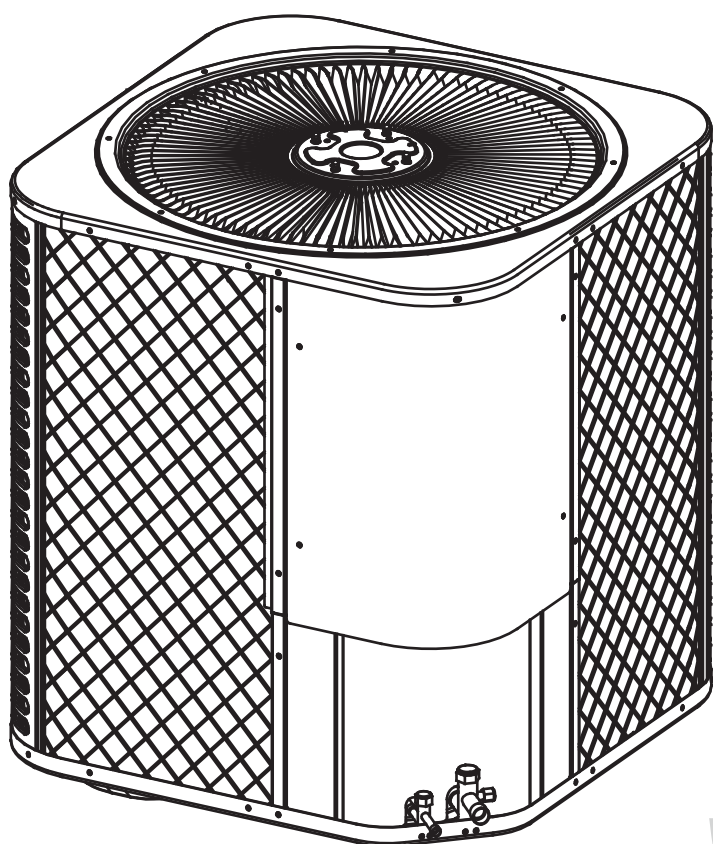


VERTICAL DISCHARGE AIR CONDITIONER

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# Installation Manual



**IMPORTANT NOTE:**

Read this manual carefully before installing or operating your new air conditioning unit. Make sure to save this manual for future reference.



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This document is customer property and is to remain with this unit.

These instructions do not cover all the different variations of systems nor do they provide for every possible contingency encountered in installation.

All phases of this installation must comply with national, state, and/or local regulations. If additional information is required, please contact your local distributor.

## 1.0 SAFETY

 This is a safety alert symbol. When you see this symbol on labels or in manuals, be alert to the potential for personal injury.


 This is an attention alert symbol. When you see this symbol on labels or in manuals, be alert to the potential for personal injury.

Understand and pay particular attention to the signal words **DANGER**, **WARNING**, or **CAUTION**.


**DANGER** indicates an imminently hazardous situation which could result in death or serious injury.

**WARNING** indicates a potentially hazardous situation which could result in death or serious injury.


**CAUTION** indicates a potentially hazardous situation which could result in minor or moderate injury. It is also indicates unsafe practices and hazards involving only property damage.

 **WARNING**

The improper installation, adjustment, alteration, or service or maintenance of this product may create situations where operation could cause personal injury or property damage. Refer to this manual for assistance or, for additional information, consult a qualified contractor, installer, or service agency.

 **CAUTION**

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

 **WARNING**

**FIRE OR ELECTRICAL HAZARD**  
Failure to follow the safety warnings exactly could result in serious injury, death, or property damage.  
A fire or electrical hazard may result, causing property damage, personal injury, or death.

The appliance should be installed in accordance with national wiring regulations.

Do not operate the unit in a wet room such as a bathroom or a laundry room.

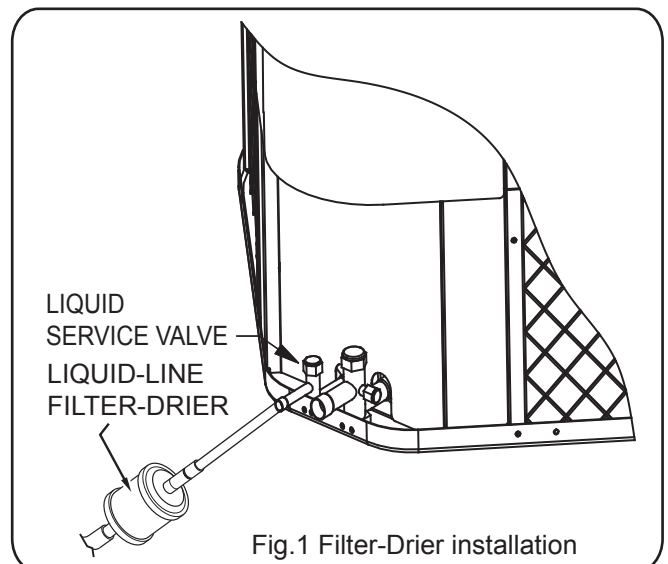
An all-pole disconnection device which has at least 3mm separation distance in all poles, leakage current exceeding 10mA and a residual current device (RCD) with a rating not exceeding 30mA must be incorporated in the fixed wiring according to national regulations.

## 1.1 INSPECTION

As soon as you receive the unit, inspect it for possible damage during transit. If damage is evident, note the extent of the damage on the carrier's delivery receipt. A separate request for inspection by the carrier's agent should be made in writing. See "Local Distributor" for more information.

Requirements For Installing/Serviceing R22 Equipment

- Gauge sets, hoses, refrigerant containers, and recovery systems must be equipped to handle POE- or PVE-type oils.
- Manifold sets should be 800 PSIG high side and 250 PSIG low side with 550 PSIG low side restart.
- All hoses must have a 700 PSIG service pressure rating.
- Leak detectors should be equipped to detect refrigerant.
- Recovery equipment (including refrigerant recovery containers) must be specifically designed to handle R22.
- Do not use an R410A TXV.
- A liquid-line filter drier is required on every unit. (See Fig.1)(some models)



## 1.2 LIMITATIONS

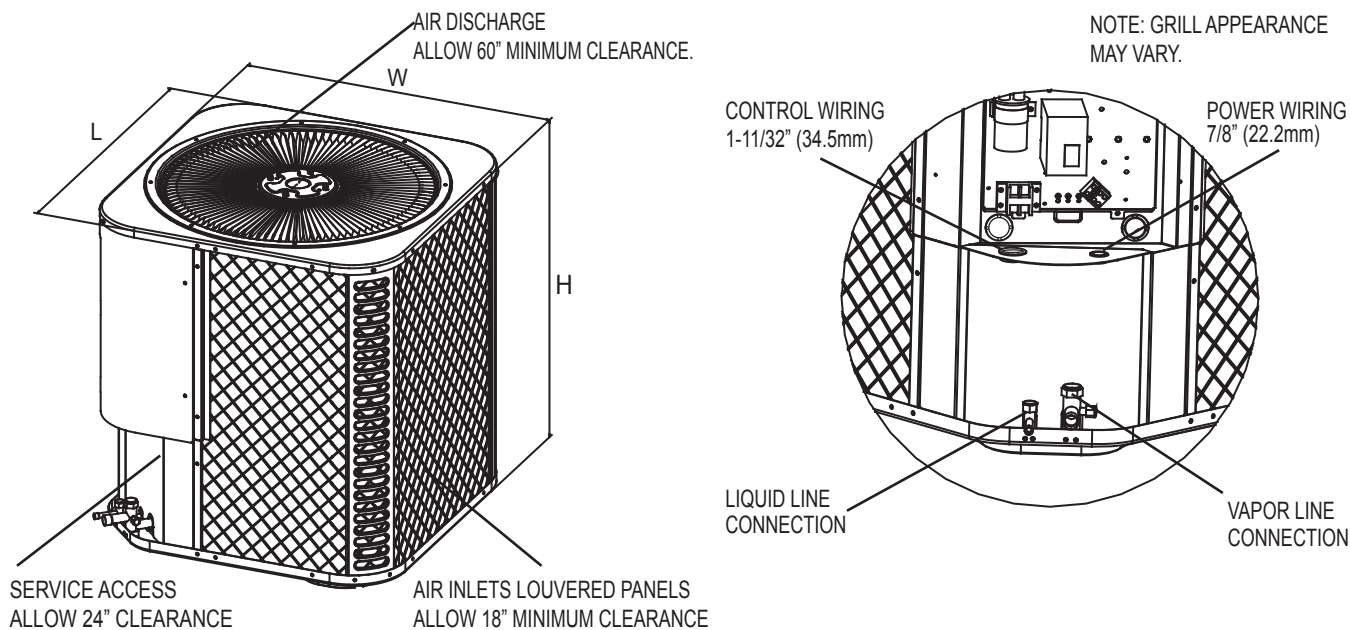
The unit must be installed in accordance with all national, state, and local safety codes and the limitations listed below:

1. Limitations for the indoor unit, coil, and appropriate accessories must be observed.
2. The outdoor unit must not be installed with any duct work having been performed in the air stream. The outdoor fan is a propeller type and not designed to operate against any additional external static pressure.
3. The maximum and minimum conditions for operation must be observed to assure that the system will give maximum performance with minimum servicing.
4. This unit is not designed to operate with a low ambient kit. Do not modify the control system to operate with any kind of low ambient kit.
5. The maximum allowable line length for this product is 75 feet.

## 2.0 GENERAL

Outdoor units are designed to be connected to a matching indoor coil with sweat connect lines. Sweat connect units are factory charged with refrigerant for a matching indoor coil and come with 25 feet of field-supplied lines included.

Matching indoor coils are available with a thermal expansion valve or an orifice liquid feed sized for the most common usage. The orifice size and/or refrigerant charge may need to be changed for some indoor-outdoor unit combinations or contingent on elevation differences, or total line lengths.



DIMENSIONAL DATA

FIG.2 DIMENSIONS

Unit Model (Btu/h)	Dimensions (Inches)			Refrigerant Connection Service Valve Size	
	"H" in [mm]	"W" in [mm]	"L" in [mm]	Liquid in	Vapor in
18000	24-15/16[633]	23-5/8[600]	23-5/8[600]	1/4	1/2
24000	24-15/16[633]	23-5/8[600]	23-5/8[600]	3/8	5/8
36000	24-15/16[633]	23-5/8[600]	23-5/8[600]	3/8	3/4
36000	29-7/8[759]	23-5/8[600]	23-5/8[600]	3/8	3/4
36000	24-15/16[633]	23-5/8[600]	23-5/8[600]	3/8	3/4
36000	24-15/16[633]	23-5/8[600]	23-5/8[600]	3/8	7/8
36000	29-7/8[759]	23-5/8[600]	23-5/8[600]	3/8	3/4
36000	24-15/16[633]	28[710]	28[710]	3/8	3/4
36000	29-7/8[759]	28[710]	28[710]	3/8	3/4
48000	29-7/8[759]	28[710]	28[710]	3/8	3/4
48000	29-7/8[759]	28[710]	28[710]	3/8	7/8
48000	29-7/8[759]	23-5/8[600]	23-5/8[600]	3/8	3/4
60000	29-7/8[759]	23-5/8[600]	23-5/8[600]	3/8	3/4
60000	29-7/8[759]	28[710]	28[710]	3/8	3/4
60000	33-3/16[843]	28[710]	28[710]	3/8	3/4

### 3.0 UNIT INSTALLATION

#### 3.1 LOCATION

Before starting installation, evaluate the suitability of the prospective locations for both the indoor and outdoor units. Observe all limitations and clearance requirements. The outdoor unit must have sufficient clearance to allow air to enter the condenser coil and for air discharge and service access purposes. (See Fig. 5)

The unit may be installed at ground level on a solid base that will not shift or settle, thereby putting strain on the refrigerant lines and causing possible leaks. Maintain the clearances shown in Fig.5 and install the unit in a level position.

Normal operating sound levels may be objectionable if the unit is placed directly under the windows of certain rooms (bedrooms, studies, etc.).

To prevent hindrance, no objects should be placed less than 6 feet above the unit discharge area.

**NOTE**

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For multiple unit installations, units must be spaced a minimum of 18 inches apart (coil face to coil face).

**WARNING**

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The outdoor unit should not be installed in an area where mud or ice could cause personal injury.

If the unit is to be installed on an exposed roof or a black-topped ground area, particularly in a sunny climate, the unit should be raised sufficiently above the roof or ground to prevent the accumulated layer of hot air from entering the outdoor unit.

Elevate the unit sufficiently to prevent any blockage of the air entrances by snow in areas where snow may accumulate. Check with your local weather bureau for anticipated snowfall in your area. Isolate the unit from rain gutters to avoid any possible washout of the foundation.

Provide adequate structural support.

#### 3.2 GROUND INSTALLATION

### 3.3 ROOF INSTALLATION

When installing units, make sure the structure is capable of supporting the total weight of the unit, including features such as a padded frame unit and rails, which are used to minimize the transmission of sound or vibration into the conditioned space.

### 3.4 UNIT PLACEMENT

1. Provide a base in the predetermined location.
2. Remove the shipping carton and inspect for possible damage.
3. Confirm that compressor tie-down bolts remain tight.
4. Position the unit on the base provided.

The outdoor unit must be connected to the indoor coil using field-supplied refrigerant grade copper tubing that is clean and dry internally. Units should be installed only with the prescribed tubing sizes for approved system combinations. The charge given is applicable for total tubing lengths up to 25 feet.

The maximum length of refrigeration lines that extend from outdoor to indoor units is 75 feet.

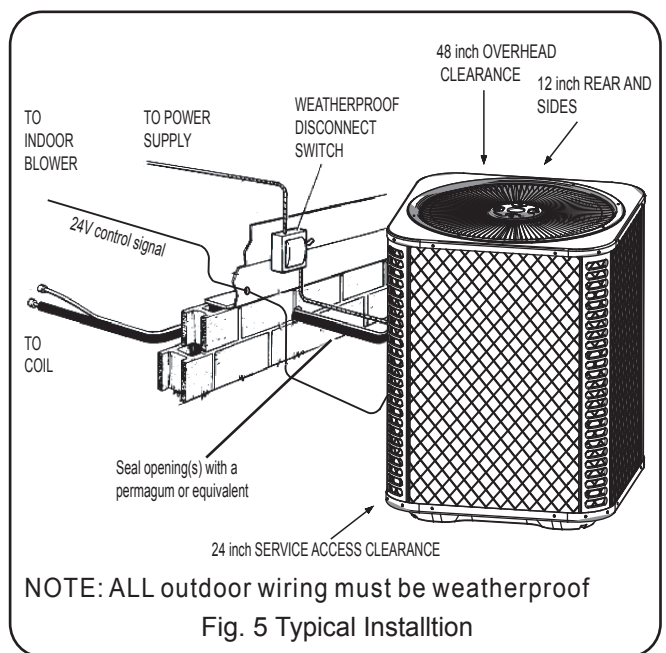
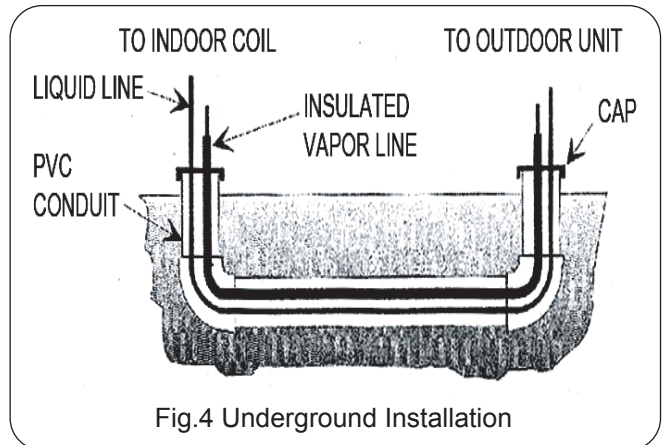
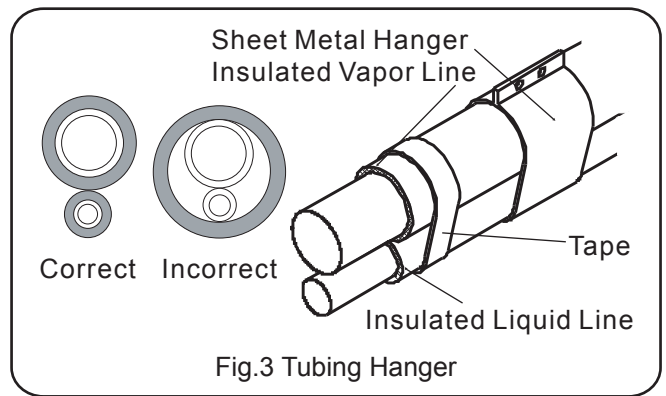


#### NOTE

Using a larger-than-specified line length could result in oil return problems. Using too short a line will result in loss of capacity and other problems caused by insufficient refrigerant flow. Slope horizontal vapor lines at least 1" every 20 feet toward the outdoor unit to facilitate proper oil return.

### 3.5 PRECAUTIONS DURING LINE INSTALLATION

1. Install the lines with as few bends as possible. Take care not to damage the couplings or kink the tubing. Use clean hard drawn copper tubing where no appreciable amount of bending around obstruction is necessary. If soft copper must be used, take care to avoid sharp bends which may cause a restriction.
2. The lines should be installed so that they will not obstruct service access to the coil, air handling system, or filter.
3. Care must also be taken to isolate the refrigerant lines in order to minimize noise transmission from the equipment to the structure.
4. The vapor line and liquid line must be insulated with a minimum of 1/2" foam rubber insulation (Armaflex or an equivalent). Tape and suspend the refrigerant lines as shown. DO NOT allow metal-to-metal contact between tubes. (See Fig. 4)
5. Use PVC piping as a conduit for all underground installations (see Figure 4). Buried lines should be kept as short as possible to minimize the build up of liquid refrigerant in the vapor line during long shutdown periods.
6. Pack fiberglass insulation and a sealing material such as permagum around refrigerant lines where they penetrate a wall to reduce vibration and retain flexibility.



### 3.6 PRECAUTIONS DURING BRAZING OF LINES

All outdoor unit and evaporator coil connections are copper-to-copper and should be brazed with a phosphorous-copper alloy material such as Silfos-5 or an equivalent. DO NOT use a soft solder. The outdoor units have reusable service valves on both the liquid and vapor connections. The total system refrigerant charge is retained within the outdoor unit during shipping and installation. Reusable service valves are provided to evacuate and charge per this instruction. Serious service problems can be avoided by taking adequate precautions to ensure an internally clean and dry system.





## CAUTION

Dry nitrogen must be supplied through the tubing while the tubing is being brazed. The flow of dry nitrogen should continue until the joint has cooled. Always use a pressure regulator and safety valve to ensure that only low pressure dry nitrogen is introduced into the tubing. Only a small flow is necessary to displace air and prevent oxidation.

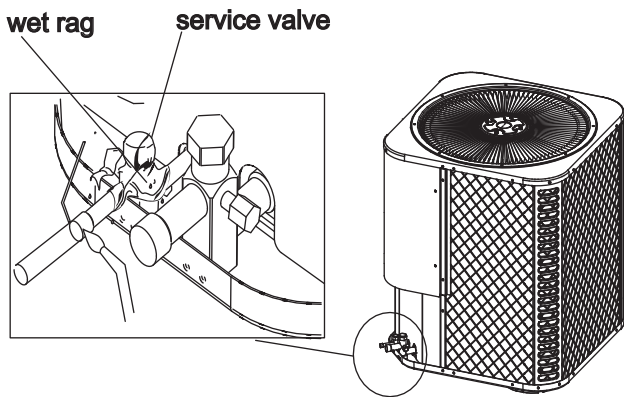
### 3.7 PRECAUTIONS DURING BRAZING SERVICE VALVE

Take precaution to prevent heat damage to the service valve by wrapping a wet rag around it as shown in Fig. 6. Also, protect all painted surfaces and insulation, during brazing. After brazing, cool the joint with a wet rag.

The valve can be opened by removing the plunger cap, fully inserting a hex wrench into the stem, and backing out counter-clockwise until the valve stem is just touching the chamfered retaining wall.

Connect the refrigerant lines using the following procedure:

1. Remove the cap and Schrader valve core from both the liquid and vapor service valve service ports on the outdoor unit. Connect low-pressure nitrogen to the liquid line.



**Fig.6 Heat Protection**

2. Braze the liquid line to the liquid valve on the outdoor unit. Be sure to wrap the valve body with a wet rag. Allow the nitrogen to continue flowing. Refer to the Tabular Data Sheet for proper liquid line sizing.
3. Carefully remove the rubber plugs from the evaporator liquid and vapor connections on the indoor coil.
4. Braze the liquid line to the evaporator liquid connection. Nitrogen should be flowing continually through the evaporator coil.
5. Slide the plastic cap away from the vapor connection at the indoor coil. Braze the vapor line to the evaporator vapor connection. Refer to Table 1 for proper vapor line sizing.
6. Protect the vapor valve with a wet rag and braze the vapor line connection to the outdoor unit. The nitrogen flow should be exiting the system from the vapor service port connection. After this connection has cooled, remove the nitrogen source from the liquid fitting service port.
7. Replace the Schrader valve core in the liquid and vapor valves.
8. Leak test all refrigerant piping connections including the service port flare caps to be sure they are leak tight. **DO NOT OVER-TIGHTEN** (between 40 and 60 inch-lbs. maximum).
9. Evacuate the vapor line, evaporator, and the liquid line to 500 microns or less.

Table 1: Refrigerant Connections and Recommended Liquid and Vapor Tube Diameters (In.)

UNIT	LIQUID	VAPOR	LIQUID(LONG-LINE)
SIZE	Tube Diameter		
24K	3/8	5/8	3/8
36K	3/8	3/4	3/8
48K	3/8	3/4	3/8
60K	3/8	3/4	3/8



## NOTE

1. Tube diameters are for lengths up to 50 equivalent ft and/or 20 ft vertical differential.
2. Do not increase or decrease tubing sizes.



## NOTE

You can pressurize the line set and indoor coil to 250 psig with dry nitrogen and leak test with a bubble type leak detector. The nitrogen charge should then be released. Do not use the system refrigerant in the outdoor unit to purge or leak test.

10. Replace cap on service ports. Do not remove the flare caps from the service ports except when necessary for system.



## CAUTION

Do not connect manifold gauges unless trouble is suspected. Approximately 3/4 ounce of refrigerant will be lost each time a standard manifold gauge is connected.

11. Release the refrigerant charge into the system. Open both the liquid and vapor valves by removing the plunger cap and with an hex wrench, back out counter-clockwise until valve stem is just touching the chamfered retaining wall.
12. Replace plunger cap finger-tight, then tighten an additional 1/12 turn (1/2 hex flat). The cap must be replaced to prevent leaks.



## WARNING

Never attempt to repair any brazed connections while the system is under pressure. This may result in personal injury.

See the "System Charge" section for details on checking and recording system charge.

### 3.8 FACTORY-APPROVED TIE-DOWN METHOD

#### IMPORTANT NOTE:

These instructions are intended as a method to tie down systems to cement slabs as a securing procedure for high and windy areas. It is recommended that you check local codes for tie-down methods and protocols.

Step 1: Prior to installation, clear the pad of debris.

Step 2: Ensure that the cement pad is level.

#### IMPORTANT

The cement pad must be composed of HVAC-approved materials and be of the proper thickness to accommodate fasteners.

Step 3: Center unit onto pad.

Step 4: Fasten 4 L-shaped stainless steel braces onto the cabinet base using 4 1/4" \* 1/2" hex washer head stainless steel self-tapping screws where indicated by Detail A in Fig.7.

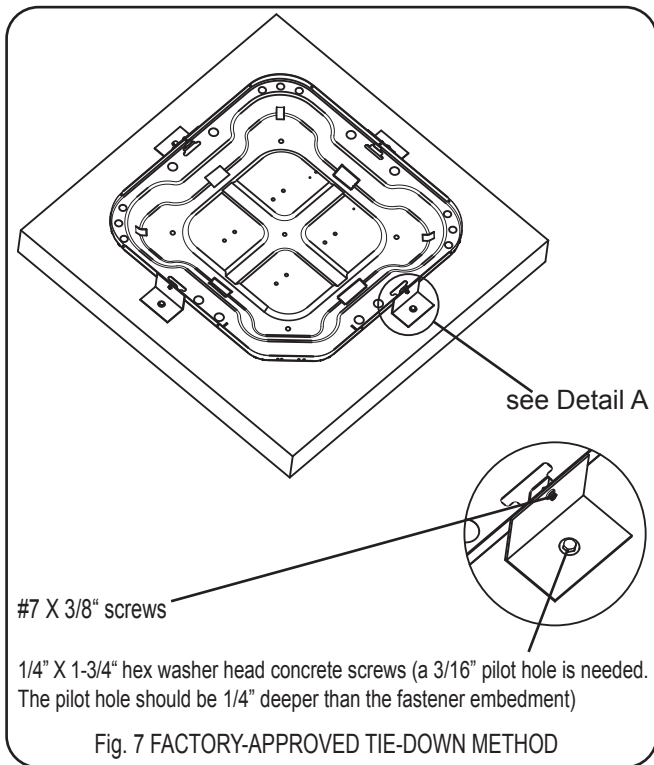


Fig. 7 FACTORY-APPROVED TIE-DOWN METHOD

**IMPORTANT**

Do not use screws longer than the indicated 1/4" \* 2/3" and make sure that the brace is attached on the center of the base bar as indicated in Fig. 7. Damage to the system may otherwise occur .

- Step 5: Drill 4 holes into the cement base ensuring holes are 2 1/2" dp.
- Step 6: Assemble unit on cement pad using 4 1/4" \* 2" hex washer head cement screws. Make sure not to over-tighten.
- Step 7: Finish unit assembly process as indicated in the installation manual.

REQUIRED PARTS LIST	
NOTE: ALL PARTS ARE AVAILABLE THROUGH LOCAL HARDWARE SUPPLIER	
DESCRIPTION	QUANTITY
1/4" X 3/8" hex washer head concrete screws	4
1/8" X 1-1/2" X W (width of unit +4") metal straps	4
3/8" washers	4

**3.9 REMOVING THE TOP PANEL AND MOTOR**

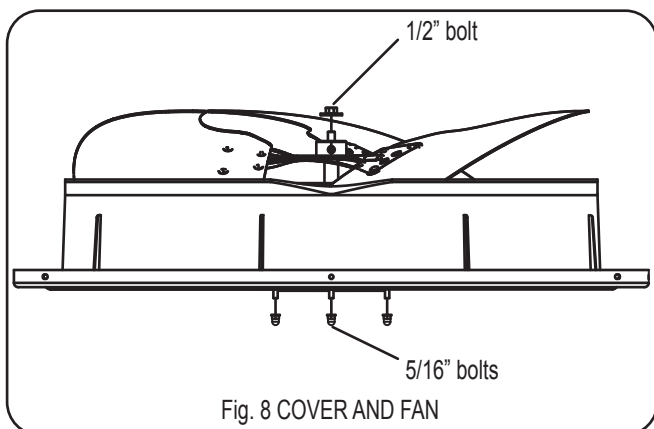


Fig. 8 COVER AND FAN

When the motor requires changing, do the following:

- Step 1: Go into the electrical panel and disconnect the motor power lines.

**IMPORTANT NOTE**

Disconnect the main power to the unit. Severe burns and electrical shock may otherwise occur if this is not done.

- Step 2: Remove the cover (be careful of motor wires).
- Step 3: Be sure to place fan cover unit on the ground as indicated in Fig. 8.

**IMPORTANT NOTE**

Do not place fan blades on ground or lean them against surfaces.

- Step 4: Remove the fan motor by removing the 4 5/16" bolts from the cover.
- Step 5: Remove the fan blade from the motor by removing 1 1/2" and placing the fan on the ground.

- Step 6: Perform the removal process in reverse to reinstall the fan and motor.

**IMPORTANT NOTE**

When connecting motor wires be sure to check motor direction.

**4.0 ELECTRICAL CONNECTIONS**

**4.1 GENERAL INFORMATION & GROUNDING**

Check that the electrical supply meets the values specified on the unit nameplate and wiring label.

Power wiring, control (low voltage) wiring, disconnect switches and over current protection must be supplied by the installer. Wires should be sized according to requirements.



**CAUTION**

All field wiring **MUST USE COPPER CONDUCTORS ONLY** and comply with local and national fire, safety, and electrical codes. This unit must be grounded with a separate ground wire in accordance with the local and national codes.

The complete connection diagram and schematic wiring label is located on the inside surface of the unit service access panel and in this manual.

**4.2 FIELD CONNECTIONS POWER WIRING**

1. Install the properly sized weatherproof disconnect switch outdoors and within sight of the unit.
2. Remove the screws at the side of the corner cover. Slide the corner cover down and remove from the unit. (See Fig. 9)
3. Run power wiring from the disconnect switch to the unit.
4. Route wires from the disconnect through the power wiring opening provided and into the unit control box.

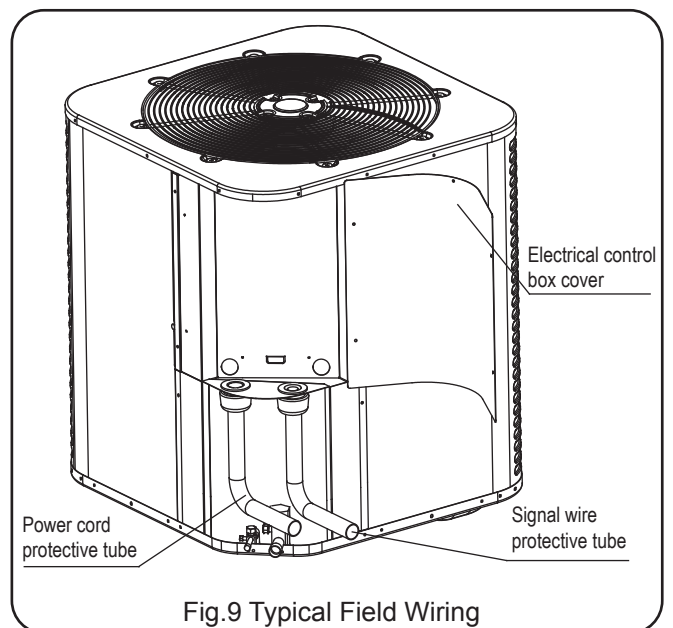


Fig.9 Typical Field Wiring

5. Install proper sized time-delay fuses or the circuit breaker, and enable the power supply connections.
6. Energize the crankcase heater if it is equipped to save time by preheating compressor oil while the remaining installation is completed.

Note: When changing the motor, please replace the cover first.

## 5.0 EVACUATION

It will be necessary to evacuate the system to 500 microns or less. If a leak is suspected, leak test with dry nitrogen to locate the leak. Repair the leak and then test again.

To verify that the system has no leaks, simply close the valve to the vacuum pump suction to isolate the pump and hold the system under the vacuum. Watch the micron gauge for a few minutes. If the micron gauge indicates a steady and continuous rise, this indicates a leak. If the gauge shows a rise, then levels off after a few minutes, and remains fairly constant, it's an indication that the system is leak-free but still contains moisture and may require further evacuation if the reading is above 500 microns.

## 6.0 SYSTEM CHARGE



### CAUTION

R22 refrigerant cylinders are rose colored and have a dip tube which allows liquid to flow out of the cylinder in the upright position. Always charge the system slowly with the tank in the upright position.

The factory charge in the outdoor unit includes enough charge for the unit, a 25 ft. line set, and the match indoor coil. Some indoor coil matches may require an additional charge. See the tabular data sheet provided in the unit literature packet for detailed charge requirements.



### CAUTION

Do not leave the system exposed to the surrounding atmosphere. Any moisture absorbed by the mineral oil in the system may damage the unit. This type of oil is highly susceptible to moisture absorption.

The TOTAL SYSTEM CHARGE must be permanently stamped on the unit data plate.

Total system charge is determined as follows:

1. Determine the outdoor unit charge from the tabular data sheet.
2. Determine the indoor coil adjustment from the tabular data sheet.
3. Calculate the line charge using the tabular data sheet if the line length exceeds 25 feet.
4. Total system charge = item 1 + item 2 + item 3.
5. Permanently stamp the unit data plate with the total amount of refrigerant in the system. Use the following subcooling charging method whenever additional refrigerant is required for system charge. A superheat charging method is not suitable for TXV equipped systems.



### CAUTION

Refrigerant charging should only be carried out by a qualified air conditioning contractor.

## 6.1 MEASUREMENT METHOD

If a calibrated charging cylinder or an accurate weighing device is available, add the refrigerant accordingly.



### CAUTION

Compressor damage will occur if the system is improperly charged. On new system installations, charge the system as per the tabular data sheet for the matched coil and follow the guidelines in this instruction manual.

Check that the flare caps on service ports are leak tight. **DO NOT OVER-TIGHTEN (between 40 and 60 inch-lbs maximum).**

## 6.2 SUB-COOLING CHARGING METHOD.

For the cooling operation, the recommended subcooling is typically around 10 °F. This may vary significantly between systems.

1. Set the system running in cooling mode by setting the thermostat at least 6°F below room temperature.
2. Operate the system for a minimum of 15-20 minutes.
3. Refer to the tabular data sheet for the recommended airflow and verify this indoor airflow (it should be about 400 SCFM per ton).
4. Measure the liquid refrigerant pressure "P" and temperature "T" at the service valve
5. Calculate the saturated liquid temperature "ST" from Table 2 on the last page of this document.
6. Subcooling temperature "TC" = Saturated Temperature (ST) - Liquid Temp (T).

Example: The pressure "P" and temperature "T" measured at the liquid service port is 360 Psig and 93 °F. From Table 2, the saturated temperature for 360 Psig is 109°. The subcooling temperature "TC" = 109° - 93° = 16° F

Increase the charge if the calculated subcooling temperature "TC" in Step 6 is lower than the recommended level. Remove and recover the refrigerant if the subcooling "TC" exceeds the recommended level.

## 7.0 SYSTEM OPERATION

### 7.1 COMPRESSOR CRANKCASE HEATER (CCH)

While scroll compressors usually do not require crankcase heaters, there are instances when you should add a heater. Refrigerant migration during the off cycle can result in a noisy start-up. Add a crankcase heater to minimize refrigeration migration and to help eliminate any start-up noise or bearing "washout."

All heaters are located on the lower half of the compressor shell. Its purpose is to drive refrigerant from the compressor shell during long off cycles, thus preventing damage to the compressor during start-up.

At initial start-up or after extended shutdown periods, make sure the heater is energized for at least 12 hours before the compressor is started (turn the disconnect switch on and the wall thermostat off).

### 7.2 HIGH-PRESSURE SWITCH FAULT (Heat Pump Only)

The unit is equipped with a high-pressure switch that is connected to the main board. If the high-pressure switch opens for more than 40 milliseconds, the control will de-energize the compressor and then store and display the appropriate fault code. If the pressure switch closes and a thermostat call for compressor operation is present, the control will apply the three-minute anti-short cycle delay timer and start the compressor when the timer expires.



### 7.3 LOW-PRESSURE SWITCH (Heat pump only)

The unit is equipped with a low-pressure switch connected to the main board. If the low-pressure switch opens for more than five seconds, the control will trigger a soft lockout.

### 7.4 TEMPERATURE SENSOR (Heat pump only)

The unit has two temperature sensors, which are called "T3" and "T4." "T3" refers to the pipe temperature sensor, while "T4" refers to the outdoor unit circumstance temperature sensor. When the temperature sensor is damaged, the system closes.

## 8.0 INSTRUCTING THE OWNER

Assist the owner with processing warranty cards and/or online registration. Review the Owner's Guide and provide a copy to the owner in addition to guidance on proper operation and maintenance. Instruct the owner or operator on how to start, stop, and adjust temperature settings. The installer should also instruct the owner on the proper operation and maintenance of all other system components.

### 8.1 MAINTENANCE

1. Dirt should not be allowed to accumulate on the outdoor coils or other parts in the air circuit. Clean as often as necessary to keep the unit clean. Use a brush, a vacuum cleaner attachment, or another suitable tool.
2. The outdoor fan motor is permanently lubricated and does not require periodic oiling.
3. If the coil needs to be cleaned, it should be washed with Calgon Coilclean (mix one part Coilclean to seven parts water). Allow solution to remain on coil for 30 minutes before rinsing with clean water. The solution should not be permitted to come into contact with painted surfaces.
4. Refer to the furnace or air handler instructions for filter and blower motor maintenance.
5. The indoor coil and drain pan should be inspected and cleaned regularly to prevent outdoors and ensure proper drainage.



#### CAUTION

It is unlawful to knowingly vent, release, or discharge refrigerant into the open air during the repair, service, maintenance, or final disposal of this unit. When the system is functioning properly and the owner has been fully informed, secure the owner's approval.

The design and specifications are subject to change without prior notice. Consult with the sales agency or manufacturer for details.

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