HP10 SERIES UNITS

I - INTRODUCTION

The HP10 was first introduced in 1977. The systems are expansion valve. All major components must be matched according to Lennox recommendations for the compressor to be covered under warranty. The Engineering Handbook lists the approved combinations.

HP10-460V and HP10-510V models are equipped with Lennox "L5" compressors. The HP10 series units are designed for continuous low ambient operation and are not equipped with a low temperature shut-off switch like earlier HP8 models. Figure 1 shows a cutaway view of unit.

All major components must be matched according to Lennox recommendations for the compressor to be covered under warranty. A misapplied system will cause erratic operation and can result in early compressor failure. The heat pump selector in the introduction to heat pumps lists the approved match-ups.

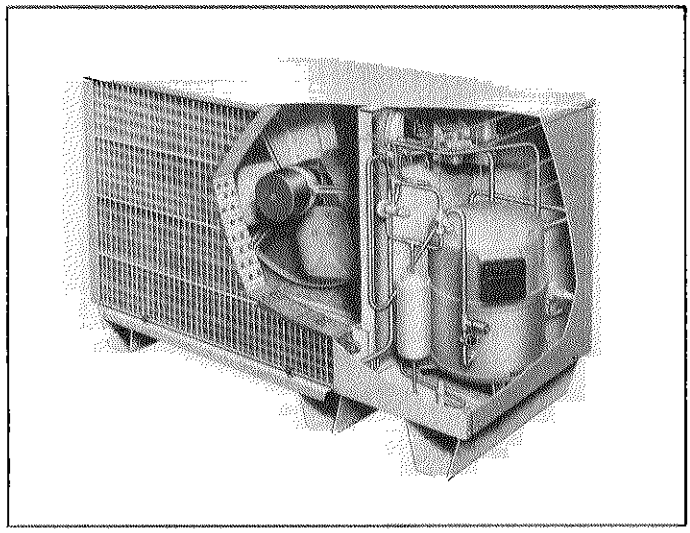


FIGURE 1

II - UNIT INFORMATION

A - Specifications

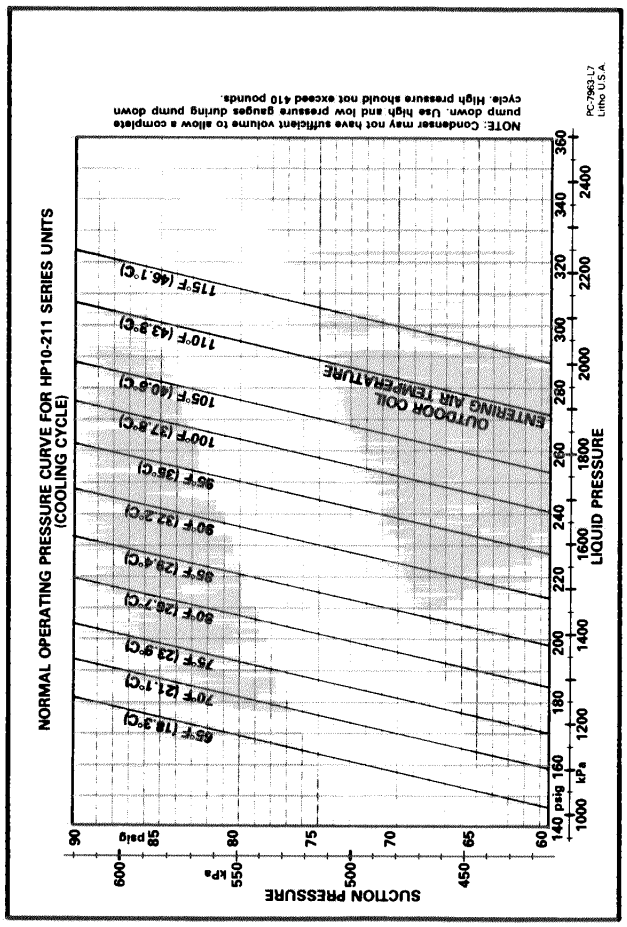
Model No.		HP10-211V	HP10-261V	HP10-311V	HP10-411-413V	HP10-511-513V
Outdoor Coil	Net face area (sq. ft.)	4.06	5.64	5.64	5.64	7.92
	Tube diam. (in.) & No. of rows	1/2 — 3	3/8 — 3	1/2 — 3	1/2 — 4	1/2 — 3
	Fins per inch	13	13	10	10	10
Outdoor Fan	Diameter (in.) & No. of blades	20 — 4	20 — 4	22 — 4	22 — 4	26 — 4
	Motor hp	1/5	1/5	1/3	1/3	1/2
	Cfm (factory setting)	1750	2330	2840	2730	4830
	Rpm (factory setting)	1110	1125	838	836	830
	Watts (factory setting)	220	200	360	380	605
Refrigerant-22 (charge furnished)		7 lb. 2 oz.	7 lb. 8 oz.	9 lbs. 3 oz.	10 lbs. 8 oz.	14 lbs.
Liquid line connection (compression)		3/8	3/8	3/8	3/8	3/8
Vapor line connection (compression)		5/8	5/8	3/4	3/4	7/8
Shipping weight (lbs.) & No. of packages		233 — 1	270 — 1	350 — 1	390 — 1	440 — 1

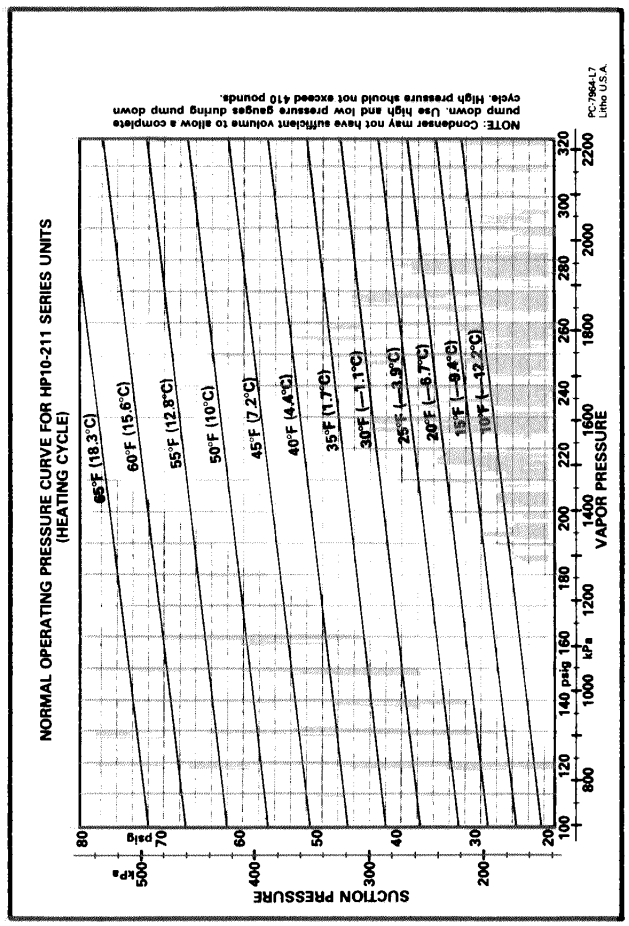
B - Electrical Data

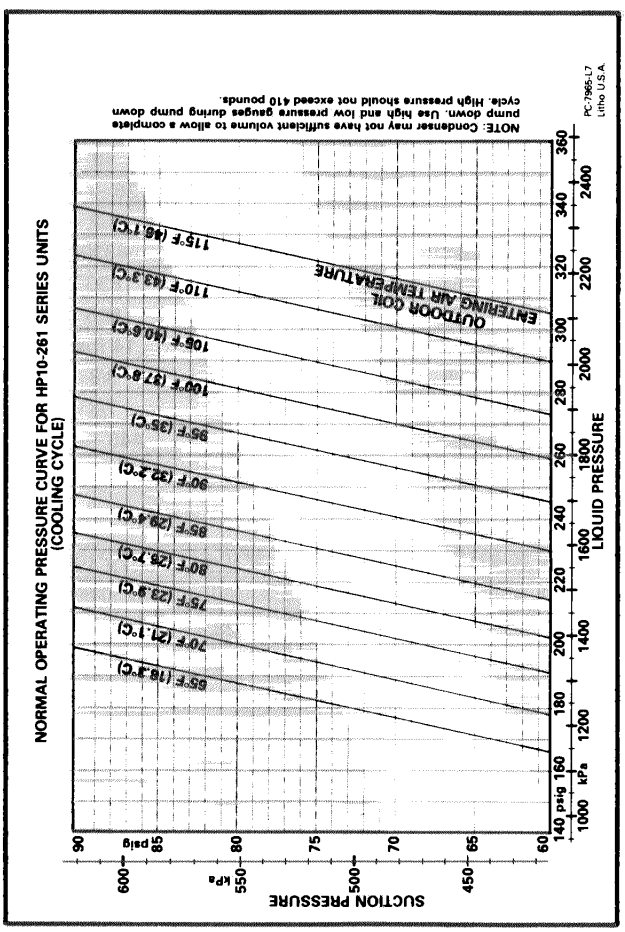
Model Number		HP10-211V	HP10-261V	HP10-311V	HP10-411V	HP10-413V	HP10-511V	HP10-513V
Line voltage data		230/60hz/1ph	230/60hz/1ph	230v/60hz/1ph	230v/60hz/1ph	230v/60hz/3ph	230v/60hz/1ph	230/60hz/3ph
Compressor	Rated load amps	9.7	12.1	17.0	15.8	10.4	23.8	14.7
	Power factor	.97	.95	.90	.96	.87	.96	.87
	Locked rotor amps	48.0	59.0	85.0	91.0	69.9	124.0	98.1
Outdoor Coil Fan Motor	Full load amps	1.3	1.3	3.0	3.0	3.0	3.2	3.2
	Locked rotor amps	3.5	3.5	6.6	6.6	6.6	5.6	5.6
Recommended max. fuse size (amps)		20.0	25.0	40.0	40.0	25.0	55.0	35.0
*Minimum circuit ampacity		13.4	16.5	24.3	22.9	16.0	33.0	21.6

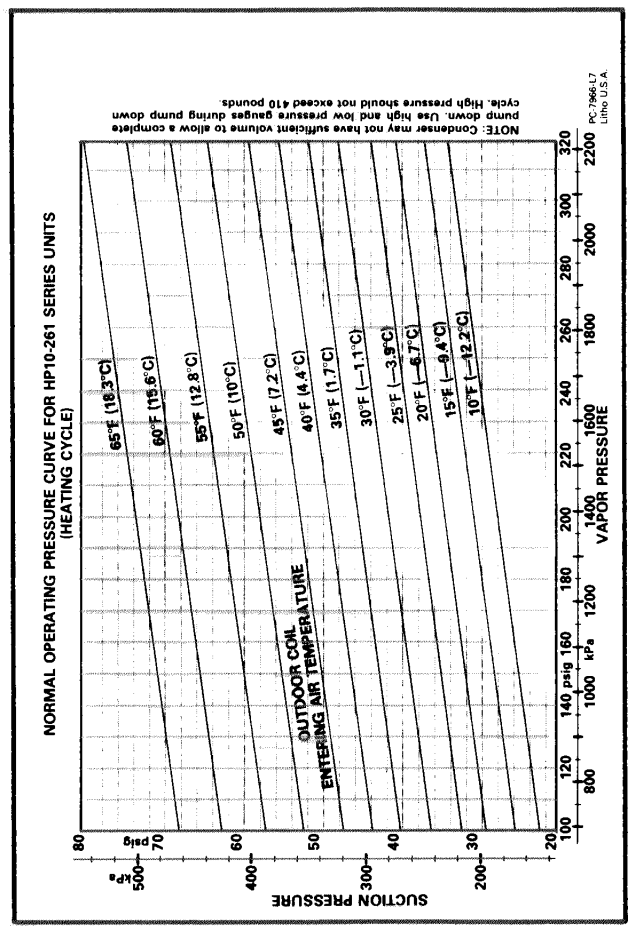
*Refer to National Electrical Code manual to determine wire, fuse and disconnect size requirements.
NOTE — Extremes of operating range are plus and minus 10% of line voltage.

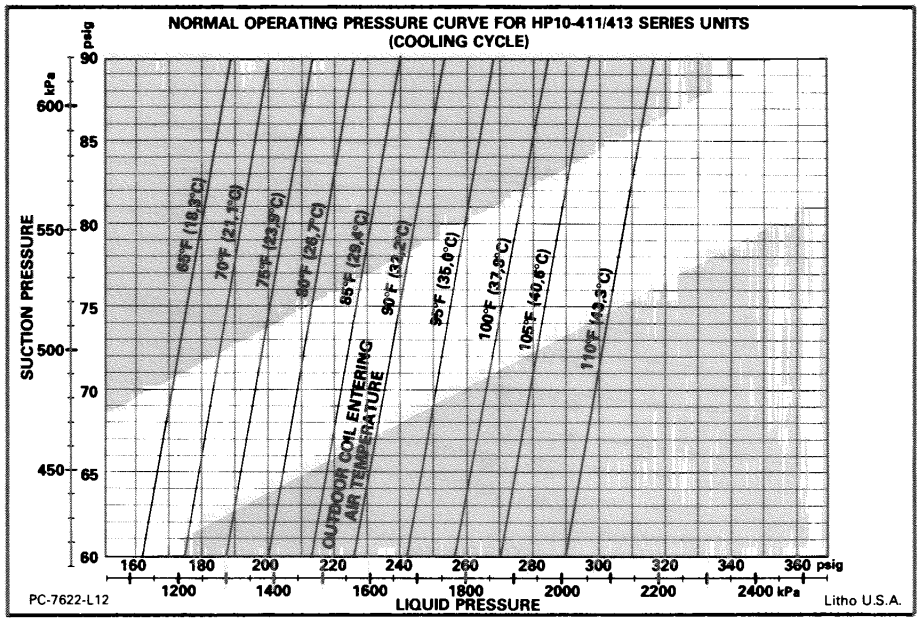
C - Pressure Curves

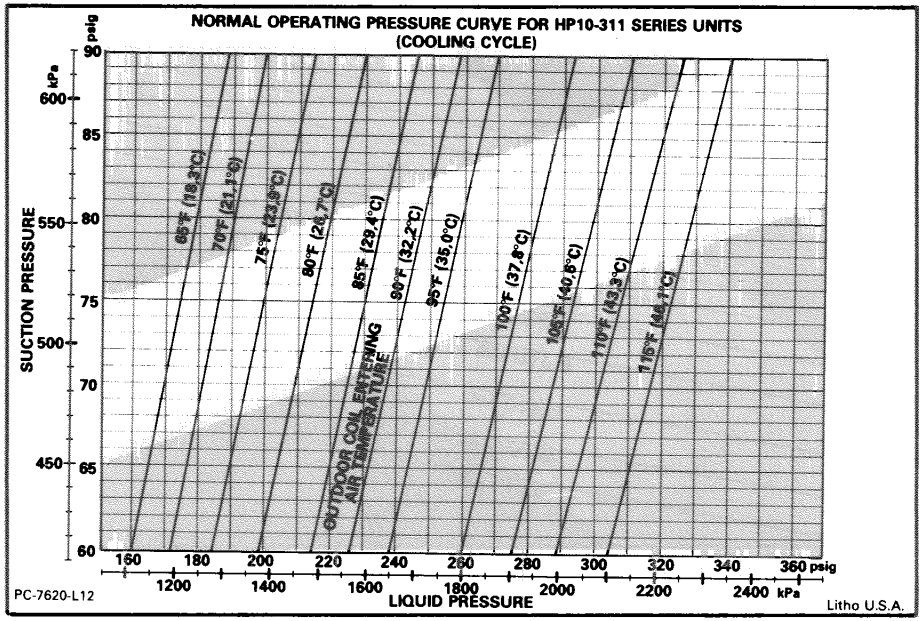


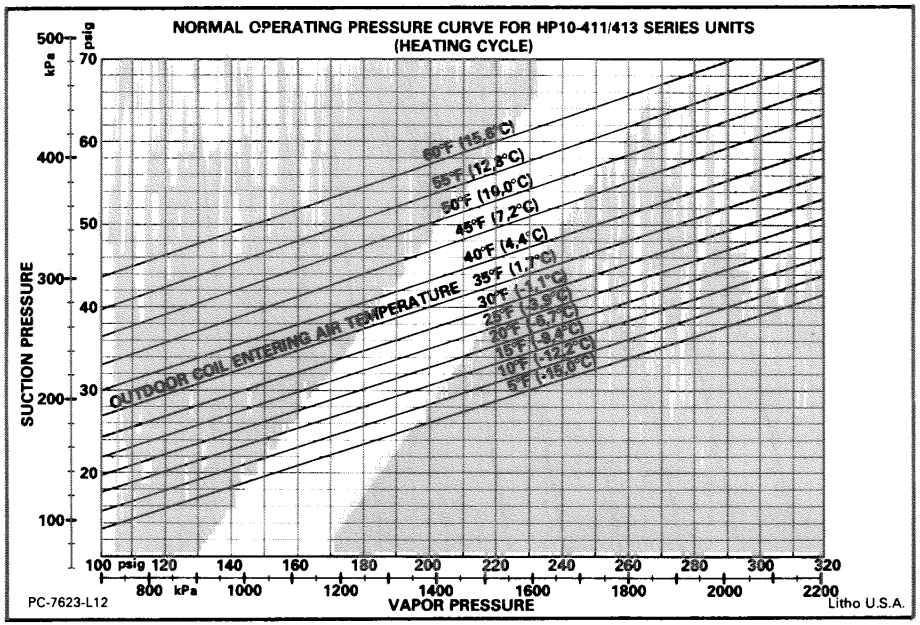


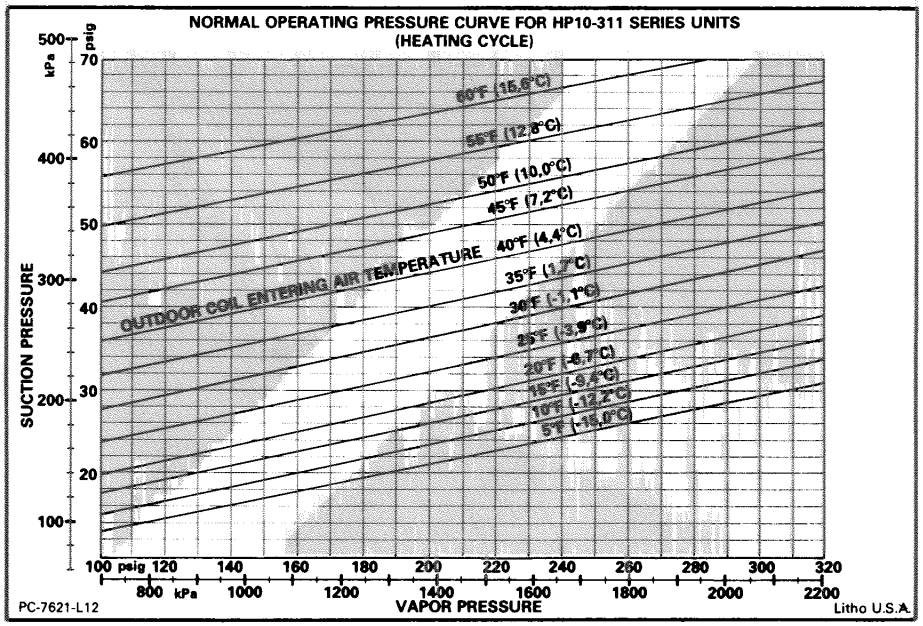


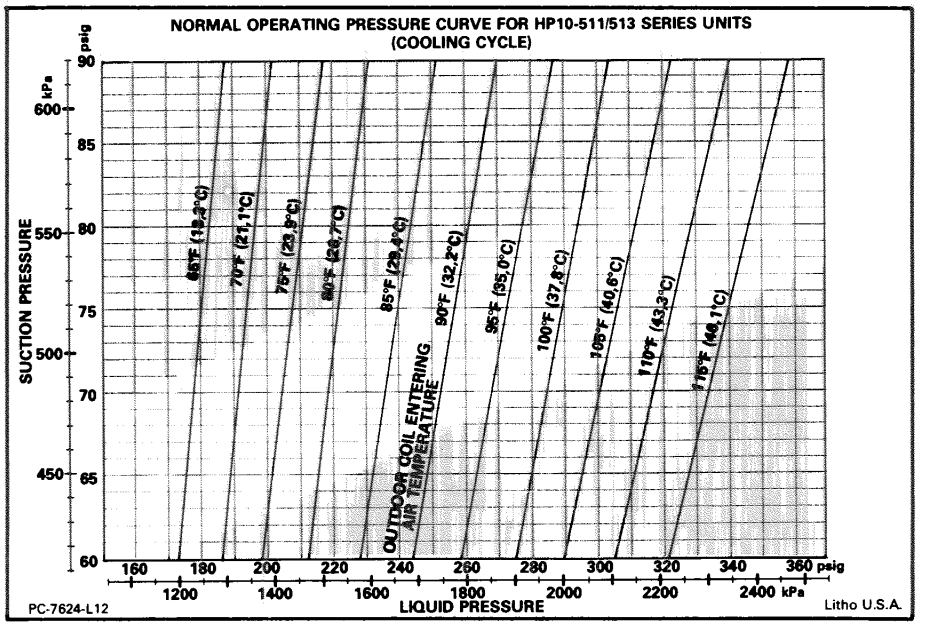


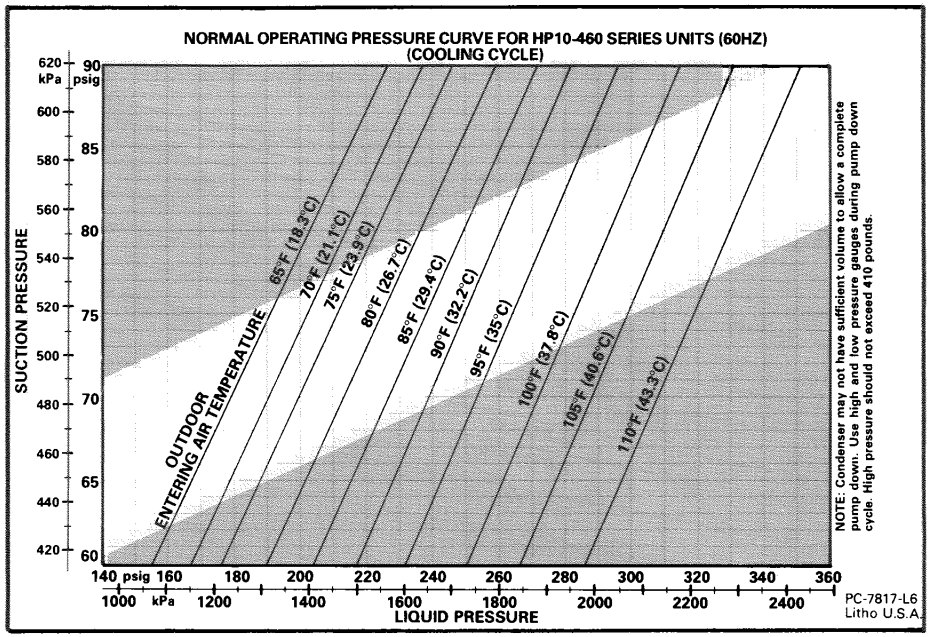

NORMAL OPERATING PRESSURE CURVE FOR HP10-411/413 SERIES UNITS
(COOLING CYCLE)
SUCTION PRESSURE
psig
kPa
LIQUID PRESSURE
OUTDOOR COIL ENTERING AIR TEMPERATURE
65°F (18,3°C)
70°F (21,1°C)
75°F (23,9°C)
80°F (26,7°C)
85°F (29,4°C)
90°F (32,2°C)
95°F (35,0°C)
100°F (37,8°C)
105°F (40,6°C)
110°F (43,3°C)
PC-7622-L12
Litho U.S.A.

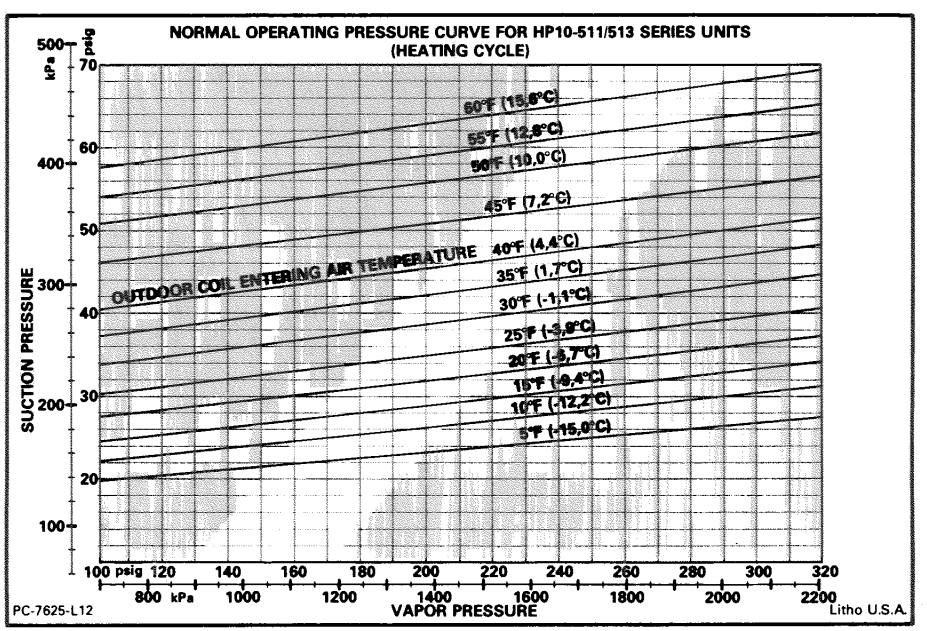

NORMAL OPERATING PRESSURE CURVE FOR HP10-311 SERIES UNITS
(COOLING CYCLE)
SUCTION PRESSURE
psig
kPa
LIQUID PRESSURE
OUTDOOR COIL ENTERING AIR TEMPERATURE
65°F (18,3°C)
70°F (21,1°C)
75°F (23,9°C)
80°F (26,7°C)
85°F (29,4°C)
90°F (32,2°C)
95°F (35,0°C)
100°F (37,8°C)
105°F (40,6°C)
110°F (43,3°C)
115°F (46,1°C)
PC-7620-L12
Litho U.S.A.

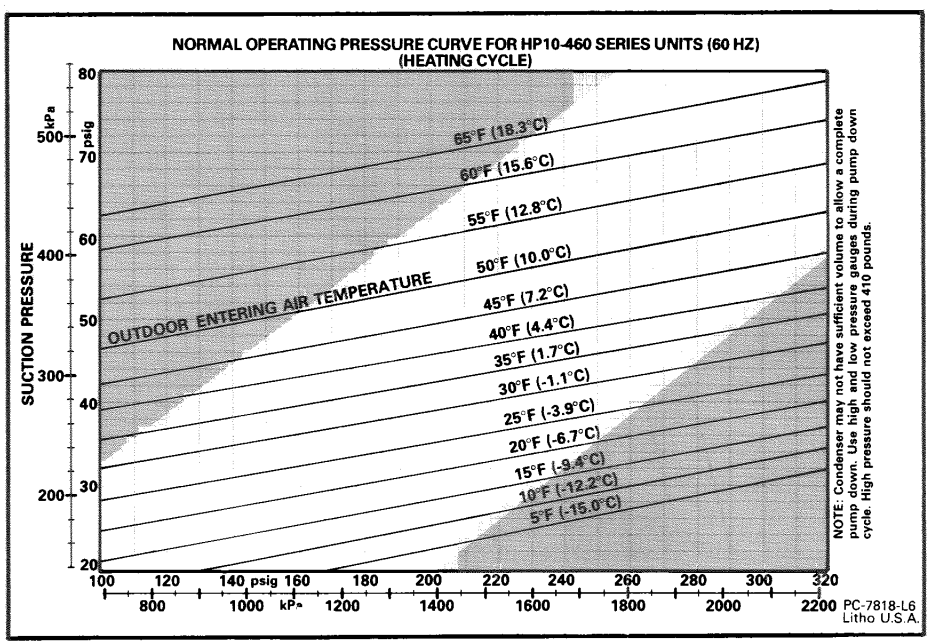

NORMAL OPERATING PRESSURE CURVE FOR HP10-411/413 SERIES UNITS
(HEATING CYCLE)
SUCTION PRESSURE
psig
kPa
VAPOR PRESSURE
OUTDOOR COIL ENTERING AIR TEMPERATURE
60°F (15,6°C)
55°F (12,8°C)
50°F (10,0°C)
45°F (7,2°C)
40°F (4,4°C)
35°F (1,7°C)
30°F (-1,1°C)
25°F (-3,9°C)
20°F (-6,7°C)
15°F (-9,4°C)
10°F (-12,2°C)
5°F (-15,0°C)
PC-7623-L12
Litho U.S.A.


NORMAL OPERATING PRESSURE CURVE FOR HP10-311 SERIES UNITS
(HEATING CYCLE)
SUCTION PRESSURE
psig
kPa
VAPOR PRESSURE
OUTDOOR COIL ENTERING AIR TEMPERATURE
60°F (15,6°C)
55°F (12,8°C)
50°F (10,0°C)
45°F (7,2°C)
40°F (4,4°C)
35°F (1,7°C)
30°F (-1,1°C)
25°F (-3,9°C)
20°F (-6,7°C)
15°F (-9,4°C)
10°F (-12,2°C)
5°F (-15,0°C)
PC-7621-L12
Litho U.S.A.

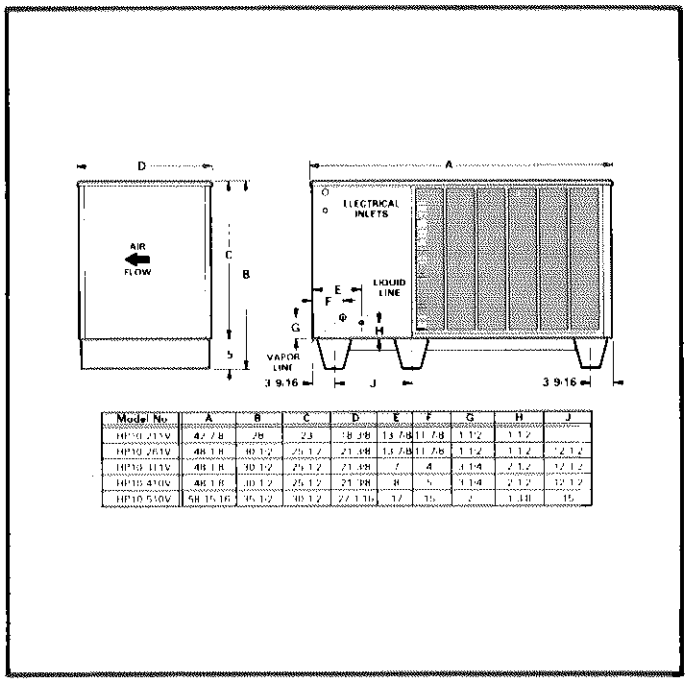

NORMAL OPERATING PRESSURE CURVE FOR HP10-511/513 SERIES UNITS
(COOLING CYCLE)
SUCTION PRESSURE
psig
kPa
LIQUID PRESSURE
OUTDOOR COIL ENTERING AIR TEMPERATURE
65°F (18.3°C)
70°F (21.1°C)
75°F (23.9°C)
80°F (26.7°C)
85°F (29.4°C)
90°F (32.2°C)
95°F (35.0°C)
100°F (37.8°C)
105°F (40.6°C)
110°F (43.3°C)
115°F (46.1°C)
PC-7624-L12
Litho U.S.A.


NORMAL OPERATING PRESSURE CURVE FOR HP10-460 SERIES UNITS (60HZ)
(COOLING CYCLE)
SUCTION PRESSURE
kPa
psig
LIQUID PRESSURE
OUTDOOR ENTERING AIR TEMPERATURE
65°F (18.3°C)
70°F (21.1°C)
75°F (23.9°C)
80°F (26.7°C)
85°F (29.4°C)
90°F (32.2°C)
95°F (35°C)
100°F (37.8°C)
105°F (40.6°C)
110°F (43.3°C)
NOTE: Condenser may not have sufficient volume to allow a complete pump down. Use high and low pressure gauges during pump down cycle. High pressure should not exceed 410 pounds.
PC-7817-L6
Litho U.S.A.


NORMAL OPERATING PRESSURE CURVE FOR HP10-511/513 SERIES UNITS
(HEATING CYCLE)
SUCTION PRESSURE
kPa
psig
VAPOR PRESSURE
OUTDOOR COIL ENTERING AIR TEMPERATURE
60°F (15.6°C)
55°F (12.8°C)
50°F (10.0°C)
45°F (7.2°C)
40°F (4.4°C)
35°F (1.7°C)
30°F (-1.1°C)
25°F (-3.9°C)
20°F (-6.7°C)
15°F (-9.4°C)
10°F (-12.2°C)
5°F (-15.0°C)
PC-7625-L12
Litho U.S.A.


NORMAL OPERATING PRESSURE CURVE FOR HP10-460 SERIES UNITS (60 HZ)
(HEATING CYCLE)
SUCTION PRESSURE
kPa
psig
OUTDOOR ENTERING AIR TEMPERATURE
65°F (18.3°C)
60°F (15.6°C)
55°F (12.8°C)
50°F (10.0°C)
45°F (7.2°C)
40°F (4.4°C)
35°F (1.7°C)
30°F (-1.1°C)
25°F (-3.9°C)
20°F (-6.7°C)
15°F (-9.4°C)
10°F (-12.2°C)
5°F (-15.0°C)
NOTE: Condenser may not have sufficient volume to allow a complete pump down. Use high and low pressure gauges during pump down cycle. High pressure should not exceed 410 pounds.
PC-7818-L6
Litho U.S.A.

D - Dimensions



Model No.	A	B	C	D	E	F	G	H	J
HP10-211V	42 7/8	26	23	18 3/8	13 7/8	11 7/8	1 1/2	1 1/2	
HP10-261V	48 1/8	30 1/2	25 1/2	21 3/8	13 7/8	11 7/8	1 1/2	1 1/2	2 1/2
HP10-311V	48 1/8	30 1/2	25 1/2	21 3/8	7	4	3 1/4	2 1/2	12 1/2
HP10-410V	48 1/8	30 1/2	25 1/2	21 3/8	8	5	3 1/4	2 1/2	12 1/2
HP10-510V	58 15/16	36 1/2	30 1/2	22 1/16	17	15	2	1 1/8	15

E - Heating Performance Charts

HP10-211V HEATING PERFORMANCE
at 675 cfm Indoor Coil Air Volume

*Outdoor Temperature (Degree F)	CBP13-480FF		C12-420 & CR12-420	
	Compressor Motor Watts Input	Total Output (Btuh)	Compressor Motor Watts Input	Total Output (Btuh)
65	1,835	24,400	1,790	23,800
60	1,785	22,900	1,740	22,300
55	1,720	21,400	1,680	20,900
50	1,670	20,100	1,630	19,600
45	1,610	19,100	1,570	18,600
40	1,580	17,800	1,540	17,300
35	1,530	16,600	1,490	16,400
30	1,475	15,300	1,440	15,400
25	1,425	14,300	1,390	14,400
20	1,365	13,300	1,330	13,400
15	1,300	12,000	1,270	12,200
10	1,215	10,600	1,190	10,900
5	1,125	9,300	1,100	9,600
0	1,035	8,100	1,010	8,300
-5	940	6,900	920	7,100
-10	850	5,800	830	6,000
-15	770	4,700	750	4,900
-20	690	4,100	670	4,300

HP10-261V HEATING PERFORMANCE
at 900 cfm Indoor Coil Air Volume

*Outdoor Temperature (Degree F)	(C12-420 & CR12-420)		C12-525 & CR12-525		CBP13-480FF	
	Compressor Motor Watts Input	Total Output (Btuh)	Compressor Motor Watts Input	Total Output (Btuh)	Compressor Motor Watts Input	Total Output (Btuh)
65	2725	32,900	2565	31,600	2725	32,300
60	2535	30,500	2385	29,300	2535	29,900
55	2345	28,400	2205	27,300	2345	27,900
50	2175	26,300	2045	25,300	2175	25,900
45	2035	24,000	1915	23,100	2035	23,600
40	1895	21,700	1785	20,800	1895	21,300
35	1790	20,000	1685	19,200	1790	20,000
30	1700	18,600	1600	17,800	1700	18,900
25	1630	16,900	1535	16,200	1630	17,200
20	1555	15,300	1465	14,700	1555	15,600
15	1495	13,900	1405	13,400	1495	14,300
10	1425	12,200	1340	11,700	1425	12,700
5	1370	10,700	1290	10,300	1370	11,100
0	1310	9,300	1235	8,900	1310	9,700
-5	1250	7,900	1175	7,600	1250	8,200
-10	1190	6,900	1120	6,600	1190	7,100
-15	1125	6,300	1060	6,100	1125	6,500
-20	1060	5,800	1000	5,600	1060	6,000

*Outdoor temperature at 70% relative humidity.
Indoor temperature at 70°.

HP10-311V HEATING PERFORMANCE
at 1125 cfm Indoor Coil Air Volume

*Outdoor Temperature (Degree F)	CBP10-41		CPH10-490 & CBPH10-490/41		C12-525 & CR12-525		C5-620FF	
	Compressor Motor Watts Input	Total Output (Btuh)	Compressor Motor Watts Input	Total Output (Btuh)	Compressor Motor Watts Input	Total Output (Btuh)	Compressor Motor Watts Input	Total Output (Btuh)
65	3210	41,500	3210	41,500	3305	41,500	3440	40,800
60	3015	38,400	3015	38,400	3105	38,400	3250	37,800
55	2840	35,400	2840	35,400	2925	35,400	3050	34,800
50	2670	32,300	2670	32,300	2750	32,300	2865	31,800
45	2525	29,700	2525	29,700	2600	29,700	2710	29,200
40	2380	26,700	2380	26,700	2450	26,700	2555	26,300
35	2210	23,600	2210	23,500	2275	23,600	2370	23,200
30	2085	21,500	2050	21,300	2145	21,500	2240	21,200
25	2020	19,800	1925	19,500	2080	19,800	2170	19,500
20	1940	18,500	1850	18,200	2000	18,500	2080	18,200
15	1890	17,400	1800	17,100	1945	17,400	2030	17,100
10	1795	15,400	1745	15,200	1850	15,400	1925	15,200
5	1695	14,000	1670	13,800	1745	14,000	1820	13,800
0	1575	12,300	1565	12,300	1620	12,300	1690	12,100
-5	1470	10,000	1470	10,000	1515	10,000	1580	9,900
-10	1350	8500	1350	8500	1390	8,500	1450	8,400
-15	1220	7500	1220	7500	1255	7,500	1310	7,400
-20	1070	6000	1070	6000	1100	6,000	1150	6,000

HP10-410V HEATING PERFORMANCE
at 1350 cfm Indoor Coil Air Volume

*Outdoor Temperature (Degree F)	CBP10-41		CPH10-490 & CBPH10-490/41		C12-630 & CR12-630		CP12-630 & CR12-630N		C5-620FF	
	Compressor Motor Watts Input	Total Output (Btuh)	Compressor Motor Watts Input	Total Output (Btuh)	Compressor Motor Watts Input	Total Output (Btuh)	Compressor Motor Watts Input	Total Output (Btuh)	Compressor Motor Watts Input	Total Output (Btuh)
65	3170	44,600	3215	44,600	3215	44,600	3350	42,700	3260	44,600
60	3025	42,000	3070	42,000	3065	42,000	3195	40,200	3110	42,000
55	2875	39,100	2915	39,100	2915	39,100	3035	37,400	2955	39,100
50	2755	36,500	2795	36,500	2795	36,500	2910	34,900	2835	36,500
45	2615	34,100	2650	34,100	2650	34,100	2760	32,600	2690	34,100
40	2485	31,600	2520	31,500	2520	31,600	2625	30,200	2555	31,600
35	2365	29,100	2400	28,700	2400	29,100	2495	27,800	2430	29,100
30	2245	26,700	2275	26,200	2275	26,700	2370	25,600	2310	26,700
25	2125	24,100	2140	23,700	2155	24,100	2245	23,100	2185	24,100
20	2000	21,500	2000	21,100	2025	21,500	2110	20,600	2055	21,500
15	1900	19,500	1850	18,900	1925	19,500	2005	18,700	1955	19,500
10	1780	16,900	1740	16,400	1805	16,900	1880	16,200	1830	16,900
5	1660	14,900	1630	14,400	1685	14,900	1755	14,300	1705	14,900
0	1535	12,300	1520	12,000	1555	12,300	1620	11,800	1580	12,300
-5	1450	10,300	1440	10,300	1470	10,300	1530	9,900	1490	10,300
-10	1350	8,800	1340	8,800	1370	8,800	1425	8,400	1390	8,800
-15	1220	7,500	1200	7,500	1215	7,500	1260	7,200	1235	7,500
-20	1050	6,200	1050	6,200	1065	6,200	1110	5,900	1080	6,200

HP10-510V HEATING PERFORMANCE
at 1800 cfm Indoor Coil Air Volume

*Outdoor Temperature (Degree F)	CBP10-51		CPH10-645 & CBPH10-645/51		C12-840 & CR12-840		C5-805FF	
	Compressor Motor Watts Input	Total Output (Btuh)	Compressor Motor Watts Input	Total Output (Btuh)	Compressor Motor Watts Input	Total Output (Btuh)	Compressor Motor Watts Input	Total Output (Btuh)
65	4440	62,500	4440	62,500	4610	62,200	4525	63,700
60	4255	58,900	4255	58,900	4415	58,600	4340	60,100
55	4090	55,300	4090	55,300	4245	55,000	4170	56,400
50	3895	51,800	3895	51,800	4020	50,500	3970	52,800
45	3720	48,200	3720	48,200	3840	47,000	3795	49,200
40	3525	44,600	3510	44,600	3640	43,500	3595	45,500
35	3330	41,400	3285	41,200	3435	40,400	3395	42,200
30	3155	38,400	3095	37,900	3255	37,400	3215	39,200
25	3000	35,200	2930	34,200	3075	34,300	3060	35,900
20	2815	32,600	2800	31,600	2885	31,800	2870	33,300
15	2630	29,600	2560	28,600	2695	28,800	2680	30,200
10	2435	26,000	2355	25,000	2485	25,400	2485	26,500
5	2245	22,600	2165	21,600	2290	22,100	2290	23,100
0	2060	19,000	1960	18,000	2100	18,600	2100	19,400
-5	1785	15,000	1760	14,500	1820	14,700	1820	15,300
-10	1690	12,000	1690	12,000	1705	11,700	1725	12,200
-15	1595	9,000	1595	9,000	1610	8,800	1625	9,200
-20	1505	7,000	1505	7,000	1520	6,900	1535	7,100

*Outdoor temperature at 70% relative humidity.
Indoor temperature at 70°.

F - Field Wiring

High voltage leads provided in make-up area of control box for connection to power supply. Figure 2 shows two typical low voltage hook-ups.

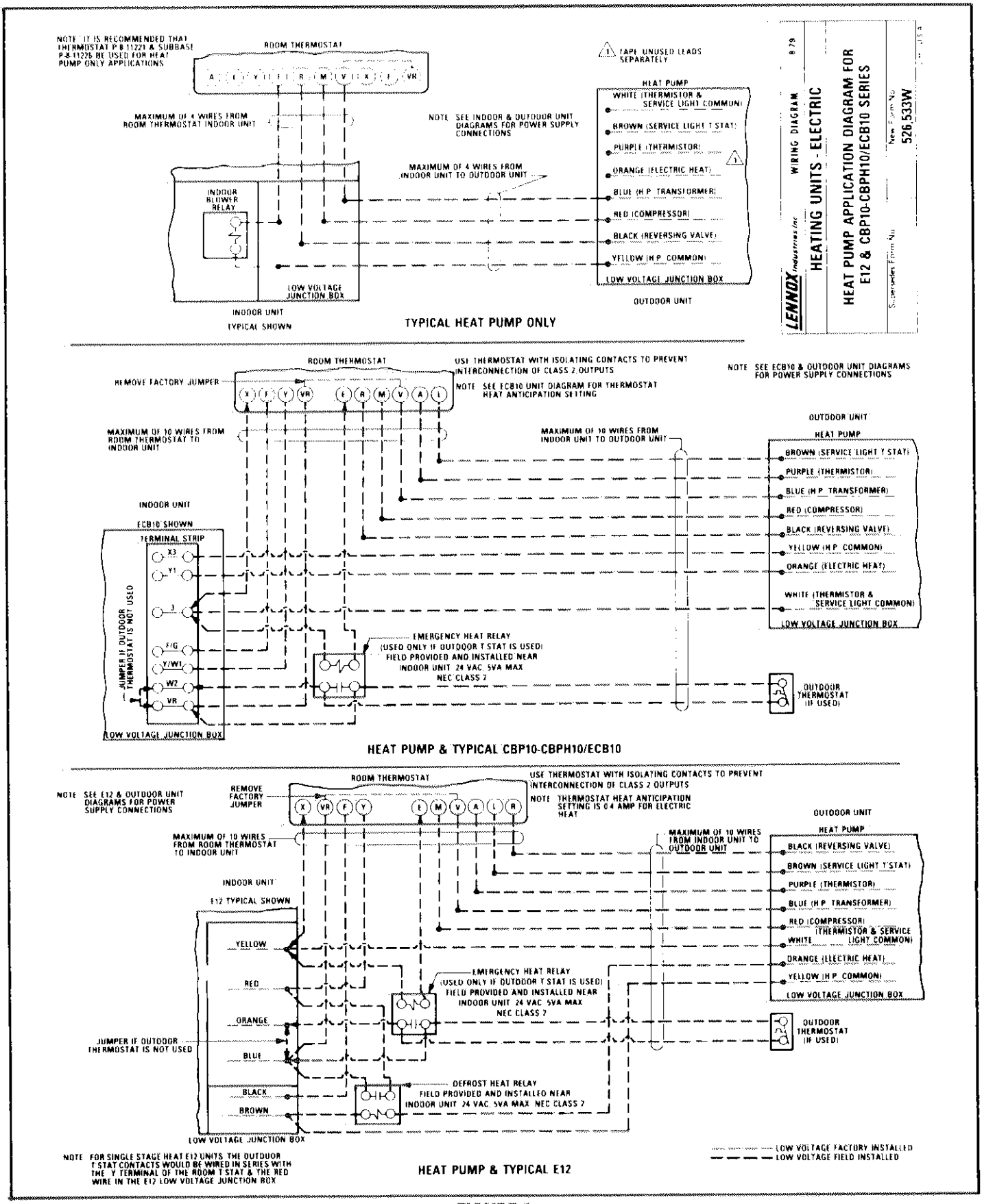


FIGURE 2

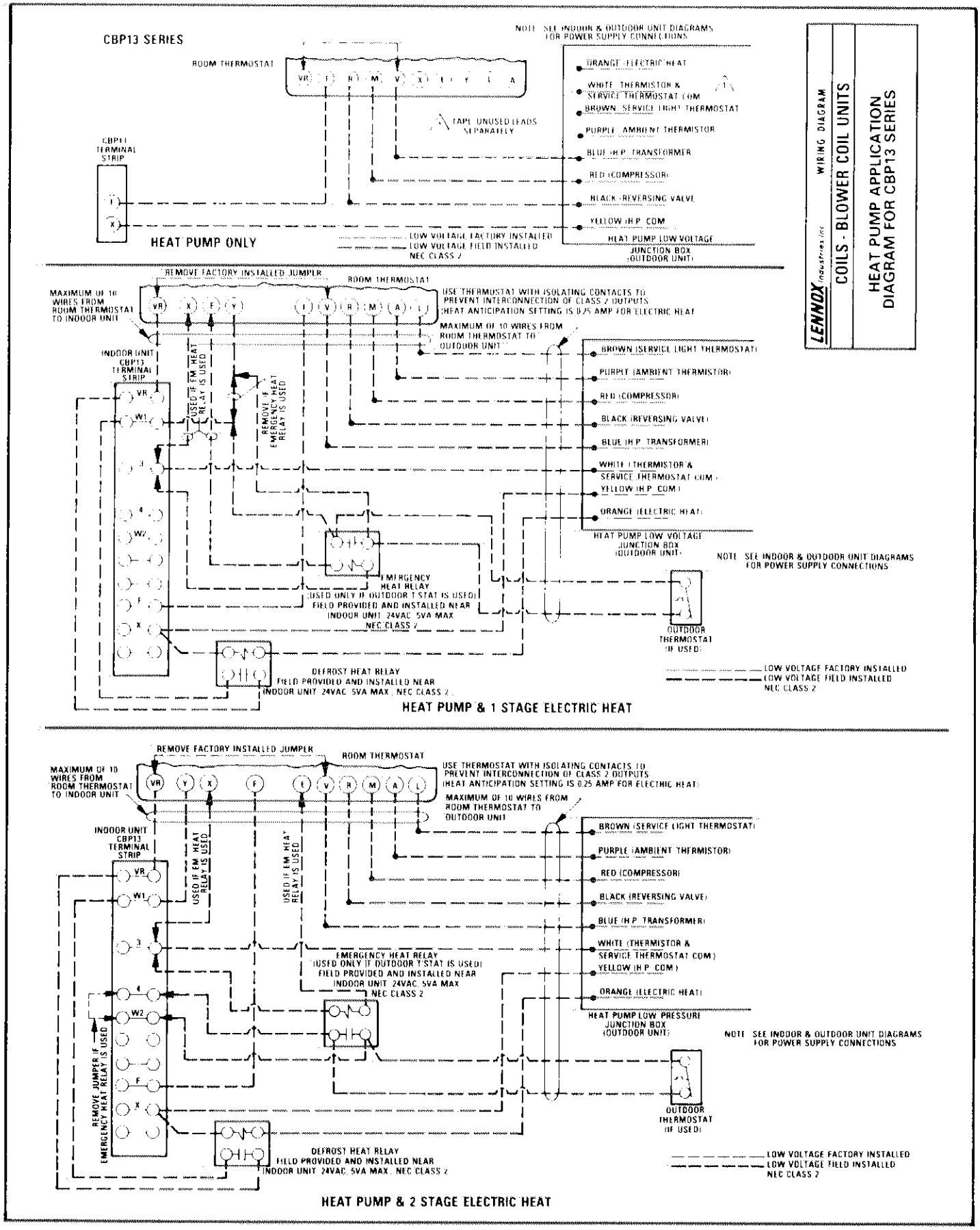
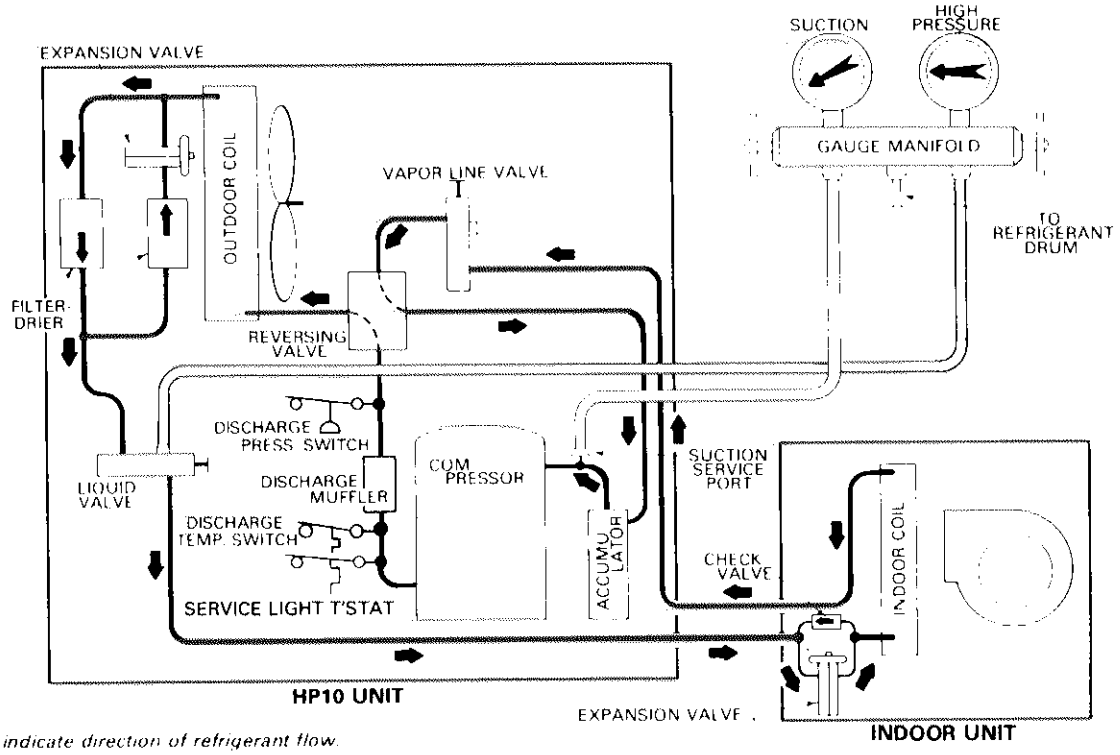

CBP13 SERIES
NOTE SEE INDOOR & OUTDOOR UNIT DIAGRAMS FOR POWER SUPPLY CONNECTIONS
ROOM THERMOSTAT
VR F R M V X E Y L A
TAPE UNUSED LEADS SEPARATELY
CBP13 TERMINAL STRIP
ORANGE (ELECTRIC HEAT)
WHITE (THERMISTOR & SERVICE THERMOSTAT COM)
BROWN (SERVICE LIGHT THERMOSTAT)
PURPLE (AMBIENT THERMISTOR)
BLUE (H.P. TRANSFORMER)
RED (COMPRESSOR)
BLACK (REVERSING VALVE)
YELLOW (H.P. COM)
HEAT PUMP LOW VOLTAGE JUNCTION BOX (OUTDOOR UNIT)
LOW VOLTAGE FACTORY INSTALLED
LOW VOLTAGE FIELD INSTALLED NEC CLASS 2
HEAT PUMP ONLY
LENNOX Industries Inc
WIRING DIAGRAM
COILS - BLOWER COIL UNITS
HEAT PUMP APPLICATION DIAGRAM FOR CBP13 SERIES
REMOVE FACTORY INSTALLED JUMPER
ROOM THERMOSTAT
MAXIMUM OF 10 WIRES FROM ROOM THERMOSTAT TO INDOOR UNIT
USE THERMOSTAT WITH ISOLATING CONTACTS TO PREVENT INTERCONNECTION OF CLASS 2 OUTPUTS (HEAT ANTICIPATION SETTING IS 0.25 AMP FOR ELECTRIC HEAT)
MAXIMUM OF 10 WIRES FROM ROOM THERMOSTAT TO OUTDOOR UNIT
INDOOR UNIT CBP13 TERMINAL STRIP
USED IF EM HEAT RELAY IS USED
REMOVE IF EMERGENCY HEAT RELAY IS USED
EMERGENCY HEAT RELAY (USED ONLY IF OUTDOOR T'STAT IS USED) FIELD PROVIDED AND INSTALLED NEAR INDOOR UNIT 24VAC 5VA MAX NEC CLASS 2
OUTDOOR THERMOSTAT (IF USED)
DEFROST HEAT RELAY FIELD PROVIDED AND INSTALLED NEAR INDOOR UNIT 24VAC 5VA MAX. NEC CLASS 2
HEAT PUMP & 1 STAGE ELECTRIC HEAT
HEAT PUMP LOW PRESSURE JUNCTION BOX (OUTDOOR UNIT)
REMOVE JUMPER IF EMERGENCY HEAT RELAY IS USED
HEAT PUMP & 2 STAGE ELECTRIC HEAT

FIGURE 3

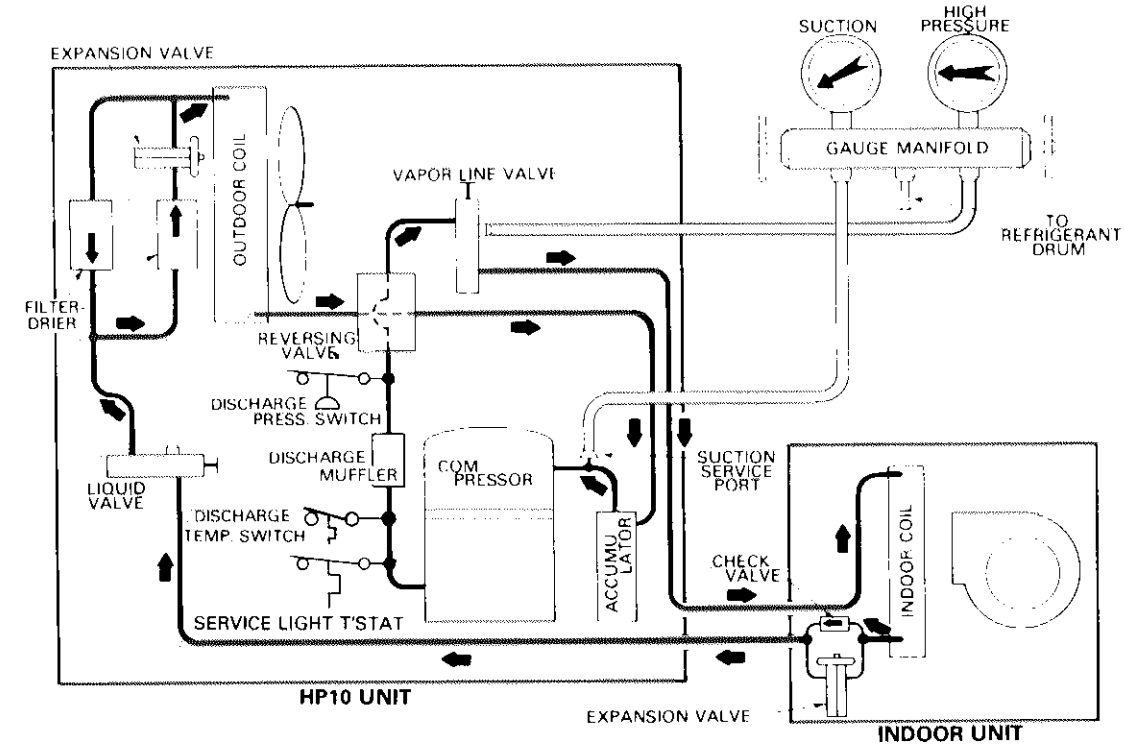
GAUGE MANIFOLD CONNECTIONS (COOLING CYCLE)



Note - Arrows indicate direction of refrigerant flow.

FIGURE 4

GAUGE MANIFOLD CONNECTIONS (HEATING CYCLE)



Note - Arrows indicate direction of refrigerant flow.

FIGURE 5

III - REFRIGERANT SYSTEM

Figures 4 and 5 show the gauge manifold connections for both the cooling and heating cycles. They also show the refrigerant flow. The vapor line and liquid service valves and gauge port connections are located inside cabinet as shown in Figure 6.

Two special filter-drier/check valves are used. The driers are mounted in the liquid line in a parallel flow arrangement with one drier for the cooling cycle and the other drier for the heating cycle. They are single directional flow with built-in check valves for correct refrigerant flow.

The expansion valve used in HP10-260, 310 and 410 units changes superheat setting in response to the affects of low ambient conditions on the outdoor coil. This expansion valve allows a slight floodback to the accumulator during low ambients to maintain the refrigerant flow rate to compressor. This keeps oil and discharge temperatures within safe limits and helps prevent motor "hot spotting" from occuring. As a typical example, one might expect 15°F superheat at approximately 47°F ambient and zero superheat at 0°F.

It is very critical not to overcharge a heat pump. 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 cycle, the charge should be rechecked in the cooling cycle when outdoor conditions permit.

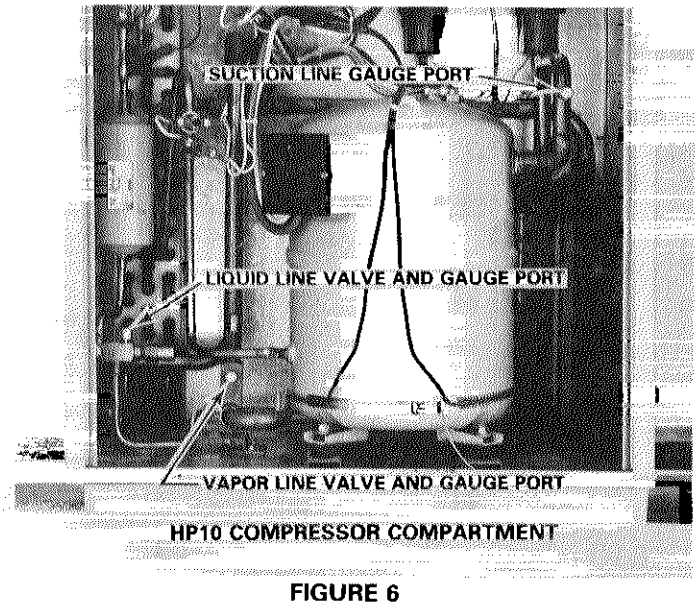


FIGURE 6

IV - HP10 COMPONENTS

Figure 7 shows an exploded view of the HP10. Note that the expansion valve, check valve and filter-drier arrangement was for early production units.

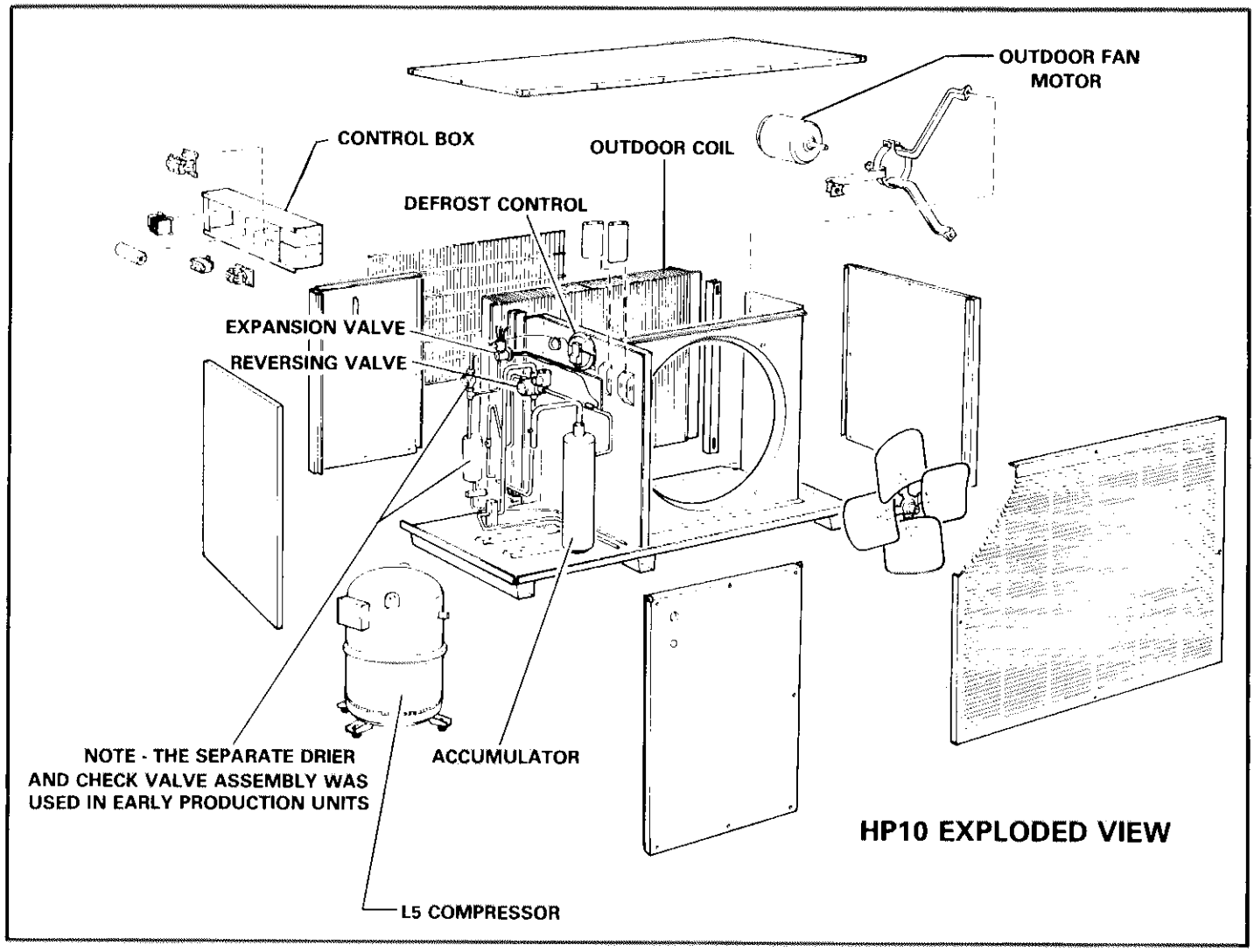


FIGURE 7

A - Control Box (Figure 8)

1 - Transformer

Power the heat pump control circuits and the "V" leg of thermostat. Transformer is fused.

2 - Compressor Contactor

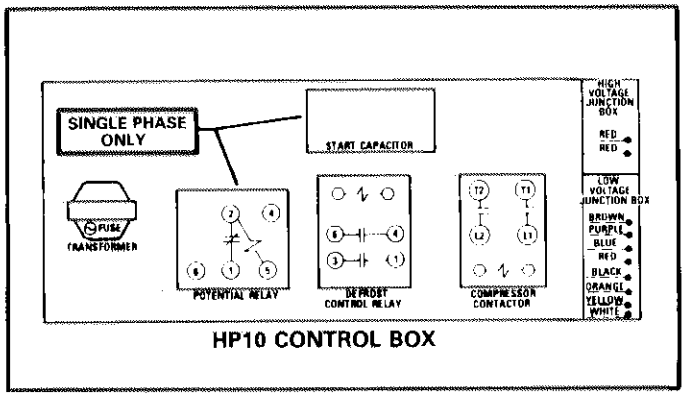
Powers the compressor and condenser fan motor (through the defrost control relay) on demand.

3 - Defrost Control Relay

Is a two-pole single-throw with normally open contacts and 208/240V coil. Switches the unit into defrost cycle upon demand by Defrost Control.

4 - Potential Relay And Start Capacitor (1ø only)

On start-up it brings compressor up to operating speed.



HP10 CONTROL BOX

FIGURE 8

B - Compressor Compartment

1 - Compressor

HS10-460 and 510 units are equipped with the Lennox "L5" compressors. All compressors are internally protected from excessive current and temperature. Compressors used in HS10-260, 310 & 410 are also protected by an internal pressure relief valve. This valve opens at a discharge and suction differential of 450 psig ± 50.

2 - High Pressure Switch

This switch mounts in the discharge line. It cuts out at 410 psig and must be manually reset when pressure drops below 180 psig.

3 - Discharge Temperature Limit Switch or Crankcase Temperature Limit Switch

Some HP10 units are equipped with a discharge limit switch which is mounted on the compressor discharge line. It shuts off the system if discharge temperature exceeds 260°F (127°C). The limit switch must be manually reset when discharge temperature drops to 225°F (107°C) or below.

Some HP10 units are equipped with a crankcase temperature limit switch which is mounted to the outside bottom of the compressor from operating at an exceedingly high oil temperature by opening control circuit at 190°F (87.8°C).

4 - Service Light Thermostat

The service light thermostat is used in conjunction with the room thermostat. It monitors discharge temperature and closes on a temperature fall (110°F closes - 130°F opens). The red service light on the room thermostat is energized when thermostat closes, providing second stage bulb is made. This service light may briefly come on during a compressor start-up.

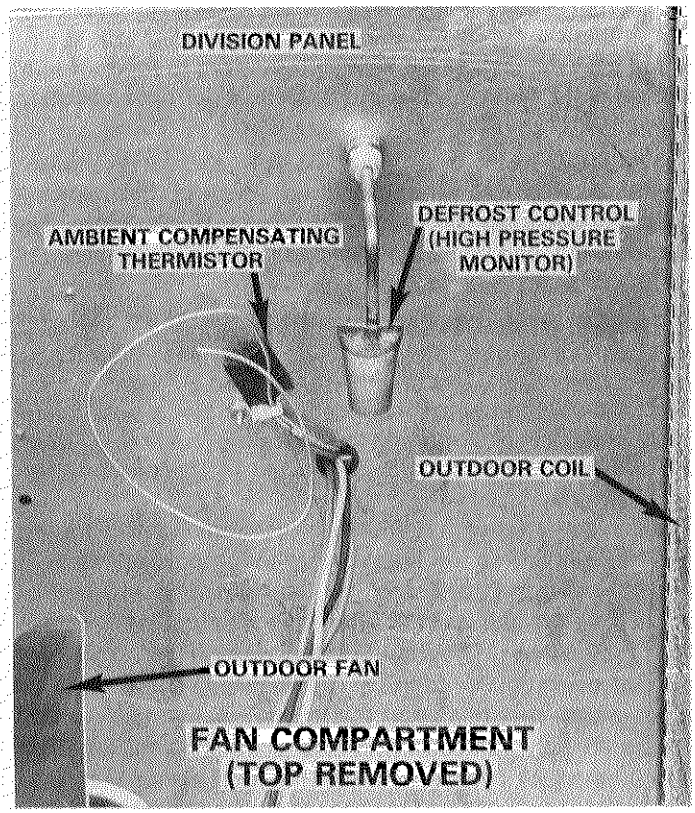
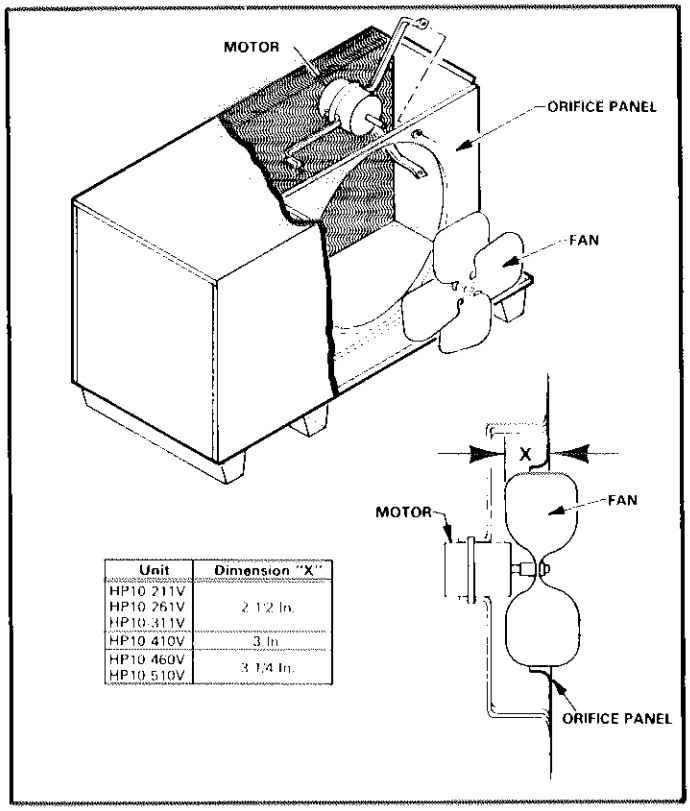


FIGURE 9

C - Outdoor Coil Compartment (Figure 9)

The high pressure monitor portion of the defrost control is located between the outdoor coil and outdoor fan. The ambient compensating thermistor is used in conjunction with



Unit	Dimension "X"
HP10 211V HP10 261V HP10 311V	2 1/2 In.
HP10 410V	3 In.
HP10 460V HP10 510V	3 1/4 In.

FIGURE 10

the room thermostat. It varies heat anticipator resistance as the ambient temperature changes. The outdoor coil is circuited with the refrigerant flow from bottom to top during a defrost cycle. This provides more positive defrost and better condensate run-off.

The unit uses a blow-through coil with horizontal discharge. For fan service access remove top of unit and then remove the bolts securing fan assembly. Figure 10 illustrates the outdoor fan and motor assemblies. The fan motors on HP10-211 & 261 have oiling ports.

D - Room Thermostat

HP10 uses a single stage cool - two stage heat thermostat with ambient compensating thermistor and emergency heat subbase. The ambient conpensating thermistor cuts down thermostat droop to improve the operating characteristics of the system. The thermistor is located in the outdoor fan compartment.

Thermostat is equipped with two indicator lights. The red service light warns the homeowner that the compressor is not operating properly and the heat pump is in need of service. As the unit is cycled "on" by a heating demand, this light may come on briefly until the compressor reaches its normal operating conditions. The homeowner should be made aware that this short intermittent lighting is normal. The amber light comes on whenever the thermostat is placed into emergency heat. It reminds the homeowner that he is not getting the benefit of his heat pump and that he is using expensive electric heat. Figure 11 illustrates thermostat.

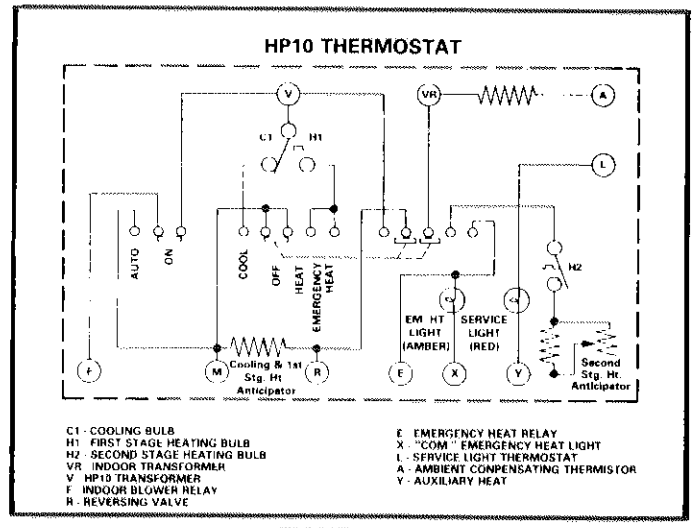


FIGURE 11

E - Defrost Control (Figure 12)

Robertshaw defrost control is pressure initiated and temperature terminated. The high pressure monitor portion of the defrost control is located in the outdoor fan section between the coil and fan. Low pressure is monitored from the compressor compartment. The sensing bulb is clamped to the liquid line.

The control will initiate the defrost cycle at a pressure difference across the outdoor coil at approximately 0.5" WC. The defrost cycle will terminate when the temperature sensor clamped to the liquid line on the outdoor coil reaches 65°F.

V - SCHEMATIC WIRING DIAGRAM OPERATING SEQUENCE

The following illustrations explain the operating sequence in a typical HP10/E12 application.

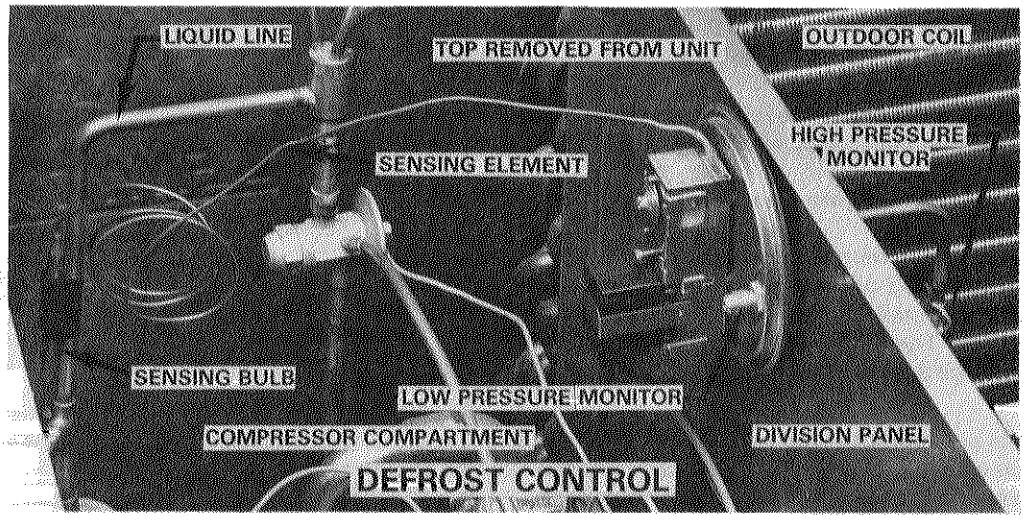
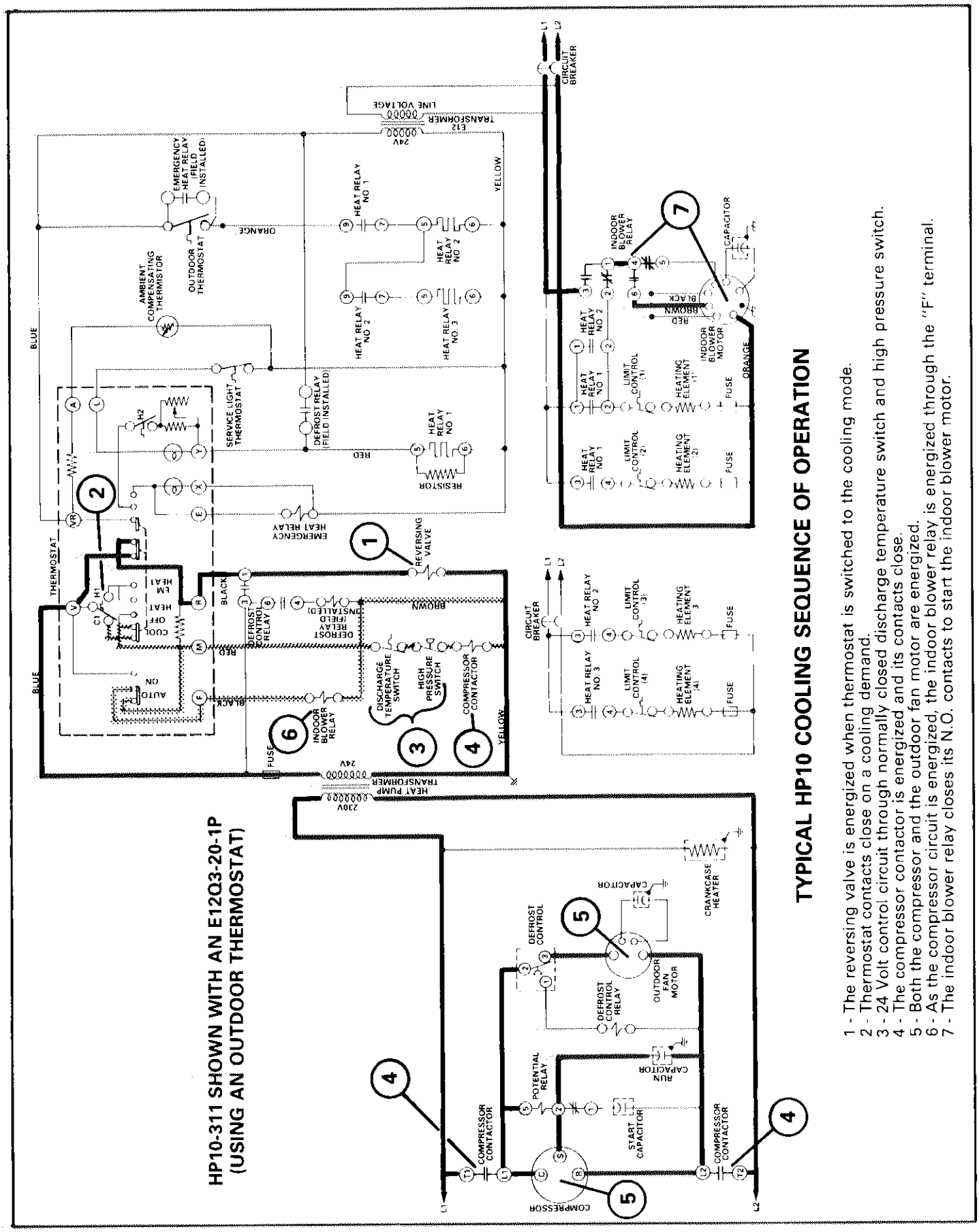
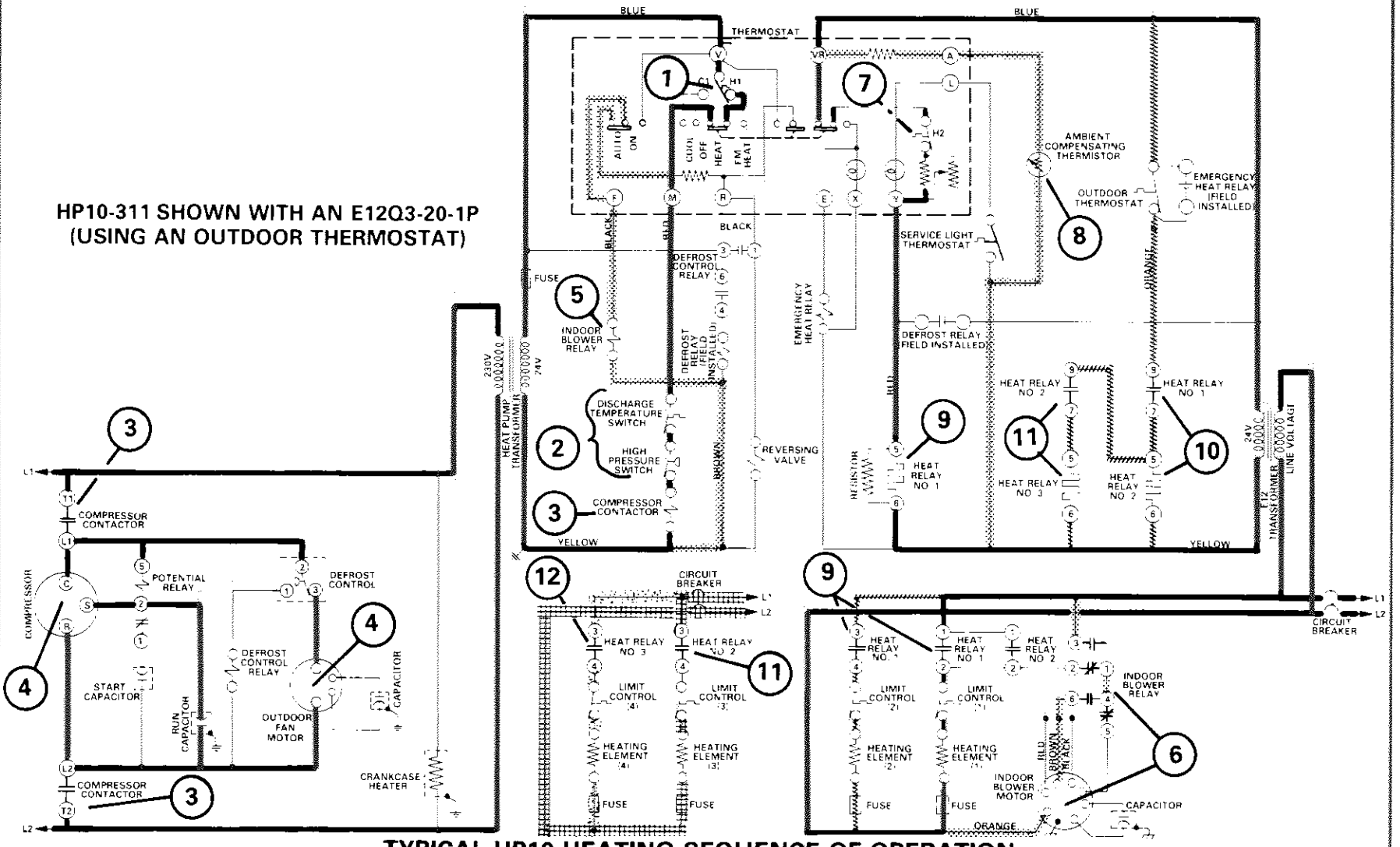


FIGURE 12


HP10-311 SHOWN WITH AN E12Q3-20-1P
(USING AN OUTDOOR THERMOSTAT)
TYPICAL HP10 COOLING SEQUENCE OF OPERATION
1 - The reversing valve is energized when thermostat is switched to the cooling mode.
2 - Thermostat contacts close on a cooling demand.
3 - 24 Volt control circuit through normally closed discharge temperature switch and high pressure switch.
4 - The compressor contactor is energized and its contacts close.
5 - Both the compressor and the outdoor fan motor are energized.
6 - As the compressor circuit is energized, the indoor blower relay is energized through the "F" terminal.
7 - The indoor blower relay closes its N.O. contacts to start the indoor blower motor.
THERMOSTAT
REVERSING VALVE
DEFROST CONTROL RELAY
DISCHARGE TEMPERATURE SWITCH
HIGH PRESSURE SWITCH
COMPRESSOR CONTACTOR
INDOOR BLOWER RELAY
TRANSFORMER
HEAT PUMP
CIRCUIT BREAKER
HEAT RELAY NO 1
HEAT RELAY NO 2
HEAT RELAY NO 3
LIMIT CONTROL
HEATING ELEMENT
FUSE
INDOOR BLOWER MOTOR
CAPACITOR
DEFROST CONTROL
OUTDOOR FAN MOTOR
CRANKCASE HEATER
POTENTIAL RELAY
START CAPACITOR
RUN CAPACITOR
COMPRESSOR
EMERGENCY HEAT RELAY
OUTDOOR THERMOSTAT
AMBIENT COMPENSATING THERMISTOR
SERVICE LIGHT THERMOSTAT
RESISTOR
LINE VOLTAGE

HP10-311 SHOWN WITH AN E12Q3-20-1P (USING AN OUTDOOR THERMOSTAT)



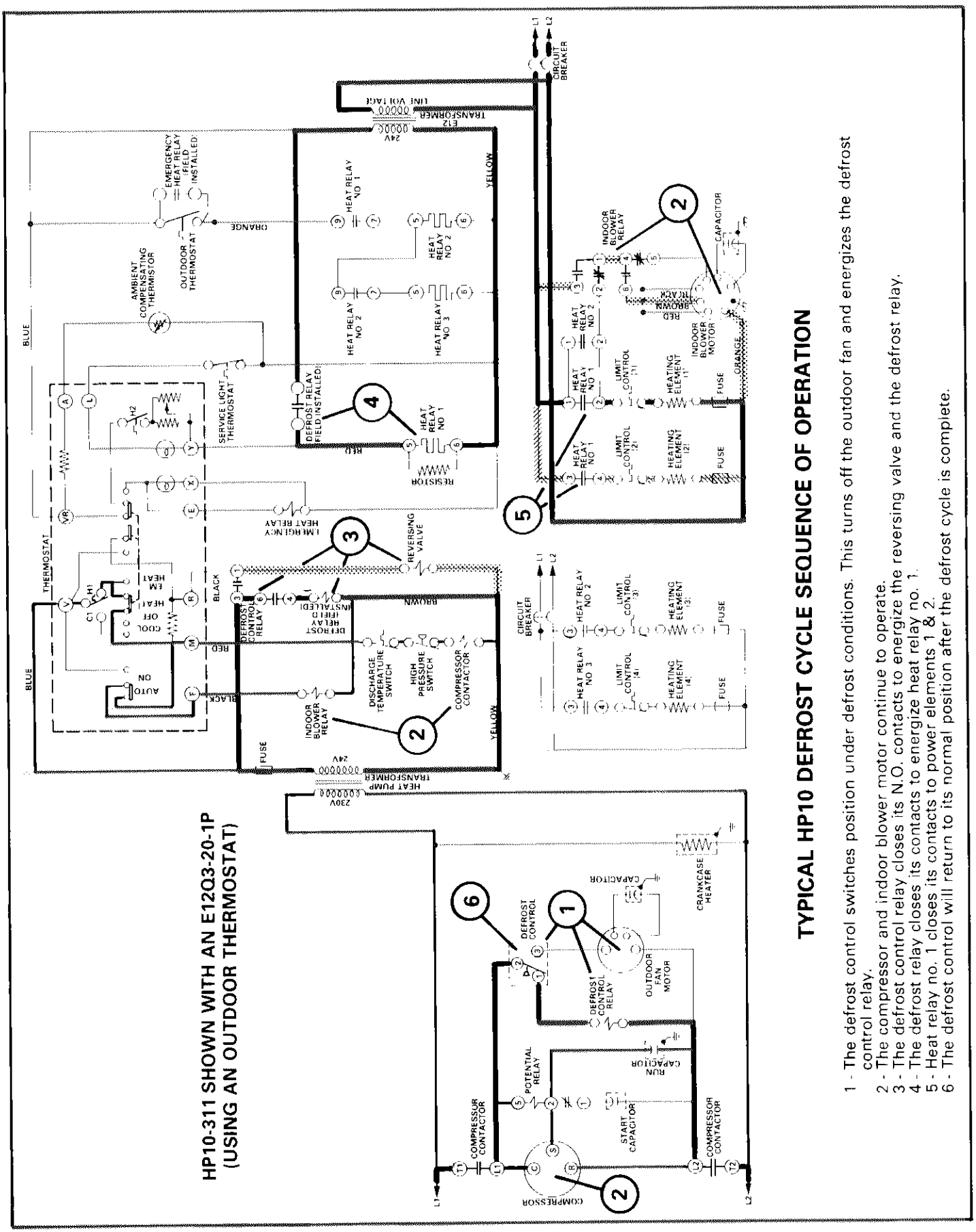
TYPICAL HP10 HEATING SEQUENCE OF OPERATION

HEAT PUMP ONLY

1 - Thermostat controls close on a heating demand.
2 - 24 Volt control circuit through normally closed discharge temperature switch and high pressure switch.
3 - The compressor contactor is energized and its contacts close.
4 - Both the compressor and the outdoor fan motor are energized.
5 - As the compressor circuit is energized, the indoor blower relay is energized through the "F" terminal.
6 - The indoor blower relay closes its N.O. contacts to start the indoor blower motor.

SUPPLEMENT HEAT

7 - If additional heat is needed, the thermostat closes its second stage contacts.
8 - The ambient compensating thermistor circuit cuts down thermostat droop.
9 - Heat relay no. 1 is energized to power elements 1 and 2.
10 - Heat relay no. 1's auxiliary contacts also close to energize heat relay no. 2, providing the outdoor thermostat is closed.
11 - Heat relay no. 2 powers element 3 and also closes an auxiliary set of contacts to energize heat relay no.3.
12 - Heat relay no. 3 powers element 4.

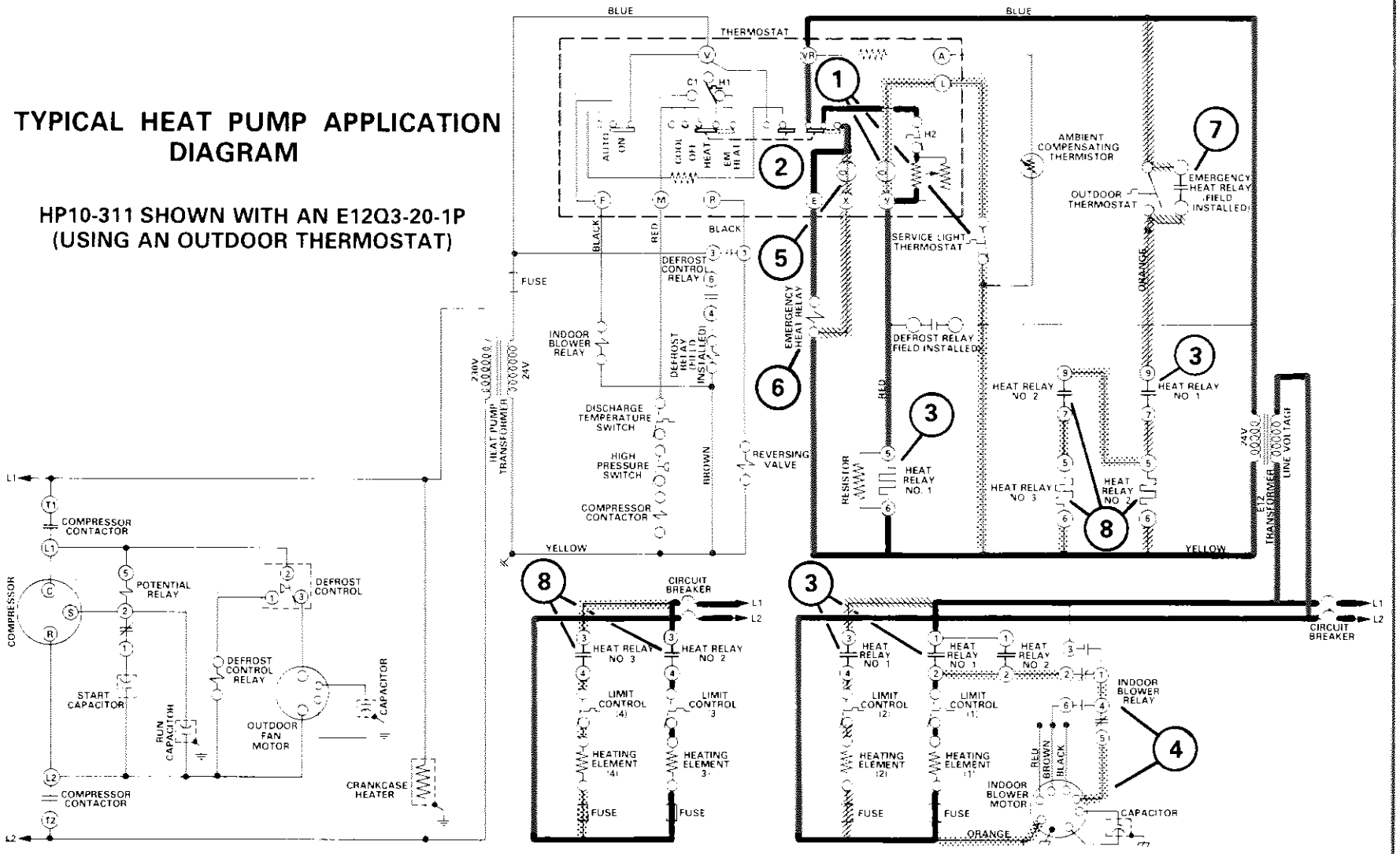


TYPICAL HP10 DEFROST CYCLE SEQUENCE OF OPERATION

1 - The defrost control switches position under defrost conditions. This turns off the outdoor fan and energizes the defrost control relay.
2 - The compressor and indoor blower motor continue to operate.
3 - The defrost control relay closes its N.O. contacts to energize the reversing valve and the defrost relay.
4 - The defrost relay closes its contacts to energize heat relay no. 1.
5 - Heat relay no. 1 closes its contacts to power elements 1 & 2.
6 - The defrost control will return to its normal position after the defrost cycle is complete.

TYPICAL HEAT PUMP APPLICATION DIAGRAM

HP10-311 SHOWN WITH AN E12Q3-20-1P (USING AN OUTDOOR THERMOSTAT)



TYPICAL HP10 EMERGENCY HEAT SEQUENCE OF OPERATION

1 - Should a heat pump malfunction occur, the service light comes on.
2 - Place the thermostat in the emergency heat position.
3 - Heat relay no. 1 remains energized as before and elements no. 1 and no. 2 are energized.
4 - Switching the thermostat de-energizes the indoor blower relay, which consequently changes the blower motor speed.
5 - Switching the thermostat also brings on another service light to remind the homeowner that the system is on emergency heat.
6 - The emergency heat relay is energized through the "E" terminal.
7 - The relay closes its contacts to bypass the outdoor thermostat.
8 - Heat relays no. 2 and no. 3 are energized to bring on elements (3) and (4).