# 50GL 7-14 kW (024-048) Single Packaged 50 Hz, CE Electric Cooling Units with Puron® (R-410A) Refrigerant

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# Installation, Start-Up and Service Instructions

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

## TABLE OF CONTENTS



NOTE TO INSTALLER — Before the installation, READ THESE INSTRUCTIONS CAREFULLY AND COMPLETELY. Also, make sure the User's Manual and Replacement Guide are left with the unit after installation.

## SAFETY CONSIDERATIONS

Installation and servicing of air-conditioning equipment can be hazardous due to system pressure and electrical components. Only trained and qualified personnel should install, repair, or service air-conditioning equipment.

Untrained personnel can perform basic maintenance functions of cleaning coils and filters. All other operations should be performed by trained service personnel. When working on air-conditioning equipment, observe precautions in the literature, tags, and labels attached to the unit, and other safety precautions that may apply.

Follow all safety codes. Wear safety glasses and work gloves. Use quenching cloth for unbrazing operations. Have fire extinguisher available for all brazing operations. Consult a qualified installer or service agency for information or assistance. The qualified installer or agency must use only factory-authorized kits or accessories when modifying this product.

**⚠ WARNING**

Before performing service or maintenance operations on system, turn off power to unit. Turn off accessory heater power switch, if applicable. Electrical shock can cause personal injury.

**⚠ CAUTION**

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).

## RULES FOR SAFE INSTALLATION AND OPERATION

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

Understand the signal words DANGER, WARNING, CAUTION, and NOTE. These words are used with the safety-alert symbol. DANGER identifies the most serious hazards which **will** result in severe personal injury or death. WARNING signifies a hazard which **could** result in personal injury or death. CAUTION is used to identify unsafe practices which **would** 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.

The power supply (volts, phase, and hertz) must correspond to that specified on unit rating plate.

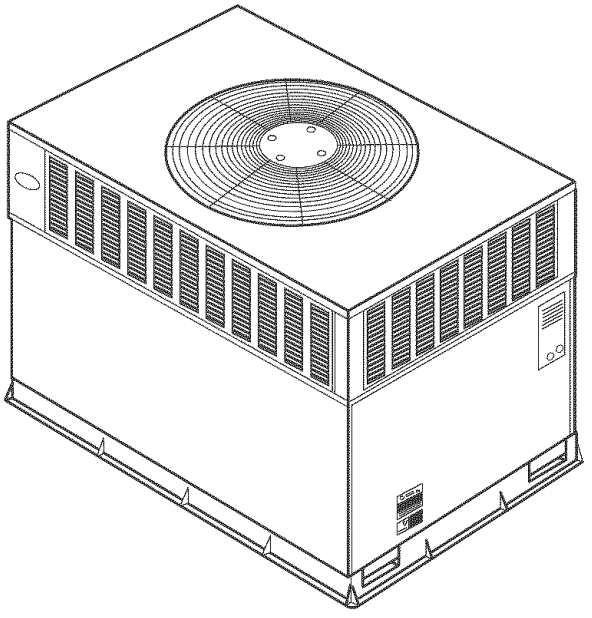

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**Fig. 1—Model 50GL (50 Hz)**

The electrical supply provided by the utility must be sufficient to handle load imposed by this unit.

This installation must conform with local building codes and with NEC (National Electrical Code) and NFPA 70, NFPA 54/ANSI Z223.1 latest revision, and NFGC (National Fuel Gas Code). Refer to provincial and local plumbing or waste water codes and other applicable local codes.

Approved for outdoor installation on wood flooring or on class A, B or C roof covering materials.

These instructions cover minimum requirements and conform to existing national standards and safety codes. In some instances, these instructions exceed certain local codes and ordinances, especially those that may not have kept up with changing residential construction practices. We require these instructions as a minimum for a safe installation.

The 50GL units are fully self-contained, and designed for outdoor installation (see Fig. 1). See Figs. 2 and 3 for unit dimensions. All unit sizes have discharge openings for both horizontal and downflow configurations, and are factory shipped with all duct openings covered. Units may be installed either on a rooftop, ground-level cement slab, or directly on the ground if local codes permit. See Fig. 4 for roof curb dimensions.

## RECEIVING AND INSTALLATION

### Step 1—Check Equipment

IDENTIFY UNIT

The unit model number and serial number are stamped on unit identification plate. Check this information against shipping papers and job data.

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. 4 for roof curb dimensions.) 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 watertight seal. Install gasketing material supplied with the roof curb. Improperly applied gasketing can also result in air leaks and poor unit performance. Curb should be level to within 1/4 inch (6.4 mm), See Fig. 7. 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. (101.6 mm) thick with 2 in. (50.8 mm) above grade. The slab should extend 2 in. (50.8 mm) on sides of the unit. Do not secure the unit to the slab *except* when required by local codes.

GROUND LEVEL

If local codes permit, the unit can be placed directly on the ground. Prepare a level gravel foundation for proper drainage.

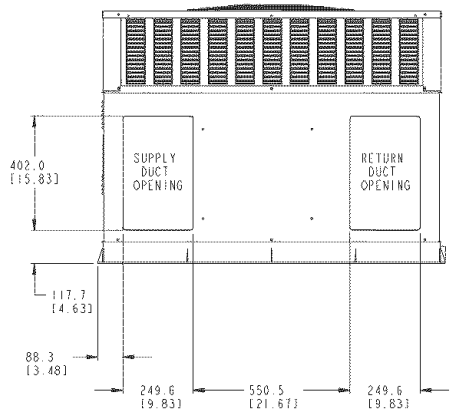
### Step 3—Field Fabricate Ductwork

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.

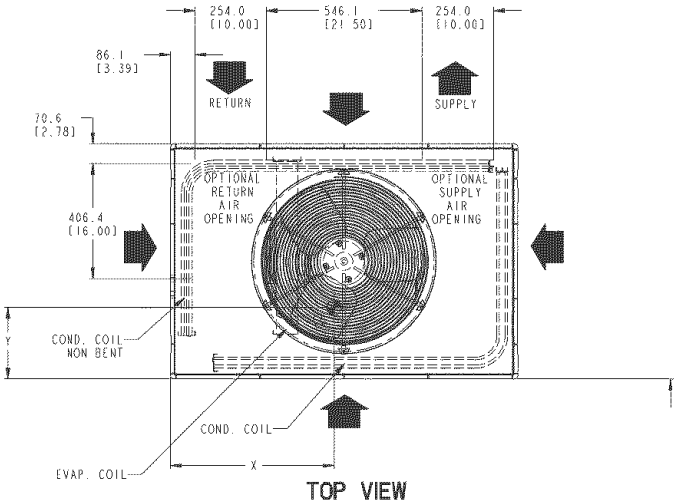
Ducts passing through an unconditioned space must be insulated and covered with a vapor barrier. If a plenum return is used on a vertical unit, the return should be ducted through the roof deck to comply with applicable fire codes. A minimum clearance is not required around ductwork. Cabinet return-air static shall not exceed -.25 in. wg.

### Step 4—Provide Clearances

The required minimum operating and service clearances are shown in Figs. 2 and 3. Adequate ventilation and condenser air must be provided.




REAR VIEW




TOP VIEW

REQ'D CLEARANCES FOR OPERATION AND SERVICING. IN.(MM)

| | |
|---|---|
| EVAPORATOR COIL ACCESS SIDE | 36 (914) |
| POWER ENTRY SIDE (EXCEPT FOR NEC REQUIREMENTS) | 36 (914) |
| UNIT TOP | 48 (1219) |
| SIDE OPPOSITE DUCTS | 36 (914) |
| DUCT PANEL | 12 (304.8)* |

*MINIMUM DISTANCES: IF UNIT IS PLACED LESS THAN 12 IN. (304.8 MM) FROM WALL SYSTEM, THEN THE SYSTEM PERFORMANCE MAY BE COMPROMISED.

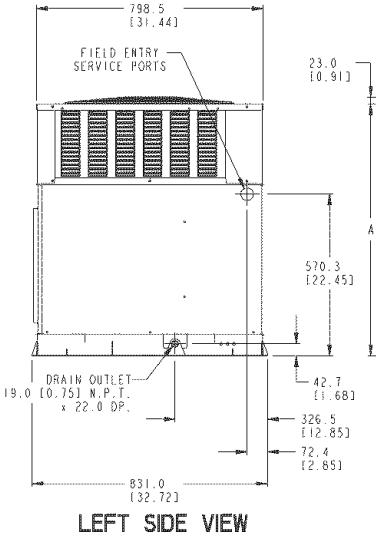
REQ'D CLEARANCES TO COMBUSTIBLE MAT'L. IN.(MM)

| | |
|---|---|
| TOP OF UNIT | 14 (355.6) |
| DUCT SIDE OF UNIT | 2 (50.8) |
| SIDE OPPOSITE DUCTS | 14 (355.6) |
| BOTTOM OF UNIT | 0.50 (12.7) |
| ELECTRIC HEAT PANEL | 36 (914.4) |

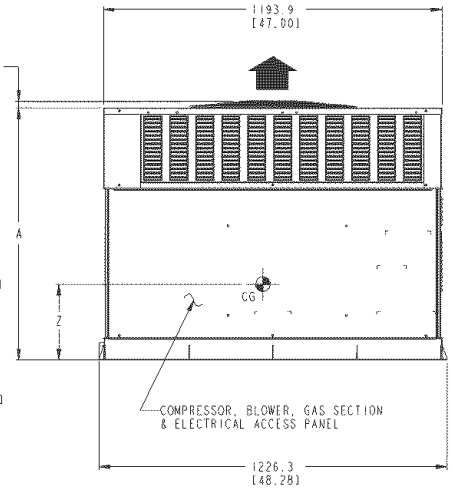
NEC REQ'D CLEARANCES. IN.(MM)

| | |
|---|---|
| BETWEEN UNITS, POWER ENTRY SIDE | 42 (1066.8) |
| UNIT AND UNGROUNDED SURFACES, POWER ENTRY SIDE | 36 (914) |
| UNIT AND BLOCK OF CONCRETE WALLS AND OTHER GROUNDED SURFACES, CONTROL BOX SIDE | 42 (1066.8) |

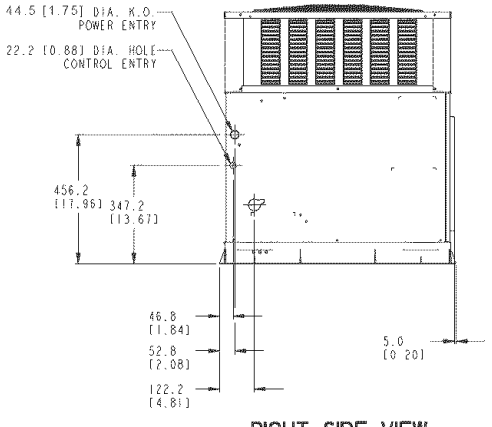
LEGEND
CG - CENTER OF GRAVITY
COND - CONDENSER
EVAP - EVAPORATOR
NEC - NATIONAL ELECTRICAL CODE
REQ'D - REQUIRED
NOTE: DIMENSIONS ARE IN IN. (MM)




LEFT SIDE VIEW




FRONT VIEW




RIGHT SIDE VIEW

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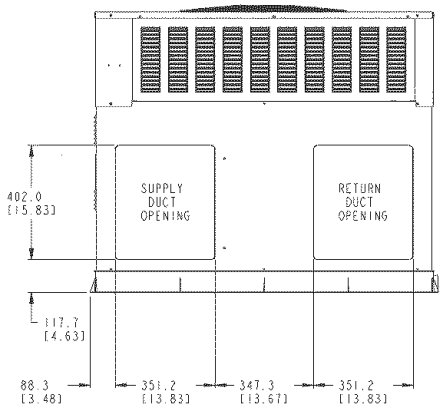
| UNIT | ELECTRICAL CHARACTERISTICS | UNIT WEIGHT | | UNIT HEIGHT IN. (MM) "A" | CENTER OF GRAVITY IN. (MM) | | |
|---|---|---|---|---|---|---|---|
| | | lb | kg | | X | Y | Z |
| 50GL024 | 400–3–50 | 264 | 119.2 | 37.02 (940.3) | 18.5 (469.9) | 14.5 (368.3) | 16.0 (406.4) |
| 50GL030 | 400–3–50 | 296 | 134.3 | 39.02 (991.1) | 19.5 (495.3) | 15.5 (393.7) | 17.6 (447.0) |
| 50GL036 | 400–3–50 | 302 | 137.0 | 35.02 (889.5) | 19.5 (495.3) | 15.3 (387.4) | 16.5 (419.1) |

**Fig. 2— 50GL024-036 Unit Dimensions**

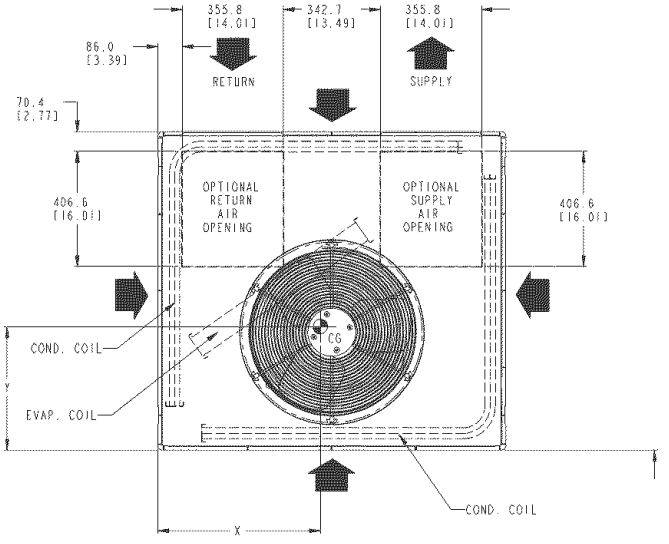
**⚠ CAUTION**

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

The condenser fan draws air through the condenser coil and discharges it through the top fan grill. 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 36-in. (914.4 mm) above the unit top. The maximum horizontal extension of a partial overhang must not exceed 48 in. (1219.2 mm)




REAR VIEW




TOP VIEW

**REQUIRED CLEARANCE FOR OPERATION AND SERVICING**

| | in. [mm] |
|---|---|
| EVAP. COIL ACCESS SIDE | 36.00 [914.0] |
| POWER ENTRY SIDE | 36.00 [914.0] |
| (EXCEPT FOR NEC REQUIREMENTS) | |
| UNIT TOP | 48.00 [1219.0] |
| SIDE OPPOSITE DUCTS | 36.00 [914.0] |
| DUCT PANEL | 12.00 [304.8] * |

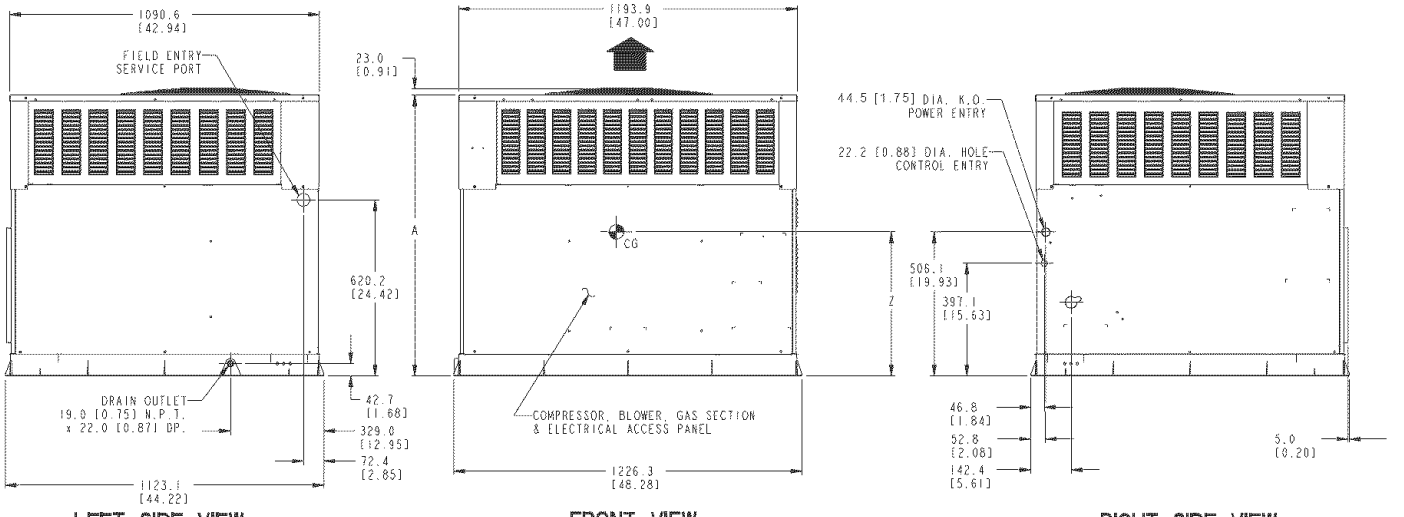
*MINIMUM DISTANCES: IF UNIT IS PLACED LESS THAN 12.00 [304.8] FROM WALL SYSTEM, THEN SYSTEM PERFORMANCE MAYBE COMPROMISE.

**REQUIRED CLEARANCE TO COMBUSTIBLE MATL.**

| | in. [mm] |
|---|---|
| TOP OF UNIT | 14.00 [355.6] |
| DUCT SIDE OF UNIT | 2.00 [50.8] |
| SIDE OPPOSITE DUCTS | 14.00 [355.6] |
| BOTTOM OF UNIT | 0.50 [12.7] |
| ELECTRIC HEAT PANEL | 36.00 [914.4] |

**NEC. REQUIRED CLEARANCES.**

| | in. [mm] |
|---|---|
| BETWEEN UNITS, POWER ENTRY SIDE | 42.00 [1066.8] |
| UNIT AND UNGROUNDED SURFACES, POWER ENTRY SIDE | 36.00 [914.0] |
| UNIT AND BLOCK OR CONCRETE WALLS AND OTHER GROUNDED SURFACES, POWER ENTRY SIDE | 42.00 [1066.8] |




LEFT SIDE VIEW FRONT VIEW RIGHT SIDE VIEW

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| UNIT | ELECTRICAL CHARACTERISTICS | UNIT WEIGHT | | UNIT HEIGHT IN. (MM) "A" | CENTER OF GRAVITY IN. (MM) | | |
|---|---|---|---|---|---|---|---|
| | | lb | kg | | X | Y | Z |
| 50GL048 | 400–3–50 | 350 | 158.8 | 38.98 (990.2) | 19.5 (495.3) | 17.6 (447.6) | 18.0 (457.2) |

**Fig. 3— 50GL048 Unit Dimensions**

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, tile, or other combustible materials.

### 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.)

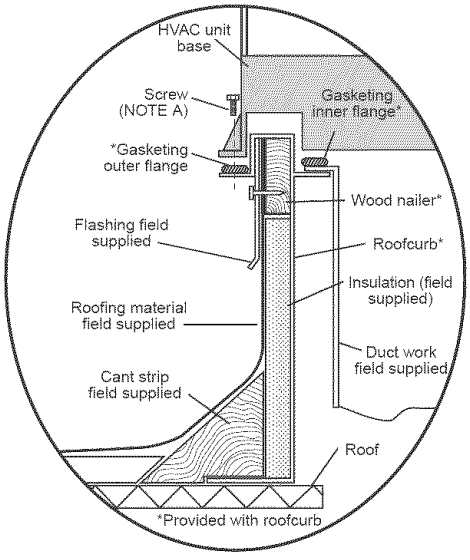
Only trained, qualified crane operators and ground support staff should handle and install this equipment.

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.

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

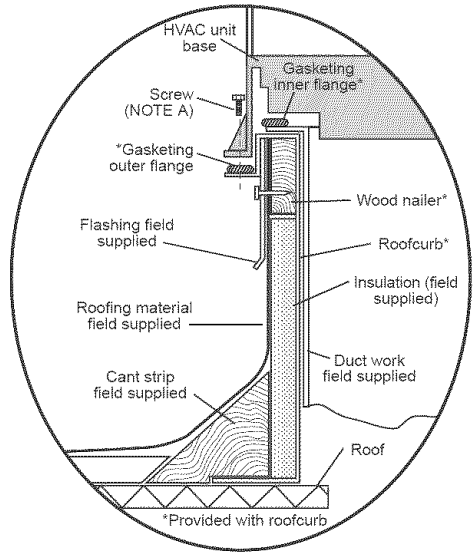
**⚠ WARNING**

Never stand beneath rigged units or lift over people.



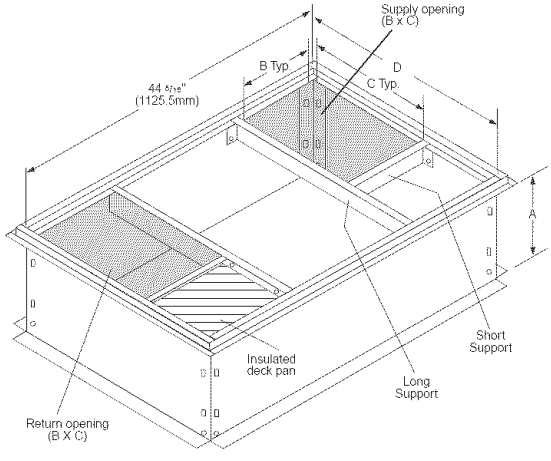

**Roof Curb for Small Cabinet**

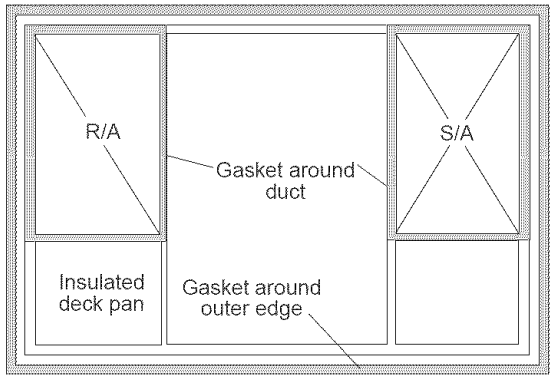
Note A: When unit mounting screw is used, retainer bracket must also be used.




**Roof Curb for Large Cabinet**

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

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| 50GL | UNIT SIZE | ODS CATALOG ORDERING NO. | A IN. (MM) | B IN. (MM) | C IN. (MM) | D IN. (MM) |
|---|---|---|---|---|---|---|
| ROOF CURB | 024-036 | CPRFCURB006A00 | 8 (203) | 11(279) | 161/2 (419) | 28-3/4 (730) |
| | | CPRFCURB007A00 | 14 (356) | 11(279) | 161/2 (419) | 28-3/4 (730) |
| | 048 | 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. Dimensions in ( ) are in millimeters.
4. Roof curb is made of 16-gage steel.
5. Table lists only the dimensions per ODS Catalog Ordering Number that have changed.
6. Attach ductwork to curb (flanges of duct rest on curb).
7. Insulated panels: 1-in. (25.4 mm) thick fiberglass 1 lb. (.45 kg) density.

**Fig. 4— Roof Curb Dimensions**

**⚠ WARNING**

Never exceed 90.7 kg (200 lb) per bracket lifting force.

**⚠ WARNING**

Accessory lifting kit is only to be used with Small Packaged units which have a composite base with molded rigging holds.

INSPECTION

Prior to initial use, and at monthly intervals, all rigging brackets and straps should be visually inspected for any damage, evidence

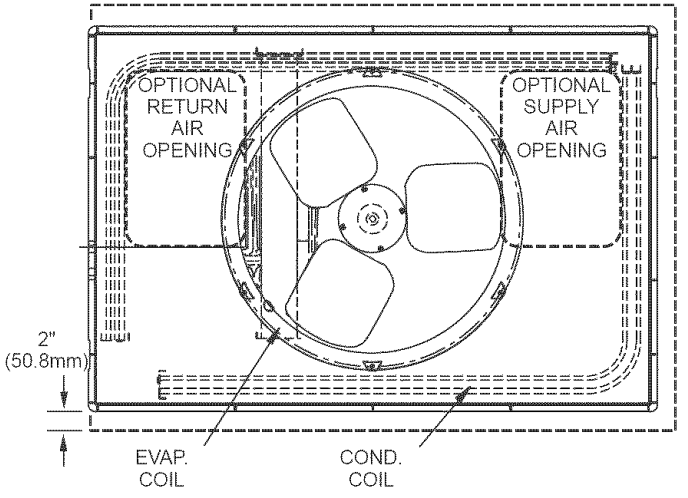


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**Fig. 5—Slab Mounting Details**

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.

INSTALLATION

1. Remove unit from shipping carton. Leave top shipping skid on the unit as a spreader bar to prevent the rigging straps from damaging the unit. If the wood skid is not available, use a spreader bar of sufficient length to protect unit from damage.
2. Position the lifting bracket assembly around the base of the unit. Be sure the strap does not twist.
3. Place each of the 4 metal lifting brackets into the rigging holds in the composite base.
4. Thread lifting bracket strapping around bottom perimeter of unit as follows:
   a. Open lever of tension buckle (ratchet type).
   b. Feed strapping through tension buckle (See Fig. 6 & 8).
   c. Pull strapping through tension buckle unit taut.
   d. Snap lever down to lock strap in tension buckle. To release strapping, squeeze safety latch, lift lever, and pull webbing outward.
5. Tighten the tension buckle until it is taut. Lifting brackets must be secure in the rigging holds.
6. Attach field-supplied clevis or hook of sufficient strength to hole in the lifting bracket (See Fig. 6, 8 & 9).
7. Attach the 2 safety straps directly to the clevis or hook at the 4 rigging brackets. **DO NOT** attach the safety straps to the lifting brackets (See Fig. 9).
8. Position lifting point directly over the unit's center of gravity.
9. Lift unit. When unit is directly over the roof curb, remove the 2 safety straps. Lower the equipment onto the roof curb.

**⚠ WARNING**

Lifting point should be directly over the center of gravity for the unit.

### Step 6—Connect Condensate Drain

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

Model 50GL disposes of condensate water through a 3/4 in. NPT (19.05 mm) fitting which exits through the base on the evaporator coil access side (See Figs. 2 and 3 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 condensate trap at end of condensate connection to ensure proper drainage. Make sure that the outlet of the trap is at least 1 in. (25.4mm) lower than the drain condensate connection to prevent the drain from overflowing (See Fig. 10). When using a gravel apron, make sure it slopes away from the unit.

Connect a drain tube using a minimum of 3/4 -in. (19.05 mm) PVC copper pipe (all field-supplied) at the outlet end of the 2-in. (50.8 mm) trap. Do not undersize the tube. Pitch the drain tube downward at a slope of at least 1-in. (25.4 mm) for every 10ft. (3.1 m) of horizontal run. Be sure to check the drain tube for leaks. Prime trap at the beginning of the cooling season start-up.

### Step 7—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 can be connected to the roof curb (See Figs. 2 and 3 for connection sizes and locations).

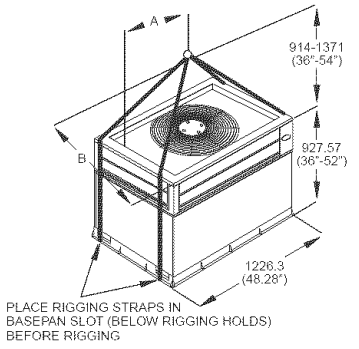
**IMPORTANT:** Use flexible connectors between ductwork and unit to prevent transmission of vibration. Use suitable gaskets to ensure weathertight and airtight seal. When electric heat is installed, use fire proof canvas (or similar heat resistant material) connector between ductwork and unit discharge connection. If flexible duct is used, insert a sheet metal sleeve inside duct. Heat resistant duct connector (or sheet metal sleeve) must extend 24-in. (609.6 mm) from the unit discharge connection flange into the ductwork.

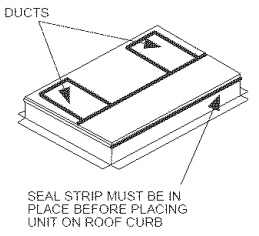
CONFIGURING UNITS FOR DOWNFLOW (VERTICAL) DISCHARGE

**⚠ WARNING**

Before performing service or maintenance operations on the system, turn off main power to unit or electrical shock could result.

1. Open all electrical disconnects and install lockout tag before starting any service work.
2. Remove side duct covers to access bottom return and supply knock out covers (See Fig. 12).

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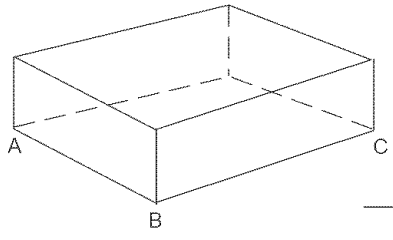
| SIZE | MAXIMUM WEIGHT | | A | | B | |
|---|---|---|---|---|---|---|
| | lb | kg | in. | mm | in. | mm |
| **024** | 292 | 132.5 | 18.5 | 469.9 | 14.50 | 368.3 |
| **030** | 313 | 142.5 | 19.5 | 495.3 | 15.50 | 393.7 |
| **036** | 321 | 145.6 | 19.5 | 495.3 | 15.25 | 387.4 |
| **048** | 348 | 157.9 | 19.5 | 495.3 | 17.62 | 447.6 |

**Fig. 6—Suggested Rigging**




MAXIMUM ALLOWABLE DIFFERENCE (in.)

| A-B | B-C | A-C |
|---|---|---|
| 1/4 | 1/4 | 1/4 |

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**Fig. 7—Unit Leveling Tolerances**

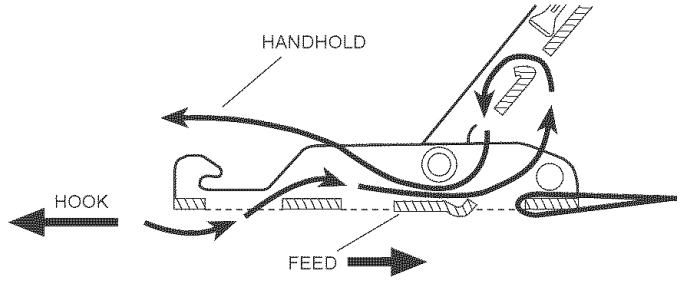


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**Fig. 8—Belt Threading**

3. To remove supply and return duct covers, break front and right side connecting tabs with a screwdriver and a hammer. Push cover down to break rear and left side tabs.
4. If unit ductwork is to be attached to vertical opening flanges on the unit base (jackstand applications only), do so at this time. 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 unit base with aluminum tape. Applicable local codes may require aluminum tape to prevent exposure to fiberglass.
6. Cover both horizontal duct openings with the duct covers shipped on the unit from the factory. 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.

8. Select and size ductwork, supply-air registers, and return-air grilles according to American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) recommendations.
9. 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 weathertight and airtight seal.
10. 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.

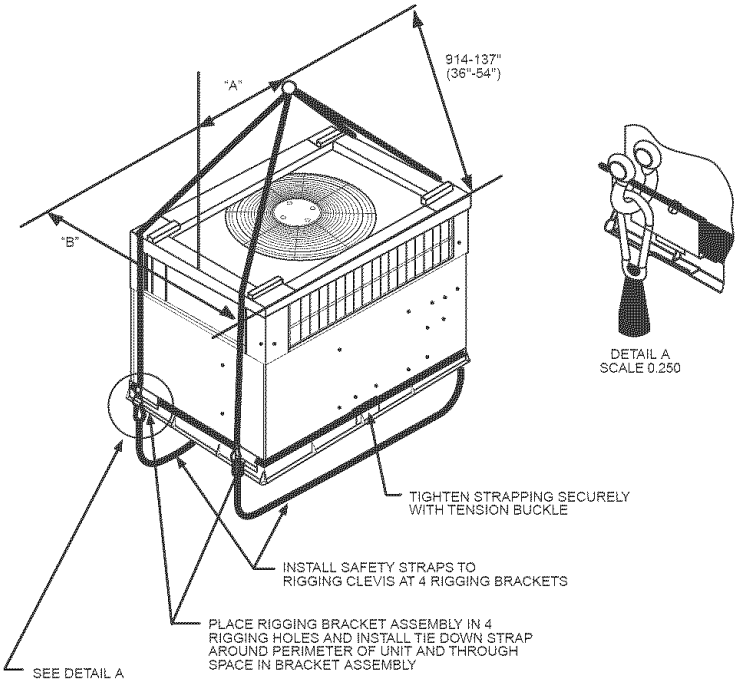


**Fig. 9—Lifting Point**

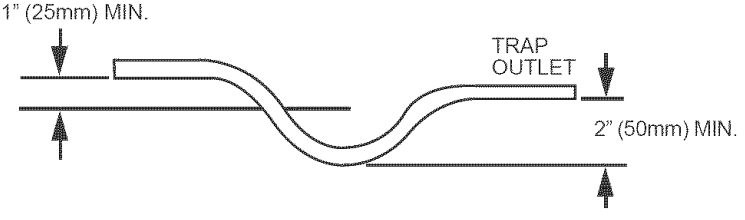


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**Fig. 10—Condensate Trap**

11. 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.
12. 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.
13. Flash, weatherproof, and vibration-isolate all openings in building structure in accordance with local codes and good building practices.

### Step 8—Install Electrical Connection

**⚠ WARNING**

The unit cabinet must have an uninterrupted, unbroken electrical ground to minimize the possibility of personal injury if an electrical fault should occur. This ground may consist of an electrical wire connected to the unit ground lug in the control compartment, or conduit approved for electrical ground when installed in accordance with IEC (International Electrical Code) Failure to adhere to this warning could result in personal injury or death.

**⚠ CAUTION**

Failure to follow these precautions could result in damage to the unit being installed:

1. Make all electrical connections in accordance with IEC and local electrical codes governing such wiring. 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.
4. Do not damage internal components when drilling through any panel to mount electrical hardware, conduit, etc. On 3-phase units, ensure phases are balanced within 2 percent. Consult local power company for correction of improper voltage and/or phase imbalance.

HIGH-VOLTAGE CONNECTIONS

The unit must have a separate electrical service with a field-supplied, waterproof, disconnect switch mounted at, or within sight from, the unit. Refer to the unit rating plate for maximum fuse/circuit breaker size and minimum circuit amps (ampacity) for wire sizing (See Table 4 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 Figs. 2 and 3 for acceptable location).

## Table 1—Physical Data-Unit 50GL (50 Hz)-English

| UNIT SIZE | 024 | 030 | 036 | 048 |
|---|---|---|---|---|
| NOMINAL CAPACITY (ton) | 2 | 2-1/2 | 3 | 4 |
| OPERATING WEIGHT (lb) | 264 | 296 | 302 | 350 |
| COMPRESSOR | Scroll | | | |
| REFRIGERANT (R-410A) Quantity (lb) | 4.25 | 6 | 7.25 | 9.75 |
| REFRIGERANT METERING (in) | .057 | .057 | .065 | .073 |
| | | | | |
| CONDENSER COIL Rows...Fins/in. Face Area (sq. ft.) | 1...17<br>10.9 | 1...17<br>12.7 | 2...17<br>9.1 | 2...17<br>12.3 |
| CONDENSER FAN Nominal Cfm Diameter (in.) Motor Hp (Rpm) | 2350<br>22<br>1/4....900 | 2350<br>22<br>1/4....900 | 2350<br>22<br>1/4....900 | 3300<br>22<br>1/3...1340 |
| EVAPORATOR COIL Rows...Fins/in. Face Area (sq. ft.) | 3...15<br>3.70 | 3...15<br>3.70 | 3...15<br>3.70 | 4...15<br>4.70 |
| EVAPORATOR BLOWER Nominal Airflow (Cfm) Size (in.) Motor (hp) | 800<br>10x10<br>1/4....1075 | 1000<br>10x10<br>1/2....1300 | 1200<br>10x10<br>1/2...1300 | 1600<br>11x10<br>1...1230 |
| RETURN-AIR FILTERS (in.)* throwaway | 20x20 | 20x20 | 20x24 | 24x30 |

* Required filter sizes shown are based on rated cooling airflow or heating airflow velocity of 300 ft/min for throwaway type or 450 ft/min for high-capacity type. Air filter pressure drop for non-standard filters must not exceed 0.08 in. wg.

## Table 2—Physical Data—Unit 50GL (50 Hz)-SI

| UNIT SIZE | 024 | 030 | 036 | 048 |
|---|---|---|---|---|
| NOMINAL CAPACITY (kW) | 7.0 | 8.8 | 10.6 | 14.1 |
| OPERATING WEIGHT (kg) | 119.7 | 134.3 | 137.0 | 158.8 |
| COMPRESSOR | Scroll | | | |
| REFRIGERANT (R-410A) Quantity (kg) | 1.93 | 2.72 | 3.29 | 4.42 |
| REFRIGERANT METERING DEVICE | 1.45 | 1.45 | 1.65 | 1.85 |
| | | | | |
| CONDENSER COIL Rows...Fins/m. Face Area (sq. m) | 1...669<br>1.0 | 1...669<br>1.2 | 2...669<br>0.8 | 2...669<br>1.1 |
| CONDENSER FAN Nominal L/s Diameter (mm) Motor Hp (r/s) | 1109<br>558.8<br>.187...15 | 1109<br>558.8<br>.187...15 | 1109<br>558.8<br>.187...15 | 1557<br>558.8<br>.249...22 |
| EVAPORATOR COIL Rows...Fins/m Face Area (sq. m) | 2...590<br>0.34 | 3...590<br>0.34 | 3...590<br>0.34 | 3...590<br>0.44 |
| EVAPORATOR BLOWER Nominal Airflow (L/s) Size (m) Motor Hp (r/s) | 378<br>0.254x0.254<br>186...17.9 | 472<br>0.254x0.254<br>373...21.7 | 566<br>0.254x0.254<br>373...21.9 | 755<br>0.254x0.279<br>746...20.5 |
| RETURN-AIR FILTERS (mm.)* Throwaway | 508x508 | 508x508 | 508x610 | 610x762 |

* Required filter sizes shown are based on rated cooling airflow or heating airflow velocity of 91.5 m./min. for throwaway type or 137 m. cu../min. for high-capacity type. Air filter pressure drop for non-standard filters must not exceed 2.03 mm. wg.

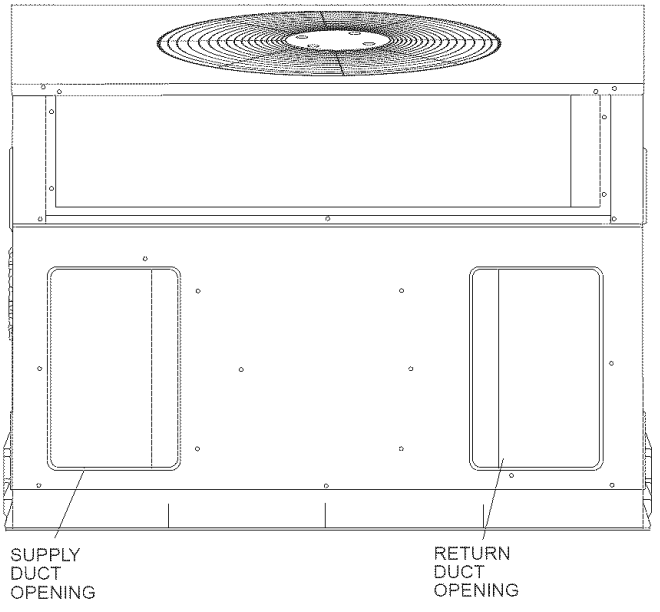
See unit wiring label and Fig. 13 for reference when making high voltage connections. Proceed as follows to complete the high-voltage connections to the unit.

Three phase units:

1. Run the high-voltage (L1, L2, L3) and ground leads into the control box.
2. Connect ground lead to chassis ground connection.
3. Connect field L1 to Black wire on connection L1 of the high voltage terminal block.
4. Connect field wire L2 to Black wire on connection L2 of the high voltage terminal block.
5. Connect field wire L3 to Black wire on connection L3 of high voltage terminal block.
6. If Red light blinks on the phase monitor control board (See Fig. 17), switch 2 legs on the high voltage terminal block..

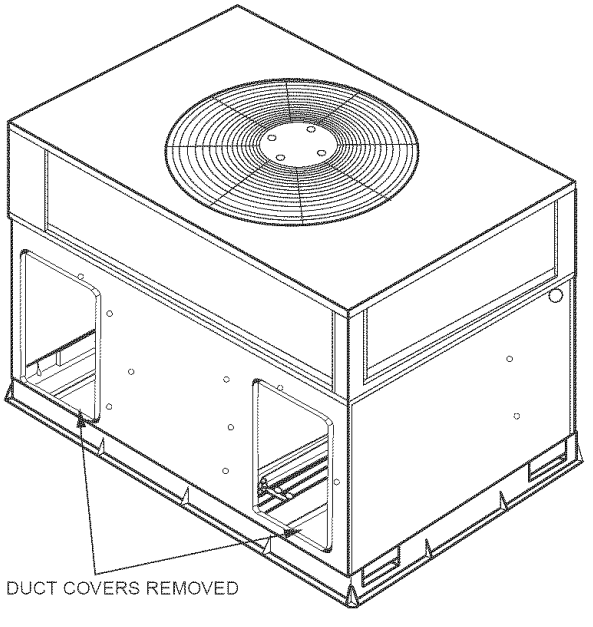
## Table 3—Minimum Airflow for Safe Electric Heater Operation

| | SIZE | | | |
|---|---|---|---|---|
| Airflow | 024 | 030 | 036 | 048 |
| CFM | 800 | 1000 | 1200 | 1600 |
| L/s | 378 | 472 | 567 | 756 |




C99011

**Fig. 11—Supply and Return Duct Opening**




C99012

**Fig. 12—Vertical Duct Cover Removed**

### CONTROL VOLTAGE CONNECTIONS

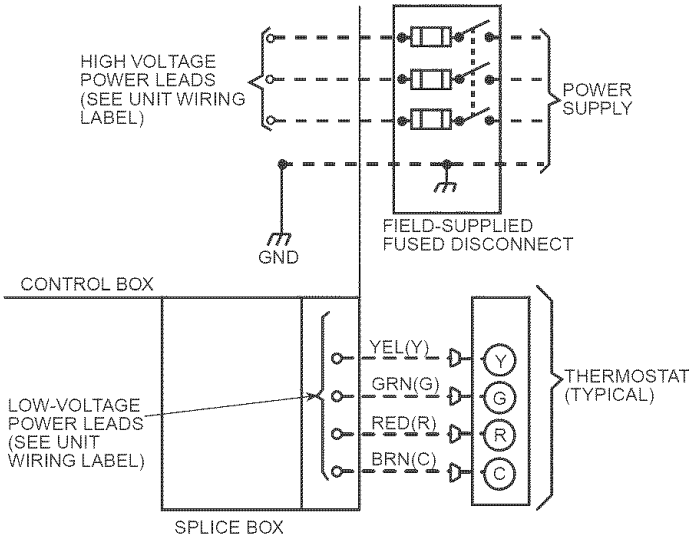
**NOTE:** Do not use any type of power-stealing thermostat. Unit control problems may result.

Use no. 18 American Wire Gage (AWG) color-coded, insulated (35 C minimum) wires to make the control voltage connections between the thermostat and the unit. If the thermostat is located more than 100 ft. from the unit (as measured along the control voltage wires), use no. 16 AWG color-coded, insulated (35 C minimum) wires.

### STANDARD CONNECTION

Remove knockout hole located in the electric heat panel adjacent to the control access panel (See Figs. 2 and 3). Remove the rubber grommet from the installer's packet (included with unit) and install grommet in the knockout opening. Provide a drip loop before running wire through panel.

Run the low-voltage leads from the thermostat, through the inlet hole, and into unit low-voltage splice box.




LEGEND

Field Control-Voltage Wiring
Field High-Voltage Wiring

NOTE: Use blue wire for 3-phase units only.

C99010

**Fig. 13—High- and Control-Voltage Connections**

LEGEND

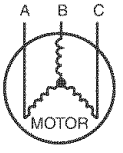
FLA — Full Load Amps
LRA — Locked Rotor Amps
MCA — Minimum Circuit Amps
MOCP — Maximum Overcurrent Protection
RLA — Rated Load Amps
CKTBKR — Circuit Breaker

NOTES:

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

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

EXAMPLE: Supply voltage is 400-3-50.




AB = 393 v
BC = 403 v
AC = 396 v

$$\text{Average Voltage} = \frac{393 + 403 + 396}{3} = \frac{1192}{3} = 397$$

Determine maximum deviation from average voltage.
(AB) 397- 393 = 4 v
(BC) 403 - 397 = 6 v
(AC) 397 - 396 = 1 v

Maximum deviation is 6 v.

Determine percent of voltage imbalance.

$$\% \text{ Voltage Imbalance} = 100 \times \frac{6}{397} = 1.5\%$$

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.

C01054

**Fig. 14—Electrical Legend**

Locate 18-gage wires leaving control box. These low-voltage connection leads can be identified by the colors red, green, yellow, brown, and white. (See Fig. 13.) Ensure the leads are long enough to be routed into the low-voltage splice box (located below right side of control box). Route leads through hole in bottom of control box and make low-voltage connections as shown in Fig. 13. Secure all cut wires, so that they do not interfere with operation of unit.

TRANSFORMER PROTECTION

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

## Table 4—Electrical Data—50GL (50Hz)

| UNIT 50GL SIZE | V-PH-HZ | VOLTAGE RANGE | | COMPRESSOR | | OFM | IFM | ELECTRIC HEAT | | POWER SUPPLY | | | DISCONNECT SIZE | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Min | Max | RLA | LRA | FLA | FLA | Nominal Kw | FLA | MCA | FUSE OR CKT. BKR | MOCP | FLA | LRA |
| 024 | 400–3–50 | 380 | 420 | 4.5 | 32.0 | 0.8 | 1.1 | –<br>6.5<br>8.7 | –<br>9.4<br>12.6 | 7.5<br>19.2<br>23.2 | 10<br>20<br>25 | – | 7<br>18<br>22 | 35<br>44<br>48 |
| 030 | 400–3–50 | 380 | 420 | 5.2 | 35.0 | 0.8 | 1.7 | –<br>6.5<br>8.7<br>13.0 | –<br>9.4<br>12.6<br>18.8 | 9.0<br>20.7<br>24.7<br>32.5 | 10<br>20<br>25<br>35 | – | 9<br>20<br>23<br>30 | 39<br>49<br>52<br>59 |
| 036 | 400–3–50 | 380 | 420 | 6.5 | 46.0 | 0.8 | 2.0 | –<br>6.5<br>8.7<br>13.0 | –<br>9.4<br>12.6<br>18.8 | 10.9<br>22.7<br>26.6<br>34.4 | 15<br>25<br>30<br>35 | – | 11<br>21<br>25<br>32 | 51<br>61<br>64<br>70 |
| 048 | 400–3–50 | 380 | 420 | 6.7 | 50.0 | 1.3 | 3.9 | –<br>6.5<br>8.7<br>13.0<br>17.4 | –<br>9.4<br>12.6<br>18.8<br>25.1 | 13.6<br>25.3<br>29.3<br>37.0<br>45.0 | 15<br>30<br>30<br>40<br>45 | – | 14<br>24<br>28<br>35<br>43 | 58<br>67<br>71<br>77<br>83 |

(See legend following Electrical Data charts)

## PRE-START-UP

**⚠ WARNING**

Failure to observe the following warnings could result in serious 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 lockout tags are installed.
4. Relieve and recover all refrigerant from both high- and low-pressure sides of 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.

Proceed as follows to inspect and prepare the unit for initial startup:

1. Remove access panel.
2. Read and follow instructions on all WARNING, CAUTION, and INFORMATION labels attached to, or shipped with, unit.
3. Make the following inspections:
   a. Inspect for shipping and handling damages such as broken lines, loose parts, disconnected wires, etc.
   b. Inspect for oil at all refrigerant tubing connections and on unit base. Detecting oil generally indicates a refrigerant leak. Leak test all refrigerant tubing connections using electronic leak detector, halide torch, or liquid-soap solution. If a refrigerant leak is detected, see Check for Refrigerant Leaks section under Start-Up.
   c. Inspect all field- and factory-wiring connections. Be sure that connections are completed and tight.
   d. Inspect coil fins. If damaged during shipping and handling, carefully straighten fins with a fin comb.

Verify the following conditions:

a. Make sure that condenser-fan blade is correctly positioned in fan orifice. Ensure that distance from fan hub to motor is set to 1/8" (3.175mm). Adjust if necessary (see Fig. 15).
b. Make sure that air filter(s) is in place.
c. Make sure that condensate drain trap is filled with water to ensure proper drainage.
d. Make sure that all tools and miscellaneous loose parts have been removed.

## START-UP

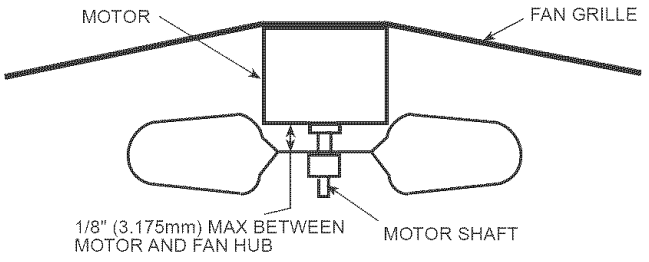
CHECK FOR REFRIGERATION LEAKS

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

1. Locate leak and make sure that refrigerant system pressure has been relieved and reclaimed from both high- and low-pressure ports.
2. Repair leak following accepted practices.

**NOTE:** Replace filter drier with factory authorized replacement whenever the system has been opened for repair.

3. Charge unit with R-410A refrigerant, using a volumetric-charging cylinder or accurate scale. *Refer to unit rating plate for required charge.*




C99009

**Fig. 15—Fan Blade Clearance**

START UP COOLING SECTION AND MAKE ADJUSTMENT

**⚠ CAUTION**

Complete the required procedures given in the Pre-Start-Up section before starting the unit. Do not jumper any safety devices when operating the unit. Do not operate the compressor when the outdoor temperature is below 55°F/12.8°C (unless accessory low-ambient kit is installed). Do not rapid-cycle the compressor. Allow 5 minutes between "on" cycles to prevent compressor damage.

CHECKING COOLING CONTROL OPERATION

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

1. Place room thermostat SYSTEM switch in OFF position. Observe that blower motor starts when FAN switch is placed in ON position and shuts down when FAN switch is placed in AUTO position.
2. Place SYSTEM switch in COOL position and FAN switch in AUTO position. Set cooling control below room temperature. Observe that compressor, condenser fan, and evaporator blower motors start. Observe that cooling cycle shuts down when control setting is satisfied. The evaporator fan will continue to run for 30 seconds.
3. When using an auto-changeover room thermostat, place both SYSTEM and FAN switches in AUTO positions. Observe that unit operates in heating mode when temperature control is set to "call for heating" (above room temperature) and operates in cooling mode when temperature control is set to "call for cooling" (below room temperature).

**IMPORTANT:** Three-phase, scroll compressor units are direction-oriented. These units must be checked to ensure proper compressor 3-phase power lead orientation. If not correct the phase monitor (See Fig. 17) will not allow power to pass through the components. Any two of the 3-phase power leads to the unit must be reversed to correct rotation.

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 R-410A charge. The charging label and the tables shown refer to system temperatures and pressures.

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

Refrigerant charge

The amount of refrigerant charge is listed on the unit nameplate. Refer to the Refrigeration Service Techniques Manual, Refrigerants section.

Unit panels must be in place when unit is operating during charging procedures.

No charge

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

Low charge cooling

Measure outdoor ambient temperature using Cooling Charging Tables. Vary refrigerant until the conditions of the tables are met. Note that charging tables are different from type normally used. Tables are based on charging the units to correct superheat for the various operating conditions. Accurate pressure gauge and temperature sensing devices are required. Connect the pressure gauge to the service port on the suction line. Mount the temperature sensing device on the suction line and insulate it so that the outdoor ambient does not affect the reading. Indoor air CFM (L/s) must be within the normal operating range of the unit.

INDOOR AIRFLOW AND AIRFLOW ADJUSTMENTS

**⚠ CAUTION**

For cooling operation, the recommended airflow is 350 to 450 cfm for each 12,000 Btuh of rated cooling capacity (165 to 212 L/s for each 3.5 kW of rated cooling capacity).

Table 6 shows cooling airflows at various external static pressures. Refer to these tables to determine the airflow for the system being installed.

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

**⚠ WARNING**

Disconnect electrical power to the unit and install lockout tag before changing blower speed. Electrical shock can cause personal injury or death.

Airflow can be changed by changing the lead connections of the blower motor.

All 50GL units are factory wired for low speed and may need to be wired for medium or high speed in the field.

FOR 400–V MOTORS

The motor leads are color coded as follows:

To change the speed of the indoor fan motor (IFM), remove fan motor speed lead from the indoor fan relay (R) and replace with the lead for the desired blower motor speed. The motor speed lead is attached to terminal BM. For all speeds, yellow must be

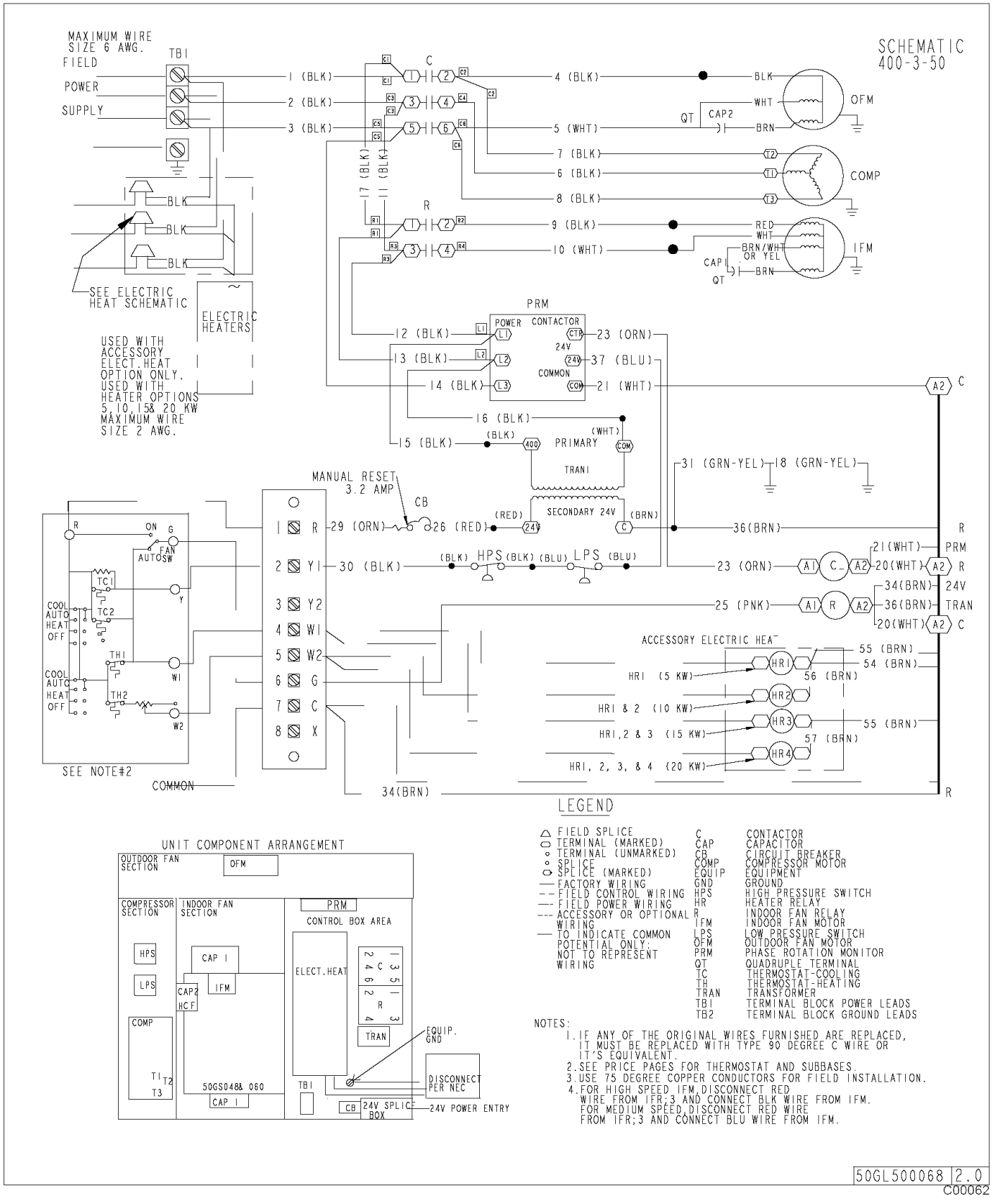



**Fig. 16—Wiring Diagram-400–3–50**

connected to the jumper wire. See Table 9 for 2 and 3 speed motor leads.*Insulate removed lead end to avoid contact with chassis parts.*

COOLING SEQUENCE OF OPERATION

With the room thermostat SYSTEM switch in the COOL position and the FAN switch in the AUTO position, the cooling sequence of operation is as follows:

When the room temperature rises to a point that is slightly above the cooling control setting of the thermostat, the thermostat completes the circuit between thermostat terminal R to terminals Y and G. These completed circuits through the thermostat connect contactor coil (C) (through unit wire Y) and blower relay coil (BR) (through unit wire G) across the 24-v secondary of transformer (TRAN).

## Table 5—Required Suction-Line Temperature (Metric)

| SUPERHEAT TEMP (°C) | SUCTION PRESSURE AT SERVICE PORT (KPA) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 424 | 443 | 463 | 483 | 503 | 524 | 546 | 568 | 591 |
| 0 | 1.7 | 2.8 | 3.9 | 5.0 | 6.1 | 7.2 | 8.3 | 9.4 | 10.6 |
| 1 | 2.8 | 3.9 | 5.0 | 6.1 | 7.2 | 8.3 | 9.4 | 10.6 | 11.7 |
| 2 | 3.9 | 5.0 | 6.1 | 7.2 | 8.3 | 9.4 | 10.6 | 11.7 | 12.8 |
| 3 | 5.0 | 6.1 | 7.2 | 8.3 | 9.4 | 10.6 | 11.7 | 12.8 | 13.9 |
| 4 | 6.1 | 7.2 | 8.3 | 9.4 | 10.6 | 11.7 | 12.8 | 13.9 | 15.0 |
| 6 | 7.2 | 8.3 | 9.4 | 10.6 | 11.7 | 12.8 | 13.9 | 15.0 | 16.1 |
| 7 | 8.3 | 9.4 | 10.6 | 11.7 | 12.8 | 13.9 | 15.0 | 16.1 | 17.2 |
| 8 | 9.4 | 10.6 | 11.7 | 12.8 | 13.9 | 15.0 | 16.1 | 17.2 | 18.3 |
| 9 | 10.6 | 11.7 | 12.8 | 13.9 | 15.0 | 16.1 | 17.2 | 18.3 | 19.4 |
| 10 | 11.7 | 12.8 | 13.9 | 15.0 | 16.1 | 17.2 | 18.3 | 19.4 | 20.6 |
| 11 | 12.8 | 13.9 | 15.0 | 16.1 | 17.2 | 18.3 | 19.4 | 20.6 | 21.7 |
| 12 | 13.9 | 15.0 | 16.1 | 17.2 | 18.3 | 19.4 | 20.6 | 21.7 | 22.8 |
| 13 | 15.0 | 16.1 | 17.2 | 18.3 | 19.4 | 20.6 | 21.7 | 22.8 | 23.9 |
| 14 | 16.1 | 17.2 | 18.3 | 19.4 | 20.6 | 21.7 | 22.8 | 23.9 | 25.0 |
| 15 | 16.7 | 17.8 | 18.9 | 20.0 | 21.1 | 22.2 | 23.3 | 24.4 | 25.6 |
| 16 | 17.2 | 18.3 | 19.4 | 20.6 | 21.7 | 22.8 | 23.9 | 25.0 | 26.1 |
| 17 | 18.3 | 19.4 | 20.6 | 21.7 | 22.8 | 23.9 | 25.0 | 26.1 | 27.2 |
| 18 | 19.4 | 20.6 | 21.7 | 22.8 | 23.9 | 25.0 | 26.1 | 27.2 | 28.3 |
| 19 | 20.6 | 21.7 | 22.8 | 23.9 | 25.0 | 26.1 | 27.2 | 28.3 | 29.4 |
| 20 | 21.7 | 22.8 | 23.9 | 25.0 | 26.1 | 27.2 | 28.3 | 29.4 | 30.6 |
| 21 | 22.8 | 23.9 | 25.0 | 26.1 | 27.2 | 28.3 | 29.4 | 30.6 | 31.7 |
| 22 | 23.9 | 25.0 | 26.1 | 27.2 | 28.3 | 29.4 | 30.6 | 31.7 | 32.8 |

## Table 6—Superheat Charging Table (Metric)

| OUTDOOR TEMP (°C) | EVAPORATOR ENTERING AIR TEMPERATURE (°C WB) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| 13 | 5.0 | 6.7 | 7.8 | 9.4 | 11.1 | 11.9 | 12.8 | 14.4 | 16.1 | 17.8 | 19.4 | 20.6 | 22.2 | 23.3 | 25.0 |
| 16 | 3.9 | 5.6 | 6.7 | 8.3 | 10.0 | 10.8 | 11.7 | 13.3 | 15.0 | 16.7 | 18.3 | 20.0 | 21.1 | 22.2 | 23.9 |
| 18 | – | 3.3 | 5.6 | 7.2 | 8.9 | 9.7 | 10.6 | 11.7 | 13.3 | 15.0 | 16.7 | 18.3 | 20.0 | 21.1 | 22.8 |
| 21 | – | – | 3.9 | 5.6 | 7.2 | 8.1 | 8.9 | 10.6 | 11.7 | 13.3 | 15.0 | 16.7 | 18.3 | 20.0 | 21.7 |
| 24 | – | – | – | 3.3 | 5.0 | 5.8 | 6.7 | 8.3 | 10.0 | 11.7 | 7.8 | 15.6 | 17.2 | 18.9 | 20.6 |
| 27 | – | – | – | – | 2.8 | 3.6 | 4.4 | 6.7 | 8.3 | 10.0 | 11.7 | 13.9 | 15.6 | 17.2 | 19.4 |
| 29 | – | – | – | – | – | – | – | 4.4 | 6.1 | 8.3 | 10.6 | 12.2 | 14.4 | 16.7 | 18.3 |
| 32 | – | – | – | – | – | – | – | 2.8 | 5.0 | 7.2 | 8.9 | 11.1 | 13.3 | 15.0 | 17.2 |
| 35 | – | – | – | – | – | – | – | – | 3.3 | 5.6 | 7.8 | 10.0 | 12.2 | 13.9 | 16.1 |
| 38 | – | – | – | – | – | – | – | – | – | 4.4 | 6.7 | 8.3 | 11.1 | 12.8 | 15.0 |
| 41 | – | – | – | – | – | – | – | – | – | 2.8 | 5.0 | 7.2 | 9.4 | 12.2 | 14.4 |
| 43 | – | – | – | – | – | – | – | – | – | – | 3.3 | 6.1 | 8.3 | 11.1 | 13.9 |
| 46 | – | – | – | – | – | – | – | – | – | – | – | 4.4 | 7.8 | 10.0 | 12.8 |

Where a dash (–) appears, do not attempt to charge system under these conditions, or refrigerant slugging may occur. Charge must be weighed in.
NOTE: Superheat °C is at low-side service port.

The normally open contacts of energized contactor (C) close and complete the circuit through compressor motor (COMP) to condenser (outdoor) fan motor (OFM). Both motors start instantly.

The set of normally open contacts of energized relay TDR close and complete the circuit through evaporator blower (indoor) fan motor (IFM).

**NOTE:** Once the compressor has started and then has stopped, it should not be started again until 5 minutes have elapsed.

The cooling cycle remains "on" until the room temperature drops to a point that is slightly below the cooling control setting of the room thermostat. At this point, the thermostat "breaks" the circuit between thermostat terminal R to terminals Y and G. These open circuits deenergize contactor coil C and relay coil TDR. The condenser and compressor motors stop. After a 30-second delay, the blower motor stops. The unit is in a "standby" condition, waiting for the next "call for cooling" from the room thermostat.

### MAINTENANCE

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

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

## Table 7—Required Suction-Line Temperature (English)

| SUPERHEAT TEMP (°F) | SUCTION PRESSURE AT SERVICE PORT (PSIG) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 61.5 | 64.2 | 67.1 | 70.0 | 73.0 | 76.0 | 79.2 | 82.4 | 85.7 |
| **0** | 35 | 37 | 39 | 41 | 43 | 45 | 47 | 49 | 51 |
| **2** | 37 | 39 | 41 | 43 | 45 | 47 | 49 | 51 | 53 |
| **4** | 39 | 41 | 43 | 45 | 47 | 49 | 51 | 53 | 55 |
| **6** | 41 | 43 | 45 | 47 | 49 | 51 | 53 | 55 | 57 |
| **8** | 43 | 45 | 47 | 49 | 51 | 53 | 55 | 57 | 59 |
| **10** | 45 | 47 | 49 | 51 | 53 | 55 | 57 | 59 | 61 |
| **12** | 47 | 49 | 51 | 53 | 55 | 57 | 59 | 61 | 63 |
| **14** | 49 | 51 | 53 | 55 | 57 | 59 | 61 | 63 | 65 |
| **16** | 51 | 53 | 55 | 57 | 59 | 61 | 63 | 65 | 67 |
| **18** | 53 | 55 | 57 | 59 | 61 | 63 | 65 | 67 | 69 |
| **20** | 55 | 57 | 59 | 61 | 63 | 65 | 67 | 69 | 71 |
| **22** | 57 | 59 | 61 | 63 | 65 | 67 | 69 | 71 | 73 |
| **24** | 59 | 61 | 63 | 65 | 67 | 69 | 71 | 73 | 75 |
| **26** | 61 | 63 | 65 | 67 | 69 | 71 | 73 | 75 | 77 |
| **28** | 63 | 65 | 67 | 69 | 71 | 73 | 75 | 77 | 79 |
| **30** | 65 | 67 | 69 | 71 | 73 | 75 | 77 | 79 | 81 |
| **32** | 67 | 69 | 71 | 73 | 75 | 77 | 79 | 81 | 83 |
| **34** | 69 | 71 | 73 | 75 | 77 | 79 | 81 | 83 | 85 |
| **36** | 71 | 73 | 75 | 77 | 79 | 81 | 83 | 85 | 87 |
| **38** | 73 | 75 | 77 | 79 | 81 | 83 | 85 | 87 | 89 |
| **40** | 75 | 77 | 79 | 81 | 83 | 85 | 87 | 89 | 91 |

## Table 8—Superheat Charging Table (English)

| OUTDOOR TEMP (°F) | EVAPORATOR ENTERING AIR TEMPERATURE (°F WB) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 50 | 52 | 54 | 56 | 58 | 60 | 62 | 64 | 66 | 68 | 70 | 72 | 74 | 76 |
| **55** | 9 | 12 | 14 | 17 | 20 | 23 | 26 | 29 | 32 | 35 | 37 | 40 | 42 | 45 |
| **60** | 7 | 10 | 12 | 15 | 18 | 21 | 24 | 27 | 30 | 33 | 35 | 38 | 40 | 43 |
| **65** | — | 6 | 10 | 13 | 16 | 19 | 21 | 24 | 27 | 30 | 33 | 36 | 38 | 41 |
| **70** | — | — | 7 | 10 | 13 | 16 | 19 | 21 | 24 | 27 | 30 | 33 | 36 | 39 |
| **75** | — | — | — | 6 | 9 | 12 | 15 | 18 | 21 | 24 | 28 | 31 | 34 | 37 |
| **80** | — | — | — | — | 5 | 8 | 12 | 15 | 18 | 21 | 25 | 28 | 31 | 35 |
| **85** | — | — | — | — | — | — | 8 | 11 | 15 | 19 | 22 | 26 | 30 | 33 |
| **90** | — | — | — | — | — | — | 5 | 9 | 13 | 16 | 20 | 24 | 27 | 31 |
| **95** | — | — | — | — | — | — | — | 6 | 10 | 14 | 18 | 22 | 25 | 29 |
| **100** | — | — | — | — | — | — | — | — | 8 | 12 | 15 | 20 | 23 | 27 |
| **105** | — | — | — | — | — | — | — | — | 5 | 9 | 13 | 17 | 22 | 26 |
| **110** | — | — | — | — | — | — | — | — | — | 6 | 11 | 15 | 20 | 25 |
| **115** | — | — | — | — | — | — | — | — | — | — | 8 | 14 | 18 | 23 |

Where a dash (–) appears, do not attempt to charge system under these conditions, or refrigerant slugging may occur. Charge must be weighed in.
NOTE: Superheat °F is at low-side service port.

## Table 9—400-V Motors
## Motor Lead Color Codes

| 3-SPEED | 2-SPEED |
|---|---|
| black = high | black = high |
| white = jumper | yellow = jumper |
| blue = medium | - |
| red = low | red = low |

## Table 10—Wet Coil Air Delivery
## Horizontal and Downflow Discharge*
## Unit 50GL (50 Hz) 024-048 (English)

| 400 VOLT | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Unit | Motor Speed | | External Static Pressure (in. wg) | | | | | | | | | |
| | | | 0.0 | 0.1 | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 | 1.0 |
| 50GL024 | Low | Watts | 303 | 305 | 303 | 300 | – | – | – | – | – | – | - |
| | | Cfm | 969 | 879 | 785 | 687 | – | – | – | – | – | – | – |
| | High | Watts | – | – | – | – | 435 | 428 | 428 | 422 | – | – | – |
| | | Cfm | – | – | – | – | 963 | 833 | 758 | 676 | – | – | – |
| 50GL030 | Low | Watts | – | 814 | 853 | 889 | 921 | 954 | 1002 | – | – | – | – |
| | | Cfm | – | 1189 | 1115 | 1041 | 971 | 903 | 833 | – | – | – | – |
| | High | Watts | – | – | – | – | – | – | – | 700 | 683 | 688 | 755 |
| | | Cfm | – | – | – | – | – | – | – | 1223 | 1142 | 1075 | 1058 |
| 50GL036 | Low | Watts | 552 | 540 | 529 | 523 | 514 | 480 | – | – | – | – | – |
| | | Cfm | 1296 | 1237 | 1167 | 1097 | 1029 | 952 | – | – | – | – | – |
| | High | Watts | – | – | – | – | – | 782 | 765 | 736 | 721 | 780 | 1002 |
| | | Cfm | – | – | – | – | – | 1467 | 1398 | 1321 | 1237 | 1165 | 1137 |
| 50GL048 | Low | Watts | 692 | 686 | 678 | 664 | 652 | 664 | 736 | – | – | – | – |
| | | Cfm | 1571 | 1509 | 1444 | 1370 | 1295 | 1240 | 1237 | – | – | – | – |
| | High | Watts | – | – | 1112 | 930 | 856 | 834 | 825 | 811 | 793 | – | – |
| | | Cfm | – | – | 1693 | 1670 | 1601 | 1521 | 1447 | 1378 | 1294 | – | – |

* Air delivery values are based on operating voltage of 400-v, wet coil, without filter or electric heater. Deduct filter and electric heater pressure drops to obtain static pressure available for ducting.

NOTES: 1. Do not operate the unit at a cooling airflow that is less than 350 cfm for each 12,000 Btuh (165 L/s for each 3.5 kW) of rated cooling capacity. Evaporator coil frosting may occur at airflows below this point.
2. Dashes indicate portions of table that are beyond the blower motor capacity or are not recommended.

## Table 11—Wet Coil Air Delivery
## Horizontal and Downflow Discharge*
## Unit 50GL (50 Hz) 024-048 (Si)

| UNIT | MOTOR SPEED | | EXTERNAL STATIC PRESSURE (PA.) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 0 | 25 | 50 | 75 | 100 | 125 | 150 | 175 | 200 | 225 | 250 |
| 50GL024 | Low | Watts | 303 | 305 | 303 | 300 | – | – | – | – | – | – | – |
| | | L/s | 458 | 415 | 371 | 324 | – | – | – | – | – | – | – |
| | High | Watts | – | – | – | – | 435 | 428 | 428 | 422 | – | – | – |
| | | L/S | – | – | – | – | 455 | 393 | 358 | 319 | – | – | – |
| 50GL030 | Low | Watts | – | 814 | 853 | 889 | 921 | 954 | 1002 | – | – | – | – |
| | | L/s | – | 561 | 526 | 491 | 458 | 426 | 393 | – | – | – | – |
| | High | Watts | – | – | – | – | – | – | – | 700 | 683 | 688 | 755 |
| | | L/S | – | – | – | – | – | – | – | 577 | 539 | 508 | 499 |
| 50GL036 | Low | Watts | 552 | 540 | 529 | 523 | 514 | 480 | – | – | – | – | – |
| | | L/s | 612 | 584 | 551 | 518 | 486 | 449 | – | – | – | – | – |
| | High | Watts | – | – | – | – | – | 782 | 765 | 736 | 721 | 780 | 1002 |
| | | L/s | – | – | – | – | – | 693 | 660 | 624 | 584 | 550 | 536 |
| 50GL048 | Low | Watts | 692 | 686 | 678 | 664 | 652 | 664 | 736 | – | – | – | – |
| | | L/s | 741 | 712 | 681 | 647 | 611 | 585 | 584 | – | – | – | – |
| | High | Watts | – | – | 1112 | 930 | 856 | 834 | 825 | 811 | 793 | – | – |
| | | L/s | – | – | 799 | 788 | 756 | 718 | 683 | 650 | 611 | – | – |

* Air delivery values are based on operating voltage of 400-v, wet coil, without filter or electric heater. Deduct filter and electric heater pressure drops to obtain static pressure available for ducting.

1. Dashes indicate portions of table that are beyond the blower motor capacity or are not recommended.

**⚠ WARNING**

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 User's Manual. FAILURE TO HEED THIS WARNING COULD RESULT IN SERIOUS PERSONAL INJURY AND POSSIBLE DAMAGE TO THIS EQUIPMENT.

**⚠ WARNING**

Failure to follow these warnings could result in serious personal injury:

1. Turn off electrical power to the unit and install lockout tag before performing any maintenance or service on the unit.
2. Use extreme caution when removing panels and parts. As with any mechanical equipment, personal injury can result from sharp edges, etc.
3. Never place anything combustible either on, or in contact with, the unit.

**⚠ CAUTION**

Errors made when reconnecting wires may cause improper and dangerous operation. Label all wires prior to disconnection 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. Each cooling season, inspect indoor coil, drain, and condensate drain line for cleanliness. Clean when necessary.
3. Inspect blower motor and wheel for cleanliness and check lubrication each heating and cooling season. Clean when necessary.
4. Check electrical connections for tightness and controls for proper operation each heating and cooling season. Service when necessary.

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 heating and cooling season or whenever the filter(s) becomes clogged with dust and lint.

EVAPORATOR BLOWER AND MOTOR

**NOTE:** All motors are prelubricated. 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**

Disconnect and tag electrical power to the unit before cleaning the blower motor and wheel. Failure to adhere to this warning could cause personal injury or death.

To clean the blower motor and wheel:

1. Remove and disassemble blower assembly as follows:
   a. Remove unit access panel.
   b. Disconnect motor leads from indoor fan relay (R).
   c. On all units, remove blower assembly from unit. Remove screws securing blower to blower partition and slide assembly out. Be careful not to tear insulation in blower compartment.
   d. Ensure proper reassembly by marking blower wheel and motor in relation to blower housing before disassembly.
   e. Loosen setscrew(s) that secures wheel to motor shaft, remove screws that secure motor mount brackets to housing, and slide motor and motor mount out of housing.
2. Remove and clean blower wheel as follows:
   a. Ensure proper reassembly by marking wheel orientation.
   b. Lift wheel from housing. When handling and/or cleaning blower wheel, be sure not to disturb balance weights (clips) on blower wheel vanes.
   c. Remove caked-on dirt from wheel and housing with a brush. Remove lint and/or dirt accumulations from wheel and housing with vacuum cleaner, using soft brush attachment. Remove grease and oil with mild solvent.
   d. Reassemble wheel into housing.
   e. Reassemble motor into housing. Be sure setscrews are tightened on motor shaft flats and not on round part of shaft.
   f. Reinstall unit access panel.
3. Restore electrical power to unit. Start unit and check for proper blower rotation and motor speeds during heating and cooling cycles.

CONDENSER COIL, EVAPORATOR COIL, AND CONDENSATE DRAIN

Inspect the condenser coil, evaporator coil, and condensate drain 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 and condensate drain line when inspecting the coils. Clean the drain and condensate drain line by removing all foreign matter from the drain. Flush the drain and drain tube with clear water. Do not splash water on the insulation, motor, wiring, or air filter(s). If the drain tube is restricted, clear it with a "plumbers snake" or similar probe device. Ensure that the auxiliary drain port above the drain tube is also clear.

CONDENSER FAN

**⚠ CAUTION**

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

1. Remove 6 screws holding condenser grille and motor to top cover.
2. Turn motor/grille assembly upside down on top cover to expose the fan blade.
3. Inspect the fan blades for cracks or bends.
4. If fan needs to be removed, loosen the setscrew and slide the fan off the motor shaft.
5. When replacing fan blade, position blade so that the hub is 1/8 in. (3.2 mm) away from the motor end.
6. Ensure that setscrew engages the flat area on the motor shaft when tightening
7. Replace grille.

ELECTRICAL CONTROLS AND WIRING

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

Remove access panel to locate all the electrical controls and wiring. Check all electrical connections for tightness. Tighten all screw connections.

After inspecting the electrical controls and wiring, replace the access panel. Start the unit, and observe at least one complete heating cycle and one complete cooling cycle to ensure proper operation. If discrepancies are observed in either or both operating cycles, 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 checkouts.

**NOTE:** Refer to the heating and/or cooling sequence of operation in this publication as an aid in determining proper control operation

REFRIGERANT CIRCUIT

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

**⚠ WARNING**

System under pressure. Relieve pressure and recover all refrigerant before system repair or final unit disposal to avoid personal injury or death. Use all service ports and open all flow-control devices, including solenoid valves.

If oil is detected or if low cooling performance is suspected, leak-test all refrigerant tubing using an electronic leak-detector, halide torch, 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 cooling performance is suspected, refer to Checking and Adjusting Refrigerant Charge section.

EVAPORATOR AIRFLOW

The heating and/or cooling air-flow 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.* When necessary, refer to Indoor Airflow and Airflow Adjustments section to check the system airflow.

HIGH FLOW VALVES

Located on the compressor hot gas and suction tubes are High Flow Valves. Large, black plastic caps distinguish those valves with o-rings located inside the caps. These valves cannot be accessed for service in the field. Ensure the plastic caps are in place and tight or the possibility of refrigerant leakage could occur.

PHASE MONITOR CONTROL

**⚠ CAUTION**

1. 3–phase scroll compressors are rotational sensitive
2. A flashing LED on phase monitor (See Fig. 17) indicates reverse rotation.
3. This will not allow contactor to be energized
4. Disconnect power to unit and interchange 2 field wiring leads on unit contactor.

Follow these steps to properly start up the system:

1. Fully back seat (open) liquid and vapor-tube service valves.
2. Unit is shipped with valve stem(s) front seated (closed) and caps installed. Replace stem caps after system is opened to refrigerant flow. Replace caps finger-tight and tighten with wrench an additional 1/12 turn for back-seating valves (male square stem).
3. Close electrical disconnects to energize system.
4. Set room thermostat desired temperature. Be sure set point is below indoor ambient temperature.
5. Set room thermostat to COOL and fan control to ON or AUTO mode, as desired. Operate unit for 15 minutes. Check system refrigerant charge.

SEQUENCE OF OPERATION

Turn on power to indoor and outdoor unit. Transformer is energized.

On a call for cooling, thermostat make circuits R-Y and R-G. On three phase models with scroll compressors, the units are equipped with a phase monitor (See Fig. 17) to detect if the incoming power is correctly phased for compressor operation. If the phasing is correct, circuit R-Y energizes contactor, starting outdoor fan motor and compressor circuit. R-G energizes indoor unit blower relay, starting indoor blower motor on high speed.

**NOTE:** If the phasing is incorrect, the contactor will not be energized. To correct the phasing, interchange any two of the three power connections on the field side.

When the thermostat is satisfied, its contacts open, de-engergizing contactor and blower relay. Compressor and motors stop.

If indoor unit is equipped with an off-delay circuit, the indoor blower can be run up to an additional 120 sec to increase the system efficiency.

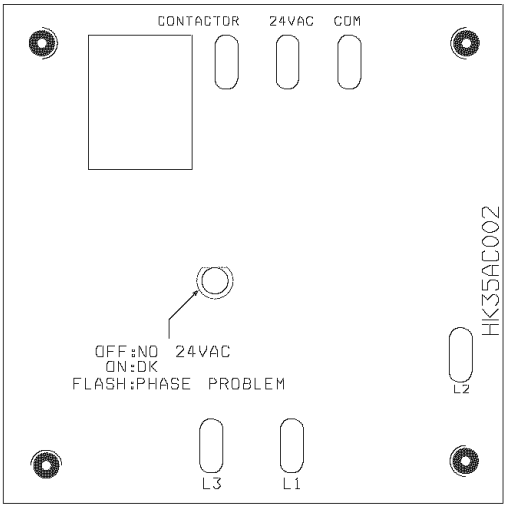
PURON® SYSTEM ITEMS

METERING DEVICE — ACCURATOR PISTON

This metering device is a fixed orifice and is contained in the brass hex-body in the liquid line.

PRESSURE SWITCHES

Pressure switches are protective devices wired into the 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. Other refrigerant pressure switches**must not** be used as replacements for the Puron (R-410A) air conditioner.




A00010

| LED | STATUS |
|---|---|
| OFF | No Call for compressor operation |
| FLASHING | Reversed phase |
| ON | Normal |

**Fig. 17—Phase Monitor Control and LED Indicators**

LOSS OF CHARGE/LOW-PRESSURE 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 (138 kpa). If system pressure is above this, switch should be closed.

To check switch:

1. Turn off all power to unit.
2. Install lockout tag.
3. Disconnect leads on switch.
4. Apply ohmmeter 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.

HIGH-PRESSURE SWITCH

The high-pressure switch is located in the discharge line and protects against excessive condenser coil pressure. It opens at 610 psig (4206 kpa).

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

To check switch:

1. Turn off all power to unit.
2. Install lockout tag.
3. Disconnect leads on switch.
4. Apply ohmmeter leads across switch. You should have continuity on a good switch.

COPELAND PURON SCROLL COMPRESSOR

**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**

Wear safety glasses and gloves when handling refrigerants. Keep torches and other ignition sources away from refrigerants and oils. Failure to follow this warning can cause a fire, serious injury, or death.

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 a phase monitoring device (See Fig. 17) and an internal pressure relief port. The phase monitoring device will not allow power to pass to the components if the phase is connected incorrectly. The internal compressor 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 (3792 and 4309 kpa) differential pressure.

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

REFRIGERANT

**⚠ CAUTION**

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. Gage set, hoses, and recovery system must be designed to handle Puron. If you are unsure, consult the equipment manufacturer. Failure to use Puron compatible servicing equipment or replacement components may result in property damage or injury.

COMPRESSOR OIL

The compressor in this system uses a polyolester (POE) oil, Mobil 3MA POE. This oil is extremely hygroscopic, meaning it absorbs

## 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 (2758 kpa). 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 (5171 kpa) high-side and 200 psig (1379 kpa) low-side with 520 psig (3585 kpa) low-side retard.
- Use hoses with 750 psig (5171 kpa) 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 (4137 kpa).
- 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.
- Always replace filter drier after opening system for service.
- 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.

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 SYNTHETIC ROOFS

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, replacing refrigerant components such as filter drier, pressure switch, metering device, coil, accumulator, or reversing valve.

**Synthetic Roof Precautionary Procedure**

The Following precautions must be taken when dealing with a synthetic roof.

1. Cover extended roof working area with an impermeable polyethylene (plastic) drip cloth or tarp. Cover an approximate 10 x 10 ft. (3 x 3 m) area.
2. Cover area in front of the unit service panel with a terry cloth shop towel to absorb lubricant spills, 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.

### TROUBLESHOOTING

Refer to the *Troubleshooting–Cooling* chart (Table 7) for troubleshooting information.

### START-UP CHECKLIST

Use the Start-Up checklist to ensure proper start-up procedures are followed.

## Table 12—Troubleshooting Chart

| SYMPTOM | CAUSE | REMEDY |
|---|---|---|
| **Compressor and outdoor fan will not start** | Power Failure | Call power company |
| | Fuse blown or circuit breaker tripped | Replace fuse or reset circuit breaker |
| | Defective thermostat, contactor, transformer, control relay, high pressure or loss-of-charge switch | Replace component |
| | Insufficient line voltage | Determine cause and correct |
| | Incorrect or faulty wiring | Check wiring diagram and rewire correctly |
| | Thermostat setting too high | Lower thermostat setting below room temperature |
| | Phase Monitor/Sensing incorrect phasing to compressor | Reverse any two incoming power leads to unit. |
| | No Power to Componenets | See if Red light is blinking on phase monitor |
| **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 overload | Determine cause and replace |
| | One leg of 3-phase power dead | Replace fuse or reset circuit breaker. Determine cause |
| **Compressor cycles (other than normally satisfying thermostat)** | Refrigerant overcharge or undercharge | Recover refrigerant, evacuate system, and recharge to capacities shown on nameplate |
| | Defective compressor | Replace and determine cause |
| | Insufficient line voltage | Determine cause and correct |
| | Blocked condenser | Determine cause and correct |
| | Defective overload | Determine cause and replace |
| | Defective thermostat | Replace thermostat |
| | Faulty condenser-fan motor | 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 |
| | Thermostat set too low | Reset thermostat |
| | Low refrigerant charge | Locate leak, repair, and recharge |
| | Air in system | Recover refrigerant, evacuate system, and recharge |
| | | |
| | | |
| **Condenser coil dirty or restricted** | Clean coil or remove restriction | |
| | Contactor Stuck Closed | Replace failed Contactor |
| **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 |
| | 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<br>Check filter – replace if necessary |
| | Temperature too low in conditioned area | Reset thermostat |
| | Outdoor ambient below 55°F/12.8°C | Install low-ambient kit |
| | Field-installed filter-drier restricted | Replace |

## START-UP CHECKLIST
## (REMOVE AND STORE IN JOB FILE)

**I. PRELIMINARY INFORMATION**

Model No .....

Serial No .....

Date .....

Technician .....

**II. PRE-START-UP**

_____ Verify that all packing materials have been removed from unit

_____ Verify that condensate connection is installed per installation instructions

_____ Check all electrical connections and terminals for tightness

_____ Check that indoor (evaporator) air filter is clean and in place

_____ Verify that unit installation is level

_____ Check fan wheel propeller for location in housing and setscrew tightness

**III. START-UP**

Supply Voltage L1-L2 _____ L2-L3 _____ L3-L1 _____

Compressor Amps L1 _____ L2 _____ L3 _____

Indoor (Evaporator) Fan Amps _____

**TEMPERATURE**

Outdoor (Condenser) Air Temperature _____ DB

Return-Air Temperature _____ DB _____ WB

Cooling Air Supply_____ DB _____WB

**PRESSURES**

Refrigerant Suction _____ psig

Suction Line Temp* _____

Refrigerant Discharge _____ psig

Discharge Temp† _____

_____ Verify refrigerant charge using charging tables

_____ Verify that 3–phase scroll compressor is rotating in correct direction.

* Measured at suction inlet to compressor

† Measured at liquid line leaving condenser