installation — operation — maintenance instructions

HP18 SERIES UNITS

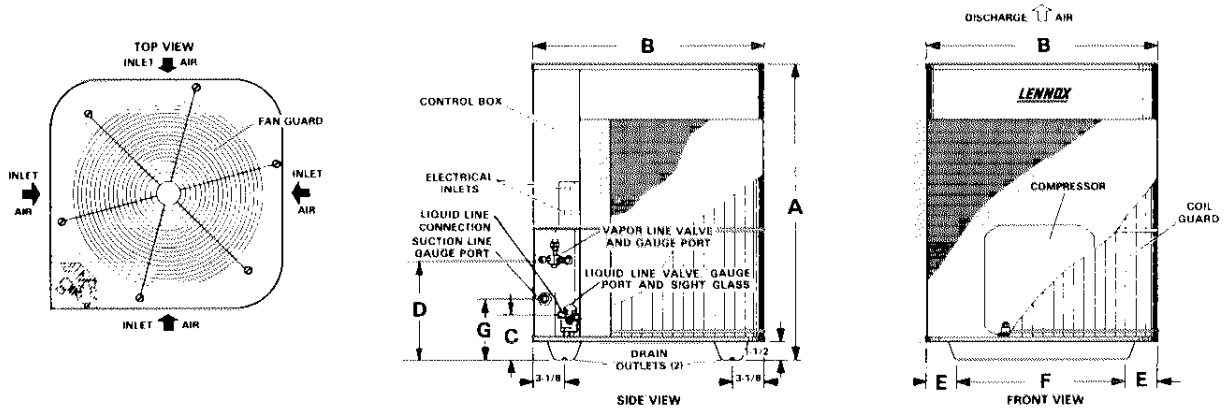
LENNOX Industries Inc.

Litho U.S.A.

1-1/2 through 5 ton HEAT PUMP
501,823M
7/85
Supersedes 7/84

UNIT DIMENSIONS

MODEL NO.	A	B	C	D	E	F	G
HP18-211 HP18-261 HP18-311 HP18-410	28-3/4 in. (730mm)	22-1/4 in. (565mm)	3-5/8 in. (92mm)	7-1/2 in. (191mm)	3-5/8 in. (92mm)	15 in. (381mm)	5-3/4 in. (146mm)
HP18-461 HP18-510	33-9/16 in. (852mm)	28-3/16 in. (716mm)	4-1/2 in. (114mm)	9-5/16 in. (237mm)	4-3/4 in. (121mm)	19-5/16 in. (491mm)	7-3/16 in. (183mm)
HP18-650	33-9/16 in. (852mm)	28-3/16 in. (716mm)	5 in. (127mm)	9-5/16 in. (237mm)	4-3/4 in. (121mm)	19-5/16 in. (491mm)	7-3/16 in. (183mm)



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 _____
Minimum Circuit Ampacity _____
Maximum Fuse Size _____
Electrical Connections Tight? ☐
Supply Voltage (Unit Off) _____

Amps:
Supply _____ Outdoor Fan _____
Compressor _____
Indoor Filter Clean? ☐ Indoor Blower RPM _____
S.P. Drop Over Indoor Coil (Dry) _____
Outdoor Coil Entering Air Temperature _____
Discharge Pressure _____ Suction Pressure _____
Refrigerant Charge Checked? ☐

HEAT PUMP SECTION

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

THERMOSTAT

Calibrated? ☐ Properly Set? [ ] Level? ☐

INSTALLATION

PACKAGE 1 OF 1 CONTAINS
1 - Assembled Unit

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

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

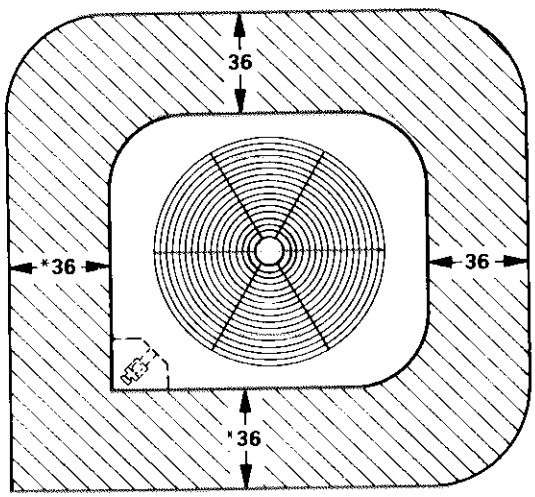
INSTALLATION

HP18 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 the "Lennox Engineering Handbook" for approved systems.

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.

INSTALLATION CLEARANCES



NOTE – 48 inch (1219mm) clearance required on top of unit.
*NOTE – One side must be 36 inches (914mm) for service. Two of the remaining three sides may be 12 inches (305mm)

1 - A sound absorbing material, such as Isomode, should be used under a 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.

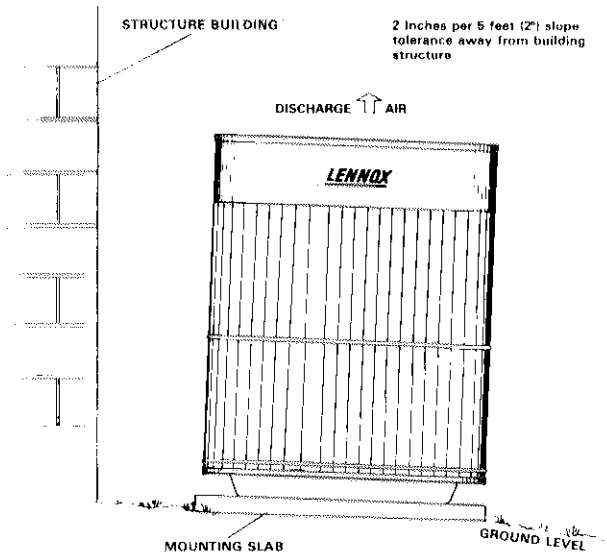
NOTE - Elevation of the unit may be accomplished by constructing a frame using suitable materials. If a support frame is constructed, it must not block drain holes in unit base.

4 - When installed in areas where low ambient temperature exists, unit should be located 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 the unit.

A - Slab Mounting

When installing unit at grade level, top of slab should be high enough above grade so that water from higher ground will not collect around unit. Slab should have a slope tolerance away from building of 2 degrees or 2 inches per 5 feet (51mm per1524mm). This will prevent ice build-up under unit during a defrost cycle. Refer to roof mounting section for barrier construction if unit must face prevailing winter winds.

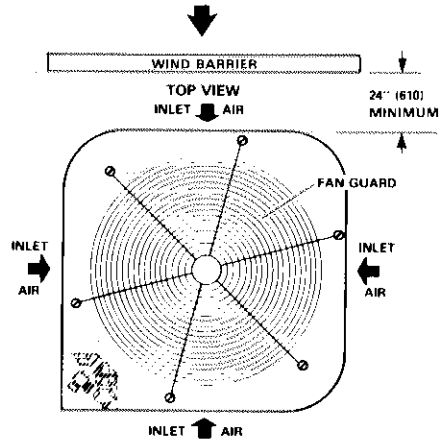


SLAB MOUNTING AT GROUND LEVEL

B - Roof Mounting

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 (610mm) from the sides of unit in the direction of prevailing winds.

DIRECTION OF WINTER PREVAILING WINDS



ROOFTOP APPLICATION

ELECTRICAL

Wiring must conform to the National Electric Code (NEC) and local codes. Application diagrams are included in this instruction and in indoor unit instructions.

Refer to unit rating plate for minimum circuit ampacity and maximum fuse size.

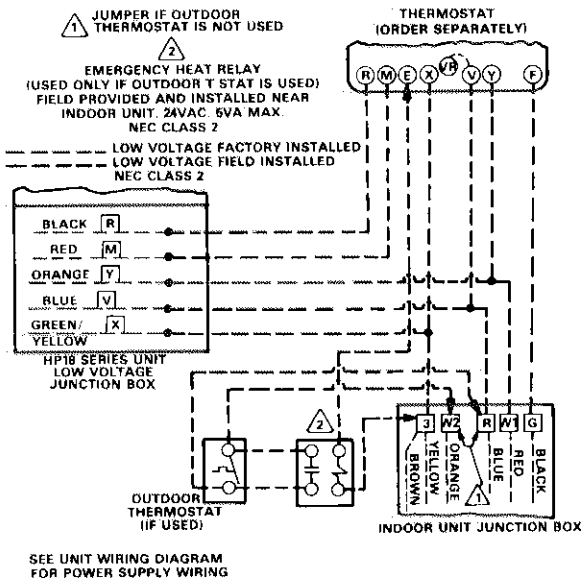
1 - Provide line voltage power supply to unit from a properly sized disconnect switch.

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

3 - Provide low voltage wiring from outdoor to indoor unit and from thermostat to indoor unit as indicated on the field diagram in this instruction.

4 - Ground unit either through supply wiring or with an earth ground.

5 - Mount compressor warning sticker on unit disconnect box.



FIELD WIRING DIAGRAM FOR HP18 SERIES UNIT WITH TYPICAL INDOOR UNIT

527.315W Litho U.S.A.

PLUMBING

Field refrigerant piping consists of liquid and vapor lines from the outdoor unit (sweat connections). Use Lennox L10 series sets as shown in the adjacent table or field fabricated refrigerant lines. Refer to the piping section of the Lennox Unit Information Service manual for proper size, type and application of field fabricated lines.

NOTE - Line length should be no greater than 50 ft. (15.2m). Select line set diameters from the adjacent table to ensure oil return to compressor. Failure to follow these recommendations could result in poor compressor lubrication and will void compressor warranty.

Sweat Connection Procedure

1 - End of refrigerant line must be cut square, round, free from nicks or dents and deburred (I.D. and O.D.).

2 - Wrap a wet cloth around the valve body and copper tube stub; braze the line set tubing to the valve.

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

Piping Connections at Indoor Coil

Piping consists of flare connections to indoor coil.

Expansion Valve Kit

Refer to installation instructions with indoor coil and expansion valve kit.

UNIT	Liquid Line	Vapor Line	L10 Line Sets
HP18-211 HP18-261	5/16 in. (8mm)	5/8 in. (16mm)	L10-21 10 ft. - 50 ft. (3m - 15.2m)
HP18-311 HP18-410	3/8 in. (10mm)	3/4 in. (19mm)	L10-41 20 ft. - 50 ft. (6.1m - 15.2m)
HP18-461 HP18-510	3/8 in. (10mm)	7/8 in. (22mm)	L10-65 30 ft. - 50 ft. (9.1m - 15.2m)
HP18-650	1/2 in. (13mm)	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.

REFRIGERATION

PROCESSING PROCEDURE

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 25 ft. (7620mm) line set. For varying lengths of line set, refer to table for refrigerant charge adjustment. A blank space is provided on the unit rating plate to list actual field charge.

Line Set Dia.		Ounce per foot (ml per mm) adjust from 25 foot (7620 mm) line set*
Vapor	Liquid	
5/8 in. 16 mm	5/16 in. (8 mm)	1/2 ounce (15 ml)
5/8 in. 16 mm	3/8 in. (10 mm)	1 ounce (30 ml)
3/4 in. 19 mm	3/8 in. (10 mm)	1 ounce (30 ml)
7/8 in. 22 mm	3/8 in. (10 mm)	1 ounce (30 ml)
1-1/8 in. 29 mm	1/2 in. (13 mm)	1-3/4 ounce (52 ml)

*If line set length is greater than 25 ft. (7620 mm), add this amount. If line set is less than 25 ft. (7620 mm), subtract this amount.

Service Valves and Gauge Manifold Attachment

The liquid line and vapor line service valves and gauge ports are accessible from outside of the unit (the "one shot" vapor line service valve cannot be closed once it has been opened). These gauge ports are used for leak testing, evacuating, charging and checking charge. A separate gauge port is provided for checking the suction pressure when the unit is in the heating cycle.

IMPORTANT - Service valves are closed to 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.

Leak Testing

1 - Attach gauge manifold and connect a drum of dry nitrogen to center port of gauge manifold.
CAUTION - When using dry nitrogen, a pressure reducing regulator must be used to prevent excessive pressure in gauge manifold, connecting hoses, and within the system. Regulator setting must not exceed 150 psig (1034 kPa).
2 - Open high pressure valve on gauge manifold and pressurize line set and indoor coil to 150 psig (1034 kPa).
3 - Check lines and connections for leaks.
NOTE - If electronic leak collector is used, add a trace of refrigerant to the nitrogen for detection by the leak detector.
4 - Release nitrogen pressure from the system, correct any leaks and recheck.

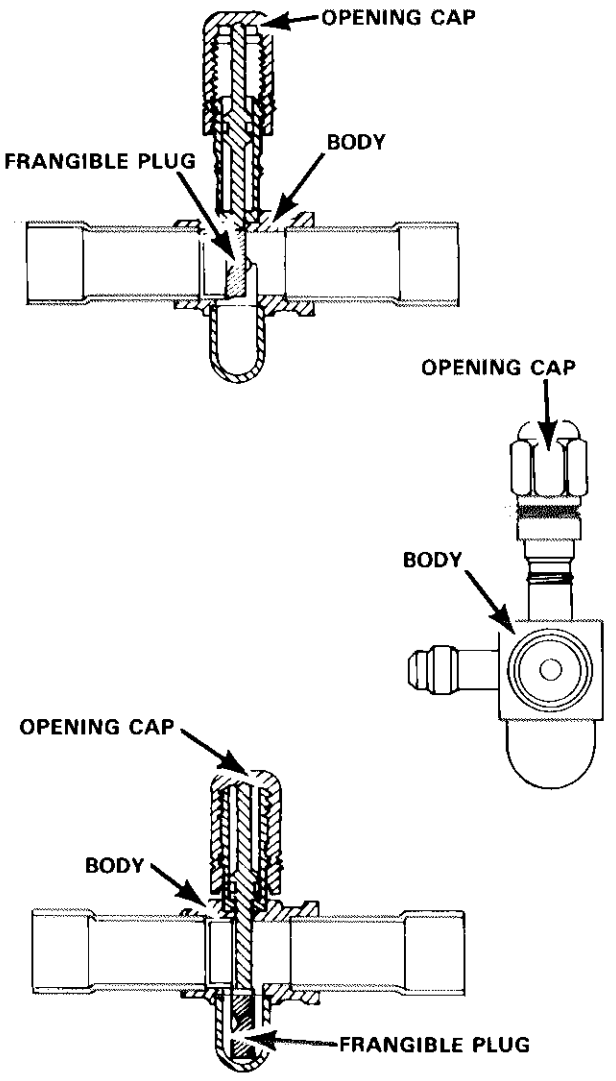
Evacuating the System

1 - Attach gauge manifold as shown in Figure 1, "Gauge Manifold Connections." Connect vacuum pump (with vacuum gauge) to center port of gauge manifold. With both manifold service valves open, start pump and evacuate indoor coil and refrigerant lines.
NOTE - A temperature vacuum gauge, mercury vacuum (u tube), or thermocouple gauge should be used. The usual Bourdon tube gauges are not accurate enough in the vacuum range.
2 - Evacuate the system to 29 inches (737 mm) vacuum. During the early stages of evacuation, it is desirable to stop the vacuum pump at least once to determine if there is a rapid loss of vacuum. A rapid loss of vacuum would indicate a leak in the system and a repeat of "Leak Testing" would be necessary.
3 - After system has been evacuated to 29 inches (737 mm), close gauge manifold valves to center port, stop vacuum pump and disconnect from gauge manifold. Attach an upright nitrogen drum to center port of gauge manifold and open drum valve slightly to purge line at manifold. Break vacuum in system with nitrogen pressure by opening manifold high pressure valve. Close manifold high pressure valve to center port.
4 - Close nitrogen drum valve and disconnect from gauge manifold center port. Release nitrogen pressure from system.
5 - Reconnect vacuum pump to gauge manifold center port. Evacuate system through manifold service valves until vacuum in system does not rise above 29.7 inches (754 mm) mercury (5 mm absolute pressure) within a 20-minute period after stopping vacuum pump.
6 - After evacuation is completed, close manifold service valves, disconnect vacuum pump from gauge manifold center port, and connect refrigerant drum. Pressurize system slightly with refrigerant to break vacuum.

START-UP

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 to release refrigerant charge (contained in heat pump unit) into the system.
4 - To open vapor valve, tighten the opening cap (longest) until a bottoming is felt (nut will be within 1/8 inch [3 mm] or less of the body). Tighten an additional 1/4 turn to make the metal to metal seal.
NOTE - When tightening, the torque will increase, then drop off as the frangible plug shears.

REFRIGERATION



VAPOR VALVE ASSEMBLY

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

6 - Set the thermostat for a cooling demand, turn on power to indoor coil blower 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

It is desirable to charge the system in the cooling cycle if weather conditions permit. However, if the unit must be charged in the heating season, one of the following procedures must be followed to ensure proper system charge.

If the system is completely 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. Refer to the "Lennox Service Manual" for procedure.

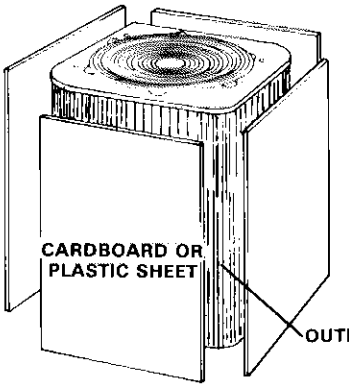
If weighing facilities are not available or if unit is just low on charge, use the following procedure:

1 - Connect gauge manifold as shown on Page 6 "Gauge Manifold Connections." Connect an upright R-22 drum to center port of gauge manifold.

2 - Set room thermostat to 74°F (23°C) in "EMERGENCY HEAT" or "HEAT" position and allow unit to run until heating demand is satisfied. This will create the necessary load for proper charging of system in cooling cycle. Change thermostat setting to 68°F (20°C) in "COOL" position. Allow unit to run until system pressures stabilize.

3 - To ensure proper system charge, it is necessary to maintain liquid line pressures in a range from 240 psig (1655 kPa) and 270 psig (1862 kPa). In order to obtain this pressure range, block off outdoor coil using a sheet of plastic or cardboard as shown in illustration below. If vapor bubbles are present in sight glass, slowly add refrigerant through suction port until sight glass clears. System charge should be correct. This procedure must be followed to prevent overcharging of system.

BLOCKING OUTDOOR COIL



OUTDOOR COIL SHOULD BE BLOCKED ONE SIDE AT A TIME WITH CARDBOARD OR PLASTIC SHEET UNTIL PROPER TESTING PRESSURES ARE REACHED.

4 - When charging procedure has been completed, close valve on refrigerant container. Switch thermostat to HEATing position and double check pressures using charging curves. Vapor bubbles might be present in sight glass at low ambients.

5 - Charge should be rechecked in cooling season.

CHECKING CHARGE

Refrigerant charge is checked by use of "charging curves" mounted in each unit. Both cooling and heating cycle curves are provided.

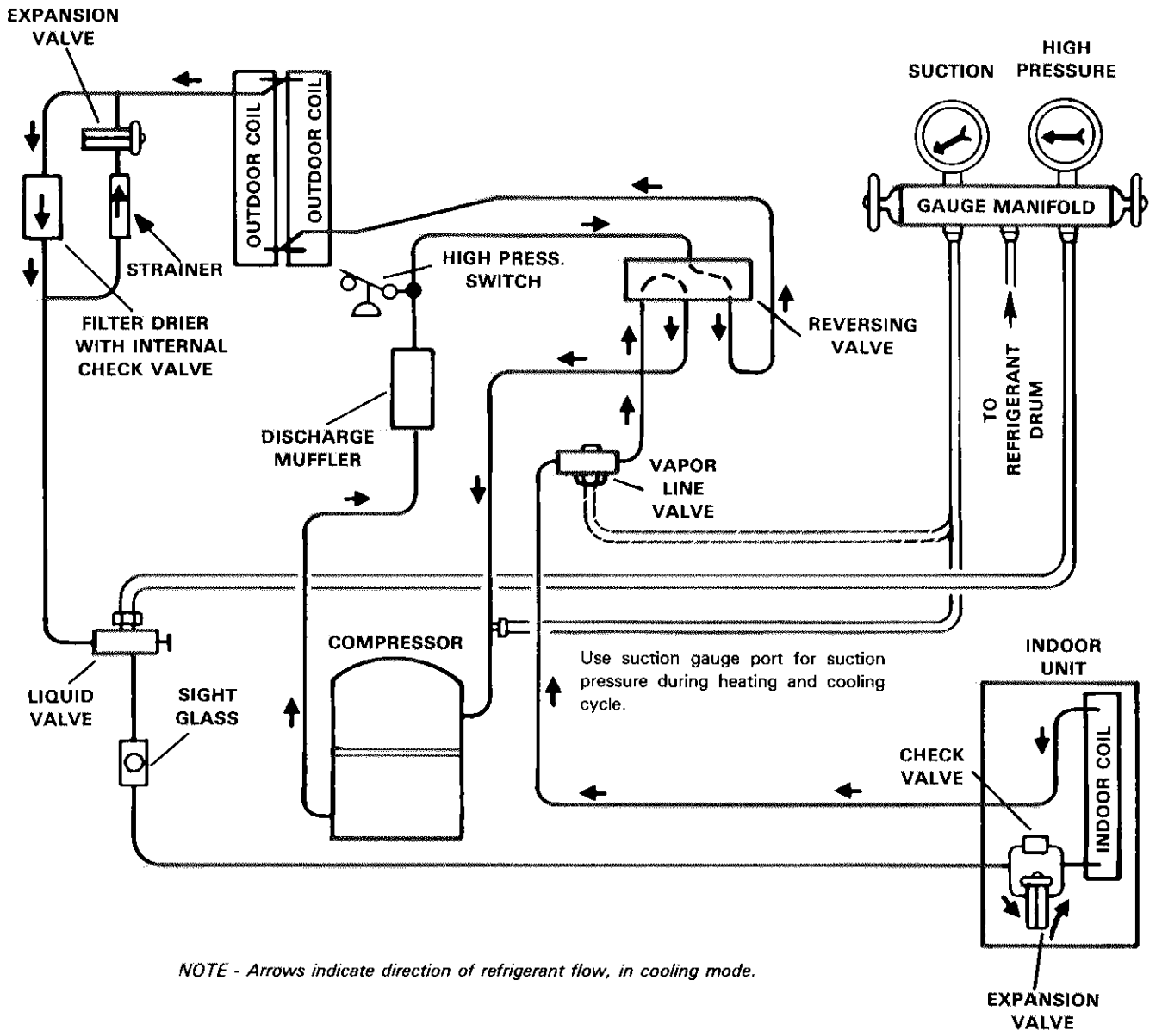
Gauge readings within the white area of these charging curves indicate a properly charged unit.

When system is operating properly, make sure all service valves are open and disconnect gauge manifold. Replace all gauge port caps and tighten. Set thermostat (ordered separately) at desired setting.

COMPRESSOR OIL CHARGE

Refer to "Lennox Cooling Service Handbook" for correct procedure to check and add compressor oil.

Use gauge ports on vapor line valve and liquid valve for evacuating refrigerant lines and indoor coil.



NOTE - Arrows indicate direction of refrigerant flow, in cooling mode.

HP18 COOLING CYCLE (SHOWING GAUGE MANIFOLD CONNECTIONS)

OPERATION

HIGH PRESSURE SWITCH

All units are equipped with a high pressure switch (manual reset type) mounted on the compressor discharge line. This switch has a "cut-out" point of 410 psig (2827 kPa) and must be manually reset when discharge pressure drops below 180 psig (1241 kPa).

CRANKCASE HEATER

IMPORTANT - All units are provided with a crankcase heater which should be energized 24 hours before unit start-up. This heater must always be energized before start-up to prevent compressor damage as a result of slugging.

FILTER DRIER

The drier is equipped with an internal check valve for correct refrigerant flow. (Refer to figure on page 6.) If replacement is necessary, order another of like design and capacity. A strainer in the liquid line gives additional protection.

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 (Amber Light)

An emergency heat function is designed into some thermostats. This feature is applicable to systems using auxiliary electric heat staged by outdoor thermostats. When the thermostat is placed in the emergency heat position, the outdoor unit control circuit is isolated from power and field-provided relays by-pass 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 over an hour and the outdoor temperature is below 50°F (10°C). System should be left in emergency heat mode at least 6 hours to allow the crankcase heater sufficient time to prevent compressor slugging.

DEFROST THERMOSTAT

A defrost thermostat is mounted on the liquid line between the expansion valve and the distributor. The unit will not defrost unless this thermostat senses the liquid line to be 35°F (2°C) or colder. It also terminates defrost when the liquid line warms up to 60°F (16°C).

DEFROST TIMER

This control asks for a defrost every 90 minutes and if the defrost thermostat is below 35°F (2°C) the unit will defrost. The timer will not allow a defrost to last for more than 10 minutes. The defrost timer can be field adjusted from a 90-minute to a 45-minute defrost interval if warranted by climatic conditions.

MAINTENANCE

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

HEAT PUMP UNIT

1 - Clean and inspect condenser coil. (May be flushed with a water hose.)
2 - Condenser fan motor is prelubricated 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 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 - Lubricate blower motor:
Always relubricate motor according to manufacturer's lubrication instructions on motor. If no instructions are provided, use the following as a guide:
a - Motors Without Oiling Ports - Prelubricated and sealed. No further lubrication required.
b - Direct Drive Motors With Oiling Ports - Prelubricated for an extended period of operation. For extended bearing life, relubricate with a few drops of SAE No. 10 non-detergent oil once every two years. It may be necessary to remove blower assembly for access to oiling ports.
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 _____