Service Literature

UNIT INFORMATION

100068
March 25, 2023

ELXP

7.5 & 10 TON

ELXP SERIES HEAT PUMP UNITS

The EL072XP (6 ton / 21.1 kW), EL090XP (7.5 ton / 26.4 kW), and EL120XP (10 ton / 35.2 kW) heat pump units are designed for HFC-410A, light commercial applications, with a remotely located blower-coil unit or a furnace with an add-on evaporator coil. ELXP model units are equipped with one dual speed scroll compressor. The ELXP heat pumps match with the ELXA blower-coil units. ELXP units are all three-phase.

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

Information in this manual is intended for qualified service technicians only. All specifications are subject to change. Procedures in this manual are presented as recommendations only and do not supersede or replace local or state codes.

⚠ 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 licensed professional HVAC installer or equivalent, service agency, or the gas supplier.

⚠ IMPORTANT

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

⚠ WARNING

Electric shock hazard! - Disconnect all power supplies before servicing.

Replace all parts and panels before operating.

Failure to do so can result in death or electrical shock.

⚠ WARNING

To prevent serious injury or death:

1. Lock-out/tag-out before performing maintenance.
2. If system power is required (e.g., smoke detector maintenance), disable power to blower, remove fan belt where applicable, and ensure all controllers and thermostats are set to the “OFF” position before performing maintenance.
3. Always keep hands, hair, clothing, jewelry, tools, etc. away from moving parts.

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⚠ CAUTION

As with any mechanical equipment, contact with sharp sheet metal edges can result in personal injury. Take care while handling this equipment and wear gloves and protective clothing.

Model Identification

EL 120 X P S S T 1 Y

Brand/Family
EL

Nominal Cooling Capacity – Tons
072 = 6 Tons
090 = 7.5 Tons
120 = 10 Tons

Refrigerant Type
X = R−410A

Unit Type
P = Split System Heat Pump

Cooling/Heating Efficiency
S = Standard Efficiency

Refrigerant Circuit
S = Single Circuit

Load Capability
T = Two-Stage Compressor

Minor Design Sequence
1 = 1st Revision

Voltage
Y = 208/230V-3 phase-60Hz
G = 460V-3 phase-60Hz
J = 575V-3 phase-60Hz

Specifications

	Model No.	EL072XPSST	EL090XPSST	EL120XPSST
General Data	Nominal Tonnage	6	7.5	10
Connections (sweat)	Liquid line - in. (o.d)	5/8	5/8	5/8
	Vapor line - in. (o.d)	1-1/8	1-1/8	1-1/8
Refrigerant (R-410A)	Factory Charge	R-410A holding charge (2 lbs. per circuit)		
	No. of Circuits	1	1	1
	[1] Field charge (25 ft. line set)	22 lbs. 7 oz. (includes holding charge)	23 lbs. 4 oz. (includes holding charge)	32 lbs. 8 oz. (includes holding charge)
Compressor		(1) Two Stage Scroll	(1) Two Stage Scroll	(1) Two Stage Scroll
Outdoor Coil	Net face area - sq. ft. Outer coil	29.3	29.3	34.2
	Inner coil	28.4	28.4	33.3
	Tube diameter - in. & no. of rows	3/8 - 2	3/8 - 2	3/8 - 2
	Fins per inch	20	20	20
Outdoor Coil Fan(s)	Diameter - in. & no. of blades	(2) 24 - 3	(2) 24 - 3	(2) 24 - 4
	Motor hp	(2) 1/3	(2) 1/3	(2) 1/2
	Total air volume - cfm	8300	8300	10,300
	Rpm	1075	1075	1075
	Motor Input - Watts	830	830	1130

ELECTRICAL DATA

		EL072XPSST			EL090XPSST			EL120XPSST		
Line voltage data - 60 Hz - 3 phase		208/230V	460V	575V	208/230V	460V	575V	208/230V	460V	575V
[2] Maximum overcurrent protection (MOCP) amps		40	20	15	60	25	20	80	35	25
[3] Minimum circuit ampacity (MCA)		27	14	10	39	18	14	50	22	17
Compressor (1)	Rated load amps	17.6	8.5	6.3	26.9	12	9	34.6	14.8	11.1
	Locked rotor amps	136	66.1	55.3	165	94	65	240	130	93.7
Outdoor Coil Fan Motor (2) (1 phase)	Full load amps (total)	2.4 (4.8)	1.3 (2.6)	1 (2)	2.4 (4.8)	1.3 (2.6)	1 (2)	3 (6)	1.5 (3)	1.2 (2.4)
	Locked rotor amps (total)	4.7 (9.4)	2.4 (4.8)	1.9 (3.8)	4.3 (8.6)	2.4 (4.8)	1.9 (3.8)	6 (12)	3 (6)	2.9 (5.8)

NOTE - Extremes of operating range are plus and minus 10% of line voltage.

NOTE - All units have a minimum Short Circuit Current Rating (SCCR) of 5000 amps.

[1] Approximate field provided charge with 25 ft. line set. Refer to unit installation instructions for detailed charging information. Refer to the Lennox Refrigerant Piping Manual to determine refrigerant charge required with longer length refrigerant lines.

[2] HACR type circuit breaker or fuse.

[3] Refer to National or Canadian Electrical Code manual to determine wire, fuse and disconnect size requirements.

OPTIONS / ACCESSORIES

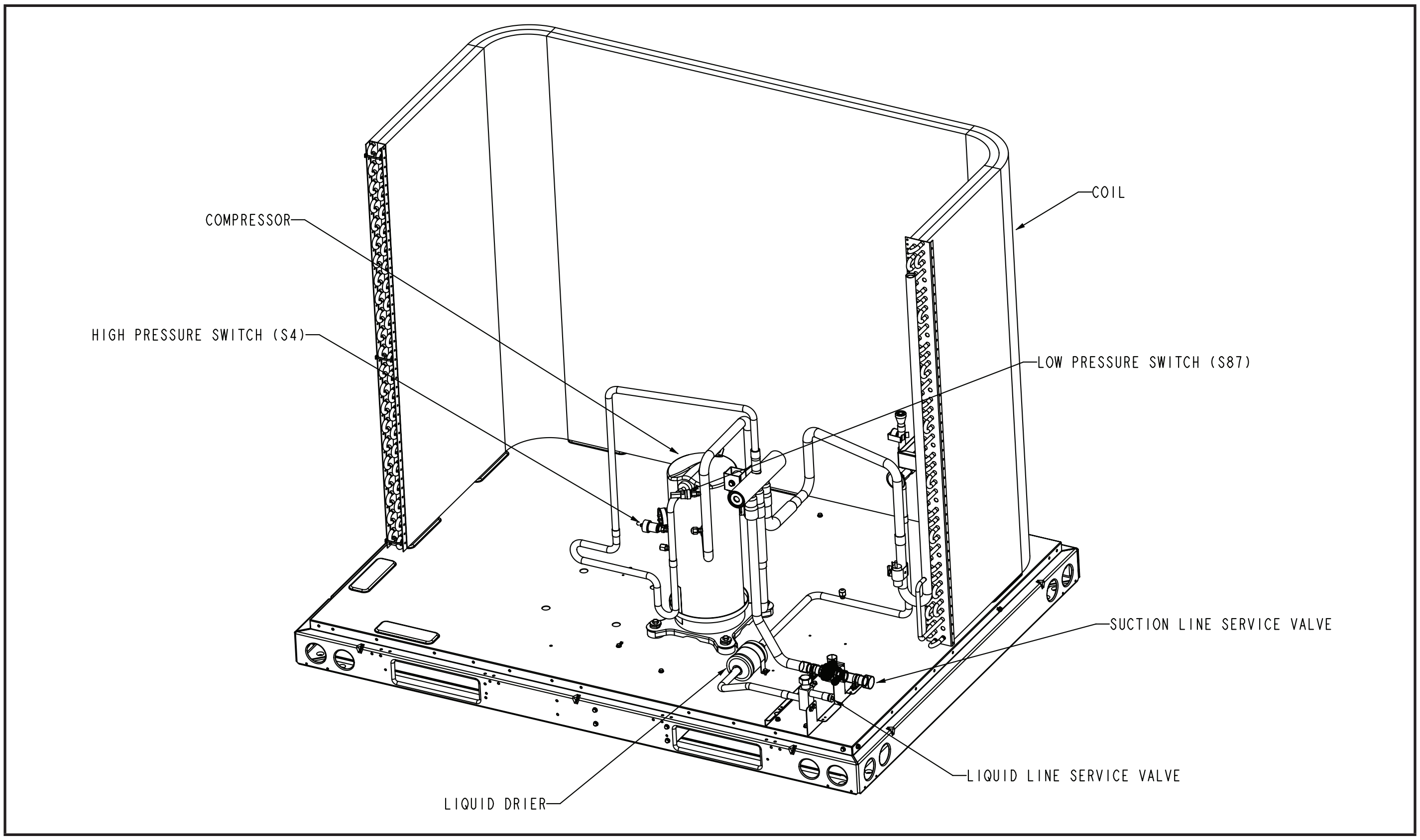
Item		Catalog No.	EL072XPSST EL090XPSST	EL120XPSST
CABINET				
Combined Coil/Hail Guards		**13T30**	X	
		13T32		X
Corrosion Protection		Factory	O	O
CONTROLS				
BACnet® Module		**17A08**	X	X
BACnet® Sensor with Display		**97W23**	X	X
BACnet® Sensor without Display		**97W24**	X	X
Low Ambient Control (0°F)		**16F26**	X	X
ELECTRICAL				
GFI Service Outlets	15 amp non-powered, field-wired (208/230V, 460V only)	**74M70**	X	X
	[1] 20 amp non-powered, field-wired (208/230V, 460V, 575V)	**67E01**	X	X
INDOOR AIR QUALITY				
Sensor - Wall-mount, off-white plastic cover with LCD display		**77N39**	X	X
Sensor - Wall-mount, off-white plastic cover, no display		**23V86**	X	X
Sensor - Black plastic case with LCD display, rated for plenum mounting		**87N52**	X	X
Sensor - Wall-mount, black plastic case, no display, rated for plenum mounting		**87N54**	X	X
CO_2 Sensor Duct Mounting Kit		**85L43**	X	X
Aspiration Box - for duct mounting non-plenum rated CO_2 sensor (**77N39**)		**90N43**	X	X

[1] Canada requires a minimum 20 amp circuit. Select 20 amp, non-powered, field wired GFI.

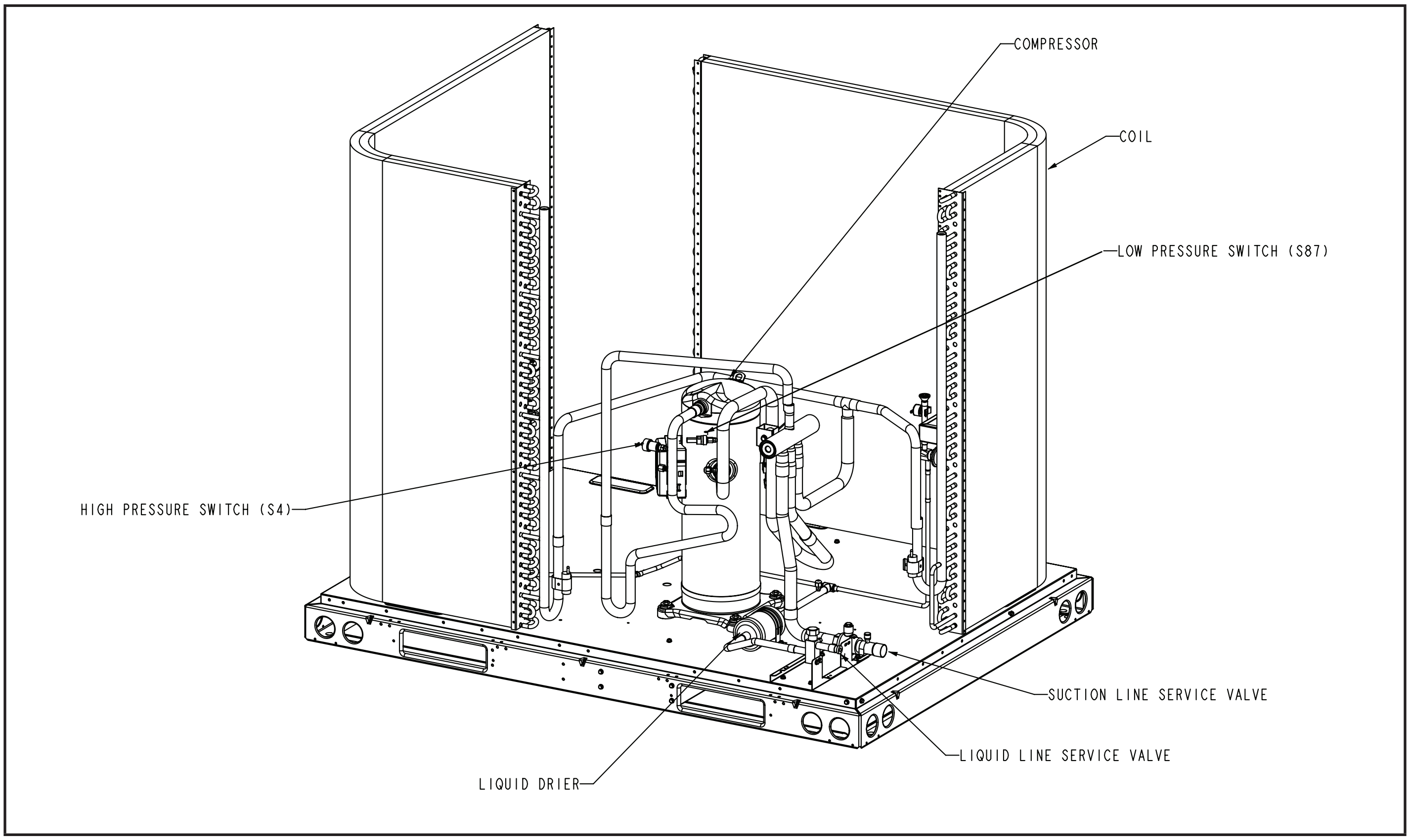
NOTE - The catalog and model numbers that appear here are for ordering field installed accessories only.
O - Factory Installed with extended lead time.
X - Field Installed

Unit Plumbing Parts Arrangement

EL072XP/EL090XP



EL120XP



⚠ WARNING

ELECTROSTATIC DISCHARGE (ESD) Precautions and Procedures	Electrostatic discharge can affect electronic components. Take care during unit installation and service to protect the unit's electronic controls. Precautions will help to avoid control exposure to electrostatic discharge by putting the unit, the control and the technician at the same electrostatic potential. Touch hand and all tools on an unpainted unit surface before performing any service procedure to neutralize electrostatic charge.

I-UNIT COMPONENTS

The heat pump components are shown in figures on page 5.

A-Control Box Components

The heat pump control box components are shown in figure 1.

CONTROL PANEL

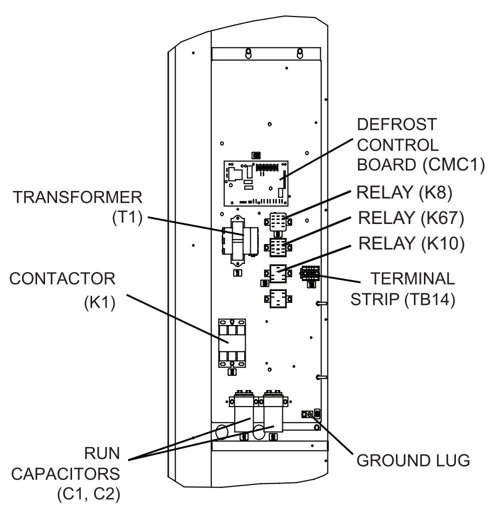


FIGURE 1

1 - Transformer T1

All models use a single line voltage to 24VAC transformer mounted in the control box. Transformer T1 sup-plies power to control circuits in the unit. The transformer is rated at 90VA and is protected by a 6.0 amp circuit breaker (CB8). CB8 is internal to the transformer. The 208/230 (Y) voltage transformers use two primary voltage taps as shown in figure 2, while 460 (G) and 575 (J) voltage transformers use a single primary voltage tap.

208/230V TRANSFORMER

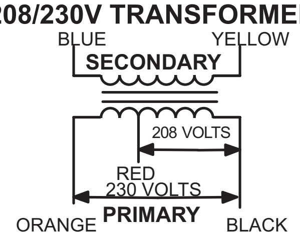


FIGURE 2

NOTE *– 208 volt units are field wired with the red wire connected to control transformer. 230 volt units are factory wired with the orange wire connected to control transformer primary.*

2 - Condenser Fan Capacitors C1 and C2

All units use single-phase condenser fan motors. Motors are equipped with a fan run capacitor to maximize motor efficiency. Condenser fan capacitors C1 and C2 assist in the start up of condenser fan motors B4 and B5. Capacitor ratings are on condenser fan motor nameplates.

3 - Compressor Contactor K1 (all units)

All compressor contactors are three-pole-double break contactors with a 24V coil. K1 energizes compressor B1 in all units.

4 - Transfer Relay K8

Transfer relay K8 ensures that the compressor will operate during all modes of operation by completing the Y1 circuit to the CMC1 defrost control board. When there is a demand for cooling, the N.C. K8-2 contacts complete the Y1 circuit to the CMC1 defrost board. When there is a demand for heating, K8 relay coil energizes, using K8-2 N.O. contacts to complete the Y1 circuit to the CMC1 defrost control board and the K8-3 N.O. contacts to energize the K67 relay.

5 - Terminal Strip TB14 (all units)

TB14 terminal strip distributes 24V power from the thermostat to control box components.

6 - Defrost System

The defrost system includes a defrost thermostat and a defrost control.

DEFROST THERMOSTAT S6 (ALL), S9 (120 ONLY)

The defrost thermostat is located on the liquid line between the check/expansion valve and the distributor. When the defrost thermostat switch senses coil temperature at set point or lower (072/090 - 35°F ± 4°F; 120 - 42°F ± 6°F), its contacts close and send a signal to the defrost control board to start the defrost timing. It also terminates defrost when the liquid line warms up to its set point (072/090 - 60°F ± 5°F; 120 - 70°F ± 5°F) and its contacts open.

DEFROST CONTROL BOARD CMC1

The defrost control board includes the combined functions of a time/temperature defrost control, defrost relay, time delay, diagnostic LEDs, and a terminal strip for field wiring connections.

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

DEFROST CONTROL TIMING PINS

Each timing pin selection provides a different accumulated compressor run time period for one defrost cycle. This time period must occur before a defrost cycle is initiated. The defrost interval can be adjusted (T1–30, T2–60, T3–90). The maximum defrost period is 14 minutes and cannot be adjusted.

NOTE – Defrost control part number is listed near the P1 timing pins. Units with defrost control **100269-07** have a factory default setting of 90 minutes.

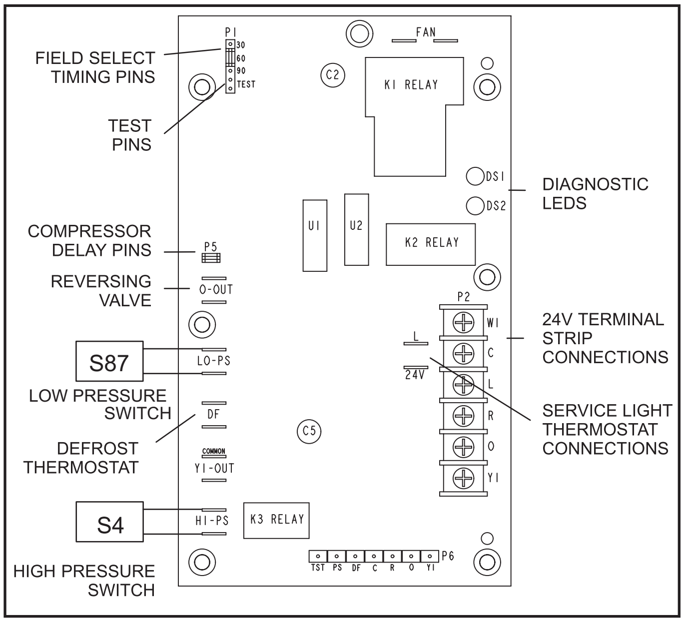


FIGURE 3

A TEST option is provided for troubleshooting. **The TEST mode may be started any time the unit is operating 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 reapplied.

COMPRESSOR DELAY

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

NOTE *– The 30-second compressor feature is ignored when jumper is installed on TEST pins.*

TIME DELAY

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

NOTE *– The board must have a thermostat demand for the bypass function.*

PRESSURE SWITCH CIRCUITS

The defrost control includes two pressure switch circuits. The factory-installed high pressure switch (S4) wires are connected to the board's HI PS terminals (figure 3). The board also includes LO PS terminals to accommodate a field-provided low (or loss-of-charge) pressure switch (S87).

During a single thermostat cycle, the defrost control will lock out the unit after the fifth time that the circuit is interrupted by any pressure switch that is wired to the control board. In addition, the diagnostic LEDs will indicate a pressure switch lockout after the fifth occurrence of an open pressure switch (see table 1). The unit will remain locked out until power is broken then remade to the control or until the jumper is applied to the TEST pins for 0.5 seconds.

NOTE *– The defrost control board ignores input from the loss_of-charge switch terminals during the TEST mode, during the defrost cycle, during the 90-second start-up period, and for the first 90 seconds each time the reversing valve switches heat/cool modes.* ***If the TEST pins are jumpered and the 5-minute delay is being bypassed, the LO PS terminal signal is not ignored during the 90-second start-up period.***

SERVICE LIGHT CONNECTION

The defrost control board includes terminal connections for a service light thermostat which provides a signal that activates the room thermostat service light during periods of inefficient operation.

⚠ IMPORTANT

After testing has been completed, properly reposition test jumper across desired timing pins

DIAGNOSTIC LEDS

The defrost board uses two LEDs for diagnostics. The LEDs flash a specific sequence according to the diagnosis. See table 1.

TABLE 1

DS2 Green	DS1 Red	Condition
OFF	OFF	Power problem
Simultaneous Slow Flash		Normal operation
Alternating Slow Flash		5-min. anti-short cycle delay
Fault and Lockout Codes		
OFF	Slow Flash	Loss-of-Charge Fault
OFF	ON	Loss-of-Charge Lockout
Slow Flash	OFF	High Pressure Fault
ON	OFF	High Pressure Lockout
Shaded entries apply to demand boards only.		

B-COOLING COMPONENTS

⚠ WARNING

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

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

1 - Compressor

All units use scroll compressors.

Compressor consists of two involute spiral scrolls matched together to generate a series of crescent shaped gas pockets between them.

During compression, one scroll remains stationary while the other scroll orbits around it.

Gas is drawn into the outer pocket, the pocket is sealed as the scroll rotates. As the spiral movement continues, gas pockets are pushed to the center of the scrolls. Volume between the pockets is simultaneously reduced.

When pocket reaches the center, gas is now high pressure and is forced out of a port located in the center of the fixed scrolls.

During compression, several pockets are compressed simultaneously resulting in a smooth continuous compression cycle. Continuous flank contact, maintained by centrifugal force, minimizes gas leakage and maximizes efficiency.

Scroll compressor is tolerant to the effects of slugging and contaminants. If this occurs, scrolls separate, allowing liquid or contaminants to be worked toward the center and discharged.

Low gas pulses during compression reduce operational sound levels.

Compressor motor is internally protected from excessive current and temperature.

Compressor is installed in the unit on resilient rubber mounts for vibration-free operation.

See ELECTRICAL section or compressor nameplate for compressor specifications.

All Compressors are Two Stage Models

A 24-volt DC solenoid valve inside the compressor controls staging. When the 3-way solenoid is energized it moves the lift ring assembly to block the ports and the compressor operates at full-load or 100% capacity. When the solenoid is de-energized the lift ring assembly moves to unblock the compressor ports and the compressor operates at part-load or approximately 67% of its full-load capacity.

The “loading” and “unloading” of the two stage scroll is done “on the fly” without shutting off the single-speed compressor motor between stages.

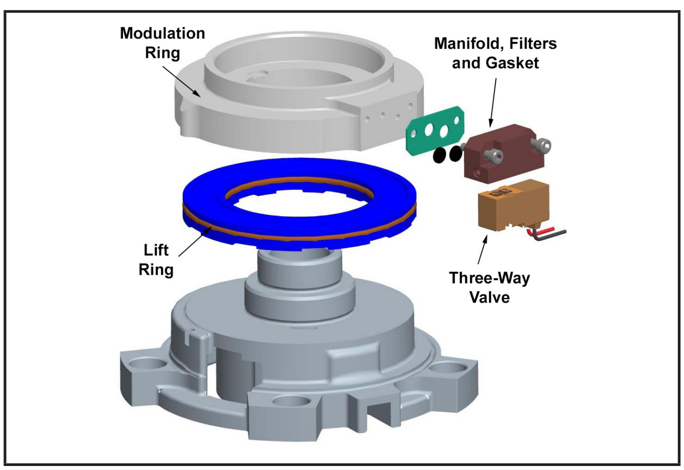


FIGURE 4. Two-Stage Scroll Compressor

2 - Two Stage Compressor Solenoid (L34) Resistance Check

Resistance check: Measure the resistance from the end of one molded plug lead to either of the two female connectors in the plug. One of the connectors should read close to zero ohms while the other should read infinity. Repeat with other wire. The same female connector as before should read zero while the other connector again reads infinity. Reverse polarity on the ohmmeter leads and repeat. The female connector that read infinity previously should now read close to zero ohms. Replace plug if either of these test methods don’t show the desired results.

3 - Crankcase Heater HR1 (all units)

All units use a belly-band type crankcase heater. Heater HR1 is wrapped around compressor B1. HR1 assures proper compressor lubrication at all times.

4 - High Pressure Switch S4

The high pressure switch is a auto-reset SPST N.C. switch which opens on a pressure rise. The switch is located on the compressor discharge line and is wired to the defrost control board CMC1. When discharge pressure rises to 640 ± 10 psig (4413 ± 69 kPa) the switch opens and the compressor is de-energized through the CMC1. The switch will close when discharge pressure drops to 475 ± 20 psig (3275 ± 138 kPA).

5 - Low Pressure Switch (S87)

The loss-of-charge switch is a auto-reset SPST N.C. switch which opens on a pressure drop. The switch is located on the suction line and is wired to the defrost control board CMC1. When suction line pressure drops to 40 ± 5 psig the switch opens and the compressor is de-energized through the CMC1. The switch will close when pressure rises to 90 ± 5 psig.

6 - Filter Drier (all units)

All units have a filter drier that is located in the liquid line of each refrigerant circuit at the exit of each condenser coil. The drier removes contaminants and moisture from the system.

7 - Reversing Valve L1 (all units)

A reversing valve with an electromechanical solenoid is used to reverse refrigerant flow during unit operation. L1 is energized during cooling demand and defrost. See figures on page 4.

8 - Condenser Fans B4 and B5

See page 2 for the specifications on the condenser fans used in the units. All condenser fans have singlephase motors. The units are equipped with two condenser fans. The fan assembly may be removed for servicing by removing the fan grill, unplugging the motor then loosening the motor bracket. The assembly will lift out.

II- REFRIGERANT SYSTEM

A- Lineset

Field refrigerant piping consists of liquid and suction lines connecting the condensing unit and the indoor unit. Liquid and suction service valves are located in a compartment at the corner of the unit below the control box.

Piping can be routed directly from the service valves or field supplied elbows can be added to divert the piping as required.

Refer to table 2 for field-fabricated refrigerant line sizes for runs up to 50 linear feet (15 m).

TABLE 2. Refrigerant Line Sizes for Runs Up to 50 Linear Feet

Unit	Liquid Line	Suction Line
EL072XP / EL090XP	5/8” (16mm)	1-1/8” (29mm)
EL120XP	5/8" (16mm)	1-1/8” (29mm)

B-Service Valves

When servicing or repairing HVAC components, ensure caps and fasteners are appropriately tightened. Table 3 lists torque values for typical service and repair items.

TABLE 3
Torque Requirements

Part	Recommended Torque	
Service valve cap	8 ft.-lb.	11 NM
Sheet metal screws	16 in.-lb.	2 NM
Machine screws #10	28 in.-lb.	3 NM
Compressor bolts	80 in.-lb.	9 NM
Gauge port seal cap	8 ft.-lb.	11 NM

USING MANIFOLD GAUGE SETS

When checking the system charge, use a manifold gauge set that features low-loss anti-blow back fittings. See figure 9 for a typical manifold gauge connection setup.

Manifold gauge sets used with HFC-410A refrigerant systems must be capable of handling the higher system operating pressures. The gauges should be rated for use with pressures of 0 - 800 on the high side and a low side of 30" vacuum to 250 psi with dampened speed to 500 psi.

Gauge hoses must be rated for use at up to 800 psi of pressure with a 4000 psi burst rating.

OPERATING SERVICE VALVES

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

⚠ IMPORTANT

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

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

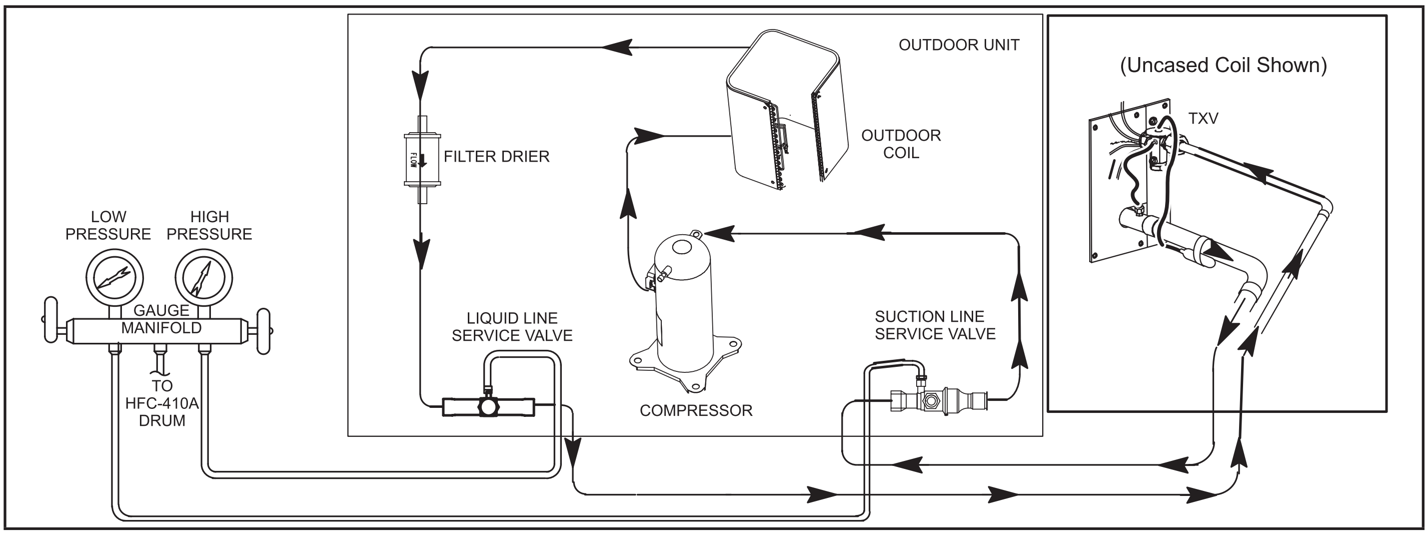


FIGURE 5

Each valve is equipped with a service port which has a factory-installed valve stem.

Cap Tightening Distances

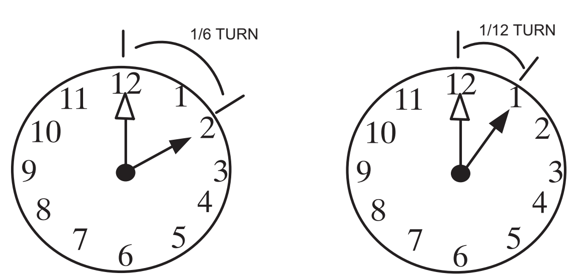


FIGURE 6

⚠ IMPORTANT

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

To Access Angle-Type Service Port:

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

1 - Remove service port cap with an appropriately sized wrench.

2 - Connect gauge to the service port.

3 - When testing is completed, replace service port cap and tighten as follows:

- *With Torque Wrench*: Finger tighten and then tighten per table 3.
- *Without Torque Wrench*: Finger tighten and use an appropriately sized wrench to turn an additional 1/6 turn clockwise as illustrated in figure 6.

To Open Liquid Line Service Valve:

1 - Remove stem cap with an adjustable wrench.

2 - Using service wrench and 5/16" hex head extension if needed (part #49A71) back the stem out counterclockwise until the valve stem just touches the retaining ring.

3 - Replace stem cap. Tighten finger tight, then tighten an additional 1/6 turn. Do not over torque.

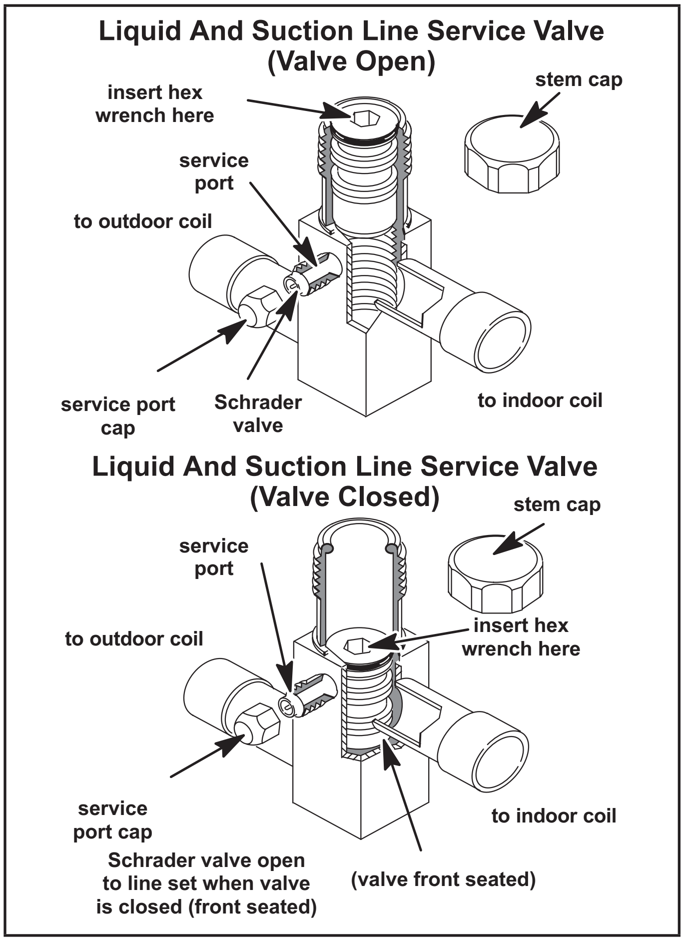


FIGURE 7

To Close Liquid Line Service Valve:

1 - Remove stem cap with an adjustable wrench.

2 - Using service wrench and 5/16" hex head extension if needed (part #49A71), turn stem clockwise to seat the valve. Tighten firmly.

3 - Replace stem cap. Tighten finger tight, then tighten an additional 1/6 turn. Do not over torque.

Service (Ball) Valve

Some units are equipped with a full service ball valve, as shown in figure 8. One service port that contains a valve core is present in this valve. A cap is also provided to seal off the service port. The valve is not rebuildable so it must always be replaced if failure has occurred.

Opening the Suction Line Service Valve

1 - Remove the stem cap with an adjustable wrench.

2 - Using a service wrench, turn the stem counterclockwise for 1/4 of a turn.

3 - Replace the stem cap and tighten it firmly.

Closing the Suction Line Service Valve

1 - Remove the stem cap with an adjustable wrench.

2 - Using a service wrench, turn the stem clockwise for 1/4 of a turn.

3 - Replace the stem cap and tighten firmly.

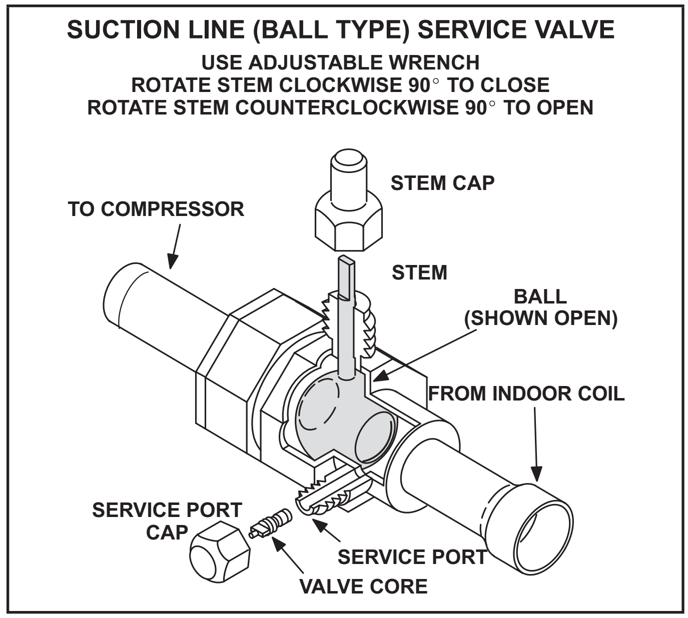


FIGURE 8

III-START-UP

Use the following procedure prior to starting up the unit for the first time.

1 - Rotate fan to check for binding.

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

3 - Open the liquid line and suction line service valves to release the refrigerant charge (contained in outdoor unit) into the system.

4 - Replace the stem caps and secure finger tight, then tighten an additional one-sixth (1/6) of a turn as illustrated in figure 9.

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

⚠ IMPORTANT

If unit is equipped with a crankcase heater and the outdoor ambient air is 50ºF (10ºC) or below, it should be energized 24 hours before unit start-up to prevent compressor damage as a result of slugging.

6 - Set the thermostat for a cooling demand. Turn on power to the indoor blower and close the outdoor unit disconnect switch to start the unit.

7 - Recheck voltage while the unit is running. Power must be within range shown on the nameplate.

8 - Check system for sufficient refrigerant using the procedures outlined Section IV- subsection C-.

IV-CHARGING

⚠ CAUTION

ANY NITROGEN CYLINDER CONNECTED TO SYSTEM MUST HAVE A 150 PSIG MAXIMUM SETTING REGULATOR. NEVER INTRODUCE PRESSURES GREATER THAN 150 PSIG TO ANY REFRIGERANT SYSTEM.

A-Leak Testing

⚠ IMPORTANT

Leak detector must be capable of sensing HFC refrigerant.

⚠ WARNING

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

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

⚠ WARNING

Fire, Explosion and Personal Safety hazard. Failure to follow this warning could result in damage, personal injury or death.

Never use oxygen to pressurize or purge refrigeration lines. Oxygen, when exposed to a spark or open flame, can cause fire and/or an explosion, that could result in property damage, personal injury or death.

1 - Connect an HFC-410A manifold gauge set as illustrated in figure 13.

2 - Open the valve on the HFC-410A cylinder (suction only).

3 - Open the high pressure side of the manifold to allow HFC-410A into the line set and indoor unit. Weigh in a trace amount of HFC-410A. *[A trace amount is a maximum of two ounces (57 g) refrigerant or three pounds (31 kPa) pressure].*

4 - Close the valve on the HFC-410A cylinder and the valve on the high pressure side of the manifold gauge set.

5 - Disconnect the HFC-410A cylinder.

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

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

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

NOTE *- Amounts of refrigerant will vary with line lengths.*

9 - Check all joints for leaks.

10 - Purge dry nitrogen and HFC-410A mixture.

11 - Correct any leaks and recheck.

12 - After leak testing, disconnect gauges from service ports.

A Connect an HFC-410A manifold gauge set high pressure hose to the suction valve service port.

B With both manifold valves closed, connect the cylinder of HFC-410A refrigerant to the center port of the manifold gauge set.

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

NOTE - LATER IN THE PROCEDURE, THE HFC-410A CONTAINER WILL BE REPLACE BY THE NITROGEN CONTAINER.

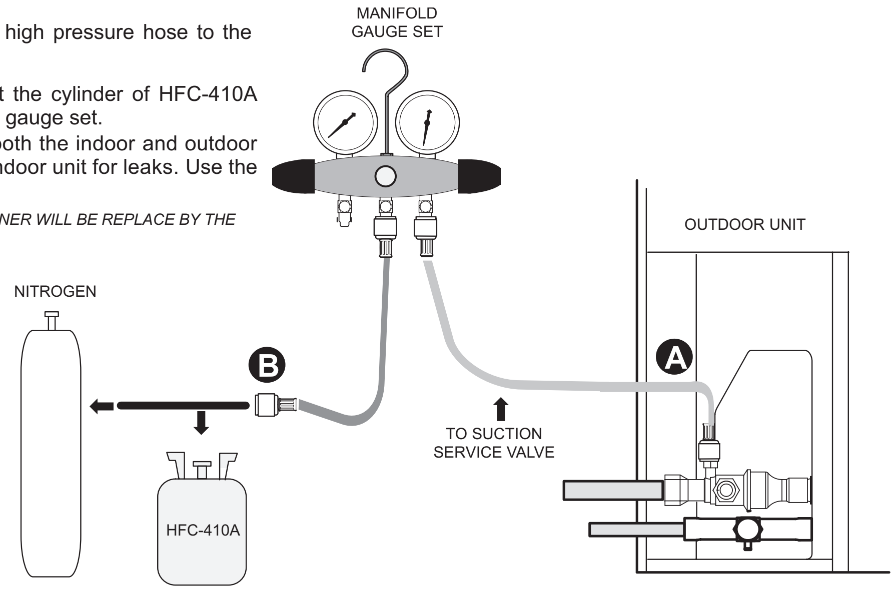


FIGURE 9

B-Evacuating the System

⚠ WARNING

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

⚠ IMPORTANT

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

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

***NOTE** - Remove cores from service valves if not already done.*

1 - Connect an HFC-410A manifold gauge set as illustrated in figure 14.

2 - Open both manifold valves and start the vacuum pump.

3 - Evacuate the line set and indoor unit to an **absolute pressure** of 23,000 microns (29 inches of mercury).

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

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

4 - When the absolute pressure reaches 23,000 microns (29 inches of mercury), close the manifold gauge valves, turn off the vacuum pump and disconnect the manifold gauge center port hose from vacuum pump. Attach the manifold center port hose to a dry nitrogen cylinder with pressure regulator set to 150 psig (1034 kPa) and purge the hose. Open the manifold gauge valves to break the vacuum in the line set and indoor unit. Close the manifold gauge valves.

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

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

7 - When the absolute pressure requirement above has been met, disconnect the manifold hose from the vacuum pump and connect it to an upright cylinder of HFC-410A refrigerant. Open the manifold gauge valve pressure line set to break vacuum with 2 to 5 psi.

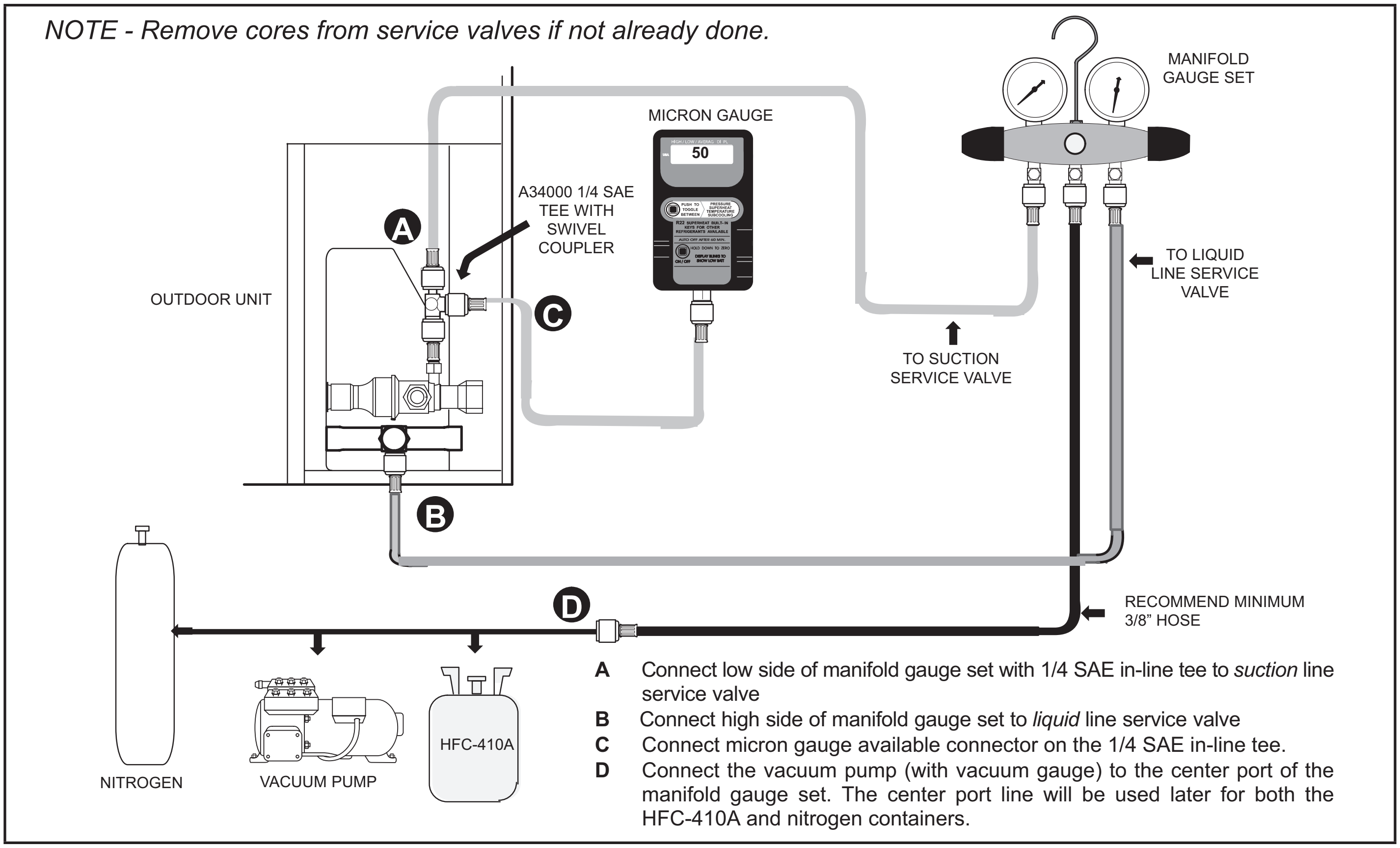
8 - Perform the following:

A - Close manifold gauge valves

B - Shut off HFC-410A cylinder

C - Reinstall service valve cores by removing manifold hose from service valve. Quickly install cores with core tool while maintaining a positive system pressure.

D - Replace the stem caps and secure finger tight, then tighten an additional one-sixth (1/6) of a turn as illustrated in figure 6.



A Connect low side of manifold gauge set with 1/4 SAE in-line tee to *suction* line service valve

B Connect high side of manifold gauge set to *liquid* line service valve

C Connect micron gauge available connector on the 1/4 SAE in-line tee.

D Connect the vacuum pump (with vacuum gauge) to the center port of the manifold gauge set. The center port line will be used later for both the HFC-410A and nitrogen containers.

FIGURE 10

C- Refrigerant Charge

The ELXP units have a factory holding charge of 2 pounds of HFC-410A in each circuit. Additional refrigerant will need to be added during installation. Charge using the HFC-410A charging information label provided in the unit.

The HFC-410A charging information label in the unit applies to Indoor and Outdoor unit with same full load capacity, see table below. For all other unit matches, please contact Commercial Application department for Charging Procedure Information (form # 508349-01).

V- SEQUENCE OF OPERATION

COOLING MODE

First Stage Cooling Call

Y1 thermostat demand from Air handler energizes 24VAC signal to TB14-C1 connection.

TB14-C1 voltage energizes CMC1-O terminal. CMC1 defrost board energizes the L1 reversing valve solenoid.

TB14-C1 voltage passes through N.C. K8-2 contacts energizing CMC1-Y1 terminal.

CMC1 energizes the CMC1-Y1 OUT terminal energizing the K1 compressor contactor (assuming S87 low pressure switch and S4 high pressure switch remain closed). Then, energized CMC1-Y1 OUT voltage passes through CMC1 N.C. fan relay energizing K10 fan relay.

K1-1 closes, energizing B1 compressor on low speed.

K1-2 opens to de-energize HR1 crankcase heater.

K10-1 closes, energizing outdoor fan B4 and B5.

***NOTE** – When high voltage power is applied to unit, K1-2 N.C. energizes HR1 crankcase heater.*

Second Stage Cooling Call

Y2 thermostat demand from Air handler energizes 24VAC signal to TB14-C2 connection.

TB14-C2 signal passes though K8-3 N.C. energizing K67 Stage 2 Relay.

K67-1 closes, energizing L34 Solenoid shifting B1 compressor to high speed.

HEATING MODE

Heating Call

W1 thermostat demand from air handler energizes 24VAC signal to TB14-H1 connection.

TB14-H1 signal energizes K8 transfer relay.

K8-2 closes, energizing CMC1-Y1 terminal.

CMC1 energizes the CMC1-Y1 OUT terminal energizing the K1 compressor contactor (assuming S87 low pressure switch and S4 high pressure switch remain closed). Then, energized CMC1-Y1 OUT voltage passes through CMC1 N.C. fan relay energizing K10 fan relay.

K1-1 closes, energizing B1 compressor on low speed.

K1-2 opens to de-energize HR1 crankcase heater.

K10-1 closes, energizing outdoor fan B4 and B5.

K8-3 closes, energizing K67 Stage 2 relay.

K67-1 closes, energizing L34 solenoid shifting B1 compressor to high speed.

***NOTE** – When high voltage power is applied to unit, K1-2 N.C. energizes HR1 crankcase heater.*

DEFROST MODE (occurs during Heating Call)

Defrost Initiation

During heating operation, if outdoor coil temperature falls below S6, S9 (120 only) defrost switch setpoint, the defrost thermostat closes. If defrost thermostat remains closed at the end of 30, 60, or 90 minutes, CMC1 defrost control initiates the defrost sequence.

CMC1 defrost control energizes L1 reversing valve.

CMC1 defrost control energizes CMC1-W1 Output terminal.

CMC-W1 signal passes to TB14-H2 which sends signal back to air handler to call for auxiliary heat as W2.

CMC1 onboard fan relay opens, de-energizing K10 fan relay.

K10-1 contacts open, B4 and B5 outdoor fans are de-energized.

Defrost Termination

Defrost terminates when 14 ± 1 minutes have elapsed or defrost switch opens. When defrost sequence terminates, the defrost timer resets.

CMC1 defrost control deenergizes L1 reversing valve

CMC1 defrost control deenergizes CMC1-W1 output terminal.

CMC1 onboard fan relay closes, energizing K10 fan relay.

K10-1 contacts close, B4 and B5 outdoor fans are energized.

VI- MAINTENANCE

At the beginning of each cooling season, the system should be checked as follows:

⚠ WARNING

Electric Shock Hazard. Can cause injury or death. Unit must be properly grounded in accordance with national and local codes.

Line voltage is present at all components when unit is not in operation on units with single-pole contactors. Disconnect all remote electric power supplies before opening access panel. Unit may have multiple power supplies.

OUTDOOR UNIT

1 - Clean and inspect the condensor coil (may be flushed with a water hose). Ensure power is off before cleaning.
2 - Outdoor unit fan motor is pre-lubricated and sealed. No further lubrication is needed.
3 - Visually inspect all connecting lines, joints and coils for evidence of oil leaks.
4 - Check all wiring for loose connections.
5 - Check for correct voltage at unit (unit operating and not operating).
6 - Check amp draw on outdoor fan motor:

UNIT NAMEPLATE: _________ ACTUAL: __________

7 - Check amp draw of the compressor:

UNIT NAMEPLATE: _________ ACTUAL: __________

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

INDOOR COIL

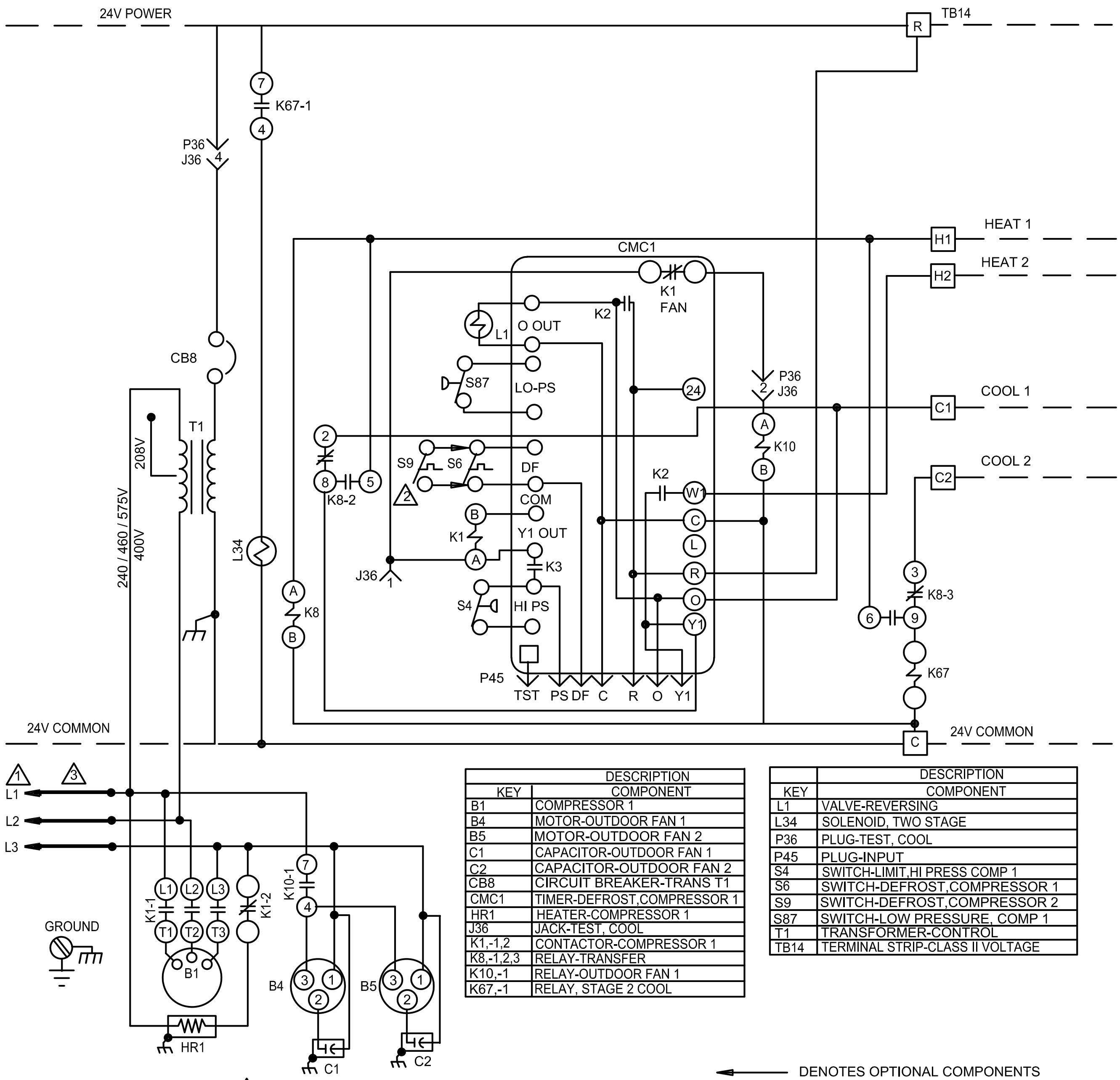
1 - Clean coil if necessary.
2 - Check connecting lines, joints and coil for evidence of oil leaks.
3 - Check condensate line and clean if necessary.

INDOOR UNIT

1 - Clean or change filters.
2 - Adjust the blower speed for cooling. Refer to the unit information service manual for pressure drop tables and procedure.
3 - Adjust blower speed for cooling. Measure the pressure drop over the coil to determine the correct blower CFM. Refer to the unit information service manual for pressure drop tables and procedure.
4 - Belt Drive Blowers - Check belt for wear and proper tension.
5 - Check all wiring for loose connections.
6 - Check for correct voltage at unit (blower operating).
7 - Check amp draw on blower motor.

UNIT NAMEPLATE: _________ ACTUAL: __________

VII- WIRING DIAGRAM AND SEQUENCE OF OPERATION



KEY	DESCRIPTION COMPONENT
B1	COMPRESSOR 1
B4	MOTOR-OUTDOOR FAN 1
B5	MOTOR-OUTDOOR FAN 2
C1	CAPACITOR-OUTDOOR FAN 1
C2	CAPACITOR-OUTDOOR FAN 2
CB8	CIRCUIT BREAKER-TRANS T1
CMC1	TIMER-DEFROST,COMPRESSOR 1
HR1	HEATER-COMPRESSOR 1
J36	JACK-TEST, COOL
K1,-1,2	CONTACTOR-COMPRESSOR 1
K8,-1,2,3	RELAY-TRANSFER
K10,-1	RELAY-OUTDOOR FAN 1
K67,-1	RELAY, STAGE 2 COOL

KEY	DESCRIPTION COMPONENT
L1	VALVE-REVERSING
L34	SOLENOID, TWO STAGE
P36	PLUG-TEST, COOL
P45	PLUG-INPUT
S4	SWITCH-LIMIT,HI PRESS COMP 1
S6	SWITCH-DEFROST,COMPRESSOR 1
S9	SWITCH-DEFROST,COMPRESSOR 2
S87	SWITCH-LOW PRESSURE, COMP 1
T1	TRANSFORMER-CONTROL
TB14	TERMINAL STRIP-CLASS II VOLTAGE

DENOTES OPTIONAL COMPONENTS
LINE VOLTAGE, FIELD INSTALLED
CLASS II FIELD WIRING

1 REFER TO UNIT RATING PLATE FOR MINIMUM CIRCUIT AMPACITY AND MAXIMUM OVERCURRENT PROTECTION SIZE.

2 S9 IS USED ON 120 ONLY

3 FOR USE WITH COPPER CONDUCTORS ONLY

IF ANY WIRE IN THIS APPLIANCE IS REPLACED, IT MUST BE REPLACED WITH WIRE OF LIKE SIZE, RATING,INSULATION THICKNESS AND TERMINATION

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

DISCONNECT ALL POWER BEFORE SERVICING

2022/03

WIRING DIAGRAM 03/22

537912-04

DUAL SPEED COMPRESSOR

EL072-120XP - G,J,Y

SECTION A5 REV. 0

Supersedes 537912-03 New Form No. 537912-04

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