

12ACB CONDENSING UNIT

12ACB condensing units are designed for expansion valve (TXV) systems. Refer to Lennox engineering handbook for expansion valve kits which must be ordered separately.

SHIPPING AND PACKING LIST

- 1 - Assembled 12ACB condensing unit
- 1 - 45° copper street elbow

Check unit for shipping damage. Consult last carrier immediately if damage is found.

GENERAL INFORMATION

These instructions are intended as a general guide and do not supersede national or local codes in any way. Authorities having jurisdiction should be consulted before installation.

! IMPORTANT

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

INSTALLATION INSTRUCTIONS

12ACB SERIES UNITS

CONDENSING UNITS
 2 through 5 ton
 503,727M
 8/97
 Supersedes 503,354M

TP Technical
 Publications
 Litho U.S.A.

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RETAIN THESE INSTRUCTIONS FOR FUTURE REFERENCE

! WARNING

Product contains fiberglass wool.

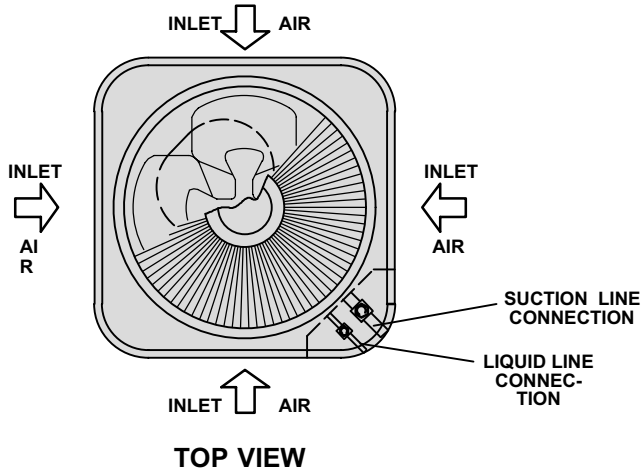
Disturbing the insulation in this product during installation, maintenance, or repair will expose you to fiberglass wool. Breathing this may cause lung cancer. (Fiberglass wool is known to the State of California to cause cancer.)

Fiberglass wool may also cause respiratory, skin, and eye irritation.

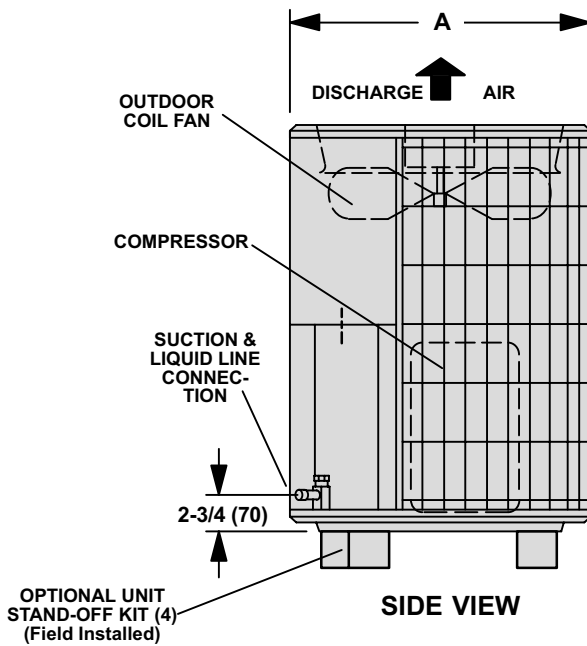
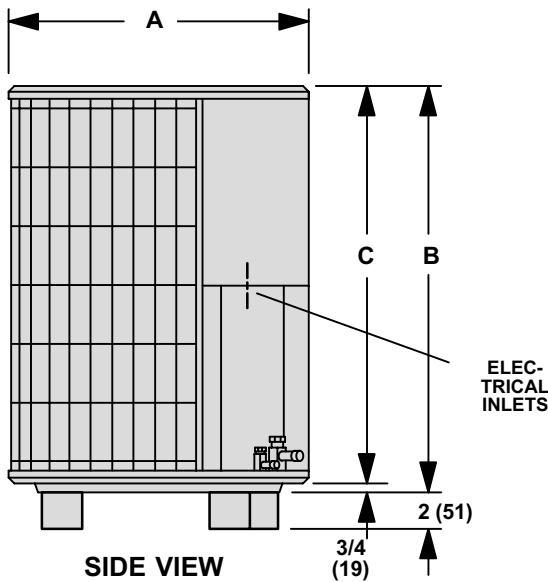
To reduce exposure to this substance or for further information, consult material safety data sheets available from address shown below, or contact your supervisor.

Lennox Industries Inc.
 P.O. Box 799900
 Dallas, TX 75379-9900

12ACB UNIT DIMENSIONS-INCHES (MM)



Model No.		A	B	C
12ACB24	in.	24-1/4	33-1/4	32-1/2
12ACB30				
12ACB36	mm	616	845	826
12ACB42				
12ACB48	in.	28-1/4	37-1/4	36-1/2
12ACB60	mm	718	946	927



START-UP AND PERFORMANCE CHECK LIST

Job Name _____ Job No. _____ Date _____

Job Location _____ City _____ State _____

Installer _____ City _____ State _____

Unit Model No. _____ Serial No. _____ Serviceman _____

Nameplate Voltage _____ Amps: _____

Minimum Circuit Ampacity _____ Supply _____ Condenser Fan _____

Maximum Overcurrent Protection Size _____ Compressor _____

Electrical Connections Tight?

Supply Voltage (Unit Off) _____

Indoor Filter Clean? Indoor Blower CFM _____

S.P. Drop Over Evaporator (Dry) _____

Condenser Entering Air Temperature _____

Discharge Pressure _____ Suction Pressure _____

Refrigerant Charge Checked?

COOLING SECTION

Refrigerant Lines:

Leak Checked?

Service Valves Fully Open? Properly Insulated?

Condenser Fan Checked? Service Valve Caps Tight?

Voltage With Compressor Operating _____

THERMOSTAT

Calibrated? Properly Set? Level?

SETTING THE UNIT

Refer to unit dimensions on page 2 for sizing mounting slab, platforms or supports. A minimum clearance of 36" (914 mm) between multiple units must be maintained. Refer to figure 1 for installation clearances.

Place a sound-absorbing material, such as Isomode, under the unit if it will be installed in a location or position that will transmit sound or vibration to the living area or adjacent buildings.

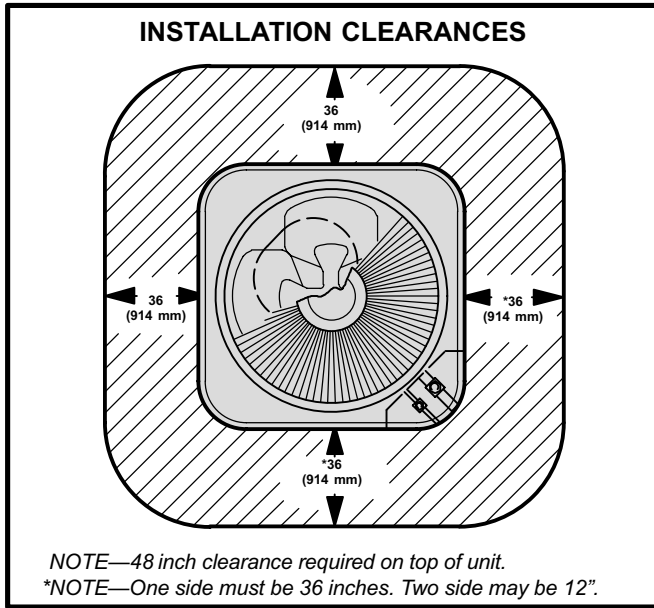


FIGURE 1

Slab Mounting

When installing unit at grade level, install on a level slab high enough above grade to allow adequate drainage of water. Top of slab should be located so run-off water from higher ground will not collect around unit.

Roof Mounting

Install unit a minimum of 4 inches above the surface of the roof. Care must be taken to ensure weight of unit is properly distributed over roof joists and rafters. Either red-wood or steel supports are recommended.

ELECTRICAL

In the U.S.A., wiring must conform with current local codes and the current National Electric Code (NEC). In Canada, wiring must conform with current local codes and the current Canadian Electrical Code (CEC). Refer to the furnace or blower coil installation instructions for additional wiring application diagrams and refer to unit rating plate for minimum circuit ampacity and maximum overcurrent protection size.

⚠ WARNING

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

Line Voltage

To accommodate conduit, a hole is provided in bottom of the control box. Connect conduit to hole in control box with proper conduit fitting.

NOTE - Units are approved for use with copper conductors only.

24V, Class II Circuit

24V, Class II Circuit connections are made in the low voltage junction box. Refer to figure 2 for field wiring diagram.

NOTE - A complete unit wiring diagram is located inside the unit control box cover.

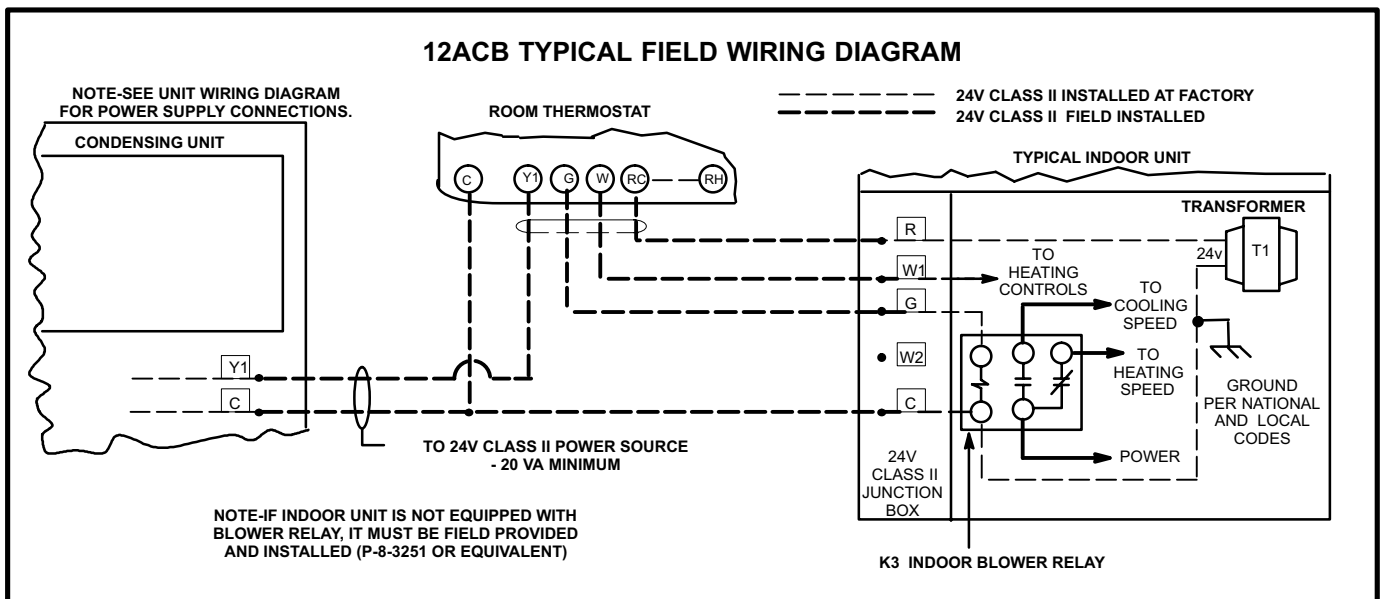


FIGURE 2

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 L10 (flare) or L15 (sweat, non-flare) series line sets as shown in table 1 or use field-fabricated refrigerant lines. Refer to unit information manual piping section for proper size, type and application of field-fabricated lines. If refrigerant tubes are routed through a wall, seal and isolate the opening so vibration is not transmitted to the building.

Sweat Connection Procedure

- 1 - Ends of refrigerant lines must be cut square, free from nicks or dents, and deburred. Pipe must remain round, do not pinch end of line.
- 2 - Wrap a wet cloth around the liquid line valve body and copper tube stub to protect from heat damage during brazing. Wrap another wet cloth underneath the liquid valve to protect the base paint.
- 3 - Quench the joints with a wet cloth to prevent possible heat damage to the valve core and opening port.
- 4 - A field provided filter drier should be installed as close as possible to the expansion device.

REFRIGERANT METERING DEVICE

12ACB units are designed for an expansion valve system. See indoor coil installation instructions and the Lennox engineering handbook for approved TXV match-ups and application information. Table 1 lists 12ACB unit liquid and suction line sizes and corresponding line sets.

**TABLE 1
REFRIGERANT LINE KITS**

UNIT	LIQUID LINE	SUCTION LINE	L10 LINE SETS	L15 LINE SETS
12ACB24 12ACB30 12ACB36	3/8 in (10 mm)	3/4 in. (19 mm)	L10-41 20 ft. - 50 ft. (6 m - 15 m)	L15-41 20 ft. - 50 ft. (6 m - 15 m)
12ACB42 12ACB48	3/8 in (10 mm)	7/8 in. (22 mm)	L10-65 30 ft. - 50 ft. (9 m - 15 m)	L15-65 30 ft. - 50 ft. (9 m - 15 m)
12ACB60	3/8 in (10 mm)	1-1/8 in. (29 mm)	FIELD FABRICATED	FIELD FABRICATED

Expansion Valve Systems

Expansion valves equipped with "Chatleff" type fittings are available from Lennox. Refer to the indoor coil installation instructions or the engineering handbook for applicable expansion valves for use with specific match-ups.

If an expansion valve application is desired with indoor coil product shipped with an RFCIV orifice, the RFCIV restrictor must be removed before installing the expansion valve.

! IMPORTANT

Failure to remove RFCIV when installing an expansion valve to the indoor coil will result in improper operation and damage to the system.

MANIFOLD GAUGE SET

A manifold gauge set equipped with "low loss" hoses should be used when checking unit charge.

LIQUID & SUCTION LINE SERVICE VALVES

The liquid line and suction line service valves (figures 3 and 4) and gauge ports are accessible from outside the unit. The service ports are used for leak testing, evacuating, charging and checking charge.

The valve is equipped with a service port. A schrader valve is factory installed. A service port cap is supplied to protect the schrader valve from contamination and assure a leak free seal.

To Access Schrader Port:

- 1 - Remove service port cap with an adjustable wrench.
- 2 - Connect gauge to the service port.
- 3 - When testing is completed, replace service port cap. Tighten finger tight, then an additional 1/6 turn.

To Open Liquid Line Service Valve:

- 1 - Remove stem cap with an adjustable wrench.
- 2 - Using service wrench and 5/16" hex head extension back the stem out counterclockwise until the valve stem just touches the retaining ring.

⚠ DANGER

Do not attempt to backseat this valve. Attempts to backseat this valve will cause snap ring to explode from valve body under pressure of refrigerant. Personal injury and unit damage will result.

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

To Close Liquid Line Service Valve:

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

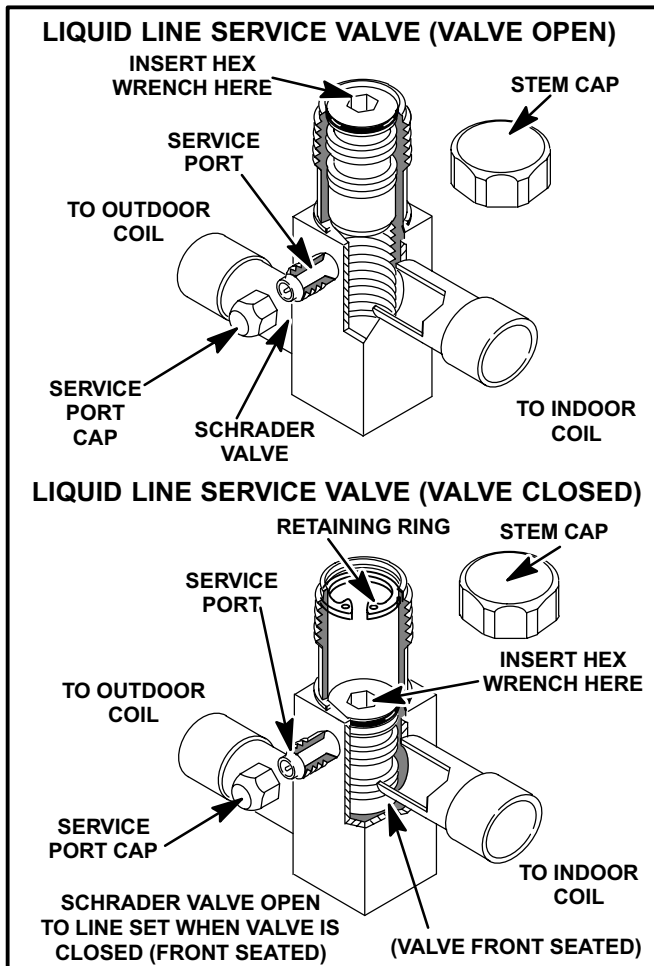


FIGURE 3

Suction Line (Ball Type) Service Valve

A ball-type full service valve is used on 12ACB units. These suction line service valves function the same way, differences are in construction. Valves are not rebuildable. If a valve has failed it must be replaced. A ball valve valve is illustrated in figure 4.

The ball valve is equipped with a service port. A schrader valve is factory installed. A service port cap is supplied to protect the schrader valve from contamination and assure a leak free seal.

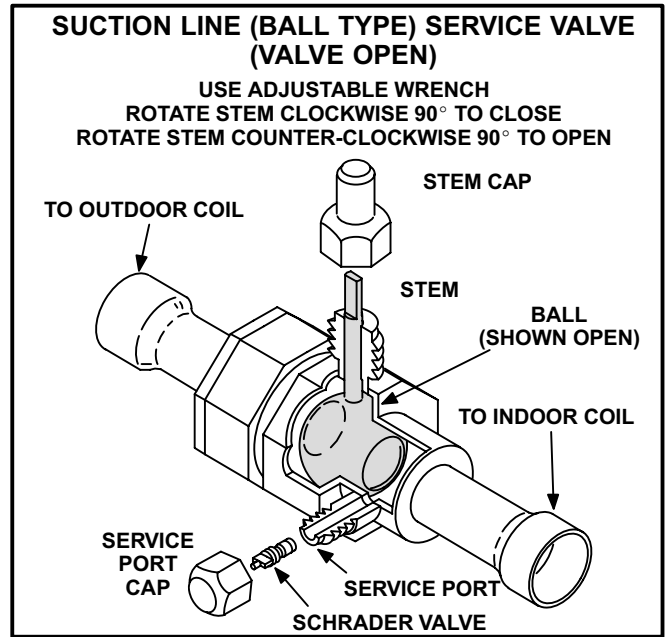


FIGURE 4

LEAK TESTING

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

⚠ WARNING

Never use oxygen to pressurize refrigeration or air conditioning system. Oxygen will explode on contact with oil and could cause personal injury. When using high pressure gas such as nitrogen or CO₂ for this purpose, be sure to use a regulator that can control the pressure down to 1 or 2 psig.

Using an Electronic Leak Detector or Halide

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

- 2 - Connect the high pressure hose of the manifold gauge set to the service port of the suction valve. *(Normally, the high pressure hose is connected to the liquid line port, however, connecting it to the suction port better protects the manifold gauge set from high pressure damage.)*
- 3 - With both manifold valves closed, open the valve on the HCFC-22 cylinder (vapor only).
- 4 - Open the high pressure side of the manifold to allow 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 or 3 pounds pressure.)* Close the valve on the HCFC-22 cylinder and the valve on the high pressure side of the manifold gauge set. Disconnect HCFC-22 cylinder.
- 5 - Adjust nitrogen pressure to 150 psig. Open the valve on the high side of the manifold gauge set which will pressurize line set and indoor unit.
- 6 - After a short period of time, open a refrigerant port to make sure the refrigerant 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.

EVACUATING

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 vapor combine with refrigerant to produce substances that corrode copper piping and compressor parts.

- 1 - Connect manifold gauge set to the service valve ports as follows: low pressure gauge to suction line service valve; high pressure gauge to liquid line service valve.
- 2 - Connect the vacuum pump (with vacuum gauge) to the center port of the manifold gauge set.
- 3 - Open both manifold valves and start vacuum pump.
- 4 - Evacuate the line set and indoor unit to an **absolute pressure** of 23mm of mercury or approximately 1 inch 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, the leak testing procedure must be repeated.

*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.*

- 5 - When the absolute pressure reaches 23mm 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 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.

- 6 - 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.
- 7 - 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 .5mm of mercury within a 20 minute period after shutting off the vacuum pump and closing the manifold gauge valves.
- 8 - Depending on the equipment used to determine the vacuum level, absolute pressure of .5mm of mercury is equal to 500 microns.
- 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 in the line set and indoor unit. Close manifold gauge valves and shut off HCFC-22 cylinder and remove manifold gauge set.

START-UP

! IMPORTANT

Crankcase heater (used on 3-1/2, 4 and 5 ton units) should be energized 24 hours before unit start-up to prevent compressor damage as a result of slugging.

- 1 - Rotate fan to check for frozen bearings or binding.
- 2 - Inspect all factory and field-installed wiring for loose connections.
- 3 - After evacuation is complete, open liquid line and suction line service valves to release refrigerant charge (contained in condensing unit) into the system.
- 4 - Replace stem caps and secure finger tight, then tighten an additional (1/6) one-sixth of a turn.
- 5 - Check voltage supply at the disconnect switch. The voltage must be within the range listed on unit nameplate. If not, do not start the equipment until the power company has been consulted and the voltage condition corrected.
- 6 - Set the thermostat for cooling demand, turn on power to evaporator blower and close condensing unit disconnect switch to start unit.
- 7 - Recheck voltage with unit running. Power must be within range shown on nameplate. Check amperage draw of unit. Refer to unit nameplate for correct running amps.

CHARGING CONSIDERATIONS

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 20 ft. (6096 mm) line set. For varying lengths of line set, refer to table 2 for refrigerant charge adjustment. A blank space is provided on the rating plate to list the actual field charge.

TABLE 2

Liquid Line Set Diameter	Ozs. per 5 ft. (ml per mm) adjust from 20 ft. (6096 mm) line set*
3/8 in. (10mm)	3 ounce per 5 ft. (90ml per 1524 mm)

*If line length is greater than 20 feet (6096 mm), add this amount. If line length is less than 20 feet (6096 mm), subtract this amount.

If the system is void of refrigerant, the recommended and most accurate method of charging is to weigh the refrigerant into the unit according to the total amount shown on the unit nameplate. This may be done after any leaks have been repaired. If weighing facilities are not available or if unit is just low on charge, use one of the procedures outlined.

Charging a condensing unit is recommended during warm weather. However, applications arise in which charging must occur in the colder months. *The way the unit is charged depends on the unit's **refrigerant metering device** and the **outdoor ambient temperature**.*

The “**weighing in the charge**” and the **Approach** methods are the two recommended procedures for charging the 12ACB using an expansion valve system for refrigerant metering. The difference between the two involves the outdoor ambient temperature. For expansion valve systems where the outdoor ambient temperature is 60°F (16°C) or above, the Approach method may be used. For expansion valve systems where the outdoor ambient temperature is below 60°F (16°C), weighing in the charge is recommended.

Before charging the unit, follow the procedure below to determine: the liquid line temperature and the outdoor ambient temperature.

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

CHARGING FOR TXV SYSTEMS

Weighing in the Charge Method

TXV Systems, < 60°F (16°C) Outdoor Temp

- 1 - Recover the refrigerant from the unit.
- 2 - Conduct a leak check, then evacuate as previously outlined.
- 3 - Weigh in the factory charge as shown on the outdoor unit's rating plate.

The Approach Method

TXV Systems, ≥ 60°F (16°C) Outdoor Temp

Having taken the outdoor ambient and liquid line temperature readings, subtract the outdoor ambient temperature from the liquid line temperature to determine the Approach temperature. **(Liquid line °F (°C) - Outdoor Ambient °F (°C) = Approach temperature.)** The resulting difference (Approach temperature) should agree with the values given in table 3. If not, add refrigerant to lower the approach temperature or recover refrigerant from the system to increase the approach temperature.

**TABLE 3
APPROACH METHOD**

MODEL NO.	APPROACH TEMPERATURE
	LIQUID LINE °F (°C) - OUTDOOR AMBIENT °F (°C)
12ACB24	10 (5.6)
12ACB30	8 (4.4)
12ACB36	7 (3.8)
12ACB42	8 (4.4)
12ACB48	8 (4.4)
12ACB60	11 (6.1)

Note-For best results, the same electronic thermometer should be used to check both outdoor ambient and liquid temperatures.

SYSTEM OPERATION

Condensing unit and indoor blower cycle on demand from room thermostat. When thermostat blower switch is switched to **ON** position, indoor blower operates continuously.

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.

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

- 1 - Clean and inspect condenser coil. Coil may be flushed with a water hose.
- 2 - Visually inspect connecting lines and coils for evidence of oil leaks.
- 3 - Check wiring for loose connections.
- 4 - Check for correct voltage at unit (unit operating).
- 5 - Check condenser fan motor amp-draw.

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.

Evaporator Coil

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

Indoor Unit

- 1 - Clean or change filters.
- 2 - Adjust blower speed for cooling. The pressure drop over the coil should be measured 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 _____ .