 10 ft of horizontal run. Be sure to check the drain tube for leaks.



C99013

Fig. 9 - Condensate Trap

Step 7—Install Flue Hood

⚠ WARNING

CARBON MONOXIDE POISONING HAZARD

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

The venting system is designed to ensure proper venting. The flue hood assembly must be installed as indicated in this section of the unit installation instructions.

Install the flue hood as follows:

1. This installation must conform with local building codes and with the National Fuel Gas Code (NFGC), ANSI Z223.1 (in Canada, CAN/CGA B149.1, and B149.2) or NFPA (National Fire Protection Association) latest revision. Refer to Provincial and local plumbing or wastewater codes and other applicable local codes.
2. Remove flue hood from shipping location (inside the return section of the blower compartment—See Fig. 11). Remove the return duct cover to locate the flue hood. Place flue hood assembly over flue panel. Orient screw holes in flue hood with holes in the flue panel.
3. Secure flue hood to flue panel by inserting a single screw on the right side and the left side of the hood.

Table 1—Physical Data - Unit 48CE

UNIT SIZE	024040	024060	030040	030060	036060	036090	042060	042090
NOMINAL CAPACITY (ton)	2	2	2–1/2	2–1/2	3	3	3–1/2	3–1/2
OPERATING WEIGHT (lb.)	362	362	362	362	384	384	415	415
COMPRESSORS	Scroll							
Quantity	1							
REFRIGERANT (R–410A)	7.3	7.3	8.0	8.0	9.5	9.5	10.7	10.7
Quantity (lb.)								
REFRIGERANT METERING DEVICE	TXV							
CONDENSER COIL	2...21	2...21	2...21	2...21	2...21	2...21	2...21	2...21
Rows...Fins/in.	11.95	11.95	11.95	11.95	13.7	13.7	15.4	15.4
Face Area (sq ft)								
CONDENSER FAN	2700	2700	2700	2700	2800	2800	2800	2800
Nominal Cfm	22 1/8	22 1/8	22 1/8	22 1/8	22 1/8	22 1/8	22 1/8	22 1/8
Diameter (in.)	(825)	(825)	(825)	(825)	(825)	(825)	(825)	(825)
Motor Hp (Rpm)								
EVAPORATOR COIL	3...15	3...15	3...15	3...15	4...15	4...15	3...15	3...15
Rows...Fins/in.	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
Face Area (sq ft)								
INDOOR BLOWER	Variable based on Comfort Roll back (see User Interface instructions for more information).							
Nominal Airflow (Cfm)								
Comfort								
Efficiency								
Max								
Size (in.)	700	700	875	875	1050	1050	1225	1225
Motor HP (RPM)	800	800	1000	1000	1200	1200	1400	1400
	10x10	10x10	10x10	10x10	11x10	11x10	11x10	11x10
	1/2	1/2	1/2	1/2	3/4	3/4	3/4	3/4
FURNACE SECTION*	2...44	2...38	2...44	2...38	2...38	3...38	2...38	2...38
Burner Orifice No. (Qty...Drill Size)								
Natural Gas	2...50	2...46	2...50	2...46	2...46	3...46	2...46	2...46
Burner Orifice No. (Qty...Drill Size)								
Propane Gas								
HIGH–PRESSURE SWITCH (psig)	650 +/– 15 420 +/– 25							
Cut–out								
Reset (Auto)								
LOSS–OF–CHARGE /	20 +/– 5 45 +/– 10							
LOW–PRESSURE SWITCH								
(Liquid Line) (psig)								
Cut–out								
Reset (auto)								
RETURN–AIR FILTERS (in.)†	20x24x1	20x24x1	20x24x1	20x24x1	24x30x1	24x30x1	24x36x1	24x36x1
Throwaway								

Continued next page.

Table 1—Physical Data Con't - Unit 48CE

UNIT SIZE	048090	048115	048130	060090	060115	060130
NOMINAL CAPACITY (ton)	4	4	4	5	5	5
OPERATING WEIGHT (lb.)	465	465	465	515	515	515
COMPRESSORS	Scroll					
Quantity	1					
REFRIGERANT (R-410A) Quantity (lb.)	11.25	11.25	11.25	13.5	13.5	13.5
REFRIGERANT METERING DEVICE	TXV					
CONDENSER FAN Nominal Cfm Diameter (in.) Motor Hp (Rpm)	3300 22 1/4 (1100)	3300 22 1/4 (1100)	3300 22 1/4 (1100)	3300 22 1/4 (1100)	3300 22 1/4 (1100)	3300 22 1/4 (1100)
CONDENSER COIL Rows...Fins/in. Face Area (sq ft)	2...21 17.4	2...21 17.4	2...21 17.4	2...21 19.3	2...21 19.3	2...21 19.3
EVAPORATOR COIL Rows...Fins/in. Face Area (sq ft)	4...15 4.7	4...15 4.7	4...15 4.7	4...17 5.7	4...17 5.7	4...17 5.7
INDOOR BLOWER Nominal Airflow (Cfm)	Variable based on Comfort Roll back (see User Interface instructions for more information).					
Comfort						
Efficiency	1400	1400	1400	1750	1750	1750
Max	1600	1600	1600	2000	2000	2000
Size (In.)	11x10	11x10	11x10	11x10	11x10	11x10
Motor HP (RPM)	3/4	3/4	3/4	1	1	1
FURNACE SECTION*						
Burner Orifice No. (Qty...Drill Size) Natural Gas	3...38	3...33	3...31	3...38	3...33	3...31
Burner Orifice No. (Qty...Drill Size) Propane Gas	3...46	3...42	3...41	3...46	3...42	3...41
HIGH-PRESSURE SWITCH (psig) Cut-out Reset (Auto)	650 +/-15 420 +/-25					
LOSS-OF-CHARGE / LOW-PRESSURE SWITCH (Liquid Line) (psig) Cut-out Reset (auto)	20 +/-5 45 +/-10					
RETURN-AIR FILTERS (in.)† Throwaway	24x36x1	24x36x1	24x36x1	24x36x1	24x36x1	24x36x1

*Based on altitude of 0 to 2000 ft.

† 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.

Table 2—Maximum Gas Flow Capacity*

NOMINAL IRON PIPE SIZE (IN.)	INTERNAL DIAMETER (IN.)	LENGTH OF PIPE (FT)†													
		10	20	30	40	50	60	70	80	90	100	125	150	175	200
1/2	.622	175	120	97	82	73	66	61	57	53	50	44	40	—	—
3/4	.824	360	250	200	170	151	138	125	118	110	103	93	84	77	72
1	1.049	680	465	375	320	285	260	240	220	205	195	175	160	145	135
1-1/4	1.380	1400	950	770	600	580	530	490	460	430	400	360	325	300	280
1-1/2	1.610	2100	1460	1180	990	900	810	750	690	650	620	550	500	460	430

*Capacity of pipe in cu ft of gas per hr for gas pressure of 0.5 psig or less. Pressure drop of 0.5-in. wg (based on a 0.60 specific gravity gas). Refer to Table, National Fire Protection Association NFPA 54.

† This length includes an ordinary number of fittings.

Step 8—Install Gas Piping

The gas supply pipe enters the unit through the access hole provided. The gas connection to the unit is made to the 1/2-in. FPT gas inlet on the gas valve.

Install a gas supply line that runs to the heating section. Refer to Table 2 and the NFGC for gas pipe sizing. Do not use cast-iron pipe. It is recommended that a black iron pipe is used. Check the local utility for recommendations concerning existing lines. Size gas supply piping for 0.5 in. wg maximum pressure drop. Never use pipe smaller than the 1/2-in. FPT gas inlet on the unit gas valve.

For natural gas applications, the gas pressure at unit gas connection must not be less than 4.0 in. wg or greater than 13 in. wg while the unit is operating. For propane applications, the gas pressure must not be less than 7.0 in. wg or greater than 13 in. wg at the unit connection.

A 1/8-in. NPT plugged tapping, accessible for test gauge connection, must be installed immediately upstream of the gas supply connection to the gas valve.

When installing the gas supply line, observe local codes pertaining to gas pipe installations. Refer to the NFGC ANSI Z223.1-2005 NFPA latest edition (in Canada, CAN/CGA B149.1). In the absence of local building codes, adhere to the following pertinent recommendations:

1. Avoid low spots in long runs of pipe. Grade all pipe 1/4 in. for every 15 ft of length to prevent traps. Grade all horizontal runs downward to risers. Use risers to connect to heating section and to meter.
2. Protect all segments of piping system against physical and thermal damage. Support all piping with appropriate straps, hangers, etc. Use a minimum of one hanger every 6 ft. For pipe sizes larger than 1/2 in., follow recommendations of national codes.
3. Apply joint compound (pipe dope) sparingly and only to male threads of joint when making pipe connections. Use only pipe dope that is resistant to action of liquefied petroleum gases as specified by local and/or national codes. Never use Teflon tape.
4. Install sediment trap in riser leading to heating section (See Fig. 10). This drip leg functions as a trap for dirt and condensate.
5. Install an accessible, external, manual main shutoff valve in gas supply pipe within 6 ft of heating section.
6. Install ground-joint union close to heating section between unit manual shutoff and external manual main shut-off valve.
7. Pressure test all gas piping in accordance with local and national plumbing and gas codes before connecting piping to unit.

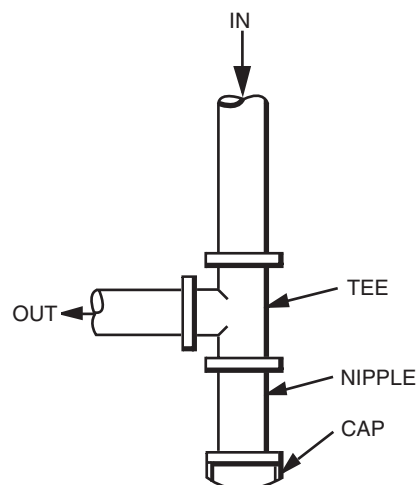


Fig. 10 - Sediment Trap

C99020

NOTE: Pressure test the gas supply system after the gas supply piping is connected to the gas valve. The supply piping must be disconnected from the gas valve during the testing of the piping systems when test pressure is in excess of 0.5 psig. Pressure test the gas supply piping system at pressures equal to or less than 0.5 psig. The unit heating section must be isolated from the gas piping system by closing the external main manual shutoff valve and slightly opening the ground-joint union.

WARNING

FIRE OR EXPLOSION HAZARD

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

-Connect gas pipe to unit using a backup wrench to avoid damaging gas controls.

-Never purge a gas line into a combustion chamber. Never test for gas leaks with an open flame. Use a commercially available soap solution made specifically for the detection of leaks to check all connections.

-Use proper length of pipe to avoid stress on gas control manifold.

-If a flexible connector is required or allowed by authority having jurisdiction, black iron pipe shall be installed at furnace gas valve and extend a minimum of 2 in. outside furnace casing.

-If codes allow a flexible connector, always use a new connector. do not use a connector which has previously serviced another gas appliance.

8. Check for gas leaks at the field-installed and factory-installed gas lines after all piping connections have been completed. Use soap-and-water solution (or method specified by local codes and/or regulations).

Step 9—Install Duct Connections

The unit has duct flanges on the supply- and return-air openings on the side and bottom of the unit. For downshot applications, the ductwork connects to the roof curb (See Fig. 5 and 6 for connection sizes and locations).

CONFIGURING UNITS FOR DOWNFLOW (VERTICAL) DISCHARGE

⚠ 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.

1. Open all electrical disconnects before starting any service work.
2. Remove horizontal (metal) duct covers to access vertical (downflow) discharge duct knockouts in unit base.
3. Use a screwdriver and hammer to remove the panels in the bottom of the unit base (See Fig. 11).
4. If unit ductwork is to be attached to vertical opening flanges on the unit base (jackstand applications only), do so at this time.

⚠ CAUTION

PROPERTY DAMAGE HAZARD

Failure to follow this caution may result in property damage.

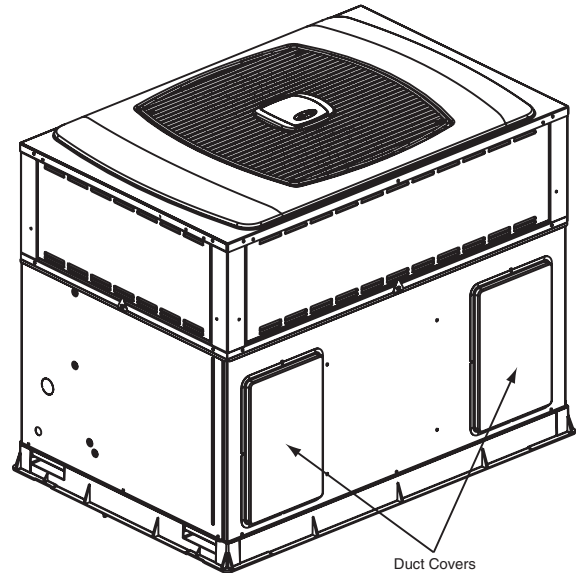
Collect ALL screws that were removed. **Do not** leave screws on rooftop as permanent damage to the roof may occur.

5. It is recommended that the base insulation around the perimeter of the vertical return-air opening be secured to the base with aluminum tape. Applicable local codes may require aluminum tape to prevent exposed fiberglass.
6. Cover both horizontal duct openings with the provided duct covers. Ensure opening is air- and watertight.
7. After completing unit conversion, perform all safety checks and power up unit.

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

Adhere to the following criteria when selecting, sizing, and installing the duct system:

1. Units are shipped for horizontal duct installation (by removing duct covers).
2. Select and size ductwork, supply-air registers, and return-air grilles according to American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) recommendations.



A05301

Fig. 11 - 48CE with Duct Covers On

3. Use flexible transition between rigid ductwork and unit to prevent transmission of vibration. The transition may be screwed or bolted to duct flanges. Use suitable gaskets to ensure weather-tight and airtight seal.
4. All units must 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.
5. Size all ductwork for maximum required airflow (either heating or cooling) for unit being installed. Avoid abrupt duct size increases or decreases or performance may be affected.
6. Adequately insulate and weatherproof all ductwork located outdoors. Insulate ducts passing through unconditioned space, and use vapor barrier in accordance with latest issue of Sheet Metal and Air Conditioning Contractors National Association (SMACNA) and Air Conditioning Contractors of America (ACCA) minimum installation standards for heating and air conditioning systems. Secure all ducts to building structure.
7. Flash, weatherproof, and vibration isolate all openings in building structure in accordance with local codes and good building practices.

Step 10—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. 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.

⚠ CAUTION

UNIT COMPONENT DAMAGE HAZARD

Failure to follow this caution could 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.

See unit wiring label 16 or 17 and Fig. 12 for reference when making high voltage and User Interface control connections.

TRANSFORMER PROTECTION

The transformer is of the energy-limiting type. It is set to withstand a 30-sec. overload or shorted secondary condition.

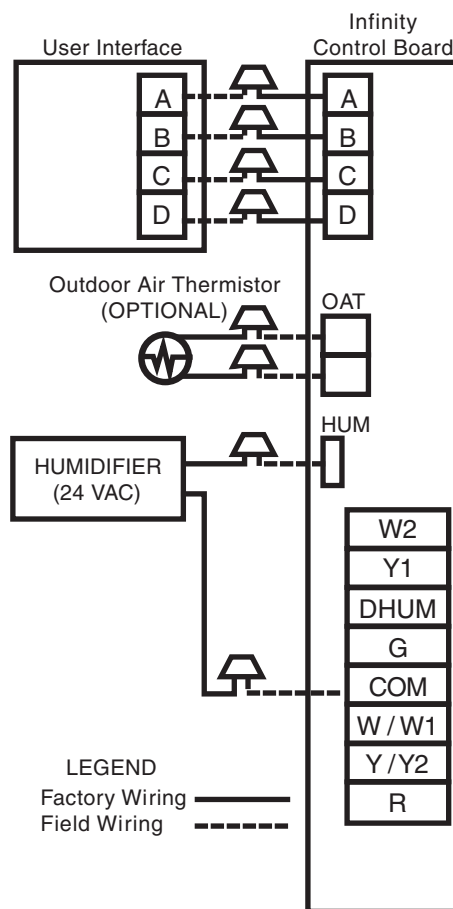
HIGH-VOLTAGE CONNECTIONS

When 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.

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 3 for electrical data).

The field-supplied disconnect switch box may be mounted on the unit over the high-voltage inlet hole when the standard power and low-voltage entry points are used (See Fig. 5 and 6 for acceptable location).

Proceed as follows to complete the high voltage connections to the unit.



A06038

Fig. 12 - Control-Voltage Connections

Single phase units:

1. Run the high-voltage (L1, L2) and ground lead into the control box.
2. Connect ground lead to chassis ground connection.
3. Locate the black and yellow wires connected to the line side of the contactor.
4. Connect field L1 to black wire on connection 11 of the compressor contactor.
5. Connect field wire L2 to yellow wire on connection 23 of the compressor contactor.

Three-phase units:

1. Run the high-voltage (L1, L2, L3) and ground lead into the control box.
2. Connect ground lead to chassis ground connection.
3. Locate the black and yellow wires connected to the line side of the contactor.
4. Connect field L1 to black wire on connection 11 of the compressor contactor.
5. Connect field wire L2 to yellow wire on connection 13 of the compressor contactor.
6. Connect field wire L3 to blue wire from compressor.

Table 3—Electrical Data - Unit 48CE

UNIT SIZE	V-PH-HZ	VOLTAGE RANGE		COMPRESSOR		OUTDOOR FAN MOTOR	INDOOR FAN MOTOR	POWER SUPPLY	
		Min	Max	RLA	LRA	FLA	FLA	MCA	MAX FUSE OR CKT BKR
024	208/230-1-60	187	253	13.5	61.0	0.8	4.3	22.0/22.0	30/30
030	208/230-1-60	187	253	15.9	73.0	0.8	4.3	25.0/25.0	30/30
036	208/230-1-60	187	253	16.9	83.0	0.8	6.8	28.7/28.7	35/35
	208/230-3-60	187	253	12.2	77.0	0.8	6.8	22.9/22.9	30/30
042	208/230-1-60	187	253	22.4	105.0	0.8	6.8	35.6/35.6	45/45
	208/230-3-60	187	253	15.4	88.0	0.8	6.8	26.9/26.9	35/35
048	208/230-1-60	187	253	21.3	109.0	1.6	6.8	35.0/35.0	45/45
	208/230-3-60	187	253	14.7	91.0	1.6	6.8	26.8/26.8	35/35
060	208/230-1-60	187	253	27.0	145.0	1.6	9.1	44.5/44.5	60/60
	208/230-3-60	187	253	19.2	137.0	1.6	9.1	33.3/33.3	40/40

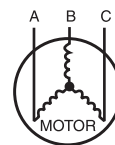
48CE

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:

- 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.
- 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.
- 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.

Fig. 13 - Electrical Data Legend

C03014

SPECIAL PROCEDURES FOR 208-V OPERATION

⚠ WARNING

ELECTRICAL SHOCK HAZARD

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

Make sure that the power supply to the unit is switched OFF before making any wiring changes. With disconnect switch open, move yellow wire from transformer (3/16 in.) terminal marked 230 to terminal marked 200. This retaps transformer to primary voltage of 208 vac.

⚠ WARNING

ELECTRICAL SHOCK HAZARD

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

Before making any wiring changes, **make sure** the gas supply is switched off first. Then switch off the power supply to the unit and install lockout tag.

Make low voltage connections to 18 gauge wires located in the splice box.

CONTROL VOLTAGE CONNECTIONS

Use only Infinity User Interface for unit control. (For detailed instructions for the low voltage connections, see the User Interface installation guide.)

Remove knockout hole located in the heat section panel adjacent to the service access panel. Remove the rubber grommet from the installer's packet and install grommet in the knockout opening. Provide a drip loop before running wire through panel. Run the low-voltage leads from the UI, through the inlet hole, and into unit low-voltage splice box. Make low-voltage connections to 18-gauge wires located in the splice box (See Fig. 12). Secure all cut wires, so that they do not interfere with operation of unit.

Step 11—Optional Accessories

OUTDOOR AIR THERMISTOR (OAT)

A 2-screw terminal strip is provided for connection of an outdoor temperature thermistor. This strip is marked OAT. The installation of an outdoor temperature sensor using the Infinity control board OAT terminals is optional.

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 the top terminal marked with a small number 1 next to the terminal strip.

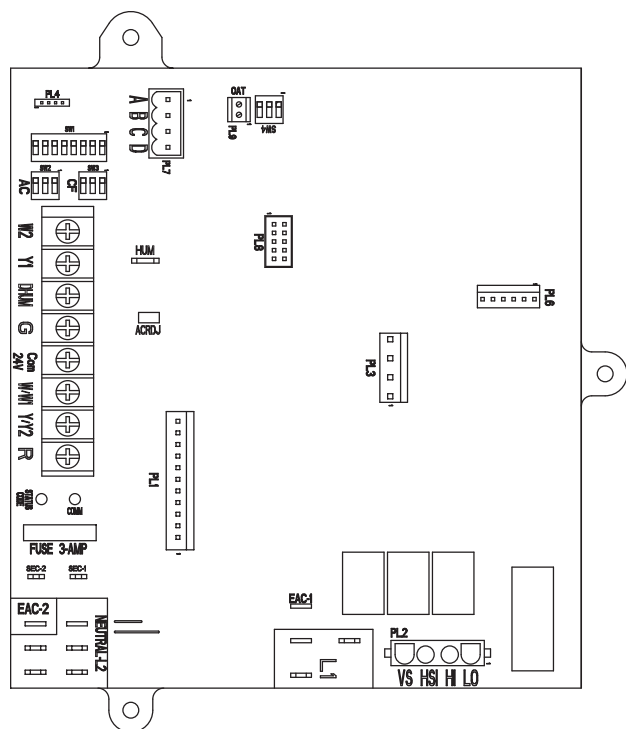


Fig. 14 - HK42FZ021

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. 12.

ELECTRONIC AIR CLEANER

Electronic Air Cleaner terminals are provided on the Infinity Control Board (EAC-1 and EAC-2). While these terminals can be used to power a 230V EAC, it is recommended that any EAC be installed per the EACs installation instructions and connected separately to a standard 115V or 230V outlet with an airflow sensor to control operation of the EAC.

PRE-START-UP

⚠ WARNING

FIRE, EXPLOSION, ELECTRICAL SHOCK HAZARD

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

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.

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 access panel.
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 damage, 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.
 - c. 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.
 - d. Inspect all field- and factory-wiring connections. Be sure that connections are completed and tight.
 - e. Ensure wires do not touch refrigerant tubing or sharp sheet metal edges.
 - f. Inspect coil fins. If damaged during shipping and handling, carefully straighten fins with a fin comb.

⚠ WARNING

FIRE, EXPLOSION HAZARD

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

Do not purge gas supply into the combustion chamber. Do not use a match or other open flame to check for gas leaks.

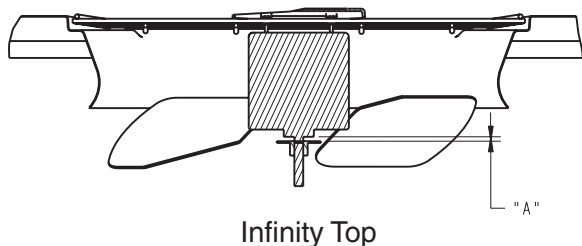
48CE

4. Verify the following conditions:

- Make sure gas line is free of air. Before lighting the unit for the first time, perform the following with the gas valve in the OFF position:

NOTE: If the gas supply pipe was not purged before connecting the unit, it will be full of air. It is recommended that the ground joint union be loosened, and the supply line be allowed to purge until the odor of gas is detected. Never purge gas lines into a combustion chamber. Immediately upon detection of gas odor, retighten the union. Allow 5 minutes to elapse, then light unit.

- Make sure that condenser-fan blade is correctly positioned in fan orifice. Top 1/3 of condenser-fan blade should be within fan orifice venturi.
 - Ensure fan hub is positioned correctly with respect to motor housing (See Fig. 15).
 - Make sure that air filter(s) is in place.
 - Make sure that condensate drain trap is filled with water to ensure proper drainage.
 - Make sure that all tools and miscellaneous loose parts have been removed.
- Compressors are internally spring mounted. Do not loosen or remove compressor holddown bolts.
 - Each unit system has two Schrader-type ports, one low-side Schrader fitting located on the suction line, and one high Schrader fitting located on the compressor discharge line. Be sure that caps on the ports are tight.



A06035

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

Fig. 15 - Fan Blade Clearance

START-UP AND TROUBLESHOOTING

Step 1—Check for Refrigerant Leaks

Proceed as follows to locate and repair a refrigerant leak and to charge the unit:

- Locate leak and make sure that refrigerant system pressure has been relieved and reclaimed from both high- and low-pressure ports.
- Repair leak following Refrigerant Service procedures.

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

- Add a small charge of R-410A refrigerant vapor to system and leak test unit.
- Evacuate and recover refrigerant from refrigerant system if additional leaks are not found.

- Charge unit with R-410A refrigerant, using a volumetric charging cylinder or accurate scale. Refer to unit rating plate for required charge. Be sure to add extra refrigerant to compensate for internal volume of filter drier.

Step 2—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.

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 upper right side of control adjacent to fuse is the system status LED and it is labeled STATUS. The green LED labeled COMM is located adjacent to the 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:

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

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 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 heating or cooling operation using a common thermostat connected to the standard 24V thermostat 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:

- Check system transformer high- and low-voltage to be sure the system is powered.
- 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:

- 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.

Table 4—Heating Inputs

HEATING INPUT (BTUH)*	NUMBER OF ORIFICES	GAS SUPPLY PRESSURE (IN. WG)				MANIFOLD PRESSURE (IN. WG)	
		Natural		Propane†			
		Min	Max	Min	Max	Natural	Propane†
40,000	2	4.0	13.0	4.0	13.0	3.5	3.5
60,000	2	4.0	13.0	4.0	13.0	3.5	3.5
90,000	3	4.0	13.0	4.0	13.0	3.5	3.4
115,000	3	4.0	13.0	4.0	13.0	3.5	3.7
130,000	3	4.0	13.0	4.0	13.0	3.5	3.5

*When a unit is converted to propane, different size orifices must be used. See separate, natural-to-propane conversion kit instructions.

†Based on altitudes from sea level to 2000 ft above sea level. For altitudes above 2000 ft, reduce input rating 4 percent for each additional 1000 ft above sea level. In Canada, from 2000 ft above sea level to 4500 ft above sea level, derate the unit 10 percent.

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 communication to be re-established.

Step 3—Sequence of Operation

NOTE: Infinity control must be grounded for proper operation or control will lock out.

NOTE: If a power interruption occurs during a call for heat, the control will start a 90-second blower-only ON period two seconds after power is restored, if the User Interface is still calling for gas

heating. The amber LED light will flash code 12 during the 90-second period, after which the LED will be ON continuously, as long as no faults are detected. After the 90-second period, the unit will respond to the User Interface normally.

GAS HEAT MODE AND ADJUSTMENTS

When the User Interface calls for heat, the Infinity control board performs a self-check, verifies the pressure switch contact is open, and starts the inducer.

1. Inducer Prepurge Period: When the inducer motor comes up to speed, the pressure switch closes, and the Infinity control CPU begins a 15-second prepurge period. If the pressure switch fails to remain closed, the inducer motor will remain running. After the pressure switch re-closes, the Infinity control CPU will begin a 15-second prepurge period and continue to run the inducer motor.
2. Trial-For-Ignition Sequence: The spark igniter will spark for 3 seconds. The main gas valve relay contact closes to energize the gas valve. After 5 seconds, the igniter is de-energized and a 2-second Flame-Proving period begins.
3. Flame-Proving-When the burner flame is proved at the flame-proving sensor, the control begins the blower-ON delay period and continues to hold the gas valve open. If the burner flame is not proved within two seconds, the control will close the gas valve and repeat the ignition sequence for up to three more Trials-For-Ignition before going to Ignition-Lockout. Lockout will be reset automatically after three hours, by momentarily interrupting 230 vac power to the , or by interrupting 24 vac power at SEC1 or SEC2 to the control board.

If flame is proved when there should be no flame present, control will lock out of Gas-Heating mode and operate the inducer motor until flame is no longer proved.

4. Blower-On Delay-If the burner flame is proven, 30 seconds after the gas valve is opened the Indoor Blower is turned ON.

Simultaneously, the humidifier terminal HUM and electronic air cleaner terminal EAC-1 are energized and remain energized throughout the heating cycle.

NOTE: EAC-2 terminal is common with L2 and will have 115v-to-ground when unit is powered.

5. Blower-Off Delay-When the call for heat is satisfied, the R to W circuit is opened, de-energizing the gas valve, stopping gas flow to the burners, and de-energizing the HUM terminal. The inducer motor will remain energized for a 4-second post-purge period. The indoor blower motor and air cleaner terminal EAC-1 will remain energized for 90, 120, 150, or 180 seconds (depending on selection of blower-OFF delay). The control is factory-set for 120-second blower-OFF delay.

CHECK GAS INPUT

Check gas input and manifold pressure after unit start-up (See Table 4). If adjustment is required proceed as follows:

1. The rated gas inputs shown in Table 4 are for altitudes from sea level to 2000 ft above sea level. These inputs are based on natural gas with a heating value of 1050 Btu/ft³ at 0.65 specific gravity, or propane gas with a heating value of 2500 Btu/ft³ at 1.5 specific gravity.
2. For elevations above 2000 ft, reduce input 4 percent for each 1000 ft above sea level. For example at 2001 ft. a 12% total derate is required.
3. When the gas supply being used has a different heating value or specific gravity, refer to national and local codes, or contact your distributor to determine the required orifice size.

⚠ CAUTION

UNIT DAMAGE HAZARD

Failure to follow this caution may result in component damage due to flame impingement of burners and heat exchangers.

Do Not redrill an orifice. Improper drilling (burrs, out-of-round holes, etc.) can cause excessive burner noise and misdirection of burner flame. If orifice hole appears damaged or it is suspected to have been redrilled, check orifice hole with a numbered drill bit of correct size.

ADJUST GAS INPUT

The gas input to the unit is determined by measuring the gas flow at the meter or by measuring the manifold pressure. Measuring the gas flow at the meter is recommended for natural gas units. The manifold pressure must be measured to determine the input of propane gas units.

Measure Gas Flow (Natural Gas Units)

Minor adjustment to the gas flow can be made by changing the manifold pressure. The manifold pressure must be maintained between 3.4 and 3.6 in. wg.

If larger adjustments are required, change main burner orifices following the recommendations of national and local codes.

NOTE: All other appliances that use the same meter must be turned off when gas flow is measured at the meter.

Proceed as follows:

1. Turn off gas supply to unit.
2. Remove pipe plug on manifold (See Fig. 16) and connect manometer. Turn on gas supply to unit.
3. Record number of seconds for gas meter test dial to make one revolution.
4. Divide number of seconds in Step 3 into 3600 (number of seconds in one hour).
5. Multiply result of Step 4 by the number of cu ft shown for one revolution of test dial to obtain cu ft of gas flow per hour.
6. Multiply result of Step 5 by Btu heating value of gas to obtain total measured input in Btuh. Compare this value with heating input shown in Table 4 (Consult the local gas supplier if the heating value of gas is not known).

EXAMPLE: Assume that the size of test dial is 1 cu ft, one revolution takes 32 sec., and the heating value of the gas is 1050 Btu/ft³. Proceed as follows:

1. 32 sec. to complete one revolution.
2. $3600 \div 32 = 112.5$.
3. $112.5 \times 1 = 112.5$ ft³ of gas flow/hr.
4. $112.5 \times 1050 = 118,125$ Btuh input.

If the desired gas input is 115,000 Btuh, only a minor change in the manifold pressure is required.

Observe manifold pressure and proceed as follows to adjust gas input:

1. Remove cover screw over regulator adjustment screw on gas valve.
2. Turn regulator adjustment screw clockwise to increase gas input, or turn regulator adjustment screw counterclockwise to decrease input. Manifold pressure must be between 3.4 and 3.6 in. wg. Unsafe operation of the unit may result if manifold pressure is outside this range. Personal injury or unit damage may result.

⚠ WARNING

FIRE AND UNIT DAMAGE HAZARD

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

Unsafe operation of the unit may result if manifold pressure is outside this range.

3. Replace cover screw cap on gas valve.
4. Turn off gas supply to unit. Remove manometer from pressure tap and replace pipe plug on gas valve. Turn on gas to unit and check for leaks.

Measure Manifold Pressure (Propane Units)

The main burner orifices on a propane gas unit are sized for the unit rated input when the manifold pressure reading matches the level specified in Table 4.

Proceed as follows to adjust gas input on a propane gas unit:

1. Turn off gas to unit.
2. Remove pipe plug on manifold and connect manometer (See Fig. 16).
3. Turn on gas to unit.
4. Remove cover screw over regulator adjustment screw on gas valve.
5. Adjust regulator adjustment screw to the correct manifold pressure, as specified in Table 4. Turn adjusting screw clockwise to increase manifold pressure, or turn adjusting screw counterclockwise to decrease manifold pressure.
6. Replace cover screw.
7. Turn off gas to unit. Remove manometer from pressure tap. Replace pipe plug on gas valve, then turn on gas to unit. Check for leaks.

CHECK BURNER FLAME

With burner access panel removed, observe the unit heating operation. Watch the burner flames to see if they are light blue and soft in appearance, and that the flames are approximately the same for each burner. Propane will have blue flame (See Fig. 17). Refer to the Maintenance section for information on burner removal.

AIRFLOW AND TEMPERATURE RISE

The heating section for each size unit is designed and approved for heating operation within the temperature-rise range stamped on the unit rating plate.

Table 5 shows the approved temperature rise range for each heating input, and the air delivery cfm at various temperature rises. The heating operation airflow must produce a temperature rise that falls within the approved range.

Refer to Indoor Airflow and Airflow Adjustments section to adjust heating airflow when required.

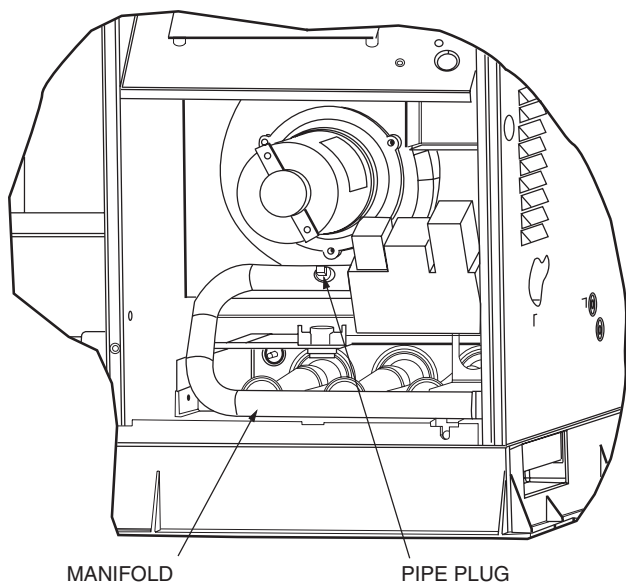


Fig. 16 - Burner Assembly

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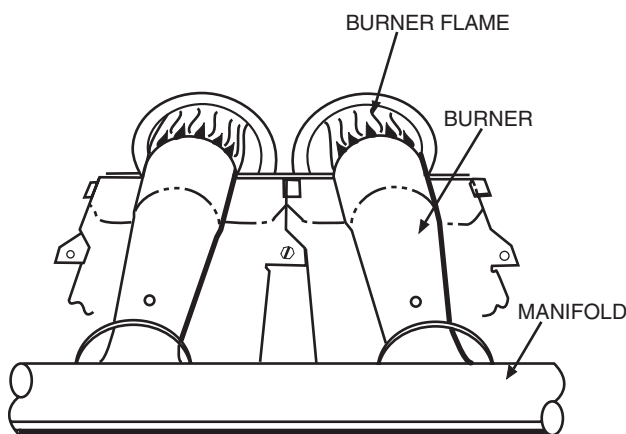


Fig. 17 - Monoport Burner

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LIMIT SWITCHES

Normally closed limit switch (LS) completes the control circuit. Should the leaving-air temperature rise above the maximum allowable temperature, the limit switch opens and the control circuit “breaks.” Any interruption in the control circuit instantly closes the gas valve and stops gas flow to the burners and pilot. The blower motor continues to run until LS resets.

When the air temperature at the limit switch drops to the low-temperature setting of the limit switch, the switch closes and completes the control circuit. The direct-spark ignition system cycles and the unit returns to normal heating operation.

ROLLOUT SWITCH

The function of the rollout switch is to close the main gas valve in the event of flame rollout. The switch is located above the main burners. When the temperature at the rollout switch reaches the maximum allowable temperature, the control circuit trips, closing the gas valve and stopping gas flow to the burners. The indoor (evaporator) fan motor (IFM) and induced draft motor continue to run until switch is reset. The IGC LED will display FAULT CODE 7.

COOLING MODE

The Infinity Control Board closes the R-to-Y circuit which starts the compressor and outdoor fan and starts the indoor blower motor

on cooling airflow specified by the User Interface. The electronic air cleaner terminal EAC-1 is energized when the indoor blower motor is operating.

When the “call for cooling” is satisfied, the R-to-Y circuit is opened. The compressor and fan will stop, and the indoor blower motor will continue operating at cooling airflow for an additional 90 seconds.

CHECKING AND ADJUSTING REFRIGERANT CHARGE

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

NOTE: Adjustment of the refrigerant charge is not required unless the unit is suspected of not having the proper charge.

A subcooling charging chart is attached to the outside of the service access panel. The chart includes the required liquid line temperature at given discharge line pressures and outdoor ambient temperatures.

An accurate subcooling, thermocouple- or thermistor-type thermometer, and a gauge manifold are required when using the subcooling charging method for evaluating the unit charge. Do not use mercury or small dial-type thermometers because they are not adequate for this type of measurement.

CAUTION

UNIT DAMAGE HAZARD

Failure to follow this caution may result in unit damage.

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.

Proceed as follows:

1. Remove caps from low- and high-pressure service fittings.
2. Using hoses with valve core depressors, attach low- and high-pressure gauge hoses to low- and high-pressure service fittings, respectively.
3. Start unit in Cooling mode and let unit run until system pressures stabilize.
4. Measure and record the following:
 - a. Outdoor ambient-air temperature (°F db).
 - b. Liquid line temperature (°F).
 - c. Discharge (high-side) pressure (psig).
5. Using “Cooling Charging Charts,” compare outdoor-air temperature(°F db) with the discharge line pressure (psig) to determine desired system operating liquid line temperature (See Fig. 18).
6. Compare actual liquid line temperature with desired liquid line temperature. Using a tolerance of $\pm 2^{\circ}\text{F}$, add refrigerant if actual temperature is more than 2°F higher than proper liquid line temperature, or remove refrigerant if actual temperature is more than 2°F lower than required liquid line temperature.

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

DEHUMIDIFICATION MODE

This Infinity system can be used to dehumidify the living space. See User Interface Installation Instructions for more details.

Required Subcooling of (oC)						Required Liquid Line Temperature for a Specific Subcooling (R-410A)											
Model Size	Outdoor Ambient Temperature					Pressure (psig)	Required Subcooling (°F)					Pressure (kPa)	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 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

Fig. 18 - Cooling Charging Table-Subcooling

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CONTINUOUS FAN MODE

When continuous fan operation is requested by the User Interface indoor blower motor will operate at continuous blower airflow. Continuous fan operation is programmable. See the User Interface Owner's Manual for detailed instructions. Terminal EAC-1 is energized as long as the indoor blower motor is energized.

During a call for heat, the Infinity control will transition the indoor blower motor to continuous blower airflow or heat airflow, whichever is lowest. The indoor blower motor will remain ON until the burners ignite then shut OFF and remain OFF for the blower-ON delay allowing the heat exchangers to heat up more quickly, then restarts at the end of the blower-ON delay period.

The indoor blower motor will revert to continuous-blower airflow after the heating cycle is completed.

When the UI "calls for cooling", the indoor blower motor will switch to operate at cooling airflow. When the call for cooling is satisfied, the indoor blower motor will operate an additional 90 seconds at cooling airflow before transitioning back to continuous-blower airflow.

When the call for continuous fan is removed, the indoor blower will continue operating for an additional 5 seconds, if no other function requires blower motor operation.

COMPONENT TEST

The Infinity Control Board features a component test system to help diagnose a system problem in the case of a component failure. To initiate the component test procedure, ensure that there are no UI inputs to the control (the ABCD connector can be removed from the Infinity control board for this operation) and all time delays have expired. Turn on setup switch SW1-6.

NOTE: The component test feature will not operate if the control is receiving any UI signals or until all time delays have expired.

The component test sequence is as follows:

1. The control turns the inducer motor ON and keeps it ON through step 3.
2. After waiting 10 seconds, the control turns the igniter ON for 15 seconds, then OFF.
3. The control then turns the indoor blower motor on for 15 seconds, then OFF.
4. After shutting the blower motor OFF, the control runs the inducer for 10 seconds, then turns it OFF.

NOTE: The EAC terminals are energized when the blower is operating.

After the component test is completed, one or more status codes (11, 25, or 41) will flash. See component test section or Status Code Label for explanation of status codes.

NOTE: To repeat component test, turn setup switch SW1-6 to OFF and then back ON.

Step 4—Unit Troubleshooting

STATUS CODE CONTINUOUS OFF

Check for 230 VAC at L1 and L2, and 24 VAC at SEC-1 and SEC-2.

STATUS CODE CONTINUOUS ON

Control has 24 VAC power.

STATUS CODE 11 - NO PREVIOUS CODE

Stored status codes are erased automatically after 72 hours.

STATUS CODE 12 - BLOWER ON AFTER POWER UP

(230 VAC or 24 VAC) Blower runs for 90 seconds, if unit is powered up during a call for heat (R-W/W1 closed) or (R-W/W1 opens) during blower on-delay period.

STATUS CODE 13 - LIMIT CIRCUIT LOCKOUT

Lockout occurs if a limit or flame rollout switch is open longer than 3 minutes or 10 successive limit trips occurred during high-heat. Control will auto reset after three hours. Refer to status code 33.

STATUS CODE 14 - IGNITION LOCKOUT

Control will auto reset after three hours. Refer to status code 34.

STATUS CODE 15 - BLOWER MOTOR LOCKOUT

Indicates the blower failed to reach 250 RPM or the blower failed to communicate within 30 seconds after being turned ON in two successive heating cycles. Control will auto reset after 3 hours. Refer to status code 41.

STATUS CODE 21 - GAS HEATING LOCKOUT

Control will NOT auto reset. Check for mis-wired gas valve or defective control (valve relay).

STATUS CODE 22 - ABNORMAL FLAME-PROVING SIGNAL

Flame is proved while gas valve is de-energized. Inducer will run until fault is cleared. Check for leaky gas valve or stuck-open gas valve.

STATUS CODE 23 - PRESSURE SWITCH DID NOT OPEN

Check for obstructed pressure tubing or pressure switch stuck open.

STATUS CODE 24 - SECONDARY VOLTAGE FUSE IS OPEN

Check for short circuit in secondary voltage (24VAC) wiring.

STATUS CODE 25 - INVALID MODEL SELECTION OR SETUP ERROR

Indicates either the model plug is missing or incorrect. If code flashes 4 times on power-up, control is defaulting to model selection stored in memory. Check for proper model plug number and resistance values per wiring diagram.

STATUS CODE 31 - HIGH-HEAT PRESSURE SWITCH OR RELAY DID NOT CLOSE OR REOPENED

Control relay may be defective. If open longer than five minutes, inducer shuts off for 15 minutes before retry. If opens during blower on-delay period, blower will come on for the selected blower off-delay. Check for excessive wind, restricted vent, defective inducer motor, defective pressure switch, lower inducer voltage (230VAC), inadequate combustion air supply, disconnected or obstructed pressure tubing, or low inlet gas pressure (if LGPS used).

STATUS CODE 33 - LIMIT CIRCUIT FAULT

Indicates a limit or flame rollout switch is open. Blower will run for 4 minutes or until open switch remakes, whichever is longer. If open longer than 3 minutes, code changes to lockout 13. If open less than 3 minutes status code 33 continues to flash until blower shuts off. Flame rollout switch requires manual reset. Check for loose blower

wheel, restricted vent, excessive wind, dirty filter or restricted duct system, defective switch or connections, or inadequate combustion air supply (flame roll-out switch open).

STATUS CODE 34 - IGNITION PROVING FAILURE

Control will try three more times before lockout 14 occurs. If flame signal lost during blower on-delay period, blower will come on for the selected blower off-delay. Check for oxide buildup on flame sensor (clean with fine steel wool), proper flame sense microamps (.5 microamps D.C. min., 4.0-6.0 nominal), manual valve shut-off, low inlet gas pressure, control ground continuity, gas valve defective or turned off, flame sensor must not be grounded, inadequate flame carryover or rough ignition, or green/yellow wire must be connected to unit sheet metal.

STATUS CODE 41 - BLOWER MOTOR FAULT

Indicates the blower failed to reach 250RPM or the blower failed to communicate within the prescribed time limits. Thirty seconds after being turned ON or ten seconds during steady-state operation.

STATUS CODE 45 - CONTROL CIRCUITRY LOCKOUT

Auto reset after one hour lockout due to gas valve relay stuck open, flame sense circuit failure, or software check error. Reset power to clear lockout. Replace control if status code repeats.

Step 5—Indoor Airflow and Airflow Adjustments



CAUTION

UNIT OPERATION HAZARD

Failure to follow this caution may result in unit damage.

For cooling operation, the recommended airflow is 350 to 450 cfm for each 12,000 Btuh of rated cooling capacity. For heating operation, the airflow must produce a temperature rise that falls within the range stamped on the unit rating plate.

Table 5 shows the temperature rise in each heating mode. Refer to these tables to determine the desired heating airflow for the system being installed.

NOTE: Be sure that all supply-and return-air grilles are open, free from obstructions, and adjusted properly. Airflow can be changed using the User Interface.

Table 5—Air Delivery and Temperature Rise at Rated Heating Input

Unit	Rated Heating Input (BTUH)	Heating Rise Range (°F)	Motor	Heating Mode	
				"Efficiency"	"Comfort"
48CE(-,N)024040 48CE(-,N)030040	40,000	20 - 50	CFM	844	658
			Heating Rise (°F)	35	45
48CE(-,N)024060 48CE(-,N)030060	60,000	35 - 65	CFM	1093	874
			Heating Rise (°F)	40	50
48CE(-,N)036060 48CE(-,N)042060	60,000	25 - 55	CFM	1093	874
			Heating Rise (°F)	40	50
48CE(-,N)036090 48CE(-,N)042090	90,000	35 - 65	CFM	1333	1213
			Heating Rise (°F)	50	55
48CE(-,N)048090 48CE(-,N)060090	90,000	25 - 55	CFM	1638	1310
			Heating Rise (°F)	40	50
48CE(-,N)048115 48CE(-,N)060115	115,000	35 - 65	CFM	1917	1725
			Heating Rise (°F)	45	50
48CE(-,N)048130 48CE(-,N)060130	130,000	40 - 70	CFM	1933	1759
			Heating Rise (°F)	50	55

Airflow delivery values for external static pressure values of up to 1" wc.

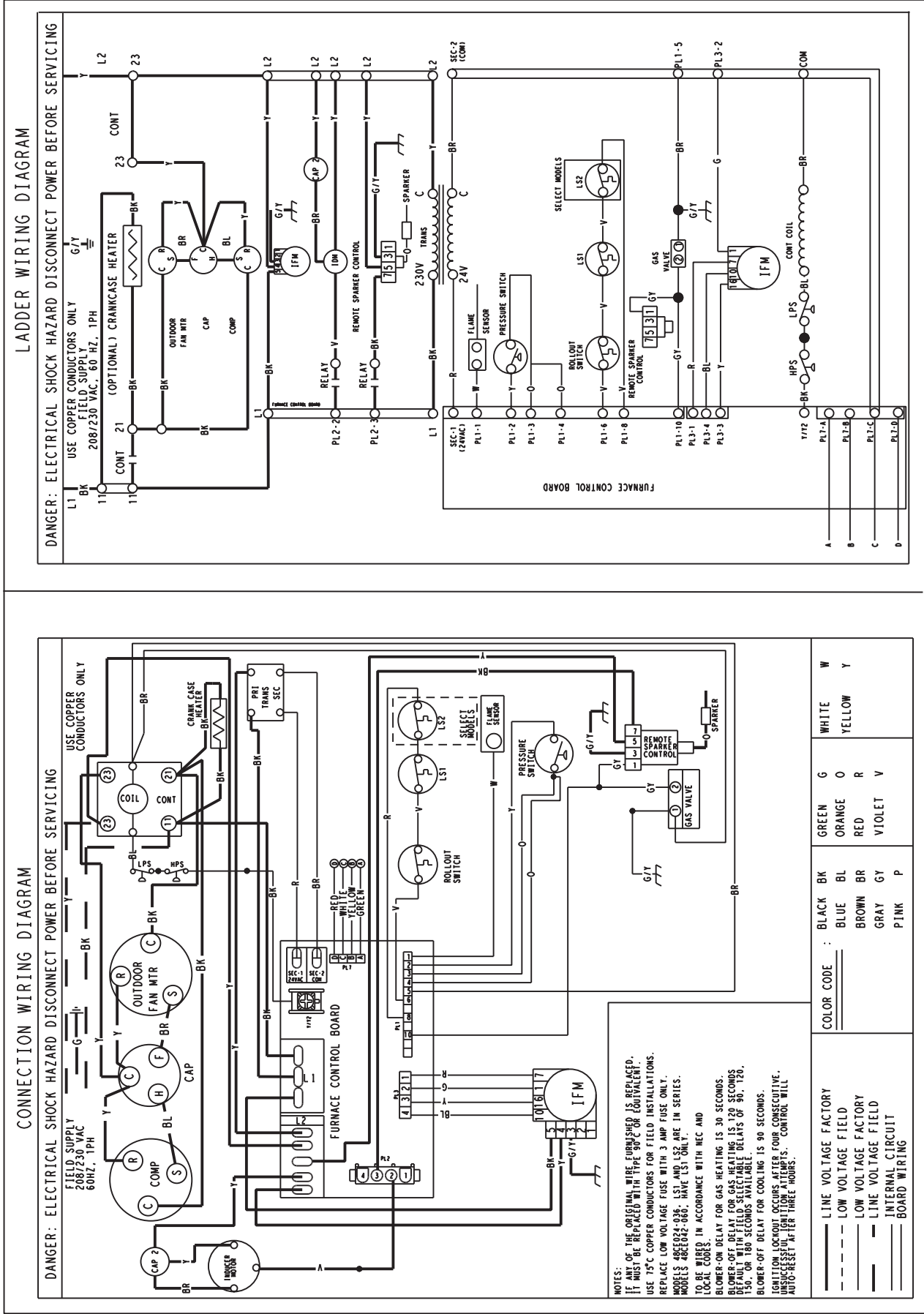


Fig. 19 - 208/230-1-60 Wiring Diagram, Unit 48CE

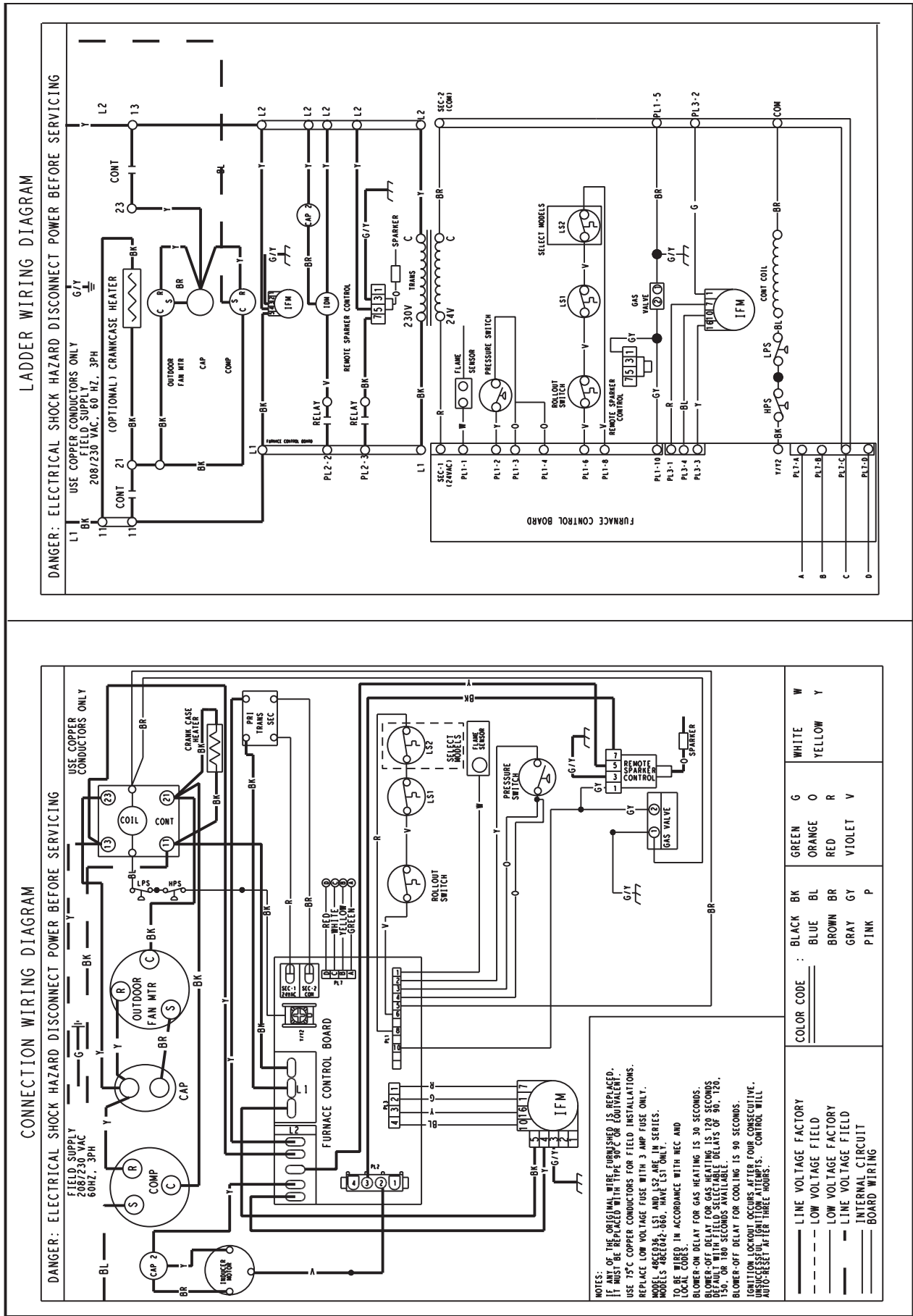


Fig. 20 - 208/230-3-60 Wiring Diagram, Unit 48CE

MAINTENANCE

To ensure continuing high performance and to minimize the possibility of premature equipment failure, periodic maintenance must be performed on this equipment. This unit should be inspected at least once each year by a qualified service person. To troubleshoot unit, refer to Table 6, 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.

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).

6. Ensure that setscrew engages the flat area on the motor shaft when tightening.
7. Replace grille.

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.

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.

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 48CE, 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 or coil.

Synthetic Roof Precautionary Procedure

1. Cover extended roof work 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 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.

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.

TROUBLESHOOTING

Refer to the Cooling and Heating Troubleshooting Chart (Table 6) for troubleshooting information.

START-UP CHECKLIST

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

AIR CONDITIONER WITH PURON (R-410A) 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 6—Troubleshooting Chart

SYMPTOM	CAUSE	REMEDY
Compressor and condenser fan will not start.	Power failure	Call power company
	Fuse blown or circuit breaker tripped	Replace fuse or reset circuit breaker
	Defective contactor, transformer, 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
	UI setting too high	Lower UI temperature setting below room temperature
Compressor will not start but condenser fan runs	Faulty wiring or loose connections in compressor circuit	Check wiring and repair or replace
	Compressor motor burned out, seized, or internal overload open	Determine cause Replace compressor
	Defective run/start capacitor, overload, start relay	Determine cause and replace
	One leg of 3-phase power dead	Replace fuse or reset circuit breaker Determine cause
	Low input voltage (20% low)	Determine cause and correct
Three-phase scroll compressor makes excessive noise, and there may be 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. Shut down unit to allow pressures to equalize.
Compressor cycles (other than normally satisfying UI)	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	Determine cause and replace
	Faulty outdoor fan motor or capacitor	Replace
	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	Reset UI
	Low refrigerant charge	Locate leak, repair, and recharge
	Air in system	Recover refrigerant, evacuate system, and recharge
	Outdoor coil dirty or restricted	Clean coil or remove restriction
Excessive head pressure	Dirty air filter	Replace filter
	Dirty condenser coil	Clean coil
	Refrigerant overcharged	Recover excess refrigerant
	Air in system	Recover refrigerant, evacuate system, and recharge
	Condenser air restricted or air short-cycling	Determine cause and correct
Head pressure too low	Low refrigerant charge	Check for leaks, repair, and recharge.
	Restriction in liquid tube	Remove restriction
Excessive suction pressure	High heat load	Check for source and eliminate
	Compressor valves leaking	Replace compressor
	Refrigerant overcharged	Recover excess refrigerant
Suction pressure too low	Dirty air filter	Replace filter
	Low refrigerant charge	Check for leaks, repair and recharge
	Metering device or low side restricted	Remove source of restriction
	Insufficient evaporator airflow	Increase air quantity Check filter—replace if necessary
	Temperature too low in conditioned area	Reset UI
	Outdoor ambient below 55°F	Install low-ambient kit
	Filter drier restricted	Replace filter
IFM does not run	Blower wheel not secured to shaft	Properly tighten blower wheel to shaft
	Insufficient voltage at motor	Determine cause and correct
	Power connectors not properly sealed	Connectors should snap easily; do not force
IFM operation is intermittent	Water dripping into motor	Verify proper drip loops in connector wires
	Connectors not firmly sealed	Gently pull wires individually to be sure they are crimped into the housing

Table 6—Troubleshooting Chart Con't

SYMPTOM	CAUSE	REMEDY
Burners will not ignite	Water in gas line	Drain. Install drip leg.
	No power to furnace	Check power supply fuses, wiring or circuit breaker.
	No 20-v power supply to control circuit	Check transformer. NOTE: Some transformers have internal over-current protection that requires a cool-down period to reset.
	Mis-wired or loose connections	Check all wiring and wire nut connections
	Misaligned spark electrodes	Check flame ignition and sense electrode positioning. Adjust as necessary.
	No gas at main burners	1. Check gas line for air. Purge as necessary. NOTE: After purging gas line of air, wait at least 5 minutes for any gas to dissipate before attempting to light unit. 2. Check gas valve.
Inadequate heating	Dirty air filter	Clean or replace filter as necessary
	Gas input to furnace too low	Check gas pressure at manifold match with that on unit nameplate
	Unit undersized for application	Replace with proper unit or add additional unit
	Restricted airflow	Clean or replace filter. Remove any restriction.
	Limit switch cycles main burners	Check rotation of blower, temperature rise of unit. Adjust as necessary.
Poor flame characteristics	Incomplete combustion results in: Aldehyde odors, carbon monoxide, sooting flame, floating flame	1. Tighten all screws around burner compartment 2. Cracked heat exchanger. Replace. 3. Unit over-fired. Reduce input (change orifices or adjust gas line or manifold pressure). 4. Check burner alignment. 5. Inspect heat exchanger for blockage. Clean as necessary.

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

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
GAS HEAT SUPPLY AIR _____

PRESSURES

GAS INLET PRESSURE _____ IN.WG
GAS MANIFOLD PRESSURE _____ IN.WG
REFRIGERANT SUCTION _____ PSIG SUCTION LINE TEMP* _____
REFRIGERANT DISCHARGE _____ PSIG DISCHARGE TEMP† _____
☐ () VERIFY REFRIGERANT CHARGE USING CHARGING CHARTS

GAS HEAT TEMPERATURE RISE
TEMPERATURE RISE (See Literature) RANGE _____
MEASURED TEMPERATURE RISE _____

*Measured at suction inlet to compressor

†Measured at liquid line leaving condenser.

48CE