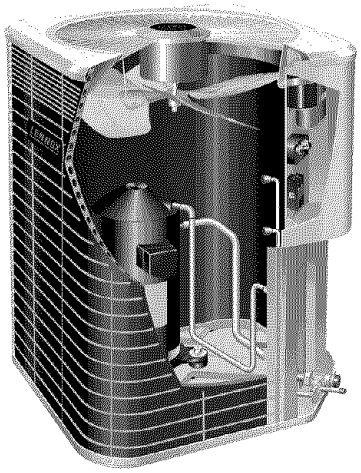
INSTALLATION INSTRUCTIONS

HS29 Series Units



CONDENSING UNITS
504,963M
03/06
Supersedes 09/04

Technical Publications
Litho U.S.A.

RETAIN THESE INSTRUCTIONS FOR FUTURE REFERENCE

⚠ WARNING

Improper installation, adjustment, alteration, service or maintenance can cause personal injury, loss of life, or damage to property. Installation and service must be performed by a qualified installer or service agency.

⚠ 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 noncompliance.

⚠ WARNING

This product, and/or the indoor unit with which it is matched, may contain fiberglass wool.

Disturbing the insulation during installation, maintenance, or repair will expose you to fiberglass wool dust. 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

Table of Contents

Elite® Series Outdoor Unit

HS29 Elite® Series outdoor units are designed for expansion valve (TXV) and fixed orifice systems. Refer to Lennox engineering handbook for expansion valve kits which must be ordered separately.

Shipping & Packing List

1 - Assembled HS29 outdoor unit
1 - Fixed orifice refrigerant metering device
1 - Coupling, 5/16 x 3/8" (012, 018, 024, 030)
1 - Sight Glass (international units only)

Check equipment for shipping damage. If you find any damage, immediately contact the last carrier.

General Information

⚠ CAUTION

Physical contact with metal edges and corners while applying excessive force or rapid motion can result in personal injury. Be aware of, and use caution when working near these areas during installation or while servicing this equipment.

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

When servicing or repairing HVAC components, ensure the fasteners are appropriately tightened. Table 1 shows torque values for fasteners.

Table 1

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

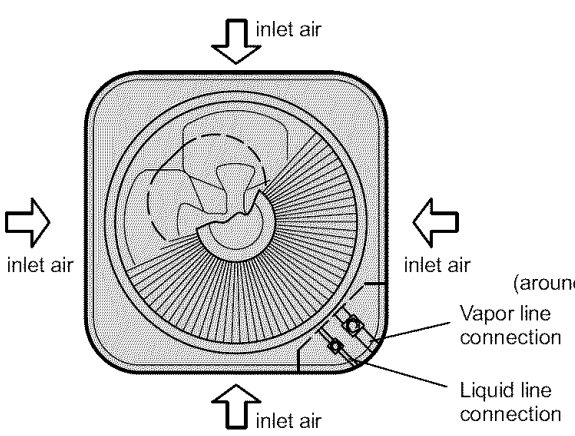
Setting the Unit

⚠ CAUTION

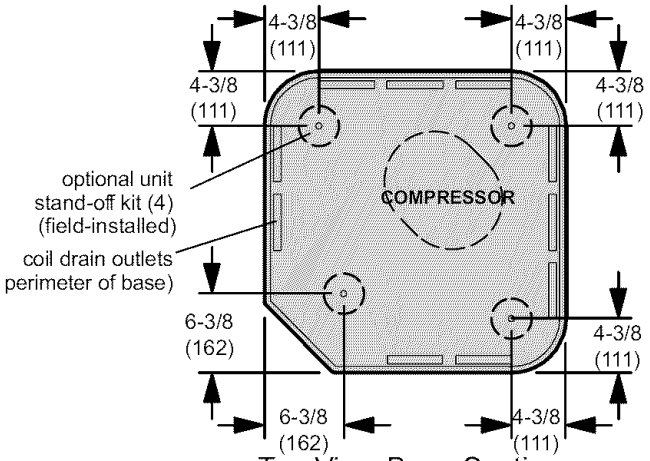
In order to avoid injury, take proper precaution when lifting heavy objects.

Refer to unit dimensions for sizing mounting slab, platforms or supports. Refer to figure 1 for installation clearances.

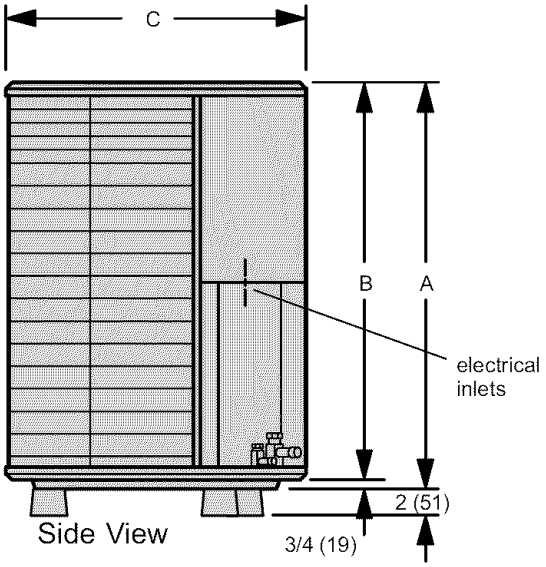
Unit Dimensions - inches (mm)



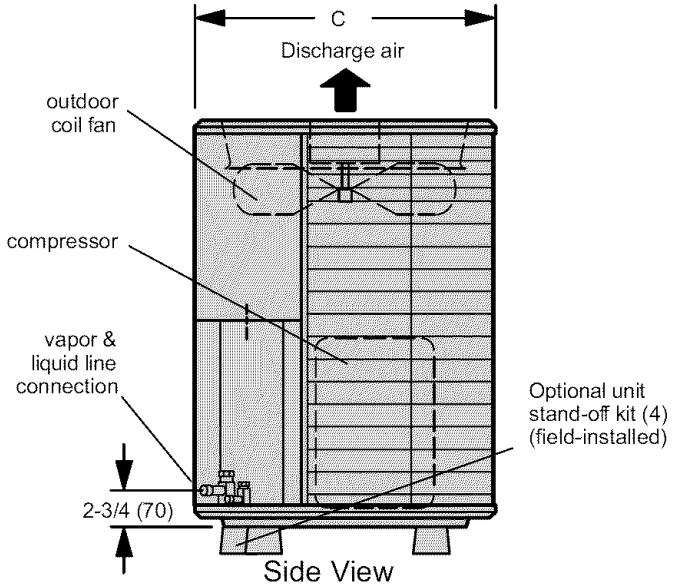
Top View



Top View Base Section



Side View



Side View

Model No.	A	B	C
HS29-012, -018, -024	25 (635)	24-1/4 (616)	24-1/4 (616)
HS29-030	29 (737)	28-1/4 **(718)**	24-1/4 (616)
HS29-036, -042, -048, -060, -062	33 (838)	32-1/4 (819)	24-1/4 (616)
HS29-065	37-1/4 (946)	36-1/2 (927)	28-1/4 **(718)**

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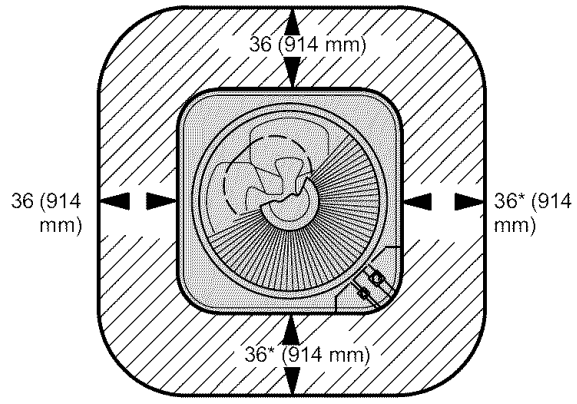
Installation Clearances



**A service clearance of 30" (762 mm) must be maintained on one of the sides adjacent to the control box. Clearance to one of the other three sides must be 36" (914 mm). Clearance to one of the remaining two sides may be 12" (304 mm) and the final side may be 6" (152 mm).*

A clearance of 24" (610 mm) must be maintained between two units. 48" (1219 mm) clearance required on top of unit. Maximum soffit overhang is 36" (914 mm).

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. Locate the top of the slab so run-off water from higher ground will not collect around the unit.

Roof Mounting

Install unit at a minimum of 4 inches above the surface of the roof. Ensure that the weight of unit is properly distributed over roof joists and rafters. Either redwood 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).

⚠WARNING

Electric Shock Hazard. Can cause injury or death.

Line voltage is present at all components on units with single-pole contactors, even when unit is not in operation!

Unit may have multiple power supplies. Disconnect all remote electric power supplies before opening access panel.

Unit must be grounded in accordance with national and local codes.

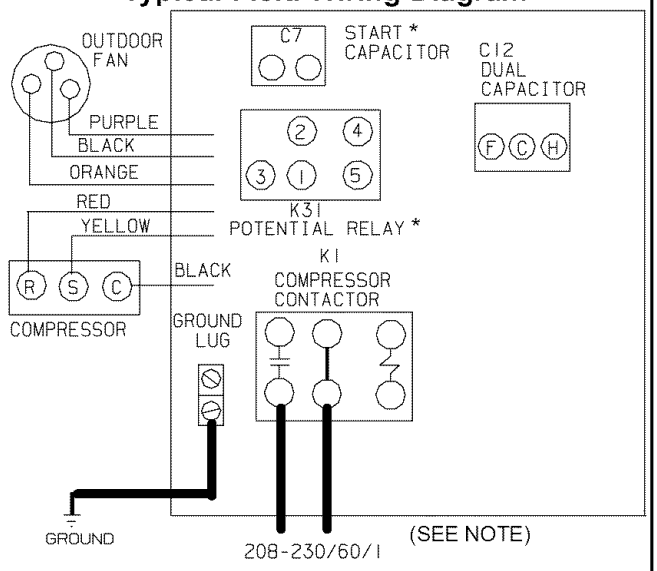
Refer to the furnace or blower coil installation instructions for additional wiring application diagrams and refer to unit nameplate for minimum circuit ampacity and maximum overcurrent protection size.

1. Install line voltage power supply to unit from a properly sized disconnect switch.
2. Ground unit at unit disconnect switch or to an earth ground.

   NOTES -

   - To facilitate conduit, a hole is in the bottom of the control box. Connect conduit to the control box using a proper conduit fitting.
   - Units are approved for use only with copper conductors.
   - 24V, Class II circuit connections are made in the low voltage junction box. Refer to figure 2 for field wiring diagram.
   - A complete unit wiring diagram is located inside the unit control box cover.

Typical Field Wiring Diagram



NOTE - For use with copper conductors only. Refer to unit rating plate for minimum circuit ampacity and maximum over-current protection size.

WARNING! - ELECTRIC SHOCK HAZARD. Can cause INJURY or DEATH. Unit must be grounded in accordance with national and local codes.

Figure 2

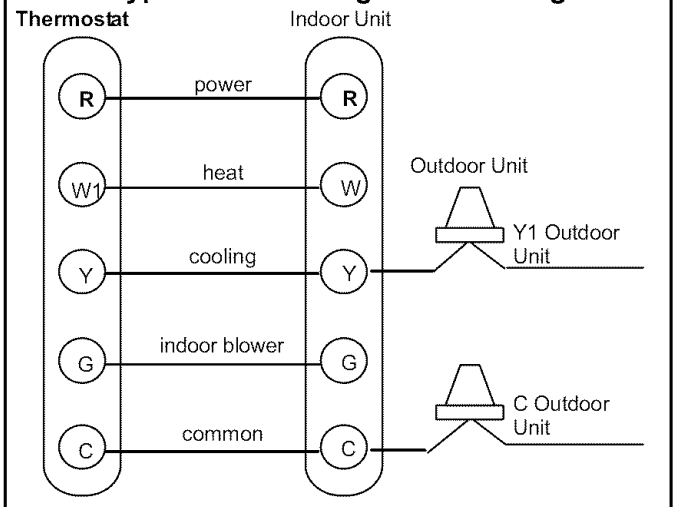
NOTE - For proper voltages, select thermostat wire gauge per the following chart:

Wire run length	AWG #	Insulation type
less than 100' (30m)	18	color-coded, temperature rating 35°C minimum
more than 100' (30m)	16	

3. Install room thermostat (ordered separately) on an inside wall approximately in the center of the conditioned area and 5 feet (1.5 m) from the floor. It should not be installed on an outside wall or where it can be effected by sunlight, drafts or vibrations.

4. Install low voltage wiring from outdoor to indoor unit and from thermostat to indoor unit. See figure 3.

Typical Low Voltage Field Wiring



NOTE - see unit wiring diagram for power supply connections.

NOTE - If the indoor unit is not equipped with blower relay. It must be field-provided and installed (P-8-3251 or equivalent).

Figure 3

Refrigerant Piping

Field refrigerant piping consists of liquid and vapor lines from the outdoor unit (sweat connections) to the indoor coil (flare or sweat connections). Use Lennox L15 (sweat, non-flare) series line sets as shown in table 2 or use field-fabricated refrigerant lines. Refer to Refrigerant Piping Guide (Corp. 9351-L9) for proper size, type, and application of field-fabricated lines. Valve sizes are also listed in table 2.

Table 2

Refrigerant Line Sets

Model No.	Valve Field SizeConnections		Recommended Line Set		
	Liquid Line	Vapor Line	Liquid Line	Vapor Line	L15 Line Sets
-012 -018	3/8 in (10 mm)	5/8 in (16 mm)	5/16 in (8 mm)	5/8 in (16 mm)	L15-21 15 ft. - 50 ft. (4.6 m - 15 m)
-024 -030	3/8 in. (10 mm)	3/4 in. (19 mm)	5/16 in. (8 mm)	3/4 in. (19 mm)	L15-31 15 ft. - 50 ft. (4.6 m - 15 m)
-036	3/8 in. (10 mm)	3/4 in. (19 mm)	3/8 in. (10 mm)	3/4 in. (19 mm)	L15-41 15 ft. - 50 ft. (4.6 m - 15 m)
-042 -048	3/8 in. (10 mm)	7/8 in. (22 mm)	3/8 in. (10 mm)	7/8 in. (22 mm)	L15-65 15 ft. - 50 ft. (4.6 m - 15 m)
-060 -062 -065	3/8 in. (10 mm)	1-1/8 in. (29 mm)	3/8 in. (10 mm)	1-1/8 in. (29 mm)	Field Fabricated

NOTE - Units are designed for line sets of up to fifty feet (15 m). For applications longer than fifty feet, consult the Lennox Refrigerant Piping Guide (Corp. 9351-L9). Select line set diameters from table 2 to ensure that oil returns to the compressor.

Installing Refrigerant Line

During the installation of any heat pump or a/c system, it is important to properly isolate the refrigerant lines to prevent unnecessary vibration. Line set contact with the structure (wall, ceiling or floor) causes some objectionable noise when vibration is translated into sound. As a result, more energy or vibration can be expected. Closer attention to line set isolation must be observed.

Following are some points to consider when placing and installing a high-efficiency outdoor unit:

1. **Placement -** Be aware some localities are adopting sound ordinances based on how noisy the unit is from the adjacent property not at the original installation. Install the unit as far as possible from the property line. When possible, do not install the unit directly outside a window. Glass has a very high level of sound transmission. Figure 4 shows how to place the outdoor unit and line set.

Outside Unit Placement and Installation

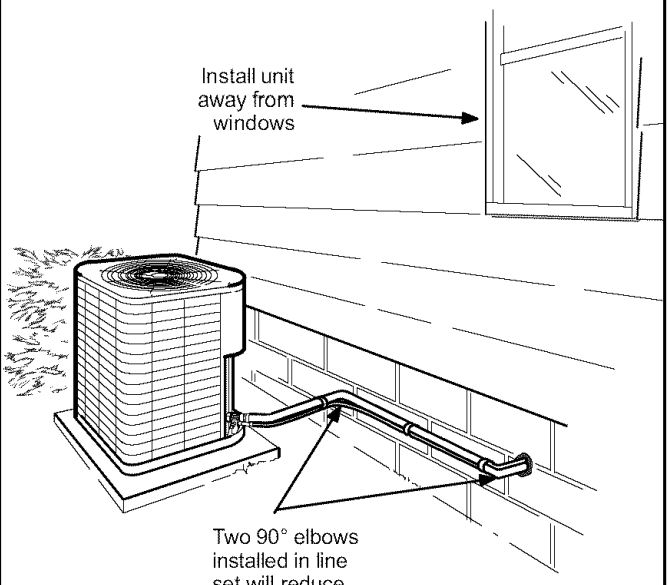


Figure 4

2. **Line Set Isolation -** The following illustrations demonstrate procedures which ensure proper refrigerant line set isolation. Figure 5 shows how to install line sets on vertical runs. Figure 6 shows how to make a transition from horizontal to vertical. Figure 7 shows how to install line sets on horizontal runs.

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Refrigerant Line Sets: Installing Vertical Runs (new construction shown)

NOTE - Similar installation practices should be used if line set is to be installed on exterior of outside wall.

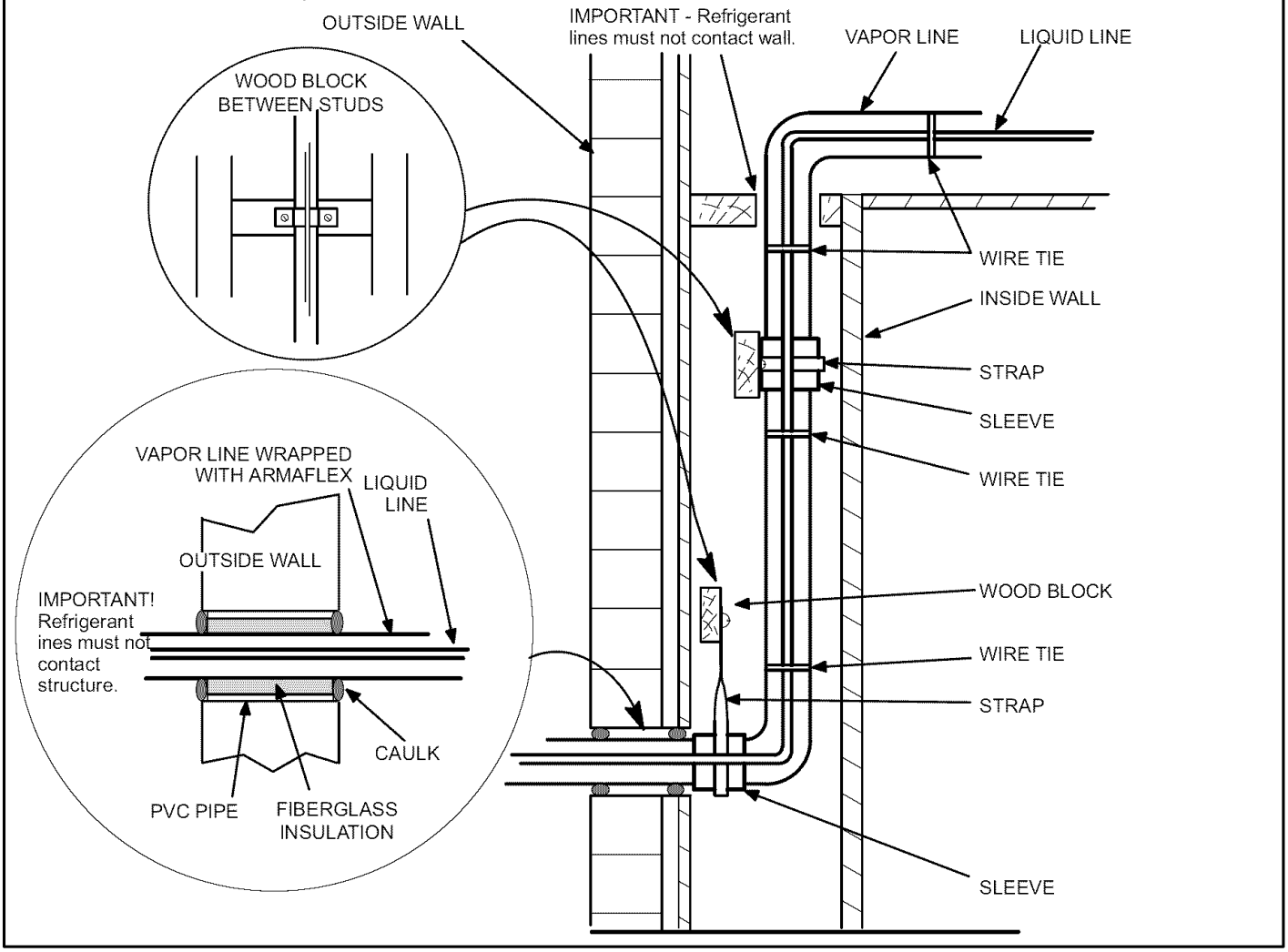

Figure 5

Refrigerant Line Sets: Transition From Vertical To Horizontal

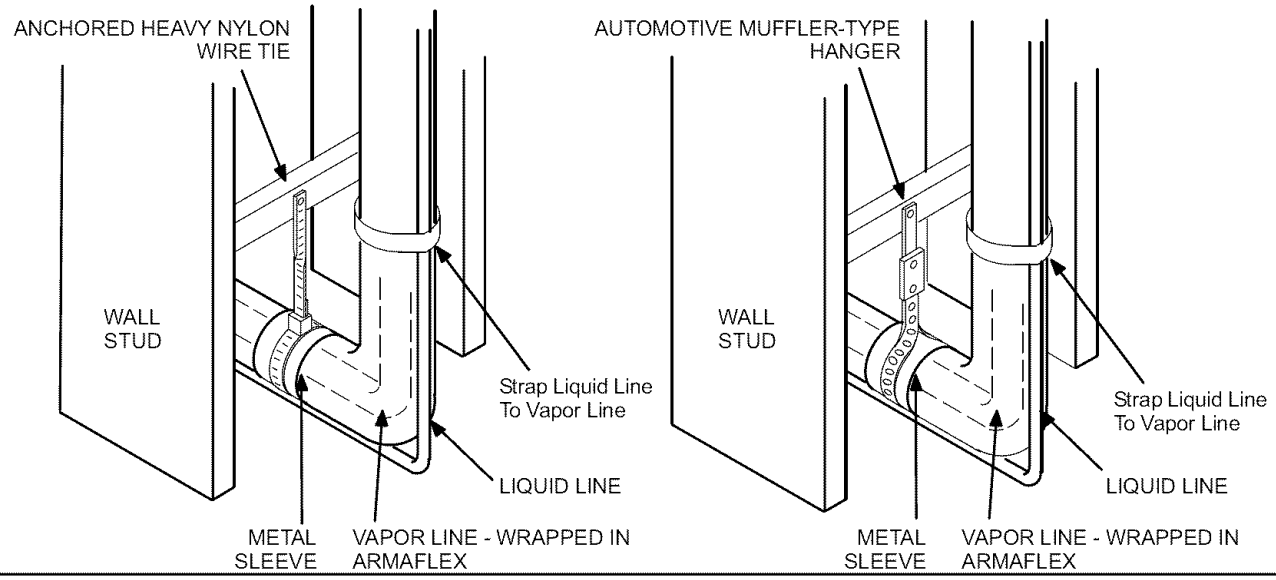

Figure 6

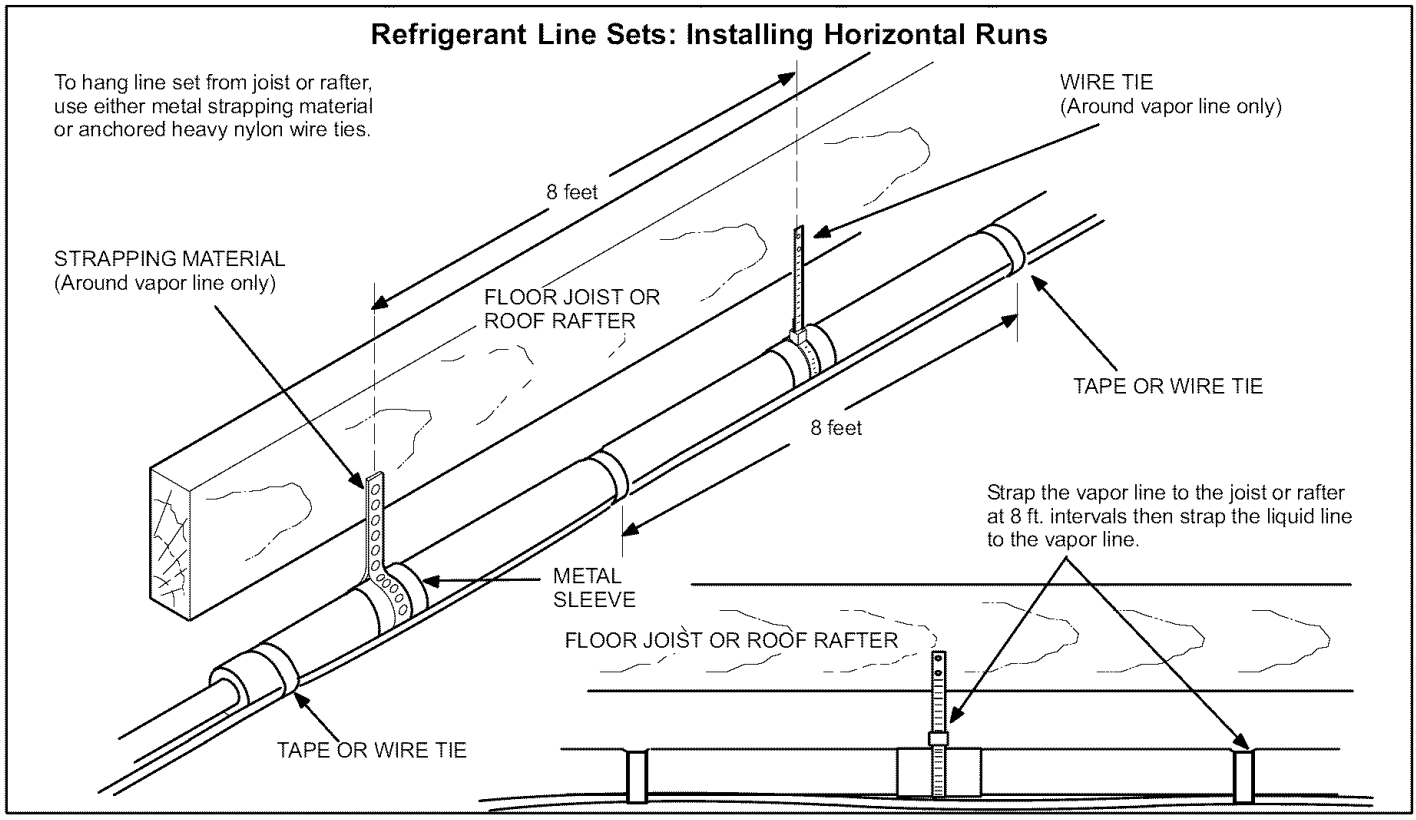

Figure 7

Brazing Connection Procedure

1. Cut ends of the refrigerant lines square (free from nicks or dents). Debur the ends. The pipe must remain round, do not pinch end of the line.
2. Before making line set connections, use dry nitrogen to purge the refrigerant piping. This helps prevent oxidation and introducing moisture into the system.
3. Use silver alloy brazing rods (5 or 6 percent minimum silver alloy for copper-to-copper brazing or 45 percent silver alloy for copper-to-brass or copper-to-steel brazing) which are rated for use with HCFC22 refrigerant. Wrap a wet cloth around the valve body and the copper tube stub. Braze the line set to the service valve.
4. Wrap a wet cloth around the valve body and copper tube stub to protect it from heat damage during brazing. Wrap another wet cloth underneath the valve body to protect the base paint.
5. NOTE - The tube end must stay bottomed in the fitting during final assembly to ensure proper seating, sealing and rigidity.
6. Install a field-provided thermal expansion valve (approved for use with HCFC22 refrigerant) in the liquid line at the indoor coil.

Fixed Refrigerant Metering Device

HS29 units are applicable to either fixed orifice or expansion valve system. See indoor coil installation instructions and the Lennox Engineering Handbook for approved TXV and fixed orifice match-ups and application information. Table 2 lists the unit liquid and vapor line sizes and corresponding line sets.

Fixed Orifice Systems

HS29 units are shipped with a fixed refrigerant metering device. Replace the existing indoor unit fixed orifice with the orifice supplied with the outdoor unit. Place the supplied fixed orifice sticker on the indoor cabinet after installation. See table 3 for the fixed orifice size for each unit.

Table 3

Fixed Orifice Drill Sizes*		
Unit	**Fixed Orifice Part #**	**Drill Size**
HS29-012	83M54	0.045
HS29-018	42J40	0.057
HS29-024	42J43	0.063
HS29-030	42J45	0.067
HS29-036	42J48	0.073
HS29-042	25M56	0.079
HS29-048	42J55	0.086
HS29-060	42J61	0.098
*HS29-062 and HS29-065 are not approved for use with RFC kits.		

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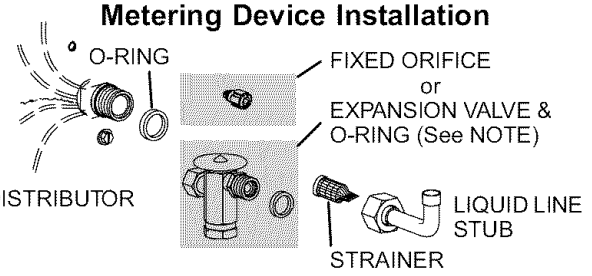
In nonstandard applications, the provided fixed orifice may not be appropriately sized. Refer to the Engineering Handbook for specific orifice information. Install the fixed orifice orifice as shown in figure 8. Do not twist cap tubes when loosening seal nut from orifice body.

Metering Device Installation



NOTE - If installing expansion valve with an indoor coil that includes a fixed orifice, remove orifice before installing valve.

Figure 8

Expansion Valve Systems

Expansion valves equipped with Chatleff type fittings are available from Lennox. Refer to the Engineering Handbook for expansion valves for use with specific match-ups.

If you install a expansion valve with an indoor coil that includes a fixed orifice, remove the orifice before the expansion valve is installed.

⚠ IMPORTANT

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

Manifold Gauge Set

When checking the unit charge, use a manifold gauge set that is equipped with "low loss" hoses. Do not use a manifold gauge set with anything other than a "low loss" hose.

Service Valves

The liquid line and vapor line service valves (figures 9 and 10) and gauge ports are used for leak testing, evacuating, charging and checking charge. See table 1 (on page 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.

To Access Schrader Port:

1. Remove access panel.
2. Remove service port cap with an adjustable wrench.
3. Connect gauge to the service port.

To Open Front-Seated Service Valves:

1. Remove stem cap with an adjustable wrench.
2. Use a service wrench with a hex-head extension (3/16" for liquid-line valve sizes; 5/16" for vapor-line valve sizes) to back the stem out counterclockwise as far as it will go.
3. When testing is completed, replace service port cap. Tighten finger tight; then torque per table 1 (Page 2).
4. Replace the stem cap. Tighten finger tight; then torque per table 1 (Page 2).

To Close Front-Seated Service Valves:

1. Remove the stem cap with an adjustable wrench.
2. Use a service wrench with a hex-head extension (3/16" for liquid-line valve sizes; 5/16" for vapor-line valve sizes) to turn the stem clockwise to seat the valve. Tighten it firmly.
3. Replace the stem cap. Tighten finger tight; then torque per table 1 (Page 2).

Front-Seated Liquid Line Service Valve

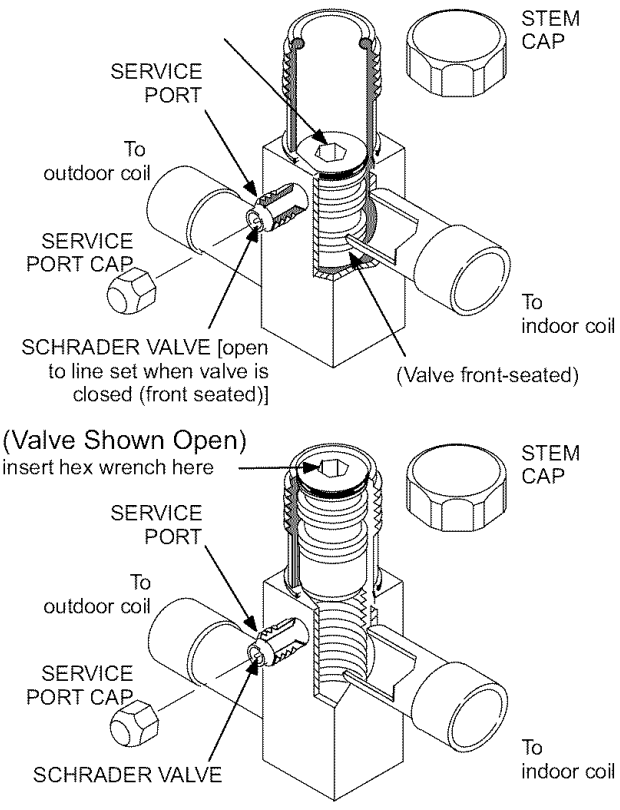


Figure 9

Ball-Type Service Valve (Vapor Line)

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 valve is illustrated in figure 10.

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.

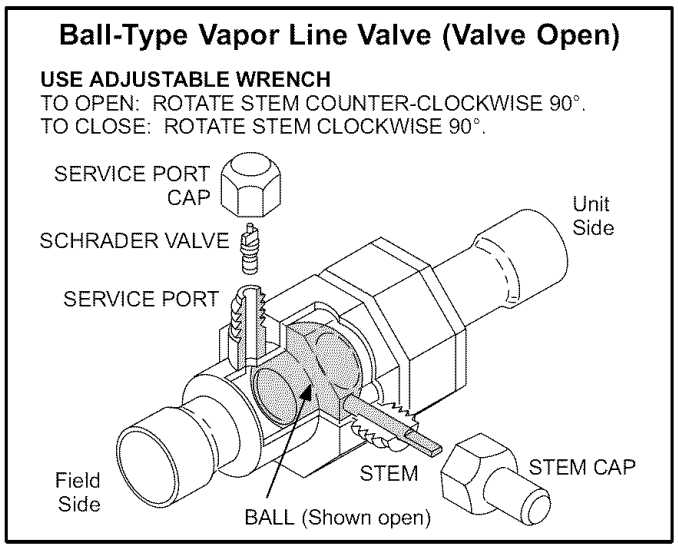


Figure 10

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

Danger of fire. Bleeding the refrigerant charge from only the high side may result in the low side shell and suction tubing being pressurized. Application of a brazing torch while pressurized may result in ignition of the refrigerant and oil mixture - check the high and low pressures before unbrazing.

⚠ 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.

   NOTE - 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.

Evacuation

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 and can lead to improper charge levels.

⚠ 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. Close manifold gauge set valves. Connect manifold gauge set to the service valve ports as follows:
   - 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.

Start-Up

⚠ IMPORTANT

If unit is equipped with crankcase heater, it should be energized 24 hours before unit start-up to prevent compressor damage as a result of slugging.

1. Rotate the 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 the liquid line and vapor line service valves to release the refrigerant charge (contained in outdoor unit) into the system.
4. Replace the stem caps and secure finger tight, then tighten an additional one-sixth (1/6) of a turn.
5. Check voltage supply at the disconnect switch. The voltage must be within the range listed on the unit's nameplate. If not, do not start the equipment until you have consulted the power company and the voltage condition has been corrected.
6. Set the thermostat for a cooling demand. Turn on power to the indoor blower and close the outdoor unit disconnect switch to start the unit.
7. Recheck voltage while the unit is running. Power must be within range shown on the nameplate.

Charging

Units are factory charged with the amount of HCFC-22 refrigerant indicated on the unit nameplate. This charge is based on a matching indoor coil and outdoor coil with a 15 ft. (4.6 m) line set. For varying lengths of line set, refer to table 4 for refrigerant charge adjustment check.

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***
5/16 in. (8 mm)	2 ounce per 5 ft. (57 g per 1.5 m)
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.

*NOTE - 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. Close manifold gauge set valves. 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

Table 5

Subcooling Values For Fixed Orifice Systems								
Outdoor Temp. °F(°C)	Liquid Subcooling [± 1°F (.6°C)]							
	-012	-018	-024	-030	-036	-042	-048	-060
60 (16)	12 (6.7)	19 (10.6)	14 (7.8)	14 (7.8)	13 (7.2)	16 (8.9)	17 (9.4)	15 (8.3)
65 (18)	11 (6.1)	17 (9.4)	13 (7.2)	14 (7.8)	13 (7.2)	15 (8.3)	16 (8.9)	15 (8.3)
70 (21)	11 (6.1)	16 (8.9)	13 (7.2)	13 (7.2)	12 (6.7)	14 (7.8)	15 (8.3)	14 (7.8)
75 (24)	10 (5.6)	14 (7.8)	12 (6.7)	13 (7.2)	12 (6.7)	12 (6.7)	14 (7.8)	14 (7.8)
80 (27)	9 (5.0)	12 (6.7)	11 (6.1)	13 (7.2)	12 (6.7)	11 (6.1)	13 (7.2)	13 (7.2)
85 (29)	7 (3.9)	10 (5.6)	10 (5.6)	13 (7.2)	11 (6.1)	10 (5.6)	12 (6.7)	13 (7.2)
90 (32)	6 (3.3)	9 (5.5)	9 (5.0)	13 (7.2)	11 (6.1)	8 (4.4)	10 (5.6)	12 (6.7)
95 (35)	4 (2.2)	8 (4.4)	8 (4.4)	12 (6.7)	11 (6.1)	7 (3.9)	10 (5.6)	11 (6.1)
100 (38)	3 (1.7)	6 (3.3)	7 (3.9)	12 (6.7)	10 (5.6)	6 (3.3)	8 (4.4)	10 (5.6)
105 (41)	3 (1.7)	6 (3.3)	6 (3.3)	11 (6.1)	10 (5.6)	4 (2.2)	7 (3.9)	10 (5.6)
110 (43)	2 (1.1)	5 (2.8)	6 (3.3)	11 (6.1)	9 (5.0)	3 (1.7)	6 (3.3)	9 (5.0)
115 (45)	2 (1.1)	5 (2.8)	4 (2.2)	10 (5.6)	9 (5.0)	3 (1.7)	5 (2.8)	9 (5.0)
NOTE - Use HS29-060 values for -062 and -065 units.								

2. 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.

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. If subcooling is greater than shown, recover some refrigerant. If subcooling is less than shown, add some refrigerant.

   NOTE - See HS29 3-phase unit charging sticker on unit for 3-phase charging information.

Charging Using the Approach Method 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. Attach high pressure gauge set and operate unit for several minutes to allow system pressures to stabilize.
2. Compare stabilized pressures with those provided in table 6, "Normal Operating Pressures." 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.

⚠ IMPORTANT

Table 6 is not a procedure for charging the system. Minor variations in these pressures may be expected 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. Used prudently, table 6 could serve as a useful service guide.

Table 6

Normal Operating Pressures In psig (liquid +/- 10 and vapor+/- 5 PSIG)*																	
Mode	Out. Coil Entering Air Temp. °F (°C)	HS29-012		HS29-018		HS29-024		HS29-030		HS29-036		HS29-042		HS29-048		HS29-060	
		Liq	Suc	Liq	Suc	Liq	Suc	Liq	Suc	Liq	Suc	Liq	Suc	Liq	Suc	Liq	Suc
Fixed Orifice	65 (18.3)	139	57	150	69	147	58	160	64	165	62	169	72	168	73	158	67
	75 (23.9)	165	67	175	74	174	63	185	67	192	66	197	75	195	75	185	71
	85 (29.4)	192	73	201	79	204	68	216	71	223	69	227	78	225	78	216	74
	95 (35.0)	222	78	229	82	234	75	248	73	257	71	259	80	257	80	247	77
	105 (40.6)	254	81	262	86	272	77	284	76	292	73	294	83	291	82	283	79
TXV	65 (18.3)	141	60	149	76	143	71	154	68	162	66	159	76	154	75	154	75
	75 (23.9)	164	64	173	78	170	73	174	70	190	67	188	78	183	76	181	77
	85 (29.4)	193	72	197	81	202	73	204	70	224	68	222	78	216	77	213	79
	95 (35.0)	222	77	228	82	236	75	246	72	257	71	257	79	251	78	249	80
	105 (40.6)	255	81	260	85	271	76	276	74	296	72	294	80	288	79	285	82

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

NOTE - Use HS29-060 values for -062 and -065 units.

3. Record outdoor ambient temperature using a digital thermometer.
4. NOTE - See HS29 3-phase unit charging sticker on unit for 3-phase charging information.
5. Use the same digital thermometer you used to check the outdoor ambient temperature to check the liquid line temperature.
6. The difference between the ambient and liquid temperatures should match values given in table 7. If the values don't agree with the those in table 7, add refrigerant to lower the approach temperature, or recover refrigerant from the system to increase the approach temperature.

   NOTE - See HS29 3-phase unit charging sticker on unit for 3-phase charging information.

Table 7

Approach Values								
HS29 Model	-012	-018	-024	-030	-036	-042	-048	-060
Temp. °F (°C)	6 (3.3)	8 (4.4)	11 (6.1)	11 (6.1)	14 (7.8)	18 (10)	17 (9.4)	12 (6.7)
	____°	Liquid Line Temperature °F (°C)						
—	____°	Outdoor Ambient Temperature °F (°C)						
=	____°	Approach Value °F (°C)						

Compressor Start Kit

The -012, -018, and -024 single phase units have internal start components and do not require field installation of a compressor start kit.

High and Low Pressure Switches (international units and units with factory-installed options)

International units and units with factory-equipped options include high and low pressure switches. The pressure switches are located on valve cores in the liquid line to allow for easy access. The manually reset high pressure switch protects the system from high pressure conditions as a result of a fan failure or a blocked or dirty coil. The low pressure switch (SPST, NO) protects the system compressor from damage due to a loss of charge. The low pressure switch trips at 15 + 5 psig (103 + 34 kPa) and automatically resets at 25 + 3 psig (172 + 21 kPa).

Maintenance

Maintenance and service must be performed by a qualified installer or service agency.

NOTE - Use HS29-060 values for -062 and -065 units.

Checking the Charge Using Normal Operating Pressures

Use table 6 as a general guide for performing maintenance checks.

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System Operation

The outdoor unit and indoor blower cycle on demand from the room thermostat. When the thermostat blower switch is in the **ON** position, the indoor blower operates continuously. Check amp-draw outdoor fan motor.

Unit nameplate _____ Actual _____ .

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

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

⚠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.

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. Outdoor fan motor is prelubricated and sealed. No further lubrication is needed.
3. Check connecting lines and coils for signs of oil leaks.
4. Check wiring for loose connections.
5. Check for correct voltage at unit (unit operating).

Indoor Coil

1. Clean coil, if necessary.
2. Check connecting lines and coils for signs 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. Check blower drive 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 _____.

Optional Accessories

Refer to the Engineering Handbook for optional accessories that may apply to this unit. The following may or may not apply:

- Loss of Charge Kit
- High Pressure Switc Kit
- Compressor Monitor
- Compressor Crankcase Heater
- Hail Guards
- Mounting Bases
- Timed Off Control
- Stand-off Kit
- Sound Cover
- *SignatureStat*™ Thermostat
- Low Ambient Kit

Start-Up & Performance Check List

Job Name _____ Job no. _____ Date _____

Job Location _____ City _____ State _____

Installer _____ City _____ State _____

Unit Model No. _____ Serial No. _____ Service Technician _____

Nameplate Voltage _____

Rated Load Ampacity _____ Compressor _____ Outdoor Fan _____

Maximum Fuse or Circuit Breaker _____

Electrical Connections Tight? ❑ Indoor Filter clean? ❑ Supply Voltage (Unit Off) _____

Indoor Blower RPM _____ S.P. Drop Over Indoor (Dry) _____ Outdoor Coil Entering Air Temp. _____

Discharge Pressure _____ Vapor Pressure _____ Refrigerant Charge Checked? ❑

Refrigerant Lines: - Leak Checked? ❑ Properly Insulated? ❑ Outdoor Fan Checked? ❑

Service Valves: --- Fully Opened? ❑ Caps Tight? ❑ **Thermostat**

Voltage With Compressor Operating _____ Calibrated? ❑ Properly Set? ❑ Level? ❑