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Installation and Start-Up Instructions

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

This symbol → indicates a change since the last issue.

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 National Electrical Code (NEC) for special requirements.

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 the 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

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. Electrical shock can cause personal injury or death.

⚠ CAUTION

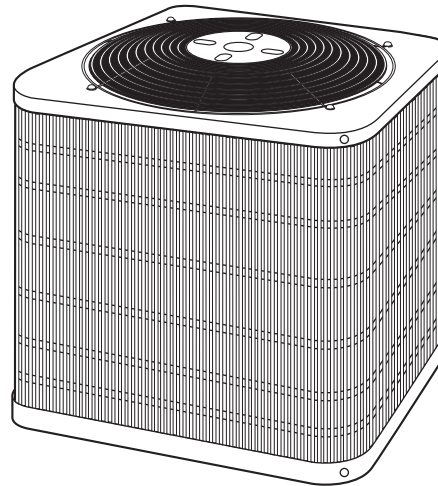
Puron® (R-410A) systems operate at higher pressures than standard R-22 systems. Be certain that service equipment is rated for Puron® to prevent unit damage. Some R-22 service equipment may not be acceptable. Check with your distributor.

INSTALLATION RECOMMENDATIONS

NOTE: In some cases noise in the living area has been traced to gas pulsations from improper installation of equipment.

1. Locate unit away from windows, patios, decks, etc. where unit operation sound may disturb customer.
2. Ensure that vapor and liquid tube diameters are appropriate to capacity of unit.

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Fig. 1—Model 38EYX

3. Run refrigerant tubes as directly as possible by avoiding unnecessary turns and bends.
4. Leave some slack between structure and unit to absorb vibration.
5. When passing refrigerant tubes through the wall, seal opening with RTV or other pliable silicon-based caulk. (See Fig. 2.)
6. Avoid direct tubing contact with water pipes, duct work, floor joists, wall studs, floors, and walls.
7. Do not suspend refrigerant tubing from joists and studs with a rigid wire or strap which comes in direct contact with tubing. (See Fig. 2.)
8. Ensure that tubing insulation is pliable and completely surrounds vapor tube.
9. When necessary, use hanger straps which are 1 in. wide and conform to shape of tubing insulation. (See Fig. 2.)
10. Isolate hanger straps from insulation by using metal sleeves bent to conform to shape of insulation.

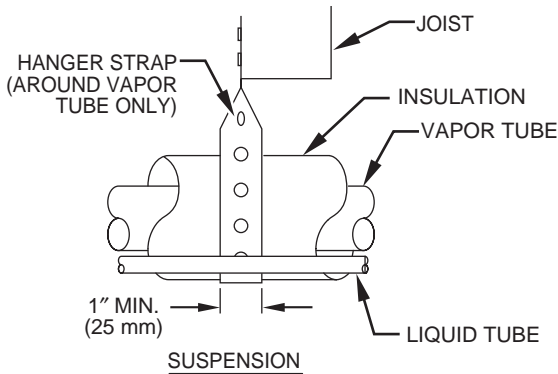
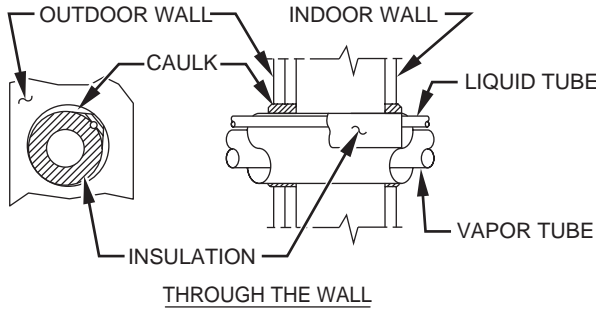
When outdoor unit is connected to factory-approved indoor unit, outdoor unit contains system refrigerant charge for operation with indoor unit of same size when connected by 7.6 m of field-supplied or factory accessory tubing. Add (or subtract) 56 g of 9.5 mm liquid line for lengths greater (or less) than 7.6 m. For proper unit operation, check refrigerant charge using charging information located on control box cover and/or in the Check Charge section of this instruction.

Manufacturer reserves the right to discontinue, or change at any time, specifications or designs without notice and without incurring obligations.

IMPORTANT: Maximum liquid-line size is 3/8-in. (9.5 mm) O.D. for all residential applications including long line.

IMPORTANT: Always install the factory-supplied Puron® heat pump (bi-flow) liquid-line filter drier. If replacing the filter drier, refer to Product Data Digest for appropriate part number. Obtain replacement filter driers from your distributor or branch.

NOTE: Avoid contact between tubing and structure



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Fig. 2—Connecting Tubing Installation

INSTALLATION

IMPORTANT: Specifications for this unit in residential new construction market require using the outdoor unit, indoor unit, refrigerant tubing sets, metering device, and filter drier listed in presale literature. There can be no deviation. Consult the Application Guideline and Service Manual for Residential Split-System Air Conditioners and Heat Pumps using Puron® Refrigerant to obtain required unit changes for specific applications and for R-22 retrofit.

Step 1—Check Equipment and Job Site

UNPACK UNIT

Move to final location. Remove carton taking care not to damage unit.

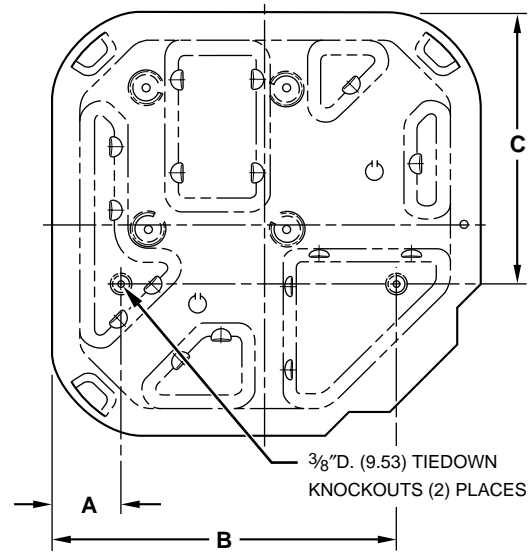
INSPECT EQUIPMENT

File claim with shipping company prior to installation if shipment is damaged or incomplete. Locate unit rating plate on unit corner panel. It contains information needed to properly install unit. Check rating plate to be sure unit matches job specifications.

Step 2—Install On a Solid, Level Mounting Pad

If conditions or local codes require the unit be attached to pad, tie down bolts should be used and fastened through knockouts provided in unit base pan. Refer to unit mounting pattern in Fig. 3 to determine base pan size and knockout hole location.

On rooftop applications, mount on level platform or frame. Place unit above a load-bearing wall and isolate unit and tubing set from



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DIMENSIONS (cm)

UNIT SIZE	MINIMUM MOUNTING PAD DIMENSIONS	TIEDOWN KNOCKOUT LOCATIONS		
		A	B	C
024	57 X 57	9.4	46	36.5
036-060	76 X 76	16.5	59.7	50.8

Fig. 3—Mounting Unit to Pad

structure. Arrange supporting members to adequately support unit and minimize transmission of vibration to building. Consult local codes governing rooftop applications.

⚠ CAUTION

Do not allow POE lubricant to come into contact with roofing material. POE may deteriorate certain types of synthetic roofing.

Roof mounted units exposed to winds above 5 mph (8km/h) may require wind baffles. Consult the Application Guideline and Service Manual for Residential Split-System Air Conditioners and Heat Pumps using Puron® Refrigerant for wind baffle construction.

NOTE: Unit must be level to within $\pm 2^\circ$ (± 31 mm/m) per compressor manufacturer specifications.

Step 3—Clearance Requirements

When installing, allow sufficient space for airflow clearance, wiring, refrigerant piping, and service. Allow 76 cm clearance to service end of unit and 122 cm above unit. For proper airflow, a 15 cm clearance on 1 side of unit and 30.5 cm on all remaining sides must be maintained. Maintain a distance of 61cm between units. Position so water, snow, or ice from roof or eaves cannot fall directly on unit.

On rooftop applications, locate unit at least 15 cm above roof surface.

Step 4—Operating Ambient

The minimum outdoor operating ambient in cooling mode without additional accessories is 13°C, and the maximum outdoor operating ambient in cooling mode is 52°C. The maximum outdoor operating ambient in heating mode is 19°C.

Step 5—Elevate Unit

⚠ CAUTION

Accumulation of water and ice in base pan may cause equipment damage.

Elevate unit per local climate and code requirements to provide clearance above estimated snowfall level and ensure adequate drainage of unit.

Step 6—Check Indoor Expansion Device

⚠ CAUTION

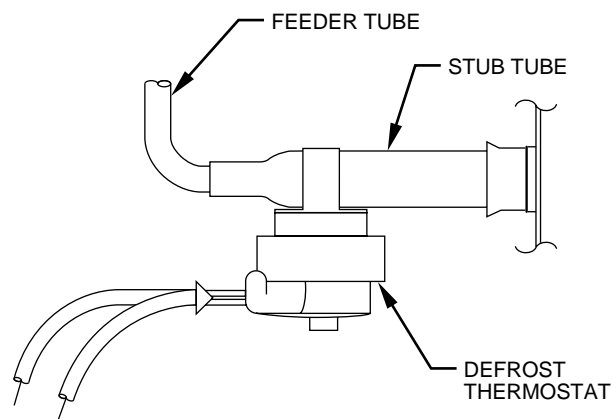
Check indoor coil piston to see if it matches the required piston shown on outdoor unit rating plate. If it does not match, replace indoor coil piston with correct piston. Failure to follow this caution could result in unit damage.

Step 7—Check Defrost Thermostat

Check defrost thermostat to ensure it is properly located and securely attached. Find the liquid tube with a brass distributor and feeder tubes going into outdoor coil. At the end of 1 of the feeder tubes, there is a 9.5 mm OD stub tube approximately 7.6 cm long. (See Fig. 4.) The defrost thermostat should be located on stub tube. Note that there is only 1 stub tube used with feeder tube, and on most units it is the bottom circuit.

Step 8—In Long-Line Applications, Install Liquid-Line Solenoid Valve (LSV)

For refrigerant piping arrangements with equivalent lengths greater than 15 m and/or when elevation difference between indoor and outdoor unit is greater than ± 6 m, follow all requirements of the Long-Line Guideline section in the Application Guideline and Service Manual for Residential Split-System Air Conditioners and Heat Pumps Using Puron® Refrigerant.



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Fig. 4—Defrost Thermostat Location

If required by Long-Line Application Guideline, install LSV kit part No. KHALS0401LLS specifically designed for Puron® Heat Pump. LSV should be installed within 60 cm of the outdoor unit with flow arrow pointing toward outdoor unit, as close as possible to filter drier. Follow the Installation Instructions included with accessory kit.

IMPORTANT: Flow arrow must point toward outdoor unit.

Step 9—Making Piping Connections

⚠ WARNING

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

⚠ CAUTION

Do not leave system open to atmosphere any longer than minimum required for installation. POE oil in compressor is extremely susceptible to moisture absorption. Always keep ends of tubing sealed during installation. Failure to follow this caution could result in unit damage.

⚠ CAUTION

If ANY refrigerant tubing is buried, provide a 15 cm vertical rise at service valve. Refrigerant tubing lengths up to 91 cm may be buried. Do NOT bury tubing lengths over 91 cm. Failure to follow this caution could result in unit damage.

⚠ CAUTION

To prevent damage to unit or service valves observe the following:

- Use a brazing shield
- Wrap service valves with wet cloth or use a heat sink material.

Outdoor units may be connected to indoor section using accessory tubing package or field-supplied refrigerant grade tubing of correct size and condition. For tubing requirements beyond 15 m, substantial capacity and performance losses can occur. Following the recommendations in the Application Guideline and Service Manual for Residential Split-System Air Conditioners and Heat Pumps using Puron® Refrigerant to minimize losses. Refer to Table 1 for field tubing diameters. Refer to Table 2 for accessory requirements.

Refrigerant tubes and indoor coil must be evacuated to 500 microns to minimize contamination and moisture in the system.

OUTDOOR UNIT CONNECTED TO FACTORY-APPROVED INDOOR UNIT

These outdoor units are carefully evaluated and listed with specific indoor coils for proper system performance.

IMPORTANT: Do not apply indoor coils which are not factory approved to these units.

INSTALL ADAPTER TUBE

1. Remove plastic retainer holding outdoor piston in liquid service valve.
2. Check outdoor piston size with matching number listed on unit rating plate.
3. Locate plastic bag taped to unit containing adapter tube.
4. Remove Teflon washer from bag and install on open end of liquid service valve. (See Fig. 5.)
5. Remove adapter tube from bag and connect threaded nut to liquid service valve. Tighten nut finger tight and then with wrench an additional 1/12 turn (15 ft-lb/20 n-m). DO NOT OVERTIGHTEN.

Table 1—Refrigerant Connections and Recommended Liquid Line and Vapor Tube Diameters-In. (mm)

UNIT SIZE	CONNECTION DIAMETER		TUBE DIAMETER		TUBE DIAMETER (ALTERNATE)
	Liquid	Vapor	Liquid	Vapor	Vapor
024	3/8 (9.5)	5/8 (15.9)	3/8 (9.5)	5/8 (15.9)	3/4(19.1)
036	3/8 (9.5)	3/4 (19.1)	3/8 (9.5)	3/4 (19.1)	5/8, 7/8 (15.9, 22.2)
048	3/8 (9.5)	7/8 (22.2)	3/8 (9.5)	7/8 (22.2)	3/4 (19.1)
060	3/8 (9.5)	1-1/8 (28.6)	3/8 (9.5)	1-1/8 (28.6)	7/8 (22.2)

NOTES:

1. Tube diameters are for lengths up to 50 ft (15 m). For tubing lengths greater than 50 ft (15 m) horizontal and/or 20 ft (6 m) vertical differential, consult the Application Guideline and Service Manual — Residential Split-System Air Conditioners and Heat Pumps Using Puron® Refrigerant.
2. Refrigerant tubes and indoor coils must be evacuated to 500 microns to minimize contamination and moisture in the system.
3. If required by local codes, Pressure Guard™ kit is available. See Product Data Digest for part numbers.

REFRIGERANT TUBING AND FILTER DRIER

CAUTION
 Installation of filter drier in liquid line is required to avoid performance loss due to plugged circuits or plugged expansion devices, and to avoid compressor failure.

Connect vapor tubing to fittings on outdoor unit vapor service valves. Connect liquid tube to filter drier. (See Table 1 and Fig. 6.) Use refrigerant grade tubing. Connect other end of filter drier to adapter tube on liquid service valve.

SWEAT CONNECTION

CAUTION
 To avoid valve damage while brazing, service valves must be wrapped in a heat-sink material such as a wet cloth.

Wrap service valves and filter drier with a wet cloth or heat-sinking material. Braze connections using either silver bearing or non-silver bearing brazing material. Do not use soft solder (materials which melt below 800°F/427°C.) Consult local code requirements.

LEAK CHECKING

Leak test all joints in indoor, outdoor, and refrigerant tubing.

EVACUATE REFRIGERANT TUBING AND INDOOR COIL

CAUTION
 To avoid compressor damage never use the system compressor as a vacuum pump.

Refrigerant tubes and indoor coil should be evacuated using the recommended deep vacuum method of 500 microns. The alternate triple evacuation method may be used if the procedure outlined below is followed.

IMPORTANT: Never open system under vacuum to atmosphere without first breaking it open with nitrogen.

Deep Vacuum Method

The deep vacuum method requires a vacuum pump capable of pulling a vacuum of 500 microns and a vacuum gage capable of accurately measuring this vacuum depth. The deep vacuum method is the most positive way of assuring a system is free of air and liquid water. (See Fig. 7.)

Triple Evacuation Method

The triple evacuation method should only be used when vacuum pump is only capable of pumping down to 28 in. (71 cm) of mercury vacuum and system does not contain any liquid water. Refer to Fig. 8 and proceed as follows:

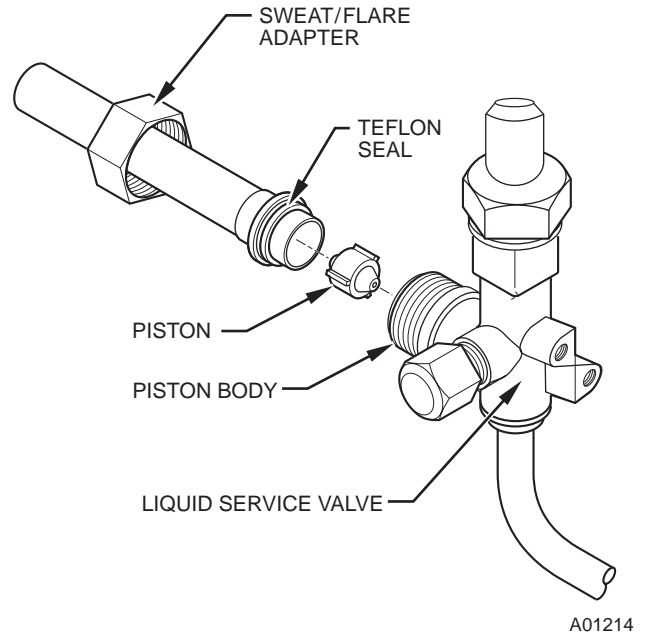


Fig. 5—Liquid Service Valve with Sweat Adapter Tube

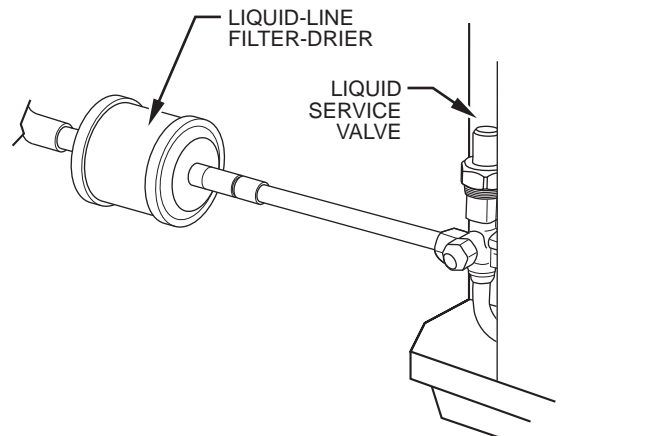
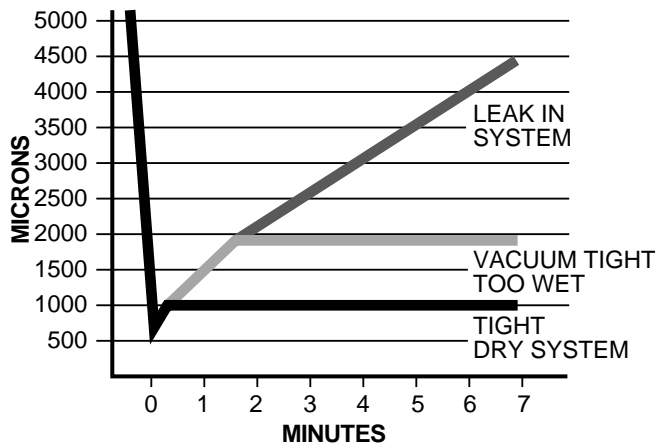


Fig. 6—Filter Drier with Sweat Adapter Tube and Liquid Tube

Table 2—Accessory Usage

ACCESSORY	REQUIRED FOR LOW-AMBIENT APPLICATIONS (BELOW 55°F/13°C)	REQUIRED FOR LONG-LINE APPLICATIONS* (OVER 50 FT/15 M)
Crankcase Heater	Yes	Yes
Evaporator Freeze Thermostat	Yes	No
Compressor Start Assist—Capacitor and Relay	Yes	Yes
Puron® Low-Ambient Pressure Switch	Yes	No
Wind Baffle	See Low-Ambient Instructions	No
Support Feet	Recommended	No
Hard Shutoff TXV	Yes	Yes
Liquid-Line Solenoid Valve for Heating	No	See Long-Line Application Guideline

* For tubing line sets between 50 (15) and 175 ft (53 m), or when vertical difference is greater than 20 ft (6 m), refer to Application Guideline and Service Manual—Residential Split-System Air Conditioners and Heat Pumps Using Puron®.



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Fig. 7—Deep Vacuum Graph

1. Pump system down to 28 in. (71 cm) of mercury and allow pump to continue operating for an additional 15 minutes.
2. Close service valves and shut off vacuum pump.
3. Connect a nitrogen cylinder and regulator to system and open until system pressure is 2 psig (14 KPa).
4. Close service valve and allow system to stand for 1 hr. During this time, dry nitrogen will be able to diffuse throughout the system absorbing moisture.
5. Repeat this procedure as indicated in Fig. 8. System will then be free of any contaminants and water vapor.

FINAL TUBING CHECK

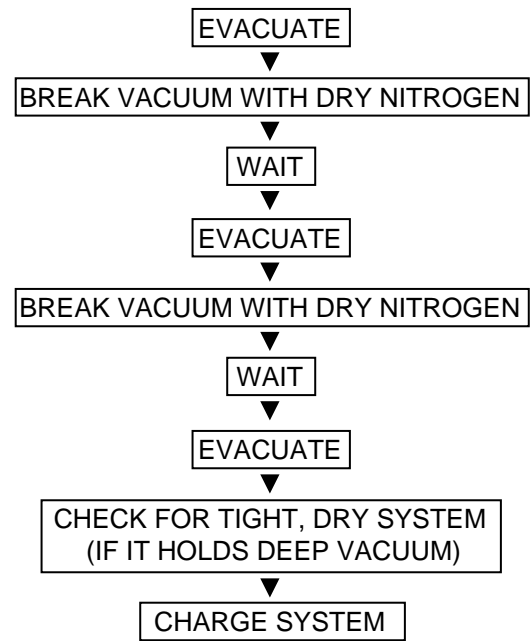
IMPORTANT: Check to be certain factory tubing on both indoor and outdoor unit has not shifted during shipment. Ensure tubes are not rubbing against each other or any sheet metal. Pay close attention to feeder tubes, making sure wire ties on feeder tubes are secure and tight.

Step 10—Make Electrical Connections

⚠ WARNING

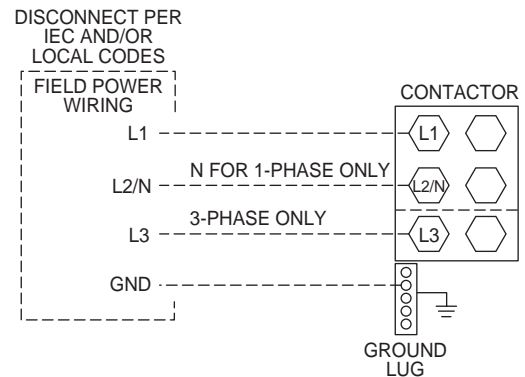
To avoid personal injury or death, do not supply power to unit with compressor terminal box cover removed.

Be sure field wiring complies with local and national fire, safety, and electrical codes, and voltage to system is within limits shown on unit rating plate. Contact local power company to correct improper voltage. See unit rating plate for recommended circuit protection device.



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Fig. 8—Triple Evacuation Method



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Fig. 9—Line Power Connections

NOTE: Operation of unit on improper line voltage constitutes abuse and could affect unit reliability. See unit rating plate. Do not install unit in system where voltage or phase imbalance (3-phase)

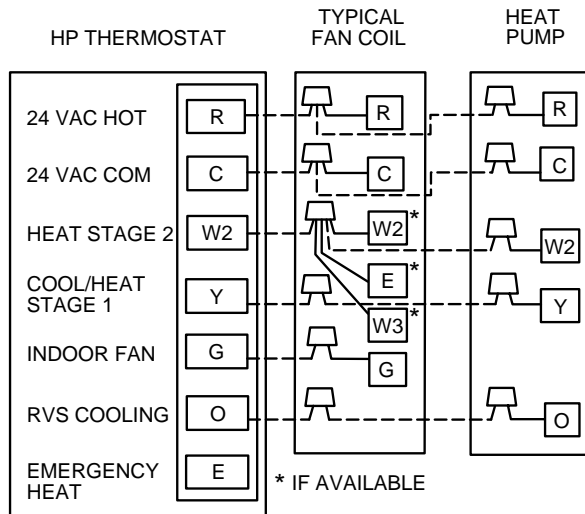


Fig. 10—Generic Wiring Diagram A02325
 (See Thermostat Installation Instructions for wiring specific unit combinations)

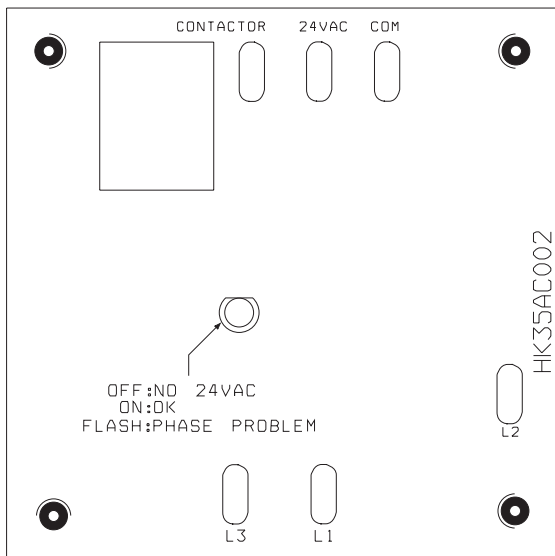


Fig. 11—Phase Monitor Control A00010

⚠ WARNING
 The 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. Failure to follow this warning can result in an electric shock, fire, or death.

CONNECT CONTROL WIRING

Remove grommet from control wiring hole in control box. Install conduit to knockout hole in control box. Extend control wiring leads into control box and connect to terminal board as shown on unit wiring diagram and Fig. 10. Consult IEC 60335-1, Part 25 for additional information.

Use No. 18 AWG color-coded, insulated (35°C minimum) wire. If thermostat is located more than 100 ft (30 m) from unit, as measured along the control voltage wires, use No. 16 AWG color-coded wire to avoid excessive voltage drop.

All wiring must be NEC Class 1 (US), or 245 IEC 57 and must be separated from incoming power leads. Wire insulation must conform to EN 60335-2-40.

Use fan coil transformer or accessory transformer for control power, 24v/40va minimum.

NOTE: Use of available 24v accessories may exceed the minimum 40va power requirement. Determine total transformer loading and increase the transformer capacity or split the load with an accessory transformer as required.

FINAL WIRING CHECK

IMPORTANT: Check factory wiring and field wire connections to ensure terminations are secured properly. Check wire routing to ensure wires are not in contact with tubing, sheet metal, etc.

Step 11—Compressor Crankcase Heater

When equipped with a crankcase heater, furnish power to heater a minimum of 24 hr before starting unit. To furnish power to heater only, set thermostat to OFF and close electrical disconnect to outdoor unit.

may fluctuate above or below permissible limits.

NOTE: Use copper wire only between disconnect switch and unit.

NOTE: Install branch circuit disconnect of adequate size per NEC to handle unit starting current. Locate disconnect within sight from and readily accessible from unit, per Section 440-14 of NEC or local code.

ROUTE GROUND AND POWER WIRES

Remove access panel to gain access to unit wiring. Install conduit to knockout hole in bottom of control box. Extend power and ground leads into control box and connect to unit contactor and ground lug as shown on unit wiring diagram and Fig. 9. Consult IEC 60335-1, Part 25 for additional information.

A crankcase heater is required in long-line applications (tubing greater than 50 ft (15 m) horizontal and/or elevation greater than 20 ft (6 m) between indoor and outdoor units). Refer to Application Guideline and Service Manual for Residential Split-System Air Conditioners and Heat Pumps Using Puron® Refrigerant.

Step 12—Install Electrical Accessories

Refer to the individual instructions packaged with kits or accessories when installing.

Step 13—Start-Up

⚠ CAUTION

To prevent compressor damage or personal injury, observe the following:

- Do not overcharge system with refrigerant.
- Do not operate unit in a vacuum or at negative pressure.
- Do not disable low-pressure switch

In scroll compressor applications:

- Dome temperatures may be hot

⚠ CAUTION

To prevent personal injury wear safety glasses, protective clothing, and gloves when handling refrigerant.

⚠ CAUTION

Regulations require that you do not vent refrigerant into the atmosphere. Recover during system repair or final unit disposal.

Follow these steps to properly start up the system.

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

⚠ CAUTION

Failure to follow this caution could result in unit damage.

- 3-phase scroll compressors are rotation sensitive.
- A flashing LED on phase monitor indicates reverse rotation. (See Fig. 11 and Table 3.)
- This will not allow contactor to be energized.
- Disconnect power to unit and interchange 2 field wiring leads on unit contactor.

SEQUENCE OF OPERATION

NOTE: Defrost control board is equipped with a 5-minute lock-out timer which may be initiated upon an interruption of power.

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

Cooling

On a call for cooling, thermostat makes circuits R-O, R-Y, and R-G. Circuit R-O energizes reversing valve, switching it to cooling position. On three phase models with scroll compressors, the units

are equipped with a phase monitor to detect if the incoming power is correctly phased for compressor operation. (See Fig. 11 and Table 3.) If the phasing is correct, circuit R-Y energizes contactor, starting outdoor fan motor and compressor circuit. R-G energizes indoor unit blower relay, starting indoor blower motor on high speed.

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

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

NOTE: If indoor unit is equipped with a time-delay relay circuit, the blower runs an additional 90 sec to increase system efficiency.

Heating

On a call for heating, thermostat makes circuits R-Y and R-G. If phasing is correct, circuit R-Y energizes contactor, starting outdoor fan motor and compressor. Circuit R-G energizes indoor blower relay, starting blower motor on high speed.

Should temperature continue to fall, R-W2 is connected through room thermostat. Circuit R-W2 energize the supplemental heat (if used). If outdoor temperature falls below setting of outdoor thermostat (field-installed option), contacts close to complete circuit and bring on additional supplemental heat.

When thermostat is satisfied, its contacts open, de-energizing contactor and supplemental heat. All heaters and motors should stop.

TABLE 3—PHASE MONITOR LED INDICATORS

LED	STATUS
OFF	No call for compressor operation
FLASHING	Reversed phase
ON	Normal

Quiet Shift

Quiet Shift is a field-selectable defrost mode, which will eliminate occasional noise that could be heard at the start of the defrost cycle and restarting of heating cycle. It is selected by placing DIP switch 3 (on defrost board) in ON position.

When Quiet Shift switch is placed in ON position, and a defrost is initiated, the following sequence of operation will occur. Reversing valve will energize, compressor will turn off for 30 sec, then turn back on to complete defrost. At the start of heating cycle after conclusion of defrost mode, reversing valve will de-energize, the compressor will turn off for another 30 sec, and the fan will turn off for 40 sec, before starting in the heating mode.

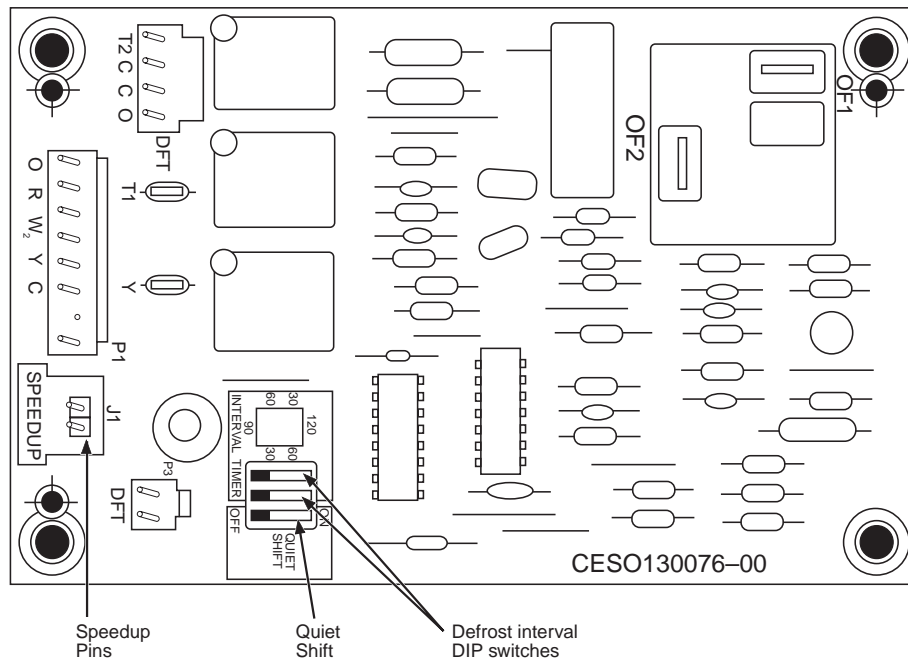
Defrost

The defrost control is a time/temperature control which includes a field-selectable time period (DIP switch 1 and 2 on the board) between defrost cycles of 30, 60, 90, or 120 minutes (factory set at 90 minutes).

To initiate a forced defrost, two options are available depending on the status of the defrost thermostat.

If defrost thermostat is closed, speedup pins (J1) must be shorted by placing a flat head screwdriver in between for 5 sec and releasing, to observe a complete defrost cycle. When the Quiet Shift switch is selected, compressor will be turned off for two 30 sec intervals during this complete defrost cycle as explained previously. When Quiet Shift switch is in factory default OFF position, a normal and complete defrost cycle will be observed.

If defrost thermostat is in open position, and speedup pins are shorted (with a flat head screwdriver) for 5 sec and released, a



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Fig. 12—Defrost Control

short defrost cycle will be observed (actual length is dependent upon the selected Quiet Shift position). When Quiet Shift switch is in ON position, the length of defrost is 1 minute (30 sec compressor off period followed by 30 sec of defrost with compressor operation). On return to heating operation, compressor will again turn off for an additional 30 sec and the fan for 40 sec. When the Quiet Shift is in OFF position, only a brief 30 sec cycle will be observed.

If it is desirable to observe a complete defrost in warmer weather, the thermostat must be closed as follows:

1. Turn off power to outdoor unit.
2. Disconnect outdoor fan motor lead from OF2 on control board (See Fig. 12.) Tape to prevent grounding.
3. Restart unit in heating mode, allowing frost to accumulate on outdoor coil.
4. After a few minutes in heating mode, liquid line temperature should drop below closing point of defrost thermostat (approximately 30°F/-1°C).

NOTE: Unit will remain in defrost until defrost thermostat reopens at approximately 80°F (26.7°C) coil temperature at liquid line or remainder of defrost cycle time.

5. Turn off power to outdoor and reconnect fan motor lead to OF2 on control board after above forced defrost cycle.

Step 14—Check Charge

UNIT CHARGE

Factory charge is shown on unit rating plate. To check charge in cooling mode, refer to Cooling Only Procedure. To check charge in heating mode, refer to Heating Check Chart Procedure.

COOLING ONLY PROCEDURE

NOTE: If superheat or subcooling charging conditions are not favorable, charge must be weighed in accordance with unit rating plate ± 0.6 oz/ft of 3/8-in. (56g/m of 9.5 mm) liquid line above or below 15 ft (7.6 m) respectively.

EXAMPLE:

To calculate additional charge required for a 10 m line set:

$$10 \text{ m} - 7.6 \text{ m} = 2.4 \text{ m} \times 56 \text{ g/m} = 134.4 \text{ g of additional charge}$$

The following procedure is valid when indoor airflow is within ± 21 percent of its rated CFM.

1. Operate unit a minimum of 10 minutes before checking charge.
2. Measure suction pressure by attaching an accurate gage to suction valve service port.
3. Measure suction temperature by attaching an accurate thermistor type or electronic thermometer to suction line near service valve.
4. Measure outdoor air dry bulb temperature with thermometer.
5. Measure indoor air (entering indoor coil) wet bulb temperature with a sling psychrometer.
6. Refer to Table 4. Find outdoor temperature and evaporator entering air web bulb temperature. At this intersection, note superheat.
7. Refer to Table 5. Find superheat temperature located in item 6 and suction pressure. At this intersection, note suction line temperature.
8. If a 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.

HEATING CHECK CHART PROCEDURE

To check system operation during heating cycle, refer to the Heat Pump Pressure chart label on outdoor unit. This chart indicates whether a correct relationship exists between system operating pressure and air temperature entering indoor and outdoor units. If pressure and temperature do not match on chart, system refrigerant charge may not be correct. Do not use chart to adjust refrigerant charge.

Table 4—Superheat Charging Table (SI)

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

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

Table 5—Required Suction-Line Temperature (°C)

SUPERHEAT TEMP (°C)	SUCTION PRESSURE AT SERVICE PORT (KPA)									
	743	774	805	836	869	902	957	971	1005	
0	1.7	2.8	3.9	5.0	6.1	7.2	8.3	9.4	10.6	
1	2.8	3.9	5.0	6.1	7.2	8.3	9.4	10.6	11.7	
2	3.9	5.0	6.1	7.2	8.3	9.4	10.6	11.7	12.8	
3	5.0	6.1	7.2	8.3	9.4	10.6	11.7	12.8	13.9	
4	6.1	7.2	8.3	9.4	10.6	11.7	12.8	13.9	15.0	
6	7.2	8.3	9.4	10.6	11.7	12.8	13.9	15.0	16.1	
7	8.3	9.4	10.6	11.7	12.8	13.9	15.0	16.1	17.2	
8	9.4	10.6	11.7	12.8	13.9	15.0	16.1	17.2	18.3	
9	10.6	11.7	12.8	13.9	15.0	16.1	17.2	18.3	19.4	
10	11.7	12.8	13.9	15.0	16.1	17.2	18.3	19.4	20.6	
11	12.8	13.9	15.0	16.1	17.2	18.3	19.4	20.6	21.7	
12	13.9	15.0	16.1	17.2	18.3	19.4	20.6	21.7	22.8	
13	15.0	16.1	17.2	18.3	19.4	20.6	21.7	22.8	23.9	
14	16.1	17.2	18.3	19.4	20.6	21.7	22.8	23.9	25.0	
15	16.7	17.8	18.9	20.0	21.1	22.2	23.3	24.4	25.6	
16	17.2	18.3	19.4	20.6	21.7	22.8	23.9	25.0	26.1	
17	18.3	19.4	20.6	21.7	22.8	23.9	25.0	26.1	27.2	
18	19.4	20.6	21.7	22.8	23.9	25.0	26.1	27.2	28.3	
19	20.6	21.7	22.8	23.9	25.0	26.1	27.2	28.3	29.4	
20	21.7	22.8	23.9	25.0	26.1	27.2	28.3	29.4	30.6	
21	22.8	23.9	25.0	26.1	27.2	28.3	29.4	30.6	31.7	
22	23.9	25.0	26.1	27.2	28.3	29.4	30.6	31.7	32.8	

NOTE: In heating mode, check refrigerant charge only when pressures are stable. If in doubt, remove charge and weigh in correct refrigerant charge.

NOTE: When charging is necessary during heating season, charge must be weighed in accordance with unit rating plate and adjusted for interconnecting tubes greater than or less than 7.6 m.

Step 15—Final Checks

IMPORTANT: Before leaving job, be sure to do the following:

1. Securely fasten all panels and covers.
2. Tighten service valve stem caps to 1/12-turn past finger tight.

3. Leave User’s Manual with owner. Explain system operation and periodic maintenance requirements outlined in manual.
4. Fill out Dealer Installation Checklist and place in customer file.

CARE AND MAINTENANCE

For continuing high performance and to minimize possible equipment failure, periodic maintenance must be performed on this equipment.

Frequency of maintenance may vary depending upon geographic areas, such as coastal applications.

PURON® (R-410A) QUICK REFERENCE GUIDE

- Puron® refrigerant operates at 50-70 percent higher pressures than R-22. Be sure that servicing equipment and replacement components are designed to operate with Puron®.
- Puron® refrigerant cylinders are rose colored.
- Recovery cylinder service pressure rating must be 400 psig (2758 KPa) . DOT 4BA400 or DOT BW400.
- Puron® systems should be charged with liquid refrigerant. Use a commercial type metering device in the manifold hose when charging into suction line with compressor operating.
- Manifold sets should be at least 700 psig (4826 KPa) high side and 180 psig (1241 KPa) low side with 550 psig (3792 KPa) low-side retard.
- Use hoses with 700 psig (4826 KPa) service pressure rating.
- Leak detectors should be designed to detect HFC refrigerant.
- Puron®, as with other HFCs, is only compatible with POE oils.
- Vacuum pumps will not remove moisture from oil.
- Do not leave Puron® suction line filter driers in line longer than 72 hrs.
- Do not use liquid-line filter driers with rated working pressures less than 600 psig (4137 KPa).
- Do not install a suction-line filter drier in liquid line.
- POE oils absorb moisture rapidly. Do not expose oil to atmosphere.
- POE oils may cause damage to certain plastics and roofing materials.
- Wrap all filter driers and service valves with wet cloth when brazing.
- A factory-approved liquid-line filter drier is required on every unit.
- Do not use an R-22 TXV.
- If indoor unit is equipped with an R-22 TXV, it must be changed to an Puron® TXV.
- All Puron® Heat Pumps must have indoor Puron® TXV.
- Never open system to atmosphere while it is under a vacuum.
- When system must be opened for service, recover refrigerant, break vacuum with dry nitrogen prior to opening to atmosphere. Evacuate to 500 microns prior to recharging.
- Always replace filter drier after opening system for service.
- Do not vent Puron® into the atmosphere.
- Do not use capillary tube coils.
- Observe all **warnings, cautions, and bold text.**