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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 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 and work gloves. Use quenching cloth for brazing operations. Have fire extinguisher available. Read these instructions thoroughly and follow all warnings or cautions attached to the unit. Consult local building codes and the national electric codes for special installation requirements.

Recognize safety information. This is the safety-alert symbol . When you see this symbol on the unit or in instructions and 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.

### WARNING

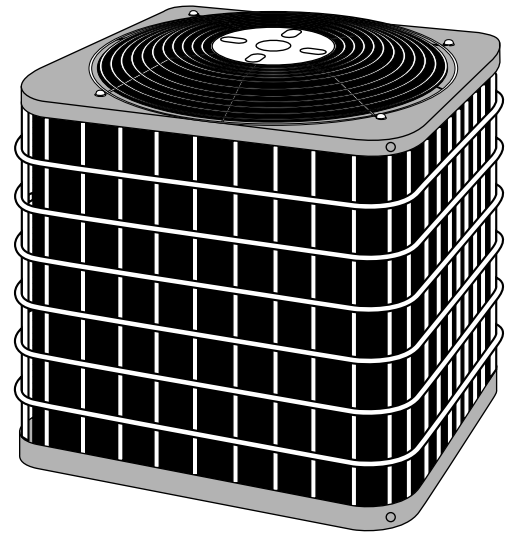
Before installing, modifying, or servicing system, main electrical disconnect switch must be in the OFF position. There may be more than 1 disconnect switch. Lock out and tag switch with a suitable warning label. Electrical shock can cause personal injury or death.

### INSTALLATION RECOMMENDATIONS

Refer to Fig. 2 for unit dimensional drawing.

**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, patio decks, or any location where sound may disturb customer.
2. Ensure that vapor and liquid tube diameters are appropriate to capacity of unit.
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. 3.)



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**Fig. 1—Model 38YCC**

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. 3.)
8. Ensure that tubing insulation is pliable and completely surrounds vapor tube.
9. When necessary, use hanger straps which are 1 in. (25.4mm) wide and conform to shape of tubing insulation. (See Fig. 3.)
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 (4.57m) 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 set is 3/8-in. O.D. for all residential applications including long line.

**IMPORTANT:** Always install a liquid line filter drier. Refer to Product Data Digest for appropriate part number.

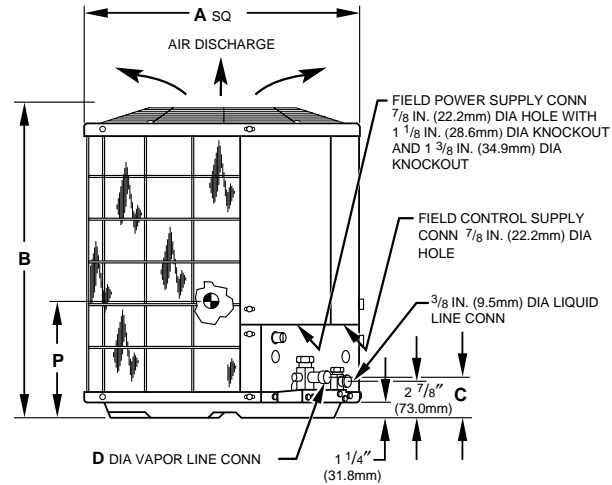
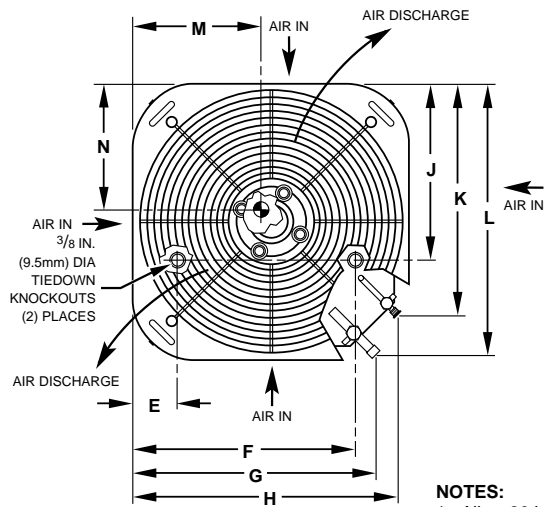
### INSTALLATION

#### 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.

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



**NOTES:**

1. Allow 30 in. (762.0 mm) clearance to service side of unit, 48 in. (1219.2 mm) above unit, 6 in. (152.4 mm) on one side, 12 in. (304.8 mm) on remaining side, and 24 in. (609.6 mm) between units for proper airflow.
2. Minimum outdoor operating ambient in cooling mode is 55°F (13°C) (unless low ambient control is used) max. 125°F (52°C).
3. Maximum outdoor operating ambient in heating mode is 66°F (19°C).
4. Series designation is the 13th position of the unit model number.
5. Center of gravity  $\ominus$ .

**Dimensions (mm)**

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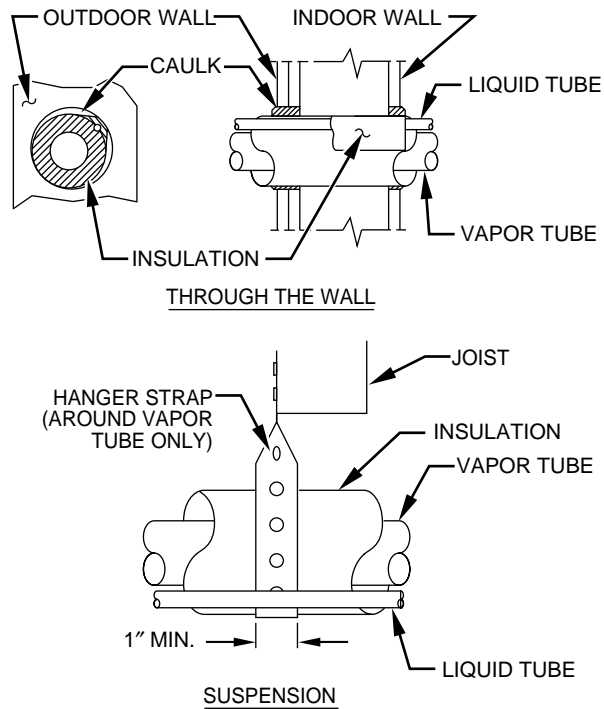
UNIT SIZE	SERIES	A	B	C	D	E	F	G	H	J	K	L	M	N	P
024	70	571.5	862.0	81.0	15.9	93.6	460.4	501.7	549.3	365.1	479.4	560.4	317.5	304.8	355.6
036	70, 90	762.0	1014.4	82.6	19.1	165.1	596.9	692.2	739.8	508.0	669.9	750.9	381.0	400.1	393.7
048	70, 90	762.0	862.0	82.6	22.2	165.1	596.9	692.2	739.8	508.0	669.9	750.9	381.0	400.1	393.7
048	92	762.0	862.0	82.6	22.2	165.1	596.9	692.2	739.8	508.0	669.9	750.9	387.4	396.9	393.7
060	90	762.0	862.0	82.6	22.2	165.1	596.9	692.2	739.8	508.0	669.9	750.9	400.1	396.9	381.0
060	92	762.0	862.0	82.6	22.2	165.1	596.9	692.2	739.8	508.0	669.9	750.9	396.9	400.1	384.2

**Dimensions (In.)**

UNIT SIZE	SERIES	A	B	C	D	E	F	G	H	J	K	L	M	N	P
024	70	22-1/2	33-15/16	3-3/16	5/8	3-11/16	18-1/8	19-3/4	21-5/8	14-3/8	18-7/8	22-1/16	12-1/2	12	14
036	70, 90	30	39-15/16	3-1/4	3/4	6-1/2	23-1/2	27-1/4	29-1/8	20	26-3/8	29-9/16	15	15-3/4	15-1/2
048	70, 90	30	33-15/16	3-1/4	7/8	6-1/2	23-1/2	27-1/4	29-1/8	20	26-3/8	29-9/16	15	15-3/4	15-1/2
048	92	30	33-15/16	3-1/4	7/8	6-1/2	23-1/2	27-1/4	29-1/8	20	26-3/8	29-9/16	15-1/4	15-5/8	15-1/2
060	90	30	33-15/16	3-1/4	7/8	6-1/2	23-1/2	27-1/4	29-1/8	20	26-3/8	29-9/16	15-3/4	15-5/8	15
060	92	30	33-15/16	3-1/4	7/8	6-1/2	23-1/2	27-1/4	29-1/8	20	26-3/8	29-9/16	15-5/8	15-3/4	15-1/8

**Fig. 2—Dimensional Drawing**

**NOTE:** Avoid contact between tubing and structure



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**Fig. 3—Connecting Tubing Installation**

**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. 4 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.

Roof mounted units exposed to winds above 5 mph may require wind baffles to achieve adequate defrost. Consult Low-Ambient Guideline for wind baffle construction.

**NOTE:** Unit must be level to within  $\pm 2^\circ$  per compressor manufacturer specifications.

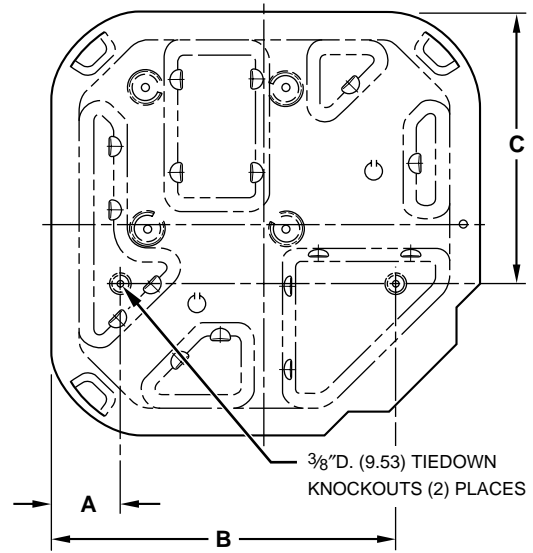
**Step 3—Clearance Requirements**

When installing, allow sufficient space for airflow clearance, wiring, refrigerant piping, and service. Allow 30-in. (762mm) clearance to service end of unit and 48 in. (1219mm) above unit. For proper airflow, a 6-in. (152mm) clearance on 1 side of unit and 12 in. (305mm) on all remaining sides must be maintained. Maintain a distance of 24 in. (610mm) between units. Position so water, snow, or ice from roof or eaves cannot fall directly on unit.

On rooftop applications, locate unit at least 6 in. (152mm) above roof surface.

**Step 4—Operating Ambients**

The minimum outdoor operating ambient in cooling mode is 55°F (13°C), and the maximum outdoor operating ambient in cooling mode is 125°F (52°C). The maximum outdoor operating ambient in heating mode is 66°F (19°C).



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**Dimensions (mm)**

UNIT SIZE	MINIMUM MOUNTING PAD DIMENSIONS	TIEDOWN KNOCKOUT LOCATIONS		
		A	B	C
024	571.5 X 571.5	93.6	460.4	365.1
036-060	762.0 X 762.0	165.1	596.9	508.0

**Dimensions (In.)**

UNIT SIZE	MINIMUM MOUNTING PAD DIMENSIONS	TIEDOWN KNOCKOUT LOCATIONS		
		A	B	C
024	22-1/2 X 22-1/2	3-11/16	18-1/8	14-3/8
036-060	30 X 30	6-1/2	23-1/2	20

**Fig. 4—Mounting Unit to Pad**

**Step 5—Elevate Unit**

**⚠ CAUTION**

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

In areas where prolonged freezing temperatures are encountered, elevate unit per local climate and code requirements to provide clearance above estimated snowfall level and ensure adequate drainage of unit. (See Fig. 5.)

**Step 6—Check Indoor and Outdoor AccuRater® Piston**

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 piston shipped with outdoor unit. The piston shipped with outdoor unit is correct for any approved indoor coil combination.

Check outdoor unit piston. Remove retainer on liquid service valve and check piston size with matching number listed on unit rating plate.

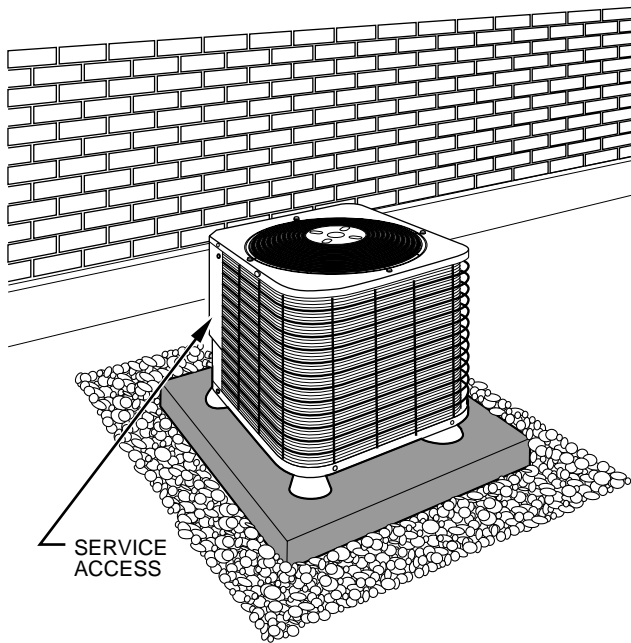


Fig. 5—Accessory Heat Pump Feet

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**⚠ CAUTION**

Remove indoor coil piston if unit is to be installed on system with a TXV metering device.

**Step 7—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**

To prevent compressor damage DO NOT bury more than 36 in. of refrigerant tubing. If ANY tubing is buried, provide 6 in. vertical rise at service valve.

**⚠ 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 50 ft (15.24m), substantial capacity and performance losses can occur. Following the recommendations in the Residential Split System Long-Line Application Guideline will reduce these losses. Refer to Table 2 for accessory requirements.

For buried line applications greater than 36 in. (0.914m), refer to Table 2 and Residential Split System Buried Line Application Guideline. Buried line applications may not exceed 100 ft (30.5m).

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

**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 (4.57m) of field-supplied or factory-accessory tubing. Check refrigerant charge for maximum efficiency.

**REFRIGERANT TUBING** — Connect tubing to fittings on outdoor unit vapor and liquid service valves. (See Fig. 2 and 6.)

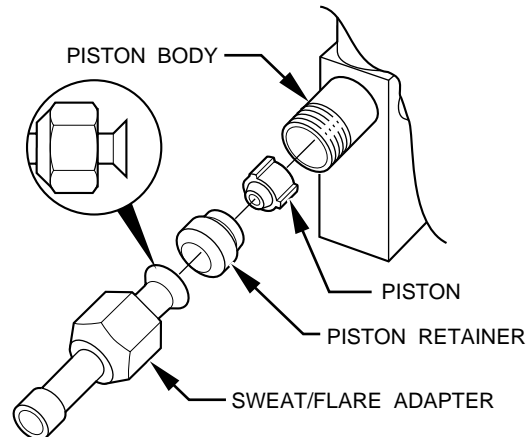


Fig. 6—Service Valve with Sweat Adapter Tube

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**SWEAT CONNECTION** — Use refrigerant grade tubing. Service valves are closed from factory and ready for brazing. After wrapping service valve with a wet cloth, tubing set can be brazed to service valve using either silver bearing or non-silver bearing brazing material. 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.

**IMPORTANT:** Always install a liquid line filter drier. Refer to Product Data Digest for appropriate part number.

**Step 8—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 per local codes to handle unit starting current. Locate disconnect within sight from and readily accessible from unit per local codes.

**Table 1—Refrigerant Connections and Recommended Liquid and Vapor Tube Diameters**

UNIT SIZE	LIQUID				VAPOR				VAPOR (LONG LINE)			
	Connection Diameter		Tube Diameter		Connection Diameter		Tube Diameter		Connection Diameter		Tube Diameter	
	In.	mm	In.	mm	In.	mm	In.	mm	In.	mm	In.	mm
<b>024</b>	3/8	9.53	3/8	9.53	5/8	15.88	5/8	15.88	5/8	15.88	3/4	19.05
<b>036</b>	3/8	9.53	3/8	9.53	3/4	19.05	3/4	19.05	3/4	19.05	7/8	22.23
<b>048</b>	3/8	9.53	3/8	9.53	7/8	22.23	7/8	22.23	7/8	22.23	1-1/8	28.58
<b>060</b>	3/8	9.53	3/8	9.53	7/8	22.23	1-1/8	28.58	7/8	22.23	1-1/8	28.58

**NOTES:**

1. Tube diameters are for lengths up to 50 ft (15.24m). For tubing lengths greater than 50 ft (15.24m), consult Residential Long-Line Application Guideline.
2. Do not apply capillary tube indoor coils to these units.

**Table 2—Accessory Usage**

ACCESSORY	REQUIRED FOR LOW-AMBIENT APPLICATIONS (BELOW 55°F/12.8°C)	REQUIRED FOR LONG-LINE APPLICATIONS* (OVER 50 FT/15.24M)	REQUIRED FOR BURIED LINE APPLICATIONS† (OVER 3 FT/0.914M)
<b>Crankcase Heater</b>	Yes	Yes	Yes
<b>Evaporator Freeze Thermostat</b>	Yes	No	No
<b>Winter Start Control</b>	Yes‡	No	No
<b>Accumulator</b>	No	No	Yes
<b>Compressor Start Assist Capacitor and Relay</b>	Yes	Yes	Yes
<b>Low-Ambient Controller or MotorMaster® Control</b>	Yes	No	No
<b>Wind Baffle</b>	See Low-Ambient Instructions	No	No
<b>Coastal Filter</b>	No	No	No
<b>Support Feet</b>	Recommended	No	No
<b>Liquid-Line Solenoid Valve or Hard Shutoff TXV</b>	No	See Long-Line Application Guideline	Yes

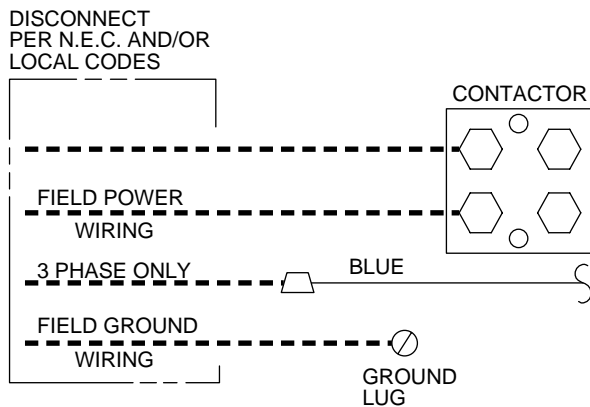
\* For tubing line sets between 50 and 175 ft (15.24 and 53.34m), refer to Residential Split System Long-Line Application Guideline.

† For buried line applications, refer to Residential Split System Buried Line Application Guideline.

‡ Only when low-pressure switch is used.

**ROUTE GROUND AND POWER WIRES** — Remove access panel and control box cover to gain access to unit wiring. Extend wires from disconnect through power wiring hole provided and into unit control box. (See Fig. 2.) Size wires per local codes but not smaller than minimum wire size shown on unit rating plate.

**CONNECT GROUND AND POWER WIRES** — Connect ground wire to ground connection in control box for safety. Connect power wiring to contactor as shown in Fig. 7.



**Fig. 7—Line Power Connections**

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**⚠ 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.

**NOTE:** Use No. 18 AWG (American Wire Gage) color-coded, insulated (35°C minimum) wires. If thermostat is located more than 100 ft (30.5m) from unit (as measured along the control voltage wires), use No. 16 AWG color-coded wires to avoid excessive voltage drop.

**CONNECT CONTROL WIRING** — Route 24-v control wires through control wiring grommet and connect leads to control wiring pigtails from terminal board. (See Fig. 8.)

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

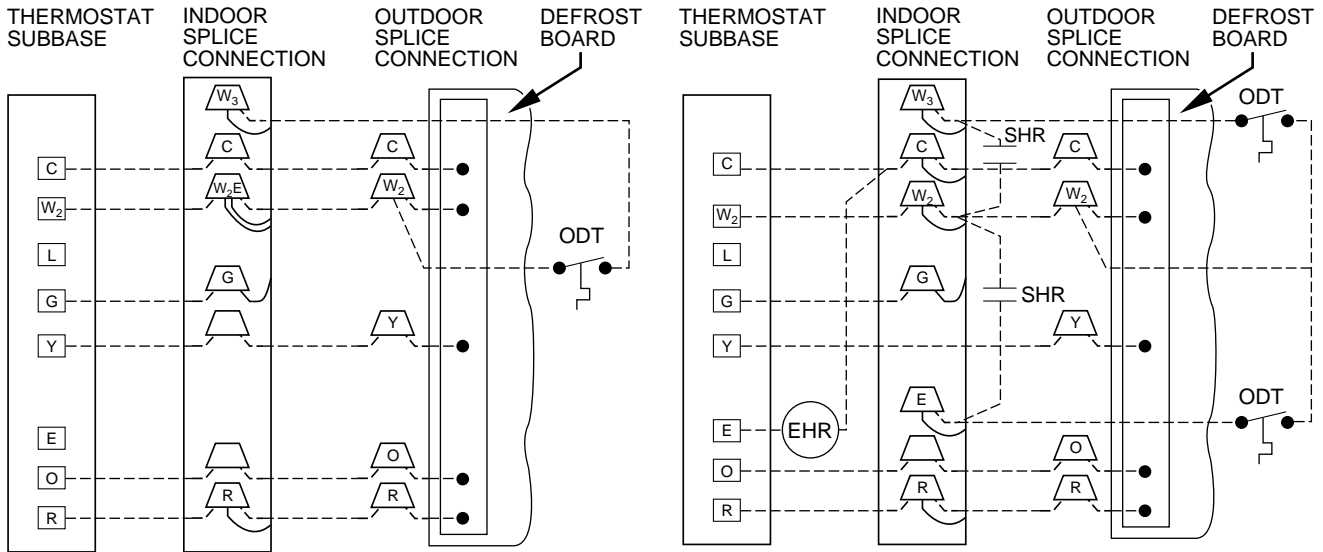
**NOTE:** Use of available 24-v accessories may exceed the minimum 40-va power requirement. Determine total transformer loading and increase the transformer capacity or split the load with an accessory transformer as required.

**NOTE:** The defrost timer is factory set for 90-minute cycles. The timer can be field set for 30- and 50-minute cycles depending on defrost conditions in your geographic location.

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

SYSTEMS WITH ONE OUTDOOR THERMOSTAT

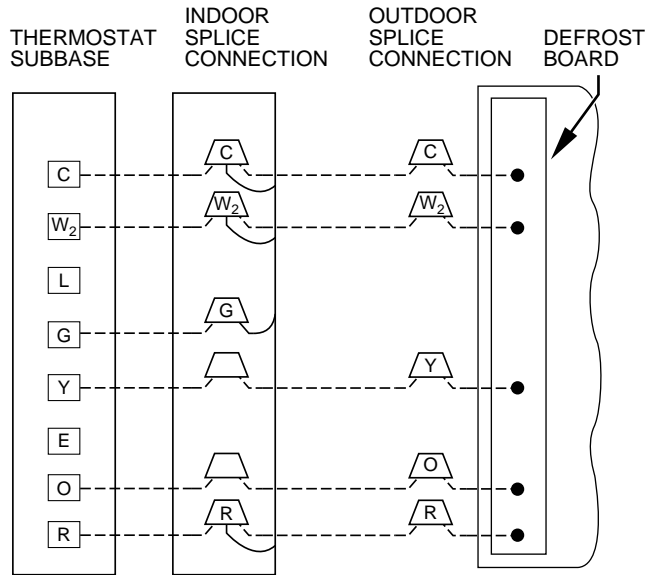
SYSTEMS WITH TWO OUTDOOR THERMOSTATS



REMOVE WIRES FROM CRIMP NUT IN INDOOR FAN COIL WHEN INSTALLING OUTDOOR THERMOSTATS.

**IMPORTANT:** WHEN USING OUTDOOR THERMOSTATS, W<sub>2</sub> MUST BE ENERGIZED WHEN REQUESTING SUPPLEMENTAL HEAT.

SYSTEMS WITHOUT OUTDOOR THERMOSTATS



- FACTORY WIRING
- - - FIELD WIRING
- ODT OUTDOOR THERMOSTAT
- EHR EMERGENCY HEAT RELAY
- ▭ FIELD SPLICE

FOR USE WITH FB4 FAN COILS

Fig. 8—24-v Control Circuit Connections



### Step 9—Compressor Crankcase Heater

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

A crankcase heater is required if the refrigerant tubing is longer than 50 ft.

### Step 10—Install Electrical Accessories

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

### Step 11—Start-Up and Check Charge

#### ⚠ WARNING

Do not operate unit in the vicinity of toxic or flammable material. Failure to follow this warning can result in personal injury, fire, or death.

#### ⚠ 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 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.
- Front seating service valves are equipped with Schrader valves.

#### ⚠ CAUTION

Do not vent refrigerant to atmosphere. Recover during system repair or final unit disposal.

1. If equipped with a crankcase heater, energize a minimum of 24 hr before starting unit. To energize heater only, set thermostat OFF and close electrical disconnect to outdoor unit.
2. Fully open liquid and vapor 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. Replace caps finger tight and tighten additional 1/12 turn using a backup wrench on valve body flats to prevent distortion of sheet metal.
4. Close electrical disconnects to energize system.
5. Set room thermostat at desired temperature.
6. Set room thermostat to HEAT or COOL and fan to ON or AUTO mode, as desired. Operate unit for 15 minutes. Check system refrigerant charge.
7. Factory charge is shown on unit rating plate. Adjust charge in cooling mode by following procedure shown in charging table. Check charge in heating mode by following procedure shown on heating check chart. Both are located on unit.

#### ⚠ CAUTION

- 3-phase scroll compressors are rotation sensitive.
- A flashing LED on phase monitor indicates reverse rotation. (See Fig. 9 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 — With power supplied to indoor and outdoor units, transformer is energized.

#### → Cooling

On a call for cooling, the 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. 9 and Table 3.) If 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, 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 90 sec to increase system efficiency.

#### → Heating

On a call for heating, the 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.

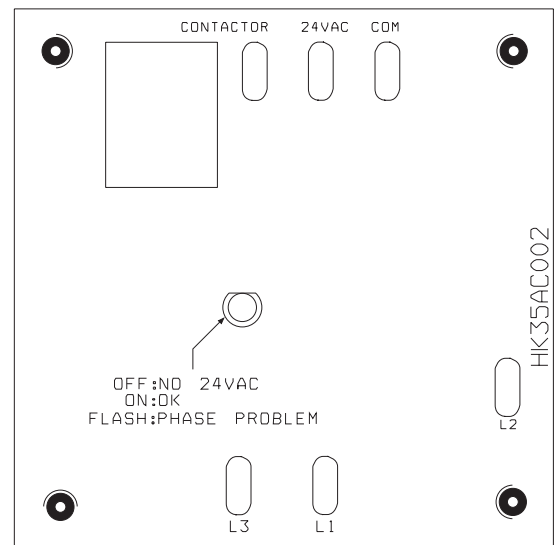


Fig. 9—Phase Monitor Control

Table 3—Phase Monitor LED Indicators

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

Should the temperature continue to fall, R-W2 is made through the second-stage room thermostat bulb. Circuit R-W2 energizes a sequencer, bringing on the first bank supplemental electric heat and providing electrical potential to the second heater sequencer (if used). If outdoor temperature falls below the setting of the outdoor thermostat (field-installed option), contacts close to complete the circuit and bring on the second bank of supplemental electric heat.

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

#### Defrost

The defrost control is a time/temperature control which includes a field-selectable (quick connects located at board edge) time period between defrost cycles (30, 50, and 90 minutes), factory set at 90 minutes.

The electronic timer and defrost cycle will start only when contactor is energized and defrost thermostat is closed.

Defrost mode is identical to cooling mode except that outdoor fan motor stops and second-stage heat is turned on to continue warming conditioned space.

## **Step 12—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.

## **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.