installation and start-up instructions

TWO-SPEED PURON® PLUS AIR CONDITIONING UNIT

598B

Cancels: II 598B-24-3 II 598B-24-4
5-03

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 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:** 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®. 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.

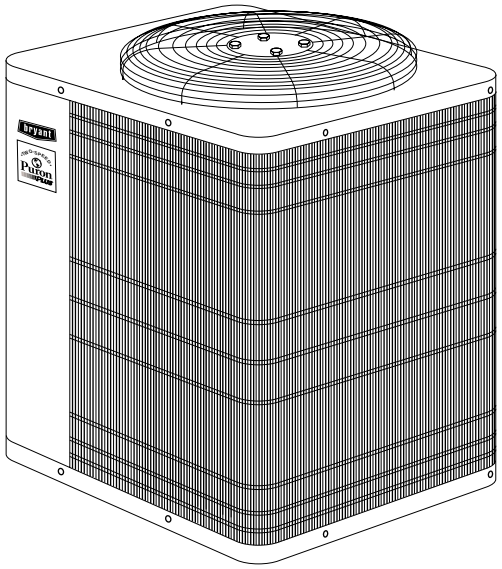

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Fig. 1—Model 598B

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 the same size when connected by 15 ft of field-supplied or factory accessory tubing. For proper unit operation, check refrigerant charge using charging information located on control box cover.

IMPORTANT: Maximum liquid-line size is 3/8-in. O.D. for all residential applications.

IMPORTANT: Always install the factory-supplied Puron® air conditioner liquid line filter drier. Obtain replacement filter driers from your local distributor or branch.

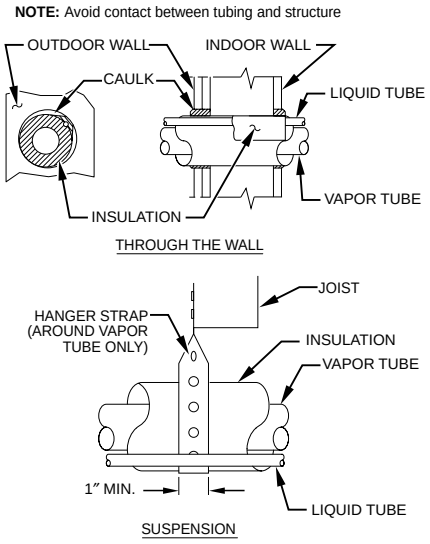


Fig. 2—Connecting Tubing Installation

INSTALLATION

I. CHECK EQUIPMENT AND JOB SITE

A. UNPACK UNIT

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

B. 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.

II. 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 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 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

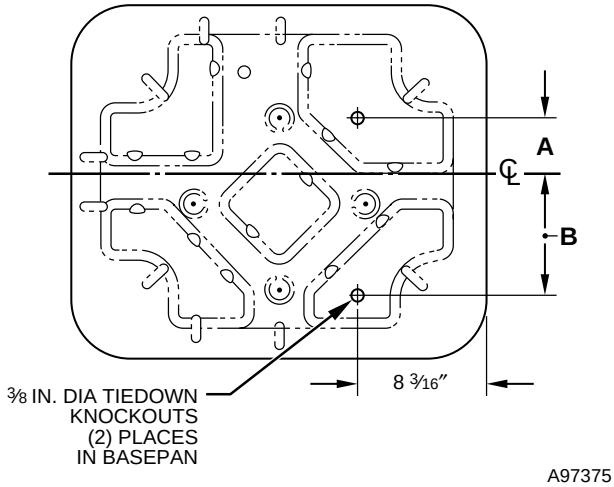
NOTE: Unit must be level to within ±2° (±3/8 in./ft) per compressor manufacturer specifications.

III. CLEARANCE REQUIREMENTS

When installing, allow sufficient space for airflow clearance, wiring, refrigerant piping, and service. Allow 30-in. clearance to service end of unit and 48 in. above unit. For proper airflow, a 6-in. clearance on 1 side of unit and 12 in. on all remaining sides must be maintained. Maintain a distance of 24 in. between units. Position so water, snow, or ice from roof or eaves cannot fall directly on unit.

IV. OPERATING AMBIENTS

The minimum outdoor operating ambient in cooling mode is 55°F, and the maximum outdoor operating ambient in cooling mode is 125°F.



DIMENSIONS (IN.)

UNIT SIZE	MINIMUM MOUNTING PAD DIMENSIONS	TIEDOWN KNOCKOUT LOCATIONS	
		A	B
024	19 X 24	2-13/16	6-15/16
036-060	26 X 32	4	9-3/4

Fig. 3—Mounting Unit to Pad

V. INSTALL TXV

Puron® fan coils and furnace coils come factory equipped with a bi-flow, hard shut off TXV specifically designed for Puron® two-speed units. No TXV changeout is required. **An existing R-22 TXV must be replaced with a factory approved TXV specifically designed for Puron® two-speed units.**

NOTE: FK4 and FC4 fan coils are equipped with an R-22 TXV. If an FK4 or an FC4 fan coil is used with a Puron® air conditioner, the R-22 TXV must be replaced with a factory-approved Puron® TXV.

→ > ⚠ **CAUTION:** If indoor unit is equipped with piston, remove indoor coil piston and replace with factory approved TXV metering device.

A. TXV INSTALLATION

IMPORTANT: The TXV should be mounted as close to the indoor coil as possible and in a vertical, upright position. Avoid mounting the inlet tube vertically down. Valve is more susceptible to malfunction due to debris if inlet tube is facing down. A factory approved filter drier must be installed in the liquid line. (See Fig. 4.)

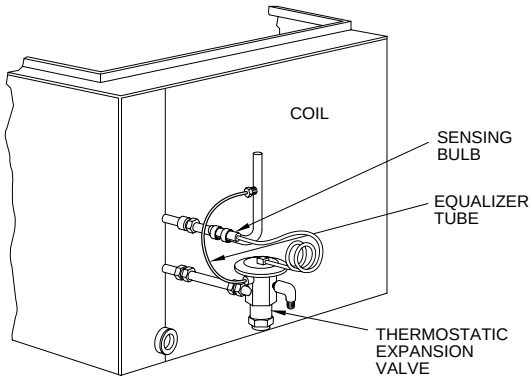


Fig. 4—TXV Installed

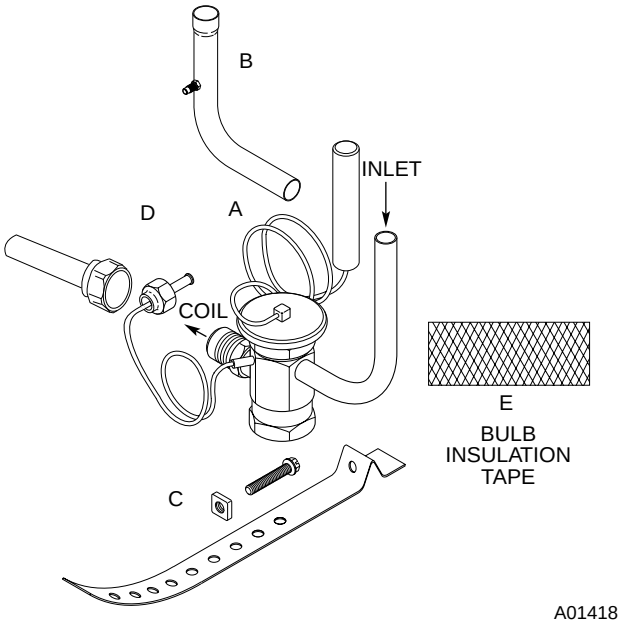


Fig. 5—TXV Kit Contents

INSTALLING TXV IN PLACE OF PISTON

1. Remove any existing refrigerant and ensure coil has not been exposed to atmospheric pressure for more than 15 minutes.
2. Remove indoor coil inlet tube at piston body inlet. Use back-up wrench to prevent damage.
3. Remove piston retainer, begin careful not to damage scaling surface of O-ring.
4. Remove and discard factory-installed piston. (Replace retainer if O-ring is damaged.)
5. Reinstall piston retainer in piston body.
6. Replace indoor coil inlet tube. Use back-up wrench to prevent damage.

⚠ **CAUTION:** To prevent damage to the unit, use a brazing shield and wrap TXV with wet cloth.

7. Sweat swivel adapter (see Fig. 5D) to inlet of indoor coil and attach to TXV (see Fig. 5A) outlet. Use backup wrench to avoid damage to tubing or valve. Sweat Inlet of TXV, marked "IN" to liquid line. Avoid excessive heat which could damage valve
8. Install vapor elbow (see Fig. 5B) with equalizer adapter to suction tube of line set and suction connection to indoor coil. Adapter has a 1/4-in. male connector or attaching equalizer tube.
9. Connect equalizer tube of TXV to 1/4-in. equalizer fitting on vapor line adapter.
10. Attach TXV bulb to horizontal section of suction line using bulb straps provided. (See Fig. 5C.) Insulate bulb with factory-supplied insulation tape. (See Fig. 5E.) See Fig. 6 for correct positioning of sensing bulb.
11. Proceed with remainder of unit installation.

REPLACING R-22 TXV OR NON-BALANCE PORT PURON TXV

1. Remove any existing refrigerant and ensure coil has not been exposed to atmospheric pressure for more than 15 minutes.
2. Remove coil access panel and fitting panel from front of cabinet.
3. Remove TXV support clamp using the 5/16-in. nut driver. Save the clamp.
4. Remove TXV using a backup wrench on flare connections to prevent damage to tubing.
5. Using wire cutters, cut equalizer tube off flush with vapor tube inside cabinet.
6. Remove bulb from vapor tube inside cabinet.
7. Braze equalizer stub-tube closed. Use protective barrier as necessary to prevent damage to drain pan.

IMPORTANT: Route the equalizer tube of approved Puron® TXV through suction line connection opening in fitting panel prior to replacing fitting panel around tubing.

8. Install TXV with 3/8-in. copper tubing through small hole in service panel. (See Fig. 5A.) To avoid damage to tubing or valve, use wrench and backup wrench to attach TXV to distributor.
9. Reinstall TXV support clamp (removed in item 3).
10. Attach TXV bulb to vapor tube inside cabinet, in same location as original was when removed, using supplied bulb strap. (See Fig. 5C.) See Fig. 6 for correct positioning of sensing bulb.
11. Route equalizer tube through suction connection opening (large hole) in fitting panel and install fitting panel in place.
12. Sweat inlet of TXV, marked "IN" to liquid line. Avoid excessive heat which could damage valve.
13. Install vapor elbow with equalizer adapter to vapor line of line set and vapor connection to indoor coil. (See Fig. 5B.) Adapter has a 1/4-in. male connector for attaching equalizer tube. (See Fig. 5B.)
14. Connect equalizer tube of TXV by 1/4-in. equalizer fitting, on vapor line adapter. Use backup wrench to prevent damage to equalizer fitting.
15. Proceed with the remainder of unit installation.

B. LONG-LINE APPLICATIONS

For refrigerant piping arrangements with equivalent lengths greater than 50 ft or when elevation difference between indoor and/or outdoor unit is more than 20 ft, 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.

VI. MAKE 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.

CAUTION: If ANY refrigerant tubing is buried, provide 6–in. vertical rise at service valve. Refrigerant tubing lengths up to 36 in. may be buried without further special consideration. Buried refrigerant tubing lengths greater than 36 in. are NOT recommended.

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. Tubing diameters listed in Table 1 are adequate for equivalent lengths up to 50 ft. For tubing requirements beyond 50 ft, substantial capacity and performance losses can occur. Follow 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.

If refrigerant tubes or indoor coil are exposed to atmosphere, they must be evacuated to 500 microns to eliminate contamination and moisture in the system.

TABLE 1—REFRIGERANT CONNECTIONS AND RECOMMENDED LIQUID AND VAPOR TUBE DIAMETERS (IN.)

UNIT SIZE	LIQUID		VAPOR		VAPOR (LONG-LINE)	
	Connection Diameter	Tube Diameter	Connection Diameter	Tube Diameter	Connection Diameter	Tube Diameter
024	3/8	3/8	5/8	5/8	5/8	3/4
036	3/8	3/8	3/4	3/4	3/4	7/8
048	3/8	3/8	7/8	7/8	7/8	7/8
060	3/8	3/8	7/8	1-1/8	7/8	1-1/8

Notes:
1. Tube diameters are for lengths up to 50 equivalent ft.
2. Do not apply capillary tube indoor coils to these units.

A. OUTDOOR UNIT CONNECTED TO FACTORY-APPROVED INDOOR UNIT

Outdoor unit contains correct system refrigerant charge for operation with indoor unit of same size when connected by 15 ft of field-supplied or factory-accessory tubing. Check refrigerant charge for maximum efficiency

CAUTION: Installation of filter drier in liquid line is required.

B. INSTALL LIQUID-LINE FILTER DRIER

Installation of filter drier in liquid line is required. Refer to Fig. 7 and install filter drier as follows:

1. Braze 5-in. connector tube to liquid service valve. Wrap filter drier with damp cloth.
2. Braze filter drier between connector tube and liquid tube to indoor coil. Flow arrow must point toward indoor coil.

C. REFRIGERANT TUBING

Connect vapor tube to fitting on outdoor unit vapor service valves. Connect liquid tube to filter drier. (See Fig. 7 and Table 1.) Use refrigerant grade tubing.

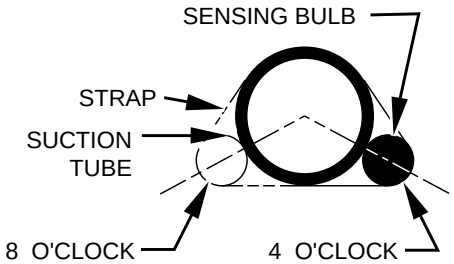


Fig. 6—Positioning of Sensing Bulb

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

D. SWEAT CONNECTION

Service valves are closed from factory and ready for brazing. After wrapping service valve and filter drier with a wet cloth, braze sweat connections using industry accepted methods and materials. Do not use soft solder (materials which melt below 800°F). Consult local code requirements. Refrigerant tubing and indoor coil are now ready for leak testing. This check should include all field and factory joints.

IMPORTANT: Check factory tubing on both indoor and outdoor unit to 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.

E. LEAK CHECKING

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

F. EVACUATE REFRIGERANT TUBING AND INDOOR COIL

CAUTION: 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. Always break a vacuum with dry 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. 8.)

TRIPLE EVACUATION METHOD

The triple evacuation method should only be used when vacuum pump is capable of pumping down to 28 in. of mercury and system does not contain any liquid water. Refer to Fig. 9 and proceed as follows:

1. Pump system down to 28 in. 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.
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. 9. System will then contain minimal amounts of contaminants and water vapor.

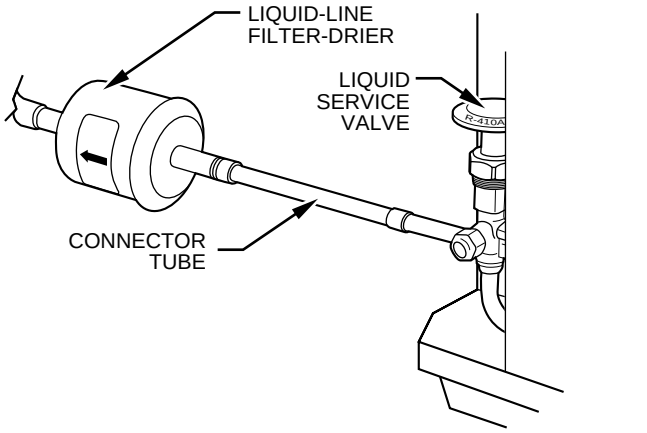


Fig. 7—Filter Drier with Sweat Adapter Tube and Liquid Tube

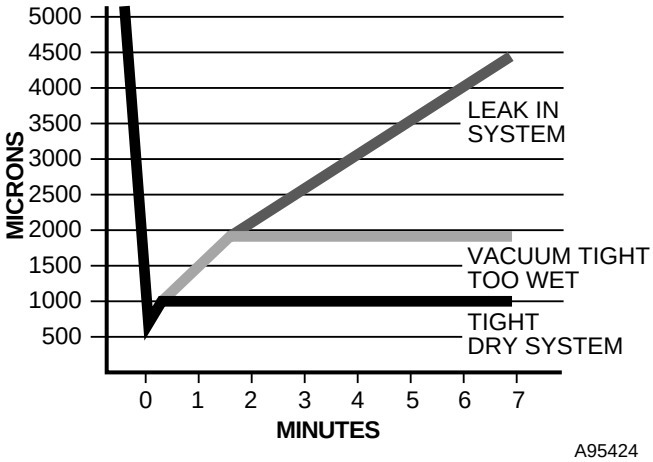


Fig. 8—Deep Vacuum Graph

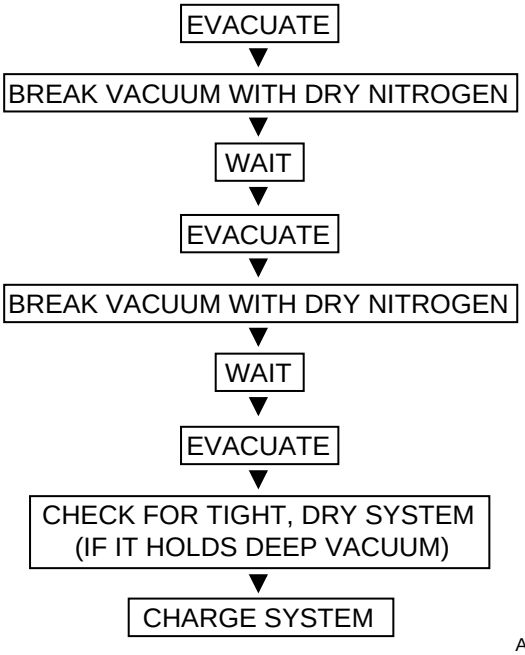


Fig. 9—Triple Evacuation Method

G. 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.

VII. 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 for correction of improper voltage. See unit rating plate for recommended circuit protection device.

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 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.

A. ROUTE GROUND AND POWER WIRES

Remove access panel to gain access to unit wiring. Extend wires from disconnect through power wiring hole provided and into unit control box. Size wires per NEC but not smaller than minimum wire size shown in Product Data Sheet.

> ⚠ **WARNING:** The unit cabinet must have as 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.

B. CONNECT GROUND AND POWER WIRES

Connect ground wire to ground connection in control box for safety. Connect power wiring to leads provided as shown in Fig. 10.

C. CONNECT CONTROL WIRING

Route 24v control wires through control wiring grommet and connect to leads provided in control box. (See Fig. 11.)

Use No. 18 AWG color-coded, insulated (35°C minimum) wire. If thermostat is located more than 100 ft 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 and must be separated from incoming power leads.

The outdoor unit requires a minimum of 27va, 24vac control power.

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

TABLE 2—ACCESSORY USAGE

ACCESSORY	REQUIRED FOR LONG-LINE APPLICATIONS* (50-175 FT)	REQUIRED FOR SEACOAST APPLICATIONS (WITHIN 2 MILES)
Coastal Filter	No	Yes
Support Feet	No	Recommended
Puron® Balance-Port Hard Shutoff TXV	Yes†	Yes†

* For tubing line sets between 50 and 175 ft horizontal or 20 ft vertical differential refer to Service Manual for Air Conditioners and Heat Pumps Using Puron® Refrigerant. Crankcase heater and start assist are standard on two-speed units.

† All two-speed units require hard shut-off TXV.

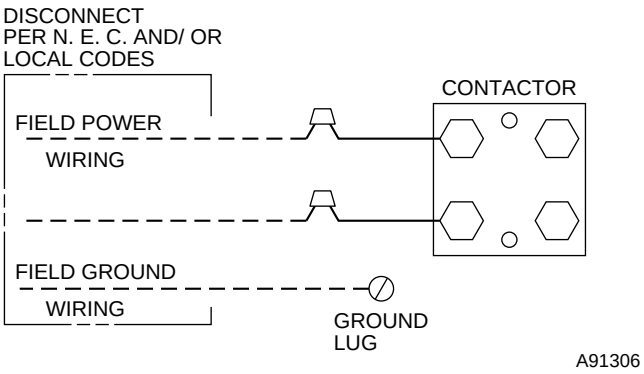


Fig. 10—Line Power Connections

VIII. INSTALL ELECTRICAL ACCESSORIES

A. GENERAL

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

Available electrical accessories include latent capacity control. See Fig. 11 for typical accessory wiring diagrams.

B. LATENT CAPACITY CONTROL (LCC)

The purpose of an LCC is to provide a dehumidification mode to assure a 75 percent or less system sensible heat ratio. If indoor unit installed contains an ECM blower (such as an FK4C or FV4A fan coil or a 315(A,J)AV or 355MAV gas furnace), no LCC is required. Indoor products with ECM blowers have enough CFM range to provide proper airflow for low-speed cooling. If indoor unit installed has a standard PSC blower motor, the low-speed airflow available is too great to assure 75 percent or less system sensible heat ratio. The LCC for standard blower products consists of a standard humidistat which opens contacts on humidity rise and a pilot duty relay with 24v coil.

NOTE: If an LCC is desired, low-speed airflow must be maintained so that a minimum of 300 CFM/ton can be supplied during high-speed LCC operation.

LCC OPERATION FOR TYPICAL PSC FAN COILS

The standard blower operation for systems with typical PSC fan coils is covered in Fig. 11. The blower runs in high speed regardless if compressor operation is high or low speed. When the LCC is wired according to Fig. 11 and humidity rises, the humidistat contacts open and de-energize the relay. If relay is de-energized, the system operates on high-speed compressor and high-speed airflow until humidistat closes. Fig. 11 shows the wiring with a Bryant Thermidistat which controls temperature and humidity level without the need for an additional humidistat and relay.

LCC OPERATION FOR TYPICAL PSC FURNACES

The standard blower operation of systems with typical PSC furnaces is covered in Fig. 11. The blower runs in high or low speed in conjunction with compressor high- or low-speed operation. When the LCC is wired according to Fig. 11, humidity rises, the humidistat contacts open and de-energize the relay. If relay is de-energized, the system operates on high-speed compressor and low-speed airflow until humidistat closes. Fig. 11 shows the wiring with a Bryant Thermidistat which controls temperature and humidity level without the need for an additional humidistat and relay.

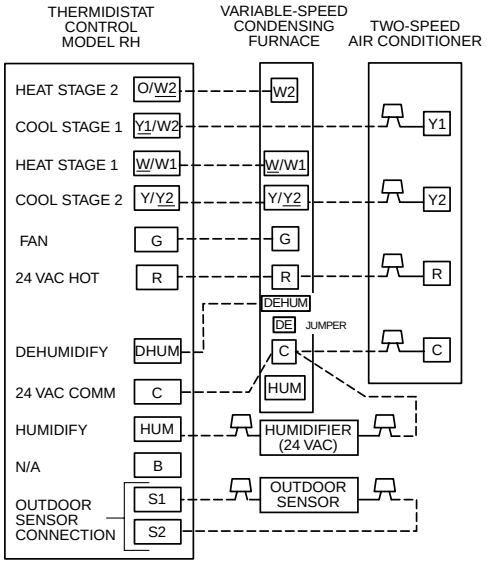
IX. MAKE AIRFLOW SELECTIONS

A. AIRFLOW SELECTION FOR 315AAV/355MAV FURNACES

The 315AAV/355MAV Non-Condensing Variable Speed Furnaces provide high- and low-speed blower operation to match the capacities of the compressor at high and low speeds. To select the recommended airflow and for adjustments to the manual switches labeled SW1, A/C and CF on the control board refer to the furnace Installation, Start-Up, and Operating Instructions. The 315AAV utilizes a control center that allows the installing technician to select the proper airflows. The A/C switch determines the airflow during high speed compressor operation. Airflow for hight and low speed can be calculated at either 350 CFM per ton or 400 CFM per ton based on the positions of SW1-5.

B. AIRFLOW SELECTION FOR FK4C OR FV4A FAN COILS

The FK4C and FV4A provides high- and low-speed blower operation to match the capacities of compressor at high and low speeds. To select recommended airflow, refer to the FK4C or FV4A Installation Instructions. The FK4C and FV4A utilize an EASY SELECT control board that allows the installing technician to select proper airflows. For adjustments to control board and recommended A/C SIZE and CFM ADJUST selections, refer to the fan coil Installation Instructions. This fan coil has an adjustable blower off delay factory set at 90 sec. for high- and low-speed blower operation.



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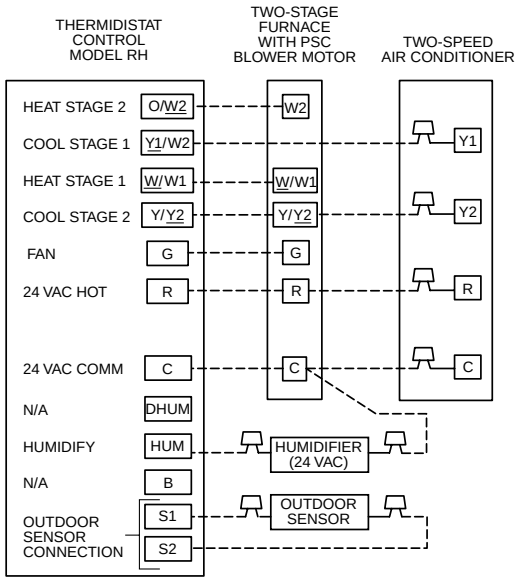

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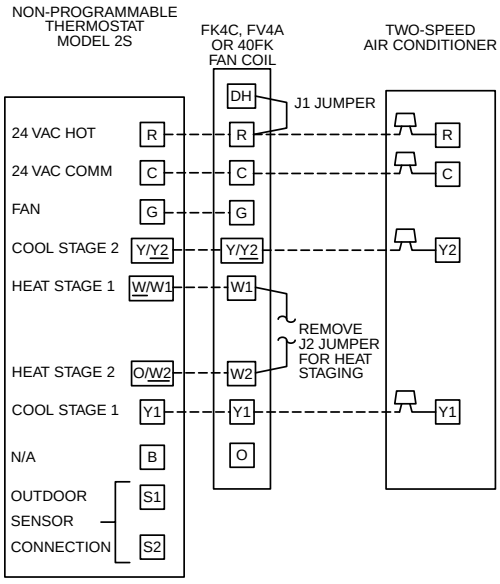

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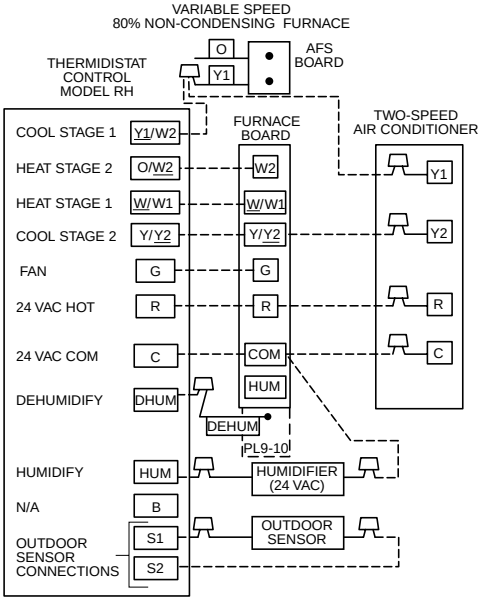

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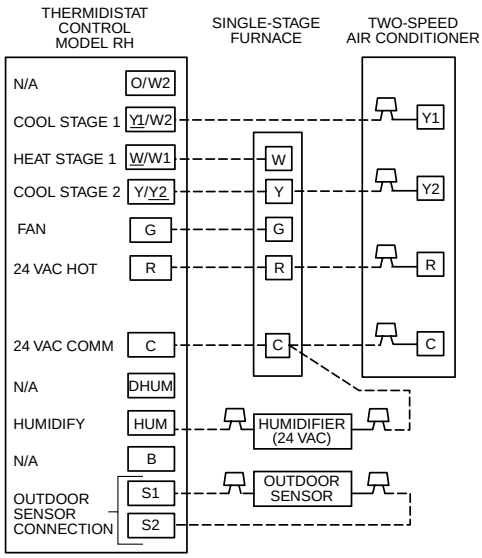

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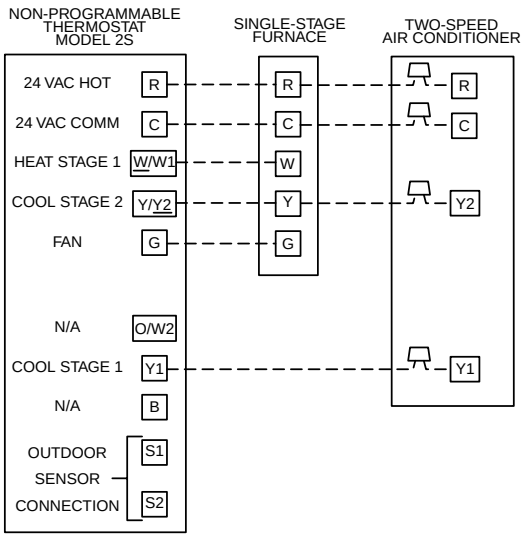

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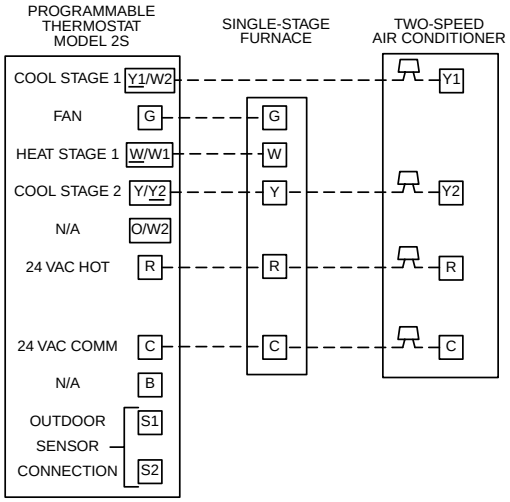
Fig. 11—Typical 24V Wiring Diagram



See notes 1, 2, 3, and 5
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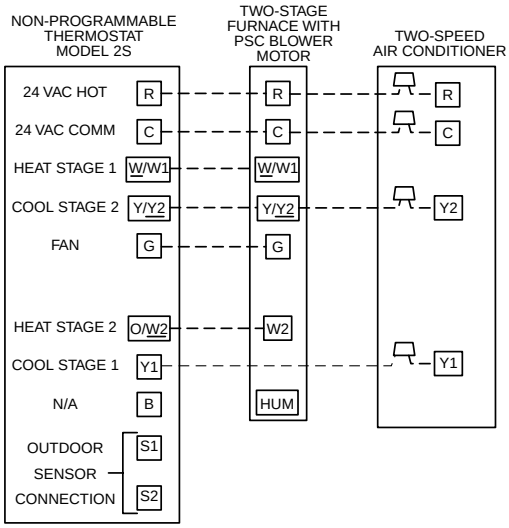
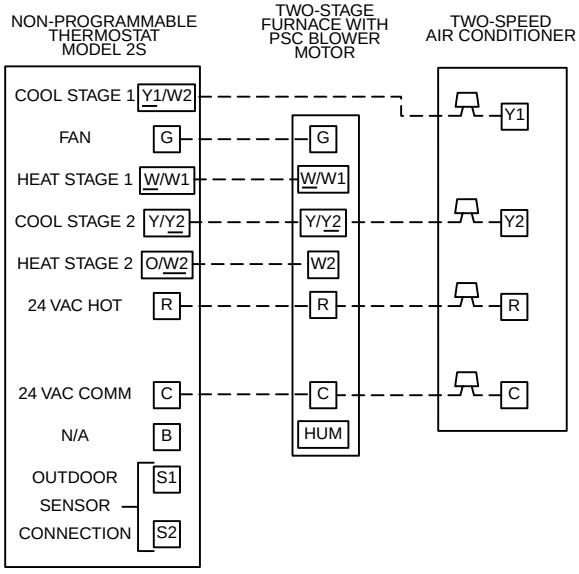
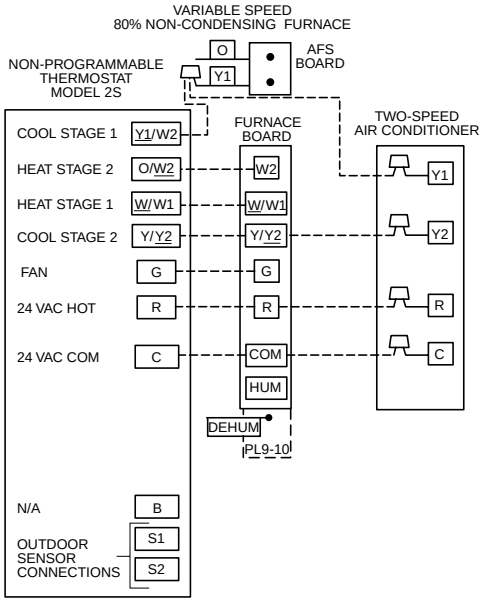


See notes 1, 2, 3, 4, and 10
A01502



See notes 1, 2, 3, 5, and 10
A01503



See note 1, 2, 3, 4, and 10
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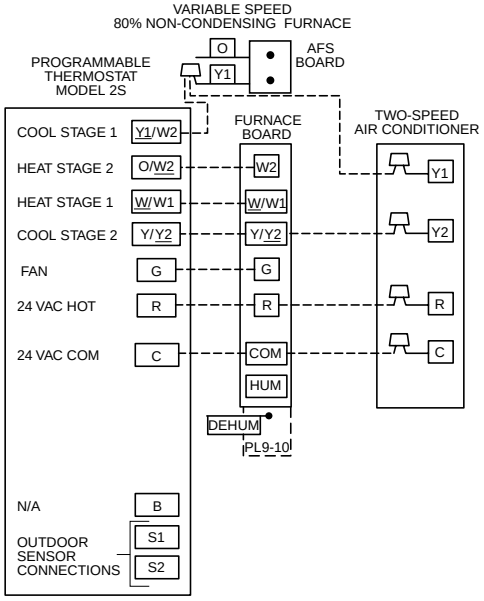

See notes 1, 2, 3, 5, and 10
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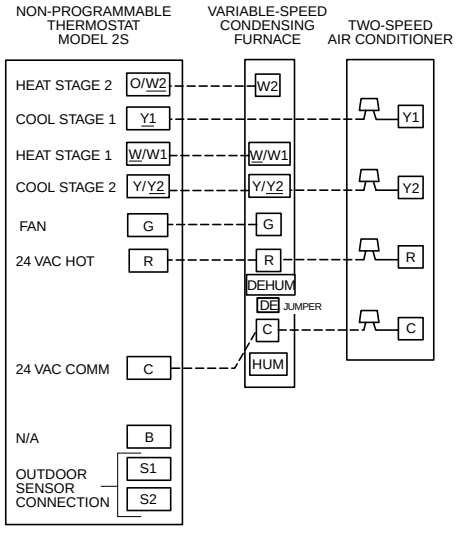
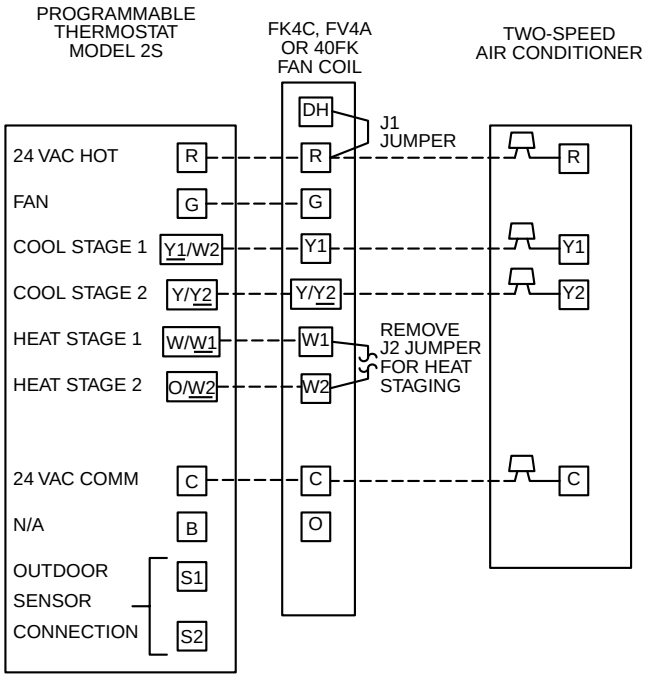
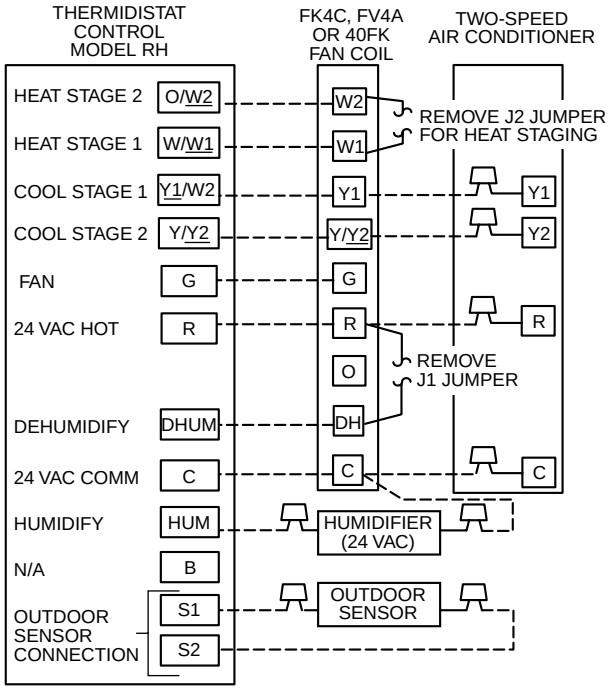


See notes 1, 2, 3, and 4
A01506

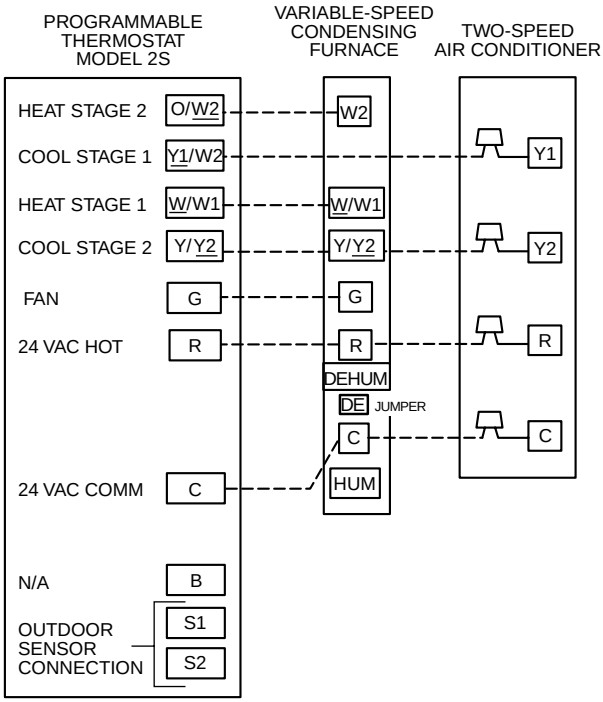
Fig. 11—Typical 24V Wiring Diagram (Cont)



See notes 1, 2, 3, 5, and 7
A01493

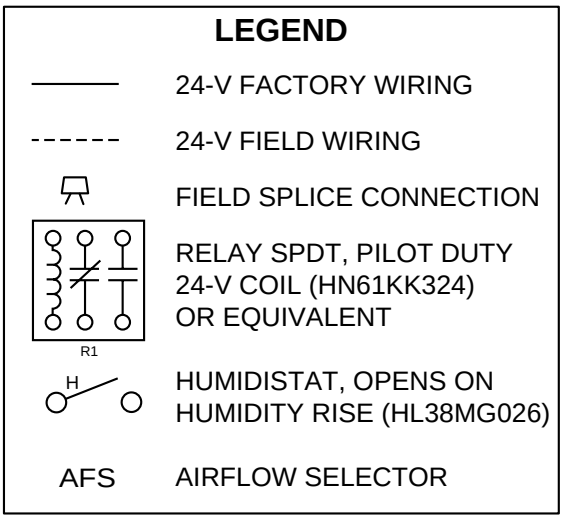


See notes 1, 2, 3, 6, 7, 8, and 9
A01494



See notes 1, 2, 3, and 5
A01507

Fig. 11—Typical 24V Wiring Diagram (Cont)



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WIRING DIAGRAM NOTES:

1. WIRING MUST CONFORM TO NEC OR LOCAL CODES.
2. UNDERLINED LETTER ON THERMOSTAT TERMINAL INDICATES USAGE. FOR EXAMPLE: O/W2 MEANS O IS ENERGIZED IN COOLING MODE.
3. REFER TO INDOOR UNIT INSTALLATION INSTRUCTIONS FOR ANY ADDITIONAL FEATURES AND WIRING INFORMATION.
4. NON-PROGRAMMABLE MODEL 2S01–B, WHEN USED IN AIR CONDITIONING INSTALLATION THE R19 JUMPER **MUST** BE CUT AND REMOVED.
5. PROGRAMMABLE MODEL 2S01–B **MUST** HAVE DIP SWITCH C ON WHEN USED IN AIR CONDITIONER APPLICATIONS.
6. THERMIDISTAT DIP SWITCH NO. 1 SHOULD BE SET IN **OFF** POSITION FOR AIR CONDITIONER APPLICATIONS (FACTORY DEFAULT).
7. AS AN OPTION O/W2CAN CONTROL SECOND-STAGE HEAT.
8. THERMIDISTAT DIP SWITCH NO. 2 SHOULD BE SET IN THE ON POSITION FOR DUAL CAPACITY COMPRESSOR OPERATION.
9. TO ACTIVATE DEHUMIDIFY FUNCTION ON FK4 OR FV4, REMOVE J1 JUMPER AT FAN COIL CONTROL BOARD.
10. AS AN OPTION, LOCK FURNACE INTO LOW-FIRE OPERATION AND LET O/W2 CONTROL HIGH FIRE OPERATION. REFER TO FURNACE INSTALLATION INSTRUCTIONS FOR PROPER SETUP.
11. TO ACTIVATE DEHUMIDIFY FEATURE ON CURRENT STYLE, VARIABLE-SPEED, 80 PERCENT NON-CONDENSING, FURNACE DISCONNECT GREEN (DEHUM) WIRE FROM G ON FURNACE CONTROL BOARD AND CONNECT TO DEHUMIDIFY TERMINAL DHUM ON THERMIDISTAT.
12. THE DE JUMPERS **MUST** BE REMOVED TO ENABLE THE DEHUMIDIFICATION FEATURE ON FURNACE.

X. 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.

> ⚠ **CAUTION:** To prevent personal injury wear safety glasses, protective clothing, and gloves when handling refrigerant and observe the following:
> • Back seating service valves are not equipped with Schrader valves. Fully back seat (counter clockwise) valve stem before removing gage port cap.

> ⚠ **CAUTION:** Do not vent refrigerant to atmosphere. Recover during system repair or final unit disposal.

Follow these steps to properly start up the system:

1. The outdoor unit is equipped with a crankcase heater which operates when the compressor is off. Energize crankcase heater 24 hr. before starting unit. To energize heater only, set indoor thermostat to OFF position and close power disconnect to unit.

NOTE: Starting the compressor without a minimum of 12 hours of crankcase heat prior to initial start-up may result in compressor chattering noise and possible damage to the compressor.

2. Fully back seat (open) liquid and vapor tube service valves.
3. Unit is shipped with valve stem(s) front seated and caps installed. Replace stem caps after system is opened to refrigerant flow (back seated). Replace caps finger tight and tighten additional 1/12 turn (20 ft-lb torque) with wrench.
4. Close electrical disconnects to energize system.
5. Set room thermostat at desired temperature. Be sure set point is below indoor ambient and is set low enough to energize desired speed.

NOTE: Bryant electronic thermostats are equipped with a 15 minute staging timer. This timer prevents the two-speed system from operating at high speed until unit has been operating in low speed for 15 minutes unless there is at least a 5°F difference between room temperature and thermostat set point. To force high speed (after a minimum of 2 minutes in low speed), adjust the set point at least 5° below room ambient.

6. Set room thermostat to COOL and fan control to AUTO or ON as desired. Wait for appropriate time delay(s) and 2 minute minimum low-speed run time. Operate unit for 15 minutes. Check refrigerant charge.

NOTE: If unit has not operated within the past 12 hours or following a unit power-up, upon the next thermostat high- or low-speed demand, unit operates for a minimum of 5 minutes in high speed.

XI. CHECK CHARGE

> ⚠ **WARNING:** Service valve gage ports are not equipped with Schrader valves. To prevent personal injury, make sure gage manifold is connected to the valve gage ports before moving valves off fully back seated position. Wear safety glasses and gloves when handling refrigerant.

A. COOLING ONLY PROCEDURE

1. Operate unit a minimum of 15 minutes before checking charge.
2. Measure liquid service valve pressure by attaching an accurate gage to service port.
3. Measure liquid line temperature by attaching an accurate thermistor type or electronic thermometer to liquid line near outdoor coil.
4. Refer to Table 4 for required subcooling temperature.
5. Refer to Table 3. Find the point where required subcooling temperature intersects measured liquid service valve pressure.
6. To obtain required subcooling temperature at a specific liquid line pressure, add refrigerant if liquid line temperature is higher than indicated or reclaim refrigerant if temperature is lower. Allow a tolerance of ± 3°F.

TABLE 3—REQUIRED LIQUID-LINE TEMPERATURE (°F)

LIQUID PRESSURE AT SERVICE VALVE (PSIG)	REQUIRED SUBCOOLING TEMPERATURE (°F)					
	8	10	12	14	16	18
189	58	56	54	52	50	48
195	60	58	56	54	52	50
202	62	60	58	56	54	52
208	64	62	60	58	56	54
215	66	64	62	60	58	56
222	68	66	64	62	60	58
229	70	68	66	64	62	60
236	72	70	68	66	64	62
243	74	72	70	68	66	64
251	76	74	72	70	68	66
259	78	76	74	72	70	68
266	80	78	76	74	72	70
274	82	80	78	76	74	72
283	84	82	80	78	76	74
291	86	84	82	80	78	76
299	88	86	84	82	80	78
308	90	88	86	84	82	80
317	92	90	88	86	84	82
326	94	92	90	88	86	84
335	96	94	92	90	88	86
345	98	96	94	92	90	88
354	100	98	96	94	92	90
364	102	100	98	96	94	92
374	104	102	100	98	96	94
384	106	104	102	100	98	96
395	108	106	104	102	100	98
406	110	108	106	104	102	100
416	112	110	108	106	104	102
427	114	112	110	108	106	104
439	116	114	112	110	108	106
450	118	116	114	112	110	108
462	120	118	116	114	112	110
474	122	120	118	116	114	112
486	124	122	120	118	116	114
499	126	124	122	120	118	116
511	128	126	124	122	120	118

B. UNIT CHARGE

Factory charge and charging method are shown on pink charging label. **Puron® refrigerant cylinders contain a dip tube which allows liquid refrigerant to flow from cylinder in upright position.** Charge Puron units with cylinder in upright position and a commercial type metering device in manifold hose. Charge refrigerant into suction line.

NOTE: Unit is to be charged in high capacity only. Charging in low capacity may cause compressor chattering and possible damage to the compressor.

TABLE 4—SUBCOOLING TEMPERATURES

UNIT	TXV TYPE EXPANSION DEVICE HIGH CAPACITY ONLY SUBCOOLING AT SERVICE VALVE
024	14°F
036	15°F
048	12°F
060	16°F

NOTE: If subcooling charging conditions are not favorable, charge must be weighed in accordance with unit rating plate ± 0.6 oz/ft of 3/8-in. liquid line above or below 15 ft respectively.
EXAMPLE: To calculate additional charge required for a 25 ft line set: 25 ft - 15 ft = 10 ft x 0.6 oz/ft = 6 oz of additional charge.

XII. SYSTEM FUNCTIONS AND SEQUENCE OF OPERATION

The outdoor unit control system has special functions. The following is an overview of the two-speed control functions:

A. COOLING OPERATION

This product utilizes a 2-stage cooling indoor thermostat. With a call for first stage cooling (Yl), the outdoor fan and low capacity compressor are energized. If low capacity cannot satisfy cooling demand, high capacity is energized (Yl and Y2 or Y2 only) by the second stage of indoor thermostat. After second stage is satisfied, the unit returns to low-speed operation until first stage is satisfied or until second stage is required again. When both one stage and two stage cooling are satisfied, the compressor will shut off.

NOTE: If unit has not operated within the past 12 hours or following a unit power-up, upon the next thermostat high- or low-speed demand, unit operates for a minimum of 5 minutes in high speed.

NOTE: When two-speed unit is operating at low speed, system vapor (suction) pressure will be higher than a standard single-speed system or high-speed operation. This normal operation is due to the reduced capacity operating with typically larger indoor and outdoor coils.

NOTE: Outdoor fan motor will continue to operate for one minute after compressor shuts off, when outdoor ambient is greater than or equal to 100°F.

B. STATUS FUNCTION LIGHTS

A system control STATUS function light is located on the outdoor unit control board (see Fig. 12). The STATUS light provides signals for several system operations. See Table 5 for codes and definitions. Table 5 also provides the order of signal importance.

NOTE: Only one code will be displayed on the outdoor unit control board (the most recent with the highest priority).

C. FACTORY DEFAULTS

Factory defaults have been provided in the event of failure of outdoor air thermistor, coil thermistor, and/or furnace interface jumper.

D. ONE MINUTE SPEED CHANGE TIME DELAY

When compressor changes speeds from high to low or low to high, there is a 1 minute time delay before compressor restarts. The outdoor fan motor remains running.

E. COMPRESSOR OPERATION

When the compressor operates in high capacity operation, the motor rotates clockwise. Both the lower and upper pistons are eccentric with the rotating crankshaft and both compress refrigerant. When the compressor operates in low capacity the motor reverses direction (rotates counterclockwise). The lower piston becomes idle and the upper piston compresses refrigerant. The start and run windings are reversed.

TABLE 5—CONTROL FUNCTION LED CODE

CODE	DEFINITION	SIGNAL IMPORTANCE*
Constant flash No pause	No demand Stand by	10
1 flash w/pause	Low-speed operation	9
2 flashes w/pause	High-speed operation	8
3 flashes w/pause	Outdoor thermistor failure	7
4 flashes w/pause	Outdoor coil thermistor failure	6
3 flashes pause 4 flashes	Thermistor out of range	5
5 flashes pause 1 flash	Low pressure switch trip	4
5 flashes pause 2 flashes	High pressure switch trip	3
6 flashes w/pause	Compressor V_C/V_H trip	2
Constant light No pause No flash	Board failure	1

*Function light signal order of importance in case of multiple signal request; 1 is most important.

TABLE 6—DUAL CAPACITY COMPRESSOR (WINDING RESISTANCE AT 70° ± 20°)

WINDING	024	036	048	060
Start (S-C)	2.280	1.850	1.457	0.740
Run (R-C)	0.770	0.745	0.552	0.356

F. CRANKCASE HEATER OPERATION

The two-speed control energizes crankcase heater during unit off cycle.

G. OUTDOOR FAN MOTOR OPERATION

The outdoor unit control energizes outdoor fan any time compressor is operating. The outdoor fan remains energized during the 1 minute speed change time delay and if a pressure switch or compressor overload should trip. Outdoor fan motor will continue to operate for one minute after the compressor shuts off when the outdoor ambient is greater than or equal to 100°F.

H. COMPRESSOR VOLTAGE FAILURE (6 FLASHES)

The control senses the voltage of the compressor run winding. If compressor voltage (Vc) is less than 90v when control board is calling for compressor operation, control shuts compressor off for 15 minutes with outdoor fan running. After 15 minutes (provided there is a call for Y1 or Y2), control attempts to start compressor. During this time, a code of 6 flashes appears at control board. If Vc trip occurs 3 consecutive times during a Y1 request, then low capacity operation is locked out and control responds to Y2 requests until a reset occurs. If 3 consecutive trips occur in a combination of Yl and Y2 or all Y2 requests, then both low and high capacity operation will be locked out. The compressor voltage failure (6 flashes) can be caused by:

- compressor internal overload trip (refer to Table 6 for correct winding resistance).
- no 240 volt power supply to outdoor unit.
- failed compressor contactor(s).
- failure of start relay to pick up properly.
- improper wiring.

I. PRESSURE SWITCH PROTECTION

The outdoor unit is equipped with high- and low-pressure switches. If the control senses the opening of a high or low pressure switch, it will respond as follows:

1. De-energize the compressor low or high speed contactor,
2. Keep the outdoor fan operating for 15 minutes,
3. Display the appropriate error code on the status light (see Table 5).
4. After a 15 minute delay, if Yl or Y2 inputs are on and the LPS or HPS is reset, energize appropriate compressor contactor, either low or high.
5. If LPS or HPS has not closed after a 15 minute delay, the outdoor fan is turned off. If the open switch closes anytime after the 15 minute delay, then resume operation on call for Y1 and/or Y2.

J. MAJOR COMPONENTS

TWO-SPEED CONTROL

The two-speed control board controls the following functions:

- Low- and high-compressor contactor operation
- Outdoor fan motor operation
- Crankcase heater operation
- Compressor protection
- Pressure switch monitoring
- Time delays

FIELD CONNECTIONS

The two-speed control received 24vac low-voltage control system inputs through the screw connections on the left side of the control board.

TWO-SPEED COMPRESSOR

The two-speed compressor contains motor windings that provide 2-pole (3500 RPM) operation.

COMPRESSOR INTERNAL RELIEF

The compressor is protected by an internal pressure relief (IPR) which relieves discharge gas into compressor shell when differential between suction and discharge pressures exceeds 525 psi. The compressor is also protected by an internal overload attached to motor windings.

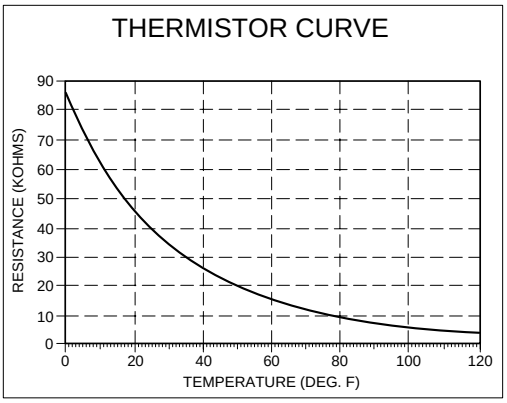

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Fig. 13—Resistance Values Versus Temperature

COMPRESSOR CONTROL CONTACTORS

Low and high capacity contactor coils are 24 volts. The electronic control board controls the operation of the low speed (C-L) and the high speed (C-H) contactors.

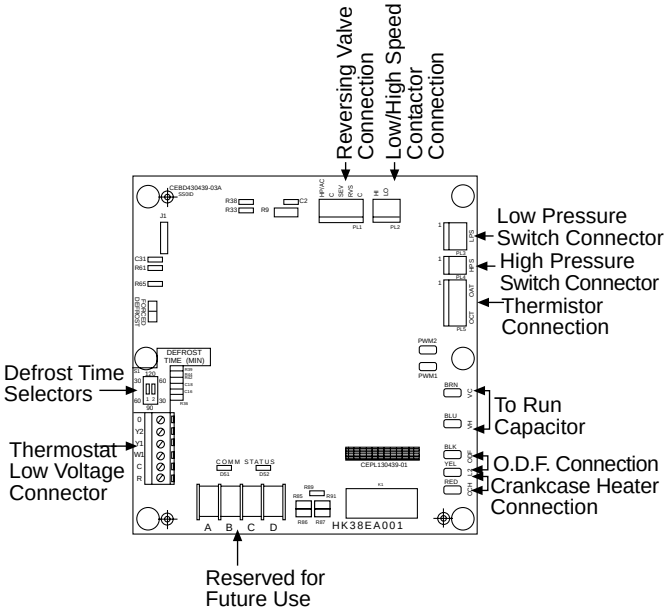
K. TEMPERATURE THERMISTORS

Thermistors are electronic devices which sense temperature. As the temperature increases, the resistance decreases. Thermistors are used to sense outdoor ambient and coil temperature. Refer to Fig. 13 for resistance values versus temperature.

If the outdoor ambient or coil thermistor should fail, a fault code appears at two-speed control.

IMPORTANT: Outdoor Air Thermistor Placement Mount outdoor air thermistor underneath unit base pan lip on control box side of the unit. Attach to base pan with adhesive tape.

IMPORTANT: If outdoor air thermistor is not properly placed underneath base pan, unit may see nuisance thermistor out of range faults.



A01192

Fig. 12—Control Board

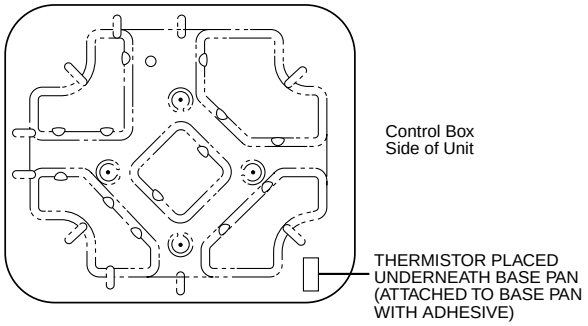


Fig. 14—View from Top of Base Pan

XIII. FINAL CHECKS

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

1. Ensure that all wiring and tubing is secure in unit before adding panels and covers. Securely fasten all panels and covers.
2. Tighten service valve stem caps to 1/12 turn past finger tight.
3. Leave Owner'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.

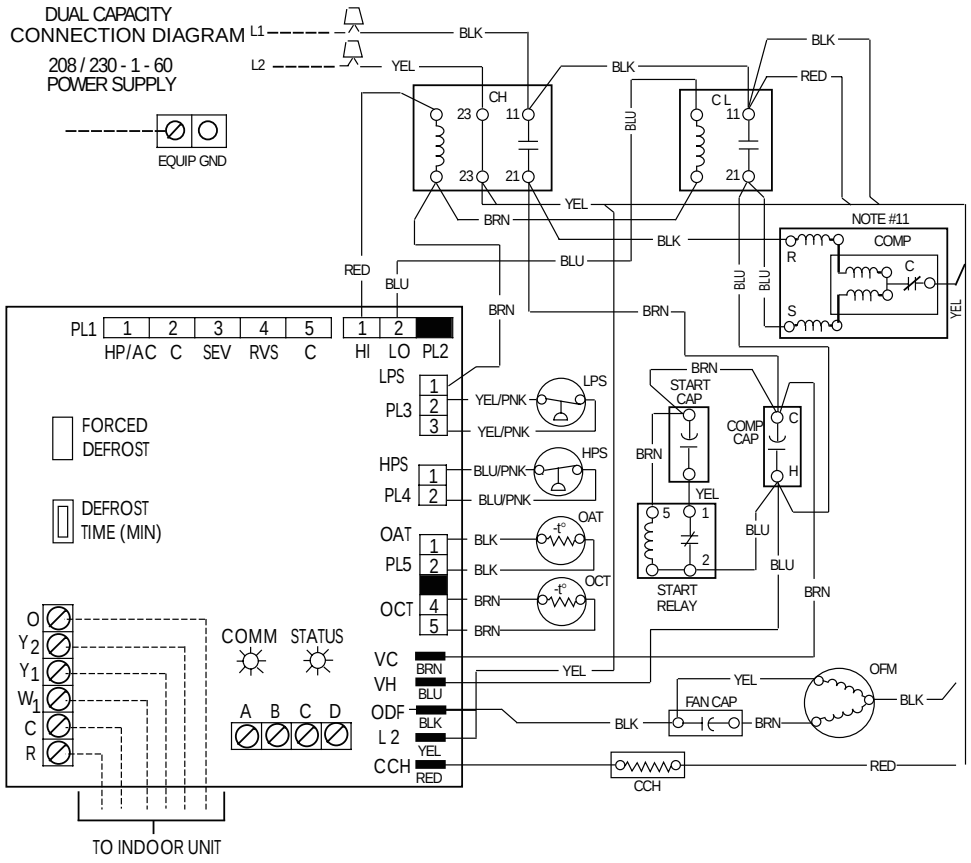


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Fig. 15—Wiring Diagram—024, 036, 048

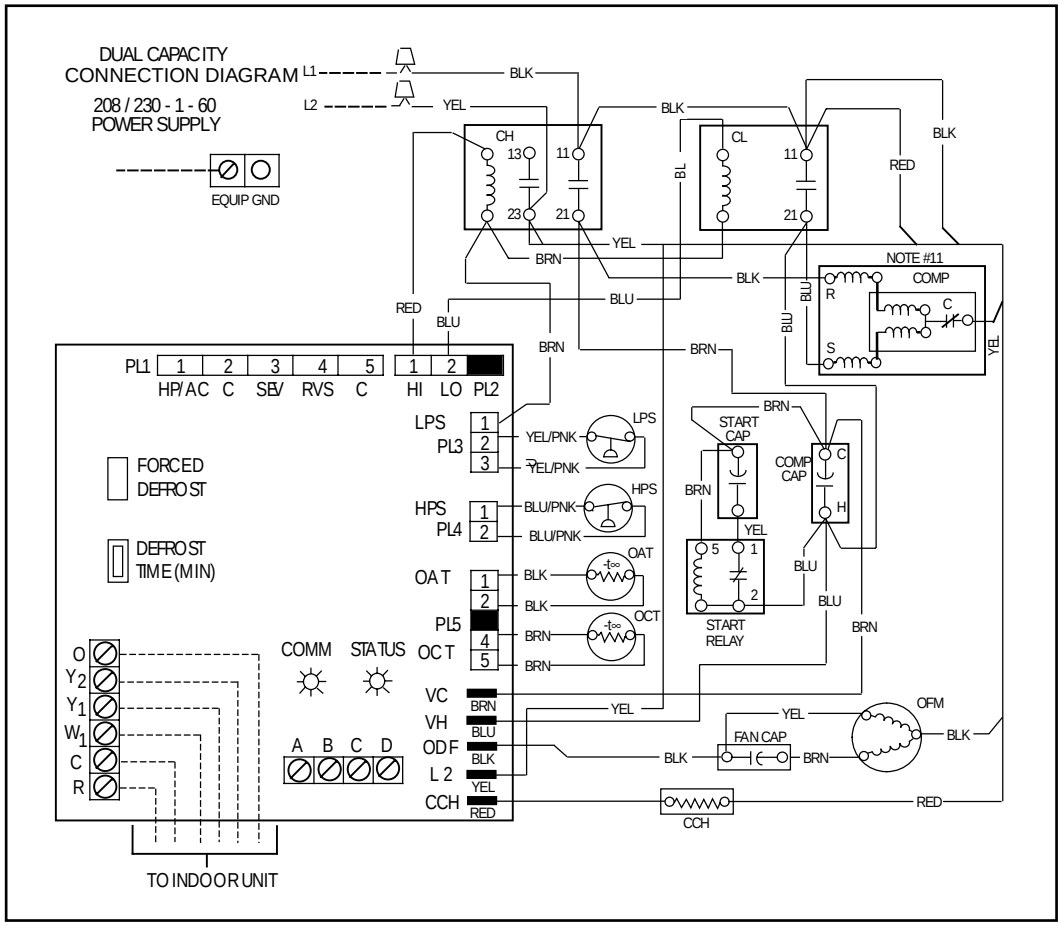

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Fig. 16—Wiring Diagram—060