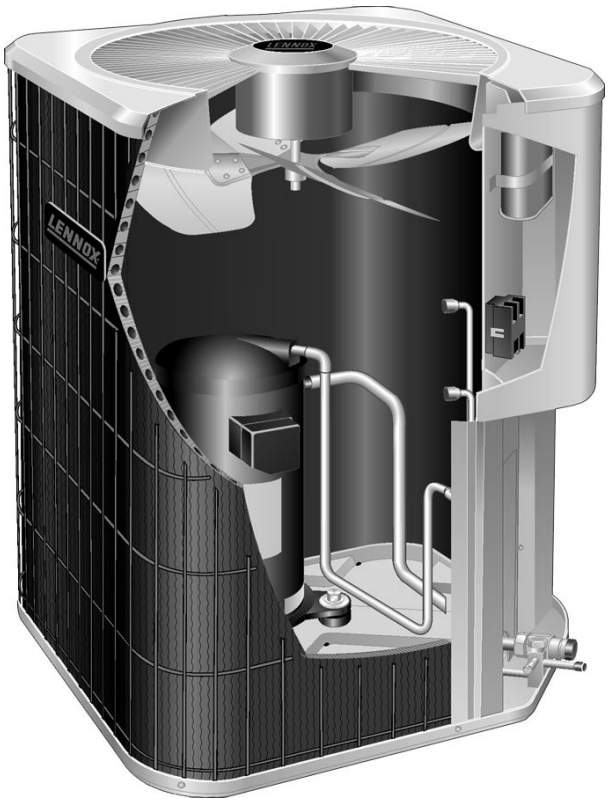
13ACC SERIES UNITS

The 13ACC is a residential split-system condensing unit with SEER ratings up to 14.80. The series is designed for use with expansion valves (TXV) and RFC. All 13ACC units utilize scroll compressors.

13ACC condensing units are available in 1-1/2, 2, 2 -1/2, 3, 3 -1/2, 4 and 5 ton capacities. All 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.

Information contained in this manual is intended for use by qualified service technicians only. All specifications are subject to change.

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



ELECTROSTATIC DISCHARGE (ESD)
Precautions and Procedures

⚠ 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.

⚠ CAUTION

Electrostatic discharge can affect electronic components. Take precautions 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. Neutralize electrostatic charge by touching hand and all tools on an unpainted unit surface before performing any service procedure.

⚠ IMPORTANT

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

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SPECIFICATIONS

General Data		**Model No.**	**13ACC-018**	**13ACC-024**	**13ACC-030**	**13ACC-036**	**13ACC-037**
		Nominal Tonnage (kW)	1.5 (5.3)	2 (7.0)	2.5 (8.8)	3 (10.6)	3 (10.6)
		Line voltage data - 60 hz - 1ph	208/230V	208/230V	208/230V	208/230V	208/230V
Connections (sweat)		Liquid line o.d. - in. (mm)	3/8 (9.5)	3/8 (9.5)	3/8 (9.5)	3/8 (9.5)	3/8 (9.5)
		Suction line o.d. - in. (mm)	5/8 (15.9)	3/4 (19.1)	3/4 (19.1)	7/8 (22.2)	7/8 (22.2)
[1]Refrigerant (HCFC-22) furnished			5 lbs. 2 oz. (2.32 kg)	5 lbs. 1 oz. (2.30 kg)	6 lbs. 10 oz. (3.00 kg)	7 lbs. 3 oz. (3.26 kg)	9 lbs. 0 oz. (4.08 kg)
Condenser 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)	19.83 (1.84)
		Inner coil	5.44 (0.51)	5.44 (0.51)	14.50 (1.35)	14.50 (1.35)	18.90 (1.76)
	Tube diameter - in. (mm) & number of rows		5/16 (8) - 1.37	5/16 (8) - 1.37	5/16 (8) - 2	5/16 (8) - 2	5/16 (8) - 2
	Fins per inch (m)		22 (866)	22 (866)	22 (866)	22 (866)	22 (866)
Condenser Fan	Diameter - in. (mm) & Number of blades		18 (457) - 3	18 (457) - 3	18 (457) - 4	18 (457) - 4	18 (457) - 4
		Motor hp (W)	1/6 (124)	1/6 (124)	1/6 (124)	1/6 (124)	1/6 (124)
		Cfm (L/s)	2500 (1180)	2500 (1180)	2450 (1155)	2450 (1155)	2410 (1135)
		Rpm	1100	1100	1100	1100	1100
		Watts	200	200	200	200	180
Shipping Data		lbs. (kg) 1 package	155 (70)	155 (70)	175 (79)	180 (82)	191 (87)

ELECTRICAL DATA

General Data		Maximum fuse size (amps)	15	20	30	35	30
		[2]Minimum circuit ampacity	11.5	14.0	18.0	20.4	19.5
Compressor		Rated load amps	8.3	10.3	13.5	15.4	14.7
		Power factor	.98	.96	.96	.96	.98
		Locked rotor amps	47.0	56.0	72.5	88.0	83.0
Condenser Fan Motor		Full load amps	1.1	1.1	1.1	1.1	1.1
		Locked rotor amps	1.9	1.9	1.9	1.9	1.9

Optional Accessories - MUST BE ORDERED EXTRA

Compressor Crankcase Heater			**18K20**	**18K20**	**18K20**	**18K20**	**18K20**
Compressor Hard Start Kit			**10J42**	**10J42**	**10J42**	**10J42**	**10J42**
Compressor Monitor			**45F08**	**45F08**	**45F08**	**45F08**	**45F08**
Compressor Sound Cover			**69J03**	**69J03**	**69J03**	**69J03**	**69J03**
Driers		Liquid Line - sweat connections	**12L71**	**12L71**	**12L71**	**12L71**	**12L71**
		Suction Line - sweat connections	**88K44**	**88K44**	**88K44**	**88K45**	**88K45**
Hail Guard			**17L73**	**17L73**	**17L73**	**17L73**	**45M55**
High Pressure Switch Kit			**94J46**	**94J46**	**94J46**	**94J46**	**94J46**
Loss of Charge Kit			**94J47**	**94J47**	**94J47**	**94J47**	**94J47**
Low Ambient Kit			**24H77**	**24H77**	**24H77**	**24H77**	**24H77**
Mounting Base		Model Number - Catalog Number	MB2-S - **69J06**	MB2-S - **69J06**	MB2-S - **69J06**	MB2-S - **69J06**	MB2-S - **69J06**
		Dimensions - W x D x H - in.	22-1/4 x 22-1/4 x 3	22-1/4 x 22-1/4 x 3	22-1/4 x 22-1/4 x 3	22-1/4 x 22-1/4 x 3	22-1/4 x 22-1/4 x 3
		mm	565 x 565 x 76	565 x 565 x 76	565 x 565 x 76	565 x 565 x 76	565 x 565 x 76
		Shipping Weight	6 lbs. (3 kg)	6 lbs. (3 kg)	6 lbs. (3 kg)	6 lbs. (3 kg)	6 lbs. (3 kg)
Refrigerant Line Set		15 ft. (4.6 m) length	L15-21-15	L15-41-15	L15-41-15	L15-65-15	L15-65-15
		20 ft. (6 m) length	L15-21-20	L15-41-20	L15-41-20	Not Available	Not Available
		25 ft. (7.6 m) length	L15-21-25	Not Available	Not Available	Not Available	Not Available
		30 ft. (9.1 m) length	Not Available	L15-41-30	L15-41-30	L15-65-30	L15-65-30
		35 ft. (10.7 m) length	L15-41-35	Not Available	Not Available	Not Available	Not Available
		40 ft. (12.2 m) length	Not Available	L15-41-40	L15-41-40	L15-65-40	L15-65-40
		50 ft. (15.2 m) length	L15-41-50	L15-41-50	L15-41-50	L15-65-50	L15-65-50
Timed-Off Control			**47J27**	**47J27**	**47J27**	**47J27**	**47J27**
Unit Stand-Off Kit			**94J45**	**94J45**	**94J45**	**94J45**	**94J45**

[1]Refrigerant charge sufficient for 15 ft. (4.6 m) length of refrigerant lines.
[2]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

		Model No.	13ACC-042	13ACC-047	13ACC-048	13ACC-060
General Data		Nominal Tonnage (kW)	3.5 (12.3)	4 (14.1)	4 (14.1)	5 (17.6)
Connections (sweat)		Liquid line o.d. - in. (mm)	3/8 (9.5)	3/8 (9.5)	3/8 (9.5)	3/8 (9.5)
		Suction line o.d. - in. (mm)	7/8 (22.2)	1-1/8 (28.6)	7/8 (22.2)	1-1/8 (28.6)
[1]Refrigerant (HCFC-22) furnished			7 lbs. 11 oz. (3.49 kg)	10 lbs. 14 oz. (4.93 kg)	9 lbs. 14 oz. (4.48 kg)	10 lbs. 8 oz. (4.76 kg)
Condenser Coil	Net face area - sq. ft. (m^2)	Outer coil	15.21 (1.41)	24.5 (2.28)	21.11 (1.96)	21.11 (1.96)
		Inner coil	14.50 (1.35)	23.56 (2.19)	20.31 (1.89)	20.31 (1.89)
	Tube diameter - in. (mm) & number of rows		5/16 (8) - 2	5/16 (8) - 2	5/16 (8) - 2	5/16 (8) - 2
	Fins per inch (m)		22 (866)	22 (866)	22 (866)	22 (866)
Condenser Fan	Diameter - in. (mm) & Number of blades		18 (457) - 4	22 (559) - 4	22 (559) - 4	22 (559) - 4
		Motor hp (W)	1/3 (249)	1/4 (186)	1/3 (249)	1/3 (249)
		Cfm (L/s)	2930 (1385)	3830 (1805)	3890 (1835)	3890 (1835)
		Rpm	1100	825	1085	1085
		Watts	310	330	375	375
Shipping Data		lbs. (kg) 1 package	186 (84)	226 (103)	250 (113)	254 (115)
Electrical Data						
General Data		Line voltage data - 60 hz - 1ph	208/230V	208/230V	208/230V	208/230V
		Maximum fuse size (amps)	35	40	50	60
		[2]Minimum circuit ampacity	22.5	24.6	31.5	38.0
Compressor		Rated load amps	16.5	18.3	23.7	28.9
		Power factor	.98	.94	.96	.96
		Locked rotor amps	95.0	109.0	129.0	169.0
Condenser Fan Motor		Full load amps	1.9	1.7	1.9	1.9
		Locked rotor amps	4.1	3.1	4.1	4.1
Optional Accessories - MUST BE ORDERED EXTRA						
Compressor Crankcase Heater			**18K20**	**18K20**	**18K20**	**18K20**
Compressor Hard Start Kit			**10J42**	**10J42**	**81J69**	**81J69**
Compressor Monitor			**45F08**	**45F08**	**45F08**	**45F08**
Compressor Sound Cover			**69J03**	**69J03**	**69J03**	**69J03**
Driers		Liquid Line - sweat connections	**12L71**	**12L71**	**12L71**	**12L71**
		Suction Line - sweat connections	**88K45**	**88K45**	**88K45**	**88K45**
Hail Guard			**17L73**	**45M56**	**17L74**	**17L74**
High Pressure Switch Kit			**94J46**	**94J46**	**94J46**	**94J46**
Loss of Charge Kit			**94J47**	**94J47**	**94J47**	**94J47**
Low Ambient Kit			**24H77**	**24H77**	**24H77**	**24H77**
Mounting Base		Model Number - Catalog Number	MB2-S - **69J06**	MB2-L - **69J07**	MB2-L - **69J07**	MB2-L - **69J07**
		Dimensions - W x D x H - in.	22-1/4 x 22-1/4 x 3	32 x 34 x 3	32 x 34 x 3	32 x 34 x 3
		mm	565 x 565 x 76	813 x 864 x 76	813 x 864 x 76	813 x 864 x 76
		Shipping Weight	6 lbs. (3 kg)	15 lbs. (7 kg)	15 lbs. (7 kg)	15 lbs. (7 kg)
Refrigerant Line Set		15 ft. (4.6 m) length	L15-65-15	Field Fabricate	L15-65-15	Field Fabricate
		30 ft. (9.1 m) length	L15-65-30	Field Fabricate	L15-65-30	Field Fabricate
		40 ft. (12.2 m) length	L15-65-40	Field Fabricate	L15-65-40	Field Fabricate
		50 ft. (15.2 m) length	L15-65-50	Field Fabricate	L15-65-50	Field Fabricate
Timed-Off Control			**47J27**	**47J27**	**47J27**	**47J27**
Unit Stand-Off Kit			**94J45**	**94J45**	**94J45**	**94J45**

[1]Refrigerant charge sufficient for 15 ft. (4.6 m) length of refrigerant lines.
[2]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 COMPONENTS

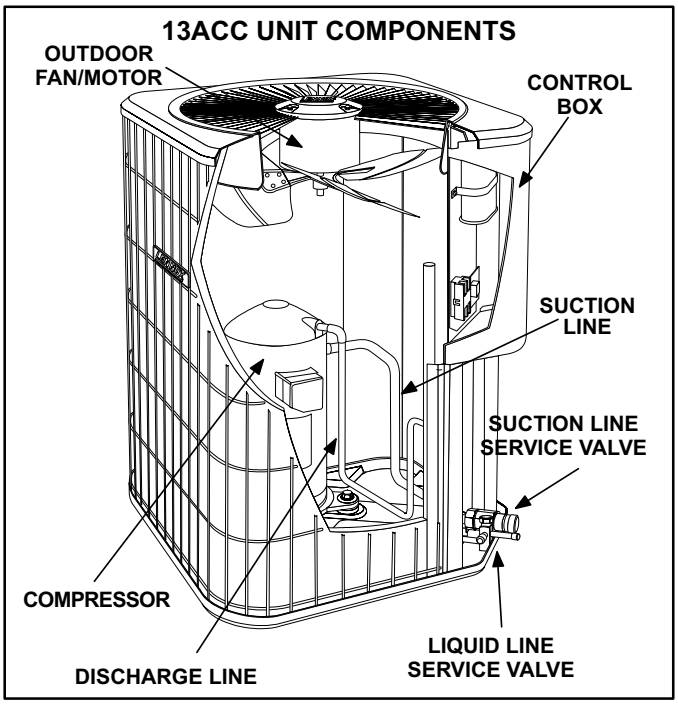


FIGURE 1

A - Control Box (Figure 2)

13ACC units are not equipped with a 24V transformer. All 24 VAC controls are powered by the indoor unit. Refer to wiring diagram.

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

1 - Compressor Contactor K1

The compressor is energized by a contactor located in the control box. See figure 2. Single-pole contactors are used in 13ACC series units. K1 is energized by the indoor thermostat terminal Y1 (24V) when thermostat demand is present.

⚠ DANGER

Electric Shock Hazard.
May cause injury or death.

Line voltage is present at all components when unit is not in operation on units with single pole contactors.

Disconnect all remote electrical power supplies before opening unit panel.

Unit may have multiple power supplies.

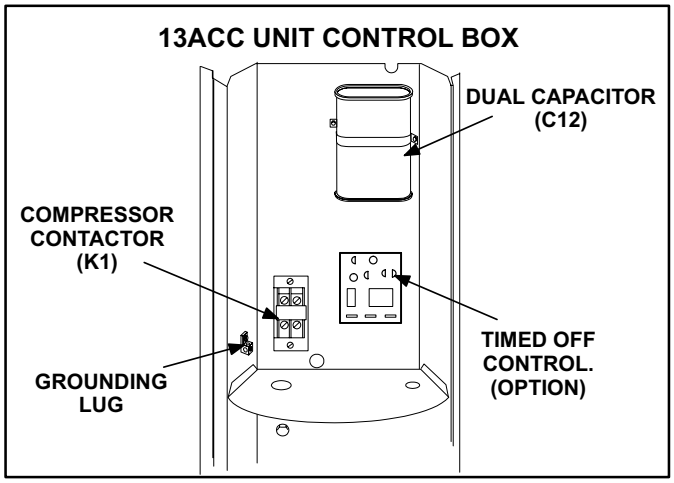


FIGURE 2

2 - Dual Capacitor C12

The compressor and fan in 13ACC series units use permanent split capacitor motors. The capacitor is located inside the unit control box (see figure 2). 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. Ratings will be on compressor nameplate and condenser fan nameplate.

3 - Timed Off Control TOC (option)

The time delay is electrically connected between thermostat terminal Y and the compressor contactor. Between cycles, the compressor contactor is delayed for 5 minutes ± 2 minutes but may last as long as 8 minutes. At the end of the delay, the compressor is allowed to energize. When thermostat demand is satisfied, the time delay opens the circuit to the compressor contactor coil and the compressor is de-energized.

B - Compressor

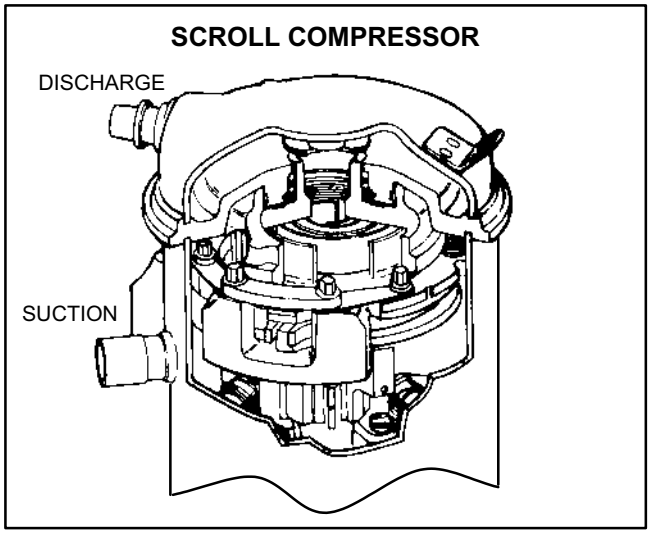


FIGURE 3

All 13ACC 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 3. 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 4 shows the basic scroll form. Two identical scrolls are mated together forming concentric spiral shapes (figure 5). One scroll remains stationary, while the other is allowed to "orbit" (figure 6). Note that the orbiting scroll does not rotate or turn but merely orbits the stationary scroll.

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

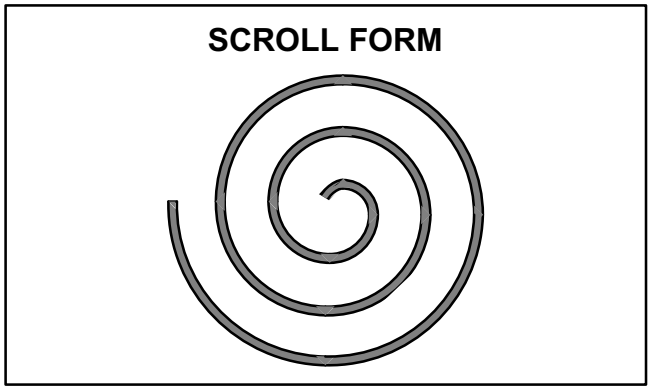


FIGURE 4

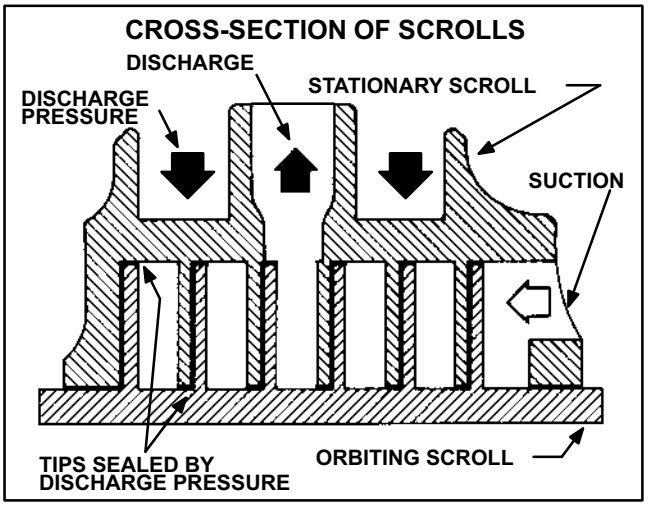


FIGURE 5

The counterclockwise orbiting scroll draws gas into the outer crescent shaped gas pocket created by the two scrolls (figure 6 - 1). The centrifugal action of the orbiting scroll seals off the flanks of the scrolls (figure 6 - 2). As the orbiting motion continues, the gas is forced toward the center of the scroll and the gas pocket becomes compressed (figure 6 - 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 5). The discharge pressure forcing down on the top scroll helps seal off the upper and lower edges (tips) of the scrolls (figure 5). 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.

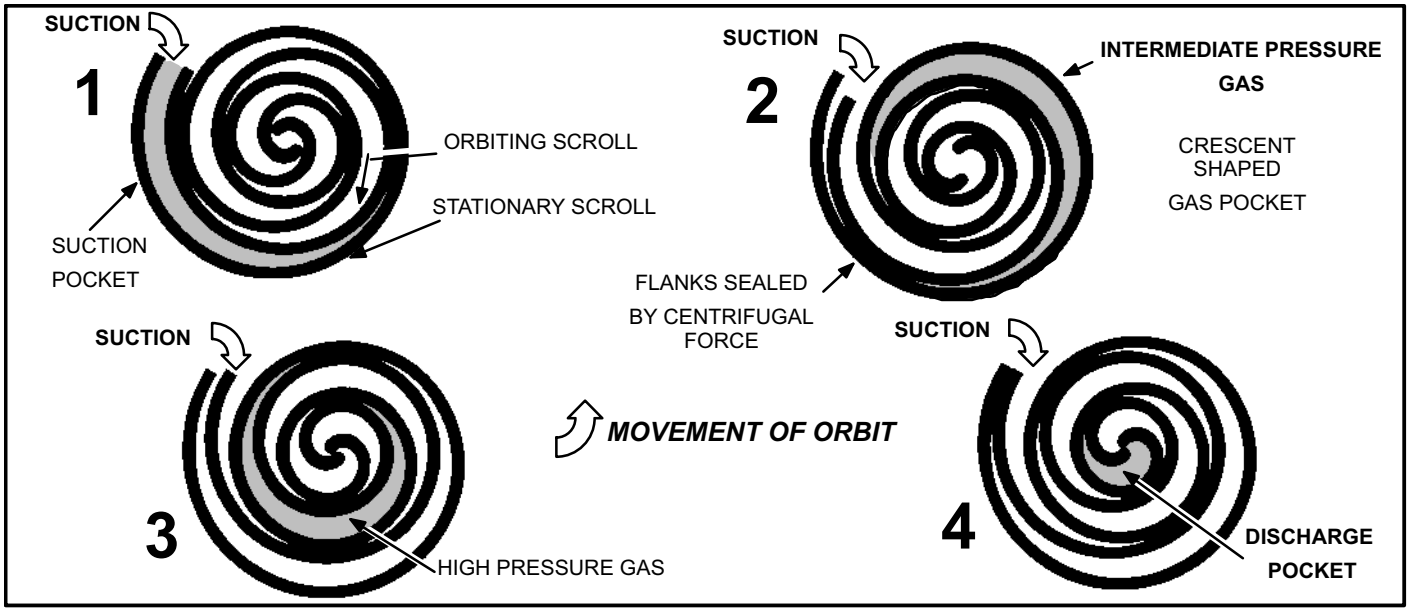


FIGURE 6

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 to pump system into a vacuum. This type of damage can be detected and will result in denial of warranty claims.

The scroll compressor is quieter than a reciprocating compressor, however, the two compressors have much different sound characteristics. The sounds made by a scroll compressor do not affect system reliability, performance, or indicate damage.

See compressor nameplate or ELECTRICAL DATA for compressor specifications.

C - Condenser Fan Motor

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

ELECTRICAL DATA tables in this manual show specifications for condenser fans used in 13ACCs.

Access to the condenser fan motor on all units is gained by removing the seven screws securing the fan assembly. See figure 7. The condenser fan motor is removed from the fan guard by removing the four nuts found on the top panel. Drip loops should be used in wiring when servicing motor. See figure 8 if condenser fan motor replacement is necessary.

⚠ DANGER

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

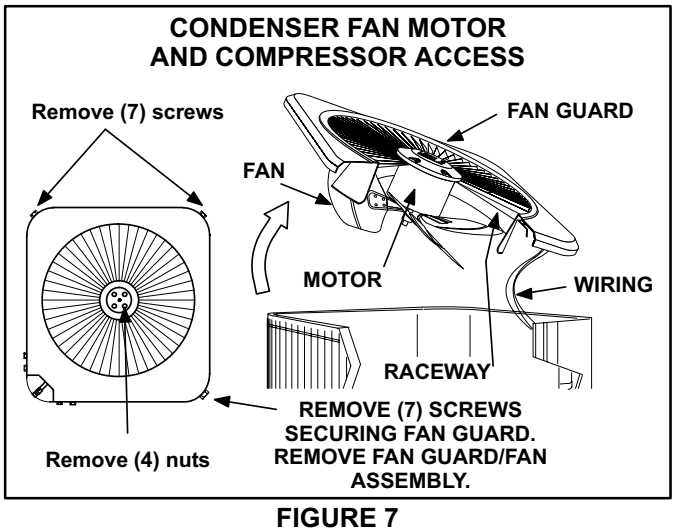


FIGURE 7

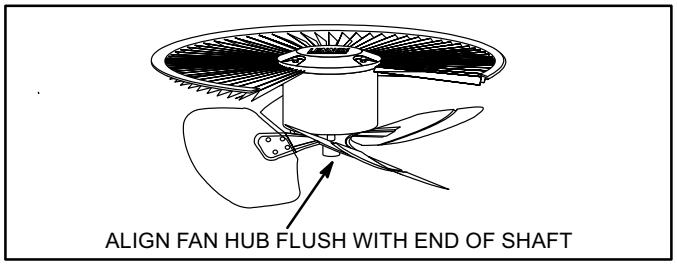


FIGURE 8

II - REFRIGERANT SYSTEM

A - Plumbing

Field refrigerant piping consists of liquid and suction lines from the condensing unit (sweat connections) to the indoor evaporator coil (flare or sweat connections). Use Lennox L15 (sweat) series line sets as shown in table 1.

TABLE 1

Condensing Unit Model No.	Line Set Model No. (L10 or L15)	Length of Lines		Liquid Line Outside Dia.		Suction Line Outside Dia.	
		ft.	m	in.	mm	in.	mm
13ACC018	L15-21-15	15	4.6	3/8	9.5	5/8	15.9
	L15-21-20	20	6				
	L15-21-25	25	7.6				
	L15-41-35	35	10.7				
	L15-41-50	50	15				
13ACC024 13ACC030	L15-41-15	15	4.6	3/8	9.5	3/4	19
	L15-41-20	20	6				
	L15-41-30	30	9				
	L15-41-40	40	12				
	L15-41-50	50	15				
13ACC036 13ACC037 13ACC042 13ACC048	L15-65-30	30	9	3/8	9.5	7/8	22.2
	L15-65-40	40	12				
	L15-65-50	50	15				
13ACC047 13ACC060	*Not available			3/8	9.5	1-1/8	28.5

*Field fabricate.

B - Service Valves

The liquid line and vapor line service valves (figures 10 and 9) and gauge ports are used for leak testing, evacuating, charging and checking charge. See table 2 for torque requirements.

Each valve is equipped with a service port which has a factory-installed Schrader valve. A service port cap protects the Schrader valve from contamination and serves as the primary leak seal.

Table 2
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	90 in.- lb.	10 NM
Gauge port seal cap	8 ft.- lb.	11 NM

To Access Schrader Port:

1 - Remove service port cap with an adjustable wrench.

2 - Connect gauge to the service port.

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

To Open Service Valve:

1 - Remove the stem cap with an adjustable wrench.

2 - Use a service wrench with a hex-head extension to back the stem out counterclockwise as far as it will go.

NOTE - Use a 3/16" hex head extension for liquid line sizes or a 5/16" extension for vapor line sizes.

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

To Close Service Valve:

1 - Remove the stem cap with an adjustable wrench.

2 - Use a service wrench with a hex-head extension to turn the stem clockwise to seat the valve. Tighten the stem firmly.

NOTE - Use a 3/16" hex head extension for liquid line sizes or a 5/16" extension for vapor line sizes.

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

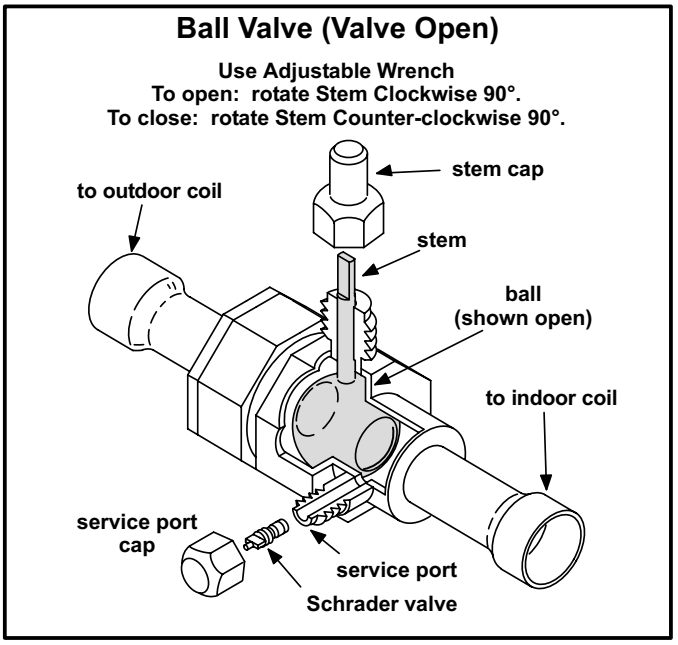


FIGURE 9

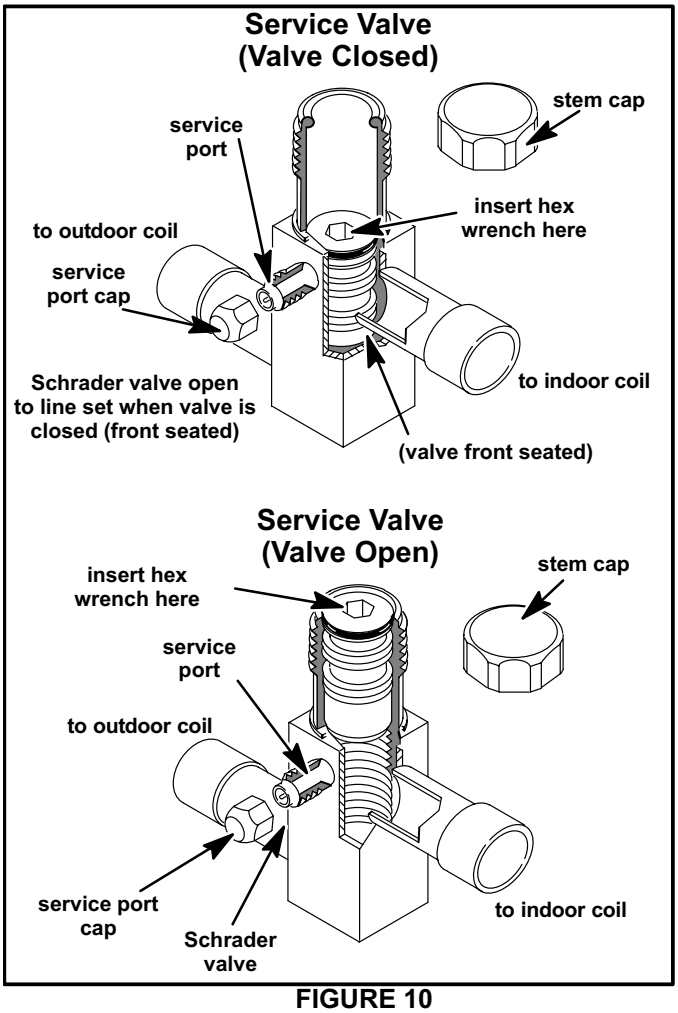


FIGURE 10

Vapor Line Ball Valve

Vapor line service valves function the same way as the other valves, the difference is in the construction. These valves are not rebuildable. If a valve has failed, you must replace it. A ball valve is illustrated in figure 9.

The ball valve is equipped with a service port with a factory-installed Schrader valve. A service port cap protects the Schrader valve from contamination and assures a leak-free seal.

III - CHARGING

The unit is factory-charged with the amount of HCFC-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 3 for refrigerant charge adjustment. A blank space is provided on the unit rating plate to list actual field charge.

⚠ IMPORTANT

If line length is greater than 15 feet (4.5 m) add this amount. If line length is less than 15 feet (4.5 m), subtract this amount.

TABLE 3

LIQUID LINE SET DIAMETER	Ounce per 5 foot (ml per mm) adjust from 15 foot (4.5m) line set*
3/8 in. (10 mm)	3 ounce per 5 feet (90 ml per 1524 mm)

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

Units are designed for line sets up to 50 feet (15.2 m). Consult Lennox Refrigerant Piping Manual for line sets over 50 feet (15.2 m).

A - Pumping Down System

⚠ CAUTION

Deep vacuum operation (operating compressor below 0 psig) 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. Attach gauge manifold then follow below:

1- Close liquid line valve.

2- Start outdoor unit.

3- Monitor suction gauge. Stop unit when 0 psig is reached.

4- Close vapor line valve.

B - Leak Testing

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

⚠ 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

Danger of explosion: Can cause equipment damage, injury or death. Never use oxygen to pressurize a refrigeration or air conditioning system. Oxygen will explode on contact with oil and could cause personal injury.

⚠ WARNING

Danger of explosion: Can cause equipment damage, injury or death. When using a high pressure gas such as dry nitrogen to pressurize a refrigeration or air conditioning system, use a regulator that can control the pressure down to 1 or 2 psig (6.9 to 13.8 kPa).

Using an Electronic Leak Detector or Halide

1 - Connect a cylinder of HCFC-22 to the center port of the manifold gauge set.

2 - With both manifold valves closed, open the valve on the HCFC-22 cylinder (vapor only).

3 - Open the high pressure side of the manifold to allow the HCFC-22 into the line set and indoor unit. Weigh in a trace amount of HCFC-22. [A trace amount is a maximum of 2 ounces (57 g) or 3 pounds (31 kPa) pressure.] Close the valve on the HCFC-22 cylinder and the valve on the high pressure side of the manifold gauge set. Disconnect the HCFC-22 cylinder.

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

5 - Connect the manifold gauge set high pressure hose to the vapor valve service port. *(Normally, the high pressure hose is connected to the liquid line port; however, connecting it to the vapor port better protects the manifold gauge set from high pressure damage.)*

6 - Adjust the nitrogen pressure to 150 psig (1034 kPa). Open the valve on the high side of the manifold gauge set which will pressurize line set and indoor unit.

7 - After a few minutes, open a refrigerant port to ensure the refrigerant you added is adequate to be detected. (Amounts of refrigerant will vary with line lengths.) Check all joints for leaks. Purge nitrogen and HCFC-22 mixture. Correct any leaks and recheck.

C - Evacuating the System

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

NOTE - This evacuation process is adequate for a new installation with clean and dry lines. If excessive moisture is present, the evacuation process may be required more than once.

⚠ IMPORTANT

Use a thermocouple or thermistor electronic vacuum gauge that is calibrated in microns. Use an instrument that reads from 50 microns to at least 10,000 microns.

1 - Connect manifold gauge set to the service valve ports :
- low pressure gauge to *vapor* line service valve
- high pressure gauge to *liquid* line service valve

2 - Connect micron gauge.

3 - Connect the vacuum pump (with vacuum gauge) to the center port of the manifold gauge set.

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

5 - Evacuate the line set and indoor unit to an **absolute pressure** of 23,000 microns (29.01 inches of mercury). During the early stages of evacuation, it is desirable to close the manifold gauge valve at least once to determine if there is a rapid rise in **absolute pressure**. A rapid rise in pressure indicates a relatively large leak. If this occurs, 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.*

6 - When the absolute pressure reaches 23,000 microns (29.01 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 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.

⚠ CAUTION

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

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

8 - Reconnect the manifold gauge to the vacuum pump, turn the pump on, and continue to evacuate the line set and indoor unit until the absolute pressure does not rise above 500 microns (29.9 inches of mercury) within a 20-minute period after shutting off the vacuum pump and closing the manifold gauge valves.

9 - 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 HCFC-22 refrigerant. Open the manifold gauge valves to break the vacuum from 1 to 2 psig positive pressure in the line set and indoor unit. Close manifold gauge valves and shut off the HCFC-22 cylinder and remove the manifold gauge set.

D - Charging

Weighing in the Charge Fixed Orifice *or* *TXV Systems – Outdoor Temp < 65°F (18°C)*

If the system is void of refrigerant, or if the outdoor ambient temperature is cool, the refrigerant charge should be weighed into the unit. Do this after any leaks have been repaired.

1 - Recover the refrigerant from the unit.

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

3 - Weigh in the unit nameplate charge.

If weighing facilities are not available or if you are charging the unit during warm weather, follow one of the other procedures outlined below.

Charging Using the Subcooling Method Fixed Orifice *Systems – Outdoor Temp. ≥ 65°F (18°C)*

If you charge a fixed orifice system when the outdoor ambient is 65°F (18°C) or above, use the subcooling method to charge the unit.

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

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

3 - Use a temperature/pressure chart for HCFC-22 to determine the saturation temperature for the liquid line pressure reading.

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

5 - Compare the subcooling value with those in table 5 or 6. If subcooling is greater than shown, recover some refrigerant. If subcooling is less than shown, add some refrigerant.

Approach and Normal Operating Pressures TXV Systems – Outdoor Temp. ≥ 65°F (18°C)

The following procedure is intended as a general guide and is for use on expansion valve systems only. For best results, indoor temperature should be 70°F (21°C) to 80°F (26°C). Monitor system pressures while charging.

1 - Record outdoor ambient temperature using a digital thermometer.

2 - Attach high pressure gauge set and operate unit for several minutes to allow system pressures to stabilize.

3 - Compare stabilized pressures with those provided in table 7, “Normal Operating Pressures.” Minor variations in these pressures may be expected due to differences in installations. Significant differences could mean that the system is not properly charged or that a problem exists with some component in the system. Pressures higher than those listed indicate that the system is overcharged. Pressures lower than those listed indicate that the system is undercharged. Verify adjusted charge using the approach method.

4 - Outdoor temperature should be 65°F (18°C) or above. Use the same digital thermometer used to check outdoor ambient temperature to check liquid line temperature. Verify the unit charge using the approach method. The difference between the ambient and liquid temperatures should match values given in table 3. Refrigerant must be added to lower approach temperature and removed to increase approach temperature. Loss of charge results in low capacity and efficiency.

5 - If the values don't agree with the those in table 4, add refrigerant to lower the approach temperature or recover refrigerant from the system to increase the approach temperature.

Table 4
Approach Temperatures
(TXV Systems Only)

Model No.	Approach Temperature Liquid Line - Outdoor Ambient °F (°C)
13ACC-018	4 (2) ± 1
13ACC-024	9 (5) ± 1
13ACC-030	6 (3) ± 1
13ACC-036	10 (6) ± 1
13ACC-037	12 (7) ± 1
13ACC-042	8 (4) ± 1
13ACC-048	7 (4) ± 1
13ACC-047	10 (6) ± 1
13ACC-060	12 (7) + 1

NOTE - For best results, use the same digital thermometer to check both outdoor ambient and liquid temperatures.

E - Oil Charge

Refer to compressor nameplate.

IV - MAINTENANCE

⚠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.

Maintenance and service must be performed by a qualified installer or service agency. At the beginning of each cooling season, the system should be checked as follows:

1 - Clean and inspect the outdoor coil. The coil may be flushed with a water hose. Ensure the power is turned off before you clean the coil.

2 - Condenser fan motor is prelubricated and sealed. No further lubrication is needed.

3 - Visually inspect connecting lines and coils for evidence of oil leaks.

4 - Check wiring for loose connections.

5 - Check for correct voltage at unit (unit operating).

6 - Check amp-draw condenser fan motor.
Unit nameplate _____ Actual _____ .

NOTE - If owner complains of insufficient cooling, the unit should be gauged and refrigerant charge checked. Refer to section on refrigerant charging in this instruction.

Indoor Coil

1 - Clean coil, if necessary.

2 - Check connecting lines and coils for evidence of oil leaks.

3 - Check the condensate line and clean it if necessary.

Indoor Unit

1 - Clean or change filters.

2 - 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.

3 - *Belt Drive Blowers* - Check belt for wear and proper tension.

4 - Check all wiring for loose connections

5 - Check for correct voltage at unit (blower operating).

6 - Check amp-draw on blower motor
Unit nameplate_____ Actual _____.

Table 5
Subcooling (SC) and Superheat (SH)*
Reading s are in °F

Metering Device	Unit	-018		-024		-030		-036		-037		-042		-047		-048		-060	
	Out. Coil Entering Air°F (°C)	SC± 2	SH± 2	SC± 2	SH± 2	SC± 2	SH± 2	SC± 2	SH± 2	SC± 2	SH± 2	SC± 2	SH± 2	SC± 2	SH± 2	SC± 2	SH± 2	SC± 2	SH± 2
13ACC TXV	65 (18.3)	10	20	9	17	9	13	7	20	8	19	8	18	9	19	11	27	16	21
	70 (21)	9	20	9	16	8	14	7	18	8	18	8	18	10	19	10	26	15	20
	75 (24)	9	21	8	17	8	14	8	18	8	18	8	18	10	18	10	24	14	18
	80 (27)	8	22	8	17	8	14	8	17	8	18	9	18	10	17	10	24	13	17
	85 (29)	7	22	7	17	8	15	8	18	8	17	9	18	10	19	9	23	13	17
	90 (32)	6	22	6	18	9	16	8	18	9	16	9	19	9	17	9	23	13	17
	95 (35)	6	23	6	18	9	17	8	19	7	16	9	19	9	17	9	23	13	17
	100 (38)	6	24	6	19	9	17	8	20	8	16	9	19	9	18	9	23	12	17
	105 (41)	6	25	7	19	8	17	8	20	9	17	10	19	9	19	9	24	12	18
	110 (43)	6	26	6	20	8	17	8	20	8	18	10	19	9	19	8	24	10	18
	115 (45)	5	27	6	21	9	17	9	22	8	19	11	20	9	18	7	24	10	17

Table 6
Subcooling (SC) and Superheat (SH)*
Reading s are in °F

Metering Device	Unit	-018	-018	-024		-030		-036		-037		-042		-047		-048		-060	
13ACC RFC	RFC SIZE	0.055 42J3901		0.063 42J4301		0.071 42J4701		0.078 42J5101		0.077 42J5001		0.079 25M5601		0.084 42J5401		0.093 78L7401		0.099 42J6201	
	Out. Coil Entering Air°F (°C)	SC± 1	SH± 1	SC± 1	SH± 1	SC± 1	SH± 1	SC± 1	SH± 1	SC± 1	SH± 1	SC± 1	SH± 1	SC± 1	SH± 1	SC± 1	SH± 1	SC± 1	SH± 1
	65 (18.3)	15	31	14	25	10	29	12	32	10	32	13	30	8	29	13	36	19	31
	70 (21)	15	29	14	24	10	29	11	30	9	29	13	28	8	28	13	33	18	29
	75 (23.9)	15	27	13	24	10	28	11	28	10	27	12	26	7	27	13	30	18	27
	80 (27)	14	25	12	23	10	25	10	27	9	25	11	24	7	25	13	29	17	25
	85 (29.4)	14	23	11	22	9	22	8	25	9	22	10	22	7	24	12	27	16	22
	90 (32)	13	17	9	21	8	20	7	22	8	18	9	19	6	22	11	25	15	20
	95 (35)	12	11	8	19	7	15	7	19	8	16	8	17	6	20	10	23	14	18
	100 (38)	11	7	7	18	6	9	5	14	8	6	8	13	6	17	10	20	13	14
	105 (40.6)	10	4	5	16	6	3	4	11	8	2	7	9	5	11	10	15	13	9
	110 (43)	9	4	4	13	5	4	3	5	7	1	5	3	5	4	9	11	12	3
	115 (45)	8	4	4	7	4	2	3	2	6	1	4	2	4	1	8	2	10	2

** Reading taken at compressor.*

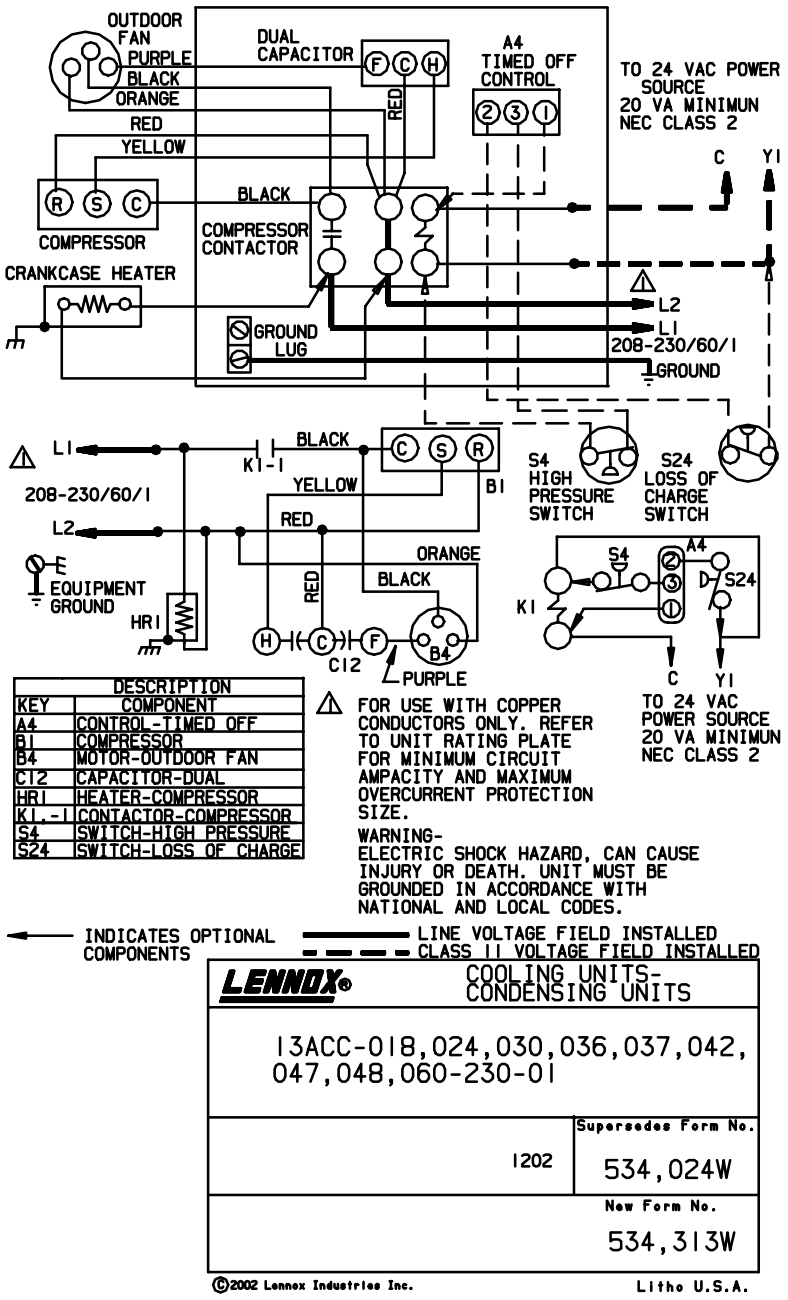
Table 7
Normal Operating Pressures In psig (liquid and suction +/- 2 psig)*

Unit / Metering Device	Out. Coil Entering Air Temp. °F (°C)	-018		-024		-030		-036		-037		-042		-047		-048		-060	
		LIQ	SUC	LIQ.	SUC.	LIQ.	SUC.	LIQ.	SUC.	LIQ.	SUC.	LIQ.	SUC.	LIQ.	SUC.	LIQ.	SUC.	LIQ.	SUC.
13ACC TXV	65 (18.3)	140	62	145	79	143	73	148	77	157	78	144	77	146	73	151	69	171	75
	70 (21)	154	67	158	79	154	74	160	78	170	79	156	78	158	74	163	71	184	77
	75 (23.9)	167	71	170	80	167	74	175	79	184	80	170	79	171	74	177	72	197	78
	80 (27)	182	75	184	81	181	75	190	79	198	81	185	79	185	75	191	73	211	79
	85 (29.4)	196	78	198	82	195	75	205	80	213	81	199	80	200	76	206	74	226	79
	90 (32)	211	80	213	82	210	76	221	81	229	82	215	80	215	73	221	75	242	80
	95 (35.0)	226	81	229	83	227	76	237	82	242	82	231	81	231	77	237	796	257	80
	100 (38)	242	82	245	84	242	77	253	82	263	83	249	81	248	77	254	76	276	81
	105 (40.6)	258	83	262	84	259	7	272	82	279	84	266	81	265	78	271	77	294	82
	110 (43)	275	84	279	85	277	79	291	83	296	84	284	81	284	79	289	78	312	83
	115 (45)	293	85	297	86	296	80	310	83	316	85	303	82	303	80	289	78	334	83
13ACC RFC	65 (18.3)	139	76	147	69	140	61	149	68	150	66	147	68	139	59	148	59	169	68
	70 (21)	151	77	160	73	152	64	162	71	165	70	159	71	155	62	163	63	183	71
	75 (23.9)	163	77	173	76	166	68	176	74	180	74	173	74	166	64	177	66	198	74
	80 (27)	176	78	187	78	180	71	190	76	195	77	186	75	177	66	191	68	213	76
	85 (29.4)	190	78	201	80	194	73	204	78	210	79	200	77	190	67	206	71	228	78
	90 (32)	205	79	216	82	209	75	219	80	226	81	214	79	201	68	223	73	245	80
	95 (35.0)	220	79	231	83	224	76	236	81	242	82	231	80	220	70	238	75	261	81
	100 (38)	236	80	246	85	241	77	252	82	260	84	247	81	238	71	257	76	279	82
	105 (40.6)	252	80	262	86	257	78	270	84	279	85	264	83	256	72	274	77	297	83
	110 (43)	269	81	279	86	276	81	288	85	297	86	281	84	271	73	292	79	316	85
	115 (45)	287	82	298	87	294	82	307	86	313	87	300	85	290	74	309	80	336	86

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

V - WIRING DIAGRAMS AND SEQUENCE OF OPERATION

13ACC 2 THROUGH 5 TON OPERATING SEQUENCE



DESCRIPTION	
KEY	COMPONENT
A4	CONTROL-TIMED OFF
BI	COMPRESSOR
B4	MOTOR-OUTDOOR FAN
CT2	CAPACITOR-DUAL
HRI	HEATER-COMPRESSOR
KI,-I	CONTACTOR-COMPRESSOR
S4	SWITCH-HIGH PRESSURE
S24	SWITCH-LOSS OF CHARGE

LENNOX® COOLING UNITS-CONDENSING UNITS

13ACC-018,024,030,036,037,042, 047,048,060-230-01

1202 | Supersedes Form No. 534,024W | New Form No. 534,313W

 Litho U.S.A.

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- Cooling demand initiates at Y1 in the thermostat.

2- 24VAC from indoor unit (Y1) energizes the timed off control TOC (if used), which energizes compressor contactor K1 provided the 5 minute delay is satisfied.

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

4 - Compressor (B1) and outdoor fan motor (B4) begin immediate operation..

END OF COOLING DEMAND:

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

6- Compressor contactor K1 is de-energized.

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