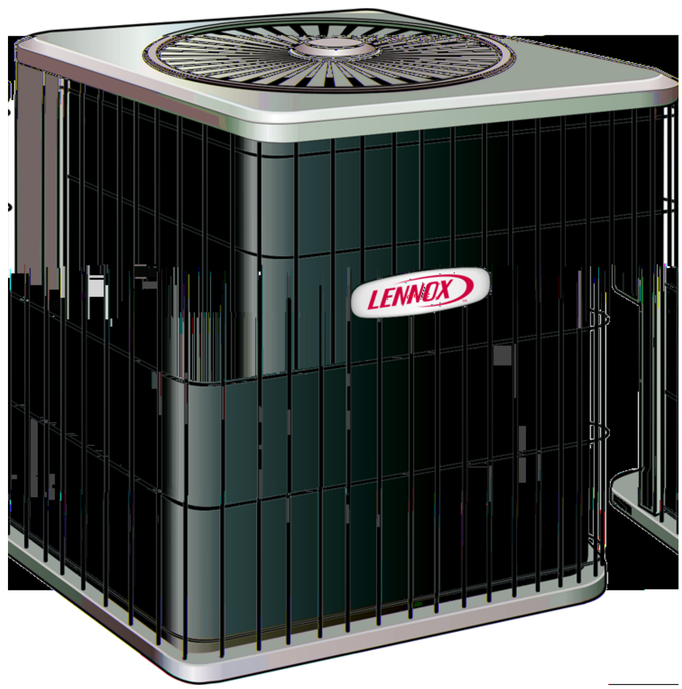
13ACD SERIES UNITS

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

13ACD 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.



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.

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ELECTROSTATIC DISCHARGE (ESD)
Precautions and Procedures

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.

SPECIFICATIONS		13ACD-018	13ACD-024	13ACD-030	13ACD-036	13ACD-042	13ACD-048 *(-1, -2 units)*	13ACD-060
General Data	**Model No.**	**13ACD-018**	**13ACD-024**	**13ACD-030**	**13ACD-036**	**13ACD-042**	**13ACD-048** *(-1, -2 units)*	**13ACD-060**
	Nominal Tonnage	1.5	2	2.5	3	3.5	4	5
Connections (sweat)	Liquid line o.d. - in.	3/8	3/8	3/8	3/8	3/8	3/8	3/8
	Suction line o.d. - in.	3/4	3/4	3/4	7/8	7/8	7/8	1-1/8
[1] Refrigerant (R-22) furnished		4 lbs. 0 oz.	4 lbs. 8 oz.	5 lbs. 5 oz.	6 lbs. 15 oz.	6 lbs. 15 oz.	9 lbs. 8 oz. *(12 lbs 12oz)*	13 lbs. 6 oz.
Outdoor Coil	Net face area - sq. ft. Outer coil	13.22	15.11	13.22	13.22	15.11	18.67 *(24.50)*	24.50
	Net face area - sq. ft. Inner coil	- - -	- - -	12.60	12.60	14.40	17.96 *(23.56)*	23.56
	Tube diameter - in.	5/16	5/16	5/16	5/16	5/16	5/16	5/16
	Number of rows	1	1	2	2	2	2	2
	Fins per inch	22	22	22	22	22	22	22
Outdoor Fan	Diameter - in.	18	18	18	18	18	22	22
	Number of blades	3	3	4	4	4	4	4
	Motor hp	1/5	1/5	1/5	1/5	1/3	1/4	1/4
	Cfm	2500	2500	2450	2450	2930	3670 *(3830)*	3830
	Rpm	1100	1100	1100	1100	1100	825	825
	Watts	200	200	200	200	310	315 *(330)*	330
Shipping Data - lbs. 1 package		122	129	150	150	177	191 *(233)*	236
ELECTRICAL DATA								
	Line voltage data - 60 hz - 1ph	208/230V	208/230V	208/230V	208/230V	208/230V	208/230V	208/230V
	[2] Maximum overcurrent protection (amps)	15	20	30	30	45	40	60
	[3] Minimum circuit ampacity	10.7	14.1	18.7	19.1	25.9	25.7	33.3
Compressor	Rated load amps	7.7	10.4	14.1	14.4	19.2	19.2	26.1
	Power factor	.98	.96	.96	.96	.98	.94	.96
	Locked rotor amps	40.0	54.0	67.0	77.0	104.0	97.0	141.0
Condenser Fan Motor	Full load amps	1.0	1.0	1.0	1.0	1.9	1.7	1.7
	Locked rotor amps	1.9	1.9	1.9	1.9	4.1	3.1	3.1
OPTIONAL ACCESSORIES - must be ordered extra								
Compressor Crankcase Heater	**93M04**	•	•	•	•			
	93M05					•	•	•
Compressor Hard Start Kit	**10J42**	•	•	•	•	•	•	
	81J69							•
Compressor Low Ambient Cut-Off	**45F08**	•	•	•	•	•	•	•
Compressor Sound Cover	**69J03**	•	•	•	•	•	•	•
Compressor Time-Off Control	**47J27**	•	•	•	•	•	•	•
Freezestat 3/8 in. tubing	**93G35**	•	•	•	•	•	•	•
5/8 in. tubing	**50A93**	•	•	•	•	•	•	•
Hail Guards	**92M88**	•		•	•			
	92M89		•			•		
	12W21						•	
	92M94							•
High Pressure Switch Kit	**94J46**	•	•	•	•	•	•	•
Indoor Blower Off Delay Relay	**58M81**	•	•	•	•	•	•	•
Loss of Charge Switch Kit	**84M23**	•	•	•	•	•	•	•
Low Ambient Kit	**24H77**	•	•	•	•	•	•	•
Mounting Base	**69J06**	•	•	•	•	•		
	69J07						•	•
Refrigerant Line Sets	L15-41-20, L15-41-30, L15-41-40, L15-41-50	•	•	•				
	L15-65-30, L15-65-40, L15-65-50				•	•	•	
	Field Fabricate							•
Unit Stand-Off Kit	**94J45**	•	•	•	•	•	•	•

NOTE — Extremes of operating range are plus 10% and minus 5% of line voltage.
[1] Refrigerant charge sufficient for 15 ft. length of 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.

I - UNIT COMPONENTS

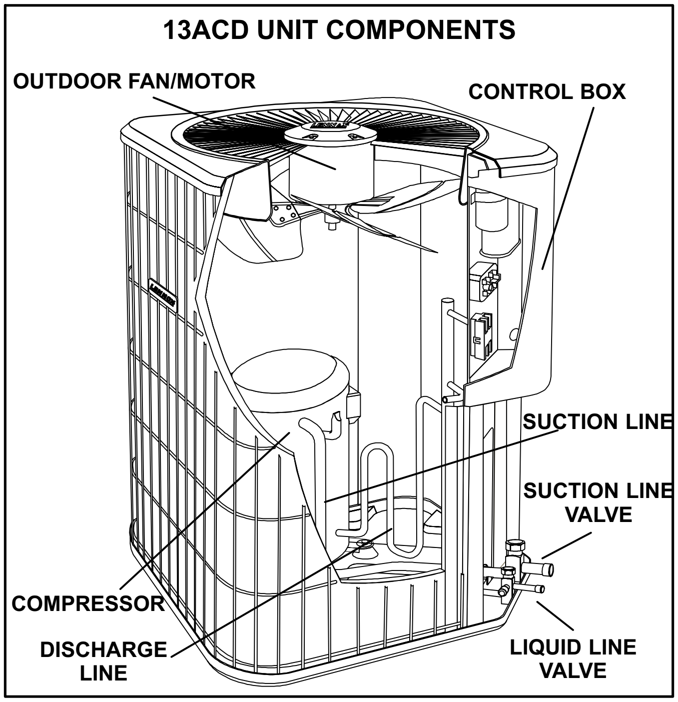

FIGURE 1

A - Control Box (Figure 2)

13ACD 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 13ACD 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.

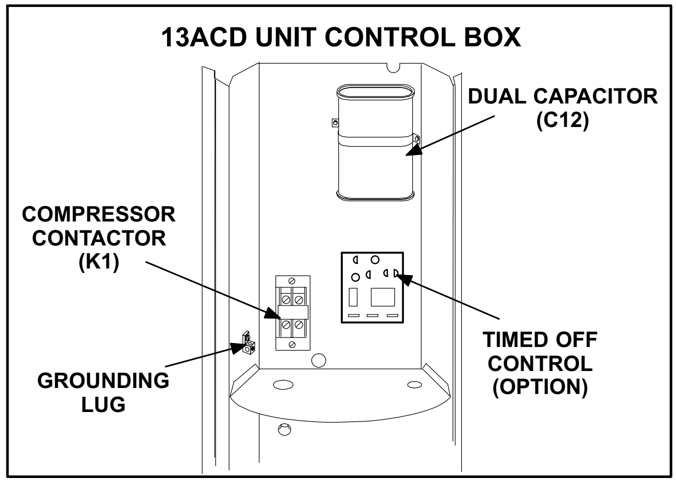

FIGURE 2

2 - Dual Capacitor C12

The compressor and fan in 13ACD 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.

4 - High Pressure Switch (option)

The manual-reset high pressure switch is located in the liquid line. When liquid line pressure exceeds the factory setting of 410 ± 10 psi, the switch opens and shuts off the compressor.

5 - Pressure Switch (-1 units only)

The auto-reset pressure switch is located in the suction line. When suction line pressure drops below the factory setting of 25 ± 5 psi, the switch opens and shuts off the compressor.

B - Compressor

SCROLL COMPRESSOR

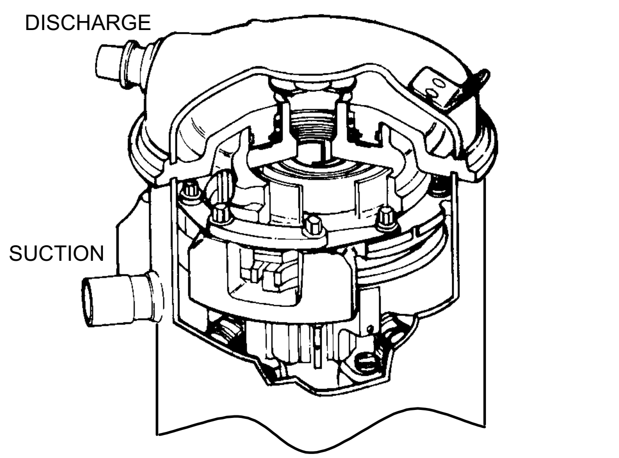

FIGURE 3

All 13ACD 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. Two identical scrolls are mated together forming concentric spiral shapes (figure 4). One scroll remains stationary, while the other is allowed to ”orbit” (figure 5). 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.

CROSS-SECTION OF SCROLLS

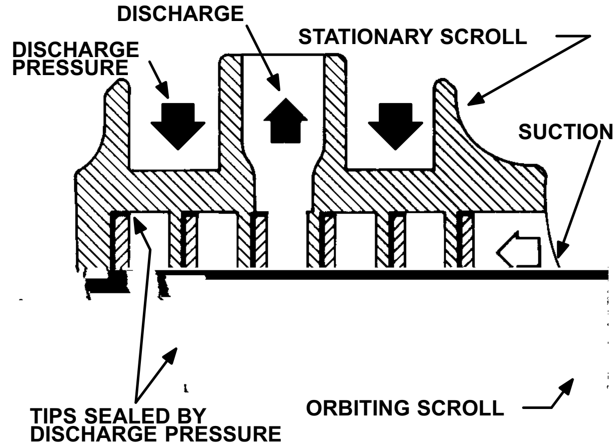

FIGURE 4

The counterclockwise orbiting scroll draws gas into the outer crescent shaped gas pocket created by the two scrolls (figure 5 - 1). The centrifugal action of the orbiting scroll seals off the flanks of the scrolls (figure 5 - 2). As the orbiting motion continues, the gas is forced toward the center of the scroll and the gas pocket becomes compressed (figure 5 - 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 4). The discharge pressure forcing down on the top scroll helps seal off the upper and lower edges (tips) of the scrolls (figure 4). 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.

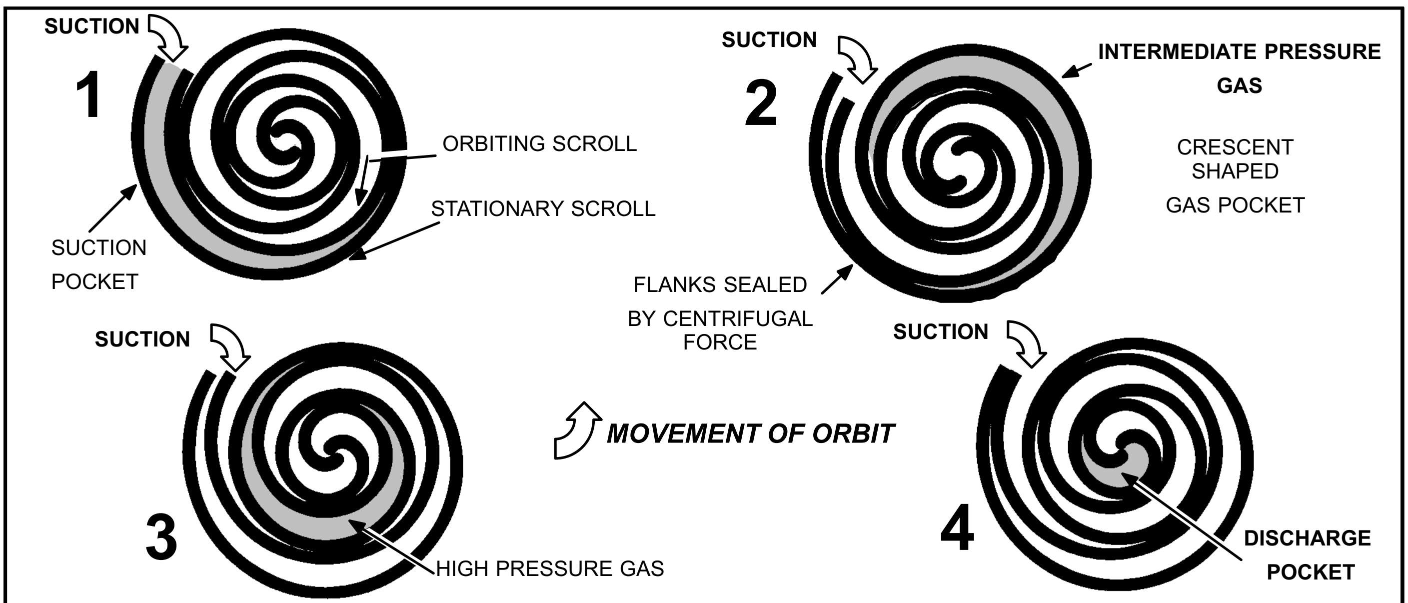

FIGURE 5

e to its efficiency, the scroll compressor is capable of draw- a much deeper vacuum than reciprocating compres- rs. Deep vacuum operation can cause internal fusite cing resulting in damaged internal parts and will result compressor failure. Never use a scroll compressor for acuating or to pump system into a vacuum. This type damage can be detected and will result in denial of arranty claims.

he scroll compressor is quieter than a reciprocating com- essor, however, the two compressors have much different ound characteristics. The sounds made by a scroll compres- or do not affect system reliability, performance, or indicate amage.

ee compressor nameplate or ELECTRICAL DATA for ompressor specifications.

C - Condenser Fan Motor

ll units use single-phase PSC fan motors which require a run apacitor. In all units, the condenser fan is controlled b he compressor contactor.

ELECTRICAL DATA tables in this manual show sp cations for condenser fans used in 13ACDs.

Access to the condenser fan motor on all units by removing the seven screws securing the ply. See figure 6. The condenser fan moto from the fan guard by removing the four nu top panel. Drip loops should be used in vicing motor. See figure 7 if conder placement is necessary.

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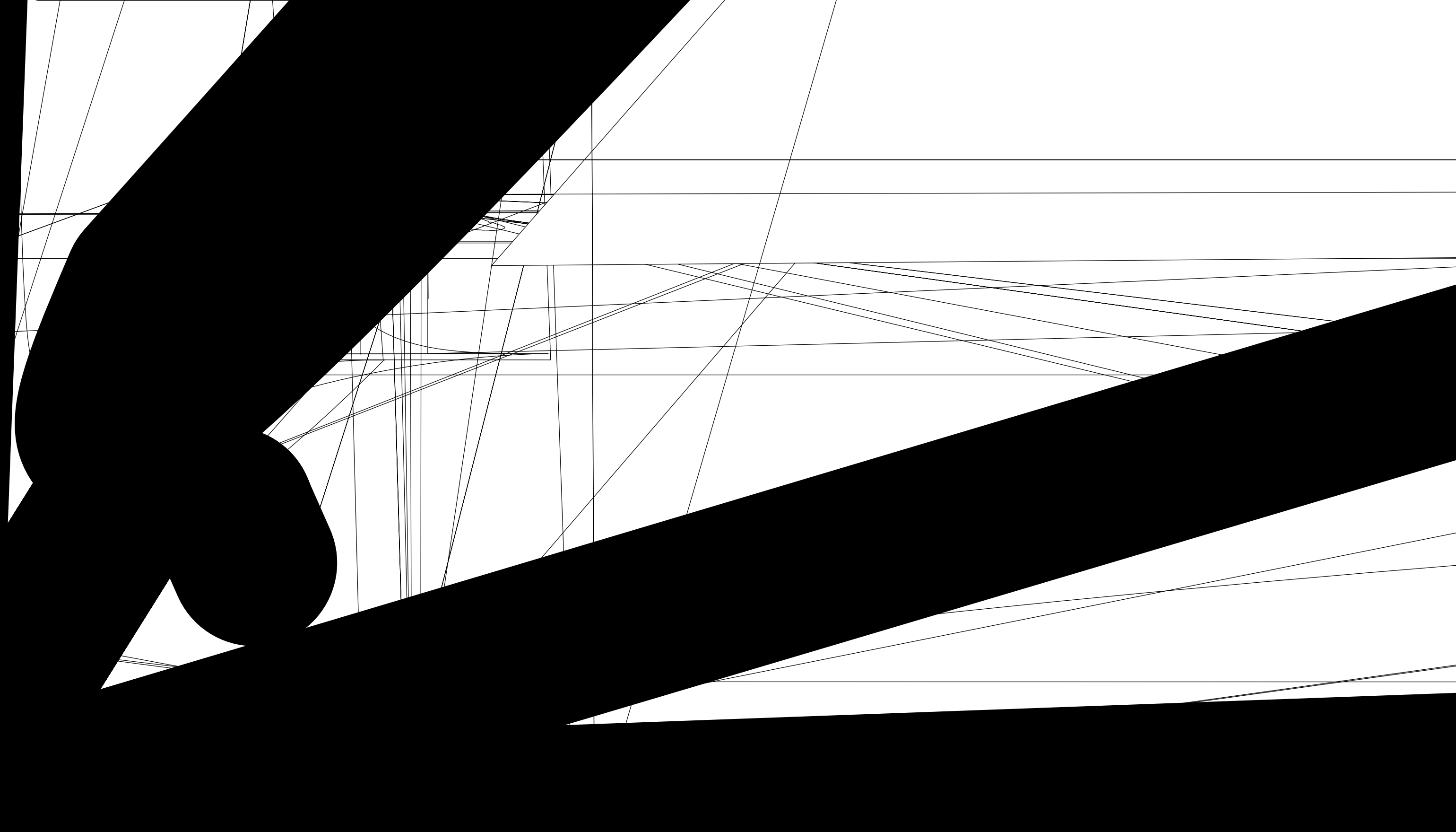


Table 2
Torque Requirements

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.

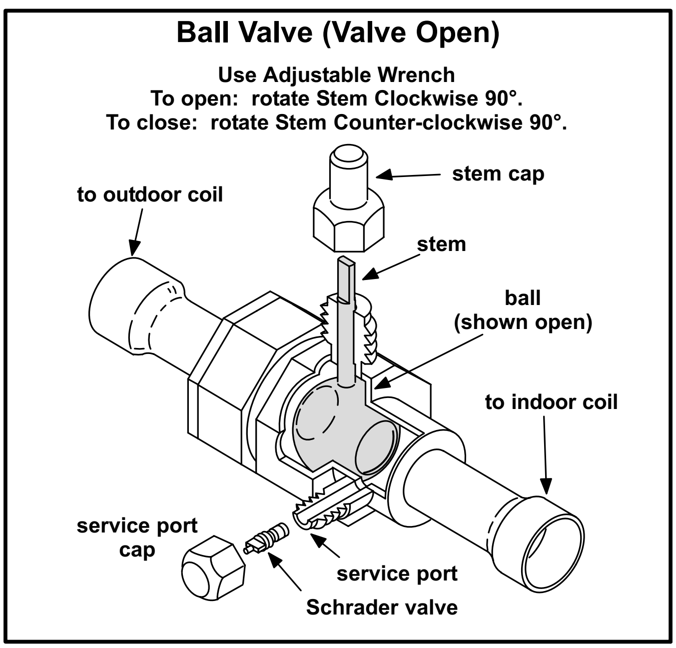
3 - Replace the stem cap. Tighten finger tight, then tighten an additional 1/6 turn.

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.



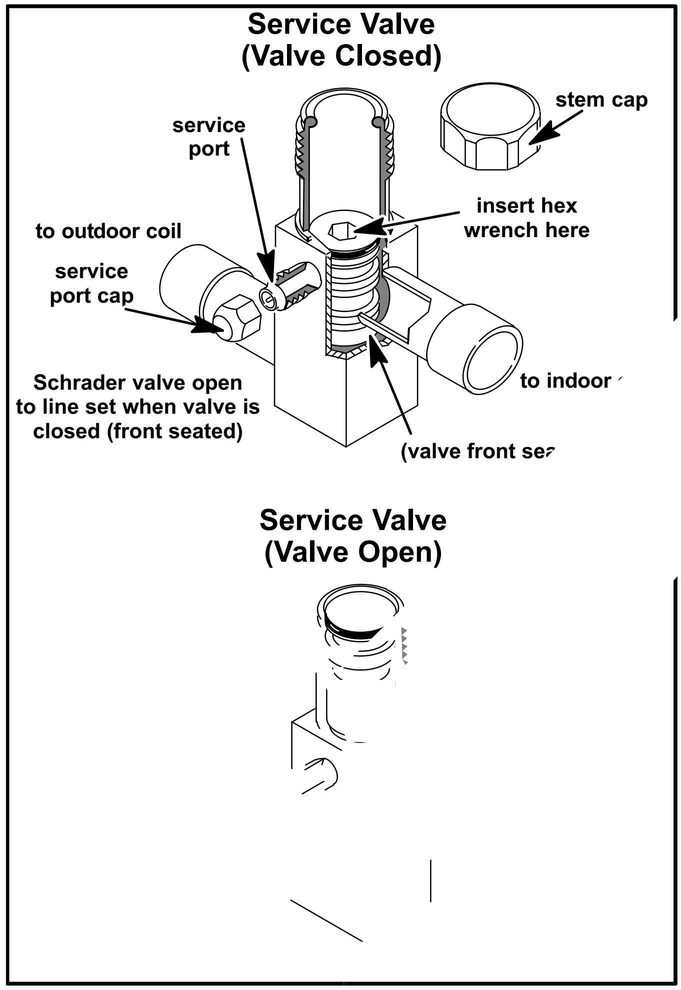


FIGURE 8

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 Corp.9351-L9 and available on the Lennox DaveNet web site 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

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 damage by fire and or an explosion, that could result in personal injury or death.

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

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

Units are 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 15 feet (4.6 m) line set. For varying lengths of line set, refer to table 4 for refrigerant charge adjustment.

TABLE 4

Refrigerant Charge per Line Set Lengths	
Liquid Line Set Diameter	**Oz. per 5 ft. (g per 1.5 m) adjust from 15 ft. (4.6 m) line set***
3/8 in. (9.5 mm)	3 ounce per 5 ft. (85 g per 1.5 m)
*NOTE - *If line length is greater than 15 ft. (4.6 m), add this amount. If line length is less than 15 ft. (4.6 m), subtract this amount.*	

The outdoor unit should be charged during warm weather. However, applications arise in which charging must occur in the colder months. The method of charging is determined by the unit's ***refrigerant metering device*** *and the* ***outdoor ambient temperature****.*

Measure the liquid line temperature and the outdoor ambient temperature as outlined below:

1. Connect the manifold gauge set to the service valves:
   - low pressure gauge to *vapor* valve service port
   - high pressure gauge to *liquid* valve service port
2. Close manifold gauge set valves. Connect the center manifold hose to an upright cylinder of HCFC-22.
3. Set the room thermostat to call for heat. This will create the necessary load for properly charging the system in the cooling cycle.
4. Use a digital thermometer to record the outdoor ambient temperature.
5. When the heating demand has been satisfied, switch the thermostat to cooling mode with a set point of 68°F (20°C). When pressures have stabilized, use a digital thermometer to record the liquid line temperature.
6. The outdoor temperature will determine which charging method to use. Proceed with the appropriate charging procedure.

Charge Using Weigh-in Method (RFC/TXV Systems) - Outdoor Temp. <65°F (18°C)

If the system is void of refrigerant, or if the outdoor ambient temperature is cool, use the weigh-in method to charge 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 charge according to the total amount shown on the unit nameplate.

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

Charge Using Subcooling Method 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 °F (°C)**
   — ____° **Liquid Line Temperature °F (°C)**
   = ____° **Subcooling Value °F (°C)**

5. Compare the subcooling value with those in table 5 for 13ACD units with fixed orifices and table 6 for 13ACD units with TXV. If subcooling is greater than shown, recover some refrigerant. If subcooling is less than shown, add some refrigerant.

TABLE 5

Subcooling Values For RFC Systems

Outdoor Temp. °F(°C)	Liquid Subcooling [± 1°F (.6°C)]							
	-018	-024	-030	-036	-042	-048 -1, -2 units	-048	-060
65 (18)	13 (7)	13 (7)	7 (4)	14 (8)	15 (8.3)	9 (5)	11 (6)	13 (7)
70 (21)	13 (7)	12 (6.7)	6 (3.3)	13 (7)	14 (8)	9 (5)	10 (5.6)	12 (6.7)
75 (24)	10 (5.6)	11 (6)	5 (3)	13 (7)	13 (7)	9 (5)	9 (5)	12 (6.7)
80 (27)	10 (5.6)	11 (6)	5 (3)	12 (6.7)	12 (6.7)	9 (5)	8 (4.5)	12 (6.7)
85 (29)	8 (4.5)	10 (5.6)	5 (3)	11 (6)	11 (6)	9 (5)	7 (4)	11 (6)
90 (32)	8 (4.5)	10 (5.6)	4 (2.2)	10 (5.6)	10 (5.6)	9 (5)	5 (2.8)	10 (5.6)
95 (35)	7 (4)	10 (5.6)	4 (2.2)	9 (5)	9 (5)	9 (5)	5 (2.8)	10 (5.6)
100 (38)	7 (4)	10 (5.6)	3 (2)	9 (5)	8 (4.5)	9 (5)	3 (1.7)	9 (5)
105 (41)	6 (3.3)	9 (5)	3 (2)	8 (4.5)	7 (4)	9 (5)	3 (1.7)	9 (5)
110 (43)	6 (3.3)	8 (4.5)	2 (1)	6 (3.3)	7 (4)	9 (5)	2 (1.1)	9 (5)
115 (45)	3 (2)	6 (3.3)	2 (1)	6 (3.3)	5 (3)	8 (4.5)	2 (1.1)	8 (4.5)

Charge using Subcooling Method (TXV Systems) — Outdoor Temp. >40ºF (4ºC)

This charging procedure *should not be used* if ambient temperatures are below 40ºF. For best results, indoor temperature should be 70ºF (21ºC) to 80ºF (26ºC).

1. Restrict the airflow (see figure 10) through the outdoor coil to achieve pressures from 200-250 psig . These higher pressures are necessary for checking the charge. Block equal sections of air intake panels and move coverings sideways until the liquid pressure is in the above noted ranges.

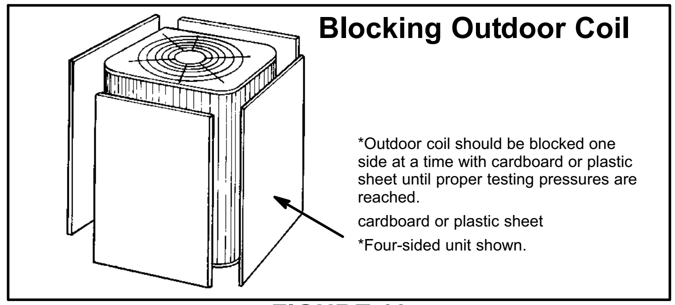


FIGURE 10

2. With the manifold gauge hose installed on the liquid service port and the unit operating stably, use a digital thermometer to record the liquid line temperature.
3. At the same time, record the liquid line pressure reading.
4. Use a temperature/pressure chart for HCFC-22 refrigerant to determine the saturation temperature for the liquid line pressure reading.
5. Subtract the refrigerant saturation temperature from the liquid line temperature to determine subcooling. Compare to table 6.

   ____° **Saturation Temperature °F (°C)**
   — ____° **Liquid Line Temperature °F (°C)**
   = ____° **Subcooling Value °F (°C)**

TABLE 6

Subcooling Values For TXV Systems

13ACD	-018	-024	-030	-036	-042	-048	-060
°F (C°)	8 (4.4)	8 (4.4)	4 (2.2)	7 (3.8)	10 (5.6)	9 (5)	14 (8)

Charge Using Approach Method (TXV Systems) - Outdoor Temperature ≥65°F (18°C)

When charging an expansion valve system when the outdoor ambient temperature is 65°F (18°C) or above, it is best to charge the unit using the approach method. Subtract the outdoor ambient temperature from the liquid line temperature to determine the approach temperature.

____° **Liquid Line Temperature °F (°C)**
— ____° **Outdoor Ambient Temperature °F (°C)**
= ____° **Approach Value °F (°C)**

The resulting difference (approach temperature) should agree with the values given in table 7. If not, add refrigerant to lower the approach temperature or recover refrigerant from the system to increase the approach temperature.

Checking Charge Using Normal Operating Pressures

⚠ IMPORTANT

Use table 8 to help perform maintenance checks. Table 8 is not a procedure for charging the system. Minor variations in these pressures may be due to differences in installations. Significant deviations could mean that the system is not properly charged or that a problem exists with some component in the system.

TABLE 7

Approach Values							
13ACD Model	**-018**	**-024**	**-030**	**-036**	**-042**	**-048**	**-060**
Temp. °F (°C)	6 (3.3)	10 (5.6)	11 (6)	9 (5)	6 (3.3)	6 (3.3)	8 (4.4)
Approach Value is the Liquid Line Temperature minus Outdoor Ambient Temperature [ºF (ºC) ± 1ºF (0.5ºC)] NOTE - For best results, use the same digital thermometer to check both outdoor ambient and liquid temperatures.							

TABLE 8
Normal Operating Pressures In psig (liquid and suction +/- 2 psig)*

Normal Operating Pressures								
13ACD Model	**-018**	**-024**	**-030**	**-036**	**-042**	**-048-1, -2 units**	**-048**	**-060**
Values below are typical pressures; indoor unit match up, indoor air quality equipment, and indoor load will cause the pressures to vary.								
***Temp. °F (°C)**	**Liquid Line Pressure/Vapor Line Pressure**							
Expansion Valve (TXV)								
65 (18)	141 / 80	147 / 79	141 / 76	145 / 74	143 / 78	145 / 80	140 / 77	151 / 76
70 (21)	154 / 81	159 / 79	154 / 76	157 / 75	153 / 79	157 / 81	152 / 77	164 / 77
75 (24)	166 / 81	173 / 80	167 / 77	170 / 76	167 / 80	170 / 81	165 / 77	177 / 78
80 (27)	180 / 82	187 / 81	181 / 78	186 / 76	182 / 80	184 / 82	179 / 78	192 / 78
85 (29)	195 / 82	218 / 82	195 / 78	201 / 77	198 / 81	198 / 82	192 / 78	207 / 79
90 (32)	209 / 83	202 / 81	210 / 79	217 / 77	215 / 81	214 / 83	209 / 80	223 / 80
95 (35)	222 / 83	234 / 82	227 / 80	234 / 78	231 / 82	230 / 84	227 / 81	240 / 80
100 (38)	244 / 84	251 / 83	249 / 81	251 / 79	249 / 83	247 / 84	243 / 81	259 / 81
105 (41)	258 / 85	267 / 84	260 / 81	268 / 79	268 / 84	265 / 85	261 / 82	277 / 81
110 (43)	276 / 85	287 / 84	278 / 82	288 / 80	287 / 84	283 / 85	279 / 83	297 / 82
115 (45)	294 / 86	307 / 85	299 / 83	309 / 81	308 / 85	303 / 86	296 / 83	318 / 83
Fixed Orifice (RFC)								
65 (18)	144 / 73	147 / 68	140 / 66	150 / 67	147 / 70	145 / 70	143 / 73	150 / 67
70 (21)	157 / 76	160 / 71	152 / 68	162 / 70	158 / 72	156 / 72	154 / 75	163 / 70
75 (24)	167 / 78	173 / 74	166 / 71	176 / 72	171 / 75	170 / 75	167 / 78	177 / 72
80 (27)	182 / 80	189 / 77	180 / 74	190 / 74	184 / 77	183 / 78	180 / 79	191 / 75
85 (29)	196 / 82	203 / 79	196 / 76	205 / 76	198 / 78	198 / 80	193 / 81	207 / 77
90 (32)	211 / 84	219 / 81	211 / 79	220 / 78	213 / 80	213 / 82	207 / 82	221 / 79
95 (35)	225 / 84	238 / 83	227 / 80	237 / 79	228 / 81	230 / 84	221 / 84	239 / 80
100 (38)	242 / 86	255 / 85	294 / 82	255 / 80	245 / 82	246 / 85	237 / 85	256 / 81
105 (41)	256 / 86	272 / 86	262 / 83	273 / 81	262 / 84	264 / 86	253 / 86	274 / 83
110 (43)	278 / 88	294 / 87	282 / 84	291 / 83	281 / 84	282 / 87	269 / 87	295 / 84
115 (45)	293 / 88	317 / 88	302 / 86	314 / 84	300 / 85	301 / 88	289 / 88	315 / 85
*Temperature of the air entering the outside coil.								

IV - MAINTENANCE

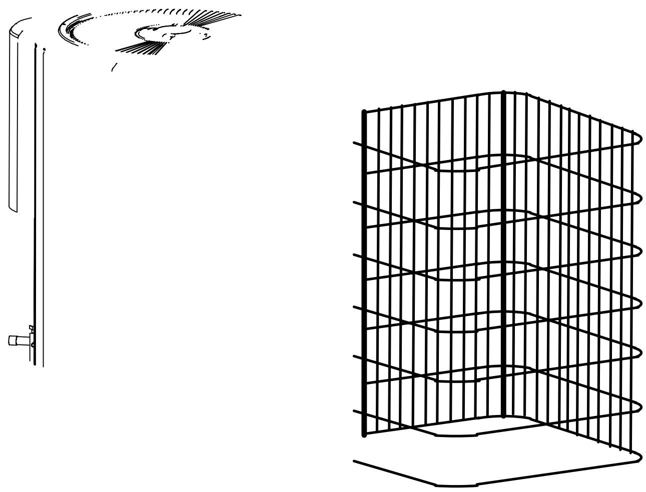
⚠WARNING

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:

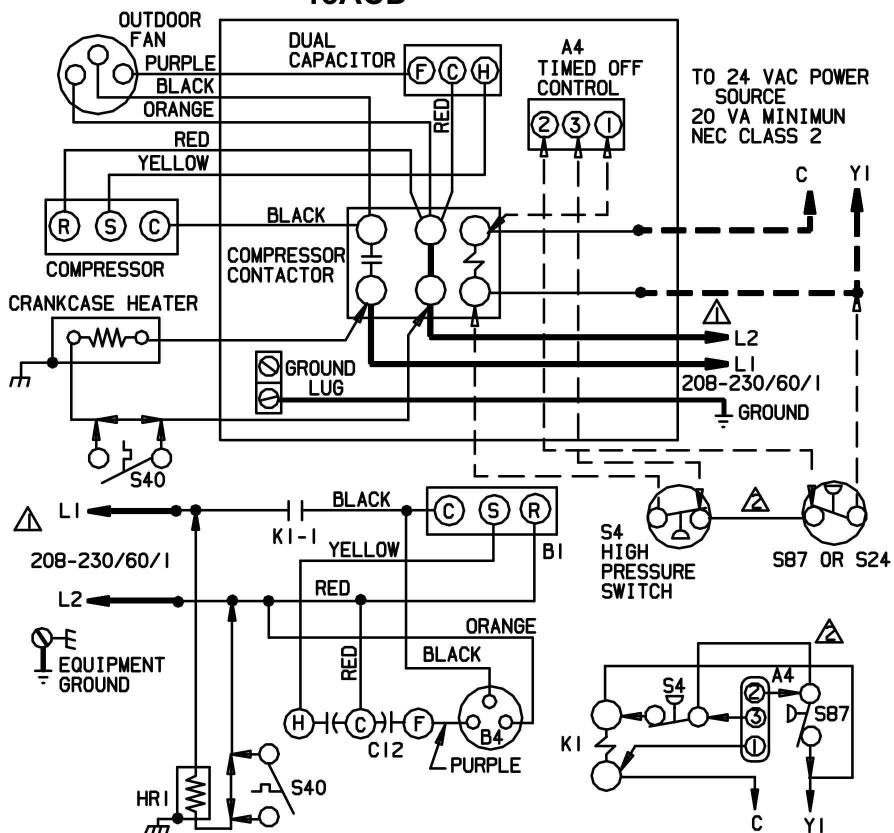
1. Clean and inspect outdoor coil. The coil may be flushed with a water hose. Make sure power is off before cleaning.

   The outdoor coil is protected by an inner mesh screen and a wire cage (see figure 11).



V - WIRING DIAGRAMS AND SEQUENCE OF OPERATION

13ACD



DESCRIPTION	
KEY	COMPONENT
A4	CONTROL-TIMED OFF
B1	COMPRESSOR
B4	MOTOR-OUTDOOR FAN
C12	CAPACITOR-DUAL
HR1	HEATER-COMPRESSOR
K1,-1	CONTACTOR-COMPRESSOR
S4	SWITCH-HIGH PRESSURE
S24	SWITCH-LOSS OF CHARGE
S40	THERMOSTAT-CRANKCASE
S87	SWITCH-LOW PRESS.COMP 1

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

⚠2 JUMPER IS USED WHEN TOC IS NOT USED

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

← INDICATES OPTIONAL COMPONENTS

━━━ LINE VOLTAGE FIELD INSTALLED
— — — CLASS II VOLTAGE FIELD INSTALLED

07/05	Supersedes Form No.
	New Form No. 534,773W

 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 TOC timed off control (if used) , which energizes contactor K1.

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.