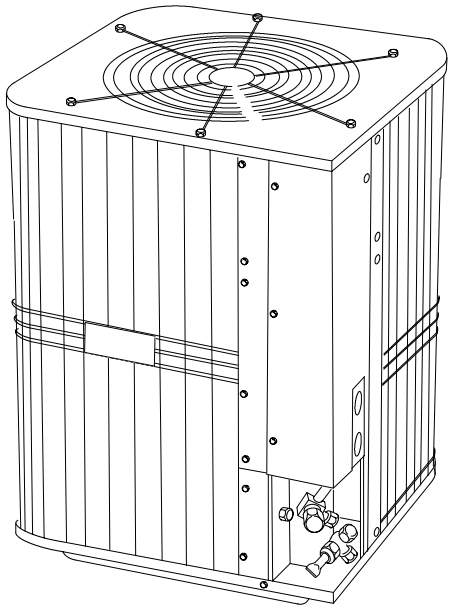
LENNOX®

PRODUCT LITERATURE



INSTALLATION INSTRUCTIONS

HP23 SERIES UNITS

HEAT PUMP UNITS
1 through 5 ton
503,083M
4/94
Supersedes 502,838M

Technical Publications
Litho U.S.A.

TABLE OF CONTENTS

RETAIN THESE INSTRUCTIONS FOR FUTURE REFERENCE

HP23 HEAT PUMP UNIT

HP23 heat pump units are approved and warranted only for installation with specially matched indoor coils, L10 line sets, and refrigerant control devices as designated by Lennox. Refer to Lennox engineering handbook for expansion valve kits which must be ordered separately.

SHIPPING AND PACKING LIST

1– Assembled HP23 heat pump unit

Check unit for shipping damage. Consult last carrier immediately if damage is found.

GENERAL INFORMATION

These instructions are intended as a general guide and do not supersede national or local codes in any way. Authorities having jurisdiction should be consulted before installation.

⚠ IMPORTANT

The Clean Air Act of 1990 bans the intentional venting of refrigerant (CFC's and HCFC's) as of July 1, 1992. Approved methods of recovery, recycling or reclaiming must be followed. Fines and/or incarceration may be levied for non–compliance.

⚠ WARNING

Product contains fiberglass wool.

Disturbing the insulation in this product during installation, maintenance, or repair will expose you to fiberglass wool. Breathing this may cause lung cancer. (Fiberglass wool is known to the State of California to cause cancer.)

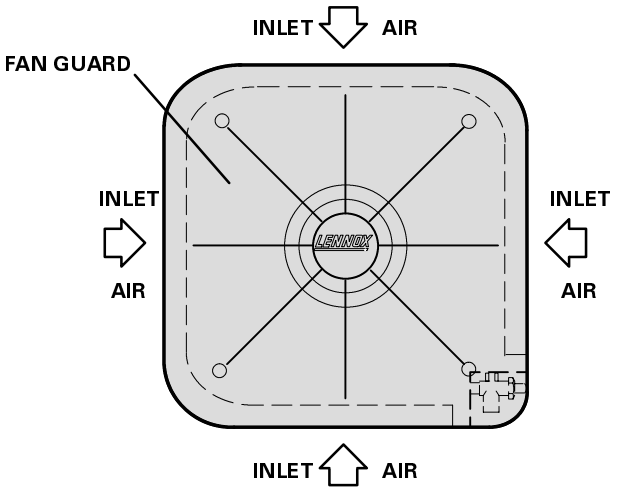
Fiberglass wool may also cause respiratory, skin, and eye irritation.

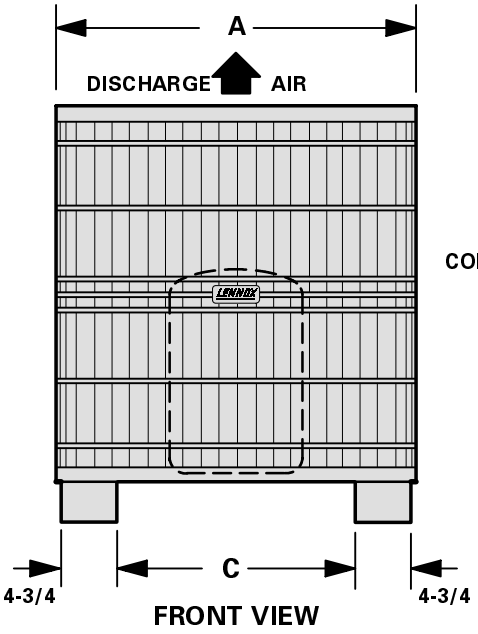
To reduce exposure to this substance or for further information, consult material safety data sheets available from address shown below, or contact your supervisor.

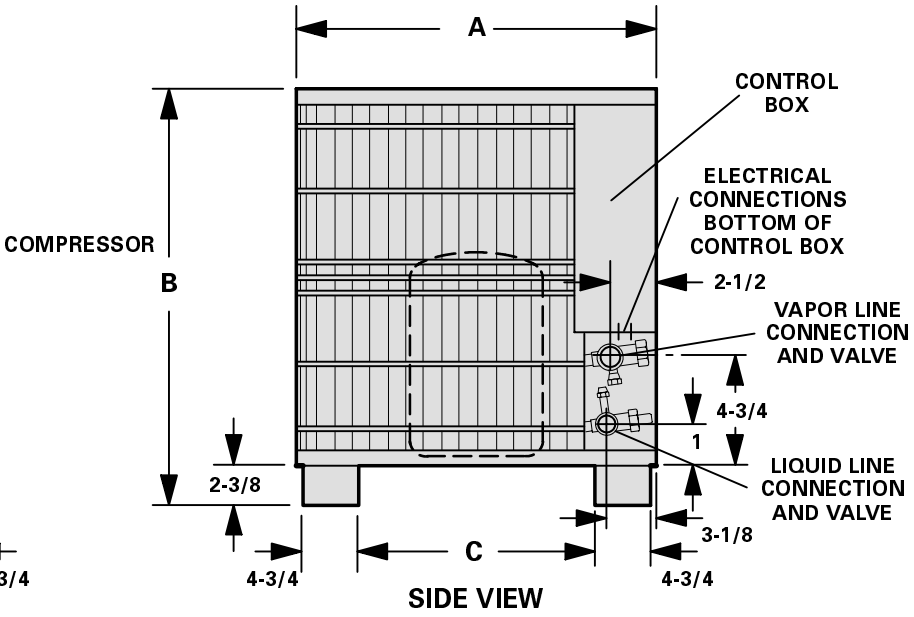
Lennox Industries Inc.
P.O. Box 799900
Dallas, TX 75379–9900

HP23 UNIT DIMENSIONS–INCHES (MM)

Model No.	A	B	C
HP23-141, HP23-211, HP23-261	26-3/8	26-3/8	16-7/8
HP23-311, HP23-411-413	26-3/8	30-3/8	16-7/8
HP23-461-463, HP23-511-513, HP23-651-653	31-5/16	34-3/8	21-3/16







CHECK POINTS

START--UP AND PERFORMANCE CHECK LIST

Job Name _____ Job No. _____ Date _____
Job Location _____ City _____ State _____
Installer _____ City _____ State _____
Unit Model No. _____ Serial No. _____ Serviceman _____
Nameplate Voltage _____ Amps:
Minimum Circuit Ampacity _____ Supply _____ Outdoor Fan _____
Maximum Fuse Size _____ Compressor _____
Electrical Connections Tight? ☐ Indoor Filter Clean? ☐ Indoor Blower RPM _____
Supply Voltage (Unit Off) _____ S.P. Drop Over Evaporator (Dry) _____
Outdoor Coil Entering Air Temperature _____
Liquid Pressure _____ Vapor Pressure _____
Refrigerant Charge Checked? ☐

HEAT PUMP SECTION

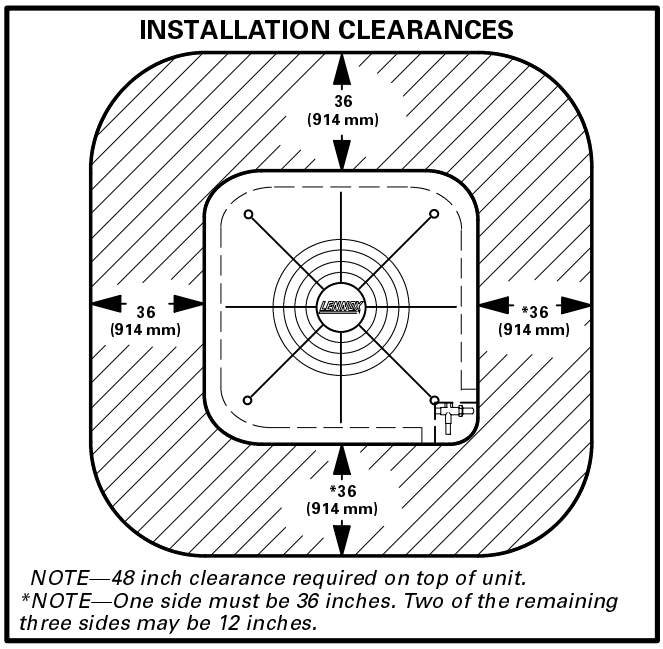
Refrigerant Lines:
Leak Checked? ☐
Service Valves Tightened? ☐ Properly Insulated? ☐
Outdoor Fan Checked? ☐
Voltage With Compressor Operating _____

THERMOSTAT

Calibrated? ☐ Properly Set? ☐ Level? ☐

SETTING THE UNIT

Heat pump units operate under a wide range of weather conditions; therefore, several factors must be considered when positioning the outdoor unit. Unit must be positioned to give adequate clearances for sufficient airflow and servicing. A minimum clearance of 36 in. (914 mm) between multiple units must be maintained. Refer to figure 1 for installation clearances.



NOTE—48 inch clearance required on top of unit.
**NOTE—One side must be 36 inches. Two of the remaining three sides may be 12 inches.*

FIGURE 1

1- Place a sound-absorbing material, such as Isomode, under the unit if it will be installed in a location or position that will transmit sound or vibration to the living area or adjacent buildings.

2- Mount unit high enough above ground or roof to allow adequate drainage of defrost water and prevent ice build-up.

3- In heavy snow areas, do not locate unit where drifting will occur. The unit base should be elevated above the depth of average snows.

NOTE-Elevation of the unit may be accomplished by constructing a frame using suitable materials. If a support frame is constructed, it must not block drain holes in unit base.

4- When installed in areas where low ambient temperatures exist, locate unit so winter prevailing winds do not blow directly into outdoor coil.

5- Locate unit away from overhanging roof lines which would allow water or ice to drop on, or in front of, coil or into unit.

Slab Mounting–Figure 2

When installing unit at grade level, top of slab should be high enough above the grade so that water from higher ground will not collect around unit. See figure 2. Slab should have a slope tolerance away from the building of 2 degrees or 2 inches per 5 feet (51 mm per 1524 mm). This will prevent ice build-up under the unit during a defrost cycle. Refer to roof mounting section for barrier construction if unit must face prevailing winter winds.

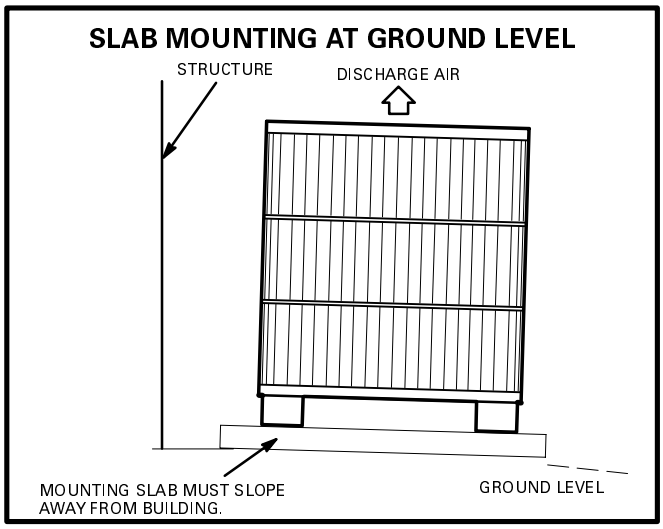


FIGURE 2

Roof Mounting–Figure 3

Install unit a minimum of 6 inches (152 mm) above the roof surface to avoid ice build–up around the unit. Locate the unit above a load bearing wall or area of the roof that can adequately support the unit. Consult local codes for rooftop applications.

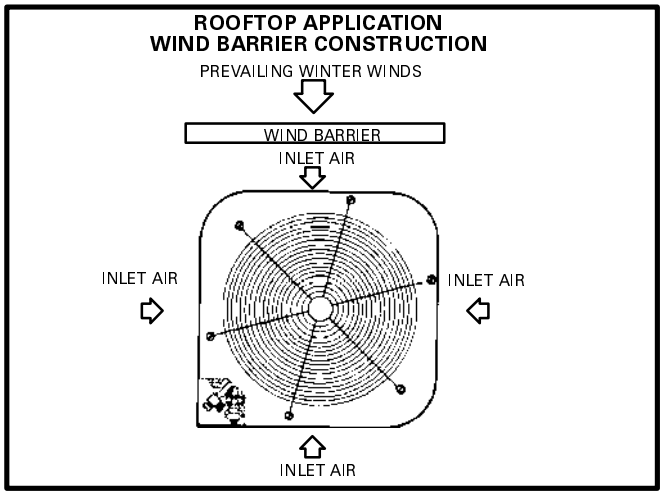


FIGURE 3

If unit coil cannot be mounted away from prevailing winter winds, a wind barrier should be constructed. Size barrier at least the same height and width as outdoor unit. Mount barrier 24 inches (610 mm) from the sides of the unit in the direction of prevailing winds.

ELECTRICAL

Wiring must conform with the National Electric Code (NEC) and local codes. An application diagram is included in this instruction and in indoor unit instructions.

Refer to unit rating plate, located on the control box cover, for minimum circuit ampacity and maximum fuse size.

1- Provide line voltage power supply to unit from a properly sized disconnect switch. Location of disconnect switch should be easily accessible and within sight of the unit.

2– Route power and ground wires from disconnect switch to unit. Electrical openings are provided under the control box cover. See unit dimension illustration on page 2.

3– Remove control box cover and connect power wiring to contactor. Connect ground wire to ground lug.

4– Install room thermostat (ordered separately) in the conditioned area. Locate thermostat where it will not be affected by sunlight, drafts or vibration. Do not install thermostat on an outside wall. A position approximately 5 feet (1524 mm) from the floor and near the center of the conditioned area is most desirable.

5- Route 24VAC control wires from the thermostat to indoor unit and from indoor unit to pigtail leads of the outdoor unit as shown in figure 4.

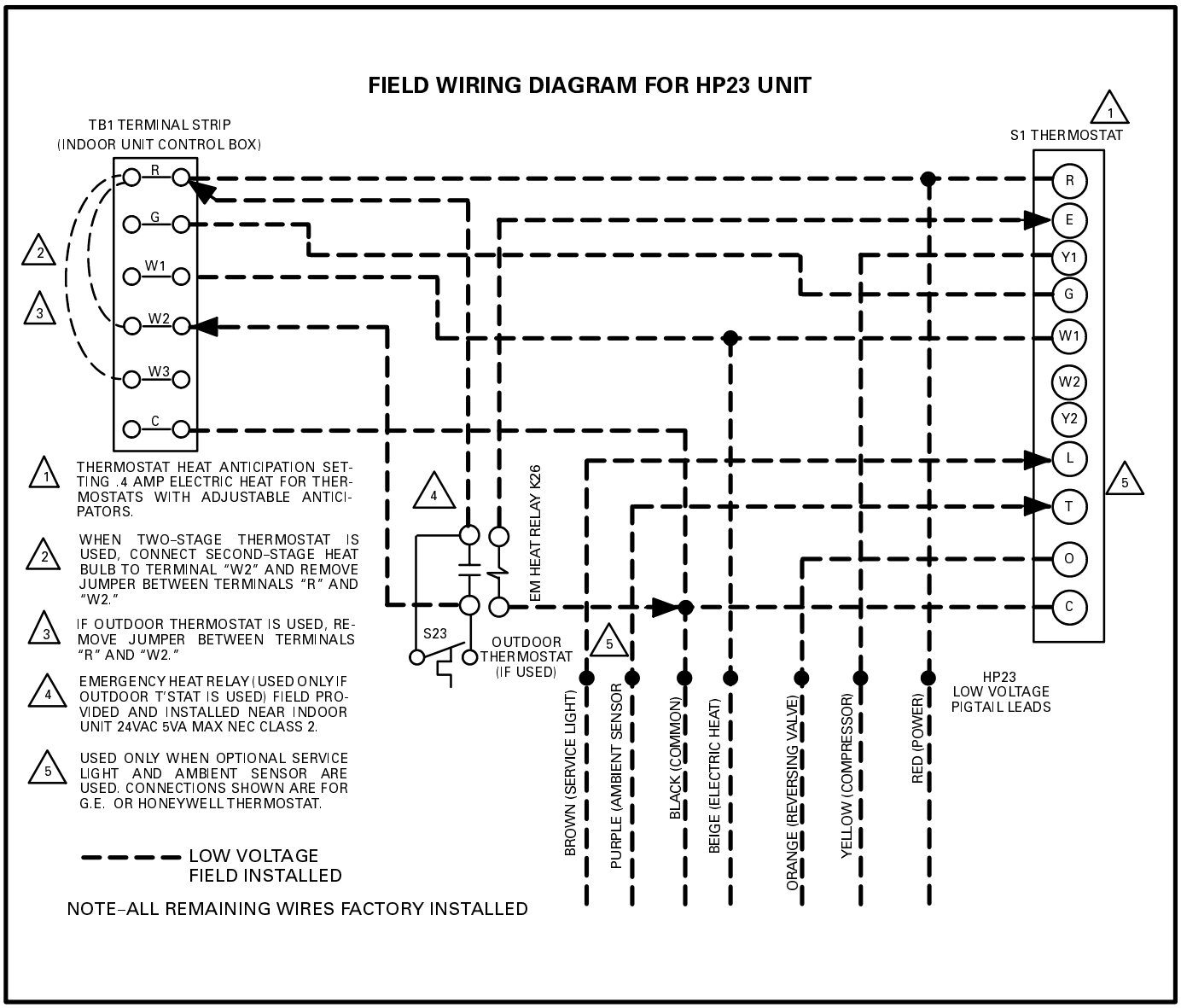


FIGURE 4

PLUMBING

Field refrigerant piping consists of liquid and vapor lines from the heat pump (sweat connections) to the indoor evaporator coil (typically flare connections). Use Lennox L10 series line sets as shown in table 1 or use field–fabricated refrigerant lines. Refer to unit information manual piping section for proper size, type and application of field–fabricated lines.

If refrigerant tubes are routed through a wall, seal and isolate the opening so vibration is not transmitted to the building.

NOTE-Line length should be no greater than 50 feet (15.2 m). Select line set diameters from table 1 to ensure oil return to compressor.

TABLE 1
REFRIGERANT LINE SET KITS

UNIT	LIQUID LINE	VAPOR LINE	L10 LINE SETS
HP23–141	1/4 in. (6mm)	1/2 in. (12mm)	Field Fabricated
HP23–211 HP23–261	5/16 in. (8mm)	5/8 in. (16mm)	L10–21 20 ft. – 50 ft. (3m – 15.2m)
HP23–311 HP23–411/413	3/8 in. (10mm)	3/4 in. (19mm)	L10–41 20 ft. – 50 ft. (6.1m – 15.2m)
HP23–461/463 HP23–511/513	3/8 in. (10mm)	7/8 in. (22mm)	L10–65 30 ft. – 50 ft. (9.1m – 15.2m)
HP23–651/653	3/8 in. (10mm)	1–1/8 in. (29mm)	Field Fabricated

NOTE-To obtain maximum efficiency, remove the 3/4" reduction from the L10-65 series line sets and the flare fitting from the indoor coil. Then, make a sweat connection using a 7/8" X 1-1/8" reducer bushing.

Sweat Connection Procedure

1– End of refrigerant line must be cut square, free from nicks or dents, deburred. Pipe must remain round, do not pinch end of line. (I.D. and O.D.)

2– The thermometer well (packaged separately and attached to the liquid line) should be installed in the liquid line close to the HP23 unit as shown in figure 5. Connect thermometer well male end to female end of liquid valve. Take care to install thermometer well so that the thermometer can be inserted and read easily. Wrap a wet cloth around the liquid line valve body and copper tube stub to protect from heat damage during brazing. Wrap another wet cloth underneath the liquid valve to protect the base paint.

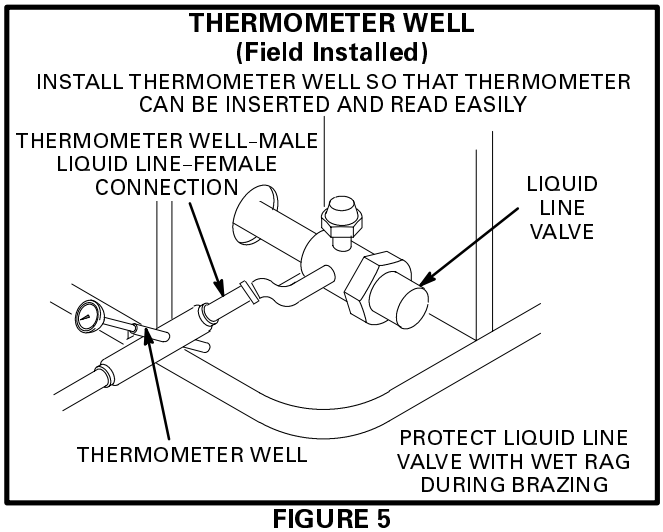


FIGURE 5

3– Quench the joint with water or a wet cloth to prevent possible heat damage to valve core and opening port.

REFRIGERANT METERING DEVICE

HP23 units are applicable to either RFC or an expansion valve system. See indoor coil installation instructions and the Lennox engineering handbook for approved RFC and TXV match- -ups and application information.

RFC Systems

HP23 units are shipped with either an RFC metering device. RFC bullet is installed as shown in figure 6. Take care not to twist cap tubes when loosening seal nut from orifice body. In cases of non- -traditional applications, RFC bullet shipped may not be appropriate. **Refer to the indoor coil installation instructions and the engineering handbook for specific orifice information.**

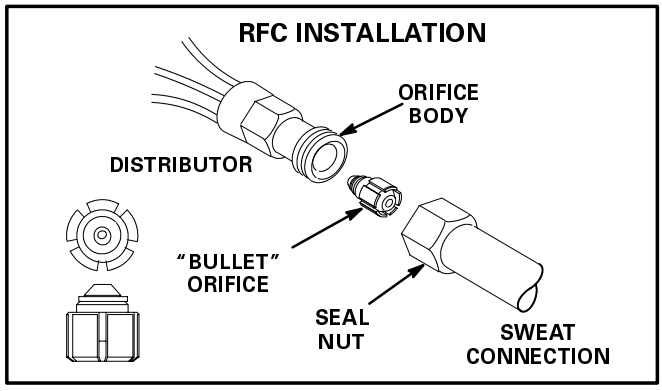


FIGURE 6

Expansion Valve Systems

Expansion valves equipped with either “Chatliff” or flare type fittings are available from Lennox. Refer to the indoor coil installation instructions or the engineering handbook for applicable expansion valves for use with specific match- -ups. See table 3 for applicable check and expansion valve kits.

TABLE 3
INDOOR CHECK AND EXPANSION VALVE KITS

MODEL	KIT NUMBER
HP23- -141	LB- -34792BJ
HP23- -211/261	LB- -34792BE
HP23- -311/410/460	LB- -34792BG
HP23- -510	LB- -34792BF
HP23- -650	LB- -34792BH

⚠ IMPORTANT

Failure to remove RFC when installing an expansion valve to the indoor coil will result in improper operation and damage to the system.

MANIFOLD GAUGE SET

A manifold gauge set equipped with “low loss” hoses should be used when checking unit charge. A manifold gauge set with anything other than “low loss” hose should not be used. See figure 7 for manifold gauge connections.

HP23 COOLING CYCLE (SHOWING MANIFOLD GAUGE CONNECTIONS)

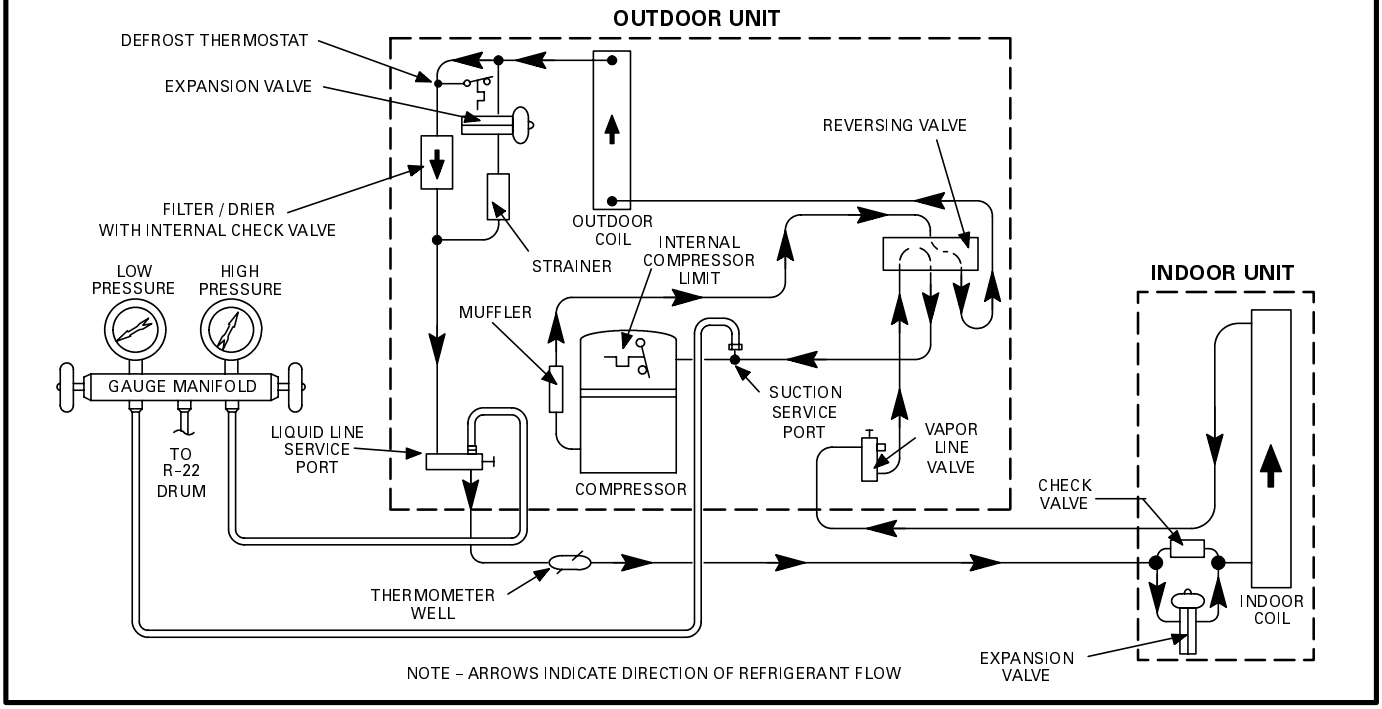


FIGURE 7

LIQUID & VAPOR LINE SERVICE VALVES

The liquid line and vapor line service valves and gauge ports are accessible by removing the compressor access cover. Full service liquid and vapor line valves are used. See figures 8 and 9. The service ports are used for leak testing, evacuating, charging and checking charge.

⚠ IMPORTANT

Service valves are closed to the heat pump unit and open to line set connections. Do not open until refrigerant lines have been leak tested and evacuated. All precautions should be exercised in keeping the system free from dirt, moisture and air.

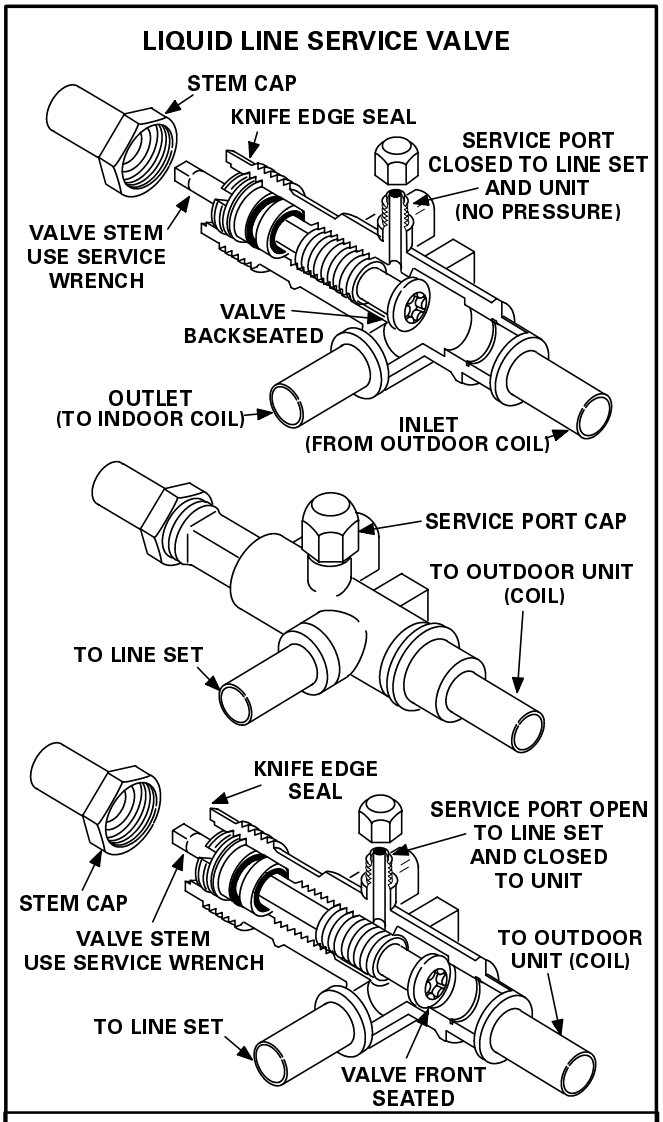
Liquid Line Service Valve (Figure 8)

The valve is equipped with a service port. There is no schrader valve installed in the liquid line service port. A service port cap is supplied to seal off the port.

The liquid line service valve is a front and back seating valve. When the valve is backseated the service port is not pressurized. The service port cap can be removed and gauge connections can be made.

To Access Service Port:

1– Remove the stem cap. Use a service wrench to make sure the service valve is backseated.



IMPORTANT

A schrader valve is not provided on the liquid line service port. Valve must be backseated to turn off pressure to service port.

FIGURE 8

CAUTION

The service port cap is used to seal the liquid line service valve. A schrader valve is not provided. Access to service port requires backseating the service valve to isolate the service port from the system. Failure to do so will cause refrigerant leakage.

2– Remove service port cap and connect high pressure gauge to service port.

3– Using service wrench, open valve stem (one turn clockwise) from backseated position.

4– When finished using port, backseat stem with service wrench. Tighten firmly.

5– Replace service port and stem cap. Tighten finger tight, then tighten an additional 1/6 turn.

To Close Off Service Port:

1– Using service wrench, backseat valve by turning stem counterclockwise. Tighten firmly.

To Open Liquid Line Service Valve:

1– Remove the stem cap with an adjustable wrench.

2– Using service wrench, backseat valve by turning stem counterclockwise until backseated. Tighten firmly.

3– Replace stem cap, finger tighten then tighten an additional 1/6 turn.

To Close Liquid Line Service Valve:

1– Remove the stem cap with an adjustable wrench.

2– Turn the stem in clockwise with a service wrench to front seat the valve. Tighten firmly.

3– Replace stem cap, finger tighten then tighten an additional 1/6 turn.

Vapor Line Service Valve (Figure 9)

The valve is equipped with a service port. A schrader valve is factory installed. A service port cap is supplied to protect the schrader valve from contamination and assure a leak free seal.

To Access Schrader Port:

1– Remove service port cap with an adjustable wrench.

2– Connect gauge to the service port.

3– When testing is completed, replace service port cap. Tighten finger tight, then an additional 1/6 turn.

To Open Vapor Line Service Valve:

1– Remove stem cap with an adjustable wrench.

2– Using service wrench and 5/16" hex head extension back the stem out counterclockwise until the valve stem just touches the retaining ring.

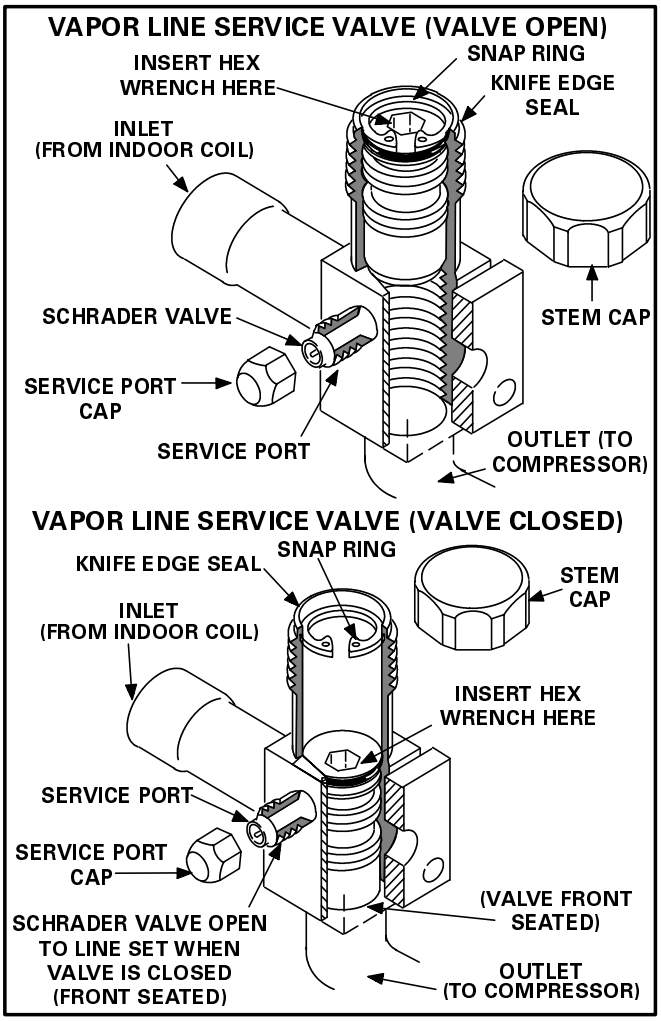


FIGURE 9

⚠ DANGER

Do not attempt to backseat this valve. Attempts to backseat this valve will cause snap ring to explode from valve body under pressure of refrigerant. Personal injury and unit damage will result.

3– Replace stem cap tighten firmly. Tighten finger tight, then tighten an additional 1/6 turn.

To Close Vapor Line Service Valve:

1– Remove stem cap with an adjustable wrench.

2– Using service wrench and 5/16" hex head extension, turn stem clockwise to seat the valve. Tighten firmly.

3– Replace stem cap. Tighten finger tight, then tighten an additional 1/6 turn.

LEAK TESTING

After the line set has been connected to the indoor and outdoor units, the line set connections and indoor unit must be checked for leaks.

⚠ WARNING

Never use oxygen to pressurize refrigeration or air conditioning system. Oxygen will explode on contact with oil and could cause personal injury. When using high pressure gas such as nitrogen or CO_2 for this purpose, be sure to use a regulator that can control the pressure down to 1 or 2 psig.

Using an Electronic Leak Detector or Halide

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

2– Connect the high pressure hose of the manifold gauge set to the service port of the vapor valve. *(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.)*

3– With both manifold valves closed, open the valve on the R22 bottle (vapor only).

4– Open the high pressure side of the manifold to allow R22 into the line set and indoor unit. Weigh in a trace amount of R22. *(A trace amount is a maximum of 2 ounces or 3 pounds pressure.)* Close the valve on the R22 bottle and the valve on the high pressure side of the manifold gauge set. Disconnect R22 bottle.

5– Adjust nitrogen pressure to 150 psig. Open the valve on the high side of the manifold gauge set which will pressurize line set and indoor unit.

6– After a short period of time, open a refrigerant port to make sure the refrigerant added is adequate to be detected. (Amounts of refrigerant will vary with line lengths.) Check all joints for leaks. Purge nitrogen and R22 mixture. Correct any leaks and recheck.

EVACUATING

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 such as water vapor, combine with refrigerant to produce substances that corrode copper piping and compressor parts.

1-- Connect manifold gauge set to the service valve ports as follows: low pressure gauge to vapor line service valve; high pressure gauge to liquid line service valve.

2– Connect the vacuum pump (with vacuum gauge) to the center port of the manifold gauge set.

3– Open both manifold valves and start vacuum pump.

4– Evacuate the line set and indoor unit to an **absolute pressure** of 23mm of mercury or approximately 1 inch of mercury. During the early stages of evacuation, it is desirable to close the manifold gauge valve at least once to determine if there is a rapid rise in **absolute pressure**. A rapid rise in pressure indicates a relatively large leak. If this occurs, the leak testing procedure must be repeated.

*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.*

5– When the absolute pressure reaches 23mm of mercury, close the manifold gauge valves, turn off the vacuum pump and disconnect the manifold gauge center port hose from vacuum pump. Attach the manifold center port hose to a nitrogen cylinder with pressure regulator set to 150 psig and purge the hose. Open the manifold gauge valves to break the vacuum in the line set and indoor unit. Close the manifold gauge valves.

⚠ CAUTION

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.

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

7– 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 5mm of mercury within a 20 minute period after shutting off the vacuum pump and closing the manifold gauge valves.

8– Depending on the equipment used to determine the vacuum level, the following units are equivalent to absolute pressure of 5mm of mercury: 5000 microns; 754 millimeters of mercury vacuum pressure; or 29.7 inches of mercury vacuum pressure.

9– When the absolute pressure requirement above has been met, disconnect the manifold hose from the vacuum pump and connect it to an upright bottle of R22 refrigerant. Open the manifold gauge valves to break the vacuum in the line set and indoor unit. Close manifold gauge valves and shut off R22 bottle and remove manifold gauge set.

START–UP

⚠ IMPORTANT

Crankcase heater should be energized 24 hours before unit start–up to prevent compressor damage as a result of slugging.

1- Rotate fan to check for frozen bearings or binding.

2- Inspect all factory and field-installed wiring for loose connections.

3- Open liquid line and vapor line service valves (counterclockwise) to release refrigerant charge (contained in heat pump unit) into the system.

4- Replace stem caps and secure finger tight, then tighten an additional (1/6) one–sixth of a turn.

5- Check voltage supply at the disconnect switch. The voltage must be within the range listed on the unit nameplate. If not, do not start the equipment until the power company has been consulted and the voltage condition has been corrected.

6- Set the thermostat for a cooling demand, turn on power to indoor blower coil and close heat pump unit disconnect to start unit.

7- Recheck unit voltage with unit running. Power must be within range shown on unit nameplate. Check amperage draw of unit. Refer to unit nameplate for correct running amps.

CHARGING CONSIDERATIONS

The unit is factory charged with the amount of R-22 refrigerant indicated on the unit rating plate. This charge is based on a matching indoor coil and outdoor coil with a 20 foot (6096 mm) line set. For varying lengths of line set, refer to table 2 for refrigerant charge adjustment.

TABLE 2

Liquid Line Set Diameter	Ozs. per 5 ft. (ml per mm) adjust from 20 ft. (6096 mm) line set*
1/4 in. (6mm)	1 ounce per 5 ft. (30ml per 1524 mm)
5/16 in. (8mm)	2 ounce per 5 ft. (60ml per 1524 mm)
3/8 in. (10mm)	3 ounce per 5 ft. (90ml per 1524 mm)

**If line length is greater than 20 feet (6096 mm), add this amount. If line length is less than 20 feet (6096 mm), subtract this amount.*

If the system is void of refrigerant, the recommended and most accurate method of charging is to weigh the refrigerant into the unit according to the total amount shown on the unit nameplate. This may be done after any leaks have been repaired. If weighing facilities are not available or if unit is just low on charge, use one of the procedures outlined.

Charging a heat pump is recommended during warm weather. However, applications arise in which charging must occur in the colder months. *The way the unit is charged depends on the unit's* ***refrigerant metering device*** *and the* ***outdoor ambient temperature****.*

For RFC systems, **weighing in the charge** and **Subcooling** are two acceptable means of charging under certain conditions. For installations of an RFC system where the outdoor ambient is less than 60°F, weighing in the charge is the best method. However, in installations where the outdoor ambient is 60°F or above, subcooling is the best method.

The **Subcooling** and the **Approach** methods are the two recommended procedures for charging the HP23 using an expansion valve system for refrigerant metering. The difference between the two involves the outdoor ambient temperature. For expansion valve systems where the outdoor ambient temperature is 60°F or above, the Approach method must be used. For expansion valve systems where the outdoor ambient temperature is below 60°F, the subcooling method should be used.

Before charging the unit, follow the procedure below to determine: the liquid line temperature and the outdoor ambient temperature.

1– Connect manifold gauge set to service valves: low pressure gauge to vapor valve service port; high pressure gauge to liquid valve service port. Connect the center manifold hose to an upright bottle of R22. Close manifold gauge set valves.

2– Set the room thermostat to call for heat. This will create the necessary load for properly charging the system in the cooling cycle.

3– Fill the thermometer well with mineral oil.

4– Record the outdoor ambient temperature. For greater accuracy, use the same thermometer to measure liquid temperature.

5– When thermostat demand has been satisfied, switch to cooling mode with a set point of 68°F. When pressures have stabilized, place the thermometer in thermometer well and record the liquid line temperature.

6– The outdoor temperature will determine which charging method to use. Proceed with the appropriate charging procedure below.

NOTE–The model number "410" refers to both 411 (single–phase) and 413 (three–phase) units. The same applies for 460 (461/463), 510 (511/513) and 650 (651/653) units.

CHARGING FOR RFC SYSTEMS

Weighing in the Charge Method

RFC Systems, < 60° F Outdoor Temp

1-- Recover the refrigerant from the unit.

2-- Conduct a leak check, then evacuate as previously outlined.

3-- Weigh in the factory charge as shown on the outdoor unit's rating plate.

The Subcooling Method

RFC Systems, ≥ 60° F Outdoor Temp

1-- With the manifold gauge hose still on the liquid service port and the unit operating stably, record the liquid line temperature.

2-- At the same time, record the liquid line pressure reading.

3-- Using a temperature/pressure chart for R22, determine the saturation temperature for the liquid line pressure reading.

4-- Subtract the liquid line temperature from the saturation temperature (according to the chart) to determine subcooling. **(Liquid line temperature -- Saturation temperature = Subcooling)**

5-- Compare the subcooling value with those in table 3. If subcooling is greater than shown, some refrigerant must be recovered. If subcooling is less than shown, some refrigerant must be added.

TABLE 3
SUBCOOLING METHOD–RFCIII Systems

Outdoor Unit	Indoor Unit	Subcooling at Various Ambient Temperatures _F					
		65	75	85	95	105	115
HP23–141	CB/CBH19–21	5	5	4	1	0	0
HP23–211	CB/CBH19–21	13	13	13	12	6	4
HP23–261	CB/CBH19–26	12	12	11	9	7	5
HP23–311	CB/CBH19–31	12	12	10	8	6	4
HP23–410CDN	CB/CBH19–41	13	12	10	8	6	3
HP23–410	CB/CBH19–41	17	15	14	11	8	5
HP23–460	CB/CBH19–41	11	10	7	6	4	2
HP23–510	CB19–51	11	10	8	7	5	2

CHARGING FOR TXV SYSTEMS

The Subcooling Method

TXV Systems, < 60° F Outdoor Temp

Because the outdoor ambient temperature is below 60°F, airflow over the outdoor coil will need to be reduced to drive up the liquid line pressure to a range of 200 – 250 psig. To do this block off the outdoor coil with cardboard or a plastic sheet.

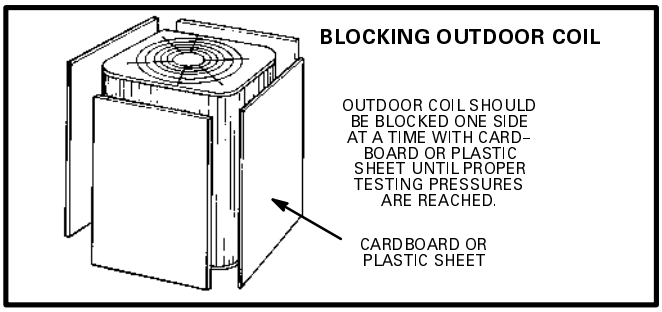


FIGURE 8

1- Remove the cap from the liquid line service valve stem and turn the stem clockwise 1/4 to 1/2 turn. This will open the service port. Exercise caution- the service port is not equipped with a valve core.

2- With the manifold gauge hose still on the liquid service port and the unit operating, read the liquid line pressure.

3- If the pressure is too low, block the airflow through the outdoor coil until the liquid line pressure stabilizes in a range of 200 to 250 psig. At that time, record the liquid line temperature and the liquid line pressure reading.

4- Using a temperature/pressure chart for R22, determine the saturation temperature for the liquid line pressure reading.

5- Subtract the liquid line temperature from the saturation temperature (according to the chart) to determine Subcooling. **(Liquid line temperature – Saturation temperature = Subcooiling)**

6- Compare the Subcooling value with those in table 4. If Subcooling is greater than shown, refrigerant must be reclaimed. If Subcooling is less than shown, refrigerant must be added.

TABLE 4
SUBCOOLING METHOD-TXV Systems

MODEL	SUBCOOLING TEMP. (°F)
HP23-141	4 ± 2
HP23-211	9 ± 2
HP23-261	13 ± 2
HP23-311	9 ± 2
HP23-410	9 ± 2
HP23-410CDN	13 ± 2
HP23-460	8 ± 2
HP23-510	6 ± 2
HP23-650	7 ± 2

The Approach Method

TXV Systems, ≥ 60° F Outdoor Temp

Having taken the outdoor ambient and liquid line temperature readings, subtract the outdoor ambient temperature from the liquid line temperature to determine the Approach temperature. **(Liquid line °F - - Outdoor Ambient °F = Approach temperature)** The resulting difference (Approach temperature) should agree with the values given in table 5. If not, add refrigerant to lower the approach temperature or recover refrigerant from the system to increase the approach temperature.

TABLE 5
APPROACH METHOD

MODEL NO.	APPROACH TEMPERATURE LIQUID LINE ° F - OUTDOOR AMBIENT ° F
HP23-141	6
HP23-211	5
HP23-261	7
HP23-311/410	14
HP23-410CDN	12
HP23-460	11
HP23-510	11
HP23-650	7

Note-For best results, the same thermometer should be used to check both outdoor ambient and liquid temperatures.

SYSTEM OPERATION

Compressor Oil Charge

Refer to Lennox Cooling Service Handbook for correct procedure to check and add compressor oil. Heat pump grade mineral oil (brand and viscosity unspecified) should be used. See table 6.

TABLE 6
COMPRESSOR OIL CHARGE

UNIT MODEL NO.	COMPRESSOR OIL CHARGE (Fluid Ozs.)
HP23--141	14
HP23--211	32
HP23--261	32
HP23--311	32
HP23--410	55
HP23--410CDN	40
HP23--460	55
HP23--510	65
HP23--650	65

Filter Drier

The filter drier is equipped with an internal check valve for correct refrigerant flow. See figure 7. If replacement is necessary, order another of like design and capacity. A strainer in the liquid line gives additional protection.

Crankcase Heater

⚠ IMPORTANT

Crankcase heater (when provided) should be energized before start--up to prevent compressor damage as a result of slugging.

Thermostat Operation

Some heat pump thermostats incorporate isolating contacts and an emergency heat function (which includes an amber indicating light). The thermostat is not included with the unit and must be purchased separately.

Emergency Heat Function

An emergency heat function is designed into some thermostats. This feature is applicable when isolation of outdoor unit is required or when auxiliary electric heat is staged by outdoor thermostats. When the room thermostat is placed in the emergency heat position, the outdoor unit control circuit is isolated from power and field-provided relays bypass the outdoor thermostats. An amber indicating light simultaneously comes on to remind the homeowner that he is operating in the emergency heat mode.

Emergency heat is usually used during a heat pump 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.

Defrost System

The HP23 defrost system includes two components: a defrost thermostat, and a defrost timer.

Defrost Thermostat

The defrost thermostat is mounted on the liquid line between the check valve/drier and the distributor.When defrost thermostat senses 35°F (2°C) or cooler, its contacts close and send a signal to the defrost timer for it to start the timing. It also terminates defrost when the liquid line warms up to 70°F (21°C).

Defrost Timer

This control asks for a defrost every 60 minutes after the defrost thermostat closes. The timer will not allow a defrost to last for more than 14 minutes. The defrost timer can be field adjusted from a 60–minute to a 30– or 90–minute defrost interval if warranted by climatic conditions.

Timed Off Control (International Units ONLY)

Five ton single phase units are factory equipped with a timed off control which provides low voltage protection and prevents compressor short cycling.

High Pressure Switch (International Units ONLY)

The HP23 is factory–equipped with a manual reset high pressure switch which is mounted on a valve core in the line to allow for easy replacement.

MAINTENANCE

At the beginning of each heating or cooling season, the system should be cleaned as follows:

Heat Pump Unit

1- Clean and inspect outdoor coil (may be flushed with a water hose).
2- Outdoor unit fan motor is pre–lubricated and sealed. Always relubricate motor according to the instructions on the motor manufacturer's nameplate.
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 heat pump fan motor.
Unit 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.

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.

Indoor Unit

1- Clean or change filters.
2- Lennox blower motors are pre–lubricated and permanently sealed. No further lubrication is necessary.
3- Adjust blower speed for cooling. The pressure drop over the coil should be checked to determine the correct blower CFM. Refer to the Lennox Cooling Service Handbook for pressure drop tables and procedures.
4- Check all wiring for loose connections.
5- Check for correct voltage at unit.
6- Check amp draw on blower motor.
Motor nameplate_____Actual_____.