10HPB SERIES UNITS

The 10HPB is a residential split-system heat pump available in sizes ranging from 1 1/2 through 5 ton capacities. Outdoor coil size, circuiting and air volume result in a minimum SEER rating of 10.0. All 10HPB units are designed for use with thermal expansion valves.

10HPB units are equipped with either a scroll or reciprocating compressor. All compressors are hermetically sealed for long service life. The compressor is installed in the unit on resilient rubber mounts to assure quiet, vibration-free operation. A built-in limit protects the compressor from excessive current and temperature. The scroll compressor operates much like a standard heat pump, but is unique in the way that it compresses refrigerant. Reciprocating compressors components are spring-mounted within the sealed housing. 10HPB-1 through -6 models are furnished with crankcase heaters. The heater prevents liquid from accumulating in the compressor. The heater is temperature-actuated and operates only when required.

This manual is divided into sections which discuss major components, refrigerant system, charging procedures, maintenance, and operation sequence.

All specifications in this manual are subject to change.

⚠WARNING

Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or loss of life. Installation and service must be performed by a qualified installer or service agency.

⚠ 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.

⚠WARNING

Electric shock hazard. Can cause injury or death. Before attempting to perform any service or maintenance, turn the electrical power to unit OFF at disconnect switch(es). Unit may have multiple power supplies.

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SPECIFICATION -1 through -6 Models

Model No.			10HPB18	10HPB24	10HPB30
Outdoor Coil	Net face area - sq. ft. (m^2)	Outer coil	11.41 (1.06)	11.41 (1.06)	13.31 (1.24)
		Inner coil	- - - -	- - - -	- - - -
	Tube diameter — in. (mm) & no. of rows		5/16 (7.9) — 1	5/16 (7.9) — 1	5/16 (7.9) — 1
	Fins per inch (m)		22 (866)	22 (866)	22 (866)
Outdoor Coil Fan	Diameter — in. (mm) & no. of blades		18 (457) — 3	18 (457) — 3	18 (457) — 4
	Motor hp (W)		1/6 (124)	1/6 (124)	1/6 (124)
	Cfm (L/s)		2400 (1135)	2400 (1135)	2500 (1180)
	Rpm		1105	1105	1100
	Watts		180	180	200
*Refrigerant charge furnished (HCFC-22)			4 lbs. 5 oz. (1.96 kg)	4 lbs. 4 oz. (1.96 kg)	5 lbs. (2.26 kg)
Liquid line — in. (mm) o.d. connection (sweat)			5/16 (8)	5/16 (8)	5/16 (8)
Vapor line — in. (mm) o.d. connection (sweat)			5/8 (15.9)	5/8 (15.9)	3/4 (19.1)
Shipping weight — lbs. (kg) 1 package			152 (69)	152 (69)	164 (74)

*Refrigerant charge sufficient for 20 ft. (6.0 m) length of refrigerant lines.

SPECIFICATIONS -1 through -6 Models

Model No.			10HPB36	10HPB42	10HPB48	10HPB60
Outdoor Coil	Net face area - sq. ft. (m^2)	Outer coil	15.21 (1.41)	15.21 (1.41)	15.21 (1.41)	15.21 (1.41)
		Inner coil	- - - -	5.44 (0.51)	5.44 (0.51)	14.50 (13.5)
	Tube diameter — in. (mm) & no. of rows		5/16 (7.9) — 1	5/16 (7.9) — 1.37	5/16 (7.9) — 1.37	5/16 (7.9) — 2
	Fins per inch (m)		22 (866)	22 (866)	22 (866)	22 (866)
Outdoor Coil Fan	Diameter — in. (mm) & no. of blades		18 (457) — 4	18 (457) — 4	18 (457) — 4	18 (457) — 4
	Motor hp (W)		1/6 (124)	1/6 (124)	1/3 (249)	1/3 (249)
	Cfm (L/s)		2520 (1190)	2500 (1180)	2950 (1390)	2930 (1385)
	Rpm		1100	1100	1100	1100
	Watts		200	200	310	310
*Refrigerant charge furnished (HCFC-22)			6 lbs. 3 oz. (2.81 kg)	7 lbs. 13 oz. (3.54 kg)	7 lbs. 1 oz. (3.20 kg)	9 lbs. 0 oz. (4.08 kg)
Liquid line — in. (mm) o.d. connection (sweat)			3/8 (9.5)	3/8 (9.5)	3/8 (9.5)	3/8 (9.5)
Vapor line — in. (mm) o.d. connection (sweat)			3/4 (19.1)	7/8 (22.2)	7/8 (22.2)	1-1/8 (28.6)
Shipping weight — lbs. (kg) 1 package			174 (79)	199 (90)	206 (93)	221 (100)

*Refrigerant charge sufficient for 20 ft. (6.0 m) length of refrigerant lines.

ELECTRICAL DATA -1 through -6 Models

Model No.		10HPB18	10HPB24	10HPB30	10HPB36	10HPB42	10HPB48	10HPB60
Line voltage data — 60 hz		208/230v 1ph	208/230v 1ph	208/230v 1ph	208/230v 1ph	208/230v 1ph	208/230v 1ph	208/230v 1ph
Compressor	Rated load amps	8.6	10.1	11.8	17.5	17.5	23.4	26.9
	Power factor	.97	.96	.92	.90	.98	.98	.98
	Locked rotor amps	49.0	60.0	69.4	92.0	92.0	110.0	123.0
Outdoor Coil Fan Motor	Full load amps	1.1	1.1	1.1	1.1	1.1	1.9	1.9
	Locked rotor amps	1.9	1.9	1.9	1.9	1.9	4.1	4.1
Rec. maximum fuse or circuit breaker size (amps)		20	20	30	35	40	50	60
*Minimum circuit ampacity		11.9	13.5	18.4	21.4	23.0	31.2	35.5

*Refer to National or Canadian Electrical Code manual to determine wire, fuse and disconnect size requirements.
NOTE — Extremes of operating range are plus 10% and minus 5% of line voltage.

SPECIFICATIONS -7 and -8 Models

Model No.		10HPB18	10HPB24	10HPB30
Outdoor Coil	Net face area - sq. ft. (m^2)	11.41 (1.06)		13.31 (1.24)
	Tube diameter - in. (mm) & no. of rows	5/16 (7.9) — 1		
	Fins per inch (m)	22 (866)		18 (709)
Outdoor Coil Fan	Diameter — in. (mm) & no. of blades	18 (457) — 3		18 (457) — 4
	Motor hp	1/6 (124)		
	Cfm (L/s)	2400 (1135)		2500 (1180)
	Rpm	1105		1100
	Watts	180		200
[1]Refrigerant charge furnished (HCFC-22)		4 lbs. 2 oz. (1.86 kg)	4 lbs. 2 oz. (1.836kg)	4 lbs. 12 oz. (2.15 kg)
Liquid line — in. (mm) o.d. connection (sweat)		[2]3/8 (9.5)		
Vapor line — in. (mm) o.d. connection (sweat)		5/8 (15.9)		3/4 (19.1)
Shipping weight — lbs. (kg) 1 package		152 (69)		139 (63)
OPTIONAL ACCESSORIES - Must Be Ordered Extra				
Outdoor Thermostat Kit	Thermostat Kit	**56A87**		
	Mounting Box	M-1595 (**31461**) or BM-10260 (**33A09**) (Canada Only)		
Low Ambient Kit		LB-57113BM (**27J00**)		
Crankcase Heater		Furnished		**59E07**
Unit Stand Off Kit		**94J45**		
Mounting Base		MS2-S (**69J06**)		
Hail Guards		**17L71**		**17L72**
Monitor Kit (Canada Only)		LB-52359CA (**76F53**)		
Compressor Monitor (Canada Only)		T6-1469 (**45F08**)		

[1]Refrigerant charge sufficient for 15 ft. (4.5 m) length of refrigerant lines.
[2]3/8 x 5/16 in. (9.5 x 7.9 mm) adaptor furnished for liquid line connection.

SPECIFICATIONS -7 and -8 Models

Model No.			10HPB36	10HPB42	10HPB48	10HPB60
Outdoor Coil	Net face area - sq. ft. (m^2)	Outer coil	15.21 (1.41)			
		Inner coil	5.44 (0.51)	14.50 (13.5)		
	Tube diameter — in. (mm) & no. of rows		5/16 (7.9) — 1.37			5/16 (7.9) — 2
	Fins per inch (m)		22 (866)	18 (709)		22 (866)
Outdoor Coil Fan	Diameter — in. (mm) & no. of blades		18 (457) — 4			
	Motor hp		1/6 (124)		1/3 (249)	
	Cfm (L/s)		2500 (1180)		2950 (1390)	2930 (1385)
	Rpm		1100			
	Watts		200		310	
[1]Refrigerant charge furnished (HCFC-22)			6 lbs. 5 oz. (2.40kg)	7 lbs. 11 oz. (3.48 kg)	8 lbs. 4 oz. (3.73 kg)	8 lbs. 13 oz. (3.98kg)
Liquid line — in. (mm) o.d. connection (sweat)			3/8 (9.5)			
Vapor line — in. (mm) o.d. connection (sweat)			3/4 (19.1)	7/8 (22.2)		1-1/8 (28.6)
Shipping weight — lbs. (kg) 1 package			153 (69)	174 (79)	178(81)	221 (100)
OPTIONAL ACCESSORIES - Must Be Ordered Extra						
Outdoor Thermostat Kit	Thermostat Kit		**56A87**			
	Mounting Box		M-1595 (**31461**) or BM-10260 (**33A09**) (Canada Only)			
Low Ambient Kit			LB-57113BM (**27J00**)			
Crankcase Heater			**59E07**			
Unit Stand Off Kit			**94J45**			
Mounting Base			MS2-S (**69J06**)			
Hail Guards			**17L73**			
Monitor Kit (Canada Only)			LB-52359CA (**76F53**)			
Compressor Monitor (Canada Only)			T6-1469 (**45F08**)			

[1]Refrigerant charge sufficient for 15 ft. (4.5 m) length of refrigerant lines.

ELECTRICAL DATA -7 and -8 Models

Model No.		10HPB18	10HPB24	10HPB30	10HPB36	10HPB42	10HPB48	10HPB60
Line voltage data — 60 hz		208/230v - 1 phase						
Compressor	Rated load amps	7.9	10.1	14.7	16.0	19.3	23.7	32.1
	Power factor	.97	.96	.94	.93	.86	.89	.98
	Locked rotor amps	48.3	60.0	84.0	100.0	127.0	129.0	169.0
Outdoor Coil Fan Motor	Full load amps	1.1	1.1	1.1	1.1	1.1	1.9	1.9
	Locked rotor amps	1.9	1.9	1.9	1.9	1.9	4.1	4.1
Rec. maximum fuse or circuit breaker size (amps)		15	20	30	35	40	50	60
†Minimum circuit ampacity		11.0	15.7	19.5	21.1	27.0	31.5	35.5

†Refer to National or Canadian Electrical Code manual to determine wire, fuse and disconnect size requirements.
NOTE — Extremes of operating range are plus 10% and minus 5% of line voltage.

I - UNIT INFORMATION

All 10HPB major components (indoor blower and coil) must be matched according to Lennox recommendations for the compressor to be covered under warranty. Refer to the Engineering Handbook for approved system matchups. A misapplied system will cause erratic operation and can result in early compressor failure.

II - UNIT COMPONENTS

Unit components are illustrated in figure 1.

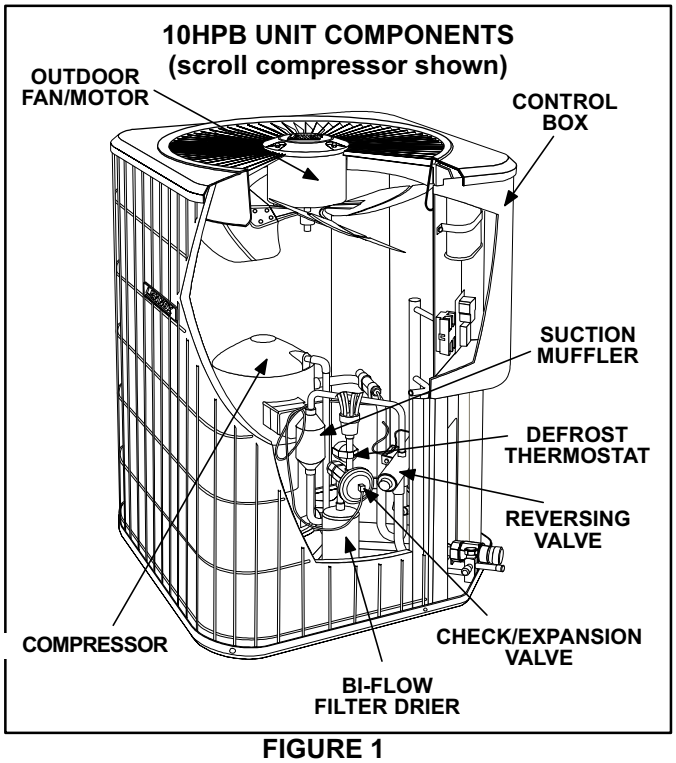


FIGURE 1

A - Control Box (Figure 3)

Electrical openings are provided under the control box cover. Field thermostat wiring is made to color-coded pigtail connections as illustrated in figure 2.

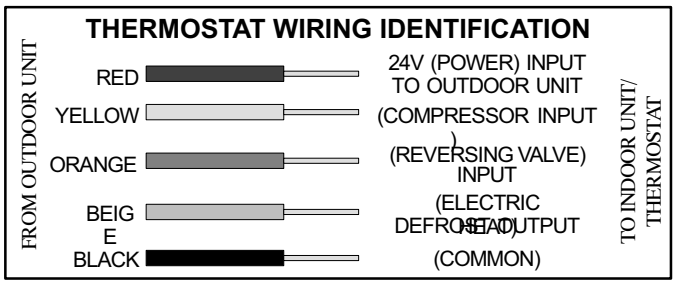


FIGURE 2

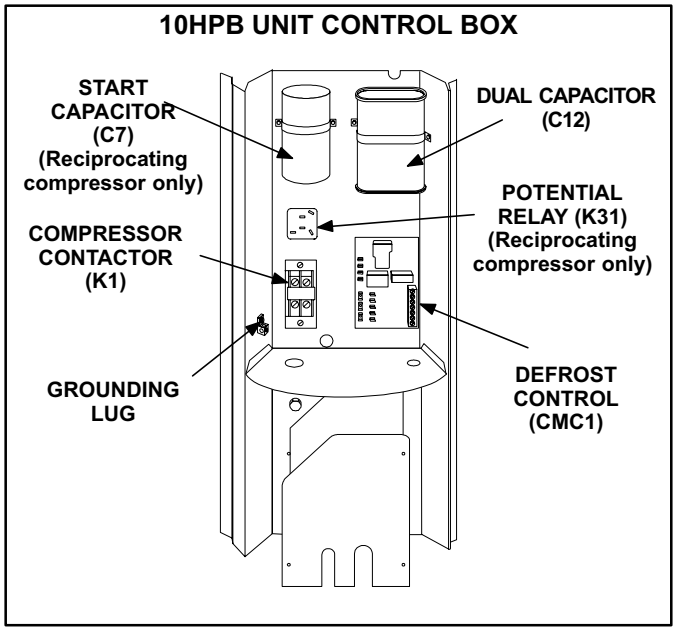


FIGURE 3

1 - Dual Capacitor C12

The compressor and fan in all 10HPB series units use permanent split capacitor motors. The capacitor is located inside the unit control box (see figure 3). A single "dual" capacitor (C12) is used for both the fan motor and the compressor (see unit wiring diagram). The fan side and the compressor side of the capacitor have different MFD ratings. Capacitor ratings may change with compressor.

2 - Compressor Contactor K1

The compressor is energized by a contactor located in the control box. See figure 3. Single-pole and two-pole contactors are used 10HPB units. See wiring diagrams for specific unit. K1 is energized by the indoor thermostat terminal Y1 (24V). 10HPB units are not equipped with a 24V transformer. All 24 VAC controls are powered by the indoor unit. Refer to unit wiring diagram.

⚠ DANGER

Electric Shock Hazard.
May cause injury or death.

Disconnect all remote electrical power supplies berore opening unit panel. Unit may have multiple power supplies.

Some units are equipped with single-pole contactors. When unit is equipped with a single-pole contactor, line voltage is present at all components (even when unit is not in operation).

3 - Potential Relay K31 (Start)

All single-phase units with a reciprocating compressor use a potential relay which controls the operation of the starting circuit. The potential relay is located inside the unit control box (see figure 3). The relay is normally closed when contactor K1 is de-energized. When K1 energizes, the compressor immediately begins start-up. K31 remains closed during compressor start-up and start capacitor C7 remains in the circuit. When the compressor reaches 75% of its speed, K31 is energized. When K31 energizes, the contacts open and start capacitor C7 is taken out of the circuit.

4 - Start Capacitor C7

All 10HPB series units equipped with a reciprocating compressor use a start capacitor. C7 is located inside the unit control box (see figure 3). C7 is wired in parallel with the compressor side of the dual capacitor. Start capacitor ratings may change with each compressor change out.

5 - Defrost System

Units built prior to April 2002

The 10HPB defrost system includes two components: a defrost thermostat and a defrost control.

a - Defrost Thermostat S6

The defrost thermostat is mounted on the liquid line

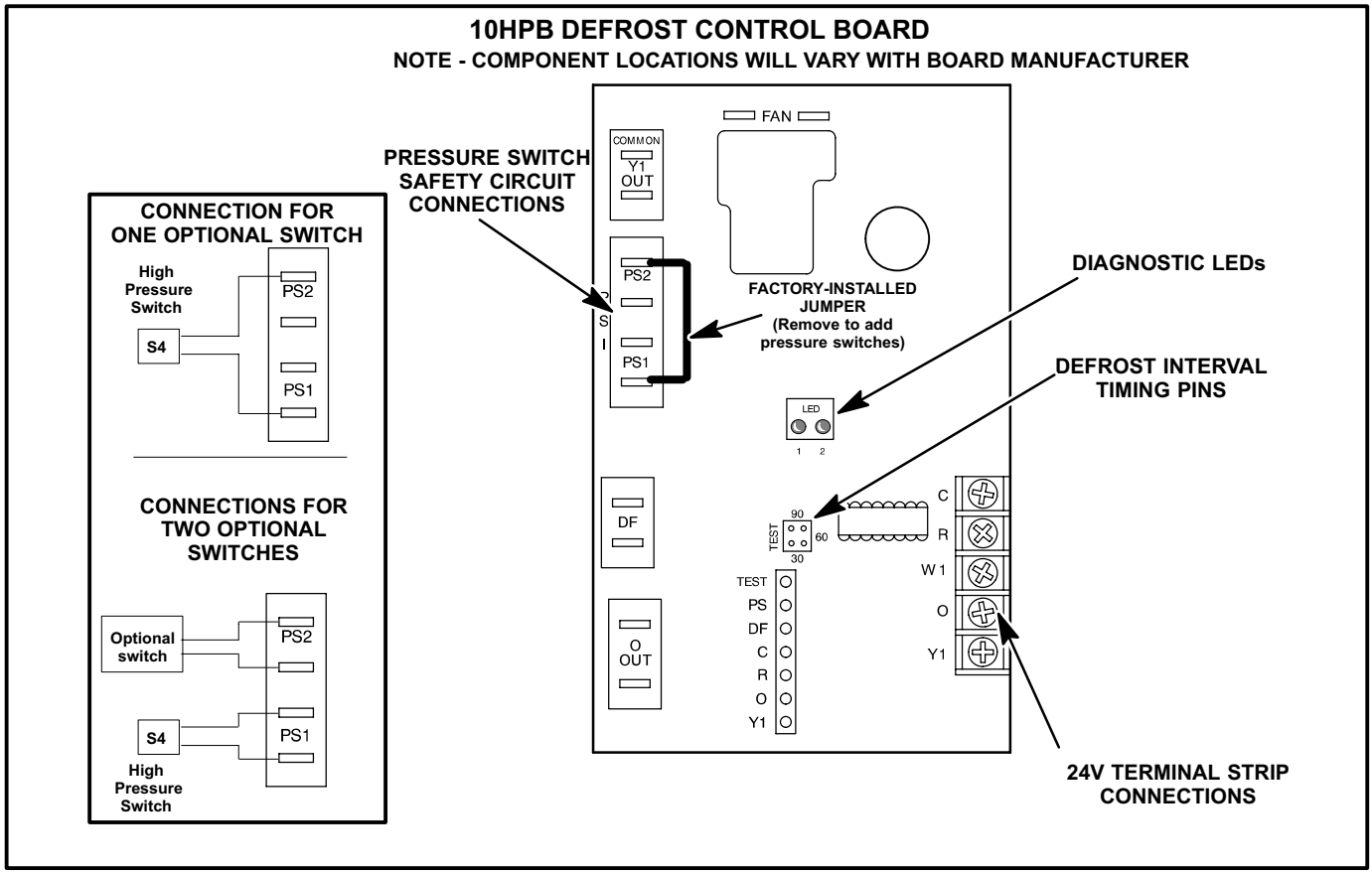


FIGURE 4

TABLE 1

DEFROST CONTROL BOARD DIAGNOSTIC LED		
MODE	**LED 1**	**LED 2**
Normal Operation/ Power to board	Flash together with LED 2	Flash together with LED 1
Pressure Switch Open	Off	On
Board Malfunction	On	On

6 - Defrost System

Units built April 2002 and later

The 10HPB defrost system includes two components: a defrost thermostat and a defrost control.

Defrost Thermostat

The defrost thermostat is located on the liquid line between the check/expansion valve and the distributor. When defrost thermostat senses 42°F (5.5°C) or coolerPunc Tw34.3859 FTp0.0171 Tc43.3519 Tw(ther24st)1rostac2.7(at 8 3

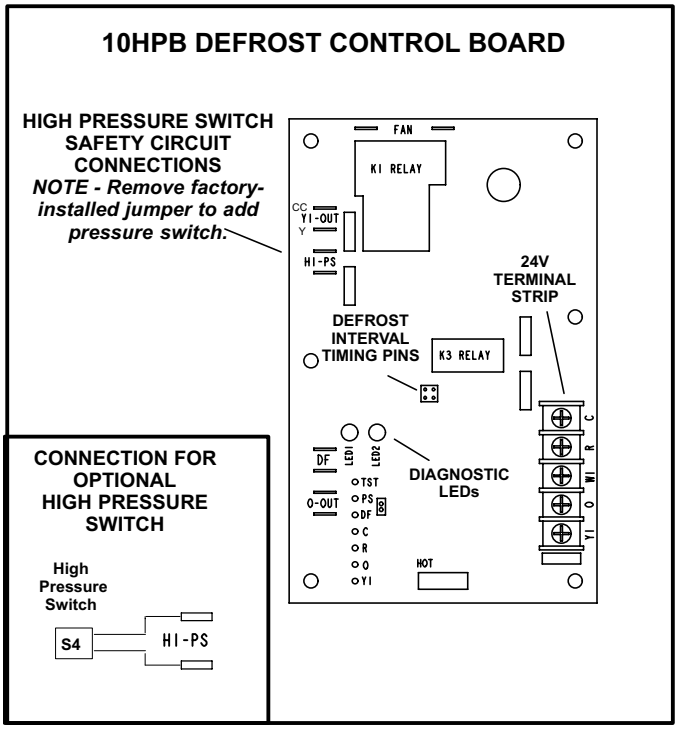


FIGURE 5

Defrost Control Timing Pins

Each timing pin selection provides a different accumulated compressor run time period during one thermostat run cycle. This time period must occur before a defrost cycle is initiated. The defrost interval can be adjusted to 30 (T1), 60 (T2), or 90 (T3) minutes. See figure 5. The defrost timing jumper is factory-installed to provide a 60-minute defrost interval. If the timing selector jumper is not in place, the control defaults to a 90-minute defrost interval.The maximum defrost period is 14 minutes and cannot be adjusted.

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.

Pressure Switch Circuit

The defrost control incorporates a pressure switch circuit that allows the application of an optional high pressure switch. See figure 5. During a demand cycle, the defrost control will lock out the unit if the optional high pressure switch opens. The diagnostic LEDs will display a pattern for an open high pressure switch. See table 2. The unit will remain locked out until the switch resets or is reset.

Remove the factory-installed jumper before connecting the optional high pressure switch to the control board.

NOTE - If not using a pressure switch, the factory-installed jumper wire must be connected.

Diagnostic LEDs

The defrost board uses two LEDs for diagnostics. The LEDs flash a specific sequence according to the condition.

TABLE 2

DEFROST CONTROL BOARD DIAGNOSTIC LED		
MODE	**LED 1**	**LED 2**
Normal operation / power to board	Synchronized Flash with LED 2	Synchronized Flash with LED 1
Board failure or no power	Off	Off
Board failure	On	On
High pressure switch open	Flash	On
Pressure switch lockout*	On	Off
Anti-short-cycle / 5-minute delay*	Alternating Flash with LED 2	Alternating Flash with LED 1

7 - Crankcase Heater

A crankcase heater is used on all 10HPB -1 through -6 model units. The well-mounted insertion-type heater is self-regulating. See table 3 for crankcase heater specifications.

TABLE 3

10HPB CRANKCASE HEATER RATINGS	
Unit	**Rating (Watts)**
10HPB18/24/30/36	40 watts
10HPB42/48/60	27 watts

B - Compressor

All 10HPB -1 through -6 model units and 1 1/2 and 2 ton -7 and -8 model units utilize a conventional reciprocating compressor. See Electrical Data section in this manual for specifications.

All 10HPB 2 1/2 through 5 ton -7 and -8 model units utilize a scroll compressor. The scroll compressor design is simple, efficient and requires few moving parts. A cutaway diagram of the scroll compressor is shown in figure 6. The scrolls are located in the top of the compressor can and the motor is located just below. The oil level is immediately below the motor.

The scroll is a simple compression concept centered around the unique spiral shape of the scroll and its inherent properties. Figure 7 shows the basic scroll form. Two identical scrolls are mated together forming concentric spiral shapes (figure 8). One scroll remains stationary, while the other is allowed to "orbit" (figure 9). Note that the orbiting scroll does not rotate or turn but merely orbits the stationary scroll.

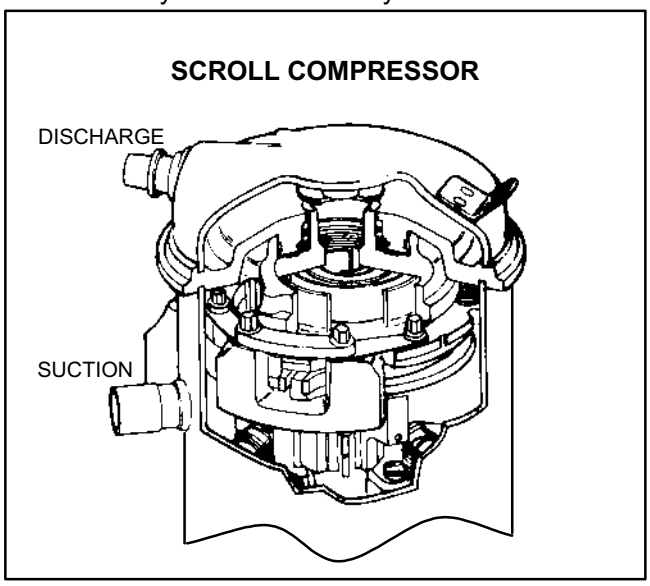


FIGURE 6

NOTE - During operation, the head of a scroll compressor may be hot since it is in constant contact with discharge gas.

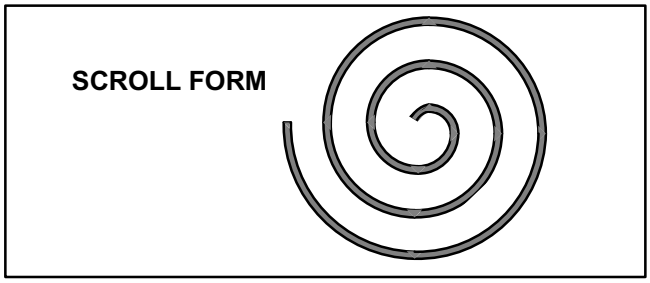


FIGURE 7

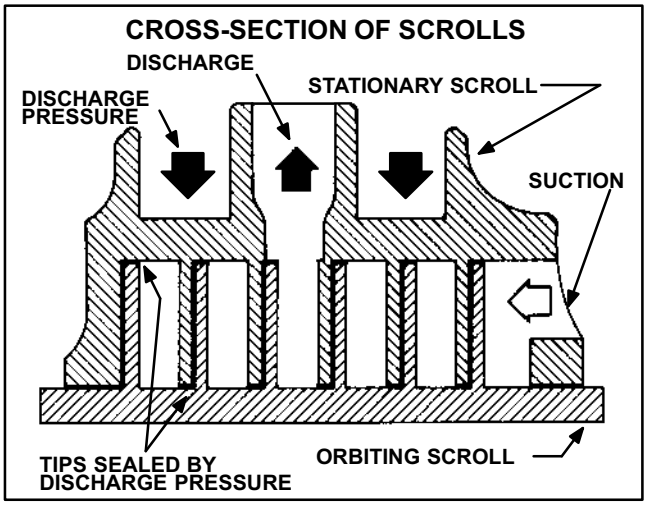


FIGURE 8

The counterclockwise orbiting scroll draws gas into the outer crescent shaped gas pocket created by the two scrolls (figure 9 - 1). The centrifugal action of the orbiting scroll seals off the flanks of the scrolls (figure 9 - 2). As the orbiting motion continues, the gas is forced toward the center of the scroll and the gas pocket becomes compressed (figure 9 - 3). When the compressed gas reaches the center, it is discharged vertically into a chamber and discharge port in the top of the compressor (figure 8). The discharge pressure forcing down on the top scroll helps seal off the upper and lower edges (tips) of the scrolls (figure 8). During a single orbit, several pockets of gas are compressed simultaneously providing smooth continuous compression.

The scroll compressor is tolerant to the effects of liquid return. If liquid enters the scrolls, the orbiting scroll is allowed to separate from the stationary scroll. The liquid is worked toward the center of the scroll and is discharged. If the compressor is replaced, conventional Lennox cleanup practices must be used.

Due to its efficiency, the scroll compressor is capable of drawing a much deeper vacuum than reciprocating compressors. Deep vacuum operation can cause internal fusite arcing resulting in damaged internal parts and will result in compressor failure. Never use a scroll compressor for evacuating or "pumping-down" the system. This type of damage can be detected and will result in denial of warranty claims.

The scroll compressor and reciprocating compressor have much different sound characteristics. The sounds made by a scroll compressor do not affect system reliability, performance, or indicate damage. See Electrical Data section in this manual for specifications of scroll compressors used in 10HPB series units.

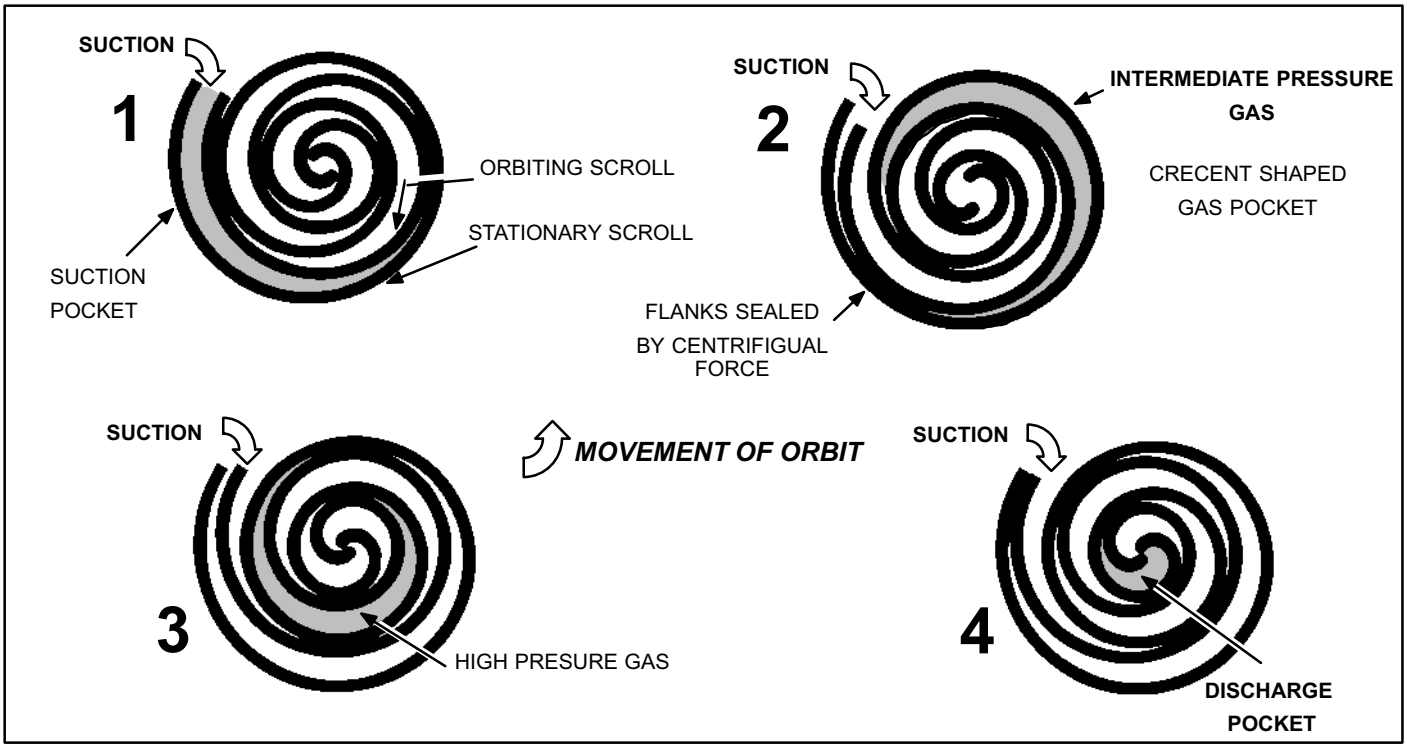


FIGURE 9

C - Outdoor Fan Motor

All units use single-phase PSC fan motors which require a run capacitor. In all units, the outdoor fan is controlled by the compressor contactor and defrost relay.

ELECTRICAL DATA tables in this manual show specifications for outdoor fans used in 10HPBs.

Access to the outdoor fan motor on all units is gained by removing the seven screws securing the fan assembly. See figure 10. The outdoor fan motor is removed from the fan guard by removing the four nuts found on the top panel. See figure 11 if condenser fan motor replacement is necessary.

⚠ DANGER

Make sure all power is disconnected before beginning electrical service procedures.

D - Reversing Valve L1 and Solenoid

A refrigerant reversing valve with electromechanical solenoid is used to reverse refrigerant flow during unit operation. The reversing valve requires no maintenance. It is not repairable. If the reversing valve has failed, it must be replaced.

If replacement is necessary, access reversing valve by removing the outdoor fan motor. Refer to figure 10.

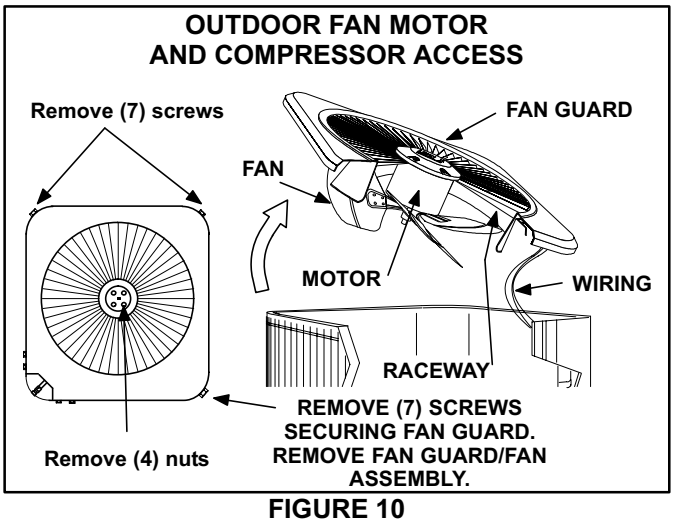


FIGURE 10

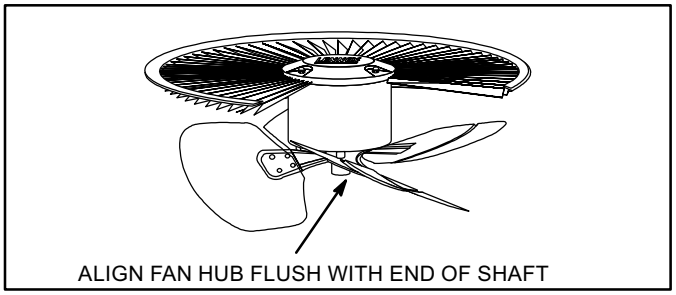


FIGURE 11

III - REFRIGERANT SYSTEM

Refer to figures 12 and 13 for refrigerant flow in the cooling and heating modes. The reversing valve is energized during cooling demand and during defrost.

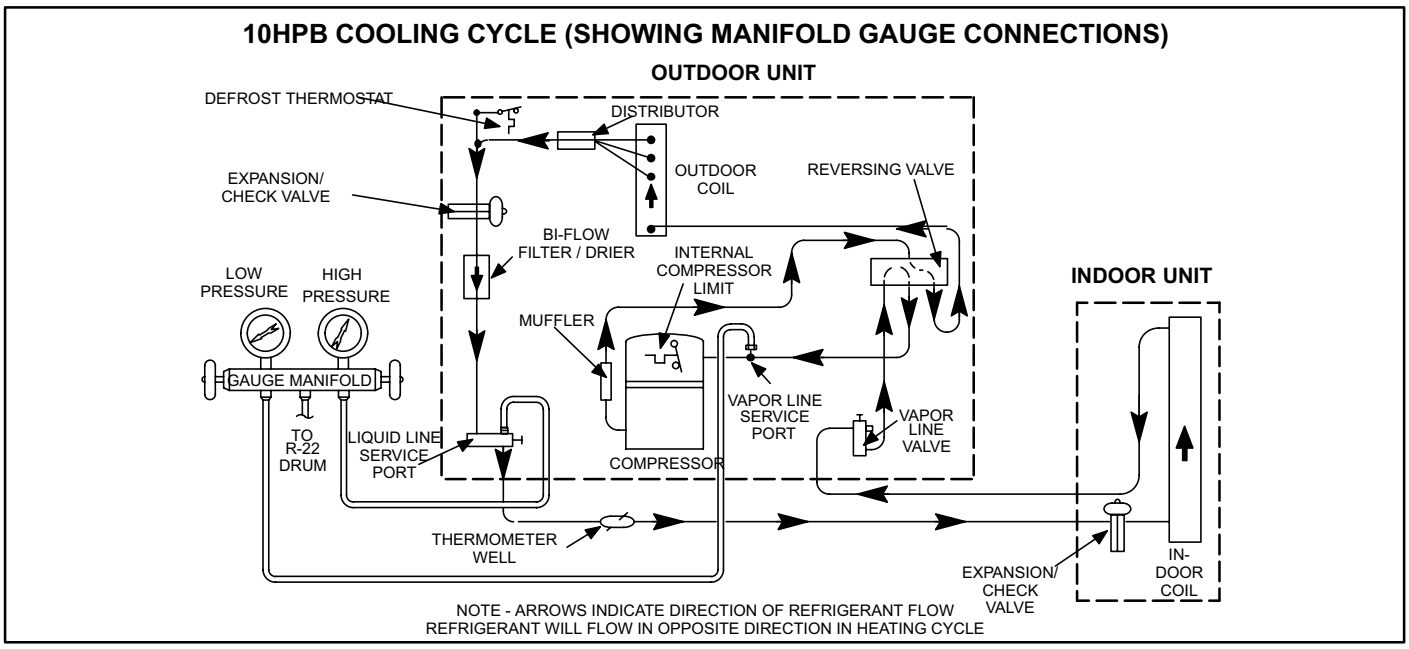


FIGURE 12

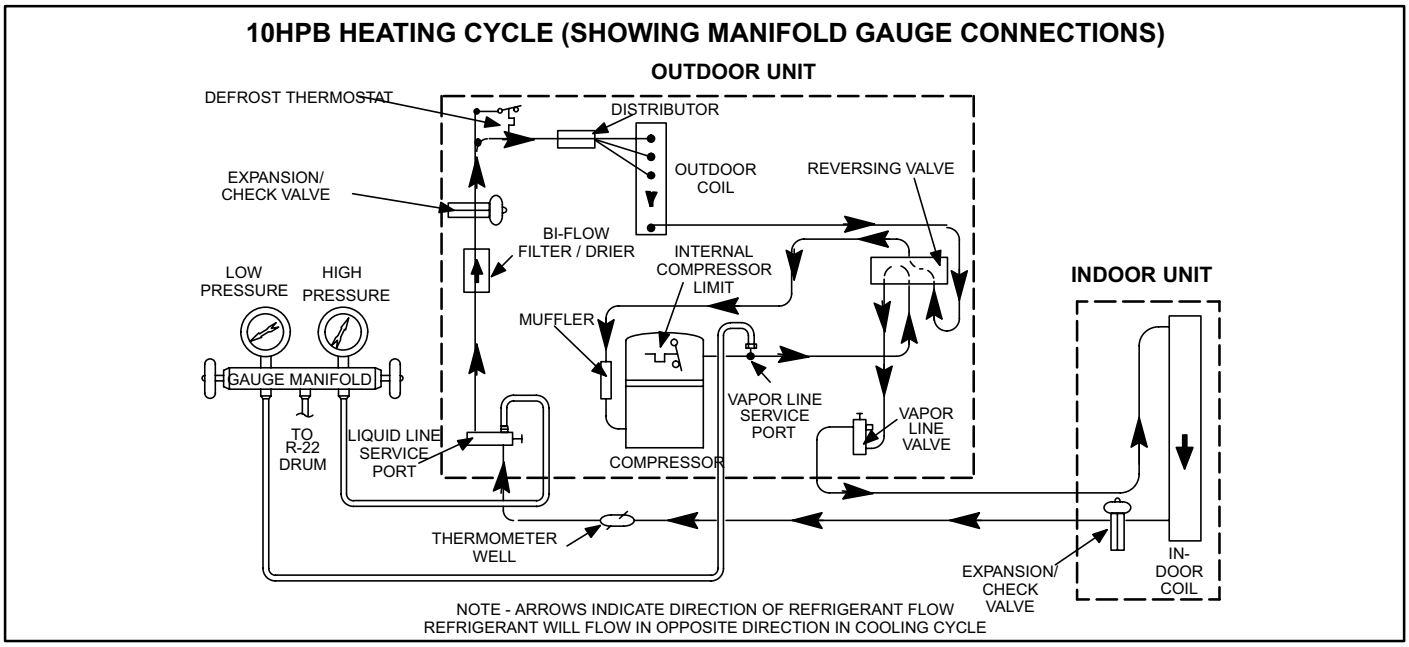


FIGURE 13

A - Liquid and Vapor Line Service Valves

The liquid and vapor line service valves (figures 14 and 15) and gauge ports are accessible from outside the unit.

Each valve is equipped with a service port. The service ports are used for leak testing, evacuating, charging and checking charge. A schrader valve is factory installed. A service port cap is supplied to protect the schrader valve from contamination and serve as the primary leak seal.

NOTE-Always keep valve stem caps clean.

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 Liquid or Vapor Line Service Valve:

1 - Remove stem cap with an adjustable wrench.
2 - Using service wrench and hex head extension (3/16" for liquid line and 5/16" for suction line) back the stem out counterclockwise until the valve stem just touches the retaining ring.
3 - Replace stem cap tighten firmly. Tighten finger tight, then tighten an additional 1/6 turn.

⚠ 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.

⚠ 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 to keep the system free from dirt, moisture and air.

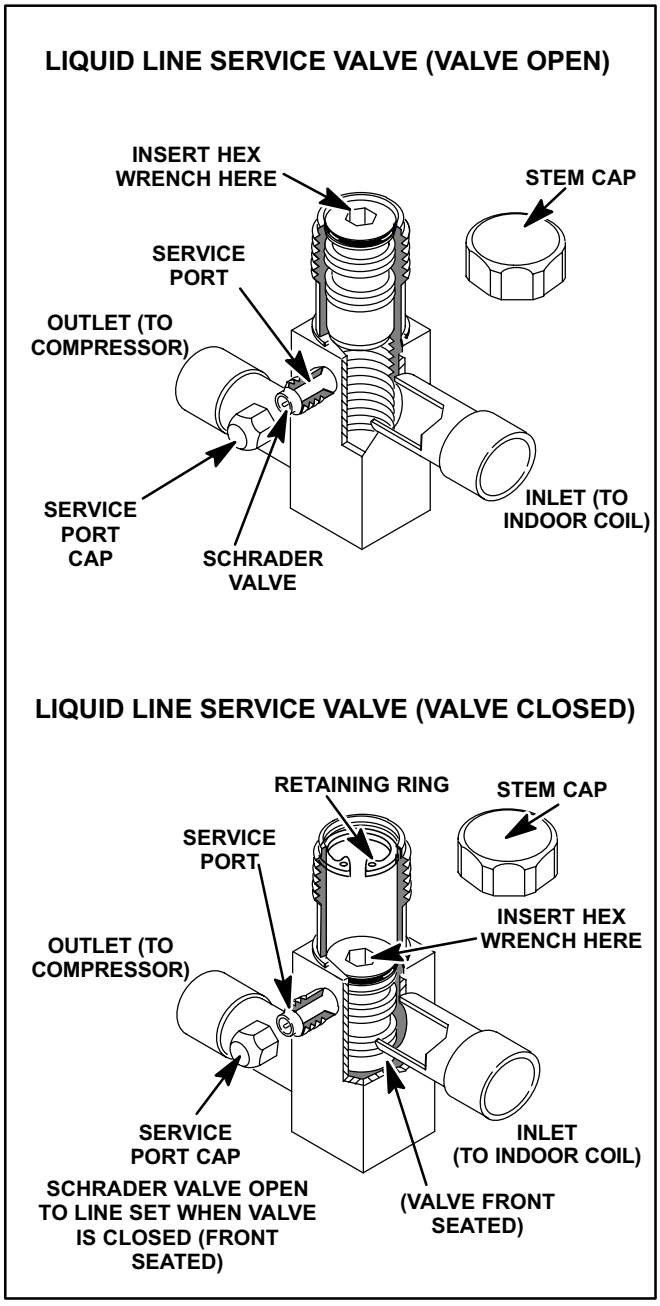


FIGURE 14

To Close Liquid or Vapor Line Service Valve:

1 - Remove stem cap with an adjustable wrench.
2 - Using service wrench and hex head extension (3/16" for liquid line and 5/16" for suction line), turn stem clockwise to seat the valve. Tighten firmly.
3 - Replace stem cap. Tighten finger tight, then tighten an additional 1/6 turn.

VAPOR LINE SERVICE VALVE (VALVE OPEN)

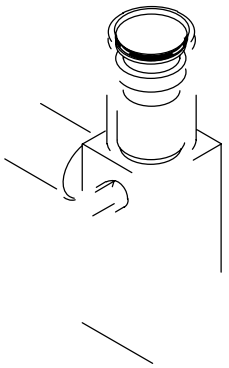
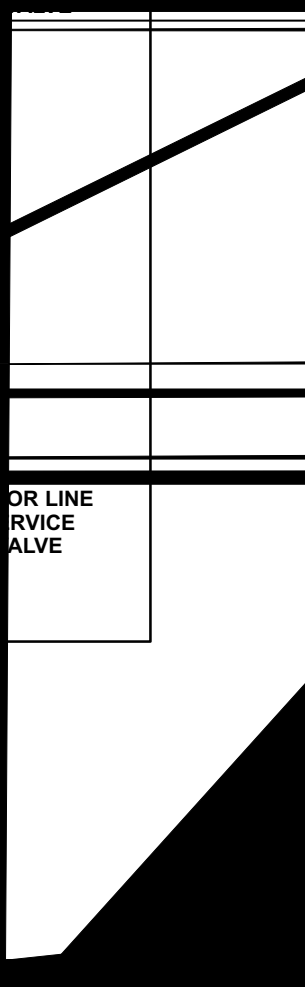


FIGURE 15


OR LINE
RVICE
ALVE

IV - CHARGING

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 15 foot (4.5 m) line set. For varying lengths of line set, refer to table 5 for refrigerant charge adjustment. A blank space is provided on the unit rating plate to list actual field charge.

TABLE 5

Liquid Line Set Diameter	Ounce per 5 foot (ml per mm) adjust from 15 ft. (4.5 m)*
1/4 in. (6 mm)	1 ounce per 5 feet (30 ml per 1524 mm)
5/16 in. (8mm)	2 ounce per 5 feet (60 ml per 1524 mm)
3/8 in. (10 mm)	3 ounce per 5 feet (90 ml per 1524 mm)

***If line set is greater than 15 ft. (4.5m) add this amount. If line set is less than 15 ft. (4.5m) subtract this amount**

A - Pumping Down System

⚠ CAUTION

Deep vacuum operation (operating compressor at 0 psig or lower) can cause internal fusite arcing resulting in a damaged or failed compressor. This type of damage will result in denial of warranty claim.

The system may be pumped down when leak checking the line set and indoor coil or making repairs to the line set or indoor coil.

1- Attach gauge manifold.
2- Front seat (close) liquid line valve.
3- Start outdoor unit in cooling mode.
4- Monitor suction gauge. Stop unit when 0 psig is reached.
5- Front seat (close) suction line valve.

B - Leak Testing (To Be Done Before Evacuating)

1- Attach gauge manifold and connect a drum of dry nitrogen to center port of gauge manifold.
2- Open high pressure valve on gauge manifold and pressurize line set /indoor coil to 150 psig (1034 kPa).
3- Check lines and connections for leaks.
4- Release nitrogen pressure from the system, correct any leaks and recheck.

⚠ 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). Failure to use a regulator can cause equipment failure resulting in injury.

NOTE-If electronic leak or Halide detector is used, add a small amount of R22 (3 to 5 psig [20kPa to 34kPa]) then pressurize with nitrogen to 150 psig.

C - Evacuating the System

⚠ IMPORTANT

The compressor should never be used to evacuate a refrigeration or air conditioning system.

1- Attach gauge manifold. 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.

⚠ IMPORTANT

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 (737mm) 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 the leak testing section would be necessary.
3- After evacuating system to 29 inches (737mm), 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- Connect vacuum pump to gauge manifold center port. Evacuate system through manifold service valves until vacuum in system does not rise above .5mm of mercury absolute pressure or 500 microns within a 20-minute period after stopping vacuum pump.
6- After evacuation is complete, close manifold center port, and connect refrigerant drum. Pressurize system slightly with refrigerant to break vacuum.

D - Charging

Charging must be done in the cooling mode. If 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.

If weighing facilities are not available or if unit is just low on charge, the following procedure applies. RFC and TXV systems use different charging methods.

Separate discharge and vapor line service ports are provided outside the unit for connection of gauge manifold during charging procedure as well as a suction line service port.

⚠ IMPORTANT

The following procedures require accurate readings of ambient (outdoor) temperature, liquid temperature and liquid pressure for proper charging. Use a thermometer with accuracy of ±2°F(± 1.1°C) and a pressure gauge with accuracy of ±5PSIG (± 34.5kPa).

1 - Expansion Valve Systems

The following procedures are intended as a general guide for use with expansion valve systems only. For best results, indoor temperature should be between 70 °F and 80 °F (21.1 °C and 26.6 °C) . If outdoor temperature is 60 °F (16 °C) or above the approach method of charging is used. If outdoor temperature is less than 60 °F (16 °C) the subcooling method of charging is used. Slight variations in charging temperature and pressure should be expected. Large variations may indicate a need for further servicing.

APPROACH METHOD (TXV SYSTEMS)
(Ambient Temperature of 60°F [16°C] or Above)

1 - Connect gauge manifold. Connect an upright R-22 drum to center port of gauge manifold.

2 - Record outdoor air (ambient) temperature.

3 - Operate indoor and outdoor units in cooling mode. Allow outdoor unit to run until system pressures stabilize.

4 - Make sure thermometer well is filled with mineral oil before checking liquid line temperature.

5 - Place thermometer in well and read liquid line temperature. Liquid line temperature should be warmer than the outdoor air temperature. Table 6 shows how many degrees warmer the liquid line temperature should be.

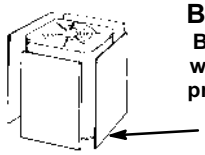
Add refrigerant to lower the liquid line temperature.

Recover refrigerant to raise the liquid line temperature.

Add refrigerant slowly as the unit approaches the correct temperature. This will allow refrigerant to stabilize allowing the correct temperature to be read.

SUBCOOLING METHOD (TXV SYSTEMS)
(Ambient Temperature Below 60°F [16°C]

NOTE- It may be necessary to restrict air flow in order to reach liquid pressures in the 200-250 psig range which are required for checking charge. The indoor temperature should be above 70°F(21°C). Block equal sections of air intake panels as shown in figure 18, moving obstructions sideways until liquid pressures in the 200-250 psig range are reached.



BLOCKING OUTDOOR COIL
Block outdoor coil one side at a time with cardboard or plastic sheets until proper testing pressures are reached.
CARDBOARD OR PLASTIC SHEET

FIGURE 18

1 - Connect gauge manifold. Connect an upright R-22 drum to center port of gauge manifold.

2 - Operate indoor and outdoor units in cooling mode. Allow outdoor unit to run until system pressures stabilize.

3 - Make sure thermometer well is filled with mineral oil before checking liquid line temperature.

4 - Read liquid line pressure and convert to condensing temperature using temperature/pressure conversion chart.

Condensing temperature (read from gauges) should be warmer than the liquid line temperature.

5 - Place thermometer in well and read liquid line temperature. Table 7 shows how much warmer the condensing temperature should be.

Add refrigerant to lower liquid line temperature.

Recover refrigerant to raise liquid line temperature.

6 - When unit is properly charged liquid line pressures should approximate those given in table 8.

TABLE 6

APPROACH METHOD AMBIENT TEMPERATURE OF 60 °F (16 °C) OR ABOVE	
Model	**Liquid Line °F Warmer Than Outside (Ambient) Temperature**
10HPB18	10F (5.6C)
10HPB24	13F (7.2C)
10HPB30	16F (8.9C)
10HPB36	22F (12.2C)
10HPB42	13F (7.2C)
10HPB48	16F (8.9C)
10HPB60	18F (10C)

TABLE 7

SUBCOOLING METHOD AMBIENT TEMPERATURE BELOW 60 °F (16 °C)	
Model	**Condensing Temp°F Warmer Than Liquid Line**
10HPB18	8F (4.4C)
10HPB24	6F (3.3C)
10HPB30	10F (5.6C)
10HPB36	8F (4.4C)
10HPB42	12F (6.7C)
10HPB48	13F (7.2C)
10HPB60	5F (2.8C)

TABLE 8

10HPB NORMAL OPERATING PRESSURES*														
OUTDOOR COIL ENTERING AIR TEMPERATURE	**10HPB18**		**10HPB24**		**10HPB30**		**10HPB36**		**10HPB42**		**10HPB48**		**10HPB60**	
	LIQ. ± 10 PSIG	**VAP. ± 10 PSIG**	**LIQ. ± 10 PSIG**	**VAP. ± 10 PSIG**	**LIQ. ± 10 PSIG**	**VAP. ± 10 PSIG**	**LIQ. ± 10 PSIG**	**VAP. ± 10 PSIG**	**LIQ. ± 10 PSIG**	**VAP. ± 10 PSIG**	**LIQ. ± 10 PSIG**	**VAP. ± 10 PSIG**	**LIQ. ± 10 PSIG**	**VAP. ± 10 PSIG**
65° F (TXV)	**148**	**71**	**156**	**70**	**165**	**73**	**171**	**68**	**173**	**69**	**163**	**74**	**166**	**71**
75° F (TXV)	**171**	**74**	**182**	**72**	**195**	**75**	**197**	**70**	**203**	**71**	**191**	**75**	**195**	**73**
85° F (TXV)	**200**	**76**	**210**	**74**	**220**	**77**	**228**	**72**	**233**	**73**	**225**	**76**	**227**	**74**
95° F (TXV)	**230**	**78**	**241**	**75**	**254**	**79**	**261**	**74**	**267**	**75**	**259**	**78**	**261**	**76**
105° F (TXV)	**263**	**81**	**275**	**78**	**292**	**81**	**299**	**77**	**307**	**77**	**295**	**79**	**302**	**78**

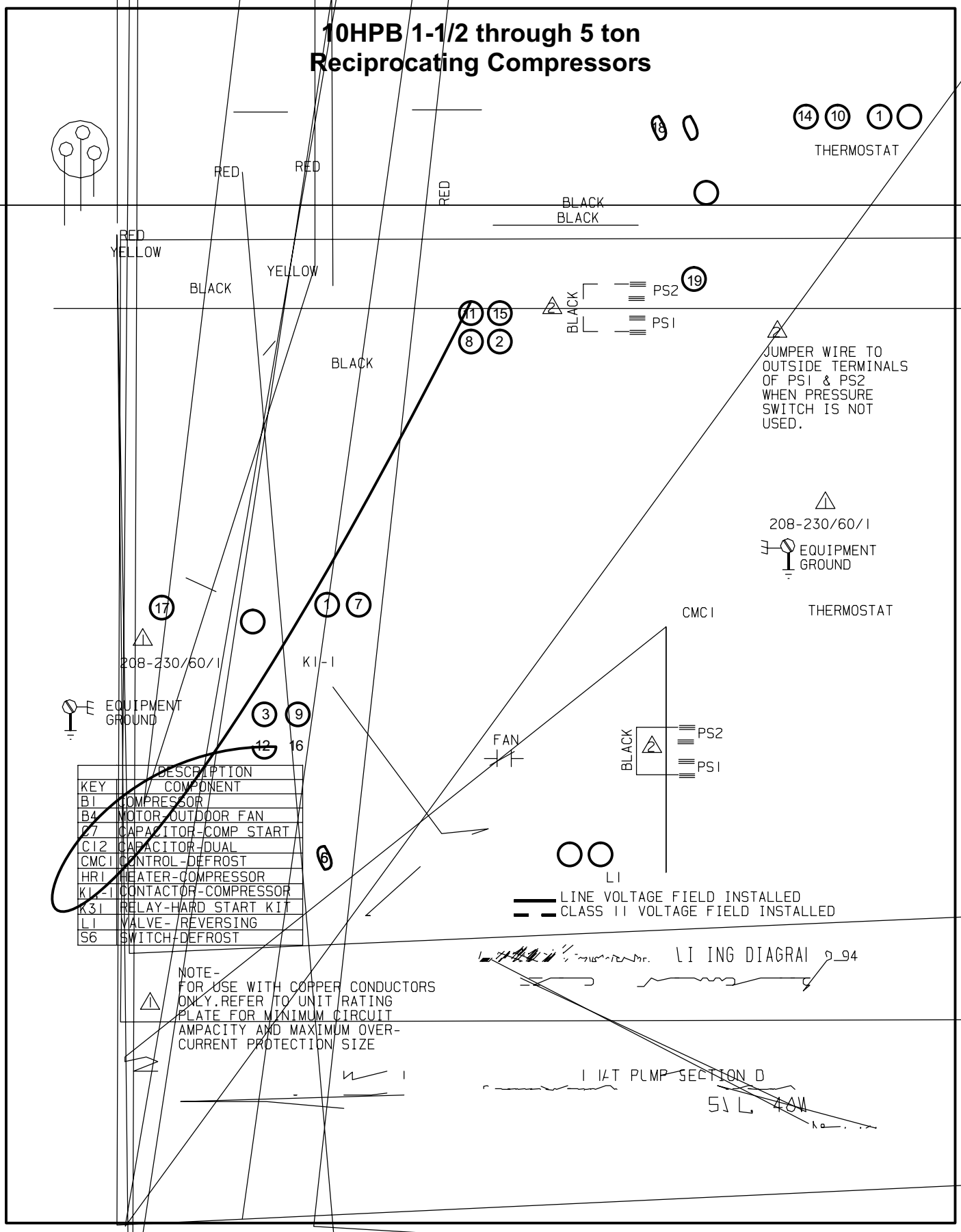
***These are typical pressures only. Indoor evaporator match up, indoor air quality and evaporator load will cause the pressures to vary.**

⚠ IMPORTANT

Use table 8 as a general guide for performing maintenance checks. Table 8 is not a procedure for charging the system. Minor variations in pressures may be expected due to differences in installations. Significant deviations may mean the system is not properly charged or that a problem exists with some component in the system. Used prudently, tly

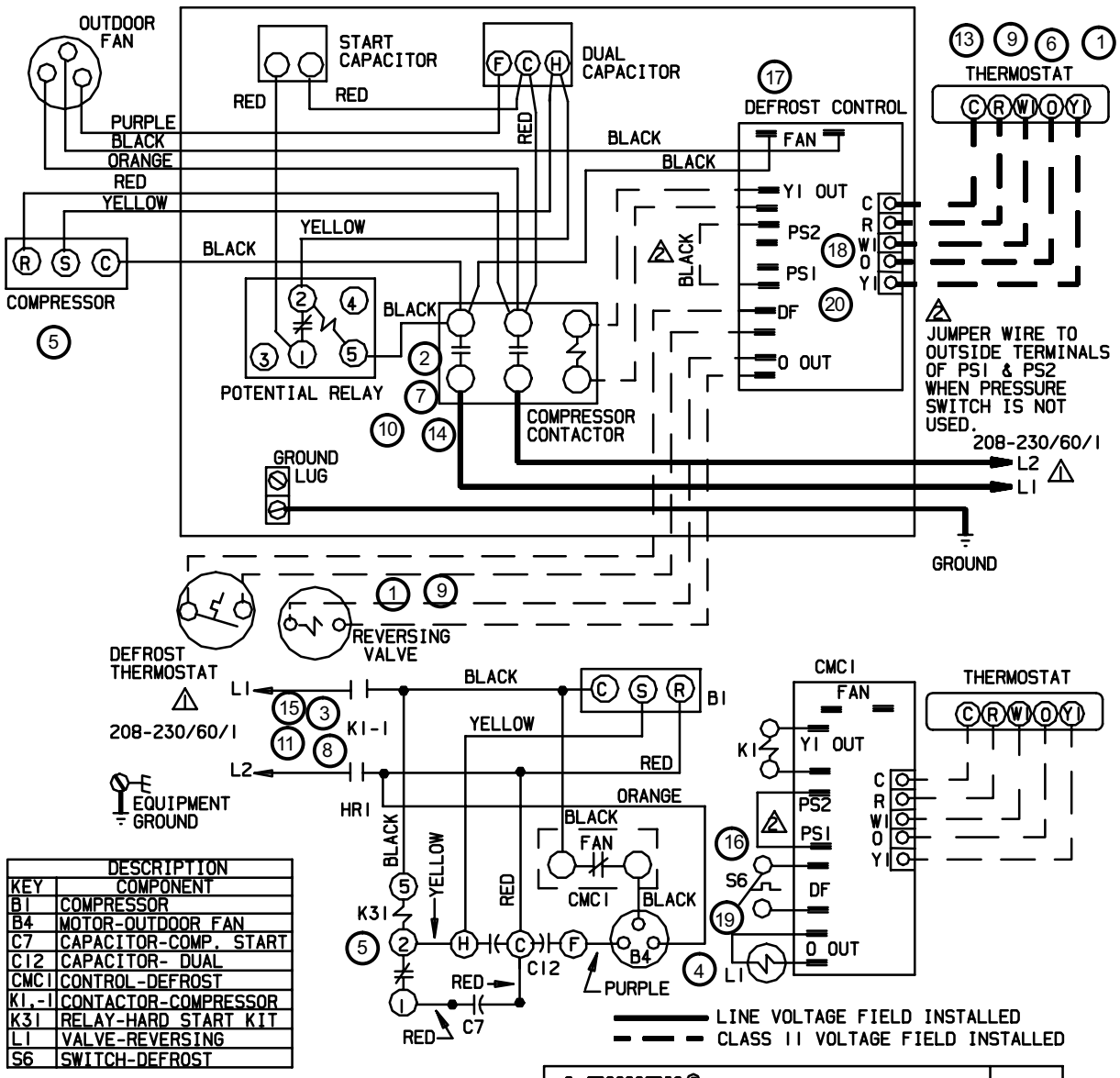
VI - WIRING DIAGRAM AND SEQUENCE OF OPERATION

10HPB 1-1/2 through 5 ton Reciprocating Compressors



KEY	DESCRIPTION COMPONENT
B1	COMPRESSOR
B4	MOTOR-OUTDOOR FAN
C7	CAPACITOR-COMP START
C12	CAPACITOR-DUAL
CMC1	CONTROL-DEFROST
HR1	HEATER-COMPRESSOR
K1-1	CONTACTOR-COMPRESSOR
K31	RELAY-HARD START KIT
L1	VALVE- REVERSING
S6	SWITCH-DEFROST

10HPB 1-1/2 and 2 ton
Reciprocating Compressors



DESCRIPTION	
KEY	COMPONENT
B1	COMPRESSOR
B4	MOTOR-OUTDOOR FAN
C7	CAPACITOR-COMP. START
C12	CAPACITOR- DUAL
CMC1	CONTROL-DEFROST
K1,-1	CONTACTOR-COMPRESSOR
K31	RELAY-HARD START KIT
L1	VALVE-REVERSING
S6	SWITCH-DEFROST

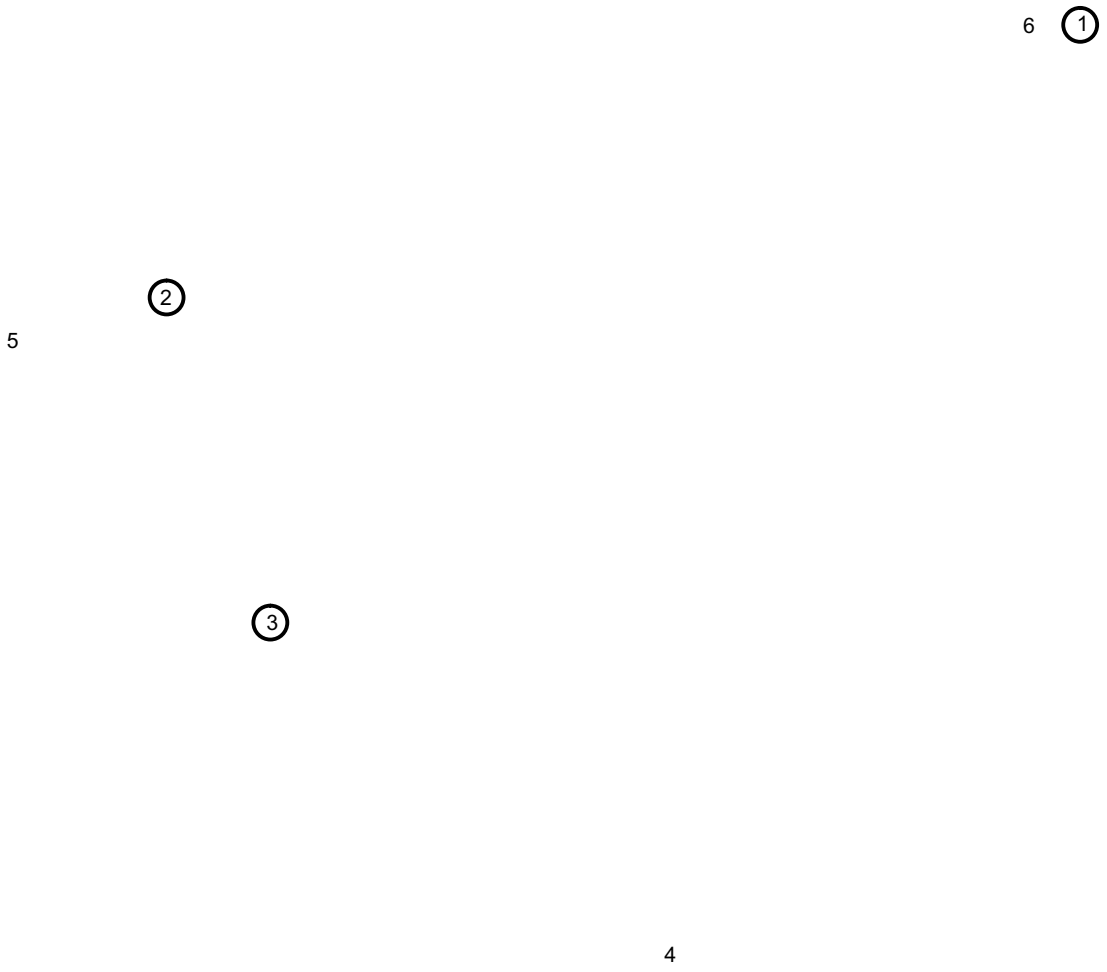
⚠ NOTE-
FOR USE WITH COPPER CONDUCTORS ONLY.REFER TO UNIT RATING PLATE FOR MINIMUM CIRCUIT AMPACITY AND MAXIMUM OVER-CURRENT PROTECTION SIZE

WARNING-
ELECTRIC SHOCK HAZARD,CAN CAUSE INJURY OR DEATH. UNIT MUST BE GROUND IN ACCORDANCE WITH NATIONAL AND LOCAL CODES.

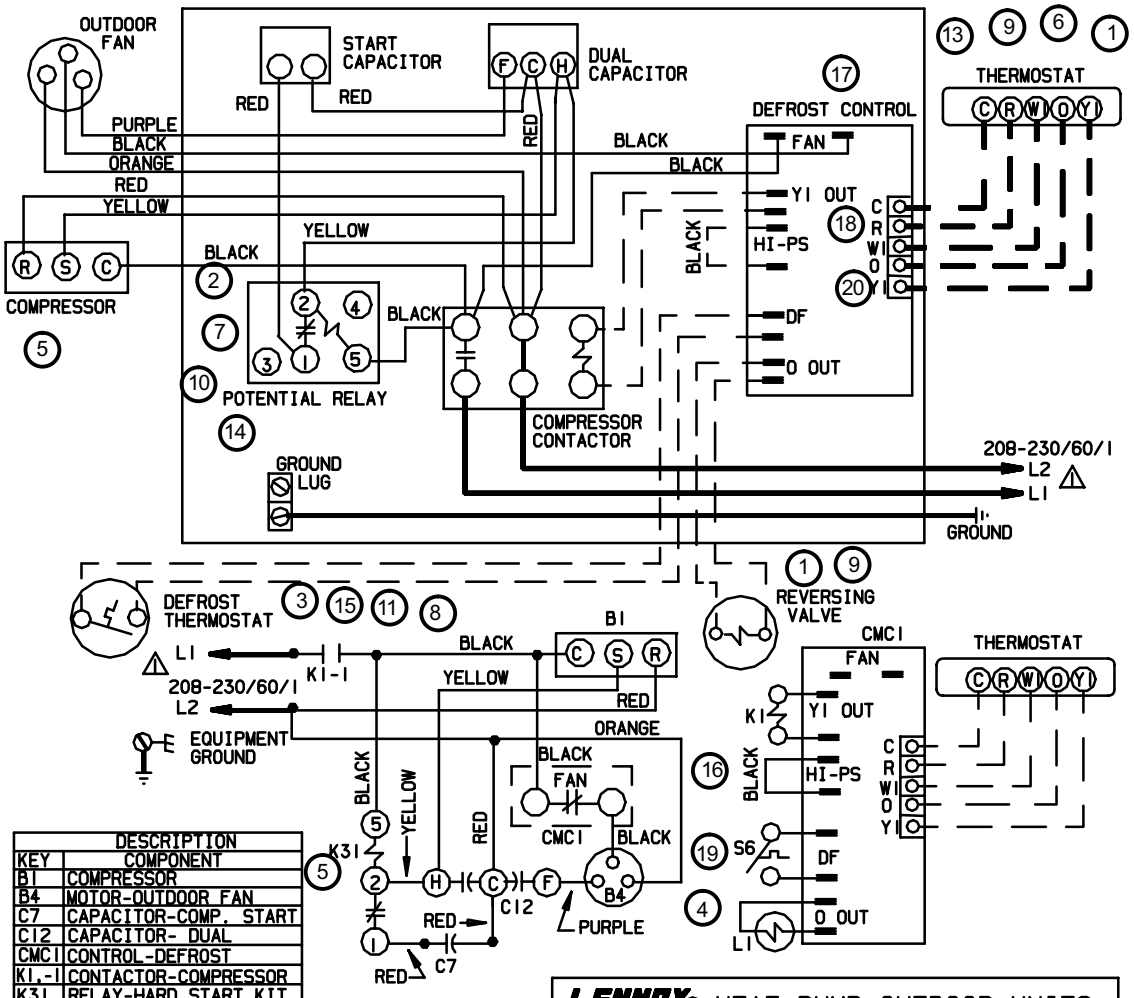
LENNOX® Industries Inc.	WIRING DIAGRAM	10/97
HEAT PUMP-OUTDOOR UNITS		
10HPB18-7P,8P 10HPB24-7P,8P		
HEAT PUMP SECTION-B		
Supersedes Form No.	New Form No. 532,646W	

Litho U.S.A.

10HPB 1-1/2 and 2 ton
Reciprocating Compressors



10HPB 1-1/2 and 2 ton
Reciprocating Compressors



DESCRIPTION	
KEY	COMPONENT
B1	COMPRESSOR
B4	MOTOR-OUTDOOR FAN
C7	CAPACITOR-COMP. START
C12	CAPACITOR- DUAL
CMC1	CONTROL-DEFROST
K1,-1	CONTACTOR-COMPRESSOR
K31	RELAY-HARD START KIT
L1	VALVE-REVERSING
S6	SWITCH-DEFROST

⚠ NOTE-
FOR USE WITH COPPER CONDUCTORS ONLY.REFER TO UNIT RATING PLATE FOR MINIMUM CIRCUIT AMPACITY AND MAXIMUM OVER-CURRENT PROTECTION SIZE.

WARNING-
ELECTRIC SHOCK HAZARD,CAN CAUSE INJURY OR DEATH. UNIT MUST BE GROUNDED IN ACCORDANCE WITH NATIONAL AND LOCAL CODES.

LINE VOLTAGE FIELD INSTALLED
CLASS II VOLTAGE FIELD INSTALLED

LENNOX® HEAT PUMP-OUTDOOR UNITS

10HPB18-11P
10HPB24-11P

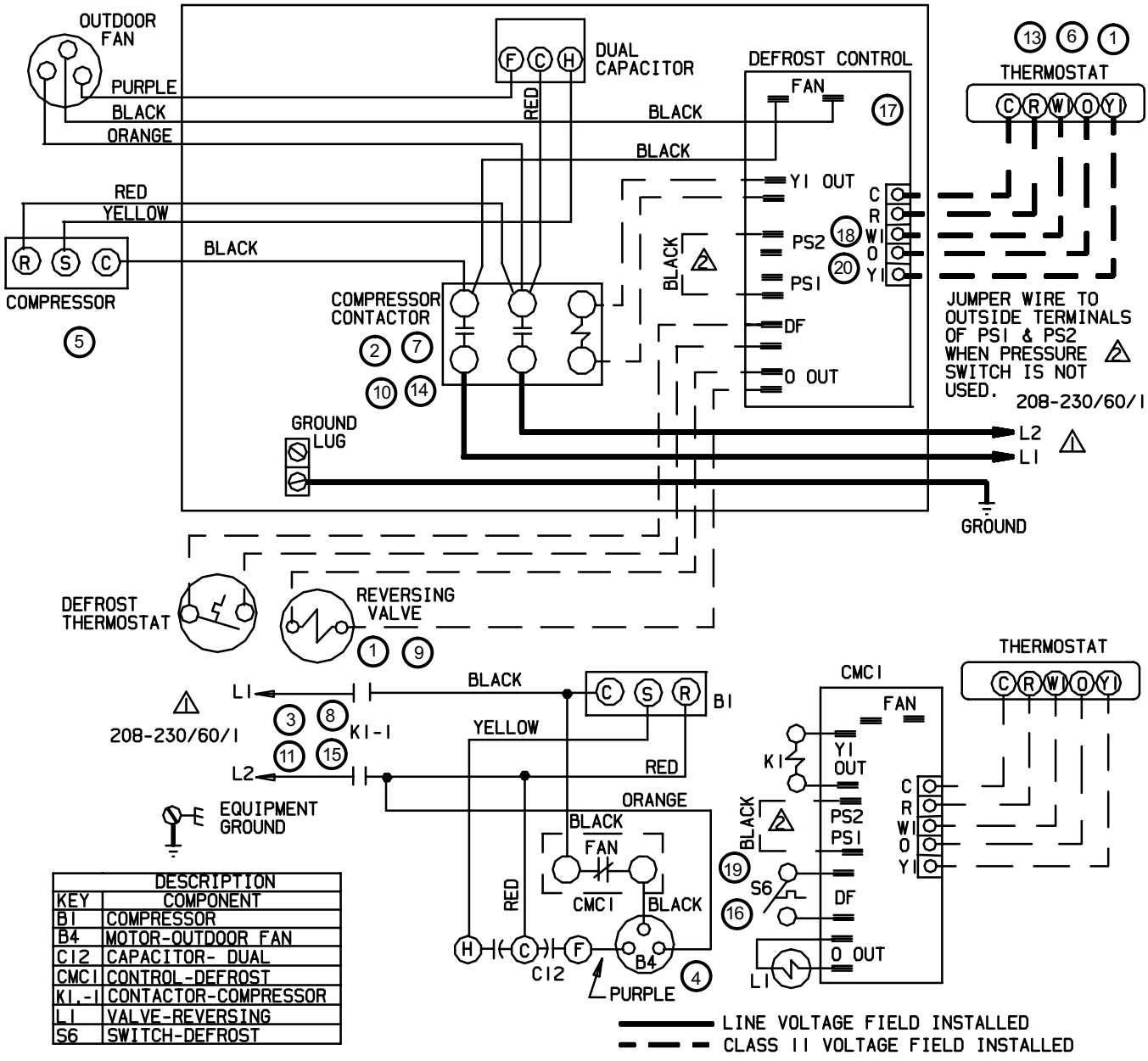
1201

Supersedes Form No.
533,476W

New Form No.
533,926W

Litho U.S.A.

10HPB 2-1/2 through 5 ton
Scroll Compressors



DESCRIPTION	
KEY	COMPONENT
B1	COMPRESSOR
B4	MOTOR-OUTDOOR FAN
C12	CAPACITOR- DUAL
CMC1	CONTROL-DEFROST
K1,-1	CONTACTOR-COMPRESSOR
L1	VALVE-REVERSING
S6	SWITCH-DEFROST

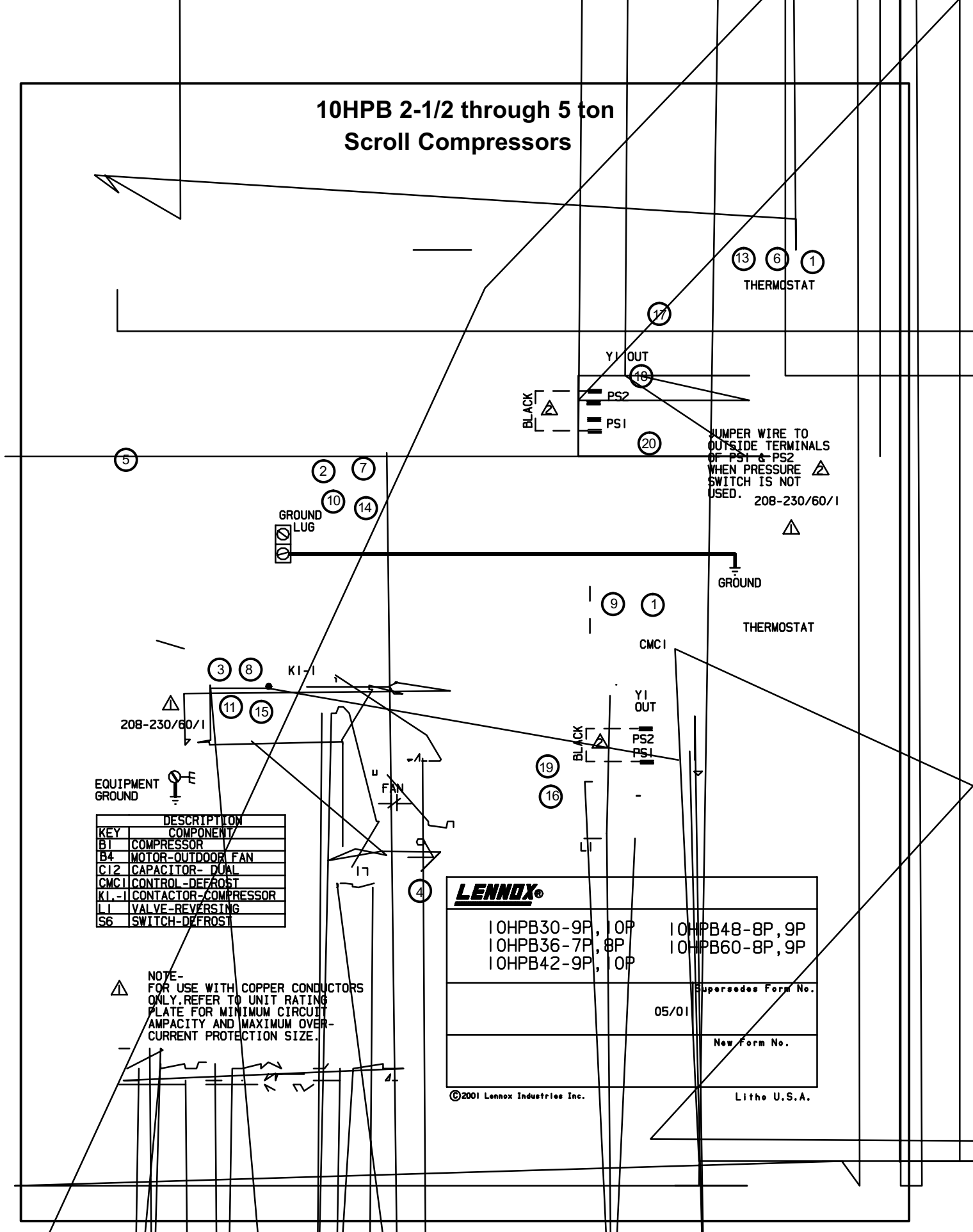
⚠ NOTE-
FOR USE WITH COPPER CONDUCTORS ONLY.REFER TO UNIT RATING PLATE FOR MINIMUM CIRCUIT AMPACITY AND MAXIMUM OVER-CURRENT PROTECTION SIZE

WARNING-
ELECTRIC SHOCK HAZARD,CAN CAUSE INJURY OR DEATH. UNIT MUST BE GROUND IN ACCORDANCE WITH NATIONAL AND LOCAL CODES.

LENNOX® Industries Inc.	WIRING DIAGRAM	10/97
HEAT PUMP-OUTDOOR UNITS		
10HPB30-7P,8P 10HPB36-5P,6P 10HPB42-7P,8P	10HPB48-6P,7P 10HPB60-6P,7P	
HEAT PUMP SECTION-B		
Supersedes Form No.	New Form No. 532,647W	

Litho U.S.A.

10HPB 2-1/2 through 5 ton Scroll Compressors



DESCRIPTION	
KEY	COMPONENT
B1	COMPRESSOR
B4	MOTOR-OUTDOOR FAN
C12	CAPACITOR- DUAL
CMC1	CONTROL-DEFROST
K1-1	CONTACTOR-COMPRESSOR
L1	VALVE-REVERSING
S6	SWITCH-DEFROST

LENNOX®

10HPB30-9P,10P
10HPB36-7P,8P
10HPB42-9P,10P
10HPB48-8P,9P
10HPB60-8P,9P

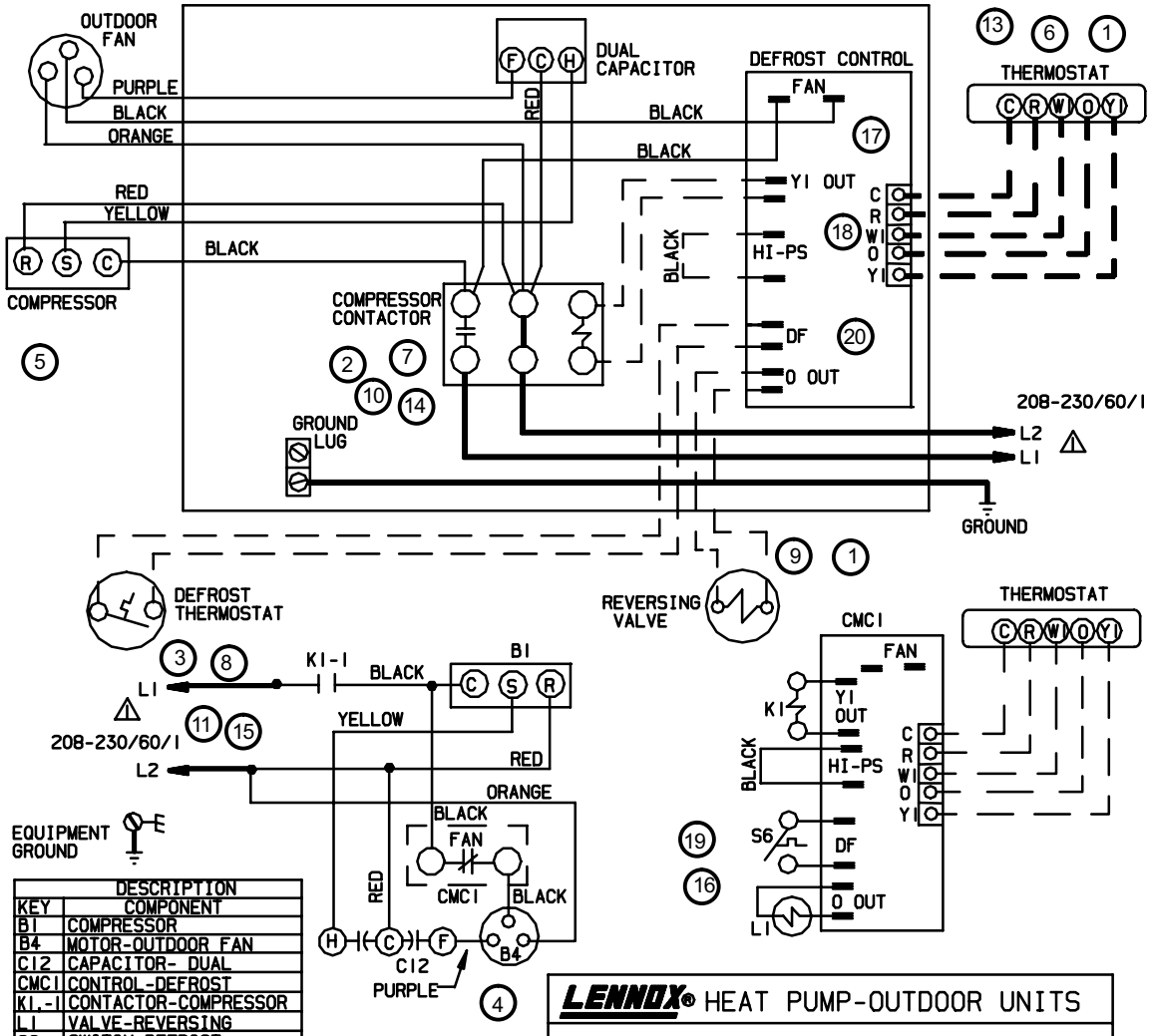
Supersedes Form No.

05/01

New Form No.

Litho U.S.A.

10HPB 2-1/2 through 5 ton
Scroll Compressors



DESCRIPTION	
KEY	COMPONENT
BI	COMPRESSOR
B4	MOTOR-OUTDOOR FAN
C12	CAPACITOR- DUAL
CMCI	CONTROL-DEFROST
KI,-I	CONTACTOR-COMPRESSOR
LI	VALVE-REVERSING
S6	SWITCH-DEFROST

⚠ NOTE-
FOR USE WITH COPPER CONDUCTORS ONLY.REFER TO UNIT RATING PLATE FOR MINIMUM CIRCUIT AMPACITY AND MAXIMUM OVER-CURRENT PROTECTION SIZE.

WARNING-
ELECTRIC SHOCK HAZARD,CAN CAUSE INJURY OR DEATH. UNIT MUST BE GROUNDED IN ACCORDANCE WITH NATIONAL AND LOCAL CODES.

LENNOX® HEAT PUMP-OUTDOOR UNITS

10HPB30-11P 10HPB48-10P
10HPB36-9P 10HPB60-10P
10HPB42-11P

1201

Supersedes Form No.
533,477W

New Form No.
533,927W

Litho U.S.A.

10HPB 1-1/2 THROUGH 5 TON OPERATING SEQUENCE

This is the sequence of operation for 10HPB series units. The sequence is outlined by numbered steps which correspond to circled numbers on the adjacent diagram.

NOTE- The thermostat used may be electromechanical or electronic.

NOTE- Transformer in indoor unit supplies power (24 VAC) to the thermostat and outdoor unit controls.

COOLING:

1 - Internal thermostat wiring energizes terminal O energizing the reversing valve L1. Cooling demand initiates at Y1 in the thermostat.

2 - 24VAC energizes compressor contactor K1.

3 - K1-1 N.O. closes, energizing terminal "C" of compressor (B1) and outdoor fan motor (B4).

4 - Outdoor fan motor (B4) begins immediate operation.

5 - Compressor (B1) begins start-up. **Units equipped with reciprocating compressors:** Hard start contactor K31 remains closed during start-up and start capacitor C7 remains in the circuit. As the compressor gains speed, K31 is energized. When K31 is energized, the contacts open and start capacitor C7 is taken out of the circuit.

END OF COOLING DEMAND:

6 - Cooling demand is satisfied. Terminal Y1 is de-energized.

7 - Compressor contactor K1 is de-energized.

8 - K1-1 opens and compressor (B1) and outdoor fan motor (B4) are de-energized and stop immediately.

FIRST STAGE HEAT:

9 - Internal thermostat wiring de-energizes terminal O by heating mode selection, de-energizing the reversing valve. Heating demand initiates at Y1.

10 - 24VAC energizes compressor contactor K1.

11 - K1-1 N.O. closes, energizing compressor and outdoor fan motor.

12 - See steps 4 and 5.

END OF FIRST STAGE HEAT:

13 - Heating demand is satisfied. Terminal Y1 is de-energized.

14 - Compressor contactor K1 is de-energized.

15 - K1-1 opens and compressor (B1) and outdoor fan motor (B4) are de-energized and stop immediately.

DEFROST MODE:

16 - During heating operation when outdoor coil temperature drops below 35°F (2°C) or 42°(5.5°C) *see defrost system description for specific unit dash number* defrost switch (thermostat) S6 closes.

17 - Defrost control CMC1 begins timing. If defrost thermostat (S6) remains closed at the end of the 30,60 or 90 minute period, defrost relay energizes and defrost begins.

18 - During defrost CMC1 energizes the reversing valve and W1 on the terminal strip (operating indoor unit on the first stage heat mode), while de-energizing outdoor fan motor B4.

19 - Defrost continues 14 $\pm$ 1 minutes or until thermostat switch (S6) opens. When defrost thermostat opens, defrost control timer loses power and resets.

20 - When CMC1 resets, the reversing valve and W1 on the terminal strip are de-energized, while the outdoor fan motor B4 is energized.

FIELD WIRING DIAGRAM FOR 10HPB UNIT