INSTALLATION INSTRUCTIONS
R–22 or R–407C Air Conditioner Outdoor Component

R2A3**GKR, R2A3**GHR, R2A3**GLR

These instructions must be read and understood completely before attempting installation.

IMPORTANT: Effective January 1, 2015, all split system and packaged air conditioners must be installed pursuant to applicable regional efficiency standards issued by the Department of Energy.

Safety Labeling and Signal Words

DANGER, WARNING, CAUTION, and NOTE

The signal words **DANGER, WARNING, CAUTION,** and **NOTE** are used to identify levels of hazard seriousness. The signal word **DANGER** is only used on product labels to signify an immediate hazard. The signal words **WARNING, CAUTION,** and **NOTE** will be used on product labels and throughout this manual and other manuals that may apply to the product.

DANGER – Immediate hazards which **will** result in severe personal injury or death.

WARNING – Hazards or unsafe practices which **could** result in severe personal injury or death.

CAUTION – Hazards or unsafe practices which **may** result in minor personal injury or product or property damage.

NOTE – Used to highlight suggestions which **will** result in enhanced installation, reliability, or operation.

Signal Words in Manuals

The signal word **WARNING** is used throughout this manual in the following manner:

⚠ WARNING

The signal word **CAUTION** is used throughout this manual in the following manner:

⚠ CAUTION

Signal Words on Product Labeling

Signal words are used in combination with colors and/or pictures on product labels.

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⚠ WARNING

DEATH, PERSONAL INJURY, AND/OR PROPERTY DAMAGE HAZARD

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

Installation or repairs made by unqualified persons could result in equipment malfunction, property damage, personal injury and/or death.

The information contained in this manual is intended for use by a qualified service technician familiar with safety procedures and equipped with the proper tools and test instruments.

Installation must conform with local building codes and with the National Electrical Code NFPA70 current edition or Canadian Electrical Code Part 1 CSA C.22.1.

INSPECT NEW UNIT

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

SAFETY CONSIDERATIONS

Consult a qualified installer, service agency, or the dealer/distributor for information and assistance. The qualified installer must use factory authorized kits and accessories when modifying this product. Refer to the individual instructions packaged with the kit or accessory when installing.

The weight of the product requires careful and proper handling procedures when lifting or moving to avoid personal injury. Use care to avoid contact with sharp or pointed edges.

Follow all safety codes. Wear safety glasses, protective clothing, and work gloves. Use a heat sinking material – such as a wet rag – during brazing operations. Keep a fire extinguisher available. Consult local codes and the National Electric Code (NEC) for special requirements.

Improper installation, adjustment, alteration, service or maintenance can void the warranty**.**

⚠ 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.

⚠ CAUTION

CUT HAZARD

Failure to follow this caution may result in property damage.

Sheet metal parts may have sharp edges or burrs. Use care and wear appropriate protective clothing and gloves when handling parts.

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 CLEARANCES 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.

CLEARANCES

When installing, allow sufficient space for airflow clearance, wiring, refrigerant piping, and service. Allow 24 in. (610 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 one 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. (3.66m). Position so water, snow, or ice from roof or eaves cannot fall directly on unit.

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 Figure 2.

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 (152mm) 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 (refer to Figure 2). Contact local distributor for hurricane hold–down details and the P.E. (Professional Engineer) certification, when required.

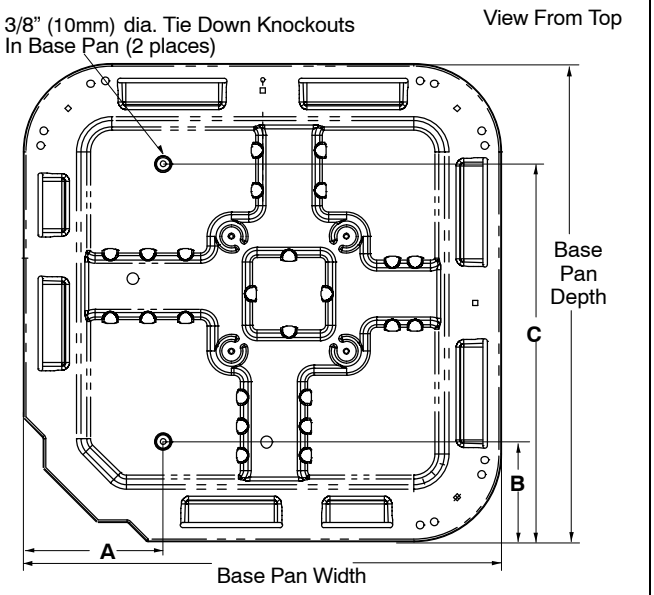
⚠ CAUTION

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.

Figure 2 Tie Down Knockouts



Inches (mm)

Base Pan Width x Depth	Tie Down Knockouts			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)

REFRIGERATION SYSTEM

A. COMPONENT MATCHES

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

R–22 or R–407C outdoor units can only be used with R–22 or R–407C 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 or Piston 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 or R–407C. Mixtures of both oils at any percentage will lubricate and return with the R–22 or R–407C.

⚠ WARNING

EXPLOSION AND FIRE HAZARD

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

This unit is designed to use ONLY R–22 or R–407C refrigerant. Use ONLY R–22 or R–407C refrigerant when charging or servicing this unit.

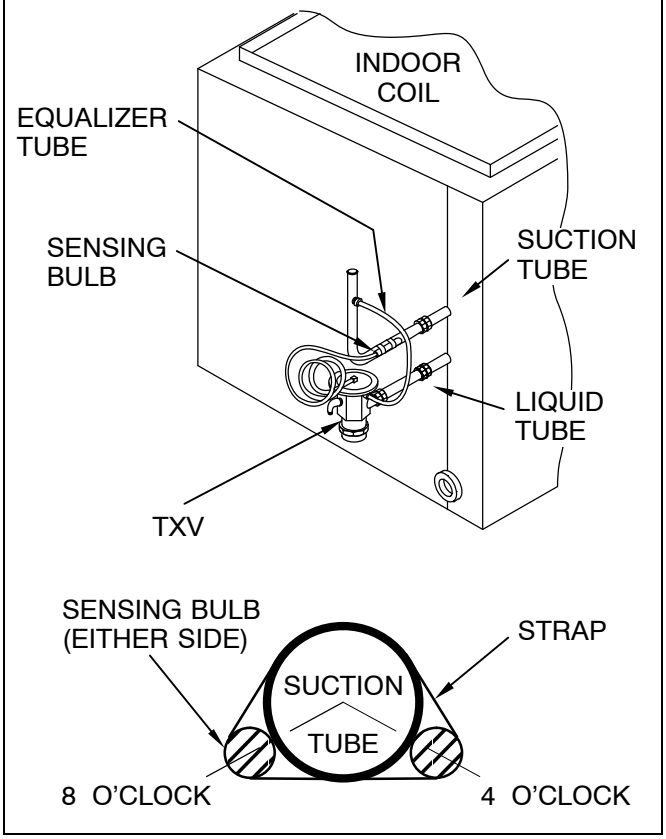
DO NOT under any circumstances use any refrigerant other than R–22 or R–407C in this unit.

Installing with TXV

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

A typical TXV installation is shown in Figure 3.

Figure 3 Typical TXV Installation



Installing with Indoor Piston – cooling operation

Check piston size shipped with indoor unit to see if it matches required indoor piston size.

If it does not match, replace indoor piston with correct piston size.

B. REFRIGERANT LINE SETS

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

Refer to Product Specifications and Long Line Applications Guideline for line set sizing.

NOTE: Total line set length must not exceed 200 feet (61m).
A crankcase heater must be used when the refrigerant line length exceeds 80 feet (24.4m).

If outdoor unit is more than 10 feet (3m) higher than the indoor coil, refer to the Long Line Applications Guideline manual for instructions.

When the outdoor unit is higher than the indoor coil, the vertical separation must not exceed 100 feet (30m).

When the outdoor unit is lower than the indoor coil, the vertical separation must not exceed 50 feet (15.2m).

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.

⚠ CAUTION

UNIT OPERATION HAZARD

Failure to follow this caution may result in improper product 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.

⚠ WARNING

PERSONAL INJURY AND ENVIRONMENTAL HAZARD

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

Relieve pressure and recover all refrigerant before system repair or final unit disposal. Use all service ports and open all flow–control devices, including solenoid valves.

Federal regulations require that you do not vent refrigerant to the atmosphere. Recover during system repair or final unit disposal.

C. ROUTING AND SUSPENDING REFRIGERANT LINES

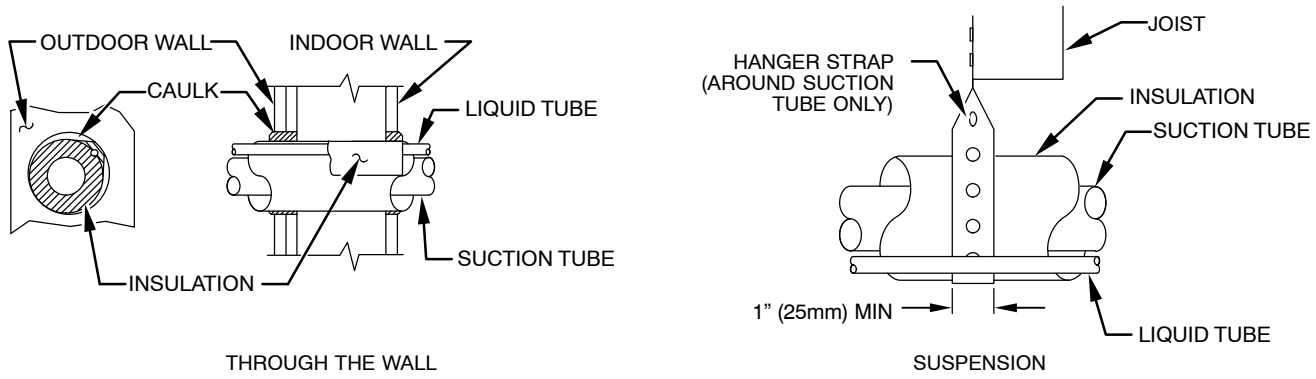
Run refrigerant lines as straight and direct as possible, avoiding unnecessary bends and turns. Always insulate the entire suction line. Both lines should be insulated when routed through an attic or when routed through an underground raceway.

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” (25mm) wide to avoid cutting into the tube insulation. Keep the liquid and suction lines separate. Refer to Figure 4.

Figure 4 **Routing and Suspending Refrigerant Lines**



⚠ CAUTION

UNIT OPERATION HAZARD

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

Do not bury more than 36" (1m) 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" (152mm) vertical rise at the service valve.

D. OUTDOOR UNIT HIGHER THAN INDOOR UNIT

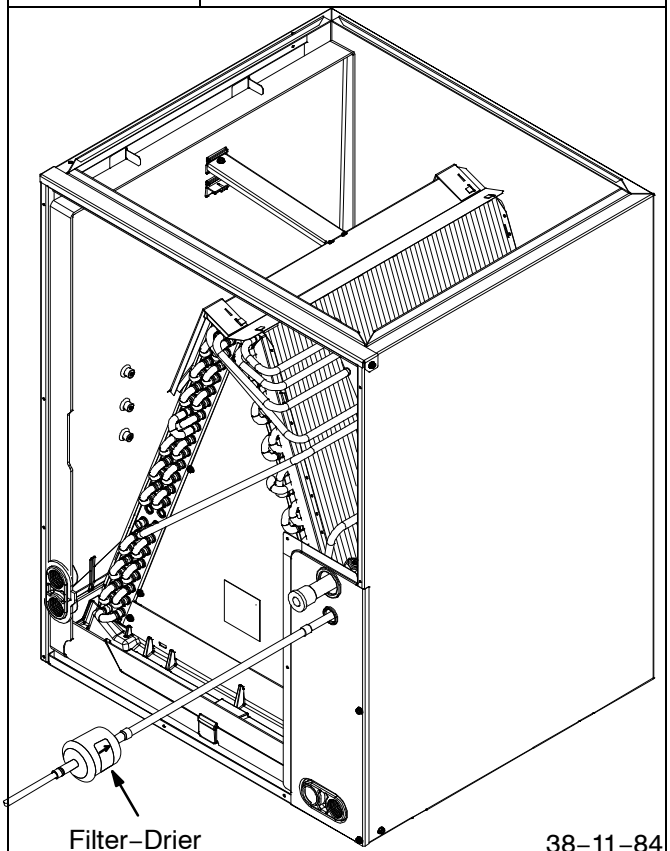
Proper oil return to the compressor should be maintained with suction gas velocity. If velocities drop below 1500 fpm (feet per minute), oil return will be decreased. To maintain suction gas velocity, do not upsize vertical suction risers.

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 Figure 5.

Figure 5 — Liquid Line Filter–Drier Installed at Indoor Coil

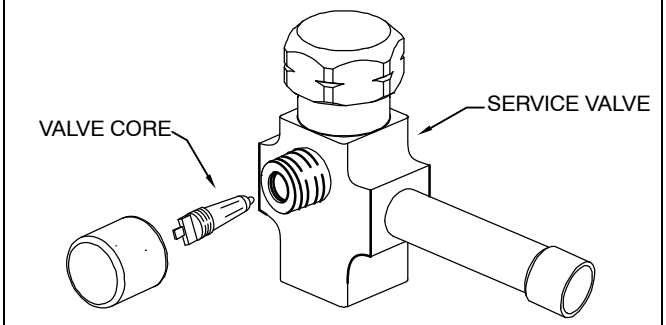


F. SERVICE VALVES

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.

Figure 6 — Service Valve



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 Figure 6). Replace valve core when brazing is completed.

⚠ WARNING

FIRE HAZARD

Failure to remove refrigerant and oil charge before brazing 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

PRODUCT DAMAGE HAZARD

Failure to follow this caution may result in product damage.

Braze with Sil–Fos or Phos–copper alloy on copper–to–copper joints and wrap a wet cloth around rear of fitting to prevent damage to TXV.

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

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.

J. GAUGE PORTS

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

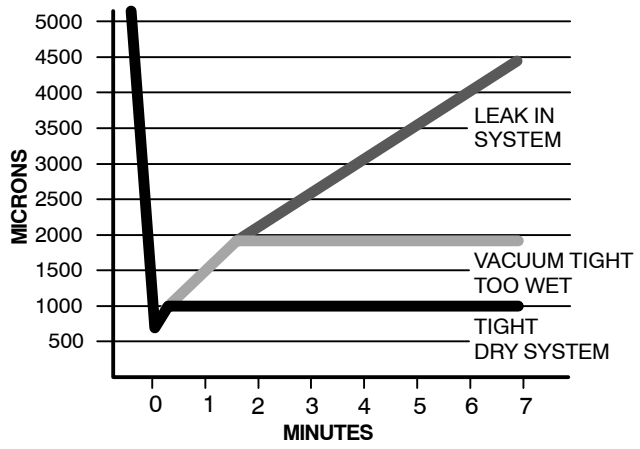
Deep Vacuum Method

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 Figure 7).

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

Figure 7 Deep Vacuum Gauge Response and System Conditions

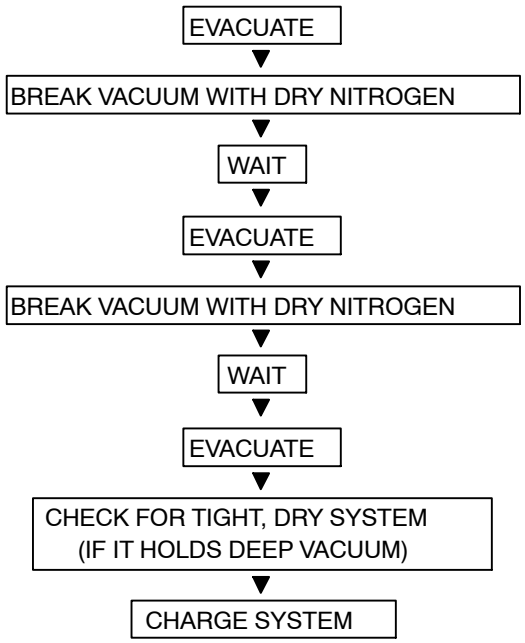


Triple Evacuation Method

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 (711mm Hg). Refer to Figure 8 and proceed is as follows:

1. Pull system down to 28 inches of mercury (711mm 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 Figure 8.
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.

Figure 8 Triple Evacuation Sequence



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.

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

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.

For 3−phase units, refer to unit rating plate for the required supply voltage. Depending on the model, required supply voltage will be:

208/230 V, 3−phase, 60 Hz
or
460 V, 3−phase, 60 Hz

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.

Wiring Connections

Make all outdoor electrical supply (Line Voltage) connections with raintight 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 Figure 9.

For 3−phase 208/230V and 460V − Connect two power wires to Contactor and one power wire to Blue lead wire (use wire nut). Connect ground wire to Ground Lug. Refer to Wiring Diagram on unit and Figure 10.

Thermostat Wiring Connections

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 Figure 11 for low voltage wiring examples.

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

Figure 9 Single−Phase Electrical Supply (Line Voltage) Connections

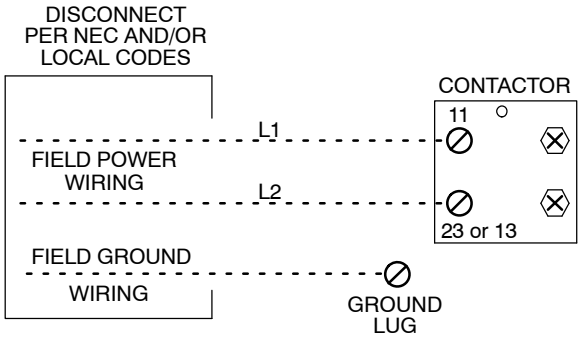


Figure 10 3–Phase 208/230V and 460V Electrical Supply (Line Voltage) Connections

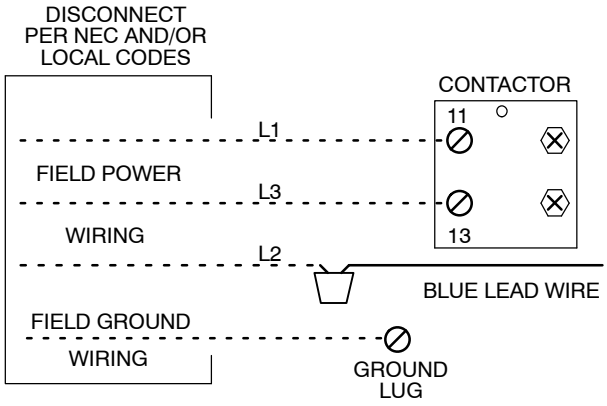
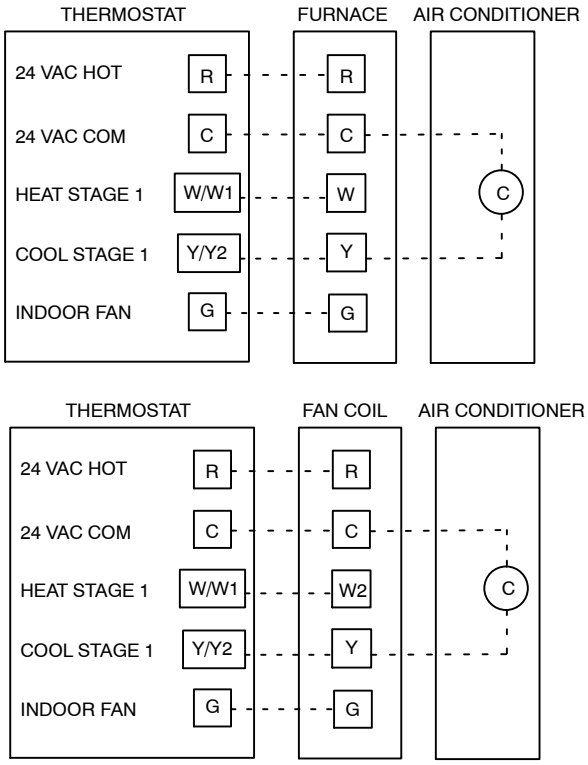


Figure 11 Typical Thermostat Connections



Phase Monitor Relay Board

Some 208/230 V and 460 V units are factory equipped with a phase monitor relay board.

The Phase Monitor Board detects the sequence of the three phase electrical system, and a relay breaks the Y (call for cooling) control signal if the phasing is incorrect. Additionally, the board will detect the loss of voltage on any of the three phase inputs and break the Y signal in the same way.

An LED on the board displays the following status:

Red LED ON – Normal function, relay contact closed.

Red LED Blinking – Abnormal function, relay contact open.

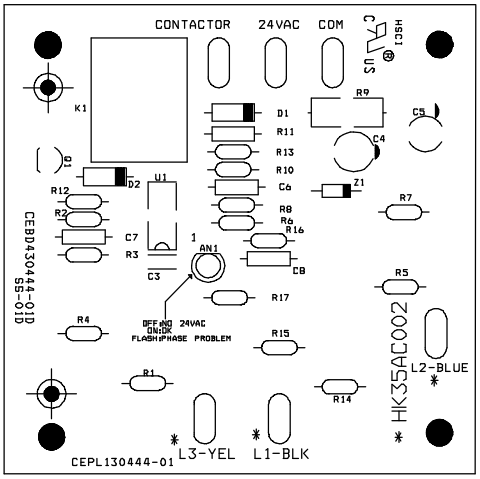
Red LED OFF – No 24 VAC control power present at board.

NOTE: If phase monitor is activated, correct the phase problem, and then follow these steps to reset the phase monitor:

1. Ensure line voltage is ON to the unit.
2. Disconnect 24 volts to outdoor unit.
3. Re–apply 24 volts to the outdoor unit.

This will reset the phase monitor.

Figure 12 Phase Monitor Relay Board



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 setpoint 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.

Check For Proper Phasing

3–phase 208/230 V and 460 V models.
Observe the LED on the Phase Monitor Relay Board. If the LED is blinking, turn off power to the unit and swap any two of the supply voltage wires. Turn power back on and repeat the start–up procedure.

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 x 0.6 = 6.0 ounces additional charge

(3 m x 17 g = 51 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 Tables 2 and 3. 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 ±3°F (±1.7°C).

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

Model Number	lbs. (kg)
R2A318GKR	3.56 (1.62)
R2A324GKR	4.08 (1.85)
R2A330GKR	4.11 (1.87)
R2A336GKR	5.35 (2.43)
R2A342GKR	7.01 (3.19)
R2A348GKR	8.88 (4.04)
R2A360GKR	10.52 (4.79)

Table 2—Required Liquid Line Temperature R–22

Measured Liquid Pressure (psig)	Rating Plate (required) Subcooling Temperature °F (°C)							
	°F 5	(°C) 3	°F 10	(°C) 6	°F 15	(°C) 8	°F 20	(°C) 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

Table 3—Required Liquid Line Temperature R–407C

Measured Liquid Pressure (psig)	P – T (°F)	Rating Plate (required) Subcooling Temperature °F (°C)											
		°F 6	(°C) 3	°F 8	(°C) 4	°F 10	(°C) 6	°F 12	(°C) 7	°F 14	(°C) 8	°F 16	(°C) 9
		R–407C Required Liquid Line Temperature °F (°C)											
140	**70**	64	18	62	17	60	15	58	14	56	13	54	12
150	**74**	68	20	66	19	64	18	62	17	60	15	58	14
160	**78**	72	22	70	21	68	20	66	19	64	18	62	17
170	**82**	76	24	74	23	72	22	70	21	68	20	66	19
180	**85**	79	26	77	25	75	24	73	23	71	22	69	21
190	**89**	83	28	81	27	79	26	77	25	75	24	73	23
200	**92**	86	30	84	29	82	28	80	27	78	26	76	24
210	**95**	89	32	87	31	85	30	83	28	81	27	79	26
220	**98**	92	34	90	32	88	31	86	30	84	29	82	28
230	**101**	95	35	93	34	91	33	89	32	87	31	85	30
240	**104**	98	37	96	36	94	35	92	33	90	32	88	31
250	**107**	101	38	99	37	97	36	95	35	93	34	91	33
260	**110**	104	40	102	39	100	38	98	37	96	36	94	34
270	**113**	107	41	105	40	103	39	101	38	99	37	97	36
280	**115**	109	43	107	42	105	41	103	40	101	38	99	37
290	**118**	112	44	110	43	108	42	106	41	104	40	102	39
300	**120**	114	46	112	45	110	44	108	42	106	41	104	40
310	**123**	117	47	115	46	113	45	111	44	109	43	107	42
320	**125**	119	48	117	47	115	46	113	45	111	44	109	43
330	**128**	122	50	120	49	118	48	116	46	114	45	112	44
340	**130**	124	51	122	50	120	49	118	48	116	47	114	45
350	**132**	126	52	124	51	122	50	120	49	118	48	116	47
360	**134**	128	53	126	52	124	51	122	50	120	49	118	48
370	**136**	130	55	128	54	126	52	124	51	122	50	120	49
380	**139**	133	56	131	55	129	54	127	53	125	51	123	50

CHECKING CHARGE – PISTON

Superheat charging is the process of charging refrigerant into a system until the temperature (superheat) of the suction gas entering the compressor reaches a prescribed value. Small variations of charge affect suction–gas superheat temperatures greatly. Therefore, this method of charging is very accurate. This method can be used only on split–system condensing units and heat pumps (operating in the cooling mode) with fixed–restrictor–type metering devices such as AccuRater™, cap tube, and so forth. For units using a TXV, the subcooling method must be used. Heat pumps must be operating in the cooling mode. To charge by superheat, a service technician needs an accurate superheat thermocouple or thermistor–type thermometer, a sling psychrometer, and a gage manifold. Do not use mercury or small–dial–type thermometers as they are not adequate for this type of measurement. Then use the following procedure:

Superheat Charging Method

1. Operate a unit a minimum of 10 minutes before checking charge.
2. Measure vapor pressure by attaching a gage to vapor valve service port.
3. Measure vapor–line temperature by attaching a service thermometer to unit vapor line near vapor valve. On a heat pump, attach to the suction tube between the accumulator and the compressor. Insulate thermometer for accurate readings.
4. Measure outdoor–air, dry–bulb temperature with a second thermometer.
5. Measure indoor–air (entering indoor coil), wet–bulb temperature with a sling psychrometer.
6. Locate outdoor temperature and evaporator entering air wet bulb temperature in Table 4. At this intersection note the superheat.
7. Locate superheat temperature located in previous step and vapor pressure in Table 5. At this intersection note vapor–line temperature.
8. If unit has a higher suction line temperature than charted temperature, add refrigerant until charted temperature is reached.
9. If unit has a lower suction line temperature than charted temperature, reclaim refrigerant until charted temperature is reached.
10. When adding refrigerant, charge in liquid form into suction service port using a flow–restricting device.
11. If outdoor air temperature or pressure at suction valve changes, charge to new suction line temperature indicated on chart.

Table 4—Superheat Charging

Outdoor Temp (°F)	Indoor Coil Entering Air Temp °F (Wet Bulb)													
	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

IMPORTANT: Where a dash appears: do not attempt to charge the system under these conditions or refrigerant slugging may occur.

Table 5—Required Vapor Line Temperature

Vapor Pressure (psig)	P — T (°F)	Superheat Temperature °F (°C)													
		°F 6	(°C) 3	°F 8	(°C) 4	°F 10	(°C) 6	°F 12	(°C) 7	°F 14	(°C) 8	°F 16	(°C) 9	°F 18	(°C) 10
		Vapor Line Temperature °F (°C)													
44	25	31	0	33	1	35	2	37	3	39	4	41	5	43	6
46	27	33	1	35	2	37	3	39	4	41	5	43	6	45	7
48	29	35	2	37	3	39	4	41	5	43	6	45	7	47	8
50	30	36	2	38	4	40	5	42	6	44	7	46	8	48	9
52	32	38	3	40	4	42	6	44	7	46	8	48	9	50	10
54	33	39	4	41	5	43	6	45	7	47	9	49	10	51	11
56	35	41	5	43	6	45	7	47	8	49	9	51	11	53	12
58	36	42	6	44	7	46	8	48	9	50	10	52	11	54	12
60	38	44	7	46	8	48	9	50	10	52	11	54	12	56	13
62	39	45	7	47	8	49	10	51	11	53	12	55	13	57	14
64	41	47	8	49	9	51	10	53	11	55	13	57	14	59	15
66	42	48	9	50	10	52	11	54	12	56	13	58	14	60	16
68	43	49	10	51	11	53	12	55	13	57	14	59	15	61	16
70	45	51	10	53	11	55	13	57	14	59	15	61	16	63	17
72	46	52	11	54	12	56	13	58	14	60	15	62	17	64	18
74	47	53	12	55	13	57	14	59	15	61	16	63	17	65	18
76	48	54	12	56	13	58	15	60	16	62	17	64	18	66	19
78	50	56	13	58	14	60	15	62	16	64	18	66	19	68	20
80	51	57	14	59	15	61	16	63	17	65	18	67	19	69	20
82	52	58	14	60	15	62	17	64	18	66	19	68	20	70	21
84	53	59	15	61	16	63	17	65	18	67	19	69	21	71	22
86	54	60	16	62	17	64	18	66	19	68	20	70	21	72	22
88	55	61	16	63	17	65	18	67	20	69	21	71	22	73	23

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 (0.5m) 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.