


Installation Instructions

SAFETY CONSIDERATIONS

Improper installation, adjustment, alteration, service, maintenance, or use can cause explosion, fire, electrical shock, or other conditions which may cause death, personal injury, or property damage. Consult a qualified installer, service agency, or your distributor or branch for information or assistance. The qualified installer or agency must use factory-authorized kits or accessories when modifying this product. Refer to the individual instructions packaged with the kits or accessories when installing.

Follow all safety codes. Wear safety glasses, protective clothing, and work gloves. Use quenching cloth for brazing operations. Have fire extinguisher available. Read these instructions thoroughly and follow all warnings or cautions included in literature and attached to the unit. Consult local building codes and current editions of the National Electrical Code (NEC) NFPA 70. In Canada, refer to current editions of the Canadian electrical code CSA 22.1.

Recognize safety information. This is the safety-alert symbol . When you see this symbol on the unit and in instructions or manuals, be alert to the potential for personal injury. Understand these signal words; **DANGER**, **WARNING**, and **CAUTION**. These words are used with the safety-alert symbol. **DANGER** identifies the most serious hazards which **will** result in severe personal injury or death. **WARNING** signifies hazards which **could** result in personal injury or death. **CAUTION** is used to identify unsafe practices which **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.



WARNING

ELECTRICAL SHOCK HAZARD

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

Before installing, modifying, or servicing system, main electrical disconnect switch must be in the OFF position. There may be more than 1 disconnect switch. Lock out and tag switch with a suitable warning label.



WARNING

EXPLOSION HAZARD

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

Never use air or gases containing oxygen for leak testing or operating refrigerant compressors. Pressurized mixtures of air or gases containing oxygen can lead to an explosion.



INSPECT NEW UNIT

After un-crating unit, inspect thoroughly for hidden damage. If damage is found, notify the transportation company immediately and file a concealed damage claim.

LOCATION

Check local codes for regulations concerning zoning, noise, platforms, and other issues.

Locate unit away from fresh air intakes, vents, or bedroom windows. Noise may carry into the openings and disturb people inside.

Locate unit in a well drained area, or support unit high enough so that water runoff will not enter the unit.

Locate unit away from areas where heat, lint, or exhaust fumes will be discharged onto unit (as from dryer vents).

Locate unit away from recessed or confined areas where recirculation of discharge air may occur (refer to CLEARANCE REQUIREMENT section of this document).

Roof-top installation is acceptable providing the roof will support the unit and provisions are made for water drainage and noise/vibration dampening.

NOTE: Roof mounted units exposed to wind may require wind baffles. Consult the manufacturer for additional information.

CLEARANCE REQUIREMENTS

When installing, allow sufficient space for airflow clearance, wiring, refrigerant piping, and service.

Allow 24 in. (609.6 mm) clearance to service end of unit and 48 in. (1219.2 mm) (above unit. For proper airflow, a 6-in. (152.4 mm) clearance on 1 side of unit and 12-in. (304.8 mm) on all remaining sides must be maintained. Maintain a distance of 24 in. (609.6 mm) between units or 18 in. (457.2 mm) if no overhang within 12 ft. (3.66 m).

Position so water, snow, or ice from roof or eaves cannot fall directly on unit.

NOTE: 18" (457.2 mm) clearance option described above is approved for outdoor units with wire grille coil guard only. Units with louver panels require 24" (609.6 mm) between units. On rooftop applications, locate unit at least 6 in. (152.4 mm) above roof surface.

UNIT SUPPORT

NOTE: Unit must be level ± 2 degrees {3/8 inch rise or fall per foot of run (10 mm rise or fall per 305 mm of run) } or compressor may not function properly.

A. GROUND LEVEL INSTALLATION

The unit must be level and supported above grade by beams, platform, or a pad. Platform or pad can be of open or solid construction but should be of permanent materials such as concrete, bricks, blocks, steel, or pressure-treated timbers approved for ground contact. Soil conditions must be considered so that the platform or pad does not shift or settle and leave the unit partially supported. Minimum pad dimensions are shown in Fig. 1.

If beams or an open platform are used for support, it is recommended that the soil be treated or area be graveled to reduce the growth of grasses and weeds.

To minimize vibration or noise transmission, it is recommended that supports not be in contact with the building structure. However, slabs on grade constructions with an extended pad are normally acceptable.

B. ROOF TOP INSTALLATION

This type of installation is not recommended on wood frame structures where low noise levels are required.

Supporting structure or platform for the unit must be level. If installation is on a flat roof, locate unit minimum 6 inches (152 mm) above roof level.

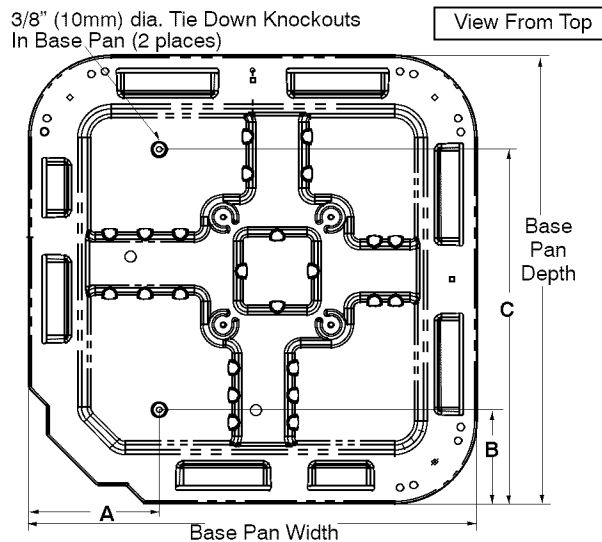
Place the unit over one or more load bearing walls. If there are several units, mount them on platforms that are self-supporting and span several load bearing walls. These suggestions are to minimize noise and vibration transmission through the structure. If the structure is a home or apartment, avoid locating the unit over bedrooms or study.

NOTE: When unit is to be installed on a bonded guaranteed roof, a release must be obtained from the building owner to free the installer from all liabilities.

C. FASTENING UNIT DOWN

If conditions or local codes require the unit be attached in place, remove the knockouts in the base pan and install tie down bolts through the holes (see Fig. 1).

Contact local distributor for hurricane hold-down details and the P.E. (Professional Engineer) certification, when required.



Base Pan W x D	Inches (mm)			Minimum Mounting Pad Dimensions
	A	B	C	
23 x 23 (584 x 584)	7-3/4 (197)	4-7/16 (113)	18 (457)	23 x 23 (584 x 584)
25-11/16 x 25-11/16 (652 x 652)	9-1/16 (230)	4-7/16 (113)	21-1/4 (540)	26 x 26 (660 x 660)
31-1/8 x 31-1/8 (791 x 791)	9-1/16 (230)	6-1/2 (165)	24-5/8 (625)	31-1/2 x 31-1/2 (800 x 800)

Fig. 1 – Tie Down Knockouts

REFRIGERATION SYSTEM

⚠ WARNING

EXPLOSION AND FIRE HAZARD

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

This unit utilizes R-22 refrigerant. Use only R-22 refrigerant when servicing this unit.

DO NOT, under any circumstances, use R-410A refrigerant in this system.

⚠ CAUTION

PROPERTY DAMAGE HAZARD

Failure to follow this caution may result in property damage.

Inadequate unit support may cause excessive vibration, noise, and/or stress on the refrigerant lines, leading to refrigerant line failure.

A. COMPONENT MATCHES

Check to see that the proper system components are in place, especially the indoor coil.

R-22 outdoor units can only be used with R-22 specific indoor coils. If there is a refrigerant mis-match, consult the indoor coil manufacturer to determine if a refrigerant conversion kit is available for the indoor coil.

This outdoor unit is designed for use only with indoor coils that utilize a TXV refrigerant metering device. If any other type of metering device is installed on the indoor coil, consult the indoor coil manufacturer to determine if a TXV conversion kit is available.

The compressors for these units are supplied with Polyol Ester (POE) Oil. If the existing line set and indoor coil has residual mineral oil (MO) there is no concern with percentage of oil mixtures as both are miscible with the R-22. Mixtures of both oils at any percentage will lubricate and return with the R-22.

When installing a TXV on an indoor coil, follow the instructions provided with the new TXV.

A typical TXV installation is shown in Fig. 2.

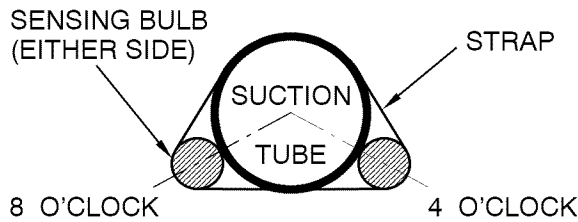
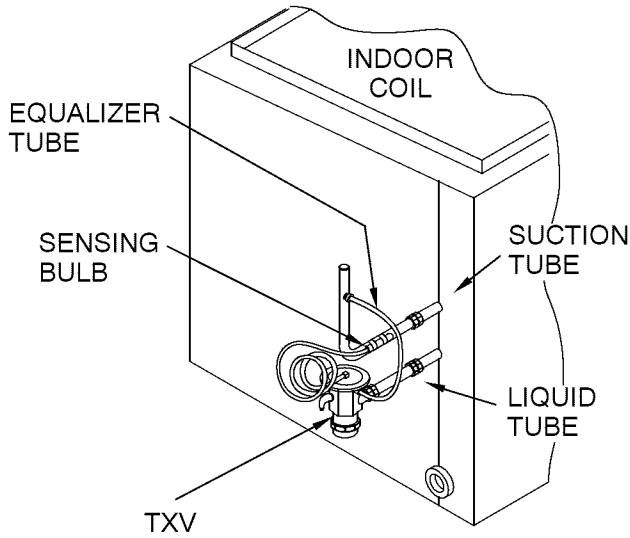


Fig. 2 – Typical TXV Installation

B. REFRIGERANT LINE SETS

The refrigerant line set must be properly sized to assure maximum efficiency and proper oil circulation.

Refer to **Long Line Guideline** for line set sizing.

NOTE: Total line set length must not exceed 200 feet (61 m).

A crankcase heater must be used when the refrigerant line length exceeds 80 feet (24.4 m).

If vertical separation between indoor and outdoor units is greater than 30 ft (9.14 m), refer to the Long Line Guideline.

If it is necessary to add refrigerant line in the field, use dehydrated or dry, sealed, deoxidized, copper refrigeration tubing. Do not use copper water pipe.

Do not remove rubber plugs or caps from copper tubing until connections are ready to be made.

Be extra careful when bending refrigeration tubing. Tubing can “kink” easily, and if this occurs, the entire length of tubing must be replaced.

⚠ WARNING

PERSONAL INJURY HAZARD

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

Relieve pressure and recover all refrigerant before servicing existing equipment, and before final unit disposal. Use all service ports and open all flow-control devices, including solenoid valves.

⚠ CAUTION

UNIT OPERATION HAZARD

Failure to follow this caution may result in improper unit operation.

Do not leave system open to atmosphere any longer than absolutely required for installation. Internal system components - especially refrigerant oils - are extremely susceptible to moisture contamination. Keep ends of tubing sealed during installation until the last possible moment.

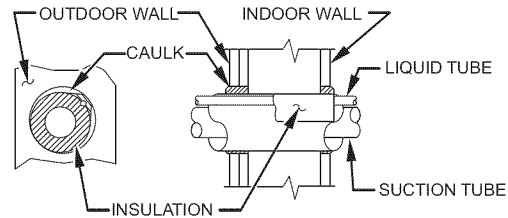
C. ROUTING AND SUSPENDING REFRIGERANT LINES

Run refrigerant lines as straight and direct as possible, avoiding unnecessary bends and turns. Always insulate the entire suction line. Both lines should be insulated when routed through an attic or when routed through an underground raceway.

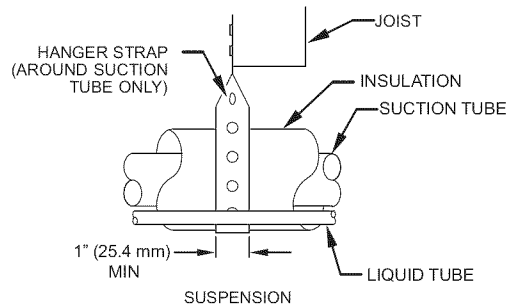
When routing refrigerant lines through a foundation or wall, do not allow refrigerant lines to come in direct contact with the building structure.

Make openings large enough so that lines can be wrapped with extra insulation. Fill all gaps with RTV caulk. This will prevent noise transmission between the tubing and the foundation or wall.

Along floor or ceiling joists, suspend refrigerant lines so that they do not contact the building structure, water pipes, or ductwork. Use insulated or suspension type hangers. Metal straps must be at least 1” (25 mm) wide to avoid cutting into the tube insulation. Keep the liquid and suction lines separate. Refer to Fig. 3.



THROUGH THE WALL



SUSPENSION

Fig. 3 – Routing and Suspending Refrigerant Lines

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⚠ CAUTION

UNIT OPERATION HAZARD

Failure to follow this caution may result in improper product operation.

Do not bury more than 36” (1 m) of line set underground. Refrigerant may migrate to cooler buried section during extended periods of unit shut-down, causing refrigerant slugging and possible compressor damage at start-up.

If ANY section of the line set is buried underground, provide a minimum 6” (152 mm) vertical rise at the service valve.

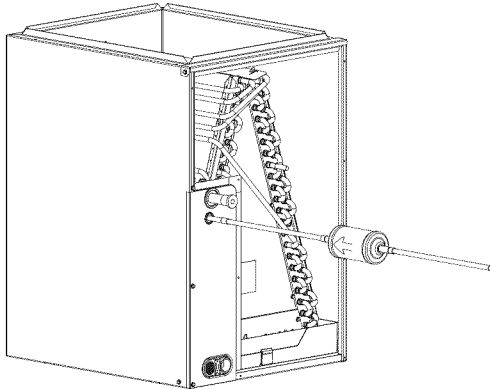
D. OUTDOOR UNIT HIGHER THAN INDOOR UNIT

Proper oil return to the compressor should be maintained with suction gas velocity. If velocities drop below 1500 fpm (feet per minute), oil return will be decreased. To maintain suction gas velocity, do not upsize vertical suction risers.

E. LIQUID LINE FILTER-DRIER

NOTE: It is required that an approved filter drier (XH-6 with 25% activated alumina / 75% molecular sieve desiccants) be installed in the liquid line due to the POE oil.

Leave the plugs in the tube ends until the filter-drier is installed. The optimal location for the filter-drier is close to the indoor coil. Install the filter-drier with the arrow pointing towards the indoor coil. Refer to Fig. 4.



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Fig. 4 – Liquid Line Filter Drier Installed at Indoor Unit

F. SERVICE VALVES

Service valves are closed and tube stubs are plugged from the factory. Outdoor units are shipped with a dry nitrogen holding charge sealed in the unit. Leave the service valves closed until all other refrigerant system work is complete or the charge will be lost. Leave the plugs in place until line set tubing is ready to be inserted.

Service valve bodies are brass and tube stubs are copper.

G. BRAZING CONNECTIONS

NOTE: Remove valve core from schrader port on both Service Valves BEFORE brazing. This helps prevent overheating and damage to valve seals (refer to Fig. 5). Replace valve core when brazing is completed.

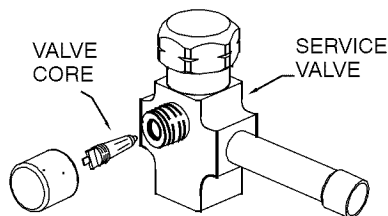


Fig. 5 – Service Valve

⚠ WARNING

FIRE HAZARD

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

Refrigerant and oil mixture could ignite and burn as it escapes and contacts brazing torch. Make sure the refrigerant charge is properly removed from both the high and low sides of the system before brazing any component or lines.

Clean line set tube ends with emery cloth or steel brush. Remove any grit or debris.

Insert line set tube ends into service valve tube stubs.

Apply heat absorbing paste or heat sink product between service valve and joint. Wrap service valves with a heat sinking material such as a wet cloth.

Braze joints using a Sil-Fos or Phos-copper alloy.

⚠ CAUTION

UNIT DAMAGE HAZARD

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

Service valves must be wrapped while brazing in a heat sink material, such as a wet cloth.

H. OPENING SERVICE VALVES

Outdoor units are shipped with a dry nitrogen holding charge sealed in the unit. Opening the service valves releases this charge into the system.

NOTE: Open the Suction service valve first. If the Liquid service valve is opened first, oil from the compressor may be drawn into the indoor coil TXV, restricting refrigerant flow and affecting operation of the system.

Remove Suction service valve cap and insert a hex wrench into the valve stem. Hold the valve body steady with an end-wrench and back out the stem by turning the hex wrench counterclockwise. Turn the stem until it just contacts the rolled lip of the valve body.

After the nitrogen charge has bled into the system, open the Liquid service valve.

NOTE: These are not back-seating valves. It is not necessary to force the stem tightly against the rolled lip.

The service valve cap is a primary seal for the valve and must be properly tightened to prevent leaks. Make sure cap is clean and apply refrigerant oil to threads and sealing surface on inside of cap.

Tighten cap finger tight and then tighten additional 1/6 of a turn (1 wrench flat) to properly seat the sealing surfaces.

NOTE: Using the service ports (or gauge set), release the nitrogen pressure from the system before attaching vacuum pump.

I. EVACUATING CONDENSER, LINE SET, AND INDOOR COIL

⚠ **CAUTION**

PRODUCT DAMAGE HAZARD

Failure to follow this caution may result in product damage.

Never use the outdoor unit compressor as a vacuum pump. Doing so may damage the compressor.

Condenser, line set, and indoor coil should be evacuated using the recommended deep vacuum method of 500 microns. If deep vacuum equipment is not available, the alternate triple evacuation method may be used by following the specified procedure.

If vacuum must be interrupted during the evacuation procedure, always break vacuum with dry nitrogen.

⚠ **CAUTION**

UNIT OPERATION HAZARD

Failure to follow this caution may result in improper unit operation..

This unit is filled with a Nitrogen charge. Prior to starting this unit, evacuate to 500 microns and charge with refrigerant listed on rating label. Purge nitrogen before connection to vacuum pump.

Deep Vacuum Method

The deep vacuum method requires a vacuum pump capable of pulling a vacuum to 500 microns and a vacuum gauge capable of accurately measuring this vacuum level. The deep vacuum method is the most positive way of assuring a system is free of air and water.

Watch the vacuum gauge as the system is pulling down. The response of the gauge is an indicator of the condition of the system (refer to Fig. 6).

With no leaks in the system, allow the vacuum pump to run for 30 minutes minimum at the deep vacuum level.

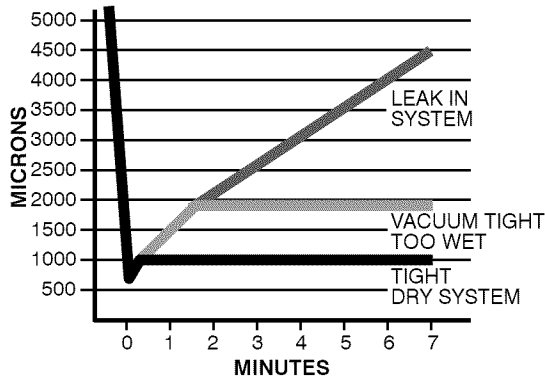


Fig. 6 – Deep Vacuum Gauge Response and System Conditions

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Triple Evacuation Method

The triple evacuation method should only be used when system does not contain any water in liquid form and vacuum pump is only capable of pulling down to 28 inches of mercury (711 mm Hg). Refer to Fig. 8 and proceed as follows:

1. Pull system down to 28 inches of mercury (711 mm Hg) and allow pump to continue operating for an additional 15 minutes.
2. Close manifold valves or valve at vacuum pump and shut off vacuum pump.
3. Connect a nitrogen cylinder and regulator to system and fill with nitrogen until system pressure is 2 psig.
4. Close nitrogen valve and allow system to stand for 1 hour. During this time, dry nitrogen will diffuse throughout the system absorbing moisture.
5. Repeat this procedure as indicated in Fig. 7.
6. After the final evacuate sequence, confirm there are no leaks in the system. If a leak is found, repeat the entire process after repair is made.

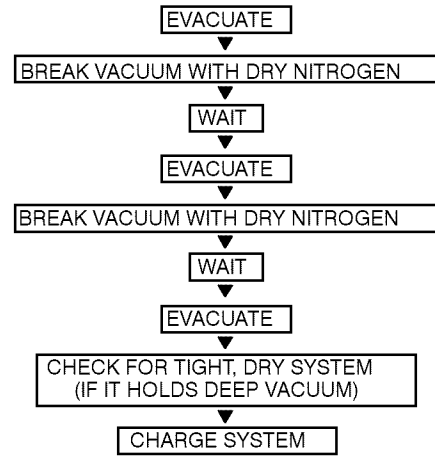


Fig. 7 – Triple Evacuation Sequence

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J. GAUGE PORTS

Check for leaks at the schrader ports and tighten valve cores if necessary. Install plastic caps finger tight.

ELECTRICAL WIRING

⚠ WARNING

ELECTRICAL SHOCK HAZARD

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

Before installing, modifying, or servicing system, main electrical disconnect switch must be in the OFF position. There may be more than 1 disconnect switch. Lock out and tag switch with a suitable warning label.

The supply voltage must be 208/230 volts (197 volt minimum to 253 volts maximum) 60 Hz single phase.

Outdoor units are approved for use with copper conductors only. Do not use aluminum wire.

Refer to unit rating plate for minimum circuit ampacity and circuit protection requirements.

Grounding

Permanently ground unit in accordance with the National Electrical Code and local codes or ordinances. Use a copper conductor of the correct size from the grounding lug in control box to a grounded connection in the service panel or a properly driven and electrically grounded ground rod.

⚠ WARNING

ELECTRICAL SHOCK HAZARD

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

Unit cabinet must have an uninterrupted or unbroken ground to minimize personal injury if an electrical fault should occur. The ground may consist of electrical wire or metal conduit when installed in accordance with existing electrical codes.

Wiring Connections

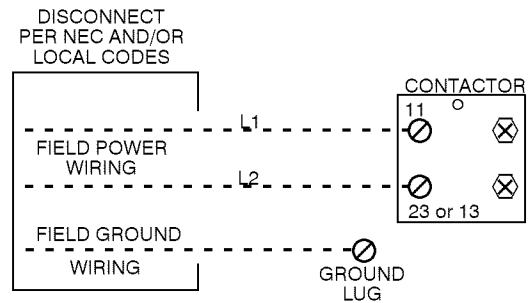
Make all outdoor electrical supply (Line Voltage) connections with rain-tight conduit and fittings. Most codes require a disconnect switch outdoors within sight of the unit. Consult local codes for special requirements.

Route electrical supply (Line Voltage) wiring through knockout hole in bottom of Control Box. Connect wires to Contactor and Ground Lug according to Wiring Diagram on unit. Also refer to Fig. 8.

Route thermostat wiring through rubber grommet in bottom of Control Box. Low voltage lead wires are provided in the control box for connection to thermostat wires (use wire nuts). Refer to Wiring Diagram on unit and Fig. 9 for low voltage wiring examples.

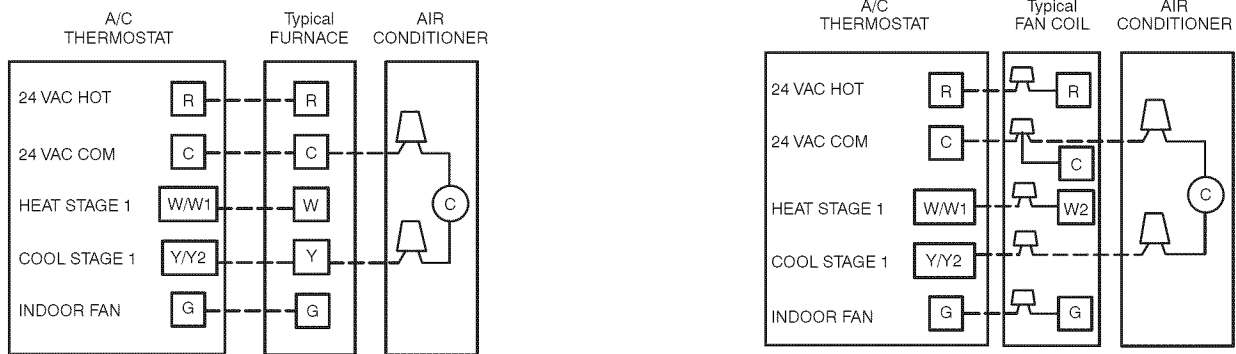
All wiring must be NEC Class 2 and must be separated from incoming power leads.

NOTE: Use No. 18 AWG (American Wire Gage) color-coded, insulated (35°C minimum) wire. If thermostat is located more than 100 feet (31 m) from unit as measured along the control voltage wires, use No. 16 AWG color-coded wires to avoid excessive voltage drop.



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Fig. 8 – Electrical Supply (Line Voltage) Connections



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LEGEND

———— 24-V FACTORY WIRING

----- 24-V FIELD WIRING

⏏ FIELD SPLICE CONNECTION

Ⓢ CONTACTOR

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Fig. 9 – Typical Thermostat Connections
(See Thermostat Installation Instruction for specific unit combinations)

START-UP PROCEDURE

1. Set indoor thermostat selector switch to OFF.
2. Turn ON all electrical disconnect devices.
3. If unit has a crankcase heater, energize the heater and wait 24 hours before proceeding.
4. Set indoor thermostat at desired temperature. Be sure set-point is below indoor ambient temperature or thermostat will not call for cooling.
5. Set indoor thermostat selector switch to COOL. Operate unit for minimum 15 minutes, then check system refrigerant charge.

REFRIGERANT CHARGE

Table 1 shows the suggested refrigerant charge quantities for a 15 foot (4.6 m) lineset. If shorter or longer refrigerant lines or a different indoor coil are used, the charge will have to be adjusted.

For different line lengths, add or remove charge based on 0.6 ounces (17 g) charge per foot (305 mm) of difference. For example, a 25 foot (7.6 m) line set is 10 feet (3 m) longer than the specified 15 feet (4.6 m). Add 0.6 ounces (17 g) charge for each of the extra 10 feet (3 m):

$10 \times 0.6 = 6.0$ ounces additional charge

$(3 \text{ m} \times 17 \text{ g} = 51 \text{ g})$ additional charge)

The initial charge should be weighed into the system per Table 1 and the additional amount for the length of line set. Then check subcooling.

This outdoor unit is designed for use only with indoor coils that utilize a TXV refrigerant metering device. With an indoor TXV, use the subcooling method to make final charge adjustments:

NOTE: Only use subcooling charging method when the following is true:

- outdoor ambient temperature is between 70°F and 100°F (21°C and 38°C)
- indoor temperature is between 70° and 80°F (21°C and 27°C)
- line set is less than 80 feet (24.4 m).

1. Operate unit a minimum of 15 minutes before checking charge.

NOTE: If outdoor unit has a 2-speed fan motor, motor will operate in low speed when outdoor ambient temperature is below 82°F (28°C). Pull one of the yellow low voltage wires off the fan control and the unit will default to high speed fan for servicing. Reconnect wire after servicing.

2. Measure liquid service valve pressure by attaching an accurate gauge to service port.
3. Measure liquid line temperature by attaching an accurate thermistor type sensor or electronic thermometer to liquid line near outdoor coil.
4. Refer to unit rating plate for required subcooling temperature.
5. Refer to Table 2. Find the required liquid line temperature where the rating plate subcooling temperature intersects measured liquid service valve pressure.
6. If the measured liquid line temperature is higher than the chart number, add refrigerant to lower the measured temperature.

NOTE: When adding refrigerant, charge in liquid form, using a flow restricting device, into the suction port.

If the measured liquid line temperature is lower than the chart number, reclaim refrigerant to raise the measured temperature.

Tolerance is $\pm 3^\circ\text{F}$ ($\pm 1.7^\circ\text{C}$).

Table 1—Suggested Refrigerant Charge Quantity for 15 foot (4.6 m) Lineset

Model Number	lbs. (kg)
PA13NR018	3.56 (1.62)
PA13NR024	4.08 (1.85)
PA13NR030	4.11 (1.87)
PA13NR036	5.35 (2.43)
PA13NR042	7.01 (3.19)
PA13NR048	8.88 (4.04)
PA13NR060	10.52 (4.79)

Table 2—Required Liquid Line Temperature

Measured Liquid Pressure (psig)	Rating Plate (required) Subcooling Temperature ° F (° C)							
	° F	(° C)	° F	(° C)	° F	(° C)	° F	(° C)
	5	3	10	6	15	8	20	11
R-22 Required Liquid Line Temperature ° F (° C)								
163	83	28	78	26	73	23	68	20
171	86	30	81	27	76	24	71	22
179	89	32	84	29	79	26	74	23
187	92	33	87	31	82	28	77	25
196	95	35	90	32	85	29	80	27
205	98	37	93	34	88	31	83	28
214	101	38	96	36	91	33	86	30
223	104	40	99	37	94	34	89	32
233	107	42	102	39	97	36	92	33
243	110	43	105	41	100	38	95	35
253	113	45	108	42	103	39	98	37
264	116	47	111	44	106	41	101	38
274	119	48	114	46	109	43	104	40
285	122	50	117	47	112	44	107	42
297	125	52	120	49	115	46	110	43
309	128	53	123	51	118	48	113	45

SEQUENCE OF OPERATION

With power supplied to indoor and outdoor units, transformer is energized.

On a call for cooling, the thermostat makes circuits R-Y and R-G. Circuit R-Y energizes contactor, starting outdoor fan motor and compressor. Circuit R-G energizes indoor unit blower relay, starting indoor blower motor.

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

NOTE: If indoor unit is equipped with a time-delay relay circuit, the blower runs an additional length of time to increase system efficiency.

MAINTENANCE

Condensate Drain

During the cooling season, check monthly for free flow of drainage and clean if necessary.

Cleanliness

These tips will help keep the air conditioner looking better and working more efficiently:

1. Free flow of air is essential. Keep fences, shrubs, trash cans, and other obstructions at least 18 inches (0.5 m) from all coil inlets.
2. Keep the coil free of grass clippings, leaves, weeds, and other debris.

NOTE: Coil may occasionally require cleaning with a liquid solution. The coil must be cold when cleaning. Use an alkaline based cleaner only. Cleaning a hot coil or using an acid based cleaner will remove the paint from the fins and may clog the coil.

3. Never use a weather cover over the outdoor unit unless it is a ventilated type or made of breathable fabric that will allow moisture to evaporate rapidly. A cover that holds moisture in the unit will cause more rust build-up and damage than normal exposure to weather.