13HPD SPLIT SYSTEM HEAT PUMP WITH DRY NITROGEN HOLDING CHARGE INSTALLATION / START-UP INSTRUCTIONS

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

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NOTICE TO INSTALLER

This unit is factory-charged with dry nitrogen. The unit is intended for installation in existing HCFC-22 systems. Carefully follow all installation procedures.

⚠ WARNING

Installation or repairs made by unqualified persons can result in hazards to you and others. Installation MUST conform with local building codes or, in the absence of local codes, with the National Electrical Code NFPA 70/ANSI C1-1993 or current edition and Canadian Electrical Code Part 1 CSA C22.1.

⚠ CAUTION

Improper selection of a matching indoor unit and a matching metering device, improper installation, adjustment, alteration, service or maintenance may void the warranty. The qualified installer or agency must use factory-authorized kits or accessories when modifying this products. Refer to the individual instructions packaged with the kits or accessories when installing.

NOTE

These instructions are intended as a general guide and do not supersede national, state or local codes in any way.
These instructions must be left with the property owner.

Shipping and Packing List

Check the unit for shipping damage. If damaged, contact the last shipping carrier.

1 — Assembled outdoor unit

General

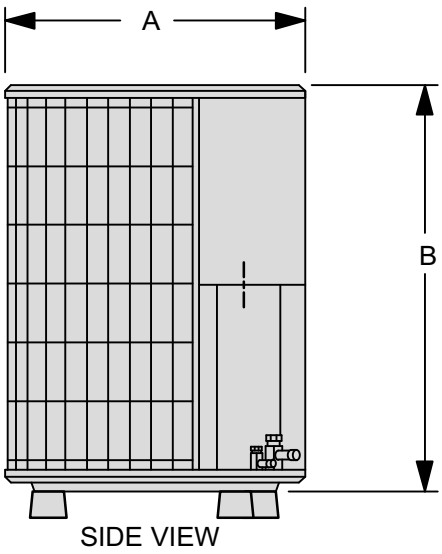
The 13HPD heat pump, which will also be referred to in this instruction as the outdoor unit, uses HCFC-22 refrigerant.

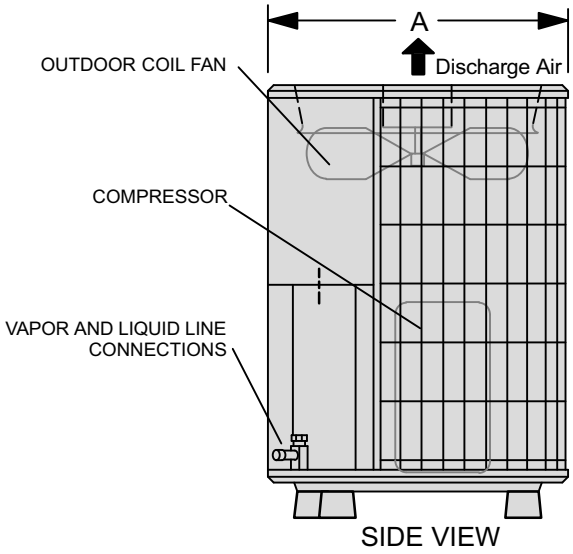
This outdoor unit is intended as a replacement outdoor component for use in residential systems which include an existing indoor coil which is functioning properly. It is **NOT** intended for new installations.

- **shipped from the factory with nitrogen holding charge that must be purged from the unit;**
- designed for use with HCFC-22 refrigerant only;
- designed for use in systems that use check / thermal expansion valve (CTXV). See the 13HPD product specification sheet for approved check / expansion valve match ups and application information.

Important — The heat pump must have properly matched system components including indoor unit and refrigerant metering device. Mismatched equipment may have an impact on the operation, performance, reliability, and warranty of the heat pump system.

Unit Dimensions - inches (mm)





Model Number	A	B
13HPD-018-230	24-1/4 (616)	33-1/4 (845)
13HPD-024-230	24-1/4 (616)	33-1/4 (845)
13HPD-030-230	24-1/4 (616)	29-1/4 (743)
13HPD-036-230	24-1/4 (616)	33-1/4 (845)
13HPD-042-230	28-1/4 (616)	33-1/4 (845)
13HPD-048-230	28-1/4 (718)	37 (940)
13HPD-060-230	32-1/4 (819)	37 (940)

Typical Unit Parts Arrangement

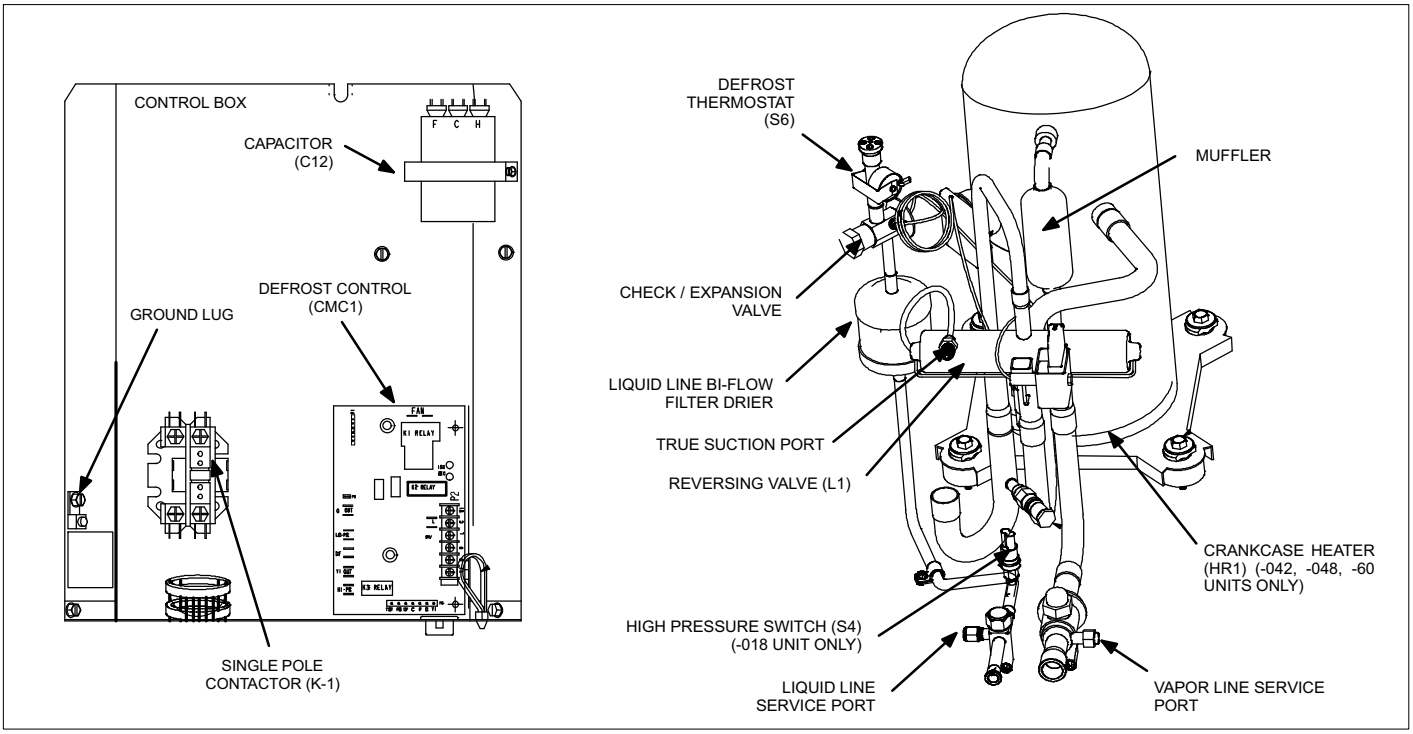


Figure 1. Typical Unit Parts Arrangement

Torque Requirements

When servicing or repairing heating, ventilating and air conditioning components, ensure the fasteners are appropriately tightened. Table 1 lists torque values for fasteners.

Table 1. Torque Requirements

Parts	Recommended Torque	
Service valve cap	8 ft.- lb.	11 NM
Sheet metal screws	16 in.- lb.	2 NM
Machine screws #10	28 in.- lb.	3 NM
Compressor bolts	90 in.- lb.	10 NM
Gauge port seal cap	8 ft.- lb.	11 NM

Operating Gauge Set and Service Valves

USING MANIFOLD GAUGE SET

When checking the system charge, only use a manifold gauge set that features low loss anti-blow back fittings.

OPERATING SERVICE VALVES

The liquid and vapor line service valves are used for removing refrigerant, flushing, leak testing, evacuating, checking charge and charging.

Each valve is equipped with a service port which has a factory-installed valve core. Figure 2 provides information on accessing and operating both angle and ball service valves.

⚠ IMPORTANT

To prevent stripping of the various caps used, the appropriately sized wrench should be used and fitted snugly over the cap before tightening.

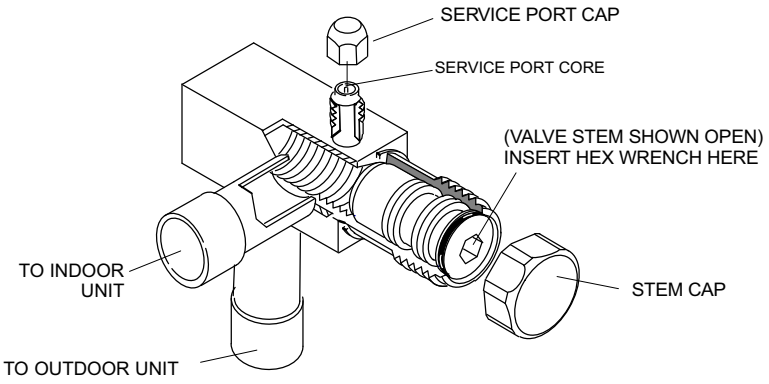
⚠ IMPORTANT

Only use Allen wrenches of sufficient hardness (50Rc - Rockwell Harness Scale minimum). Fully insert the wrench into the valve stem recess.

Service valve stems are factory-torqued (from 9 ft-lbs for small valves, to 25 ft-lbs for large valves) to prevent refrigerant loss during shipping and handling. Using an Allen wrench rated at less than 50Rc risks rounding or breaking off the wrench, or stripping the valve stem recess.

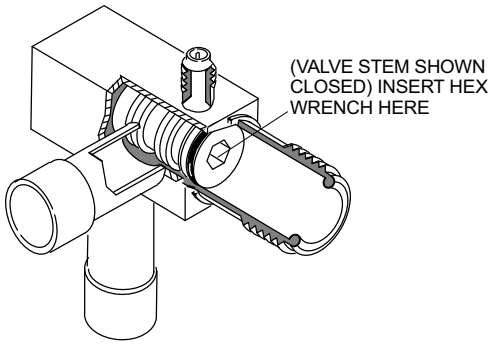
Operating Angle-Type Service Valve:

1. Remove stem cap with an appropriately sized wrench.
2. Use a service wrench with a hex-head extension (3/16" for liquid line valve sizes and 5/16" for vapor line valve sizes) to back the stem out counterclockwise as far as it will go.



ANGLE-TYPE SERVICE VALVE (BACK-SEATED OPENED)

When service valve is **OPEN**, the service port is open to line set, indoor and outdoor unit.

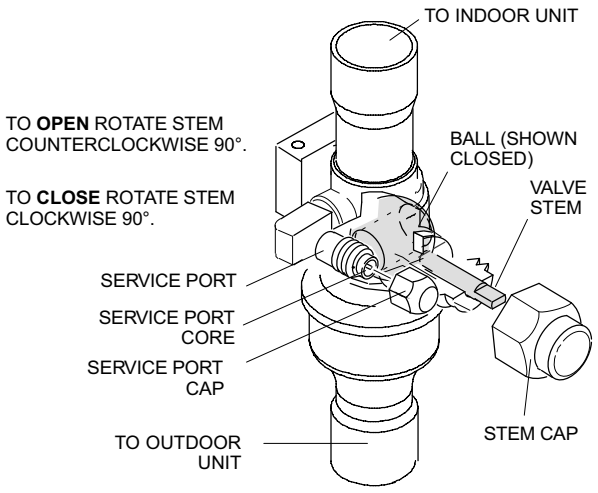


ANGLE-TYPE SERVICE VALVE (FRONT-SEATED CLOSED)

WHEN SERVICE VALVE IS **CLOSED**, THE SERVICE PORT IS OPEN TO THE LINE SET AND INDOOR UNIT.

Operating Ball-Type Service Valve:

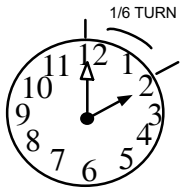
1. Remove stem cap with an appropriately sized wrench.
2. Use an appropriately sized wrenched to open. To open valve, rotate stem counterclockwise 90°. To close rotate stem clockwise 90°.



To Access Service Port:

A service port cap protects the service port core from contamination and serves as the primary leak seal.

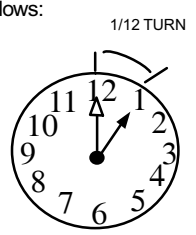
1. Remove service port cap with an appropriately sized wrench.
2. Connect gauge set to service port.
3. When testing is completed, replace service port cap and tighten as follows:
   - With torque wrench: Finger tighten and torque cap per table 1.
   - Without torque wrench: Finger tighten and use an appropriately sized wrench to turn an additional 1/6 turn clockwise.



Reinstall Stem Cap:

Stem cap protects the valve stem from damage and serves as the primary seal. Replace the stem cap and tighten as follows:

- With Torque Wrench: Finger tighten and then torque cap per table 1.
- Without Torque Wrench: Finger tighten and use an appropriately sized wrench to turn an additional 1/12 turn clockwise.



NOTE — A label with specific torque requirements may be affixed to the stem cap. If the label is present, use the specified torque.

Figure 2. Angle and Ball Service Valves

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Recovering Refrigerant from Existing System

⚠ IMPORTANT

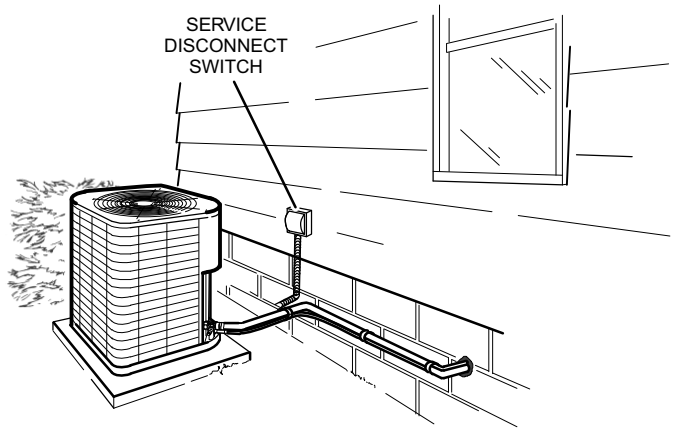
The Clean Air Act of 1990 bans the intentional venting of refrigerant (CFCs, HCFCs AND HFCs) as of July 1, 1992. Approved methods of recovery, recycling or reclaiming must be followed. Fines and/or incarceration may be levied for noncompliance.

RECOVERING

REFRIGERANT FROM SYSTEM

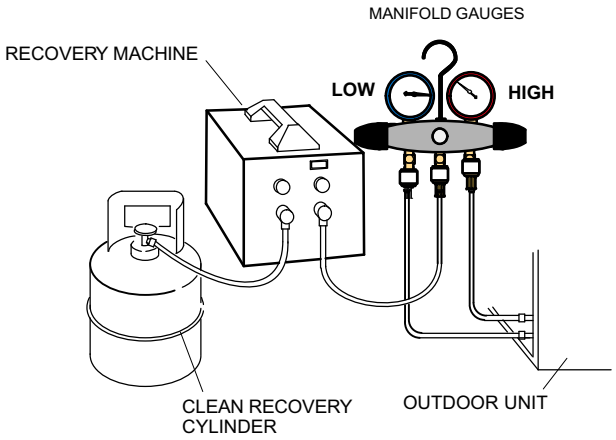
1 DISCONNECT POWER

Disconnect all power to the existing outdoor unit at the service disconnect switch or main fuse box/breaker panel.



2 CONNECT MANIFOLD GAUGE SET

Connect a gauge set, clean recovery cylinder and a recovery machine to the service ports of the existing unit. Use the instructions provided with the recovery machine to make the connections.



3 RECOVERING REFRIGERANT

Remove existing refrigerant using one of the following procedures:

IMPORTANT — Some system configurations may contain higher than normal refrigerant charge due to either large internal coil volumes, and/or long line sets.

METHOD 1:

Use this method if the existing outdoor unit is not equipped with shut-off valves, or if the unit is not operational and you plan to use the existing refrigerant to flush the system.

Remove all refrigerant from the existing system. Check gauges after shutdown to confirm that the entire system is completely void of refrigerant.

METHOD 2:

Use this method if the existing outdoor unit is equipped with manual shut-off valves, and you plan to use new refrigerant to flush the system.

The following devices could prevent full system charge recovery into the outdoor unit:

- Outdoor unit's high or low-pressure switches (if applicable) when tripped can cycle the compressor **OFF**.
- Compressor can stop pumping due to tripped internal pressure relief valve.
- Compressor has internal vacuum protection that is designed to unload the scrolls (compressor stops pumping) when the pressure ratio meets a certain value or when the suction pressure is as high as 20 psig. (Compressor suction pressures should never be allowed to go into a vacuum. Prolonged operation at low suction pressures will result in overheating of the scrolls and permanent damage to the scroll tips, drive bearings and internal seals.)

  Once the compressor cannot pump down to a lower pressure due to one of the above system conditions, shut off the vapor valve. Turn OFF the main power to unit and use a recovery machine to recover any refrigerant left in the indoor coil and line set.

Perform the following task:

A Start the existing system in the cooling mode and close the liquid line valve.

B Use the compressor to pump as much of the existing HCFC-22 refrigerant into the outdoor unit until the outdoor system is full. Turn the outdoor unit main power OFF and use a recovery machine to remove the remaining refrigerant from the system.

NOTE — It may be necessary to bypass the low pressure switches (if equipped) to ensure complete refrigerant evacuation.

C When the low side system pressures reach 0 psig, close the vapor line valve.

D Check gauges after shutdown to confirm that the valves are not allowing refrigerant to flow back into the low side of the system.

Figure 3. Refrigerant Recovery

New Outdoor Unit Placement

Remove existing outdoor unit prior to placement of new outdoor unit. See *Unit Dimensions* on page 2 for sizing mounting slab, platforms or supports. Refer to figure 4 for mandatory installation clearance requirements.

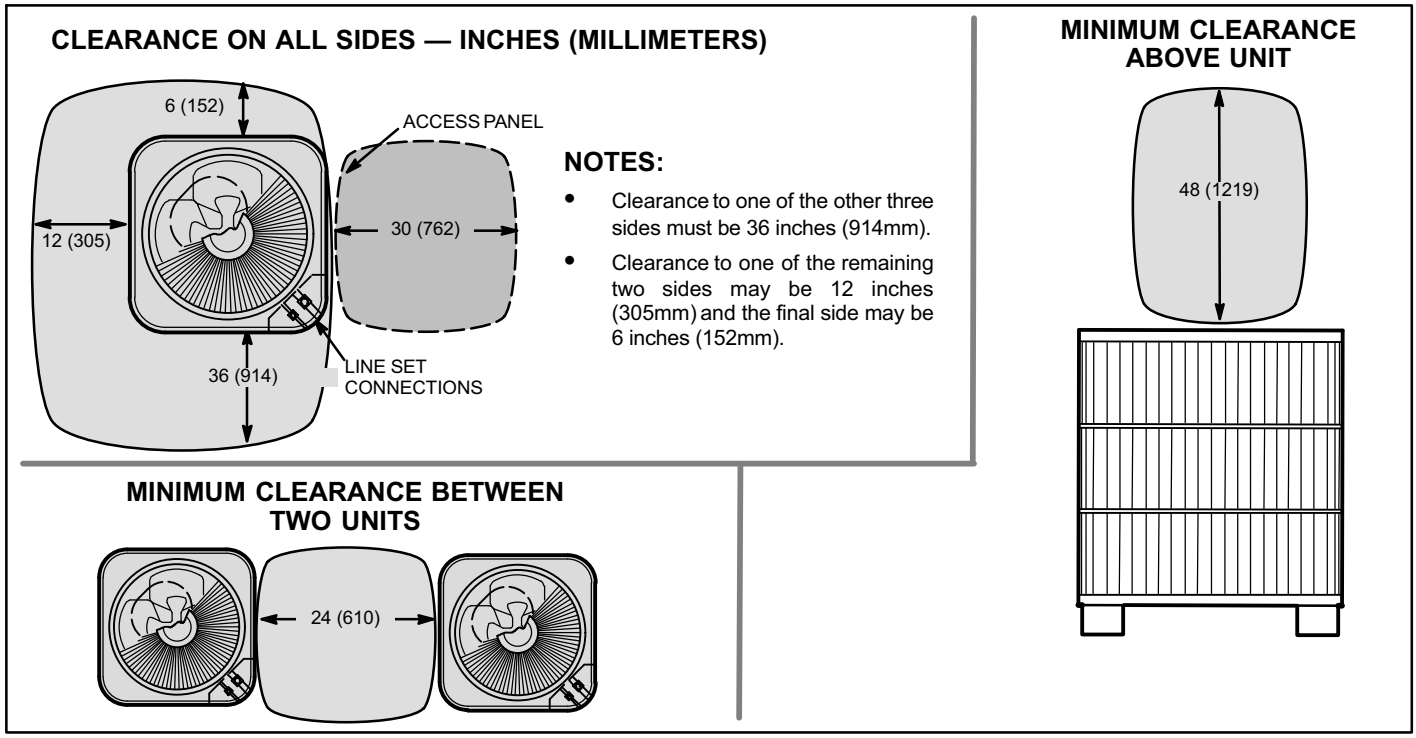


Figure 4. Installation Clearances

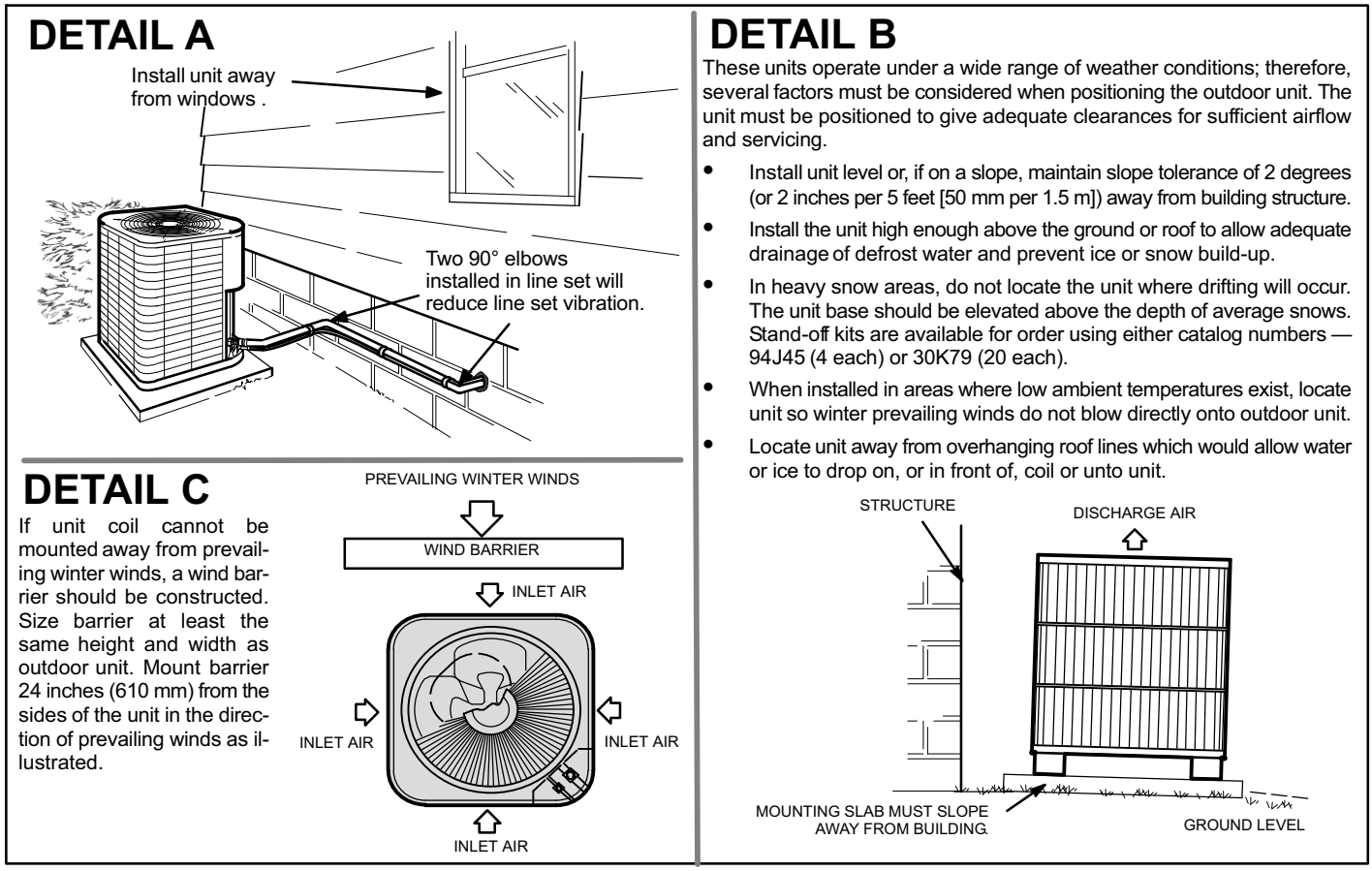


Figure 5. Placement, Slab Mounting and Wind Barrier

⚠ CAUTION

Physical contact with metal edges and corners while applying excessive force or rapid motion can result in personal injury. Be aware of, and use caution when working near these areas during installation or while servicing this equipment.

POSITIONING CONSIDERATIONS

⚠ CAUTION

In order to avoid injury, take proper precaution when lifting heavy objects.

Consider the following when positioning the unit:

- Some localities are adopting sound ordinances based on the unit's sound level registered from the adjacent property, not from the installation property. Install the unit as far as possible from the property line.
- When possible, do not install the unit directly outside a window. Glass has a very high level of sound transmission. For proper placement of unit in relation to a window see the provided illustration in figure 5.

PLACING OUTDOOR UNIT ON SLAB

When installing a unit at grade level, the top of the slab should be high enough above the grade so that water from higher ground would not collect around the unit as illustrated in figure 5.

Slab may be level or have a slope tolerance away from the building of not more than two degrees, or 2 inches per 5 feet (51 mm per 1524 mm) as illustrated in figure 5.

INSTALLING OUTDOOR UNIT ON ROOF

Install the unit at a minimum of 4 inches (102 mm) above the surface of the roof. Ensure the weight of the unit is properly distributed over roof joists and rafters. Redwood or steel supports are recommended. Refer to figure 5, detail c, for rooftop wind barrier considerations.

NOTICE

Roof Damage!

This system contains both refrigerant and oil. Some rubber roofing material may absorb oil and cause the rubber to swell when it comes into contact with oil. The rubber will then bubble and could cause leaks. Protect the roof surface to avoid exposure to refrigerant and oil during service and installation. Failure to follow this notice could result in damage to roof surface.

Replacement Line Set

This section provides information on new installation or replacement of existing line set. If a new or replacement line set is not required, then proceed to *Brazing Connections* on page 8.

REFRIGERANT LINE SET

Field refrigerant piping consists of liquid and suction lines from the outdoor unit (braze connections) to the indoor unit coil (flare or braze connections). If replacing line set, use brazed, non-flare line set, or field-fabricated refrigerant lines as listed in table 2.

Existing line set should meet size requirements listed in table 2.

NOTE - When installing refrigerant lines longer than 50 feet, contact technical support for assistance. To obtain the correct information from manufacturer, be sure to communicate the following points:

- Model (13HPD) and size of unit (e.g. -060).
- Line set diameters for the unit being installed as listed in table 2 and total length of installation.
- Number of elbows and if there is a rise or drop of the piping.

Table 2. Refrigerant Line Set — Inches (mm)

Model	Field Connections		Recommended Line Set		
	Liquid Line	Vapor Line	Liquid Line	Vapor Line	Line Sets
13HPD-018-230	3/8 in. (10 mm)	3/4 in. (19 mm)	3/8 in. (10 mm)	3/4 in. (19 mm)	Field-fabricated brazed, non-flare.
13HPD-024-230					
13HPD-030-230					
13HPD-036-230	3/8 in. (10 mm)	7/8 in. (22 mm)	3/8 in. (10 mm)	7/8 in. (22 mm)	
13HPD-042-230					
13HPD-048-230					
13HPD-060-230	3/8 in. (10 mm)	1-1/8 in. (29 mm)	3/8 in. (10 mm)	1-1/8 in. (29 mm)	

Brazing Connections

Use the procedures outline in figures 6 and 7 for brazing line set connections to service valves.

⚠ WARNING

When using a high pressure gas such as dry nitrogen to pressurize a refrigeration or air conditioning system, use a regulator that can control the pressure down to 1 or 2 psig (6.9 to 13.8 kPa).

⚠ WARNING

Danger of fire. Bleeding the refrigerant charge from only the high side may result in pressurization of the low side shell and suction tubing. Application of a brazing torch to a pressurized system may result in ignition of the refrigerant and oil mixture - Check the high and low pressures before applying heat.

⚠ IMPORTANT

Allow braze joint to cool before removing the wet rag from the service valve. Temperatures above 250ºF can damage valve seals.

⚠ IMPORTANT

Use silver alloy brazing rods with 5% minimum silver alloy for copper-to-copper brazing. Use 45% minimum alloy for copper-to-brass and copper-to-steel brazing.

⚠ WARNING

Danger of fire. Bleeding the refrigerant charge from only the high side may result in pressurization of the low side shell and suction tubing. Application of a brazing torch to a pressurized system may result in ignition of the refrigerant and oil mixture - Check the high and low pressures before applying heat.

⚠ CAUTION

Brazing alloys and flux contain materials which are hazardous to your health.

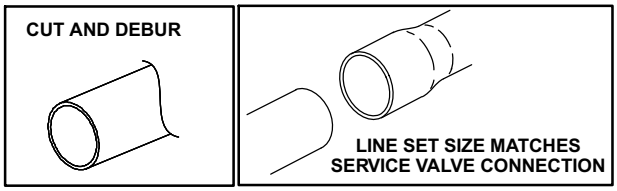
Avoid breathing vapors or fumes from brazing operations. Perform operations only in well-ventilated areas.

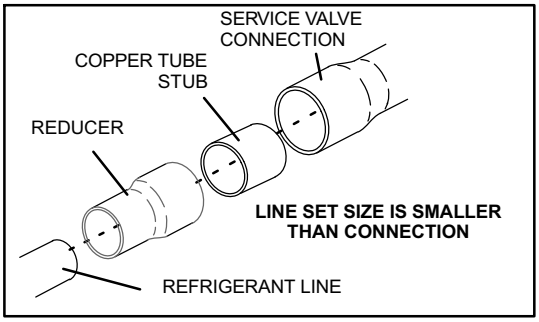
Wear gloves and protective goggles or face shield to protect against burns.

Wash hands with soap and water after handling brazing alloys and flux.

1 CUT AND DEBUR

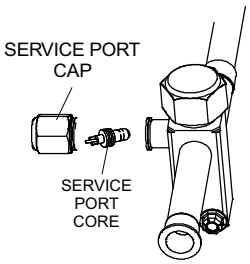
Cut ends of the refrigerant lines square (free from nicks or dents) and debur the ends. The pipe must remain round. Do not crimp end of the line.

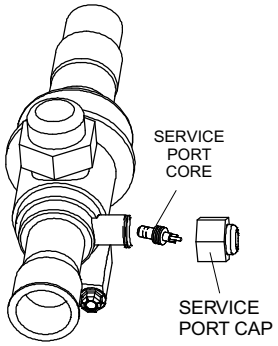




2 CAP AND CORE REMOVAL

Remove service cap and core from both the vapor and liquid line service ports.





3 ATTACH THE MANIFOLD GAUGE SET FOR BRAZING LINE SETS TO LIQUID AND SUCTION / VAPOR LINE SERVICE VALVES

Flow regulated nitrogen (at 1 to 2 psig) through the low-side refrigeration gauge set into the liquid line service port valve, and out of the suction / vapor line service port valve.

A Connect gauge set low pressure side to liquid line service valve (service port).

B Connect gauge set center port to bottle of nitrogen with regulator.

C Remove Schrader valve in suction / vapor line service port to allow nitrogen to escape.

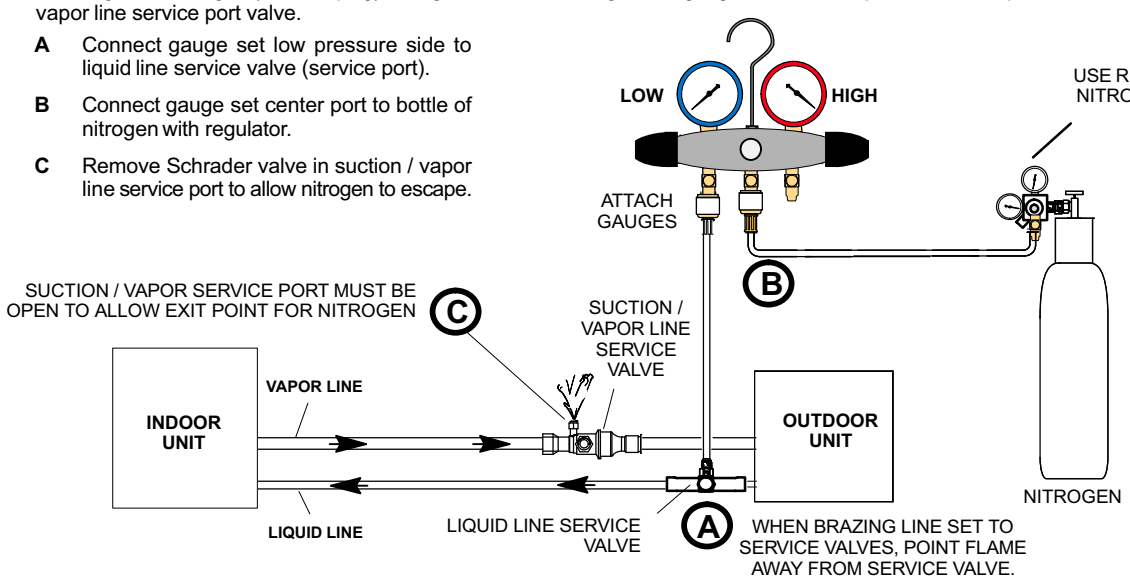


Figure 6. Brazing Procedures

4 WRAP SERVICE VALVES

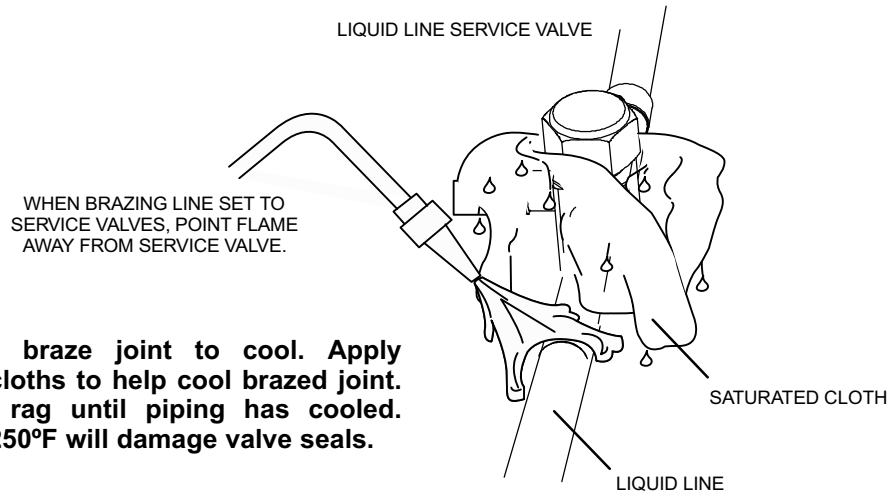
To help protect service valve seals during brazing, wrap a saturated cloth around service valve bodies and copper tube stub. Use another saturated cloth underneath the valve body to protect the base paint.

5 FLOW NITROGEN

Flow regulated nitrogen (at 1 to 2 psig) through the refrigeration gauge set into the valve stem port connection on the liquid service valve and out of the suction / vapor valve stem port. See steps **3A, 3B** and **3C** on manifold gauge set connections.

6 BRAZE LINE SET

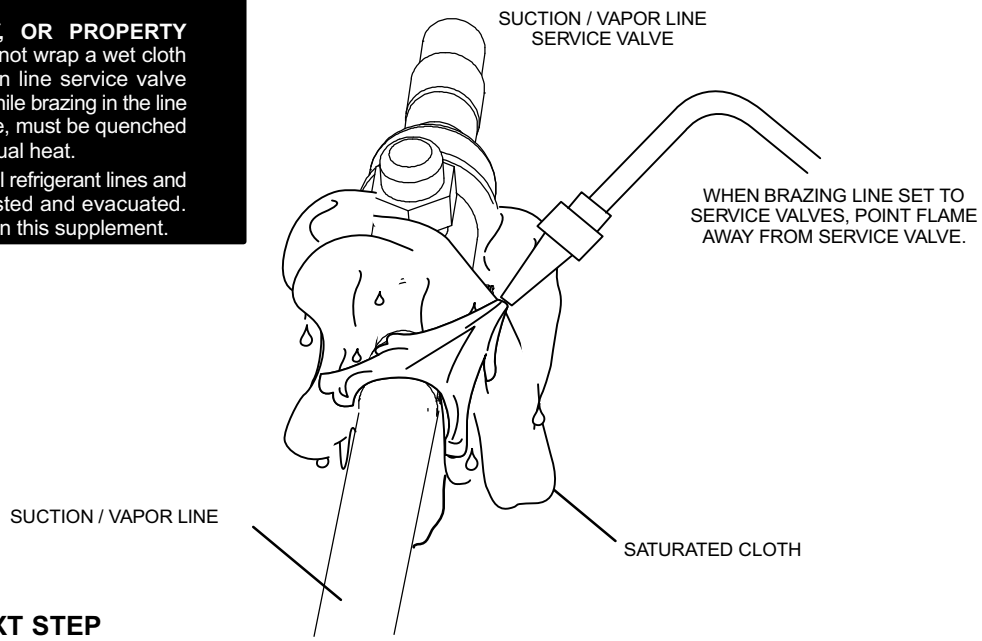
Wrap both service valves with a saturated cloth as illustrated here before brazing to line set.



IMPORTANT — Allow braze joint to cool. Apply additional saturated cloths to help cool brazed joint. Do not remove wet rag until piping has cooled. Temperatures above 250ºF will damage valve seals.

WARNING

1. **FIRE, PERSONAL INJURY, OR PROPERTY DAMAGE** will result if you do not wrap a wet cloth around both liquid and suction line service valve bodies and copper tube stub while brazing in the line set! The braze, when complete, must be quenched with water to absorb any residual heat.
2. Do not open service valves until refrigerant lines and indoor coil have been leak-tested and evacuated. Refer to procedures provided in this supplement.



7 PREPARATION FOR NEXT STEP

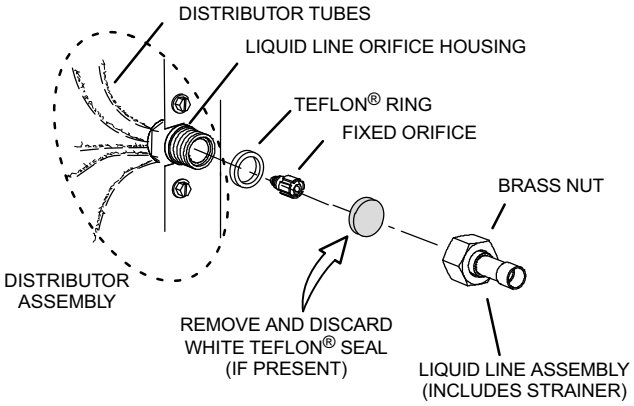
After all connections have been brazed, disconnect manifold gauge set from service ports. Apply saturated rags to both services valves to cool piping. Once piping is cool, remove all wet cloths.

Figure 7. Brazing Procedures (continued)

Removing Existing Metering Device and Flushing Line Set and Indoor Coil

Flushing is recommended if existing indoor coil and line set are to be used. Otherwise proceed to *Installing Indoor Metering Device* on page 12.

1A TYPICAL EXISTING FIXED ORIFICE REMOVAL PROCEDURE (UNCASED COIL SHOWN)



A On fully cased coils, remove the coil access and plumbing panels.

B Remove any shipping clamps holding the liquid line and distributor assembly.

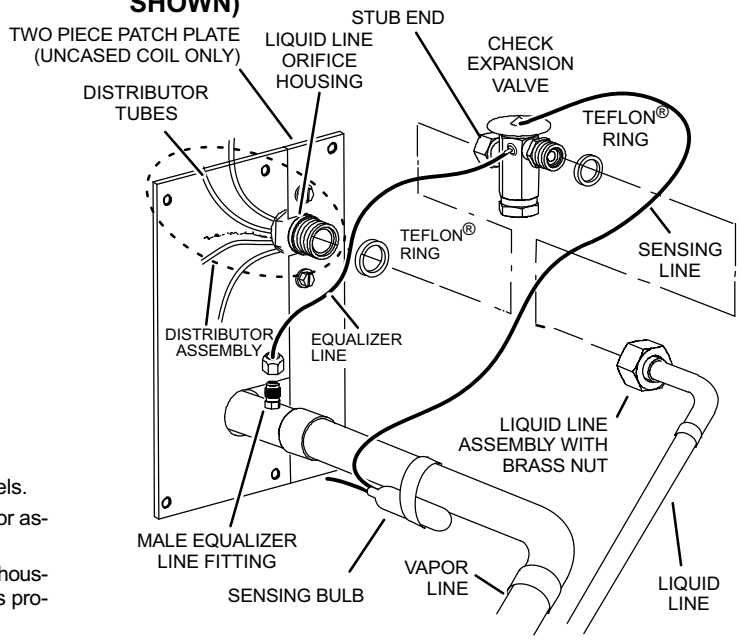
C Using two wrenches, disconnect liquid line from liquid line orifice housing. Take care not to twist or damage distributor tubes during this process.

D Remove and discard fixed orifice, valve stem assembly if present and Teflon® washer as illustrated above.

E Use a field-provided fitting to temporarily reconnect the liquid line to the indoor unit's liquid line orifice housing.

OR

1B TYPICAL EXISTING EXPANSION VALVE REMOVAL PROCEDURE (UNCASED COIL SHOWN)



A On fully cased coils, remove the coil access and plumbing panels.

B Remove any shipping clamps holding the liquid line and distributor assembly.

C Disconnect the equalizer line from the check expansion valve equalizer line fitting on the vapor line.

D Remove the vapor line sensing bulb.

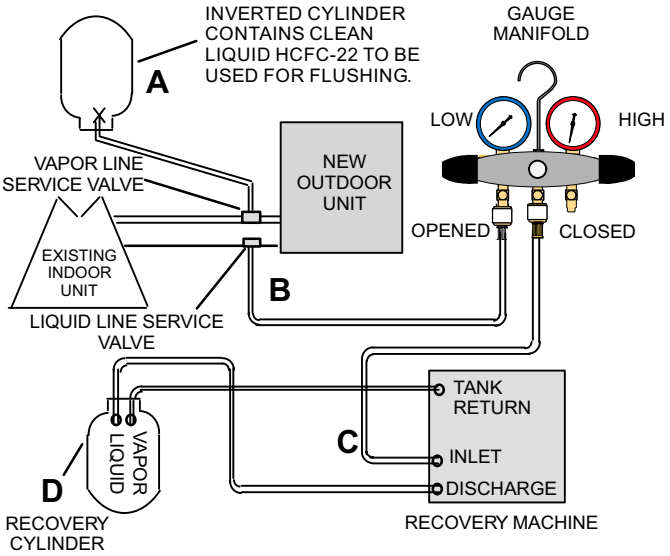
E Disconnect the liquid line from the check expansion valve at the liquid line assembly.

F Disconnect the check expansion valve from the liquid line orifice housing. Take care not to twist or damage distributor tubes during this process.

G Remove and discard check expansion valve and the two Teflon® rings.

H Use a field-provided fitting to temporary reconnect the liquid line to the indoor unit's liquid line orifice housing.

2 CONNECT GAUGES AND EQUIPMENT FOR FLUSHING PROCEDURE



A Inverted cylinder with clean refrigerant to the vapor service valve.

B gauge set (low side) to the liquid line valve.

C gauge set center port to inlet on the recovery machine with an empty recovery tank to the gauge set.

D Connect recovery tank to recovery machine per machine instructions.

3 FLUSHING LINE SET

The line set and indoor unit coil must be flushed with at least the same amount of clean refrigerant that previously charged the system. Check the charge in the flushing cylinder before proceeding.

A Set the recovery machine for liquid recovery and start the recovery machine. Open the gauge set valves to allow the recovery machine to pull a vacuum on the existing system line set and indoor unit coil.

B Invert the cylinder of clean refrigerant and open its valve to allow liquid refrigerant to flow into the system through the vapor line valve. Allow the refrigerant to pass from the cylinder and through the line set and the indoor unit coil before it enters the recovery machine.

C After all of the liquid refrigerant has been recovered, switch the recovery machine to vapor recovery so that all of the vapor is recovered. Allow the recovery machine to pull the system down to zero.

D Close the valve on the inverted drum and the gauge set valves. Pump the remaining refrigerant out of the recovery machine and turn the machine off.

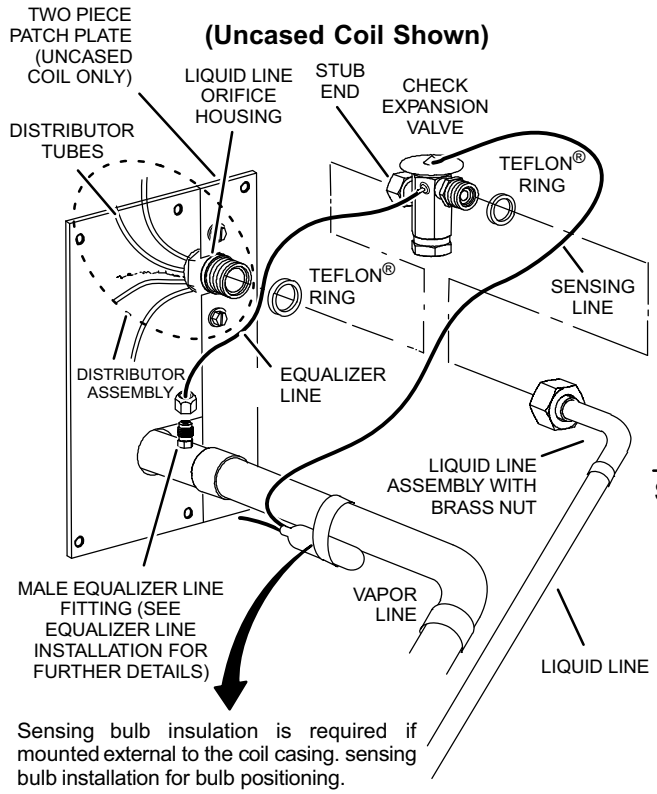
Figure 8. Removing Metering Device and Flushing

Installing New Indoor Metering Device

This outdoor unit is designed for use in existing HCFC-22 systems that use check / thermal expansion valve metering device (purchased separately) at the indoor coil.

See the *13HPD product specification sheet* for approved expansion valve kit match ups. The expansion valve unit can be installed internal or external to the indoor coil.

INDOOR CHECK EXPANSION VALVE INSTALLATION



Sensing bulb insulation is required if mounted external to the coil casing. sensing bulb installation for bulb positioning.

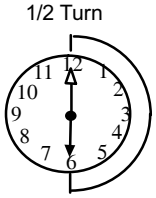
A Remove the field-provided fitting that temporarily reconnected the liquid line to the indoor unit's distributor assembly.

B Install one of the provided Teflon® rings around the stubbed end of the expansion valve and lightly lubricate the connector threads and expose surface of the Teflon® ring with refrigerant oil.

C Attach the stubbed end of the expansion valve to the liquid line orifice housing. Finger tighten and use an appropriately sized wrench to turn an additional 1/2 turn clockwise as illustrated in the figure above, or 20 ft-lb.

D Place the remaining Teflon® washer around the other end of the expansion valve. Lightly lubricate connector threads and expose surface of the Teflon® ring with refrigerant oil.

E Attach the liquid line assembly to the expansion valve. Finger tighten and use an appropriately sized wrench to turn an additional 1/2 turn clockwise as illustrated in the figure above or 20 ft-lb.

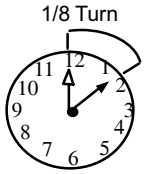


SENSING BULB INSTALLATION

A Attach the vapor line sensing bulb in the proper orientation as illustrated to the right using the clamp and screws provided.

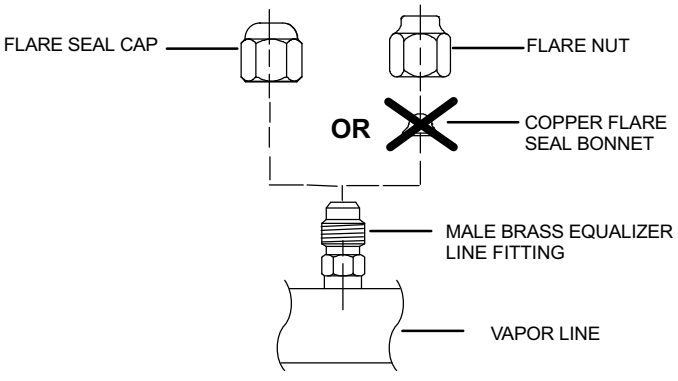
NOTE — Confirm proper thermal contact between vapor line and expansion bulb before insulating the sensing bulb once installed.

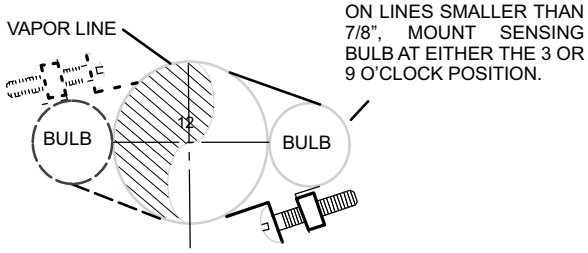
B Connect the equalizer line from the expansion valve to the equalizer vapor port on the vapor line. Finger tighten the flare nut plus 1/8 turn (7 ft-lbs) as illustrated below.

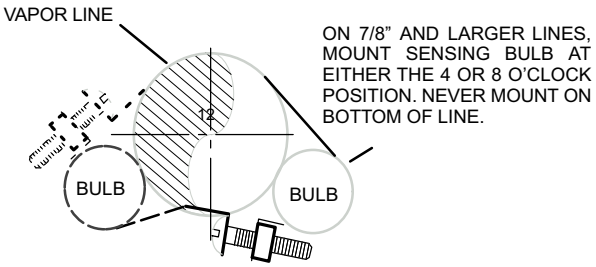


EQUALIZER LINE INSTALLATION

Remove and discard either the flare seal cap or flare nut with copper flare seal bonnet from the equalizer line port on the vapor line as illustrated in the figure below.







NOTE — NEVER MOUNT SENSING BULB ON BOTTOM OF LINE.

Figure 9. Installing Indoor Check Expansion Valve

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Leak Test Line Set and Indoor Coil

After completing the leak testing of the line set and indoor coil as outlined in figure 10, proceed to *Evacuating Line Set and Indoor Coil* on page 14.

⚠ IMPORTANT

The Environmental Protection Agency (EPA) prohibits the intentional venting of HCFC refrigerants during maintenance, service, repair and disposal of appliance. Approved methods of recovery, recycling or reclaiming must be followed.

⚠ IMPORTANT

Leak detector must be capable of sensing HCFC refrigerant.

⚠ WARNING

Refrigerant can be harmful if it is inhaled. Refrigerant must be used and recovered responsibly.

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

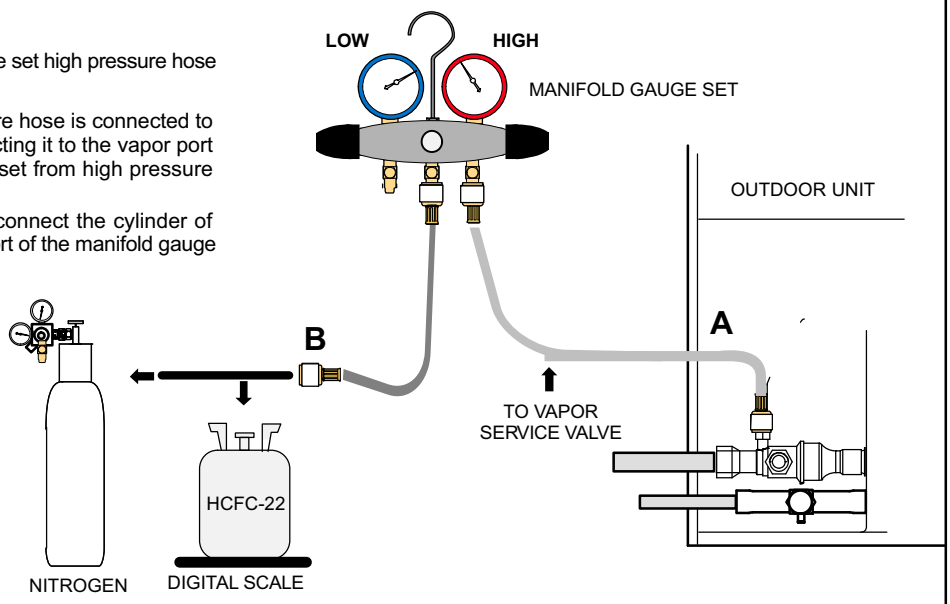
1 CONNECT GAUGE SET

A Connect an HCFC-22 manifold gauge set high pressure hose to the vapor valve service port.

NOTE — Normally, the high pressure hose is connected to the liquid line port. However, connecting it to the vapor port better protects the manifold gauge set from high pressure damage.

B With both manifold valves closed, connect the cylinder of HCFC-22 refrigerant to the center port of the manifold gauge set.

NOTE — Later in the procedure, the HCFC-22 container will be replaced by the nitrogen container.



2 TEST FOR LEAKS

After the line set has been connected to the indoor and outdoor units, check the line set connections and indoor unit for leaks. Use the following procedure to test for leaks:

A With both manifold valves closed, connect the cylinder of HCFC-22 refrigerant to the center port of the manifold gauge set. Open the valve on the HCFC-22 cylinder (vapor only).

B Open the high pressure side of the manifold to weigh in a trace amount of HCFC-22 into the line set and indoor unit. *A trace amount is a maximum of two ounces (57 g) refrigerant or three pounds (31 kPa) pressure.* Close the valve on the HCFC-22 cylinder and the valve on the high pressure side of the manifold gauge set. Disconnect the HCFC-22 cylinder.

C Connect a cylinder of dry nitrogen with a pressure regulating valve to the center port of the manifold gauge set.

D Adjust dry nitrogen pressure to 150 psig (1034 kPa). Open the valve on the high side of the manifold gauge set in order to pressurize the line set and the indoor unit.

E After a few minutes, open one of the service valve ports and verify that the refrigerant added to the system earlier is measurable with a leak detector.

F After leak testing disconnect gauges from service ports.

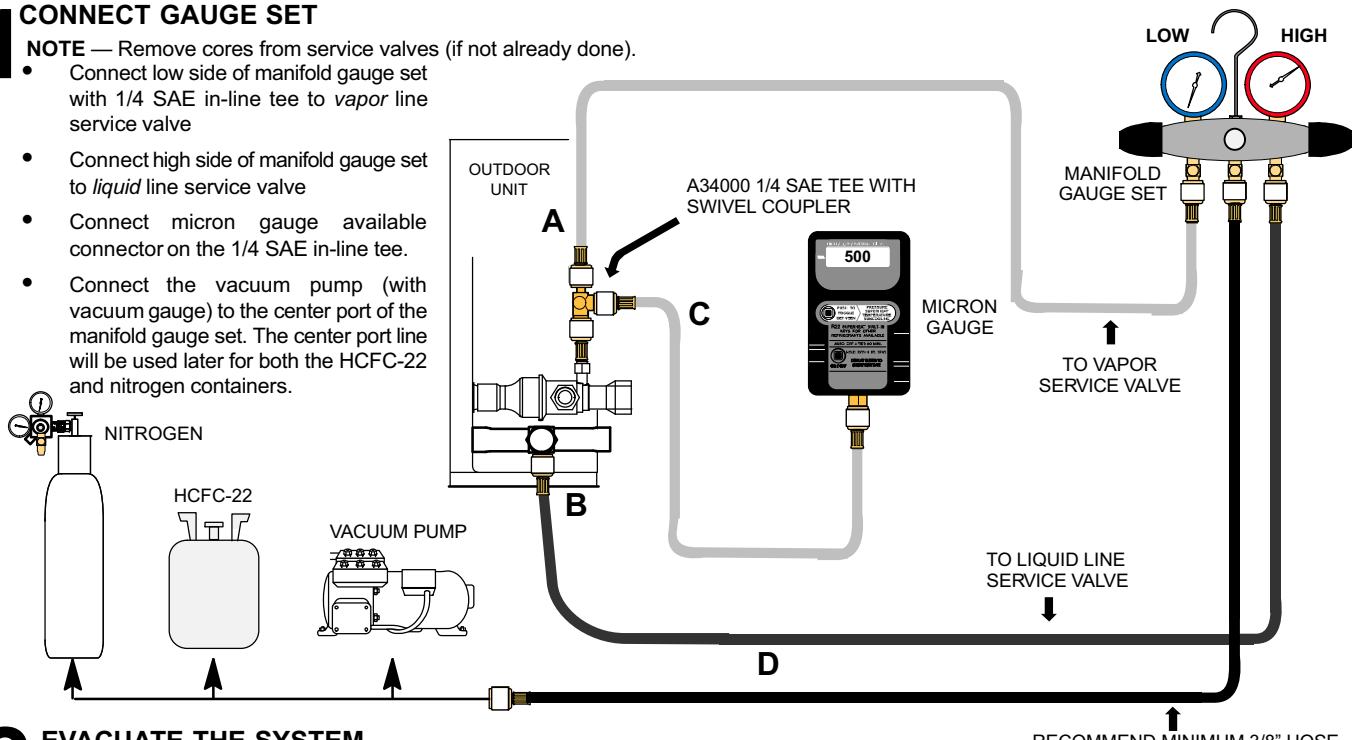
Figure 10. Leak Test

Evacuating Line Set, Indoor Coil and Outdoor Unit (System)

1 CONNECT GAUGE SET

NOTE — Remove cores from service valves (if not already done).

- Connect low side of manifold gauge set with 1/4 SAE in-line tee to *vapor* line service valve
- Connect high side of manifold gauge set to *liquid* line service valve
- Connect micron gauge available connector on the 1/4 SAE in-line tee.
- Connect the vacuum pump (with vacuum gauge) to the center port of the manifold gauge set. The center port line will be used later for both the HCFC-22 and nitrogen containers.



2 EVACUATE THE SYSTEM

A Open the liquid and vapor line service valves (counterclockwise) to release the factory nitrogen charge (contained in outdoor unit) into the system.

B Open both manifold valves and start the vacuum pump.

C Evacuate the line set, indoor unit and outdoor unit to an **absolute pressure** of 23,000 microns (29.01 inches of mercury).

NOTE *— During the early stages of evacuation, it is desirable to close the manifold gauge valve at least once. A rapid rise in pressure indicates a relatively large leak. If this occurs,* ***repeat the leak testing procedure****.*

NOTE *— The term* ***absolute pressure*** *means the total actual pressure within a given volume or system, above the absolute zero of pressure. Absolute pressure in a vacuum is equal to atmospheric pressure minus vacuum pressure.*

D When the absolute pressure reaches 23,000 microns (29.01 inches of mercury), perform the following:

- Close manifold gauge valves
- Close valve on vacuum pump
- Turn off vacuum pump
- Disconnect manifold gauge center port hose from vacuum pump
- Attach manifold center port hose to a dry nitrogen cylinder with pressure regulator set to 150 psig (1034 kPa) and purge the hose.
- Open manifold gauge valves to break the vacuum in the line set and indoor unit.
- Close manifold gauge valves.

E Shut off the dry nitrogen cylinder and remove the manifold gauge hose from the cylinder. Open the manifold gauge valves to release the dry nitrogen from the line set and indoor unit.

F Reconnect the manifold gauge to the vacuum pump, turn the pump on, and continue to evacuate the line set and indoor unit until the absolute pressure does not rise above 500 microns (29.9 inches of mercury) within a 20-minute period after shutting off the vacuum pump and closing the manifold gauge valves.

G When the absolute pressure requirement above has been met, disconnect the manifold hose from the vacuum pump and connect it to an upright cylinder of HCFC-22 refrigerant. Open the manifold gauge valve 1 to 2 psig in order to release the vacuum in the line set and indoor unit.

H Perform the following:

- Close manifold gauge valves.
- Shut off HCFC-22 cylinder.
- Reinstall service valve cores by removing manifold hose from service valve. Quickly install cores with core tool while maintaining a positive system pressure.
- Replace stem caps and secure finger tight, then tighten an additional one-sixth (1/6) of a turn as illustrated.

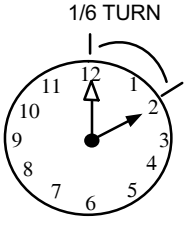


Figure 11. Evacuating System

⚠ WARNING

Danger of Equipment Damage. Avoid deep vacuum operation. Do not use compressors to evacuate a system. Extremely low vacuums can cause internal arcing and compressor failure. Damage caused by deep vacuum operation will void warranty.

⚠ CAUTION

Brazing alloys and flux contain materials which are hazardous to your health.

Avoid breathing vapors or fumes from brazing operations. Perform operations only in well ventilated areas.

Wear gloves and protective goggles or face shield to protect against burns.

Wash hands with soap and water after handling brazing alloys and flux.

Evacuating the system of non-condensables is critical for proper operation of the unit. Non-condensables are defined as any gas that will not condense under temperatures and pressures present during operation of an air conditioning system. Non-condensables and water suction combine with refrigerant to produce substances that corrode copper piping and compressor parts.

⚠ IMPORTANT

Use a thermocouple or thermistor electronic vacuum gauge that is calibrated in microns. Use an instrument capable of accurately measuring down to 50 microns.

Electrical Connections

In the U.S.A., wiring must conform with current local codes and the current National Electric Code (NEC). In Canada, wiring must conform with current local codes and the current Canadian Electrical Code (CEC).

Refer to the furnace or air handler installation instructions for additional wiring application diagrams and refer to unit nameplate for minimum circuit ampacity and maximum overcurrent protection size.

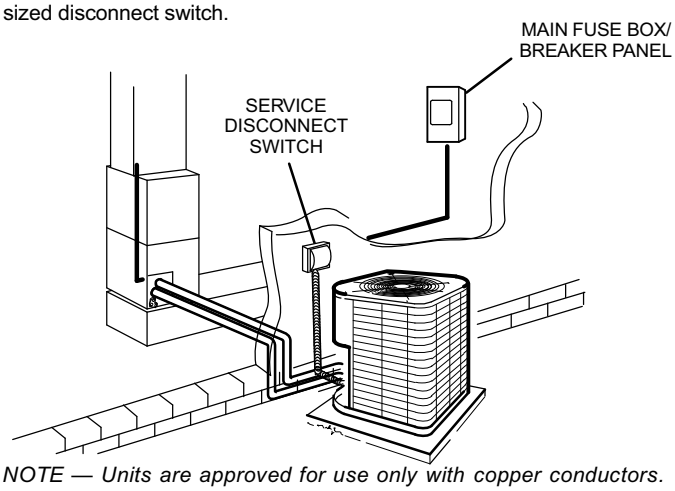
24VAC TRANSFORMER

Use the transformer provided with the furnace or air handler for low-voltage control power (24VAC - 40 VA minimum)

Figure 12 illustrates typical outdoor unit wiring diagrams for the 13HPD heat pumps.

SIZE CIRCUIT AND INSTALL DISCONNECT SWITCH

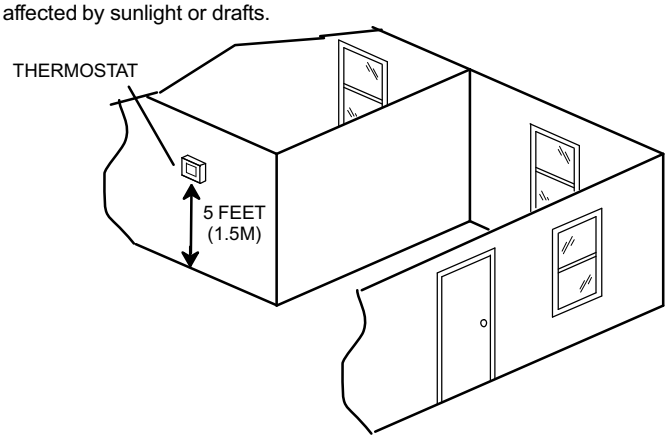
Refer to the unit nameplate for minimum circuit ampacity, and maximum fuse or circuit breaker (HACR per NEC). Install power wiring and properly sized disconnect switch.



NOTE — Units are approved for use only with copper conductors. Ground unit at disconnect switch or to an earth ground.

CHECK EXISTING ROOM THERMOSTAT

Ensure that existing room thermostat is installed on an inside wall approximately in the center of the conditioned area and 5 feet (1.5m) from the floor. It should not be installed on an outside wall or where it can be affected by sunlight or drafts.



NOTE — 24VAC, Class II circuit connections are made in the control panel.

⚠ WARNING

Electric Shock Hazard. Can cause injury or death.

Line voltage is present at all components on units with single-pole contactors, even when unit is not in operation!

Unit may have multiple power supplies. Disconnect all remote electric power supplies before opening access panel.

Unit must be grounded in accordance with national and local codes.

Refer to the furnace or blower coil installation instructions for additional wiring application diagrams and refer to unit nameplate for minimum circuit ampacity and maximum overcurrent protection size.

1. Install line voltage power supply to unit from a properly sized disconnect switch.
2. Ground unit at unit disconnect switch or to an earth ground.

   NOTE - To facilitate conduit, a hole is provided in the bottom of the control box. Connect conduit to the control box using a proper conduit fitting.

   NOTE - Units are approved for use only with copper conductors. 24V, Class II circuit connections are made in the low voltage junction box (see figure 12).

   NOTE - A complete unit wiring diagram is located inside the unit control box cover.

   NOTE - For proper voltages, select thermostat wire gauge per the following chart:

Wire run length	AWG #	Insulation type
less than 100' (30m)	18	color-coded, temperature rating 35°C minimum
more than 100' (30m)	16	

3. Install room thermostat (ordered separately) on an inside wall approximately in the center of the conditioned area and 5 feet (1.5 m) from the floor. It should not be installed on an outside wall or where it can be effected by sunlight, drafts or vibrations.
4. Install low voltage wiring from outdoor to indoor unit and from thermostat to indoor unit (see figure 12).

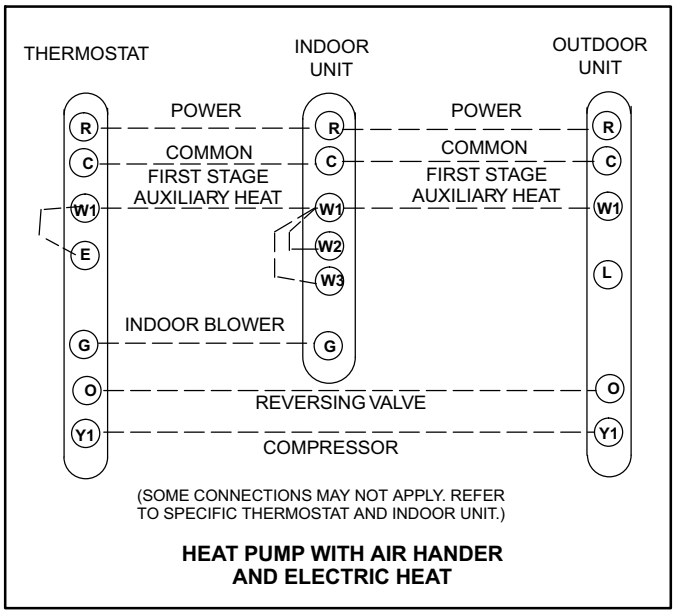


Figure 12. Typical Low Voltage Connections

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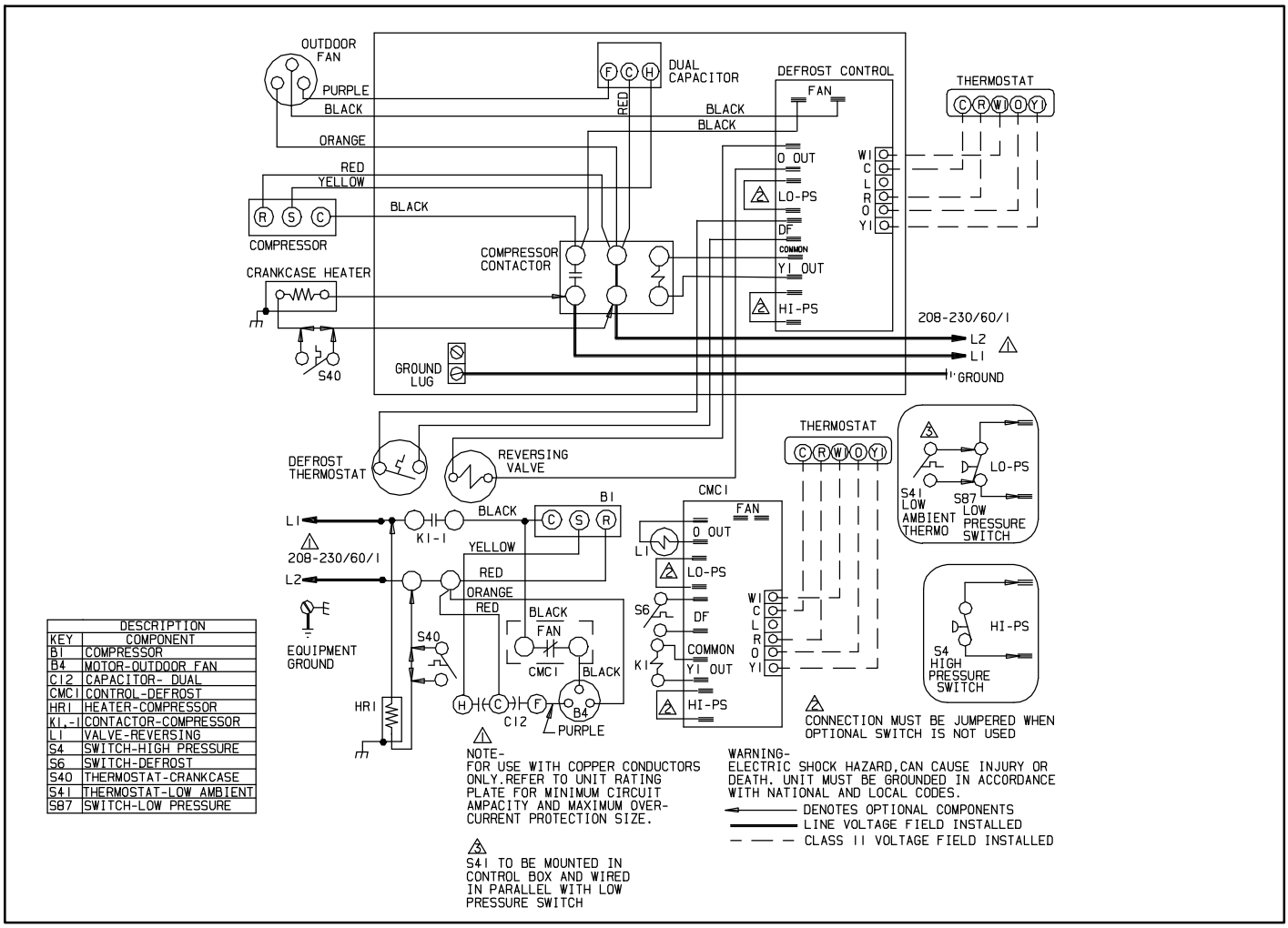


DESCRIPTION	
KEY	COMPONENT
B1	COMPRESSOR
B4	MOTOR-OUTDOOR FAN
C12	CAPACITOR- DUAL
CM1	CONTROL-DEFROST
HR1	HEATER-COMPRESSOR
K1,-1	CONTACTOR-COMPRESSOR
L1	VALVE-REVERSING
S4	SWITCH-HIGH PRESSURE
S6	SWITCH-DEFROST
S40	THERMOSTAT-CRANKCASE
S41	THERMOSTAT-LOW AMBIENT
S87	SWITCH-LOW PRESSURE

Figure 13. Typical Unit Wiring Diagram

⚠ IMPORTANT

Crankcase heater (if applicable) should be energized 24 hours before unit start-up to prevent compressor damage as a result of slugging.

Servicing Outdoor Unit Delivered Void of Nitrogen Charge

If the outdoor unit is void of factory nitrogen charge, clean the system using the procedure described below.

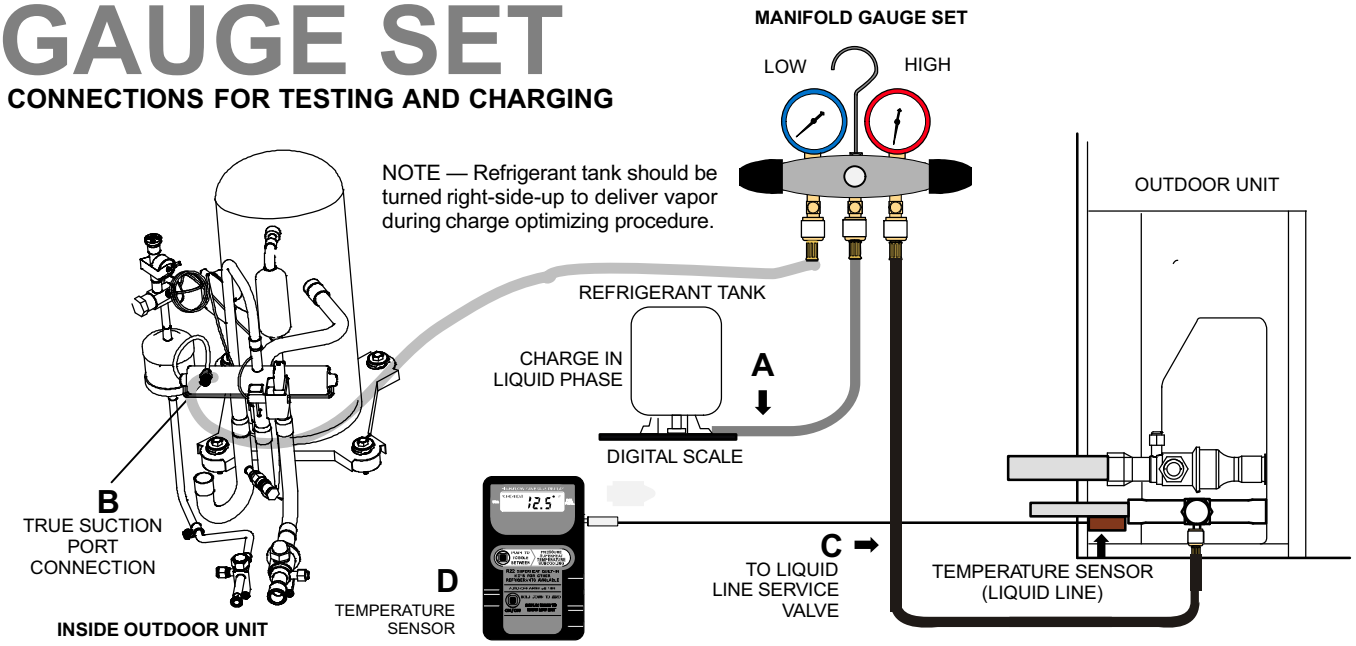
1. Use nitrogen to repressurize system and check for leaks.
2. Evacuate the system using evacuating procedure provided in this instruction.
3. Use nitrogen to break the vacuum and install a new filter drier in the system.
4. Evacuate the system again using evacuating procedure provided in this instruction.
5. Weigh in refrigerant using procedure outlined under *Unit Start-Up and Weigh-In Charging.*
6. Monitor the system to determine the amount of moisture remaining in the oil. It may be necessary to replace the filter drier several times to achieve the required dryness level. **If system dryness is not verified, the compressor will fail in the future.**

Unit Start-Up and Weigh-In Charging

1. Check that fan rotates freely.
2. Inspect all factory- and field-installed wiring for loose connections.
3. After evacuation of the outdoor unit, line set, and indoor unit are complete, close the manifold gauge set valves. Disconnect vacuum pump from center hose of gauge set.
4. Connect the center hose of the gauge set to a cylinder of HCFC-22 and purge the hose. Then, place the cylinder upside down on a scale (see figure 14).
5. Open the high side manifold gauge valve and weigh in liquid refrigerant. Refer to unit nameplate to determine correct weigh-in charge (see figure 15)
6. Close manifold gauge valves.

GAUGE SET

CONNECTIONS FOR TESTING AND CHARGING



A Close manifold gauge set valves and connect the center hose to a cylinder of HCFC-22. Set for liquid phase charging.

B Connect the manifold gauge set's low pressure side to the true suction port.

C Connect the manifold gauge set's high pressure side to the liquid line service port.

D Position temperature sensor on liquid line near liquid line service port.

Figure 14. Gauge Set Connections for Initial Weigh

WEIGH-IN CHARGING

ADD AMOUNT OF HCFC-22 REFRIGERANT AS SPECIFIED ON UNIT NAMEPLATE

_____

⇩

\+

ADJUST AMOUNT FOR VARIATION IN LINE SET LENGTH AS LISTED BELOW

_____

⇩

Refrigerant Charge per Line Set Length

Liquid Line Set Diameter	Ounces per 5 feet (g per 1.5 m) adjust from 15 feet (4.6 m) line set*
3/8" (9.5 mm)	3 ounce per 5' (85 g per 1.5 m)

*NOTE - *If line length is greater than 15 ft. (4.6 m), add this amount. If line length is less than 15 ft. (4.6 m), subtract this amount.*

=

TOTAL CHARGE

_____

Figure 15. Gauge Set Charge Setup and Weigh In

Optimizing System Charge

This section outlines procedures for optimizing the system charge.

NOTE — Gauge set should be connected as illustrate in figure 14; however, refrigerant tank should be turned right-side-up to deliver refrigerant gas during charge optimizing procedure.

1. Check voltage supply at the disconnect switch. The voltage must be within the range listed on the unit's nameplate. If not, do not start the equipment until you have consulted with the power company and the voltage condition has been corrected.
2. Move the low side manifold gauge hose from the vapor line service valve to the true suction port (see figure 1 in the unit installation instruction). **Make sure the refrigerant cylinder is right-side-up so that it will deliver gas during the charge optimizing procedure**.
3. Set the thermostat for a cooling demand. Turn on power to the indoor unit and close the outdoor unit disconnect switch to start the unit.
4. Allow unit to run for five minutes to allow pressures to stabilize.
5. Check and adjust indoor airflow using procedures provided below for heating mode and figure 16 for cooling mode.
6. Use either **approach** or **subcooling** method (see figures 17 and 18 for optimizing system charge. Adjust charge as necessary.
7. Close gauge set valves and disconnect gauge set.
8. Replace the stem and service port caps and tighten as specified in *Operating Service Valves* on page 3.
9. Recheck voltage while the unit is running. Power must be within range shown on the nameplate.

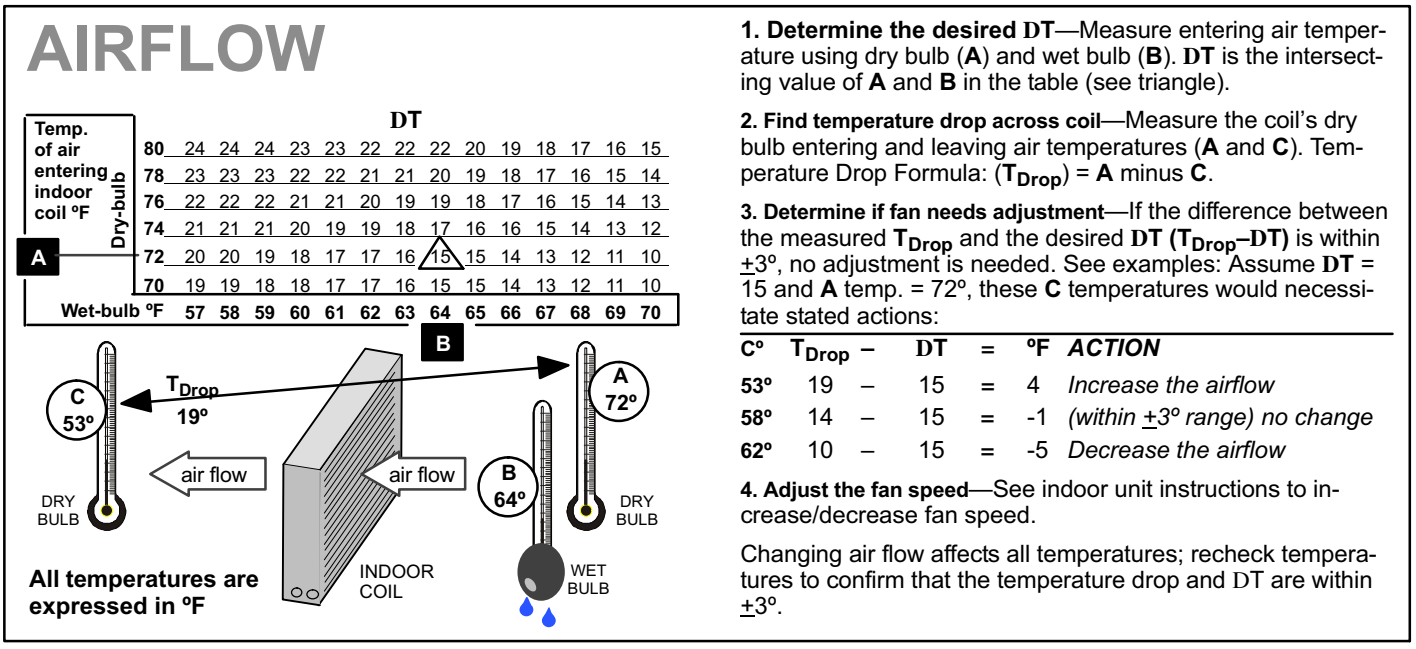
HEATING MODE INDOOR AIRFLOW CHECK

Blower airflow (CFM) may be calculated by energizing electric heat and measuring:

- temperature rise between the return air and supply air temperatures at the indoor coil blower unit,
- voltage supplied to the unit,
- amperage being drawn by the heat elements.

Then, apply the measurements taken in following formula to determine CFM:

$$CFM = \frac{\text{Amperage x Volts x 3.41}}{\text{1.08 x Temperature Rise (F)}}$$



1. Determine the desired DT—Measure entering air temperature using dry bulb (**A**) and wet bulb (**B**). **DT** is the intersecting value of **A** and **B** in the table (see triangle).

2. Find temperature drop across coil—Measure the coil's dry bulb entering and leaving air temperatures (**A** and **C**). Temperature Drop Formula: (T_{Drop}) = **A** minus **C**.

3. Determine if fan needs adjustment—If the difference between the measured T_{Drop} and the desired **DT** (T_{Drop}–**DT**) is within ±3°, no adjustment is needed. See examples: Assume **DT** = 15 and **A** temp. = 72°, these **C** temperatures would necessitate stated actions:

C°	T_{Drop}	–	DT	=	°F	*ACTION*
53°	19	–	15	=	4	*Increase the airflow*
58°	14	–	15	=	-1	*(within ±3° range) no change*
62°	10	–	15	=	-5	*Decrease the airflow*

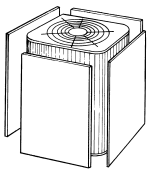
4. Adjust the fan speed—See indoor unit instructions to increase/decrease fan speed.

Changing air flow affects all temperatures; recheck temperatures to confirm that the temperature drop and DT are within ±3°.

Figure 16. Cooling Mode Indoor Airflow Check

SUBCOOLING TXV

Outdoor Ambient Temperature is 65ºF (18.3ºC) or **BELOW**



BLOCK OUTDOOR COIL: [sometimes necessary with lower temperatures] Use cardboard or plastic sheet to restrict the airflow through the outdoor coil to achieve pressures from 325-375 psig (2240-2585 kPa). Higher pressures are needed to check charge. Block equal sections of air intake panels and move coverings sideways until the liquid pressure is in the above noted ranges.

1. Confirm proper airflow across coil using figure 16.
2. Compare unit pressures with table 3, *Normal Operating Pressures*.
3. Set thermostat to call for heat (must have a cooling load between 70-80ºF (21-26ºC).
4. Connect gauge set.
5. Measure outdoor ambient temperature.
6. When heat demand is satisfied, set thermostat to call for cooling.
7. Allow temperatures and pressures to stabilize.

   NOTE - If necessary, block outdoor coil to maintain 200-250 psig.
8. Record liquid line temperature *(Position temperature sensor on liquid line near liquid line service port.)*:

   LIQº = _____
9. Measure liquid line pressure and use the value to determine saturation temperature:

   SATº = _____
10. Subtract to determine subcooling (SCº):

    SATº_____ - LIQº _____ = SCº _____
11. Compare results with table below.
12. If value is **greater** than shown, **remove** refrigerant; if **less** than shown, **add** refrigerant.
13. If refrigerant is added or removed, retest using approach method.

SCº (Subcooling) Values (F:+/-1.0° [C: +/-0.6°])							
Model	**-018**	**-024**	**-030**	**-036**	**-042**	**-048**	**-060**
°F (°C)*	6 (3.3)	11 (6)	8 (4.4)	6 (3.3)	6 (3.3)	4 (2.2)	9 (5)

*NOTE - For best results, use the same electronic thermometer to check both outdoor-ambient and liquid-line temperatures. *F: + / -1.0°; C: + / -0.5°*

Figure 17. HCFC-22 Subcooling TXV Charge

APPROACH TXV

Outdoor Ambient Temperature 66ºF (18.9ºC) or **ABOVE**.

1. Confirm proper airflow across coil using figure16.
2. Compare unit pressures with table 3, *Normal Operating Pressures*.
3. Connect gauge set.
4. When heat demand is satisfied, set thermostat to call for cooling.
5. Allow temperatures and pressures to stabilize.
6. Record outdoor ambient temperature:

   AMBº =_____
7. Record line temperature:

   LIQº = _____
8. Subtract to determine approach (APPº):

   LIQº_____ - AMBº _____ = APPº_____
9. Compare results with table below.
10. If value is **greater** than shown (high approach), **add** refrigerant; if **less** than shown (liquid temperature too close to ambient temperature, low approach), **remove** refrigerant.
11. If refrigerant is added or removed, retest to confirm that unit is properly charged.

APPº (Approach) Values(F:+/-1.0° [C: +/-0.6°])							
Model	**-018**	**-024**	**-030**	**-036**	**-042**	**-048**	**-060**
°F (°C)*	7 (3.9)	8 (4.4)	9 (5)	13 (7.2)	7 (3.9)	9 (5)	7 (3.9)

*NOTE - For best results, use the same electronic thermometer to check both outdoor-ambient and liquid-line temperatures. *F: + / -1.0°; C: + / -0.5°*

Figure 18. HCFC-22 Approach TXV Charge

Table 3. Normal Operating Pressure - Liquid ±10 and Vapor ±5 PSIG*

⚠ IMPORTANT

Minor variations in these pressures may be expected due to differences in installations. Significant differences could mean that the system is not properly charged or that a problem exists with some component in the system.

Model	13HPD-018	13HPD-024	13HPD-030	13HPD-036	13HPD-042	13HPD-048	13HPD-060
Temp. °F (°C)**	Liquid / Vapor	Liquid / Vapor	Liquid / Vapor	Liquid / Vapor	Liquid / Vapor	Liquid / Vapor	Liquid / Vapor
Cooling							
65 (18)	141 / 81	148 / 80	146 / 78	154 / 78	139 / 67	146 / 75	145 / 72
75 (24)	163 / 82	176 / 82	171 / 79	180 / 80	163 / 74	171 / 77	171 / 75
85 (29)	191 / 84	206 / 83	201 / 80	216 / 81	191 / 81	198 / 78	199 / 77
95 (35)	222 / 85	240 / 84	233 / 81	246 / 81	220 / 84	229 / 79	230 / 78
105 (41)	256 / 87	277 / 86	271 / 81	284 / 82	256 / 85	268 / 81	266 / 79
115 (45)	296 / 89	322 / 87	313 / 83	328 / 85	294 / 87	308 / 81	304 / 81
Heating							
50(10)	192 / 64	185 / 60	198 / 58	196 / 58	204 / 59	197 / 39	212 / 57
40 (4)	180 / 53	176 / 50	188 / 47	185 / 47	195 / 49	189 / 31	200 / 47
30 (-1)	172 / 43	165 / 49	175 / 35	176 / 37	184 / 39	181 / 25	187 / 38
20 (-7)	164 / 34	162 / 31	163 / 26	170 / 30	178 / 32	175 / 18	174 / 34

**These are most-popular-match-up pressures. Indoor match up, indoor air quality, and indoor load cause pressures to vary.*
***Temperature of the air entering the outside coil.*

System Operation

The outdoor unit and indoor blower cycle on demand from the room thermostat. When the thermostat blower switch is in the **ON** position, the indoor blower operates continuously.

LIQUID LINE BI-FLOW FILTER DRIER

The pre-installed liquid line bi-flow filter drier as illustrated in figure 1 is approved for use with HCFC-22 only. Do not replace liquid line filter drier with component designed for use with HFC-410A.

EMERGENCY HEAT FUNCTION (ROOM THERMOSTAT)

An emergency heat function is designed into some room thermostats. When the room thermostat is placed in the emergency heat position, the outdoor unit is disabled and only the backup heat source is used to provide heat. Typically the thermostat will have an LED or will indicate on the display the system is in the emergency heat mode to remind the homeowner that he is operating in the emergency heat mode.

Emergency heat is usually used during an outdoor shutdown, but it should also be used following a power outage if power has been off for over an hour and the outdoor temperature is below 50°F (10°C). System should be left in the emergency heat mode at least six hours to allow the crankcase heater sufficient time to prevent compressor slugging.

HIGH PRESSURE SWITCH (S4) (-018 MODEL ONLY)

S4 is standard on the 13HPD-018 model and an option on all other models. S4 is a manual re-set switch located on the liquid line. When liquid line pressure rises above the factory setting of 410 + 10 psi, the switch opens and shuts off the compressor.

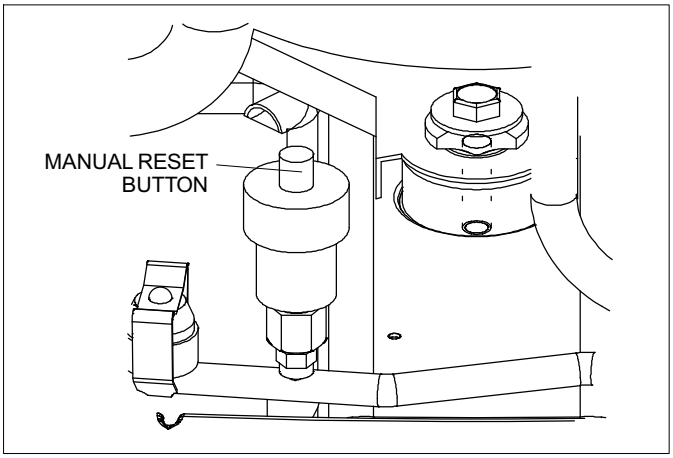


Figure 19. High Pressure Switch (S4) Manual Reset

Defrost System

The 13HPD defrost system includes two major components, a defrost control (CMC1) and defrost thermostat switch (S6).

DEFROST CONTROL (CMC1)

The defrost control includes the combined functions of a time/temperature defrost control, defrost relay, diagnostic LEDs and terminal strip for field wiring connections as illustrated in figure 20.

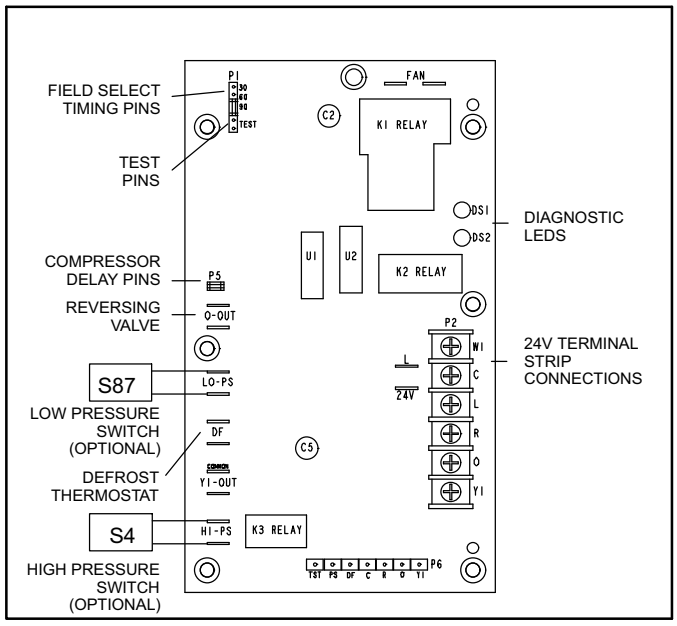


Figure 20. Defrost Control (CMC1)

The defrost control provides automatic switching from normal heating operation to defrost mode and back. During compressor cycle (call for defrost), the control accumulates compressor run times at 30-, 60-, or 90-minute field-adjustable intervals. If the defrost thermostat is closed when the selected compressor run time interval ends, the defrost relay is energized and defrost begins.

NOTE - The 30-second OFF cycle is not functional when jumpering the TEST pins.

P1 — Defrost Temperature Termination and Test Jumper

Each timing pin selection provides a different accumulated compressor run time period for one defrost cycle. This time period must occur before a defrost cycle is initiated.

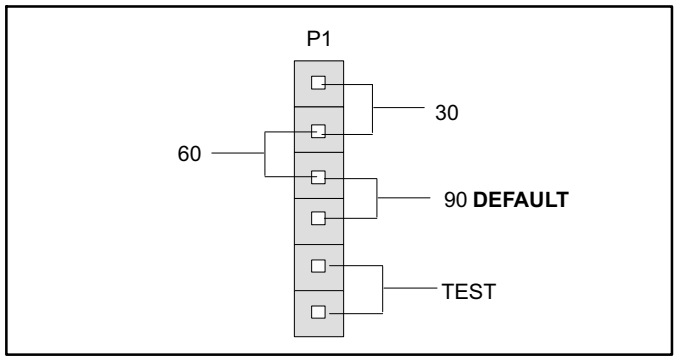


Figure 21. P1 Jumper Configurations

The defrost control selections are: 30, 60, and 90°F (10, 21, 32 and 38°C). The jumper termination pin is factory set at 90°F (10°C). If the temperature jumper is not installed, the default termination temperature is 90°F (32°C). The maximum defrost period is 14 minutes and cannot be adjusted.

P5 — Compressor 30-Second Delay

The defrost control has a field-selectable delay to reduce occasional sounds that may occur while the unit is cycling in and out of the defrost mode. The compressor will be cycled off for 30 seconds going in and out of the defrost mode when the compressor delay jumper is removed.

Test Option (P1)

A TEST option is provided for troubleshooting. **The TEST mode may be started any time the unit is in the heating mode and the defrost thermostat is closed or jumpered.**

- If the jumper is in the TEST position at power-up, the control will ignore the test pins.
- When the jumper is placed across the TEST pins for two seconds, the control will enter the defrost mode.
- If the jumper is removed before an additional 5-second period has elapsed (7 seconds total), the unit will remain in defrost mode until the defrost thermostat opens or 14 minutes have passed.
- If the jumper is not removed until after the additional 5-second period has elapsed, the defrost will terminate and the test option will not function again until the jumper is removed and re-applied.

Time Delay ByPass

The timed-off delay is five minutes long. The delay helps to protect the compressor from short-cycling in case the power to the unit is interrupted or a pressure switch opens. The delay is bypassed by placing the timer select jumper across the P1 TEST pins for 0.5 seconds as illustrated in figure 21.

DS1 and DS2 — Diagnostic LEDs

The defrost control uses two LEDs (DS1 and DS2) for diagnostics. The LEDs flash a specific sequence according to the condition.

Table 4. DS1 and DS2 LED Codes

Defrost Control (CMC1) Diagnostic LED		
Mode	**Green LED (DS2)**	**Red LED (DS1)**
No power to control	OFF	OFF
Normal operation / power to control	Simultaneous Slow FLASH	
Anti-short cycle lockout	Alternating Slow FLASH	
Low pressure switch fault (Optional)	OFF	Slow FLASH
Low pressure switch lockout (Optional)	OFF	ON
High pressure switch fault (Optional)	Slow FLASH	OFF
High pressure switch lockout (Optional)	ON	OFF

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DEFROST THERMOSTAT SWITCH (S6)

The defrost thermostat as illustrated in figure 1 is located on the liquid line between the CTXV and the distributor. When defrost thermostat senses 42°F (5.5°C) or cooler, the thermostat contacts close and send a signal to the defrost control to start the defrost timing. It also terminates defrost when the liquid line warms up to 70°F (21°C).

Table 5. Defrost Control Inputs, Outputs and Configurable Settings

Control Location	Control Label or Description	Purpose	Function
P1	TEST	Test Mode	*See Test Mode on page 22 for further details.*
P1	30, 60, 90	Defrost Temperature Termination (Jumper) Pins	The defrost control as illustrated in figure 20 has valid selections which are: 30, 60, and 90°F (-1, 16 and 32°C). The shunt termination pin is factory set at 50°F (10°C). If the temperature shunt is not installed, the default termination temperature is 90°F (32°C).
P2	W1	24VAC Thermostat Input / Output	24VAC input/output from indoor thermostat to indoor unit.
	C	24VAC Common	24VAC common
	L	Thermostat Service Light	Thermostat service light connection.
	R	24VAC	24VAC
	O	Thermostat Input	Reversing valve solenoid.
	Y1	Thermostat Input	Controls the operation of the unit.
P5	DELAY	Delay Mode	The defrost control has a field-selectable delay to reduce occasional sounds that may occur while the unit is cycling in and out of the defrost mode. When a jumper is installed on the DELAY pins, the compressor will be cycled off for 30 seconds going in and out of the defrost mode. Units are shipped with jumper installed on DELAY pins. *NOTE - The 30 second off cycle is NOT functional when jumpering the TEST pins on P1.*
P6	TST, PS DF, C, R, O, Y1	Factory Test Connectors	Factory Use Only.
DS1	RED LED	Diagnostic LED	Valid states for defrost control's two LEDs are OFF, ON and FLASHING which indicate diagnostics conditions that are described in table 4.
DS2	GREEN LED		
FAN	TWO CONNECTORS	Condenser Fan Operation	These two connections provide power for the condenser fan.
O OUT	O OUT	24VAC output	24VAC output connection for reversing valve.
LO-PS	LO-PS	Low-Pressure Switch	Not Used.
DF	DF	Defrost Thermostat	Defrost thermostat connection points.
Y1 OUT	Y1 OUT	24VAC Common Output	24VAC common output, switched for enabling compressor contactor.
HS-PS	HS-PS	High-Pressure Switch (Optional)	Not Used.
L	L	Service Light Output output	24VAC service light output.
24V	24V	24VAC output	Not Used.

Maintenance

Outdoor Unit

1. Clean and inspect outdoor coil (may be flushed with a water hose). Ensure power is off before cleaning.
2. Outdoor unit fan motor is pre-lubricated and sealed. No further lubrication is needed.
3. Visually inspect all connecting lines, joints and coils for evidence of oil leaks.
4. Check all wiring for loose connections.
5. Check for correct voltage at unit (unit operating).
6. Check amp draw on outdoor fan motor.

   Motor Nameplate:_____ **Actual**:_____.
7. Inspect drain holes in coil compartment base and clean if necessary.

NOTE - If insufficient heating or cooling occurs, the unit should be gauged and refrigerant charge should be checked.

Outdoor Coil

It may be necessary to flush the outdoor coil more frequently if it is exposed to substances which are corrosive or which block airflow across the coil (e.g., pet urine, cottonwood seeds, fertilizers, fluids that may contain high levels of corrosive chemicals such as salts)

- Outdoor Coil — The outdoor coil may be flushed with a water hose.
- Outdoor Coil (Sea Coast) — Moist air in ocean locations can carry salt, which is corrosive to most metal. Units that are located near the ocean require frequent inspections and maintenance. These inspections will determine the necessary need to wash the unit including the outdoor coil. Consult your installing contractor for proper intervals/procedures for your geographic area or service contract.

Indoor Unit

1. Clean or change filters.
2. Some blower motors are prelubricated and permanently sealed. No more lubrication is needed.
3. Adjust blower speed for cooling. Measure the pressure drop over the coil to determine the correct blower CFM. Refer to the unit information service manual for pressure drop tables and procedure.
4. *Belt Drive Blowers* - Check belt for wear and proper tension.
5. Check all wiring for loose connections.
6. Check for correct voltage at unit. (blower operating)
7. Check amp draw on blower motor.

   Motor Nameplate:_____ **Actual**:_____.

Indoor Coil

1. Clean coil if necessary.
2. Check connecting lines, joints and coil for evidence of oil leaks.
3. Check condensate line and clean if necessary.

Start-Up and Performance Checklist

Job Name _____ Job no. _____ Date _____

Job Location _____ City _____ State _____

Installer _____ City _____ State _____

Unit Model No. _____ Serial No. _____ Service Technician _____

Nameplate Voltage _____

Rated Load Ampacity _____ Compressor _____ Outdoor Fan _____

Maximum Fuse or Circuit Breaker _____

Electrical Connections Tight? ❑ Indoor Filter clean? ❑ Supply Voltage (Unit Off) _____

Indoor Blower RPM _____ S.P. Drop Over Indoor (Dry) _____ Outdoor Coil Entering Air Temp. _____

Discharge Pressure _____ Vapor Pressure _____ Refrigerant Charge Checked? ❑

Refrigerant Lines: - Leak Checked? ❑ Properly Insulated? ❑ Outdoor Fan Checked? ❑

Service Valves: --- Fully Opened? ❑ Caps Tight? ❑ **Thermostat**

Voltage With Compressor Operating _____ Calibrated? ❑ Properly Set? ❑ Level? ❑

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