LENNOX Service Literature®

INSTALLATION AND SERVICE PROCEDURE

SL18XC1

Corp. 1405-L10
June 2015
Revised August 2018

SL18XC1 (HFC-410A) SERIES UNITS WITH ALL-ALUMINUM COIL

iComfort®
So simple. So smart. So comfortable.

NOTICE

A thermostat is not included and must be ordered separately.

- A Lennox communicating thermostat must be used in communicating applications.
- In non-communicating applications, the Lennox ComfortSense® 7500 thermostat may be used, as well as other non-communicating thermostats.

In all cases, setup is critical to ensure proper system operation.

Field wiring examples for non-communicating applications begin on page 39.

See the thermostat ***Quick Start Guide*** for communicating and partial communicating field wiring connections.

⚠ 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 licensed professional installer (or equivalent) or a service agency.

⚠ CAUTION

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

Accessories

For update-to-date information, see any of the following publications:

- Lennox SL18XC1 Product Specification bulletin (EHB)
- Lennox Product Catalog
- Lennox Price Book

TABLE OF CONTENTS

IMPORTANT: Special procedures are required for cleaning the aluminum coil in this unit. See page 23 in this manual for information.

I. OVERVIEW

Model Number Identification

SL 18 X C 1 –036 – 230 –03

Product Tier
SL = Dave Lennox Signature® Collection

Nominal SEER

Refrigerant Type
X = R-410A

Unit Type
C = Air Conditioner

Cooling Stages
1 = Single Stage Compressor

Nominal Cooling Capacity
024 = 2 tons
030 = 2.5 tons
036 = 3 tons
042 = 3.5 tons
048 = 4 tons
060 = 5 tons

Voltage
230 = 208/230V-1ph-60hz

Minor Revision Number

Typical Serial Number Identification

58 09 C 05716

Location Code
19 = Saltillo, Mexico
58 = Marshalltown, IA

Year Code
08 = 2008
09 = 2009
10 = 2010

Month Code
A = January
B = February
C = March

5 (or 6) Digit Unique Number

Specifications

Model Number	Unit		Outdoor Fan	
	Sound Rating Number (dB)[1]	Factory Refrigerant Charge[2]	Number of Blades	Diameter - inches.
SL18XC1-024	65	7 lbs. 0 oz.	5	26

Model Number	Unit		Outdoor Fan	
	Sound Rating Number (dB)[1]	Factory Refrigerant Charge[2]	Number of Blades	Diameter - inches.
SL18XC1-030	68	8 lbs. 8 oz.	5	26

Model Number	Unit		Outdoor Fan	
	Sound Rating Number (dB)[1]	Factory Refrigerant Charge[2]	Number of Blades	Diameter - inches.
SL18XC1-036	71	8 lbs. 8 oz.	5	26

Model Number	Unit		Outdoor Fan	
	Sound Rating Number (dB)[1]	Factory Refrigerant Charge[2]	Number of Blades	Diameter - inches.
SL18XC1-042	71	10 lbs. 3 oz.	5	26

Model Number	Unit		Outdoor Fan	
	Sound Rating Number (dB)[1]	Factory Refrigerant Charge[2]	Number of Blades	Diameter - inches.
SL18XC1-048	74	10 lbs. 13 oz.	5	26

Model Number	Unit		Outdoor Fan	
	Sound Rating Number (dB)[1]	Factory Refrigerant Charge[2]	Number of Blades	Diameter - inches.
SL18XC1-060	74	12 lbs. 0 oz.	5	26

[1] Tested according to AHRI Standard 270-2008 test conditions.

[2] Refrigerant charge sufficient for 15 feet length of refrigerant lines.

Electrical Data

208/230V-60 Hz-1 Ph

Model Number	Unit		Compressor		Condenser Fan		
	Maximum Over-current Protection (amps)[1]	Minimum Circuity Ampacity[2]	Rated Load Amps (RLA)	Locked Rotor Amps (LRA)	Motor HP	Nominal RPM	Full Load Amps (FLA)
SL18XC1-024	25	20	11.2	60.8	1/3	450	2.0

208/230V-60 Hz-1 Ph

Model Number	Unit		Compressor		Condenser Fan		
	Maximum Over-current Protection (amps)[1]	Minimum Circuity Ampacity[2]	Rated Load Amps (RLA)	Locked Rotor Amps (LRA)	Motor HP	Nominal RPM	Full Load Amps (FLA)
SL18XC1-030	30	20	12.8	67.8	1/3	500	2.0

208/230V-60 Hz-1 Ph

Model Number	Unit		Compressor		Condenser Fan		
	Maximum Over-current Protection (amps)[1]	Minimum Circuity Ampacity[2]	Rated Load Amps (RLA)	Locked Rotor Amps (LRA)	Motor HP	Nominal RPM	Full Load Amps (FLA)
SL18XC1-036	30	20	14.1	72.2	1/3	600	2.0

208/230V-60 Hz-1 Ph

Model Number	Unit		Compressor		Condenser Fan		
	Maximum Over-current Protection (amps)[1]	Minimum Circuity Ampacity[2]	Rated Load Amps (RLA)	Locked Rotor Amps (LRA)	Motor HP	Nominal RPM	Full Load Amps (FLA)
SL18XC1-042	40	24.4	17.9	112.0	1/3	600	2.0

208/230V-60 Hz-1 Ph

Model Number	Unit		Compressor		Condenser Fan		
	Maximum Over-current Protection (amps)[1]	Minimum Circuity Ampacity[2]	Rated Load Amps (RLA)	Locked Rotor Amps (LRA)	Motor HP	Nominal RPM	Full Load Amps (FLA)
SL18XC1-048	45	26.0	19.2	117.0	1/3	675	2.0

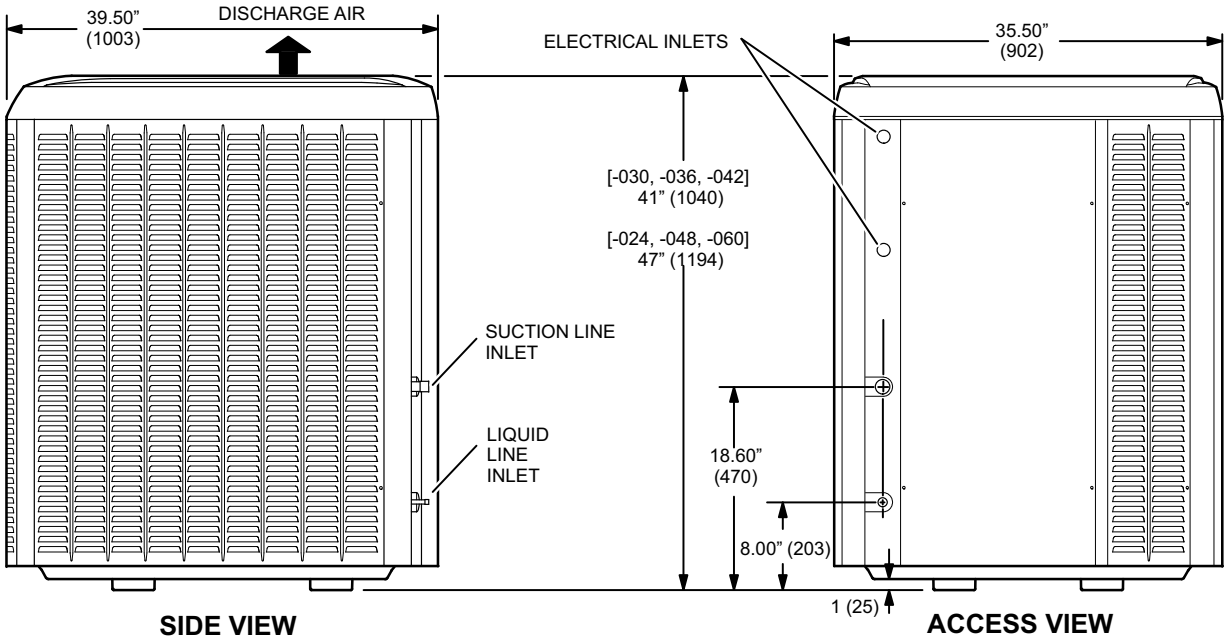
208/230V-60 Hz-1 Ph

Model Number	Unit		Compressor		Condenser Fan		
	Maximum Over-current Protection (amps)[1]	Minimum Circuity Ampacity[2]	Rated Load Amps (RLA)	Locked Rotor Amps (LRA)	Motor HP	Nominal RPM	Full Load Amps (FLA)
SL18XC1-060	50	31.6	23.7	152.5	1/3	675	2.0

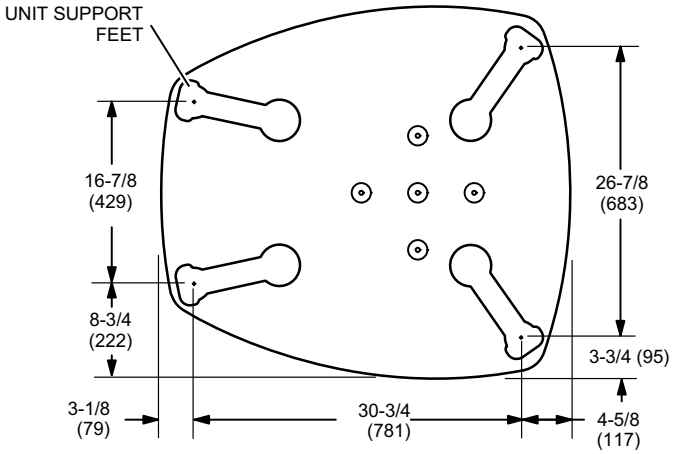
[1] HACR type circuit breaker or fuse.

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

Unit Dimensions - Inches (mm) and Parts Arrangement



SIDE VIEW **ACCESS VIEW**



BASE WITH ELONGATED LEGS

Typical Unit Parts Arrangement

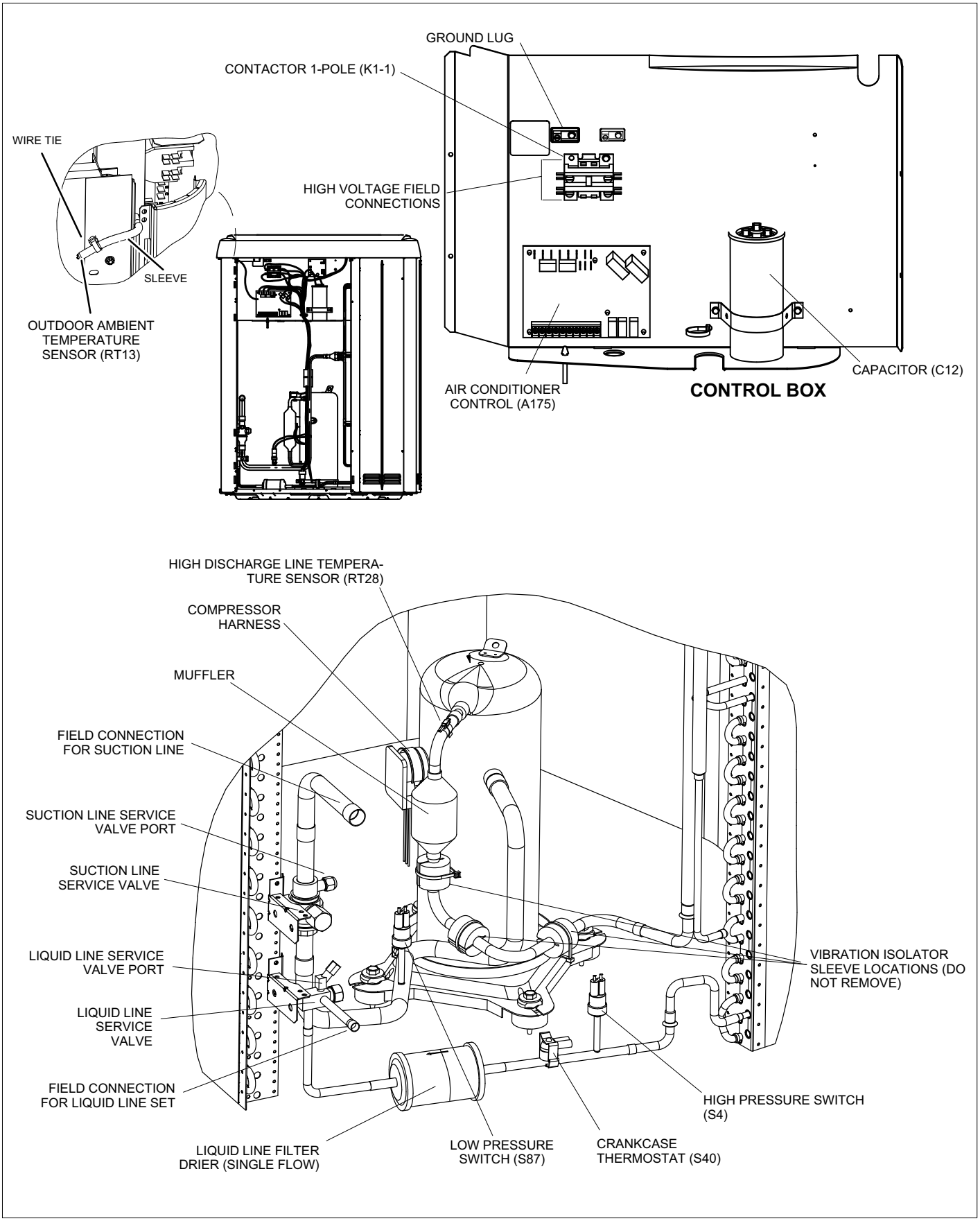


Figure 1. Typical Parts Arrangement

The SL18XC1 is a high efficiency residential split-system air conditioner unit, which features a one-stage scroll compressor, iComfort® control and HFC-410A refrigerant. Units are available in 2, 3, 4 and 5-ton sizes. This model series is designed for use with an expansion valve metering device only. Refer to the SL18XC1 Product Specification bulletin for ordering the correct indoor coil expansion valve.

⚠ IMPORTANT

This unit must be matched with an indoor coil as specified in Lennox Product Specification bulletin. Coils previously charged with HCFC-22 must be flushed.

⚠ IMPORTANT

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

⚠ WARNING

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

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

Operating Gauge Set and Service Valves

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

TORQUE REQUIREMENTS

When servicing or repairing heating, ventilating, and air conditioning components, ensure the fasteners are appropriately tightened. Table 1 shows torque values for fasteners.

⚠ IMPORTANT

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

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

See the Lennox Service and Application Notes #C-08-1 for further details and information.

⚠ IMPORTANT

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

Table 1. Torque Requirements

Parts	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

USING MANIFOLD GAUGE SET

When checking the system charge, only use a manifold gauge set that features low loss anti-blow back fittings.

Manifold gauge set used with HFC-410A refrigerant systems must be capable of handling the higher system operating pressures. The gauges should be rated for use with pressures of 0 - 800 psig on the high side and a low side of 30” vacuum to 250 psig with dampened speed to 500 psi. Gauge hoses must be rated for use at up to 800 psig of pressure with a 4000 psig burst rating.

OPERATING SERVICE VALVES

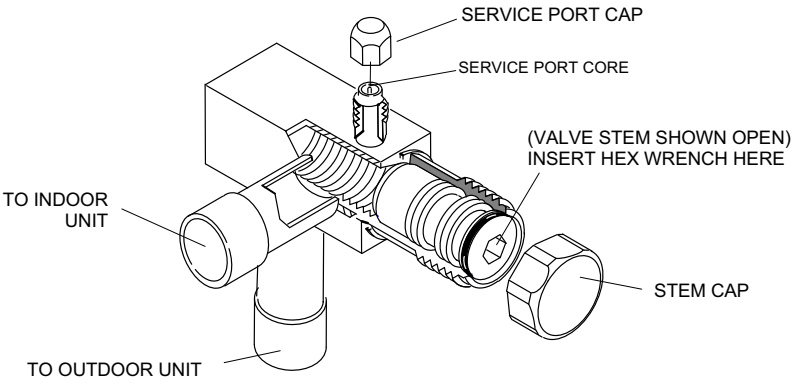
The liquid and vapor line service valves are used for removing refrigerant, flushing, leak testing, evacuating, checking charge and charging.

Each valve is equipped with a service port which has a factory-installed valve stem. Figure 2 provides information on how to access and operating both angle and ball service valves.

SERVICE VALVES ANGLE AND BALL

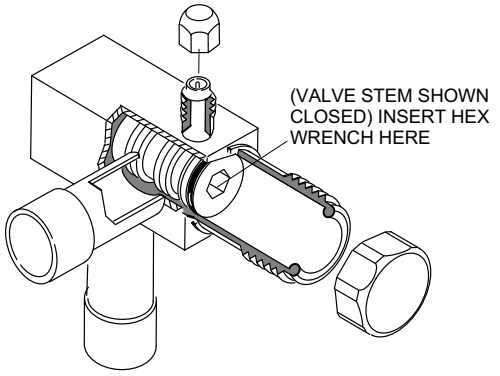
Operating Angle Type Service Valve:

1. Remove stem cap with an appropriately sized wrench.
2. Use a service wrench with a hex-head extension (3/16” for liquid line valve sizes and 5/16” for vapor line valve sizes) to back the stem out counterclockwise as far as it will go.



ANGLE-TYPE SERVICE VALVE (BACK-SEATED OPENED)

When service valve is **OPEN**, the service port is open to linE set, indoor and outdoor unit.

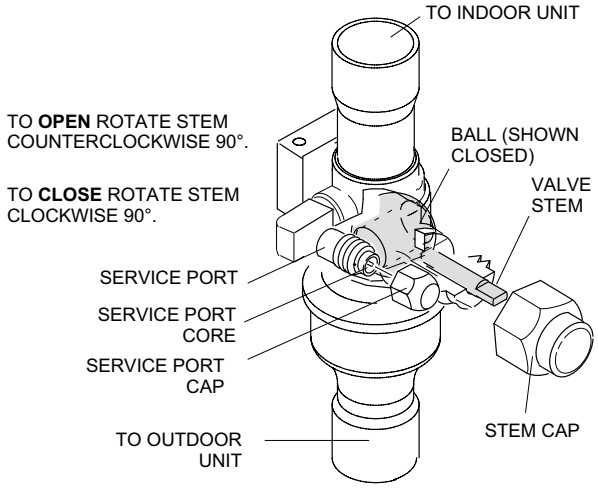


ANGLE-TYPE SERVICE VALVE (FRONT-SEATED CLOSED)

WHEN SERVICE VALVE IS **CLOSED**, THE SERVICE PORT IS OPEN TO THE LINE SET AND INDOOR UNIT.

Operating Ball Type Service Valve:

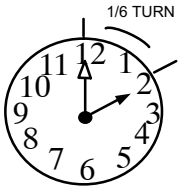
1. Remove stem cap with an appropriately sized wrench.
2. Use an appropriately sized wrenched to open. To open valve, rotate stem counterclockwise 90°. To close, rotate stem clockwise 90°.



To Access Service Port:

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

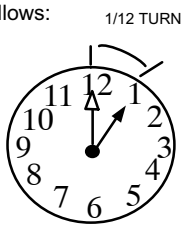
1. Remove service port cap with an appropriately sized wrench.
2. Connect gauge set to service port.
3. When testing is completed, replace service port cap and tighten as follows:
   - With torque wrench: Finger tighten and torque cap per table 1.
   - Without torque wrench: Finger tighten and use an appropriately sized wrench to turn an additional 1/6 turn clockwise.



Reinstall Stem Cap:

Stem cap protects the valve stem from damage and serves as the primary seal. Replace the stem cap and tighten as follows:

- With Torque Wrench: Finger tighten and then torque cap per table 1.
- Without Torque Wrench: Finger tighten and use an appropriately sized wrench to turn an additional 1/12 turn clockwise.



NOTE — A label with specific torque requirements may be affixed to the stem cap. If the label is present, use the specified torque.

Figure 2. Angle and Ball Service Valves

II. SYSTEM OPERATION AND SERVICE

103369-XX System Operation

⚠ IMPORTANT

Some scroll compressor have internal vacuum protector that will unload scrolls when suction pressure goes below 20 psig. A hissing sound will be heard when the compressor is running unloaded. Protector will reset when low pressure in system is raised above 40 psig. DO NOT REPLACE COMPRESSOR.

The air conditioner control (A175) provides the following system functions:

- Compressor anti-short-cycle delay.
- High and low pressure switches
- Ambient and Discharge Line Temperatures Monitoring and Protection.
- Five strikes lockout safety feature for High/Low Pressure Switches and High Discharge Line Temperature. See figures 12, 11 and 13 feature function.

COMPRESSOR ANTI-SHORT CYCLE DELAY

The air conditioner control (A175) protects the compressor from:

- Short cycling (five minutes) when there is initial power up
- Interruption in power to the unit
- High or low pressure switch or discharge line sensor trips
- Delay after Y1 demand is removed.

The anti-short timer in the air conditioner control is five (5) minutes.

HIGH AND LOW PRESSURE SWITCHES

The unit's reset pressure switches LO PS (S4) and HI PS (S87) are factory-wired into the air conditioner control (A175) on the LO-PS and HI-PS terminals, there locations are illustrated on page 5. Sequence of operations for both pressure switches are provided in figures 12 and 11.

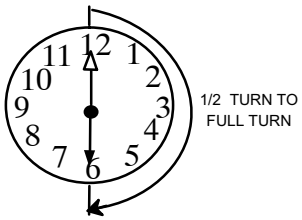
Pressure Switch Event Settings

The following pressures are the auto reset event value triggers for low and high pressure thresholds:

- **High Pressure** (auto reset) - normally closed - trips at 590±5 psig; resets at 418±5 psig.
- **Low Pressure** (auto reset) - normally opened - trips at 90±5 psig; resets at 40±5 psig.

When replacing either the high or low pressure switches, tighten switch using either of the following methods:

- With Torque Wrench: Finger tighten and torque to 100 inch pounds.
- Without Torque Wrench: Finger tighten and use an appropriately sized wrench to turn an additional 1/2 to full turn clockwise.



THERMAL PROTECTION SWITCH (S173) - COMPRESSOR MOUNTED

Some units are equipped with a compressor-mounted normally closed temperature switch that prevents compressor damage due to overheating caused by internal friction. The switch is located on top of the compressor casing. This switch senses the compressor casing temperature and opens at 239-257°F (115°C-125°C) to shut off compressor operation. The auto-reset switch closes when the compressor casing temperature falls to 151-187°F (66°C-86°C), and the compressor is re-energized. This single-pole, single-throw (SPST) bi-metallic switch is wired in series with the 24V Y input signal to control compressor operation.

HIGH DISCHARGE LINE TEMPERATURE SENSOR (RT28)

The high discharge line temperature sensor location is illustrated on page 5. This sensor's sequence of operations is provided in figure 13.

High Discharge Line Sensor Open/Shorted Event Condition

Discharge sensor open / short fault is ignored during initial 90-seconds of compressor run time. After that, if discharge temperature sensor is detected open or short, the control will de-energize all the outputs and anti-short cycle timer is started. Discharge sensor faulty alert LED code will be displayed.

OUTDOOR AMBIENT TEMPERATURE (RT13)

If the outdoor ambient temperature sensor detected a open, or out of range -40ºF to +140ºF (-40ºC to 60ºC) then LED alert codes are displayed, however cooling operation will continue. Location of outdoor ambient temperature sensor is illustrated on page 5.

COIL TEMPERATURE SENSOR

This model does not use a coil temperature sensor. The cable assembly attached to the air conditioner control (A175)'s E30 connection has a 10K resistor installed between pins 5 and 6 as illustrated in figure 3.

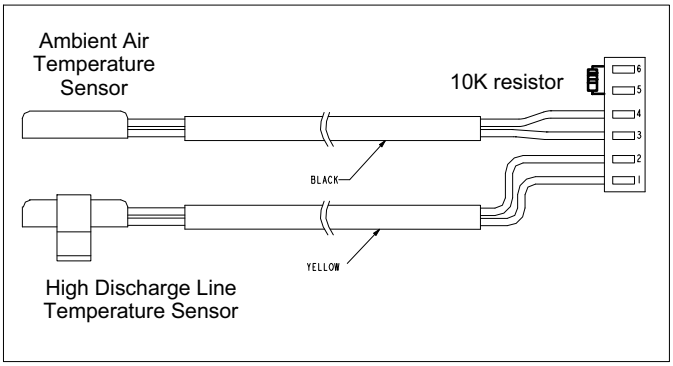


Figure 3. 10k Resistor Location

TESTING AMBIENT AND HIGH DISCHARGE LINE TEMPERATURE SENSORS

Sensors connect through a field-replaceable harness assembly that plugs directly into the air conditioner control (A175). Through these sensors, the air conditioner control can monitor outdoor ambient and discharge line temperature fault conditions. As the detected temperature changes, the resistance across the sensor changes. figures 3 and 4 lists how the resistance varies as the temperature changes for both type of sensors. Sensor resistance values can be checked by ohming across pins shown in table 2.

When a sensor indicates a resistance value that is not within the range as listed in table 2, then the following condition may be present:

- Sensor detects an out-of-range outdoor ambient air temperature condition and will display LED alert code on the air conditioner control.
- The sensor is operating normally when the ambient air temperature at the sensor is below or above the air conditioner control (A175)'s expected ohm values. The Air conditioner control (A175) will indicate the sensor as faulty, however under this scenario, the sensor is not actually faulty.
- Once the outdoor ambient air temperature has returned to within the sensor's normal operating range, the LED alert code will automatically stop.

Table 2. Sensor Temperature / Resistance Range

Sensor	Temperature Range °F (°C)	Resistance values range (ohms)	Pins/Wire Color
RT13 Outdoor (Ambient)	-40ºF to 140ºF (-40ºC to 60ºC)	280,000 to 3750	3 and 4 (Black)
RT28 High Discharge Line Temperature Sensor	-35ºF to 310ºF (-37ºC to 154ºC)	41,000 to 103	1 and 2 (Yellow)
Note: Sensor resistance decreases as sensed temperature increases (see tables 3 and 4).			

Table 3. RT13 Ambient Sensor Temperature / Resistance Range

Degrees Fahrenheit	Resistance	Degrees Fahrenheit	Resistance	Degrees Fahrenheit	Resistance	Degrees Fahrenheit	Resistance
136.3	2680	56.8	16657	21.6	44154	-11.3	123152
133.1	2859	56.0	16973	21.0	44851	-11.9	125787
130.1	3040	55.3	17293	20.5	45560	-12.6	128508
127.3	3223	54.6	17616	20.0	46281	-13.2	131320
124.7	3407	53.9	17942	19.4	47014	-13.9	134227
122.1	3592	53.2	18273	18.9	47759	-14.5	137234
119.7	3779	52.5	18607	18.4	48517	-15.2	140347
117.5	3968	51.9	18945	17.8	49289	-15.9	143571
115.3	4159	51.2	19287	17.3	50074	-16.5	146913
113.2	4351	50.5	19633	16.8	50873	-17.2	150378
111.2	4544	49.9	19982	16.3	51686	-17.9	153974
109.3	4740	49.2	20336	15.7	52514	-18.6	157708
107.4	4937	48.5	20695	15.2	53356	-19.3	161588
105.6	5136	47.9	21057	14.7	54215	-20.1	165624
103.9	5336	47.3	21424	14.1	55089	-20.8	169824
102.3	5539	46.6	21795	13.6	55979	-21.5	174200
100.6	5743	46.0	22171	13.1	56887	-22.3	178762
99.1	5949	45.4	22551	12.5	57811	-23.0	183522
97.6	6157	44.7	22936	12.0	58754	-23.8	188493
96.1	6367	44.1	23326	11.5	59715	-24.6	193691
94.7	6578	43.5	23720	11.0	60694	-25.4	199130
93.3	6792	42.9	24120	10.4	61693	-26.2	204829
92.0	7007	42.3	24525	9.9	62712	-27.0	210805
90.6	7225	41.7	24934	9.3	63752	-27.8	217080
89.4	7444	41.1	25349	8.8	64812	-28.7	223677
88.1	7666	40.5	25769	8.3	65895	-29.5	230621
86.9	7890	39.9	26195	7.7	67000	-30.4	237941
85.7	8115	39.3	26626	7.2	68128	-31.3	245667
84.5	8343	38.7	27063	6.7	69281	-32.2	253834
83.4	8573	38.1	27505	6.1	70458	-33.2	262482
82.3	8806	37.5	27954	5.6	71661	-34.1	271655
81.2	9040	37.0	28408	5.0	72890	-35.1	281400
80.1	9277	36.4	28868	4.5	74147	-36.1	291774
79.0	9516	35.8	29335	3.9	75431	-37.1	302840
78.0	9757	35.2	29808	3.4	76745	-38.2	314669
77.0	10001	34.7	30288	2.8	78090	-39.2	327343
76.0	10247	34.1	30774	2.3	79465		
75.0	10496	33.5	31267	1.7	80873		
74.1	10747	33.0	31766	1.2	82314		
73.1	11000	32.4	32273	0.6	83790		
72.2	11256	31.9	32787	0.0	85302		
71.3	11515	31.3	33309	-0.5	86852		
70.4	11776	30.7	33837	-1.1	88440		
69.5	12040	30.2	34374	-1.7	90068		
68.6	12306	29.6	34918	-2.2	91738		
67.7	12575	29.1	35471	-2.8	93452		
66.9	12847	28.6	36031	-3.4	95211		
66.0	13122	28.0	36600	-4.0	97016		
65.2	13400	27.5	37177	-4.6	98870		
64.4	13681	26.9	37764	-5.2	100775		
63.6	13964	26.4	38359	-5.7	102733		
62.8	14251	25.8	38963	-6.3	104746		
62.0	14540	25.3	39577	-6.9	106817		
61.2	14833	24.8	40200	-7.5	108948		
60.5	15129	24.2	40833	-8.2	111141		
59.7	15428	23.7	41476	-8.8	113400		
59.0	15730	23.2	42130	-9.4	115727		
58.2	16036	22.6	42794	-10.0	118126		
57.5	16345	22.1	43468	-10.6	120600		

Table 4. RT28 High Discharge Sensor Temperature / Resistance Range

Degrees Fahrenheit	Resistance	Degrees Fahrenheit	Resistance	Degrees Fahrenheit	Resistance	Degrees Fahrenheit	Resistance
303.1	183	186.1	1052	136.8	2656	94.5	6613
298.1	195	185.0	1072	136.0	2698	93.6	6739
293.4	207	183.9	1093	135.2	2740	92.8	6869
289.0	220	182.8	1114	134.5	2783	92.0	7002
284.8	232	181.8	1135	133.7	2827	91.2	7139
280.9	245	180.7	1157	132.9	2872	90.3	7281
277.1	258	179.6	1179	132.2	2917	89.5	7426
273.6	270	178.6	1201	131.4	2963	88.6	7575
270.2	283	177.6	1223	130.6	3010	87.8	7729
267.0	297	176.6	1245	129.9	3057	86.9	7888
263.9	310	175.5	1268	129.1	3105	86.0	8051
260.9	323	174.6	1291	128.4	3154	85.2	8220
258.1	336	173.6	1315	127.6	3204	84.3	8394
255.3	350	172.6	1338	126.8	3255	83.4	8574
252.7	364	171.6	1362	126.1	3307	82.5	8759
250.1	378	170.6	1386	125.3	3359	81.6	8951
247.7	391	169.7	1411	124.6	3413	80.7	9149
245.3	405	168.7	1435	123.8	3467	79.8	9354
243.0	420	167.8	1460	123.1	3523	78.8	9566
240.8	434	166.9	1486	122.3	3579	77.9	9786
238.6	448	165.9	1511	121.6	3637	76.9	10013
236.5	463	165.0	1537	120.8	3695	76.0	10250
234.4	478	164.1	1563	120.1	3755	75.0	10495
232.4	492	163.2	1590	119.3	3816	74.1	10749
230.5	507	162.3	1617	118.5	3877	73.1	11014
228.6	523	161.4	1644	117.8	3940	72.1	11289
226.7	538	160.5	1672	117.0	4005	71.1	11575
224.9	553	159.7	1699	116.3	4070	70.0	11873
223.2	569	158.8	1728	115.5	4137	69.0	12184
221.5	584	157.9	1756	114.8	4205	68.0	12509
219.8	600	157.1	1785	114.0	4274	66.9	12848
218.1	616	156.2	1815	113.2	4345	65.8	13202
216.5	632	155.3	1845	112.5	4418	64.7	13573
214.9	649	154.5	1875	111.7	4491	63.6	13961
213.4	665	153.6	1905	111.0	4567	62.5	14368
211.9	682	152.8	1936	110.2	4644	61.3	14796
210.4	698	152.0	1968	109.4	4722	60.2	15246
208.9	715	151.1	1999	108.7	4802	59.0	15719
207.5	732	150.3	2032	107.9	4884	57.8	16218
206.0	750	149.5	2064	107.1	4968	56.6	16744
204.6	767	148.7	2098	106.4	5054	55.3	17301
203.3	785	147.9	2131	105.6	5141	54.0	17891
201.9	803	147.1	2165	104.8	5231	52.7	18516
200.6	821	146.2	2200	104.0	5323	51.4	19180
199.3	839	145.4	2235	103.3	5416	50.0	19887
198.0	857	144.6	2270	102.5	5512	48.6	20641
196.8	876	143.8	2306	101.7	5610	47.2	21448
195.5	894	143.0	2343	100.9	5711	45.7	22311
194.3	913	142.3	2380	100.1	5814		
193.1	932	141.5	2418	99.3	5920		
191.9	952	140.7	2456	98.5	6028		
190.7	971	139.9	2495	97.7	6139		
189.5	991	139.1	2534	96.9	6253		
188.4	1011	138.3	2574	96.1	6370		
187.2	1031	137.6	2615	95.3	6489		

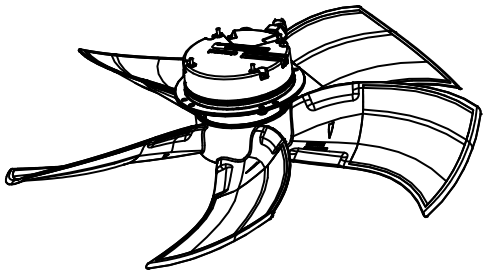
Fan Motor (B4) Test Procedure

A simple test can be used to test the fan motor operation. A fully charged 9V battery will be required for this procedure.

FAN MOTOR TEST

THIS IS A TEST THAT WILL VERIFY THAT THE MOTOR DOES OPERATE.

1. VERIFY MAIN (240 VOLT) POWER IF **OFF** TO UNIT.
2. REMOVE BOTH WIRES (BROWN AND BLACK) FROM THE OUTDOOR CONTROL.
3. ROOM THERMOSTAT SHOULD BE IN **OFF** POSITION (UNIT IN IDLE MODE - NO HEATING OR COOLING DEMANDS)
4. TURN MAIN POWER (240 VOLT) **ON** TO UNIT.
5. CONNECT 9 VOLT BATTERY TO FAN MOTOR PLUGS AS NOTED IN PICTURE BELOW.
6. FAN MOTOR SHOULD RUN AT A REDUCED FAN SPEED.
7. IF FAN MOTOR DOES NOT RUN, THEN REPLACE FAN MOTOR ASSEMBLY.



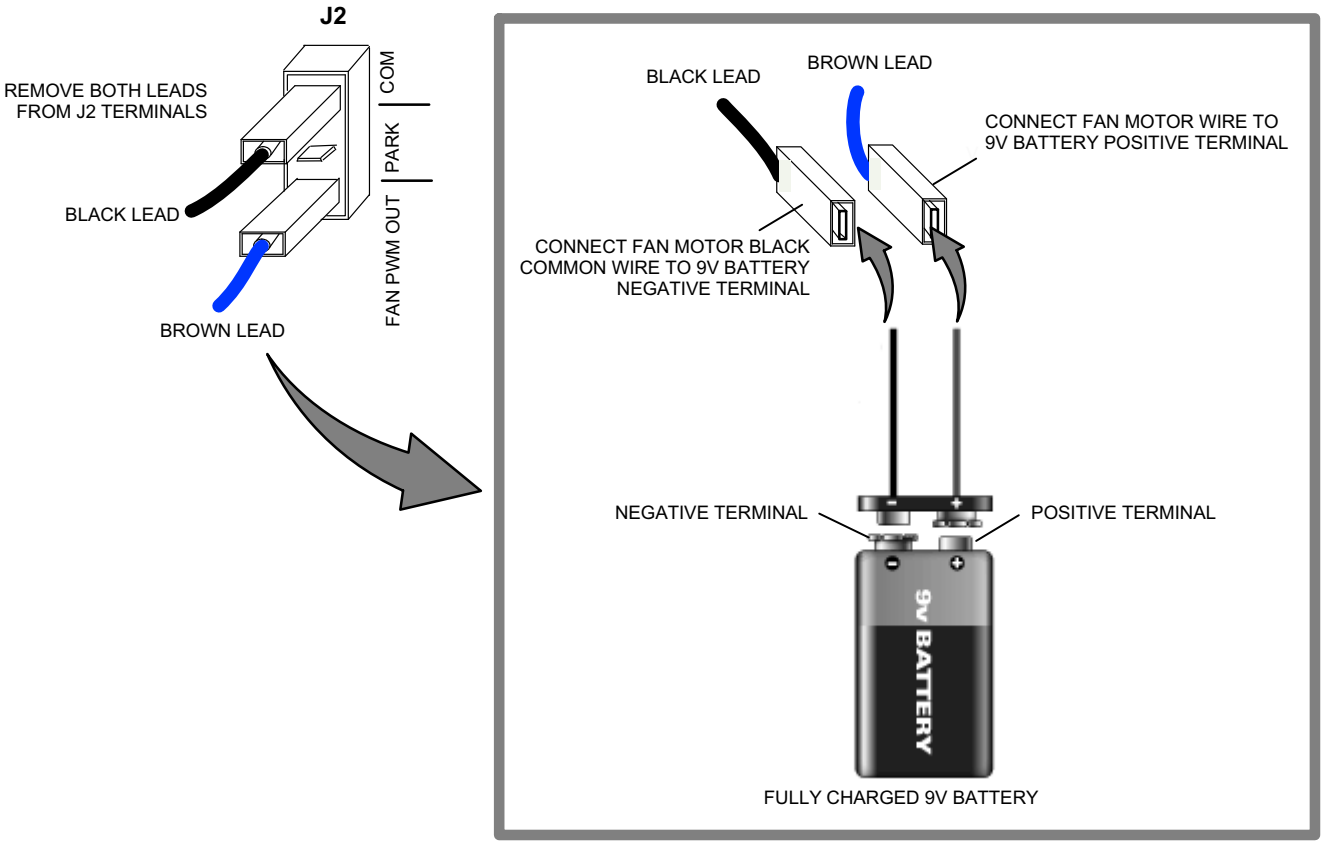


Figure 4. Fan Motor (B4) Test

TOP GRILLE OR FAN MOTOR MOUNT ADJUSTMENT FOR FAN CLEARANCE

Sometimes during shipping, either the fan motor mounting or top grille may become out of alignment. This may cause the fan motor blade to not clear the orifice ring. If this situation occurs, simply adjust either or both the fan motor mount or top grille positions to allow proper clearance. The top grille four fastener insertion points to the plastic top and motor mount locations are larger than the fasteners used to secure the grille and fan motor mounts. Use the procedures provided in figure 5 to adjust for fan clearance.

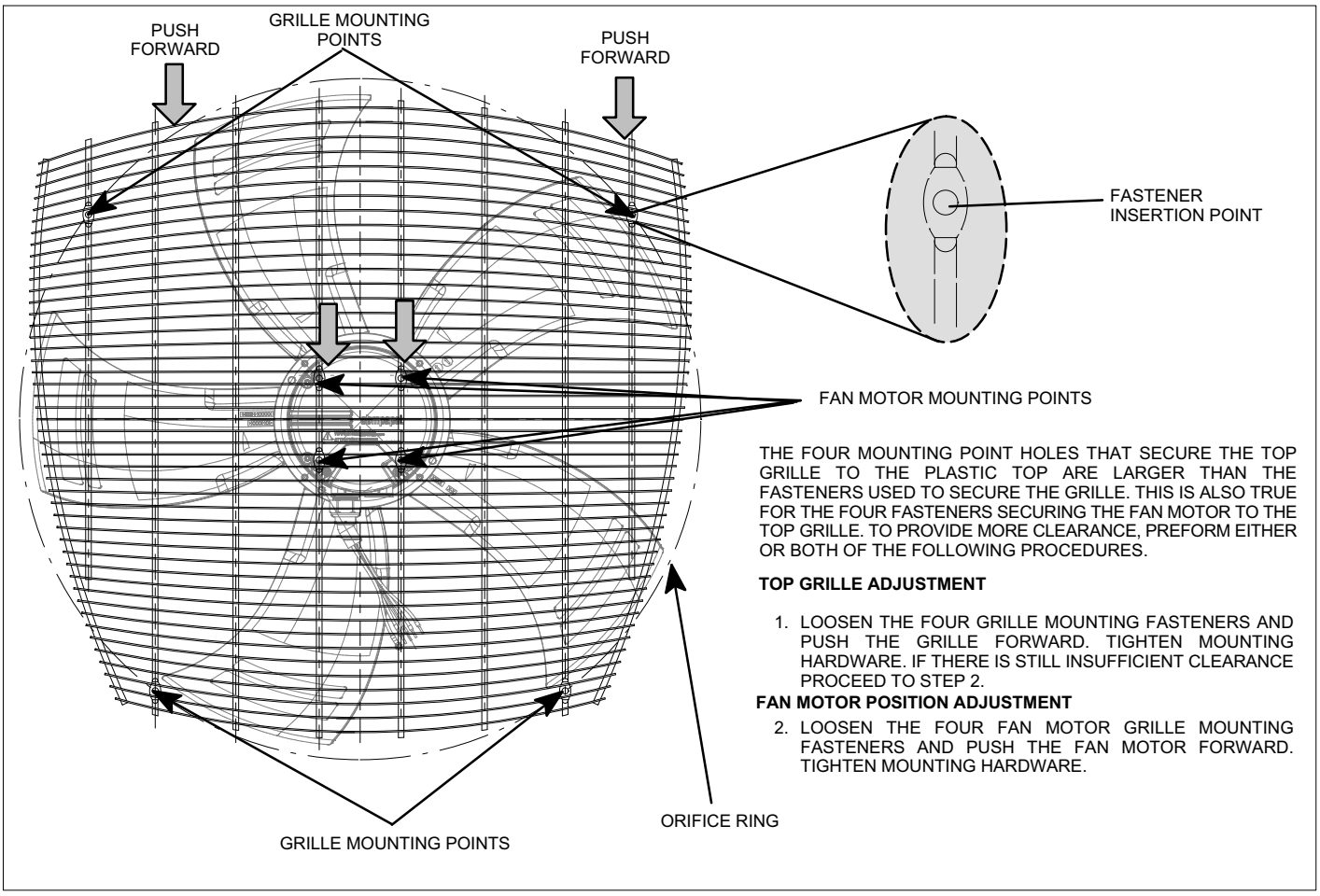


Figure 5. Fan Blade Clearance Adjustment

Jumper and Link Settings (103369-03 and later)

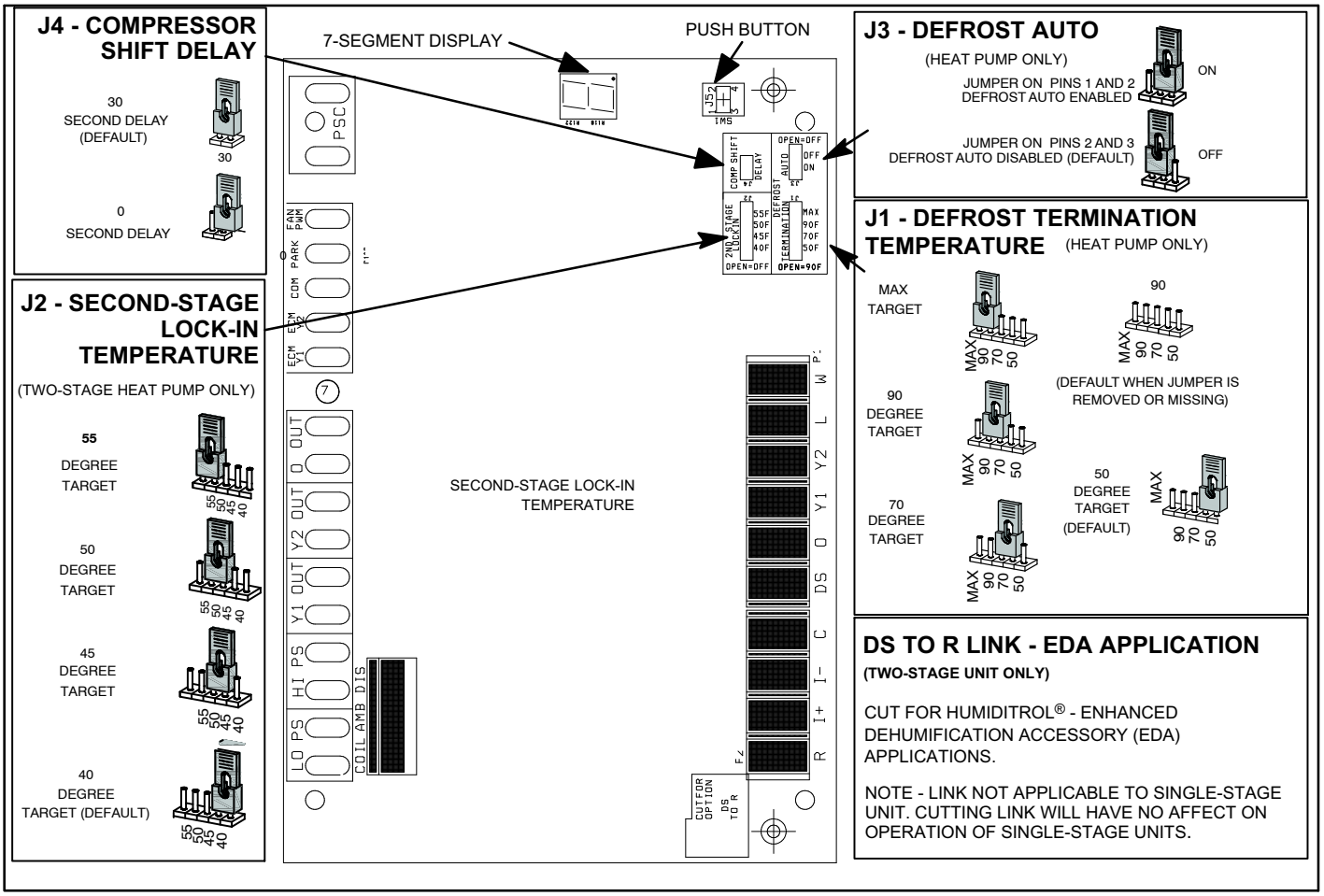


Figure 6. Jumpers and Links (Outdoor Control Part Number 103369-03 and later)

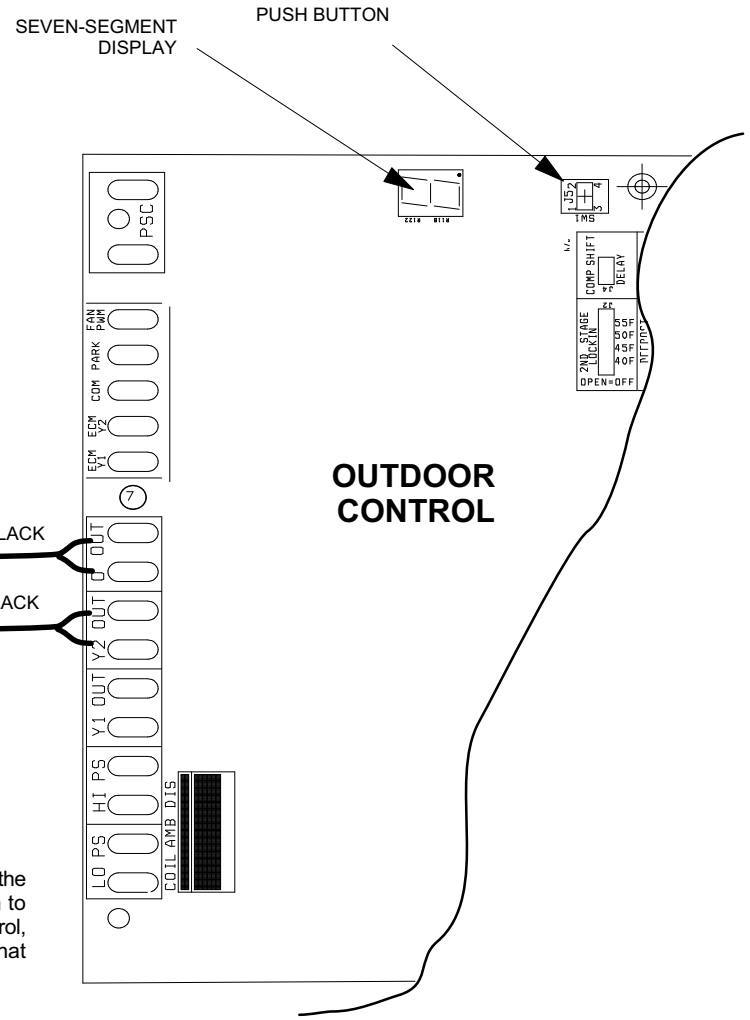
Configuring Unit

For the new outdoor control to work correctly, it **MUST BE** programmed for unit type (AC or HP and number of stages), unit capacity and outdoor fan profile (RPM). The new outdoor control has an auto-detection feature that will determine the unit type. The following set up procedures MUST be done on all new outdoor controls.

Auto-Detection of Unit Type (air conditioner or heat pump and number of stages)

During initial power-up the control will auto-detect the unit type. The unit type is determine by what is connected to various outputs on the new control.

The unit capacity and fan speed are manually configured. Until those parameters are configured the 7-segment display will show 3 bars for the unit capacity and fan speed.



- Anytime there is a connection to **O OUT** terminal, the control will detect the unit type as a heat pump.
- Anytime there is no connection to **O** terminal, the control will detect the unit type as an air conditioner.

BLACK

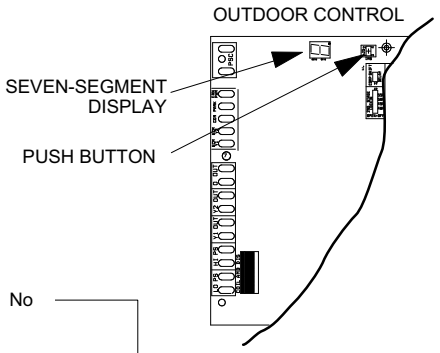
BLACK

- Anytime there is a connection to **Y2 OUT** terminal, the control will detect the unit as two-stage.
- Anytime there is no connection to **Y2** terminal, the control will detect the unit as single-stage.

If the control auto-detects the unit type incorrectly it may be due to the control being miswired, loose connection or missing connection to the required control output terminal. Disconnect power to the control, verify connections, correct wiring and reconnect power. Verify that the correct unit type is displayed on the seven-segment display.

Configuring Unit Type

During initial power-up the control will auto-detect the unit type. The unit type is automatically determine by what is connected to **Y2 OUT** and/or **O OUT** on the control. The unit type can be permanently stored in the control's memory by manually configuring the unit type using the following procedure. Typically the capacity and fan speed will not be configured and will display the three dashes for each. For manual configuration of the unit type, proceed as indicated.



Outdoor control is in **IDLE** mode (No heating or cooling demand)

Yes

No

Turn room thermostat to **OFF**

To enter **unit type configuration**, push and hold button next to single character display until **dash** symbol appears and immediately release button. Once dash starts blinking, proceed to next step.

Push and hold button until the solid Pt sequence is displayed on the seven-segment display and then immediately release the button.

[This configuration sequence allows the installer to select a unit type (number / letter combination) that matches the outdoor type and number of stages.]

Unit Type / Number of Stages

- 1AC One stage air conditioner
- 2AC Two stage air conditioner
- 1HP One stage heat pump
- 2HP Two stage heat pump

1. When the correct unit type is displayed, release button immediately. [Display will start flashing]
2. Push and hold button until selection stops flashing during one of the three cycles. [Release the button]
3. If selection is not made during those three cycles the control will return to idle mode.

NOT SELECTED

SELECTED

Press and hold the button during the Pt cycling display.

[The Pt sequence will repeat 5 times and if a selection is not made the control will return to idle mode.]

NOT SELECTED

SELECTED

The outdoor control will store unit type in memory and will automatically exit the configuration and reset control.

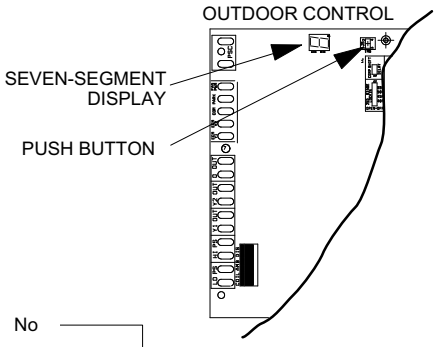
During power up of the outdoor control, the seven-segment display will show the stored number of stages unit type, capacity and outdoor fan speed.

2HP PAUSE 36 PAUSE 12

- 2HP: TWO STAGE HEAT PUMP
- 36: CAPACITY (3-TON)
- 12: FAN PROFILE

If three horizontal bars display in any part of the 7-segment string during power up, the outdoor control did not store that configuration. (Unit type, capacity or fan RPM. If this happens, the configuration sequence for that section of the string must be repeated.

Configuring Unit Capacity or Fan Profile



Power-up - Unit capacity (two-digit number) and displayed represents unit size code (outdoor unit capacity).
During initial power up, the number of stages / unit type, unit capacity and outdoor fan speed will appear on the 7-segment display.
If three horizontal bars display in any part of the 7-segment display string sections during power-up, the outdoor control did not store that configuration (unit type, capacity or fan RPM). If this happens, the configuration sequence for that section of the string must be repeated.

Outdoor control is in **IDLE** mode (No heating or cooling demand)

Yes

No

Turn room thermostat to **OFF**

To enter **unit capacity or fan profile configuration**, push and hold button next to single character display until **dash** symbol appears and immediately release button. Once dash starts blinking, proceed to next step.

Push and hold button until the solid *PC* or *PF* sequence is displayed on the seven-segment display and then immediately release the button. This configuration sequence allows the installer to select a unit type (number / letter combination) that matches the outdoor unit type and number of stages.

UNIT CAPACITY

FAN PROFILE

Either the *PC* or *PF* sequence will repeat 5 times and if a selection is not made the control will return to idle mode. Press and hold the button during the *PC* or *PF* cycling display.

NOT SELECTED

SELECTED

Unit Capacity Code

12	1-TON
18	1-1/2-TON
24	2-TON
30	2-1/2-TON
36	3-TON
42	3-1/2-TON
48	4-TON
60	5-TON

Fan Profile Code (**see notes**)

SEE NOTE 1

EBM fan motor with blades

SEE NOTE

See table 5 for fan profile.

1. When the correct unit capacity or fan profile is displayed, release button immediately. [Display will start blinking]
2. Push and hold button until selection stops flashing during one of the three cycles. [Release push button]
3. If selection is not made during those three cycles the control will return to idle mode.

NOT SELECTED

SELECTED

The outdoor control will store unit type in memory and will automatically exit the configuration and reset control.

During power up of the outdoor control, the seven-segment display will show the stored number of stages unit type, capacity and outdoor fan speed.

2 H P PAUSE 3 6 PAUSE 2

2-Stage Heat Pump | Capacity (3-Ton) | Fan Profile

If three horizontal bars display in any part of the 7-segment display string during power-up, the outdoor control did not store that configuration (unit type, capacity or fan profile). If this occurs, the configuration sequence for that section of the string must be repeated.

NOTE

Units with EBM motors - The fan motor RPM must be field set or three bars will appear in the fan profile string section of the 7-segment display. The factory default is 700 RPM.

Table 5. CFM Profile Selection

CFM PROFILE SELECTION			
Model	**Fan RPM Profile**	**Stage 1 RPM**	**EDA Stage RPM**
024	**1**	**450**	**450**
030	**2**	**500**	**500**
036	**4**	**600**	**600**
042	**4**	**600**	**600**
048	**6**	**675**	**675**
060	**6**	**675**	**675**

Seven-Segment Alert and System Status Codes

Alert codes are displayed using the seven-segment display located on the outdoor control.

NOTE — System fault and lockout alarm code displays takes precedence over system status (cooling, heating stages or defrost/dehumidification).

The seven-segment will display an abnormal condition (error code) when detected in the system. A list of the codes are shown in table 6.

RESETTING ALERT CODES

Alert codes can be reset manually or automatically:

Manual Reset

Manual reset can be achieved by one of the following methods:

- Disconnecting **R** wire from the main control's **R** terminal.
- Turning the indoor unit off and back on again

After power up all existing codes are cleared.

Automatic Reset

After an alert is detected, the main control continues to monitor the unit's system and compressor operations. When/if conditions return to normal, the alert code is turned off automatically.

Table 6. Seven-Segment Display Alert Codes

NOTE — System fault and lockout seven-segment display alarm codes takes precedence over system status codes (cooling, heating stages or defrost/dehumidification). Only the latest active fault or lockout alarm code if present will be displayed. If no fault or lockout codes are active, then system status are routinely displayed.

Alert Codes	Alarm Description	Possible Causes and Clearing Alarm
E 105	The outdoor unit has lost communication with the rest of the system.	Equipment is unable to communicate. This may indicate the existence of other alarms / codes. In most cases errors are related to electrical noise. Make sure high voltage power is separated from RSBus. Check for mis-wired and/or loose connections between the stat, indoor unit and outdoor unit. Check for a high voltage source of noise close to the system. This is a self-recoverable error.
E 120	There is a delay in the outdoor unit responding to the system.	Typically, this alarm/code does not cause any issues and will clear on its own. The alarm / code is usually caused by a delay in the outdoor unit responding to the thermostat. Check all wiring connections. Cleared after unresponsive device responds to any inquiry
E 124	The iComfort™-enabled thermostat has lost communication with the outdoor unit for more than 3 minutes.	Equipment lost communication with the thermostat. Check the wiring connections, ohm wires and cycle power. The alarm stops all associated HVAC operations and waits for a heartbeat message from the unit that's not communicating. The alarm / fault clears after communication is re-established.
E 125	There is a hardware problem with the outdoor unit control.	There is a control hardware problem. Replace the outdoor control if the problem prevents operation and is persistent. The alarm / fault is cleared 300 seconds after the fault recovers
E 126	There is an internal communication problem with the outdoor unit control.	There is an internal hardware problem on the control. Typically the control will re-set itself. Replace the control if the problem prevents operation and is persistent. The alarm / fault is cleared 300 seconds after the fault recovers.
E 131	The outdoor unit control parameters are corrupted	Reconfigure the system. Replace the control if heating or cooling is not available
E 180	The iComfort™-enabled thermostat has found a problem with the outdoor unit's ambient sensor.	In normal operation after outdoor control recognizes sensors, the alarm will be sent if valid temperature reading is lost. Compare outdoor sensor resistance to temperature/resistance charts in unit installation instructions. Replace sensor pack if necessary. At the beginning of (any) configuration, furnace or air-handler control will detect the presence of the sensor(s). If detected (reading in range), appropriate feature will be set as 'installed' and shown in the iComfort™-enabled thermostat 'About' screen. The alarm / fault will clear upon configuration, or sensing normal values.
E 401	Either the compressor ran for more than 18 hours continuously.	Compressor ran more than 18 hours to satisfy a single thermostat demand. If the unit is 2-stage, the high-speed will lock-out and the unit will run at low-speed. If it is a HP and ODT <65ºF, the system will not raise an alarm. Confirm that the system is properly charged with refrigerant. Check for stuck reversing valve, excessive cooling load and properly sized equipment. Confirm that the evaporator coil is clean. The alarm clears after 30 consecutive normal run cycles or a power reset.
E 403	The compressor ran for less than 3 minutes to satisfy a thermostat demand (short-cycling)	Compressor runs less than 3 minutes to satisfy a thermostat demand (short-cycling). Confirm that the system is properly charged with refriigerant. Check the condensation float switch and TXV. The alarm clears after 4 consecutive normal compressor run cycles or a power reset.
E 409	The secondary voltage for the outdoor unit has fallen below 18VAC. If this continues for 10 minutes, the system will shut down.	Secondary voltage is below 18VAC. After 10 minutes, operation is discontinued. Check the indoor line voltage, transformer output voltage. The alarm clears after the voltage is higher than 20VAC for 2 seconds or after a power reset.
E 410	The outdoor unit pressure is below the required limit.	Unit pressure is below the lower limit. The system is shutdown. The low pressure switch for HFC-410A will open at 40PSIG and close at 90PSIG. Confirm that the system is properly charged with refrigerant. Check TXV, indoor unit blower motor, dirty filters or clogged refrigerant filter. Confirm that the evaporator coil is clean. The alarm clears after the pressure switch closes or after a power reset
E 411	The low pressure switch has opened 5 times during one cooling cycle. As a result, the system will shutdown.	Open low pressure switch error count reached 5-strikes. The low pressure switch for R410A will open at 40PSIG and close at 90PSIG. Confirm that the system is properly charged with refrigerant. Check TXV, indoor unit blower motor, dirty filters or clogged refrigerant filter. Confirm that the evaporator coil is clean. The alarm clears after a power reset
E 412	The outdoor unit pressure is above the required limit. The system will shut down.	Unit pressure is above the upper limit. System is shut down. The high pressure switch for HFC-410A will open at 590PSIG and close at 418PSIG. Confirm that the system is properly charged with refrigerant. Check condenser fan motor, TXV, indoor unit blower motor, stuck reversing valve or clogged refrigerant filter. Confirm that the outdoor unit is clean. The alarm clears after 4 consecutive normal compressor run cycles, the pressure switch closes or a power reset
E 413	The high pressure switch has opened 5 times during one cooling cycle. As a result, the iComfort™-enabled thermostat will shutdown.	Open high pressure switch error count reached 5-strikes. System is shut down. The high pressure switch for HFC-410A will open at 590PSIG and close at 418PSIG. Confirm that the system is properly charged with refrigerant. Check condenser fan motor, TXV, indoor unit blower motor, stuck reversing valve or clogged refrigerant filter. Confirm that the outdoor unit is clean. The alarm clears after a power reset.

Table 7. Seven-Segment Display Alert Codes (continued)

Alert Codes	Alarm Description	Possible Causes and Clearing Alarm
E 414	The discharge line temperature is higher than the recommended upper limit of 279ºF.	Discharge line temperature is > 279ºF. Confirm that the system is properly charged with refrigerant. Check system operating pressures and compare to unit charging charts in installation manual. Confirm that the outdoor unit is clean. The alarm clears after the discharge temperature is < 225ºF.
E 415	The discharge line temperature has been consistently higher than the recommended upper limit of 279ºF.	Discharge line high temperature error count reached 5 strikes. Confirm that the system is properly charged with refrigerant. Check system operating pressures and compare to unit charging charts in installation manual. Confirm that the outdoor unit is clean. The alarm clears after the discharge temperature is < 225ºF. The alarm clears after a power reset.
E 416	The outdoor coil sensor is either open, short-circuited or the temperature is out of sensor range. As a result the outdoor unit control will not perform any defrost tempering.	Coil sensor being detected open or shorted, or temperature is out of coil sensor range. Outdoor unit control will not perform demand or time/temperature defrost operation. System will still heat or cool. Check the resistance of the coil sensor and compare to temperature resistance chart. Replace coil sensor if needed. The alarm clears when outdoor unit control detects proper coil sensor readings or after a power reset.
E 417	The outdoor unit discharge sensor is either open, short-circuited or the temperature is out of sensor range. As a result the outdoor unit control will not perform any defrost tempering.	Outdoor unit control detects open or shorted discharge sensor, or temperature that is out of discharge sensor range. Check the resistance of the discharge sensor and compare to temperature resistance chart - replace if needed. Reset by replacing the discharge sensor. This fault is detected by allowing the unit to run for 90 seconds before checking discharge sensor resistance. If the discharge sensor resistance is not within range after 90 seconds, the board will count one fault. After 5 faults, the board will lock out. Check for proper sensor reading and attachment to line. The alarm clears after a power reset.
E 418	There is a faulty **W** output circuit.	**W** terminal is energized **while in cooling mode**. Possible cause may be a stuck closed relay on the control, or something external to the control that is energizing W terminal when it should not be energized. Solution: Disconnect any wiring from the W terminal. If 24 volts is still on the terminal, then it is a stuck relay. If the 24 volts disappears, then there is a need to check any of the wires hooked up to the W terminal.
E 419	The **W** output on the outdoor unit has reported more than 5 errors. As a result, the system has shutdown the outdoor unit.	The **W** output (code E418) on the outdoor unit has reported more than 5-strikes. As a result, the system has shut-down the outdoor unit. Disconnect thermostat lines from W and verify 24VAC on the W. If 24VAC is present, replace the control.
E 420	The heat pump defrost cycle has taken more than 20 minutes to complete.	Defrost cycle lasts longer than 20 minutes. This alarm is applicable with non-communicating heat pump system only. Check heat pump defrost operation. The alarm is cleared after the "W1" signal is removed.
E 421	The **W** output terminal on the outdoor unit is not wired correctly.	1) Voltage sensed on **W** output terminal when **Y1** out is deactivated. 2) There is conduction between pins 1 and 2 of the microcontroller that makes it look like **W** input is energized any time the high pressure switch input is energized. (Replace control) Check heat pump operation. Cleared when **W1** signal is removed. Applicable only in communicating mode with non-communicating heat pump. The alarm clears after issue is corrected.

NOTE — Additional codes may be found in iComfort®-enabled thermostat manual.

Table 8. Outdoor Control Seven-Segment Unit Status Displays

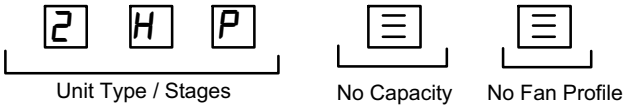
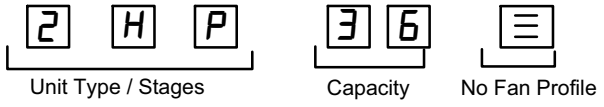
Description	Example of Display
Power up / Reset: Unit type and number of stages is displayed. Verify configuration with information published on the unit nameplate. If the information is incorrect, refer to flow chart *Manually Configuration of Unit Type* to re-configure control.	1 Stage AC: **1AC** 2 Stage AC: **2AC** 1 Stage AC: **1HP** 1 Stage AC: **2HP** POWER-UP 7-SEGMENT DISPLAY STRING 
Power up / Reset following display of self-discovered configuration: Unit nominal capacity is displayed, if not programmed then three horizontal lines and the decimal point are displayed for 2 seconds. 	Power up nominal capacity display of an XP21-036: **36** POWER-UP 7-SEGMENT DISPLAY STRING 

Table 8. Outdoor Control Seven-Segment Unit Status Displays (*continued*)

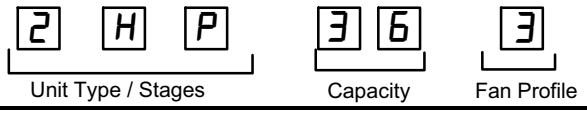
Description	Example of Display
Power up / Reset following display of nominal capacity: Fan Profile code. (a single or two digit number) See table 5 for applicable fan RPM profile.	Displays the number of the selected fan profile. **3** POWER-UP 7-SEGMENT DISPLAY STRING 
Idle Mode: Decimal point blinks at 1 Hz	Idle Mode: Decimal point blinks at 1 Hz (0.5 second on, 0.5 second off). Display OFF.
Soft Disable Mode: Top and bottom horizontal line and decimal point flash at 1 Hz. If indoor or outdoor control displays Soft Disable code: 1) Confirm proper wiring between all devices (thermostat, indoor and outdoor). 2) Cycle power to the control that is displaying the Soft Disable code. 3) Put the room thermostat through Setup. 4) Go to Setup/System Devices/Thermostat/Edit/push Reset. 5) Go to Setup/System Devices/Thermostat/Edit/push Reset All. If the room thermostat detects a new device or a device that is not communicating, it sends a Soft Disable. When this occurs, Alarm 10 is activated and the room thermostat sends a Soft Disable command to the offending device on the bus (outdoor control, IFC, AHC, EIM or Damper Control Module).	Soft Disable Mode: Top and bottom horizontal line and decimal point flash at 1 Hz (0.5 second on, 0.5 second off). The iComfort control in Soft Disable Mode is indicated by the following: • On AHC, IFC and outdoor controls, Soft Disable Mode is indicated by flashing double horizontal lines on the 7-segment display. • On the Damper Control Module and EIM, the green LED will blink 3 seconds on and 1 second off.
O.E.M test mode	All segments flashing at 2 Hz (unless error is detected) Note: Control should be replace.
Anti-Short Cycle Delay	Middle line shall blink at 1 Hz for 2 seconds, followed by a 2 second display of the rounded up number of minutes left in the timer (2 minutes 1 second shall be displayed as “3”). The Anti-Short Cycle Delay time remaining is displayed whenever the delay is active.
Cooling Stage: Shows what stage of cooling is currently operating.	Following string is repeated if second stage cooling is active with outdoor fan speed set at 700 RPM. Note: **A** - If available, displays outdoor ambient temperature. C 2 pause F 7 0 0 pause
Heat Pump Stage: Shows what stage of heat pump is currently operating.	Following string is repeated if first stage heat pump is active with outdoor fan speed set at 600 RPM. Note: **A** - If available, displays outdoor ambient temperature. H 1 pause F 6 0 0 pause
Defrost Mode: Shown only while in an active defrost.	Following string is repeated if defrost is active while unit was in 1st stage heat pump heating mode: d F pause H 1 pause
Dehumidification mode: Shows that the unit is providing dehumidification instead of straight cooling.	Following string is repeated if dehumidification is active with outdoor fan speed set at 225 RPM: d pause F 2 2 5 pause
Diagnostic recall: Shows the last 10 stored diagnostic error codes.	If first error is E250, second E231: E pause 2 5 0 pause E pause 2 3 1 Next codes (up to 10) are show using same method. If there is no error codes stored: **E** pause **0 0 0**
Fault Memory clear	After the fault memory is cleared following string is displayed with 0.5 seconds character on/off time: 0 0 0 0 pause
Active error in outdoor control Idle mode: Shown all active error(s) codes.	Following string is repeated if Error E125 and E201 are present: E 1 2 5 pause E 2 0 1
Active error in run mode: Shown current status and all active error(s) codes.	Following string is repeated if Error E311 is present while blower speed at 700RPM: F 7 0 0 pause E 3 1 1
Outdoor Ambient Temperature (OAT): Any time OAT is sensed in operating range value is displayed if unit is in diagnostic and non-diagnostic modes.	Following string is repeated if second stage cooling is active with outdoor fan speed set at 650 RPM and OAT is 104ºF: C 2 pause F 6 5 0 pause A 1 0 4 pause

Table 8. Outdoor Control Seven-Segment Unit Status Displays (*continued*)

Description	Example of Display
Outdoor Coil Temperature (OCT): Any time OCT is sensed in operating range value is displayed if unit is in diagnostic mode.	Following string is repeated if 2nd stage heat is active with outdoor fan speed set at 550 RPM and OCT is 25º F: H 2 pause F 5 5 0 pause c 2 5 pause
Discharge Line Temperature (DIS): Any time DIS is sensed in operating range value is displayed if unit is in diagnostic mode.	Following string is repeated if 2nd stage cooling is active with outdoor fan speed set at 650 RPM and DIS is 185º F: C 2 pause F 6 5 0 pause d 1 8 5 pause

Table 9. Error Recall Menu Options

Error Code Recall Mode (Note - control must be in idle mode)		
Solid	E	To enter error code recall mode, push and hold button until solid **E** appears, then release button. Control will display up to 10 error codes stored in memory. If E000 is displayed, there are no stored error codes.
Solid	- - -	To exit error code recall mode push and hold button until solid three horizontal bars appear, then release button. Note - Error codes are not cleared.
Solid	c	To clear error codes stored in memory, continue to hold push button while the 3 horizontal bars are displayed. Release push button when solid **c** is displayed.
Blinking	c	Hold push button for three seconds to confirm command to delete codes. Error codes are cleared.

**Note once the error history is deleted it cannot be recovered. After the history is deleted, the unit will reset itself.*

Table 10. Field Test and Program Menu Options

Display	Display and action (normal operation)	Display and action (configuration and test mode)
Power -UP	Display string displays > number of unit stages > pause > AC or HP unit > pause > unit capacity in BTUs > pause > RPM setting of outdoor fan. If 3 horizontal bars are displayed during any sequence of this string, it indicates that the specific parameter is not configured.	
-	Idle mode — decimal blinks at 1 Hertz > 0.5 second ON, 0.5 second OFF	
A	A in the display string represents the ambient temperature in °F at the outdoor sensor on the outdoor unit.	Enter A test mode: Display will string active error code(s) E, ambient A, coil c and discharge d temperature in °F at outdoor unit.
d	d - dehumidification mode string > d pause> F (Outdoor fan) **RPM** > pause > A (ambient temp displayed) > pause > repeat mode. **IMPORTANT**: On 2-stage unit R to DS link must be cut and correct RPM outdoor fan profile selected for outdoor fan to operate at lower RPM speed when EDA is active.	Enter d test mode: Forced defrost. (System must be configured as HP. Unit must be running in heating mode). Test defrost will terminate when coil terminate temperature is reached (or 10 seconds, whichever is longer) or 14 minutes if coil temperature remains below terminate temperature or by pushing button down for less than 2 seconds. Enter A test mode: Display will string active error codes E, ambient A, coil c and discharge d temperature in °F at outdoor unit.
d F	**d F** displays when system is in defrost mode - unit must be running in heating mode, outdoor ambient must be below 65°F and outdoor coil temperature must be below defrost termination temperature.	
F	F in the display string indicates RPM setting output on terminals PWM and com (used with EBM motors). RPM displayed does not apply to motor connected on ECM Y1 and ECM Y2.	Enter F test mode: Control outputs DC Voltage onto PWM and com terminals. Outdoor fan will cycle ON for 10 minutes at 490 RPM. To exit test - Push and hold button until three horizontal bars display. Release button, outdoor fan will cycle OFF. (Test DOES NOT output DC voltage to ECM Y1 and ECM Y2 terminals)
H 1	Heat stage 1 string display > pause > F outdoor fan RPM displayed > pause > A (ambient temperature displayed > pause > repeat mode.	
H2	Heat stage 2 string display > pause > F outdoor fan RPM displayed > pause > A ambient temperature displayed > pause > repeat mode.	
C 1	Cool stage 1 string display > pause > F outdoor fan RPM displayed > pause > A (ambient temperature displayed > pause > repeat mode.	
C2	Cool stage 2 string display > pause >F outdoor fan RPM displayed > pause > A (ambient temperature displayed > pause > repeat mode.	

Table 10. Field Test and Program Menu Options (*continued*)

Configuring Outdoor Fan Speed **(Note - Control must be in Idle Mode)**		
Display	**Code**	**Procedure**
Solid	PF	Release push button — Allows user to select outdoor fan RPM profile. **IMPORTANT**: New control may need to be manually configured to validate outdoor unit fan RPM setting is correct for unit capacity. Refer to RPM table on unit wiring diagram.
Blinking	PF	Push and hold button — Outdoor control will display a fan RPM profile 3 seconds. When the correct fan RPM profile is displayed, release button. Selected code will flash for a 10 second period. During that period, hold push button for 3 seconds to store code. Once code is stored control will automatically exit field test mode. If 10 second period expires or push button is held less than 3 seconds, control will automatically exit field test mode and go into idle mode without storing fan RPM profile. Repeat procedure to correct.
Configuring Unit Capacity **(Note - Control must be in Idle Mode)**		
Solid	PC	Release push button — Allows user to select Unit Capacity. **IMPORTANT**: Field replacement control may need to be manually configured to validate outdoor unit capacity. Refer to unit nameplate model number for capacity in 1,000 of BTUs. (18, 24, 30 ,36,42 48, 60)
Blinking	PC	Push and hold button — Control will display unit capacity numbe**r** 3 seconds. When the correct unit capacity number is displayed, release button. Selected code will flash for a 10 second period. During that period, hold push button for 3 seconds to store code. Once code is stored control will automatically exit *Field Test Mode.* If 10 second period expires or push button is held less than 3 seconds, control will automatically exit field test mode and go into idle mode without storing unit capacity Number. If this happens, configuring procedure must be repeated.

Display	**Code**	**Procedure**
Solid	Pt	Release push button — Allows user to select type and number of stages on outdoor unit.. **IMPORTANT**: Field replacement control may need to be manually configured to validate outdoor unit fan RPM setting is right for unit capacity. See RPM table on unit wiring diagram for proper RPM settings. Type and number of stages: 1AC, 2AC, 1HP, 2HP – AC – air conditioning and HP – Heat Pump
Blinking	Pt	Push and hold button — Control will display type and number of stages 3 seconds. When the correct type and number of stages is displayed, release button. Selected code will flash for a 10 second period. During that period, hold push button for 3 seconds to store code. Once code is stored control will automatically exit *field test mode.* If 10 second period expires or push button is held less than 3 seconds, control will automatically exit field test mode and go into idle mode without storing type and number of stages. If this happens, configuring procedure must be repeated.

Reconfiguring Outdoor Control using iComfort®-Enabled Thermostat

If any component of the HVAC system has been changed, e.g. replacing an outdoor sensor, reconfiguring the system will be required. To begin reconfiguring a system, press the **setup** tab. Note: Even though its in a communicating system, the fan profile will need to be set because the iComfort®-enabled thermostat does not know what the profile should be.

Refer to the iComfort®-enabled Thermostat Installer Setup Guide for configuration procedures.

Routine Maintenance

DEALER

Outdoor Unit

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 (may be flushed with a water hose). Ensure power is off before cleaning.
2. Outdoor unit fan motor is pre-lubricated and sealed. No further lubrication is needed.
3. Visually inspect all connecting lines, joints and coils for evidence of oil leaks.
4. Check all wiring for loose connections.
5. Check for correct voltage at unit (unit operating).
6. Check amp draw on outdoor fan motor.

   Motor Nameplate:_____ **Actual**:_____.
7. Inspect drain holes in coil compartment base and clean if necessary.

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

Outdoor Coil

NOTICE !

Failure to follow instructions will cause damage to the unit.

This unit is equipped with an aluminum coil. Aluminum coils may be damaged by exposure to solutions with a pH below 5 or above 9. The aluminum coil should be cleaned using potable water at a moderate pressure (less than 50psi). If the coil cannot be cleaned using water alone, Lennox recommends use of a coil cleaner with a pH in the range of 5 to 9. The coil must be rinsed thoroughly after cleaning.

In coastal areas, the coil should be cleaned with potable water several times per year to avoid corrosive buildup (salt).

It may be necessary to flush the outdoor coil more frequently if it is exposed to substances which are corrosive or which block airflow across the coil (e.g., pet urine, cottonwood seeds, fertilizers, fluids that may contain high levels of corrosive chemicals such as salts)

- Outdoor Coil — The outdoor coil may be flushed with a water hose.
- Outdoor Coil (sea coast) — Moist air in ocean locations can carry salt, which is corrosive to most metal. Units that are located near the ocean require frequent inspections and maintenance. These inspections will determine the necessary need to wash the unit including the outdoor coil. Consult your installing

contractor for proper intervals/procedures for your geographic area or service contract.

Indoor Unit

1. Clean or change filters.
2. Lennox blower motors are prelubricated and permanently sealed. No more lubrication is needed.
3. Adjust blower speed for cooling. Measure the pressure drop over the coil to determine the correct blower CFM. Refer to the unit information service manual for pressure drop tables and procedure.
4. *Belt Drive Blowers* - Check belt for wear and proper tension.
5. Check all wiring for loose connections.
6. Check for correct voltage at unit. (blower operating)
7. Check amp draw on blower motor.

   Motor Nameplate:_____ **Actual**:_____.

Indoor Coil

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

Start-Up and Performance Checklist

Customer _____ Address _____

Indoor Unit Model _____ Serial _____

Outdoor Unit Model _____ Serial _____

Notes: _____

START UP CHECKS

Refrigerant Type _____

Rated Load Amps _____ Actual Amps _____ Rated Volts _____ Actual Volts _____

Condenser Fan Full Load Amps _____ Actual Amps: _____

COOLING MODE

Suction Pressure: **Liquid Pressure:** _____

Supply Air Temperature: ___ Ambient **Temperature:** _____ Return Air: **Temperature:** ____

System Refrigerant Charge (Refer to manufacturer's information on unit or installation instructions for required subcooling and approach temperatures.)

Subcooling: Saturated Condensing Temperature (A) *minus* Liquid Line Temperature (B)	A	—	B	=	SUBCOOLING
Approach: Liquid Line Temperature (A) *minus* Outdoor Air Temperature (B)	A	—	B	=	APPROACH
Indoor Coil Temperature Drop (18 to 22°F) Return Air Temperature (A) *minus* Supply Air Temperature (B)	A	—	B	=	COIL TEMP DROP

Wiring Diagrams

Service technician will need to visually inspect the unit being serviced to determine which wiring diagram is applicable. Quick verification can usually be made by comparing the wiring diagram located on the unit access panel to the following diagrams.

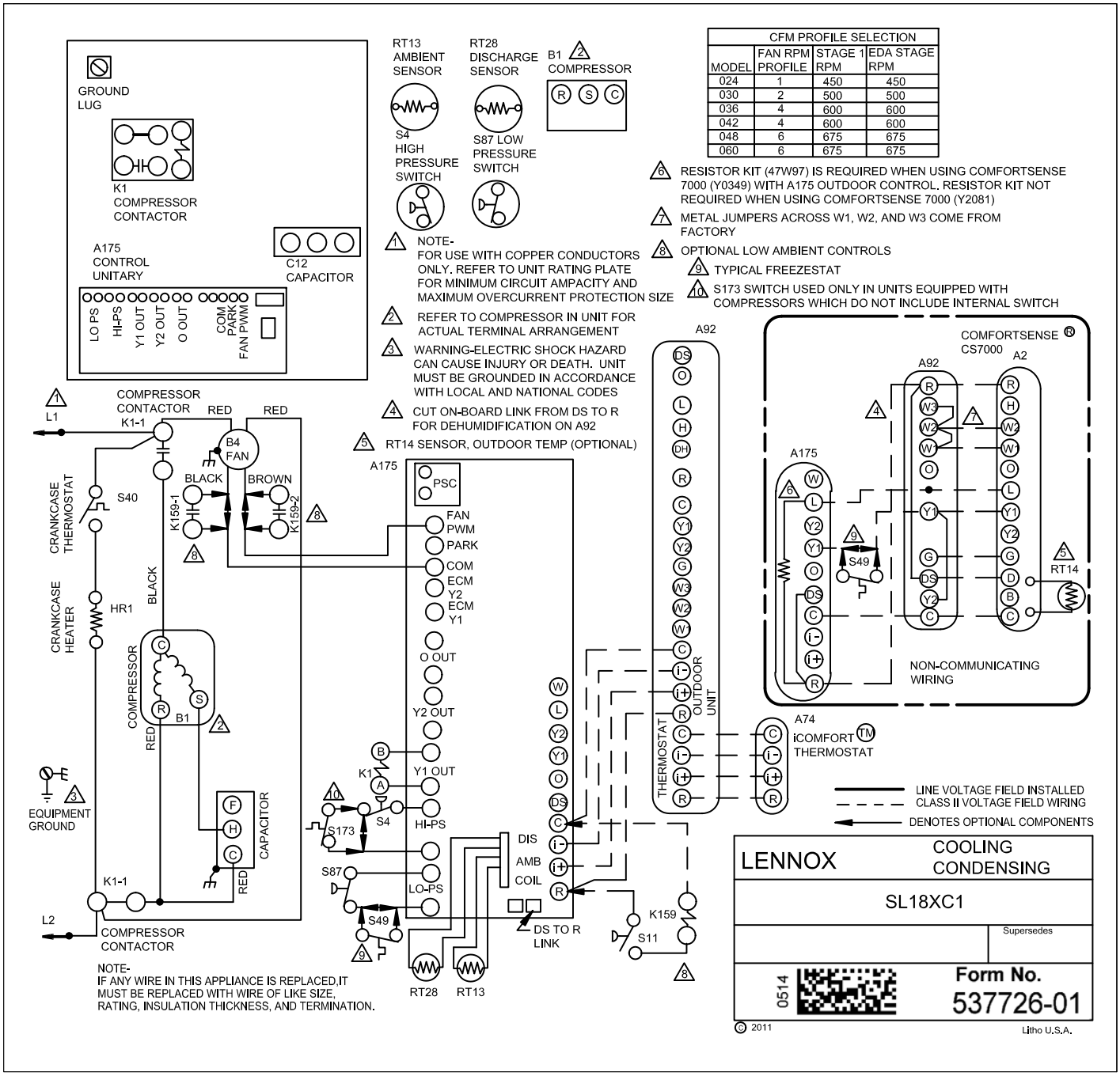
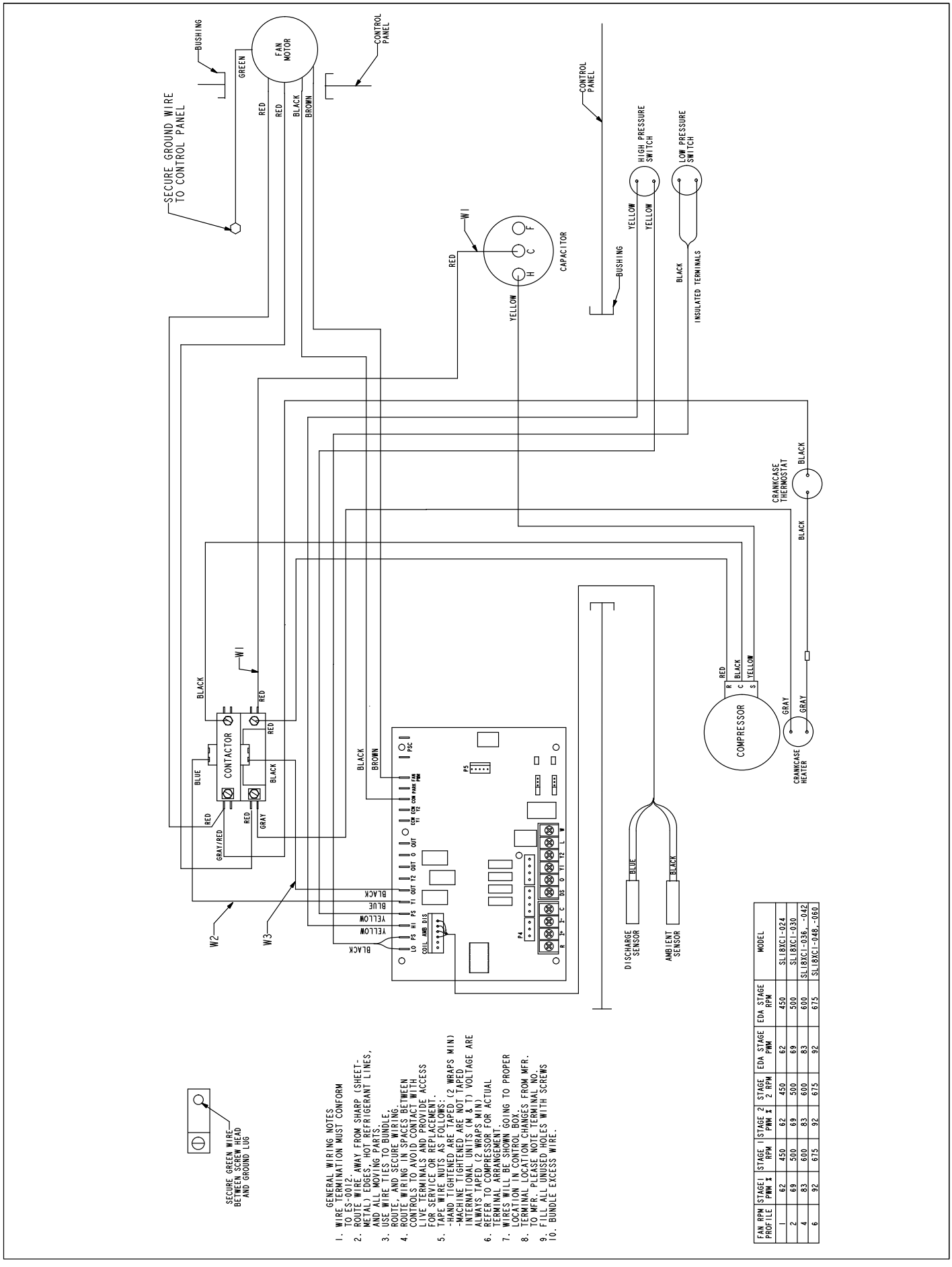


Figure 7. Typical Unit Wiring Diagram (SL18XC1-XXX-230-01)



GENERAL WIRING NOTES

1. WIRE TERMINATION MUST CONFORM TO ES-0012.
2. ROUTE WIRE AWAY FROM SHARP (SHEET-METAL) EDGES, HOT REFRIGERANT LINES, AND ALL MOVING PARTS.
3. USE WIRE TIES TO BUNDLE, ROUTE, AND SECURE WIRING.
4. ROUTE WIRING IN SPACES BETWEEN CONTROLS TO AVOID CONTACT WITH LIVE TERMINALS AND PROVIDE ACCESS FOR SERVICE OR REPLACEMENT.
5. TAPE WIRE NUTS AS FOLLOWS:
   -HAND TIGHTENED ARE TAPED (2 WRAPS MIN)
   -MACHINE TIGHTENED ARE NOT TAPED
   INTERNATIONAL UNITS (M & T) VOLTAGE ARE ALWAYS TAPED (2 WRAPS MIN)
6. REFER TO COMPRESSOR FOR ACTUAL TERMINAL ARRANGEMENT.
7. WIRES WILL BE SHOWN GOING TO PROPER LOCATION IN CONTROL BOX.
8. TERMINAL LOCATION CHANGES FROM MFR. TO MFR. PLEASE NOTE TERMINAL NO.
9. FILL ALL UNUSED HOLES WITH SCREWS
10. BUNDLE EXCESS WIRE.

FAN RPM PROFILE	STAGE1 PWM %	STAGE1 RPM	STAGE 2 PWM %	STAGE 2 RPM	EDA STAGE PWM	EDA STAGE RPM	MODEL
1	62	450	62	450	62	450	SL18XC1-024
2	69	500	69	500	69	500	SL18XC1-030
4	83	600	83	600	83	600	SL18XC1-036,-042
6	92	675	92	675	92	675	SL18XC1-048,-060

Figure 8. Typical Factory Wiring Diagram (SL18XC1-XXX-230-01)

Load Shed Wiring

Information in this note shows the proper application and interface wiring of utility load control devices to Lennox iComfort®-enabled outdoor units installed on iComfort®-enabled communicating thermostat systems.

PREFERRED WIRING (OUTDOOR CONTROL - 103369-03 AND LATER)

1. **Utility Load Shedding Mode ACTIVATED (Utility Cycled Unit OFF)** – The normally closed set of contacts in the utility load control receiver "open". This removes 24VAC from the coil of the field-provided relay (catalog # 69J79). The relay contacts close (terminal **7** to terminal **2**), completing the circuit between terminals **R** and **L** on the outdoor control. This 24VAC input to terminal **L** activates the load shedding mode in the outdoor control and the outdoor unit will be cycled **OFF**. The 7-Segment display on the outdoor control will display a load shedding alert code **E600** and an alert will appear on the display of the iComfort Wi-Fi® thermostat. If the customer has selected the option to be notified when an alert occurs, the customer will be notified by email when the alert occurs.
2. **Utility Load Shedding Mode DEACTIVATED (Normal Equipment Operation)** – When load shedding not required, the contacts in the utility load control receiver are closed. This provides 24VAC to the coil of the field provided relay (catalog # 69J79).The relay contacts **OPEN** (terminal **7** to terminal **2**) removing 24VAC from the **L** terminal on the outdoor control. This deactivates the load shedding mode in the outdoor control. The outdoor unit will return to normal operation and alert code will clear.

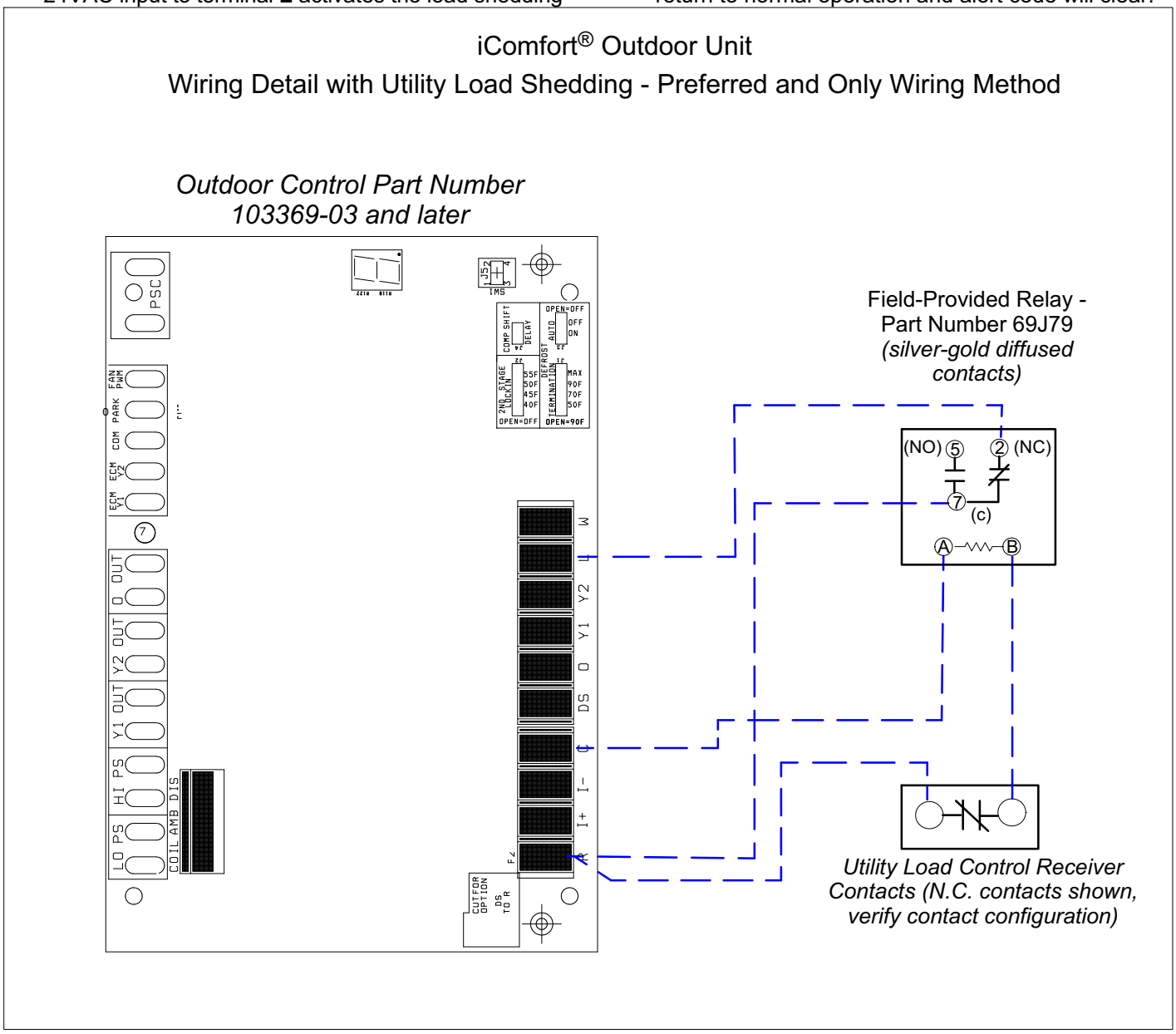


Figure 9. Preferred Method - Outdoor Control - 103369-03 and later

Unit Sequence of Operations

The following figures illustrated the overall unit sequence of operations along with various pressure switches and temperature sensor operations. The figures also illustration the use of the compressor anti-short cycle function in relations to unit Status, Fault and Lockout LED Codes system operations interaction.

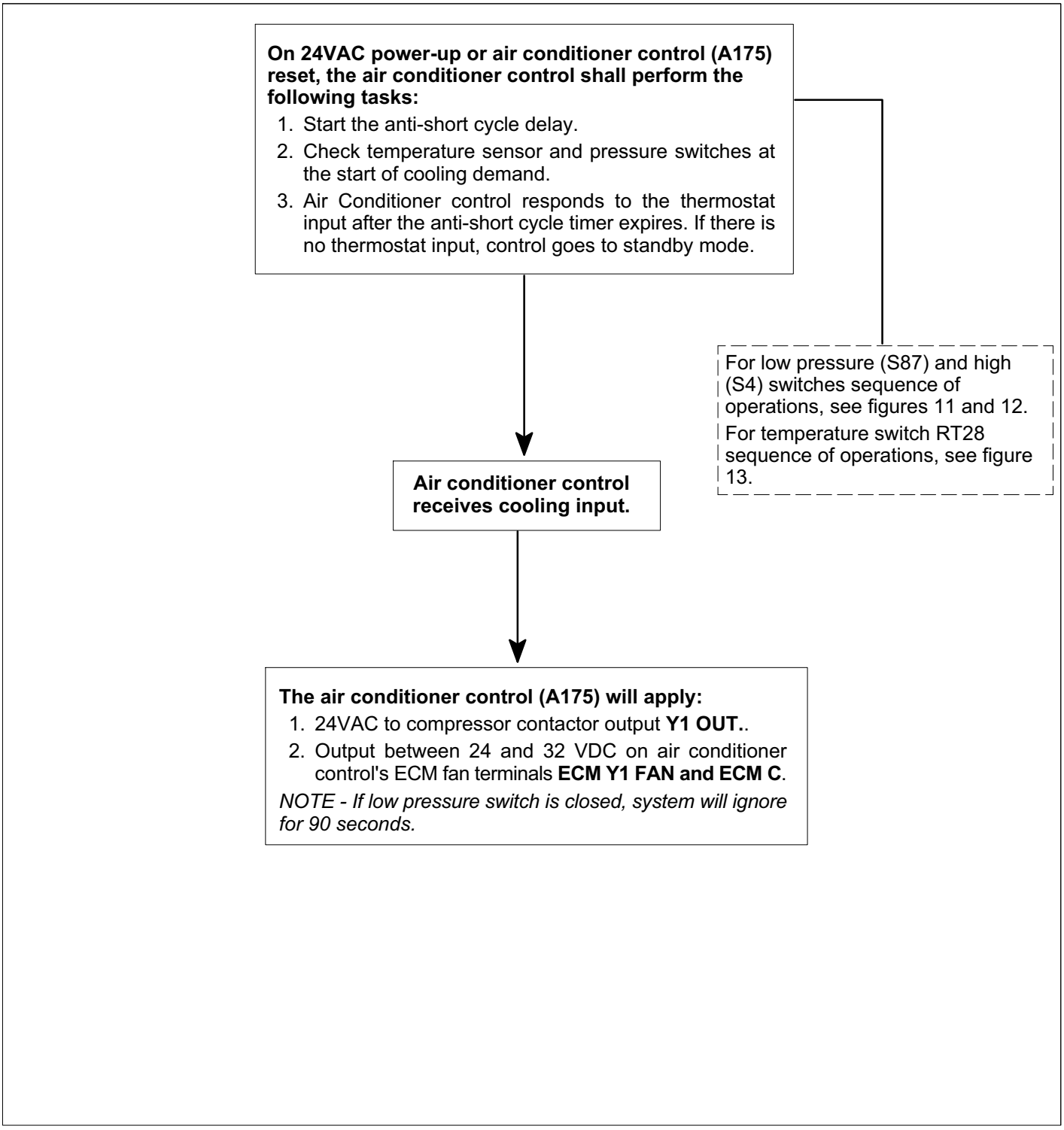


Figure 10. Single-Stage Cooling Unit Sequence of Operation

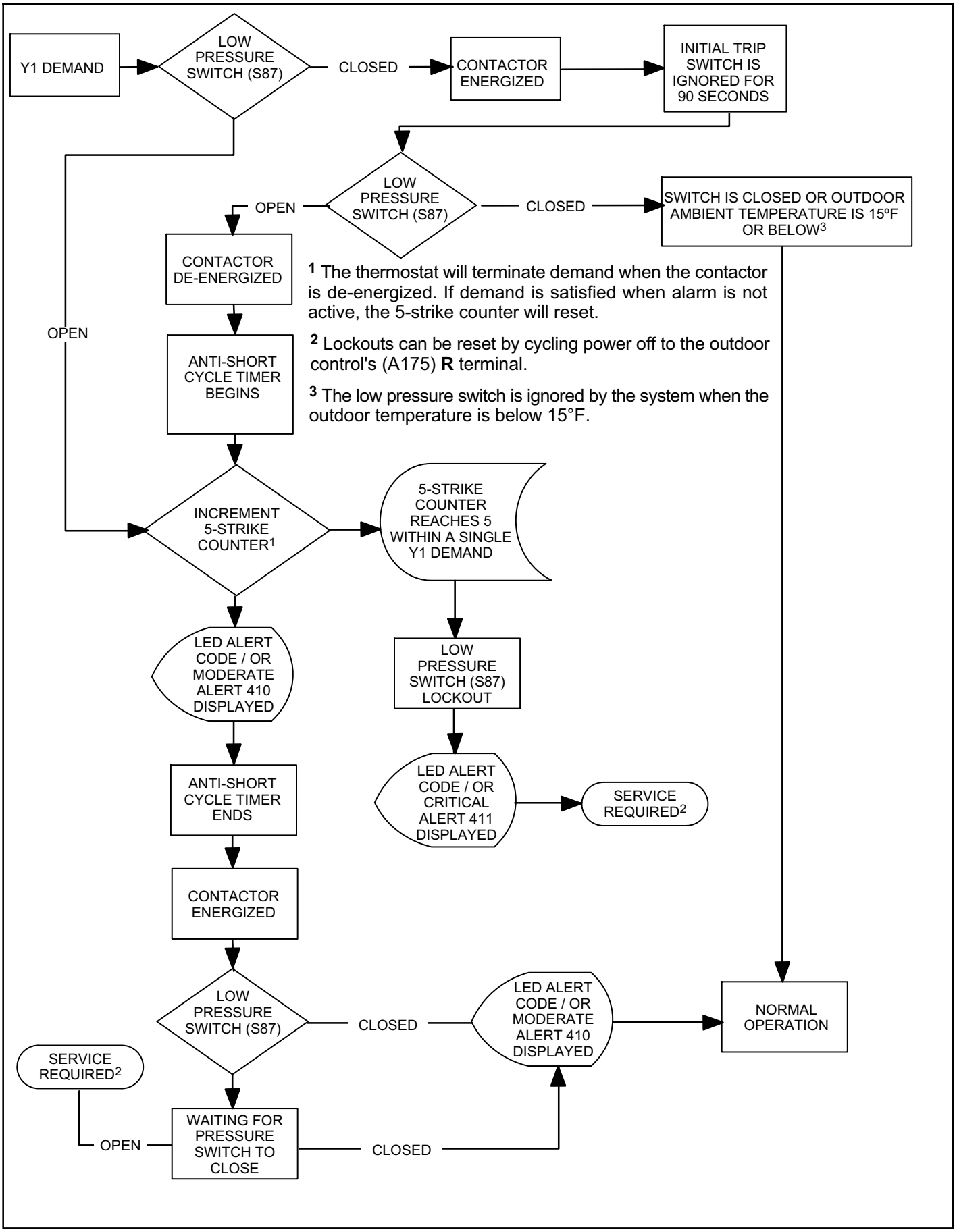


Figure 11. Low Pressure Switch (S87) Sequence of Operation (All Versions)

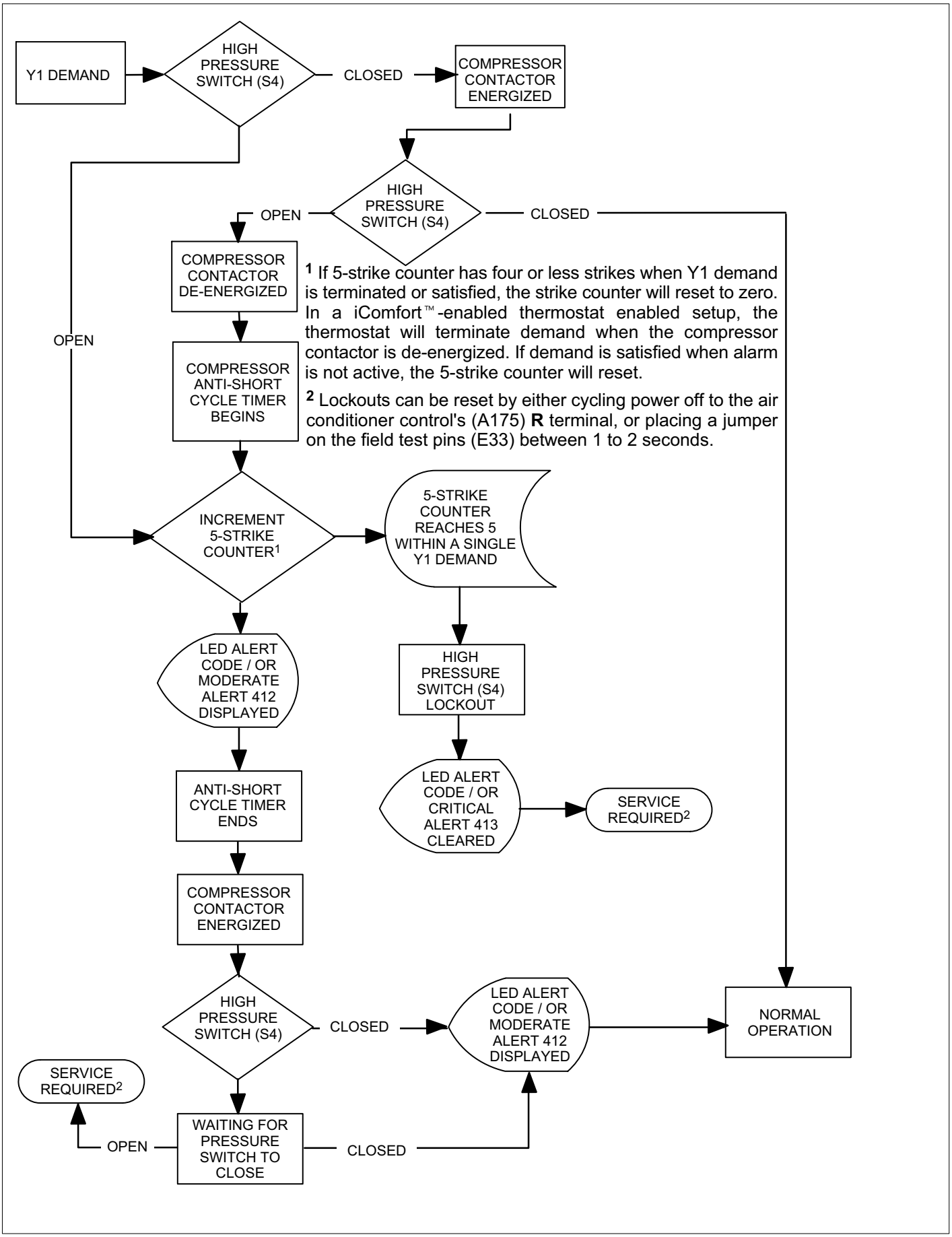


Figure 12. High Pressure Switch (S4) Sequence of Operation

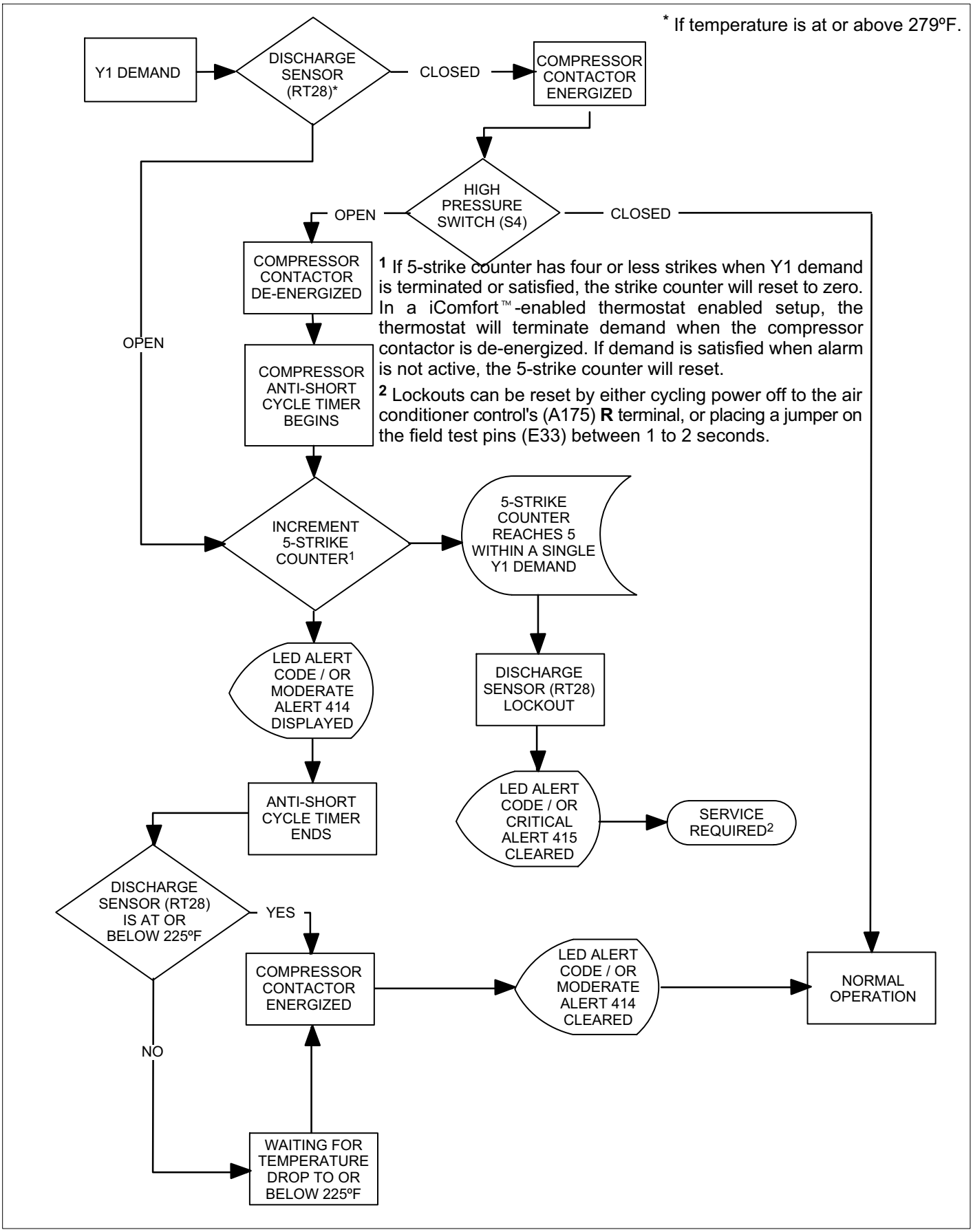
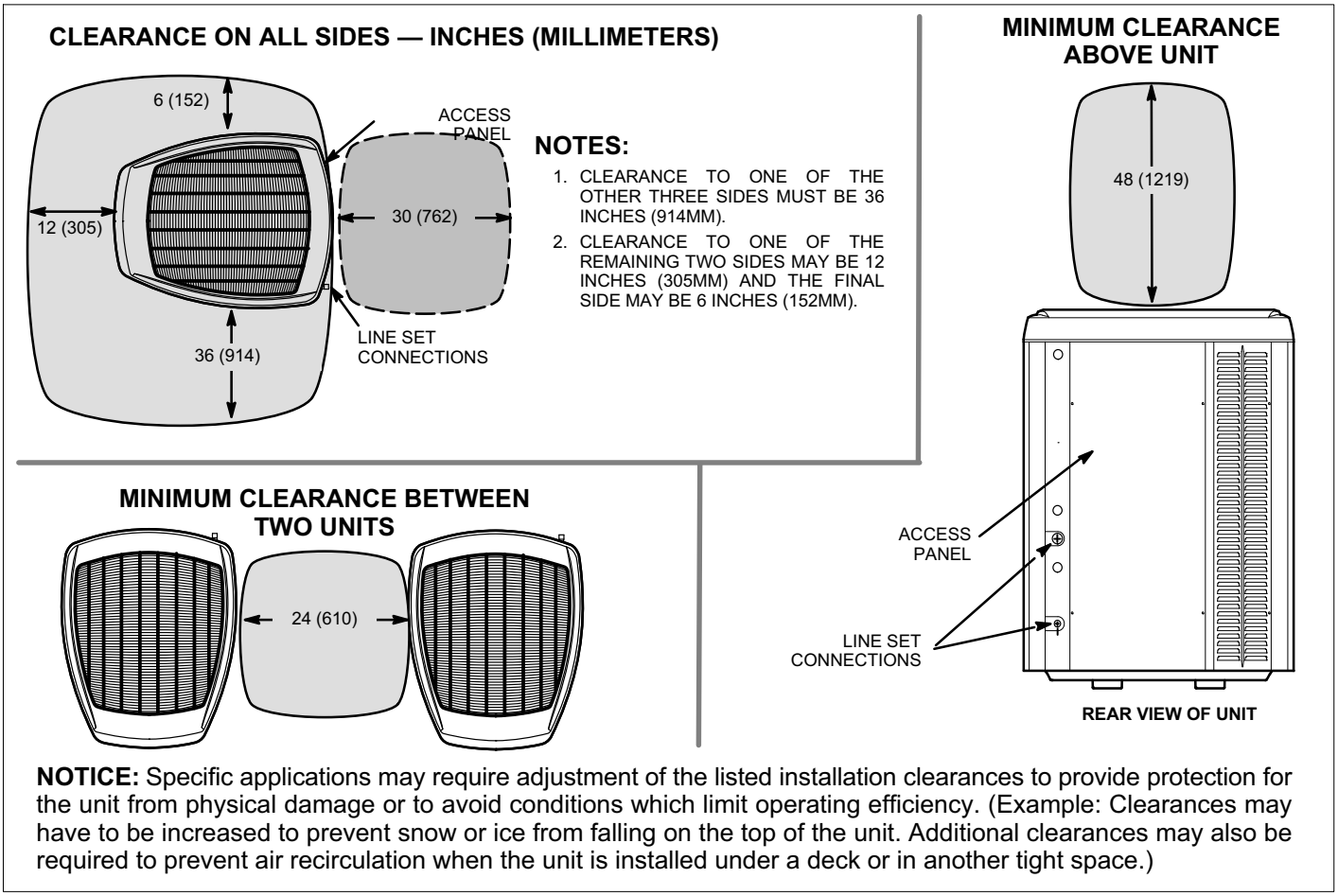


Figure 13. High Discharge Temperature Sensor (RT28) Sequence of Operation

IIII. INSTALLATION



NOTICE: Specific applications may require adjustment of the listed installation clearances to provide protection for the unit from physical damage or to avoid conditions which limit operating efficiency. (Example: Clearances may have to be increased to prevent snow or ice from falling on the top of the unit. Additional clearances may also be required to prevent air recirculation when the unit is installed under a deck or in another tight space.)

Figure 14. Installation Clearances

Unit Placement

⚠ CAUTION

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

See *Unit Dimensions* on page 3 for sizing mounting slab, platforms or supports. Refer to figure 14 for mandatory installation clearance requirements.

POSITIONING CONSIDERATIONS

Consider the following when positioning the unit:

- Some localities are adopting sound ordinances based on the unit's sound level registered from the adjacent property, not from the installation property. 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. For proper placement of unit in relation to a window see the provided illustration in figure 15, detail A.

PLACING UNIT ON SLAB

When installing unit at grade level, the top of the slab should be high enough above grade so that water from higher ground will not collect around the unit. The slab should have a slope tolerance as described in figure 15, detail B.

NOTE — *If necessary for stability, anchor unit to slab as described in figure 16, detail D.*

ELEVATING THE UNIT

Units are outfitted with elongated support feet as illustrated in figure 16, detail C.

If additional elevation is necessary, raise the unit by extending the height of the unit support feet. This may be achieved by using a 2 inch (50.8mm) Schedule 40 female threaded adapter.

The specified coupling will fit snuggly into the recessed portion of the feet. Use additional 2 inch (50.8mm) Schedule 40 male threaded adaptors which can be threaded into the female threaded adaptors to make additional adjustments to the level of the unit.

NOTE — *Keep the height of extenders short enough to ensure a sturdy installation. If it is necessary to extend further, consider a different type of field-fabricated framework that is sturdy enough for greater heights.*

STABILIZING UNIT ON UNEVEN SURFACES

⚠ IMPORTANT

Unit Stabilizer Bracket Use (field-provided):

Always use stabilizers when unit is raised above the factory height. (Elevated units could become unstable in gusty wind conditions).

Stabilizers may be used on factory height units when mounted on unstable an uneven surface.

With unit positioned at installation site, perform the following:

1. Remove two side louvered panels to expose the unit base.
2. Install the brackets as illustrated in figure 16, detail D using conventional practices.
3. Replace the panels after installation is complete.

ROOF MOUNTING

Install the unit a minimum of 6 inches (152 mm) above the roof surface to avoid ice build-up around the unit. Locate the unit above a load bearing wall or area of the roof that can adequately support the unit. Consult local codes for rooftop applications.

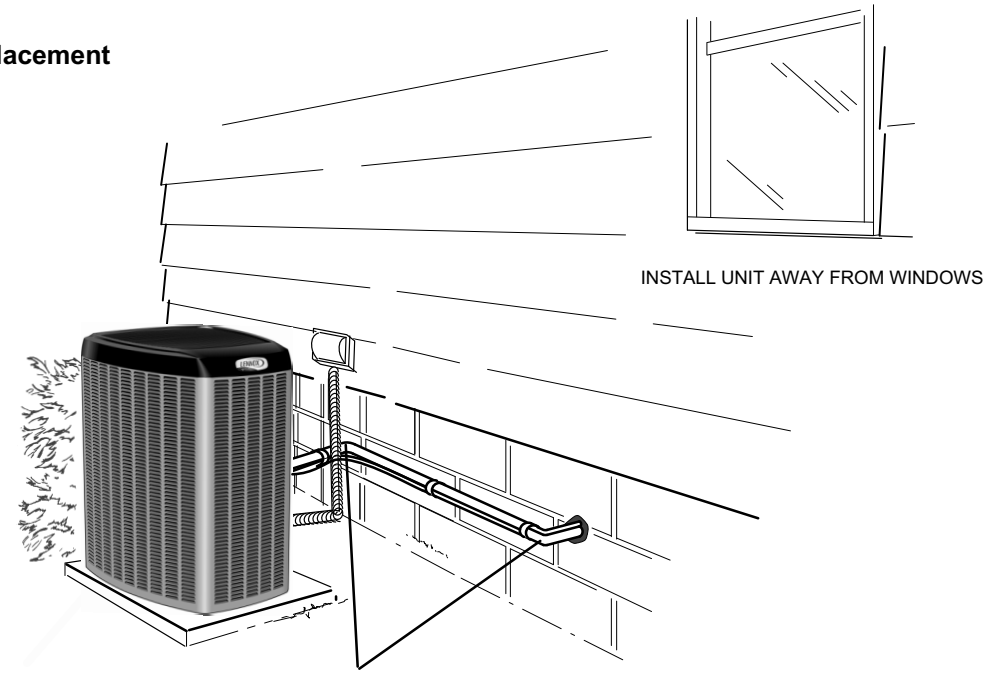
NOTICE

Roof Damage!

This system contains both refrigerant and oil. Some rubber roofing material may absorbed oil and cause the rubber to swell when it comes into contact with oil. The rubber will then bubble and could cause leaks. Protect the roof surface to avoid exposure to refrigerant and oil during service and installation. Failure to follow this notice could result in damage to roof surface.

DETAIL A

Outside Unit Placement



DETAIL B

Slab Mounting at Ground Level

INSTALL UNIT LEVEL OR, IF ON A SLOPE, MAINTAIN SLOPE TOLERANCE OF 2 DEGREES (OR 2 INCHES PER 5 FEET [50 MM PER 1.5 M]) AWAY FROM BUILDING STRUCTURE.

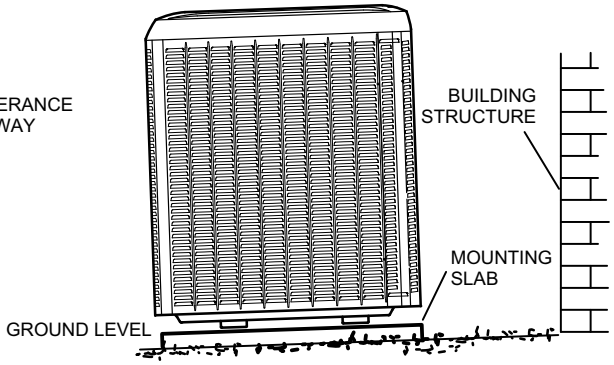
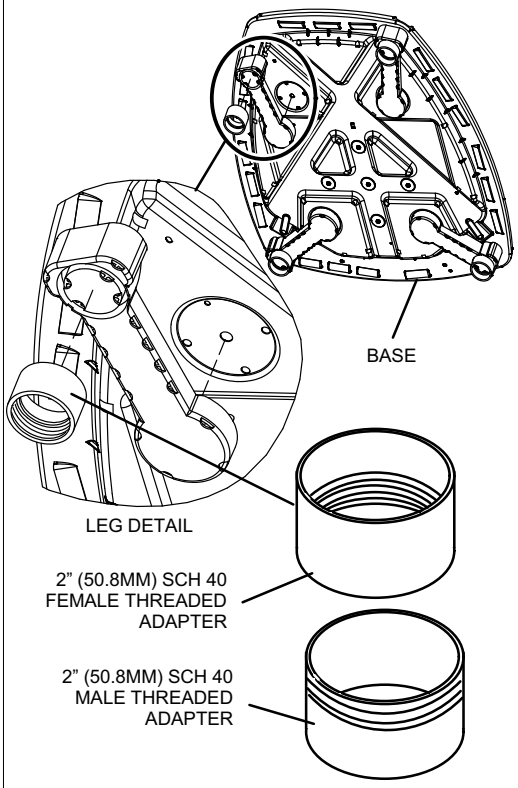


Figure 15. Placement, Slab Mounting and Stabilizing Unit

DETAIL C

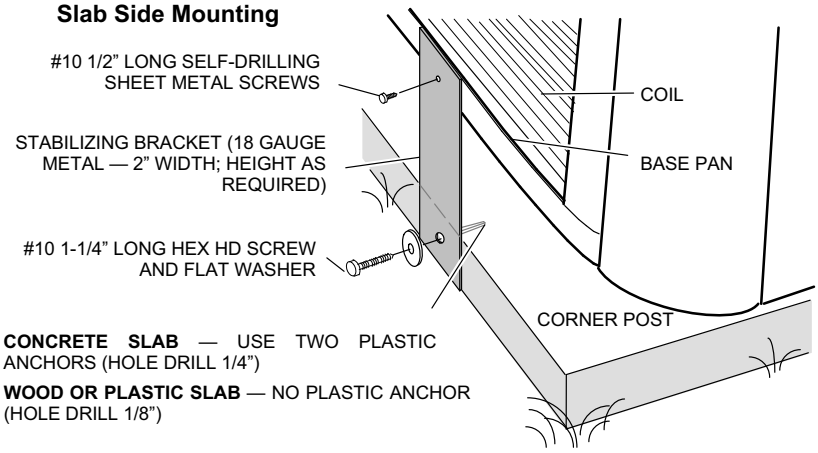


Use additional 2” SCH 40 male threaded adapters which can be threaded into the female threaded adapters to make additional adjustments to the level of the unit.

Elevated Slab Mounting using Feet Extenders

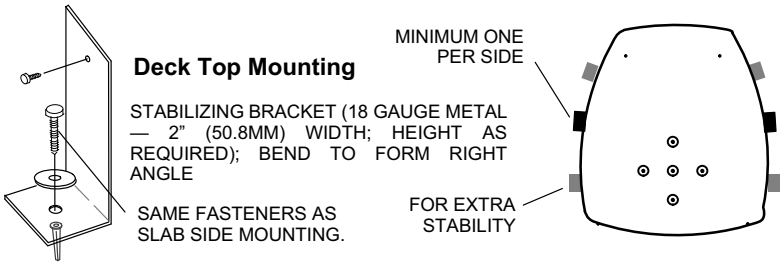
DETAIL D

Slab Side Mounting



CONCRETE SLAB — USE TWO PLASTIC ANCHORS (HOLE DRILL 1/4”)

WOOD OR PLASTIC SLAB — NO PLASTIC ANCHOR (HOLE DRILL 1/8”)



Deck Top Mounting

STABILIZING BRACKET (18 GAUGE METAL — 2” (50.8MM) WIDTH; HEIGHT AS REQUIRED); BEND TO FORM RIGHT ANGLE

SAME FASTENERS AS SLAB SIDE MOUNTING.

ONE BRACKET PER SIDE (MIN.); FOR EXTRA STABILITY, TWO BRACKETS PER SIDE, 2” (50.8MM) FROM EACH CORNER.

Stabilizing Unit on Uneven Surfaces

IMPORTANT — To help stabilize an outdoor unit, some installations may require strapping the unit to the pad using brackets and anchors commonly available in the marketplace.

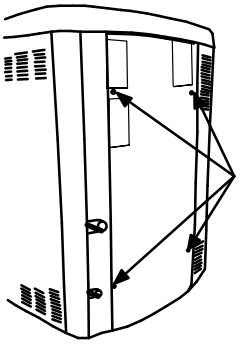
Figure 16. Placement, Slab Mounting and Stabilizing Unit

PANELS

ACCESS AND LOUVERED

ACCESS PANEL REMOVAL

Removal and reinstallation of the access panel is as illustrated.



REMOVE 4 SCREWS TO REMOVE PANEL FOR ACCESSING COMPRESSOR AND CONTROLS.

POSITION PANEL WITH HOLES ALIGNED; INSTALL SCREWS AND TIGHTEN.

⚠ WARNING

To prevent personal injury, or damage to panels, unit or structure, be sure to observe the following:

While installing or servicing this unit, carefully stow all removed panels out of the way, so that the panels will not cause injury to personnel, nor cause damage to objects or structures nearby, nor will the panels be subjected to damage (e.g., being bent or scratched).

While handling or stowing the panels, consider any weather conditions, especially windy conditions, that may cause panels to be blown around and battered.

IMPORTANT — Do not allow panels to hang on unit by top tab. Tab is for alignment and not designed to support weight of panel.

PANEL SHOWN SLIGHTLY ROTATED TO ALLOW TOP TAB TO EXIT (OR ENTER) TOP SLOT FOR REMOVING (OR INSTALLING) PANEL.

LOUVERED PANEL REMOVAL

Remove the louvered panels as follows:

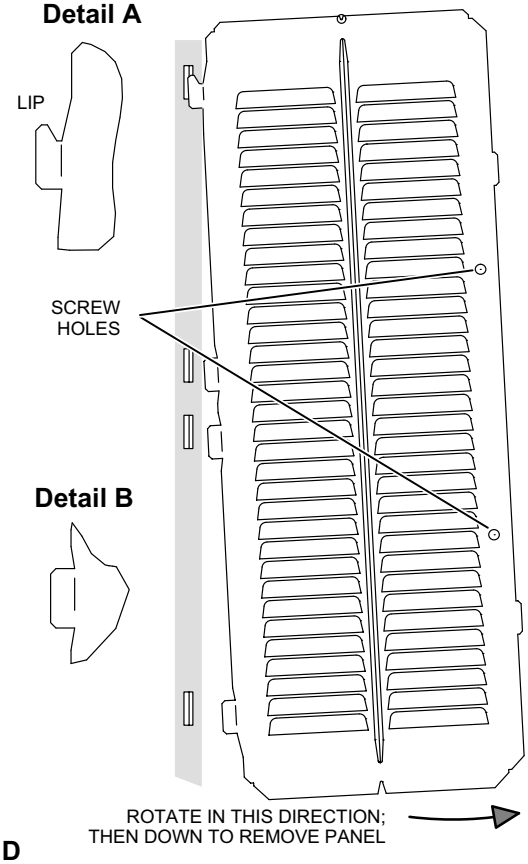
1. Remove two screws, allowing the panel to swing open slightly.
2. Hold the panel firmly throughout this procedure. Rotate bottom corner of panel away from hinged corner post until lower three tabs clear the slots as illustrated in **detail B.**
3. Move panel down until lip of upper tab clears the top slot in corner post as illustrated in **detail A**.

LOUVERED PANEL INSTALLATION

Position the panel almost parallel with the unit as illustrated in **detail D** with the screw side as close to the unit as possible. Then, in a continuous motion:

1. Slightly rotate and guide the lip of top tab inward as illustrated in **detail A** and **C**; then upward into the top slot of the hinge corner post.
2. Rotate panel to vertical to fully engage all tabs.
3. Holding the panel's hinged side firmly in place, close the right-hand side of the panel, aligning the screw holes.
4. When panel is correctly positioned and aligned, insert the screws and tighten.

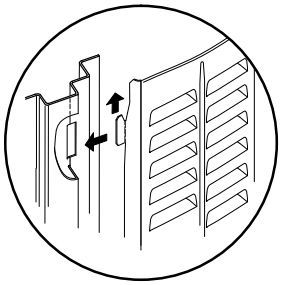
Detail A



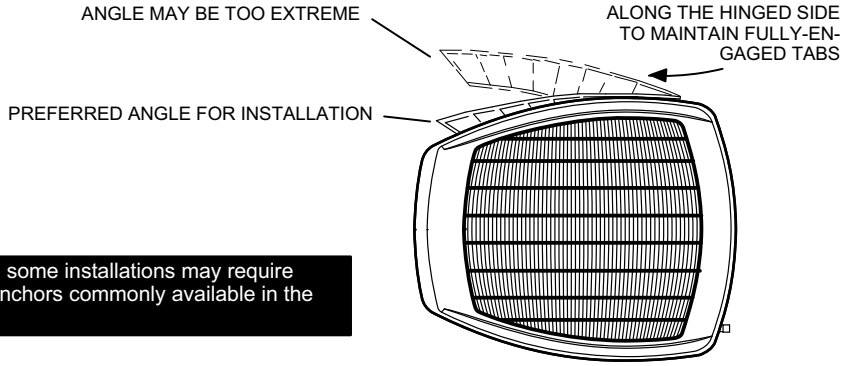
Detail B

Detail C

MAINTAIN MINIMUM PANEL ANGLE (AS CLOSE TO PARALLEL WITH THE UNIT AS POSSIBLE) WHILE INSTALLING PANEL.



Detail D



IMPORTANT — To help stabilize an outdoor unit, some installations may require strapping the unit to the pad using brackets and anchors commonly available in the marketplace.

Figure 17. Removing and Installing Panels

⚠ IMPORTANT

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

⚠ WARNING

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.

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

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).

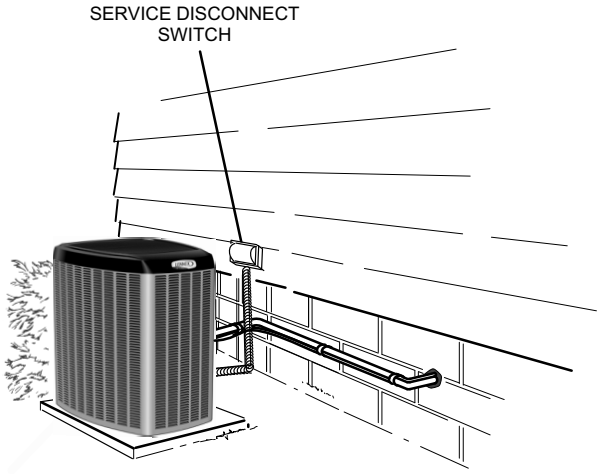
Refer to the furnace or blower coil installation instructions for additional wiring application diagrams and refer to unit nameplate for minimum circuit ampacity and maximum overcurrent protection size.

24VAC TRANSFORMER

Use the transformer provided with the furnace or air handler for low-voltage control power (24VAC - 40 VA minimum)

1 SIZE CIRCUIT AND INSTALL DISCONNECT SWITCH

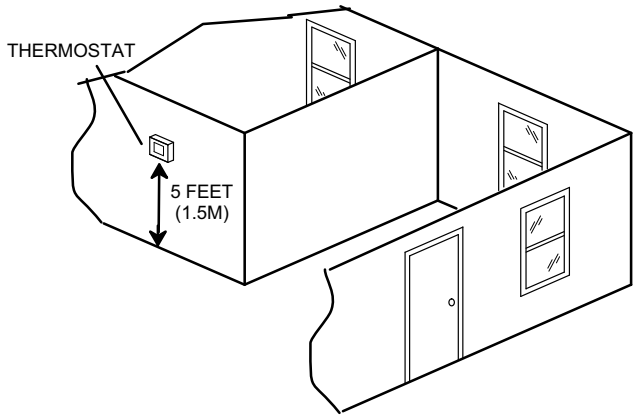
Refer to the unit nameplate for minimum circuit ampacity, and maximum fuse or circuit breaker (HACR per NEC). Install power wiring and properly sized disconnect switch.



NOTE — Units are approved for use only with copper conductors. Ground unit at disconnect switch or to an earth ground.

2 INSTALL THERMOSTAT

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



NOTE — 24VAC, Class II circuit connections are made in the control box.

3 ROUTE CONTROL WIRES — NON-COMMUNICATING

Install low voltage control wiring from outdoor to indoor unit and from thermostat to indoor unit as illustrated. See figures 18 and 19 for typical configurations.

A Run 24VAC control wires through hole with grommet.

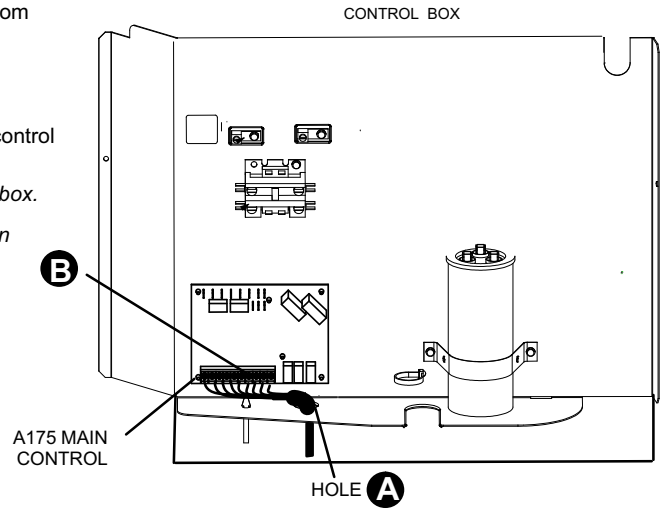
B Make 24VAC control wire connections to air conditioner control (A175).

NOTE — Do not bundle any excess 24VAC control wires inside control box.

NOTE — Wire tie provides low voltage wire strain relief and to maintain separation of field installed low and high voltage circuits.

NOTE — For proper voltages, select thermostat wire (control wires) gauge per table below.

WIRE RUN LENGTH	AWG#	INSULATION TYPE
LESS THAN 100' (30 METERS)	18	TEMPERATURE RATING
MORE THAN 100' (30 METERS)	16	35ºC MINIMUM.



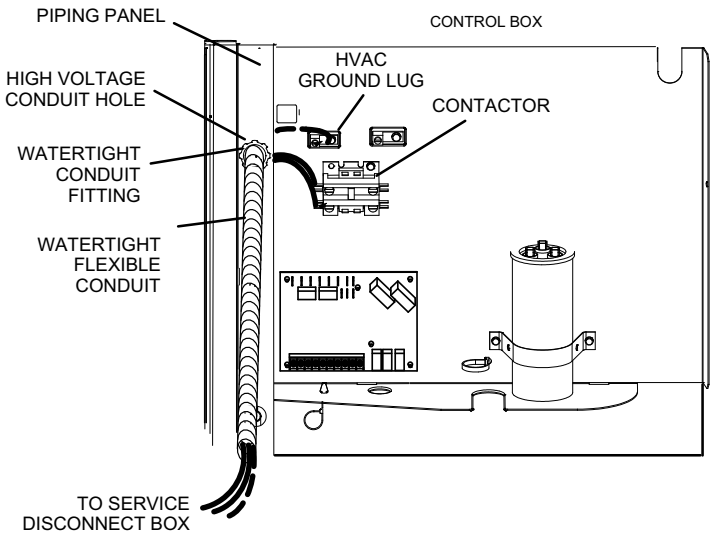
ROUTE CONTROL WIRES — COMMUNICATING

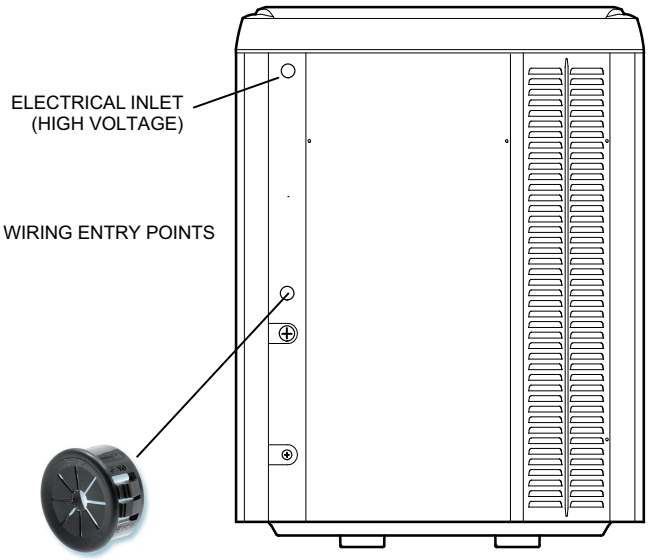
Maximum length of wiring (18 gauge) for all connections on the RSBus is limited to 1500 feet (457 meters). Color-coded, temperature rating 95°F (35°C) minimum, solid core. (Class II Rated Wiring)

Point-to-point connections shall not exceed 500 feet (152 meters).

4 ROUTE HIGH VOLTAGE AND GROUND WIRES

Any excess high voltage field wiring should be trimmed and secured away from any low voltage field wiring. To facilitate a conduit, a cutout is located in the bottom of the control box. Connect conduit to the control box using a proper conduit fitting.

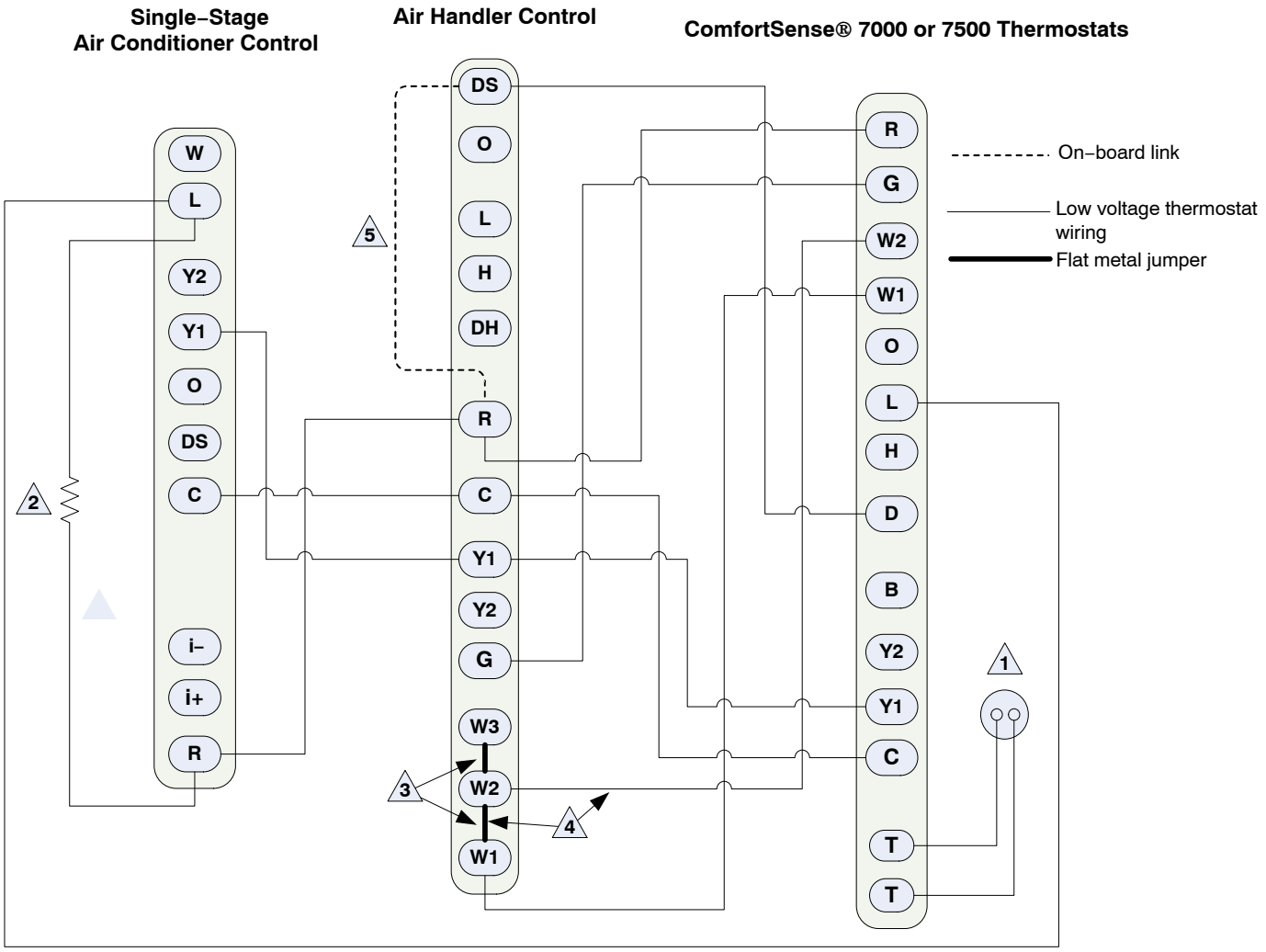




ELECTRICAL INLET (CONTROL WIRING — LOW VOLTAGE). USE BUSHING PROVIDED IN BAG ASSEMBLY HERE.

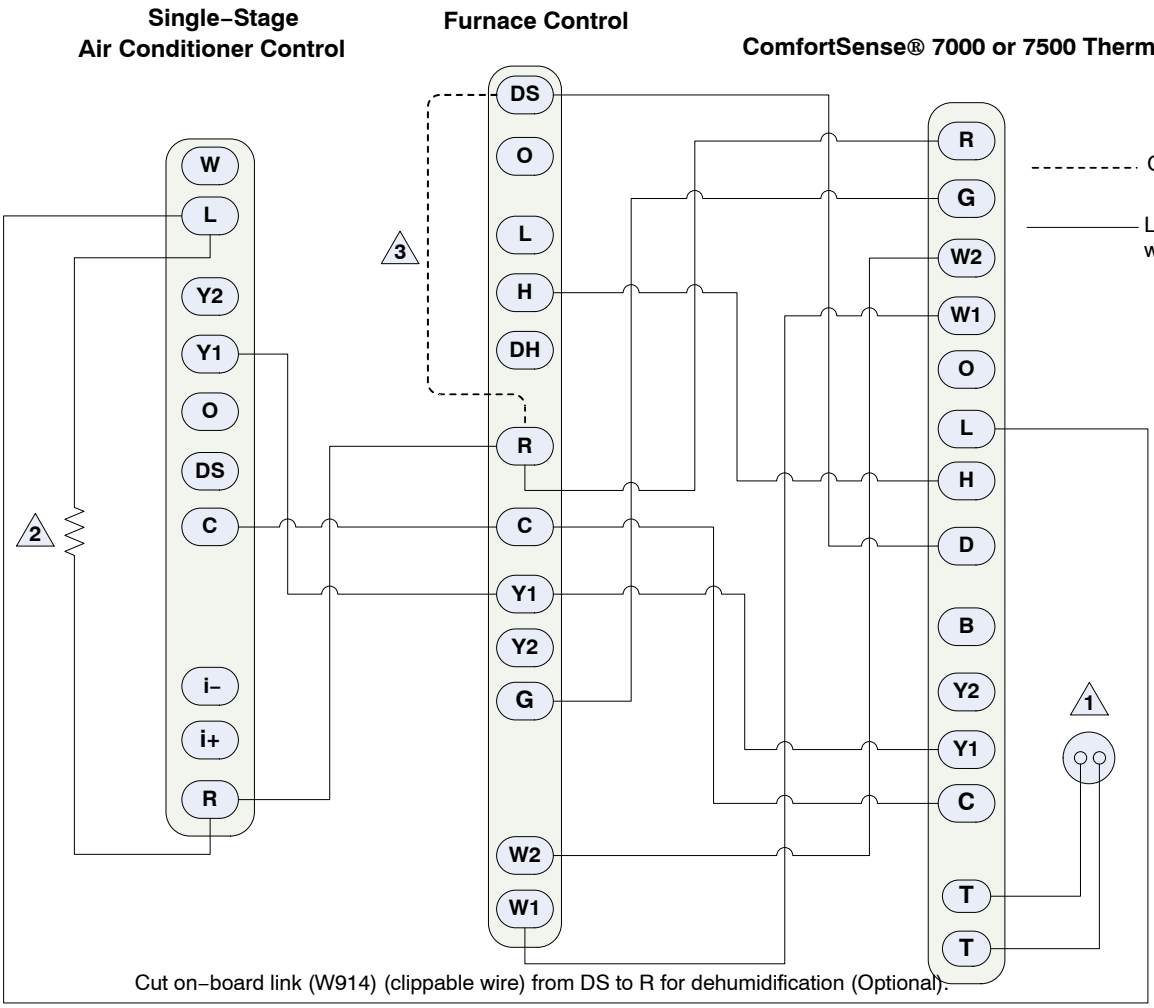
ACCESS VIEW

Field Control Wiring



1. Thermostat **T** terminals are used for outdoor sensor input. Use for thermostat's outdoor temperature display (optional).
2. **R** to **L** connection is required for this model when using the ComfortSense® 7000 or 7500 thermostat only. Resistor Kit (catalog number 47W97) is required and must be ordered separately.
3. Air handler control ships from factory with metal jumpers installed across **W1**, **W2** and **W3**. For single-stage electric heat, do not remove factory installed metal jumpers.
4. Air handler control ships from factory with metal jumpers installed across **W1**, **W2** and **W3**. For two-stage electric heat, remove factory installed metal jumper between **W1** to **W2.** Then connect thermostat wire between the air handler control's **W2** and the thermostat's **W2** terminal.
5. Cut on-board link (clippable wire) **DS-R** for Humiditrol® or Harmony III™ applications. This will slow the indoor blower motor to the lowest speed setting. See air handler installation instruction or Product Specification bulletin for lowest fan speed information.

Figure 18. ComfortSense® 7000 or 7500 Series Thermostat — Air Hander/Single-Stage Air Conditioner



1. Thermostat **T** terminals are used for outdoor sensor input. Use for thermostat's outdoor temperature display (optional).
2. **R** to **L** connection is required for this model when using the ComfortSense® 7000 or 7500 thermostat only. Resistor Kit (catalog number 47W97) is required and must be ordered separately.
3. Cut on−board link (clippable wire) **DS−R** for Humiditrol® or Harmony III™ applications. This will slow the indoor blower motor to the lowest speed setting. See furnace installation instruction or Product Specification bulletin for lowest fan speed information.

Figure 19. ComfortSense® 7000 or 7500 Series Thermostat — Furnace/Single-Stage Air Conditioner

New or Replacement Line Set

REFRIGERANT LINE SET

This section provides information on installation or replacement of existing line set. If new or replacement line set is not being installed then proceed to *Brazing Connections* on page 43.

⚠ IMPORTANT

Lennox highly recommends changing line set when converting the existing system from HCFC-22 to HFC-410A If that is not possible and the line set is the proper size as referenced in table 2, use the procedure outlined under Flushing the System on page 13.

If refrigerant lines are routed through a wall, then seal and isolate the opening so vibration is not transmitted to the building. Pay close attention to line set isolation during installation of any HVAC system. When properly isolated from building structures (walls, ceilings. floors), the refrigerant lines will not create unnecessary vibration and subsequent sounds. See figure 20 for recommended installation practices. Also, consider the following when placing and installing a high-efficiency outdoor unit.

Liquid lines that meter the refrigerant, such as RFC1 liquid lines, must not be used in this application. Existing line set of proper size as listed in table 11 may be reused. If system was previously charged with HCFC-22 refrigerant, then existing line set must be flushed (see *Flushing the System* on page 46).

Field refrigerant piping consists of liquid and vapor lines from the outdoor unit to the indoor unit coil (braze connections).

Table 11. Refrigerant Line Set Requirements

Model Size	Field Connections		Recommended Line Set		
	Liquid Line	Vapor Line	Liquid Line	Vapor Line	L15 Line Sets Feet (Meters)
-024	3/8“ (10)	3/4“ (19)	3/8“ (10)	3/4“ (19)	L15-41 15 - 50' (5 - 15)
-030					
-036	3/8“ (10)	7/8“ (22)	3/8“ (10)	7/8“ (22)	L15-65 15 - 50' (5 - 15)
-042	3/8“ (10)	7/8“ (22)	3/8“ (10)	7/8“ (22)	
-048					
-060	3/8“ (10)	1-1/8“. (29)	3/8“ (10)	1-1/8“ (29)	Field Fabricated
NOTE — Some applications may required a field provided 7/8” to 1-1/8” adapter					

NOTE — *When installing refrigerant lines longer than 50 feet, see the Lennox Refrigerant Piping Design and Fabrication Guidelines, CORP. 9351-L9, or contact Lennox Technical Support Product Applications for assistance.*

To obtain the correct information from Lennox, be sure to communicate the following information:

- Model (SL18XC1) and size of unit (e.g. -036).
- Line set diameters for the unit being installed as listed in table 11 and total length of installation.
- Number of elbows vertical rise or drop in the piping.

⚠ IMPORTANT

Mineral oils are not compatible with HFC-410A If oil must be added, it must be a Polyol ester oil.

The compressor is charged with sufficient Polyol ester oil for line set lengths up to 50 feet. Recommend adding oil to system based on the amount of refrigerant charge in the system. No need to add oil in system with 20 pounds of refrigerant or less. For systems over 20 pounds - add one ounce per every five pounds of refrigerant.

Recommended topping-off POE oils are Mobil EAL ARCTIC 22 CC or ICI EMKARATE™ RL32CF.

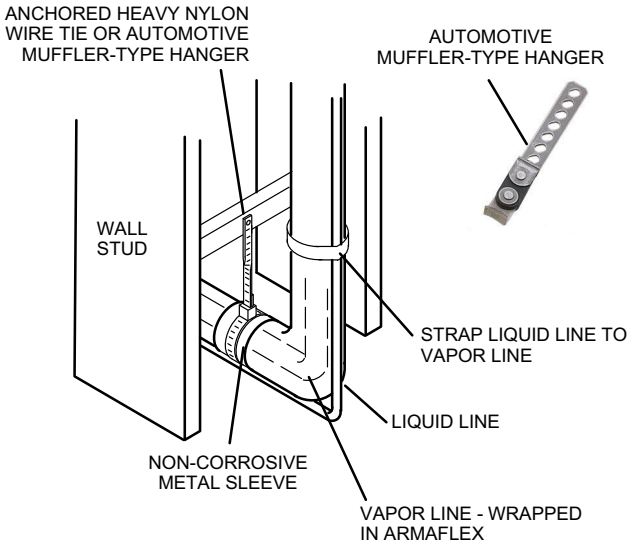
LINE SET

IMPORTANT — Refrigerant lines must not contact structure.

INSTALLATION

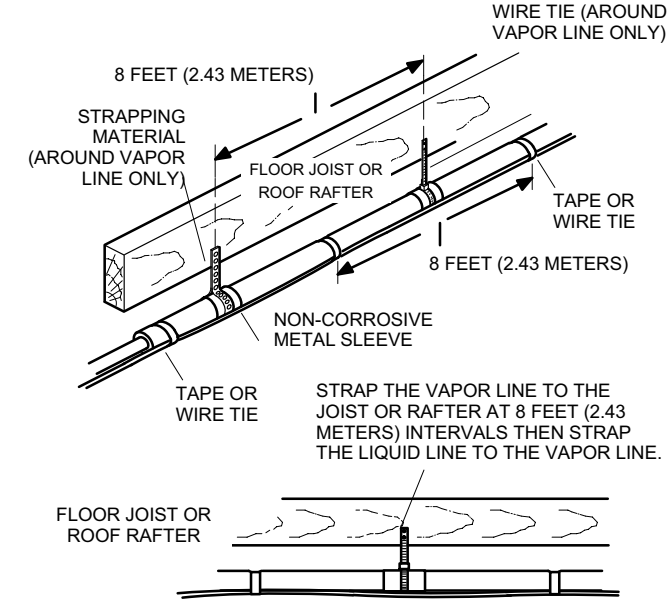
Line Set Isolation — The following illustrations are examples of proper refrigerant line set isolation:

REFRIGERANT LINE SET — TRANSITION FROM VERTICAL TO HORIZONTAL



REFRIGERANT LINE SET — INSTALLING HORIZONTAL RUNS

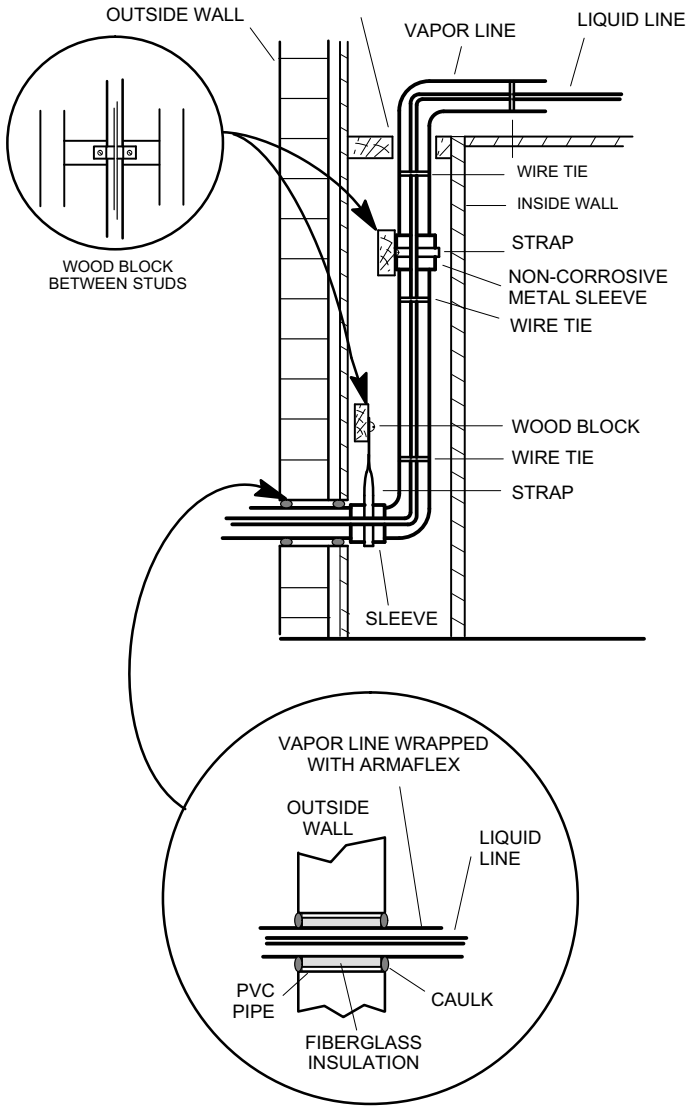
To hang line set from joist or rafter, use either metal strapping material or anchored heavy nylon wire ties.



REFRIGERANT LINE SET — INSTALLING VERTICAL RUNS (NEW CONSTRUCTION SHOWN)

NOTE — Insulate liquid line when it is routed through areas where the surrounding ambient temperature could become higher than the temperature of the liquid line or when pressure drop is equal to or greater than 20 psig.

IMPORTANT — Refrigerant lines must not contact wall



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

WARNING— Polyol ester (POE) oils used with HFC-410A refrigerant absorb moisture very quickly. It is very important that the refrigerant system be kept closed as much as possible. DO NOT remove line set caps or service valve stub caps until you are ready to make connections.

Figure 20. Line Set Installation

Brazing Connections

Use the procedures outline in figures 21 and 22 for brazing line set connections to service valves.

⚠ WARNING

Danger of fire. Bleeding the refrigerant charge from only the high side may result in pressurization of the low side shell and suction tubing. Application of a brazing torch to a pressurized system may result in ignition of the refrigerant and oil mixture - Check the high and low pressures before applying heat.

⚠ WARNING

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).

⚠ CAUTION

Brazing alloys and flux contain materials which are hazardous to your health.

Avoid breathing vapors or fumes from brazing operations. Perform operations only in well-ventilated areas.

Wear gloves and protective goggles or face shield to protect against burns.

Wash hands with soap and water after handling brazing alloys and flux.

⚠ IMPORTANT

Connect gauge set low pressure side to vapor line service valve and repeat procedure starting at paragraph 4 for brazing the liquid line to service port valve.

⚠ IMPORTANT

Allow braze joint to cool before removing the wet rag from the service valve. Temperatures above 250ºF can damage valve seals.

⚠ IMPORTANT

Use silver alloy brazing rods with 5% minimum silver alloy for copper-to-copper brazing. Use 45% minimum alloy for copper-to-brass and copper-to-steel brazing.

⚠ WARNING

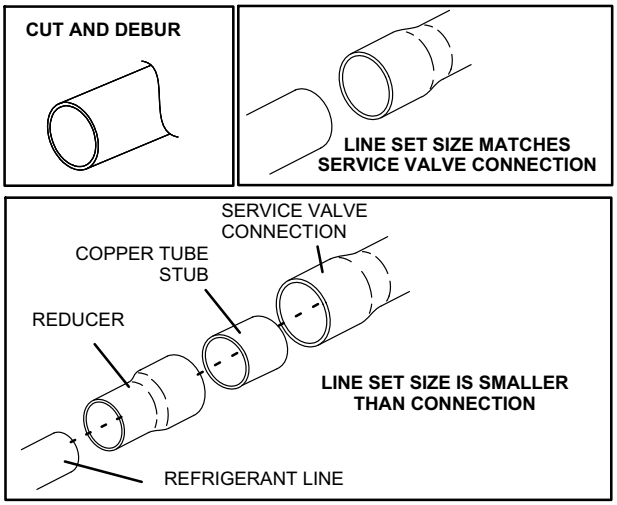
Fire, Explosion and Personal Safety Hazard.

Failure to follow this warning could result in damage, personal injury or death.

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

1 PIPING PANEL REMOVAL AND PREPARING LINE SET

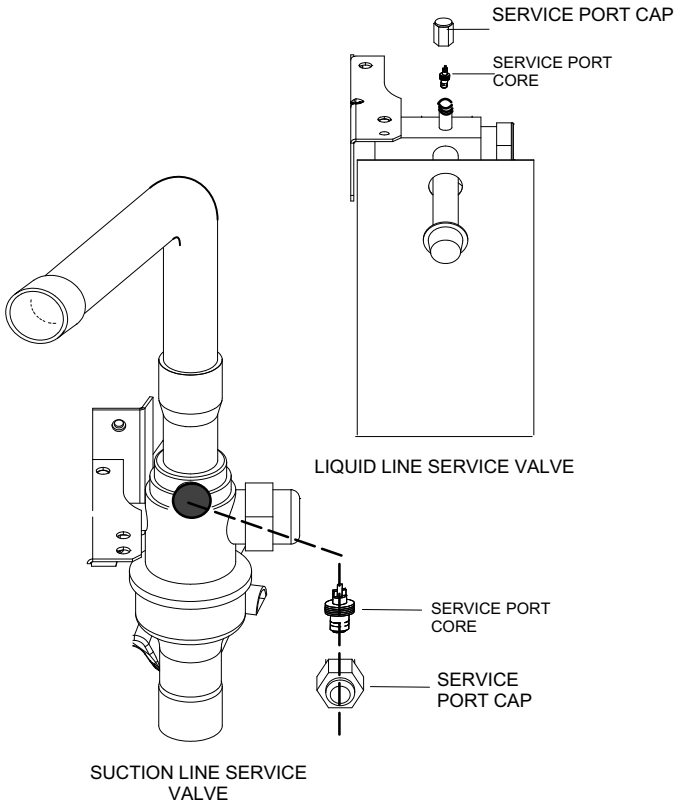
Remove piping panel for easier access to service valves. Cut ends of the refrigerant lines square (free from nicks or dents) and debur the ends. The pipe must remain round. Do not crimp end of the line.



DO NOT CRIMP SERVICE VALVE CONNECTOR WHEN PIPE IS SMALLER THAN CONNECTION

2 CAP AND CORE REMOVAL

Remove service cap and core from both the suction and liquid line service ports.



3 ATTACH THE MANIFOLD GAUGE SET FOR BRAZING LIQUID AND SUCTION LINE SERVICE VALVES

A Connect gauge set low pressure side to liquid line service valve (service port).

B Connect gauge set center port to bottle of nitrogen with regulator.

C With valve core removed from the suction line service port, nitrogen flow will have an exit point.

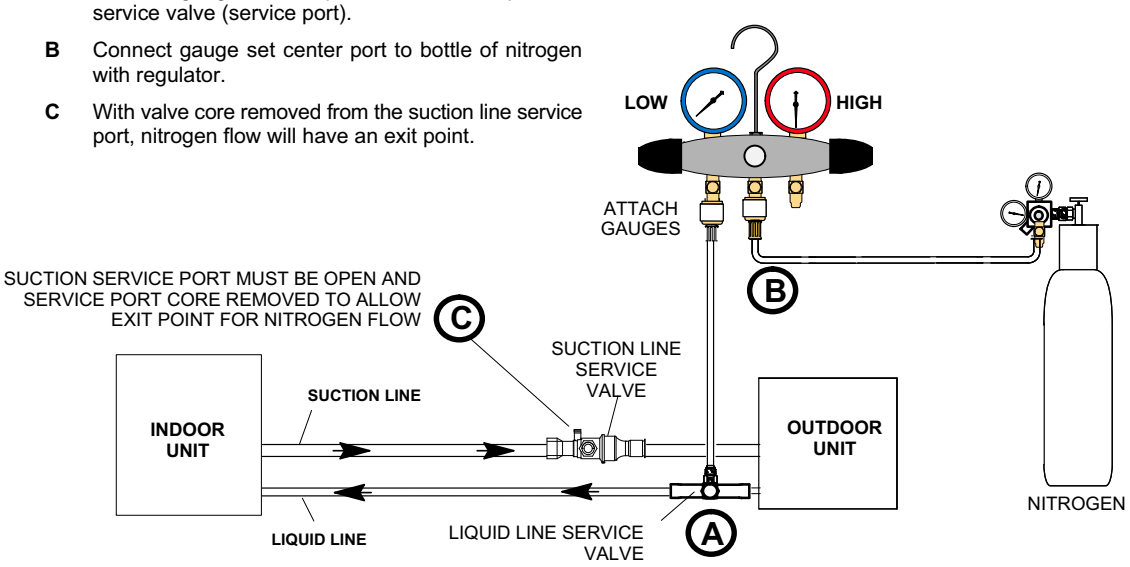


Figure 21. Brazing Procedures

4 WRAP SERVICE VALVES

To help protect service valve seals during brazing, wrap water saturated cloths around service valve bodies and copper tube stubs. Use additional water saturated cloths underneath the valve body to protect the base paint.

5 FLOW NITROGEN

Flow regulated nitrogen (at 1 to 2 psig) through the refrigeration gauge set into the valve stem port connection on the liquid service valve and out of the suction / vapor valve stem port. See steps **3A, 3B** and **3C** on previous page and below for manifold gauge setup.

WARNING

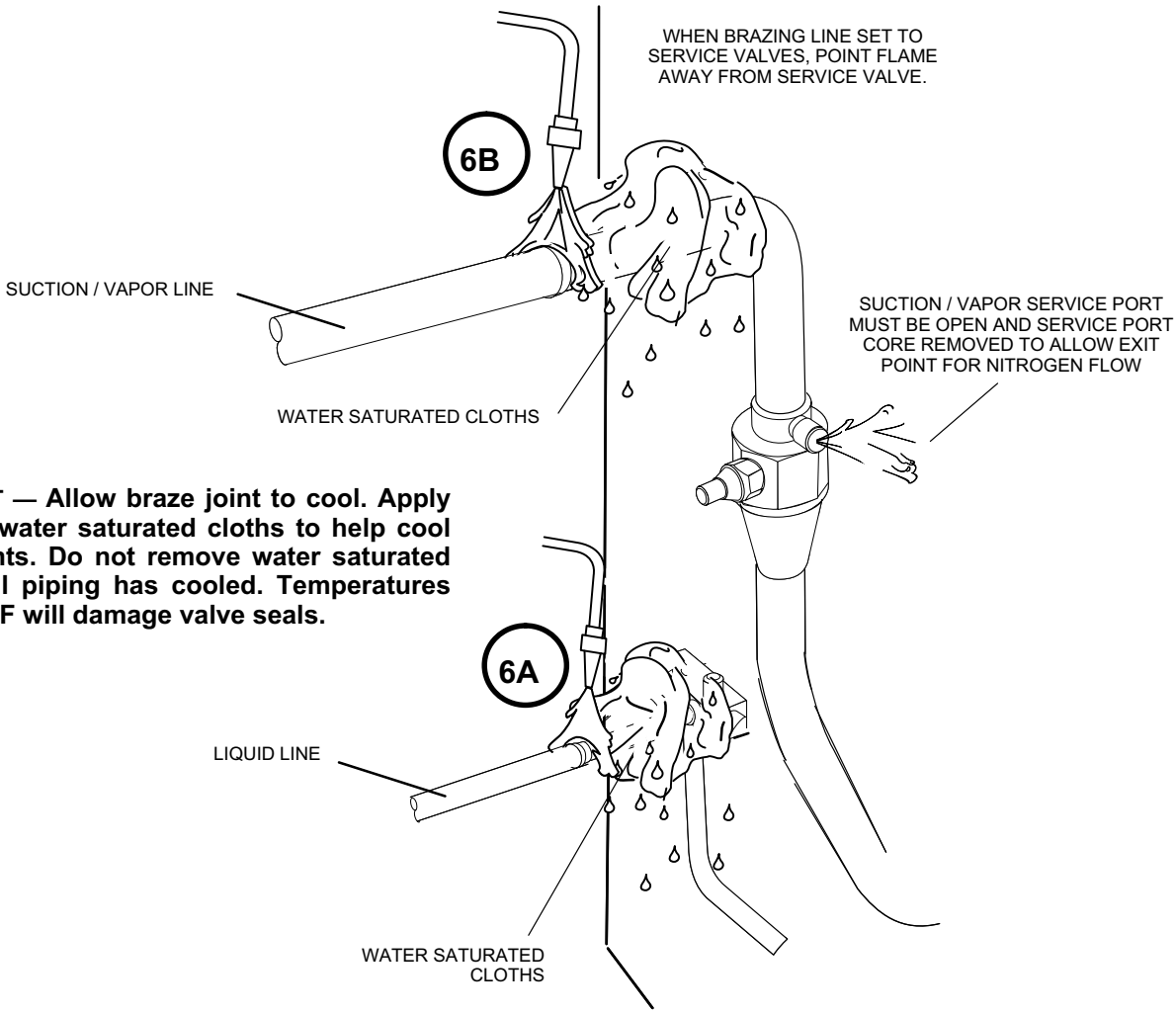
1. **FIRE, PERSONAL INJURY, OR PROPERTY DAMAGE** will result if you do not wrap a water saturated cloth around both liquid and suction line service valve bodies and copper tube stub while brazing in the line set! The braze, when complete, must be quenched with water to absorb any residual heat.
2. Do not open service valves until refrigerant lines and indoor coil have been leak-tested and evacuated. Refer to procedures provided in this supplement.

6 BRAZE LINE SET

Water saturated cloths must remain water saturated throughout the brazing and cool-down process.

A Braze liquid line to liquid line service valve.

B Braze suction / vapor line to suction / vapor service valve.



IMPORTANT — Allow braze joint to cool. Apply additional water saturated cloths to help cool brazed joints. Do not remove water saturated cloths until piping has cooled. Temperatures above 250ºF will damage valve seals.

7 PREPARATION FOR NEXT STEP

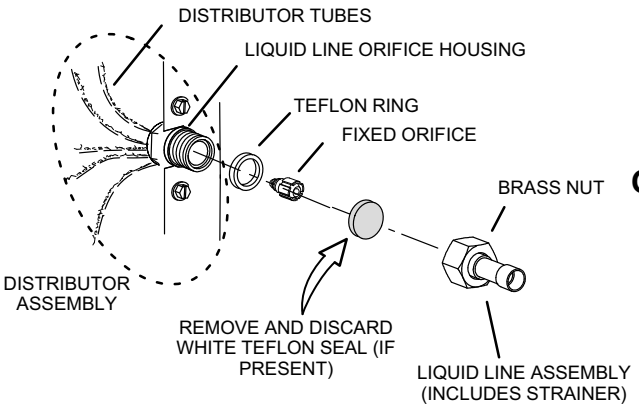
After all connections have been brazed, disconnect manifold gauge set from service ports. Apply additional water saturated cloths to both services valves to cool piping. Once piping is cool, remove all water saturated cloths. Refer to the unit installation instructions for the next step in preparing the unit.

Figure 22. Brazing Procedures (Continued)

FLUSHING

LINE SET AND INDOOR COIL (1 OF 2)

1 TYPICAL FIXED ORIFICE REMOVAL PROCEDURE (Uncased Coil Shown)



A On fully cased coils, remove the coil access and plumbing panels.

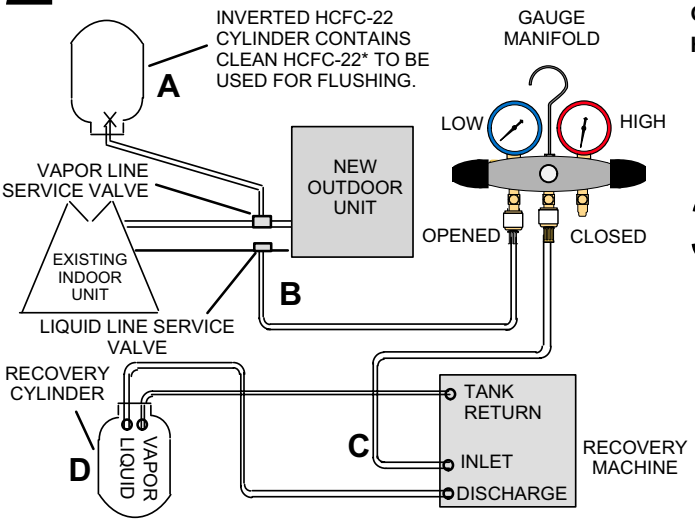
B Remove any shipping clamps holding the liquid line and distributor assembly.

C Using two wrenches, disconnect liquid line from liquid line orifice housing. Take care not to twist or damage distributor tubes during this process.

D Remove and discard fixed orifice, valve stem assembly if present and Teflon washer as illustrated above.

E Use a field-provided fitting to temporary reconnect the liquid line to the indoor unit's liquid line orifice housing.

2 CONNECT GAUGES AND EQUIPMENT FOR FLUSHING PROCEDURE



A Inverted HCFC-22 cylinder with clean refrigerant* to the vapor service valve.

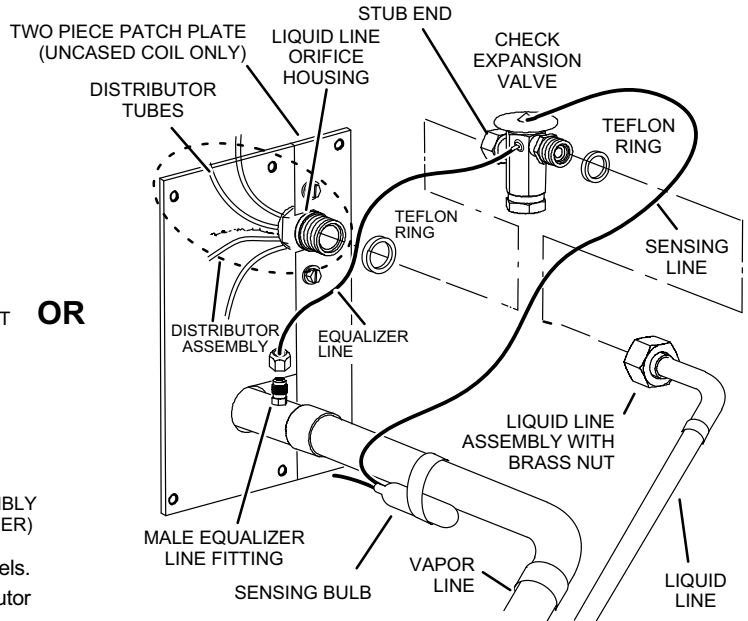
B HCFC-22 gauge set (low side) to the liquid line valve.

C HCFC-22 gauge set center port to inlet on the recovery machine with an empty recovery tank to the gauge set.

D Connect recovery tank to recovery machines per machine instructions.

TYPICAL CHECK EXPANSION VALVE REMOVAL PROCEDURE (Uncased Coil Shown)

OR



A On fully cased coils, remove the coil access and plumbing panels.

B Remove any shipping clamps holding the liquid line and distributor assembly.

C Disconnect the equalizer line from the check expansion valve equalizer line fitting on the vapor line.

D Remove the vapor line sensing bulb.

E Disconnect the liquid line from the check expansion valve at the liquid line assembly.

F Disconnect the check expansion valve from the liquid line orifice housing. Take care not to twist or damage distributor tubes during this process.

G Remove and discard check expansion valve and the two Teflon rings.

H Use a field-provided fitting to temporary reconnect the liquid line to the indoor unit's liquid line orifice housing.

CAUTION —This procedure should not be performed on systems which contain contaminants (Example compressor burn out.

3 FLUSHING LINE SET

The line set and indoor unit coil must be flushed with at least the same amount of clean refrigerant* that previously charged the system. Check the charge in the flushing cylinder before proceeding.

A Set the recovery machine for liquid recovery and start the recovery machine. Open the gauge set valves to allow the recovery machine to pull a vacuum on the existing system line set and indoor unit coil.

B Invert the cylinder of clean HCFC-22* and open its valve to allow liquid refrigerant to flow into the system through the vapor line valve. Allow the refrigerant to pass from the cylinder and through the line set and the indoor unit coil before it enters the recovery machine.

C After all of the liquid refrigerant has been recovered, switch the recovery machine to vapor recovery so that all of the HCFC-22 vapor is recovered. Allow the recovery machine to pull down to 0 the system.

D Close the valve on the inverted HCFC-22 drum and the gauge set valves. Pump the remaining refrigerant out of the recovery machine and turn the machine off.

***IMPORTANT - Clean refrigerant is any refrigerant in a system that has not had compressor burn out. If the system has experienced burn out, it is recommended that the existing line set and indoor coil be replaced.**

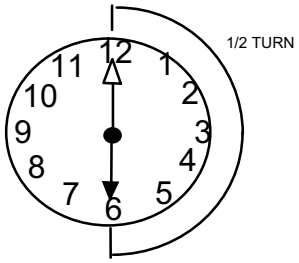
Figure 23. Flushing Procedures

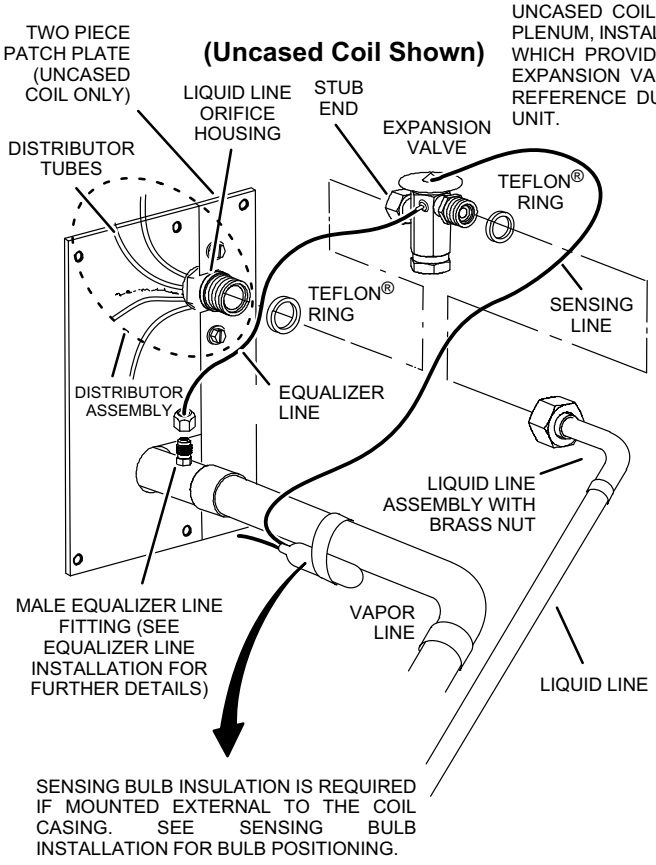
FLUSHING LINE SET AND INDOOR COIL (2 OF 2)

4 TYPICAL NEW CHECK EXPANSION VALVE INSTALLATION PROCEDURE

THIS OUTDOOR UNIT IS DESIGNED FOR USE IN SYSTEMS THAT USE A CHECK EXPANSION VALVE METERING DEVICE. SEE THE *LENNOX SL18XC1 PRODUCT SPECIFICATION* FOR APPROVED EXPANSION VALVE KIT MATCH-UPS AND APPLICATION INFORMATION.

THE EXPANSION VALVE UNIT CAN BE INSTALLED INTERNAL OR EXTERNAL TO THE INDOOR COIL. IN APPLICATIONS WHERE AN UNCASED COIL IS BEING INSTALLED IN A FIELD-PROVIDED PLENUM, INSTALL THE CHECK EXPANSION VALVE IN A MANNER WHICH PROVIDES ACCESS FOR FIELD SERVICING OF THE EXPANSION VALVE. REFER TO BELOW ILLUSTRATION FOR REFERENCE DURING INSTALLATION OF EXPANSION VALVE UNIT.





SENSING BULB INSULATION IS REQUIRED IF MOUNTED EXTERNAL TO THE COIL CASING. SEE SENSING BULB INSTALLATION FOR BULB POSITIONING.

A REMOVE THE FIELD-PROVIDED FITTING THAT TEMPORARILY RECONNECTED THE LIQUID LINE TO THE INDOOR UNIT'S DISTRIBUTOR ASSEMBLY.

B INSTALL ONE OF THE PROVIDED TEFLON® RINGS AROUND THE STUBBED END OF THE EXPANSION VALVE AND LIGHTLY LUBRICATE THE CONNECTOR THREADS AND EXPOSE SURFACE OF THE TEFLON® RING WITH REFRIGERANT OIL.

C ATTACH THE STUBBED END OF THE EXPANSION VALVE TO THE LIQUID LINE ORIFICE HOUSING. FINGER TIGHTEN AND USE AN APPROPRIATELY SIZED WRENCH TO TURN AN ADDITIONAL 1/2 TURN CLOCKWISE AS ILLUSTRATED IN THE FIGURE ABOVE, OR 20 FT-LB.

D PLACE THE REMAINING TEFLON® WASHER AROUND THE OTHER END OF THE EXPANSION VALVE. LIGHTLY LUBRICATE CONNECTOR THREADS AND EXPOSE SURFACE OF THE TEFLON® RING WITH REFRIGERANT OIL.

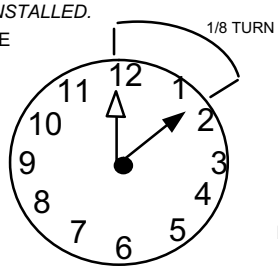
E ATTACH THE LIQUID LINE ASSEMBLY TO THE EXPANSION VALVE. FINGER TIGHTEN AND USE AN APPROPRIATELY SIZED WRENCH TO TURN AN ADDITIONAL 1/2 TURN CLOCKWISE AS ILLUSTRATED IN THE FIGURE ABOVE OR 20 FT-LB.

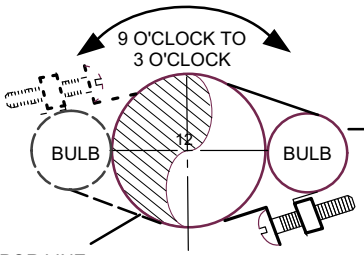
SENSING BULB INSTALLATION

A ATTACH THE VAPOR LINE SENSING BULB IN THE PROPER ORIENTATION AS ILLUSTRATED TO THE RIGHT USING THE CLAMP AND SCREWS PROVIDED.

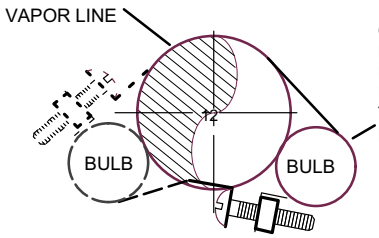
NOTE - CONFIRM PROPER THERMAL CONTACT BETWEEN VAPOR LINE AND CHECK EXPANSION BULB BEFORE INSULATING THE SENSING BULB ONCE INSTALLED.

B CONNECT THE EQUALIZER LINE FROM THE EXPANSION VALVE TO THE EQUALIZER VAPOR PORT ON THE VAPOR LINE. FINGER TIGHTEN THE FLARE NUT PLUS 1/8 TURN (7 FT-LBS) AS ILLUSTRATED BELOW.





ON LINES SMALLER THAN 7/8", MOUNT SENSING BULB BETWEEN THE 9 AND 3 O'CLOCK POSITIONS.



ON 7/8" AND LARGER LINES, MOUNT SENSING BULB AT EITHER THE 4 OR 8 O'CLOCK POSITION. NEVER MOUNT THE SENSING BULB ON BOTTOM OF LINE.

NOTE - NEVER MOUNT THE SENSING BULB ON BOTTOM OF LINE.

EQUALIZER LINE INSTALLATION

REMOVE AND DISCARD EITHER THE FLARE SEAL CAP OR FLARE NUT WITH COPPER FLARE SEAL BONNET FROM THE EQUALIZER LINE PORT ON THE VAPOR LINE AS ILLUSTRATED IN THE FIGURE TO THE RIGHT.

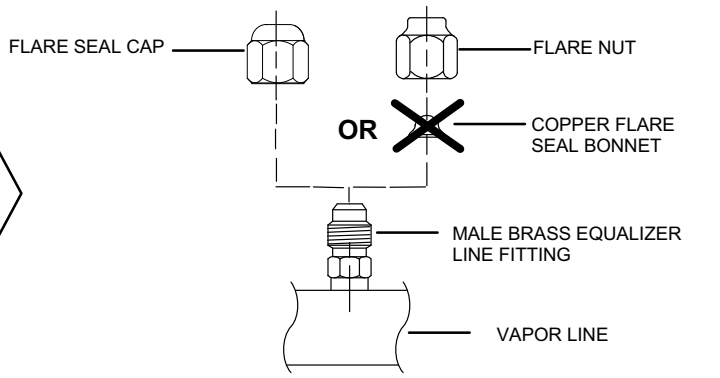


Figure 24. Flushing Procedures (Continued)

INSTALLING ISOLATION GROMMETS

Locate the isolation grommets (provided). Slide grommets onto vapor and liquid lines. Insert grommets into piping panel to isolate refrigerant lines from sheet metal edges.

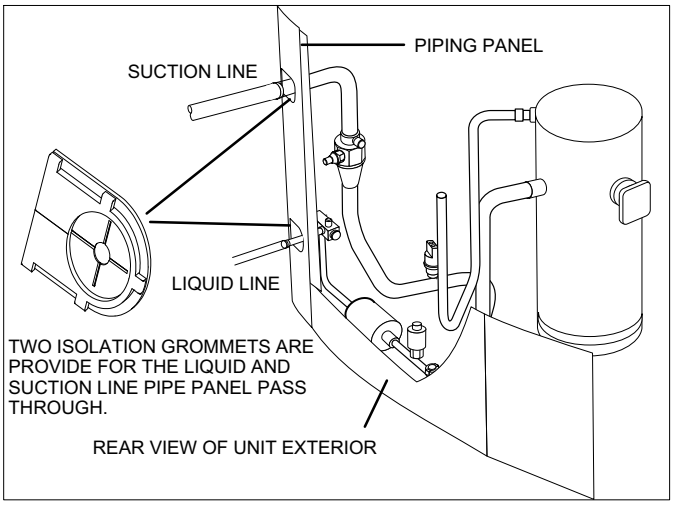


Figure 25. Isolation Grommets

⚠ IMPORTANT

The Environmental Protection Agency (EPA) prohibits the intentional venting of HFC refrigerants during maintenance, service, repair and disposal of appliance. Approved methods of recovery, recycling or reclaiming must be followed.

⚠ IMPORTANT

If this unit is being matched with an approved line set or indoor unit coil which was previously charged with mineral oil, or if it is being matched with a coil which was manufactured before January of 1999, the coil and line set must be flushed prior to installation. Take care to empty all existing traps. Polyol ester (POE) oils are used in Lennox units charged with HFC-410A refrigerant. Residual mineral oil can act as an insulator, preventing proper heat transfer. It can also clog the expansion device, and reduce the system performance and capacity.

Failure to properly flush the system per the instructions below will void the warranty.

Leak Testing the System

⚠ IMPORTANT

Leak detector must be capable of sensing HFC refrigerant.

⚠ WARNING

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).

⚠ 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.

LEAK TEST

LINE SET AND INDOOR COIL

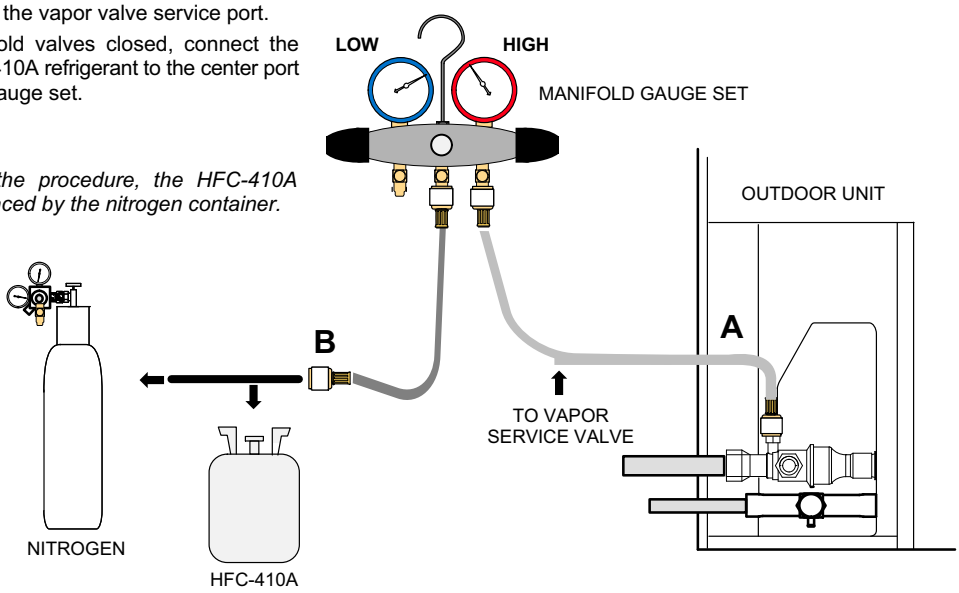
NOTE — Normally, the high pressure hose is connected to the liquid line port. However, connecting it to the vapor port better protects the manifold gauge set from high pressure damage.

1 CONNECT GAUGE SET

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

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

NOTE — Later in the procedure, the HFC-410A container will be replaced by the nitrogen container.



2 TEST FOR LEAKS

After the line set has been connected to the indoor unit and air conditioner, check the line set connections and indoor unit for leaks. Use the following procedure to test for leaks:

A With both manifold valves closed, connect the cylinder of HFC-410A refrigerant to the center port of the manifold gauge set. Open the valve on the HFC-410A cylinder (vapor only).

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

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

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

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

F After leak testing disconnect gauges from service ports.

Evacuating the System

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

⚠ WARNING

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.

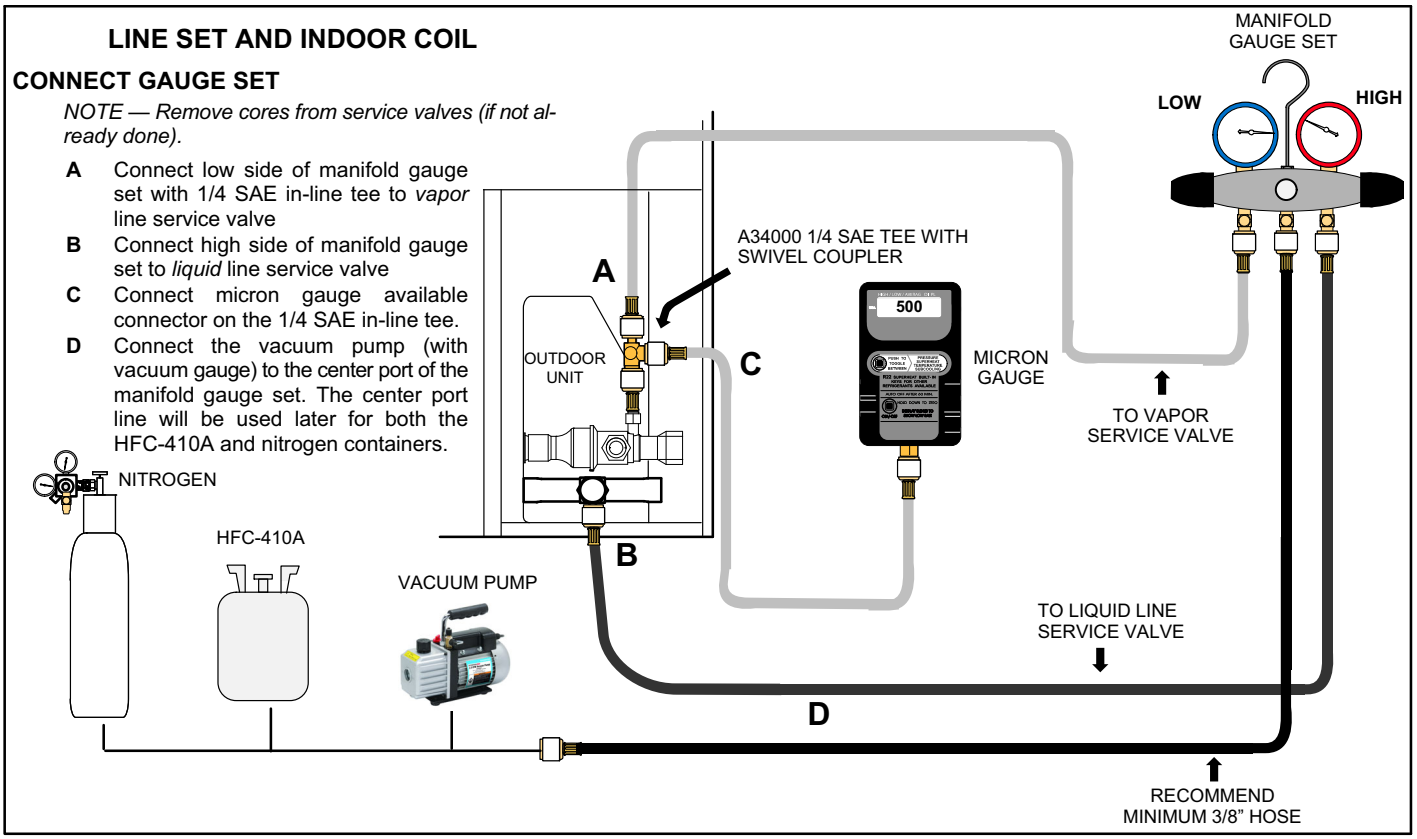


Figure 26. Connecting Gauge Set

EVACUATE LINE SET AND INDOOR COIL

The unit is shipped with a factory refrigerant charge. The liquid and suction line valves were closed after final testing at the factory. Do not operate these valves until the line set and indoor coil have been evacuated and leak checked, or the charge is lost.

NOTE - *Do not use any portion of the factory charge for purging or leak testing. The factory charge is for filling the system only after a complete evacuation and leak check has been performed.*

Line set and indoor coil should be evacuated using the recommend deep vacuum method of 500 microns. If deep vacuum equipment is not available, the alternate triple evacuation method may be used by following the specified procedure.

If vacuum must be interrupted during the evacuation procedure, always break vacuum with dry nitrogen.

Deep Vacuum Method

The deep vacuum method requires a vacuum pump capable of pulling a vacuum to 500 microns and a vacuum gauge capable of accurately measuring this vacuum level. The deep vacuum method is the most positive way of assuring a system is free of air and water.

Watch the vacuum gauge as the system is pulling down. The response of the gauge is an indicator of the condition of the system (refer to figure 27).

With no leaks in the system, allow the vacuum pump to run for 30 minutes minimum at the deep vacuum level.

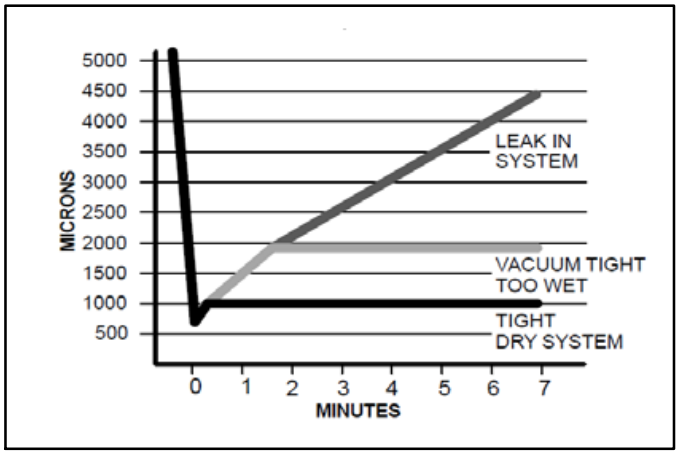


Figure 27. Deep Vacuum Gauge Response and System Conditions

IV. SYSTEM CHARGE

Servicing Units Delivered Void of Charge

If the outdoor unit is void of refrigerant, clean the system using the procedure described below.

1. Leak check system using procedure outlined on page 48.
2. Evacuate the system using procedure outlined on page 50.
3. Use nitrogen to break the vacuum and install a new filter drier in the system.
4. Evacuate the system again using procedure outlined on page 50.
5. Weigh in refrigerant using procedure outlined in figure 31.
6. Monitor the system to determine the amount of moisture remaining in the oil. It may be necessary to replace the filter drier several times to achieve the required dryness level. **If system dryness is not verified, the compressor will fail in the future.**

Unit Start-Up

⚠ IMPORTANT

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

1. Rotate fan to check for binding.
2. Inspect all factory- and field-installed wiring for loose connections.
3. After evacuation is complete, open both the liquid and vapor line service valves to release the refrigerant charge contained in outdoor unit into the system.
4. Replace the stem caps and tighten to the value listed in table 1.
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 with the power company and the voltage condition has been corrected.
6. Set the thermostat for a cooling demand. Turn on power to the indoor indoor unit and close the outdoor unit disconnect switch to start the unit.
7. Recheck voltage while the unit is running. Power must be within range shown on the nameplate.
8. Check system for sufficient refrigerant by using the procedures listed under *System Refrigerant.*

System Refrigerant

This section outlines procedures for:

1. Connecting gauge set for testing and charging.
2. Checking and adjusting indoor airflow.

GAUGE SET

CONNECTIONS FOR TESTING AND CHARGING

A Close manifold gauge set valves and connect the center hose to a cylinder of HFC-410A. Set for liquid phase charging.

B Connect the manifold gauge set's low pressure side to the suction line service port.

C Connect the manifold gauge set's high pressure side to the liquid line service port.

D Position temperature sensor on liquid line near liquid line service port.

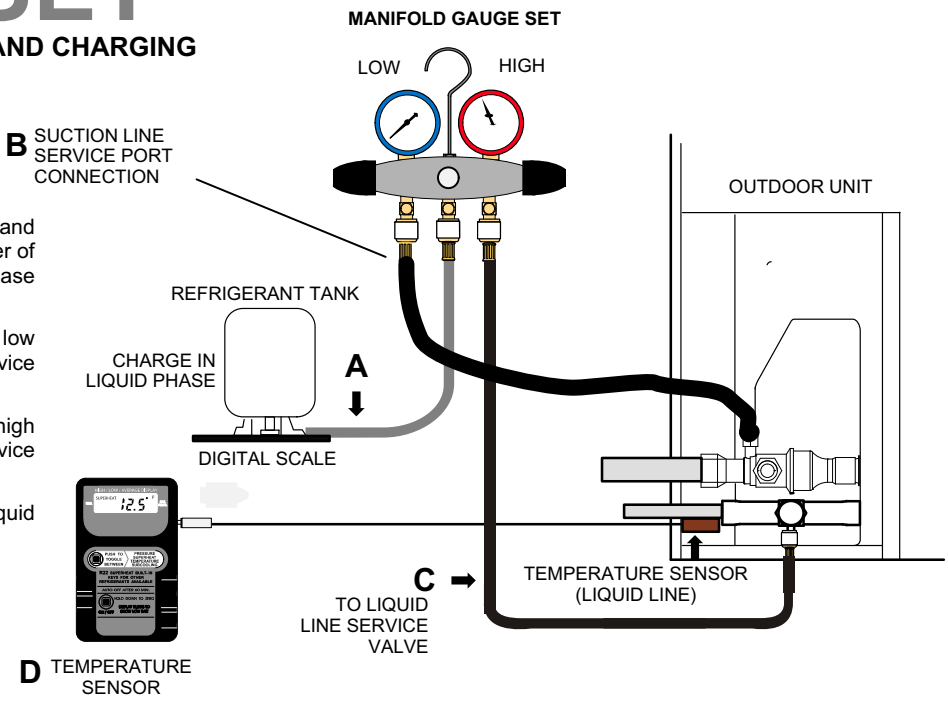
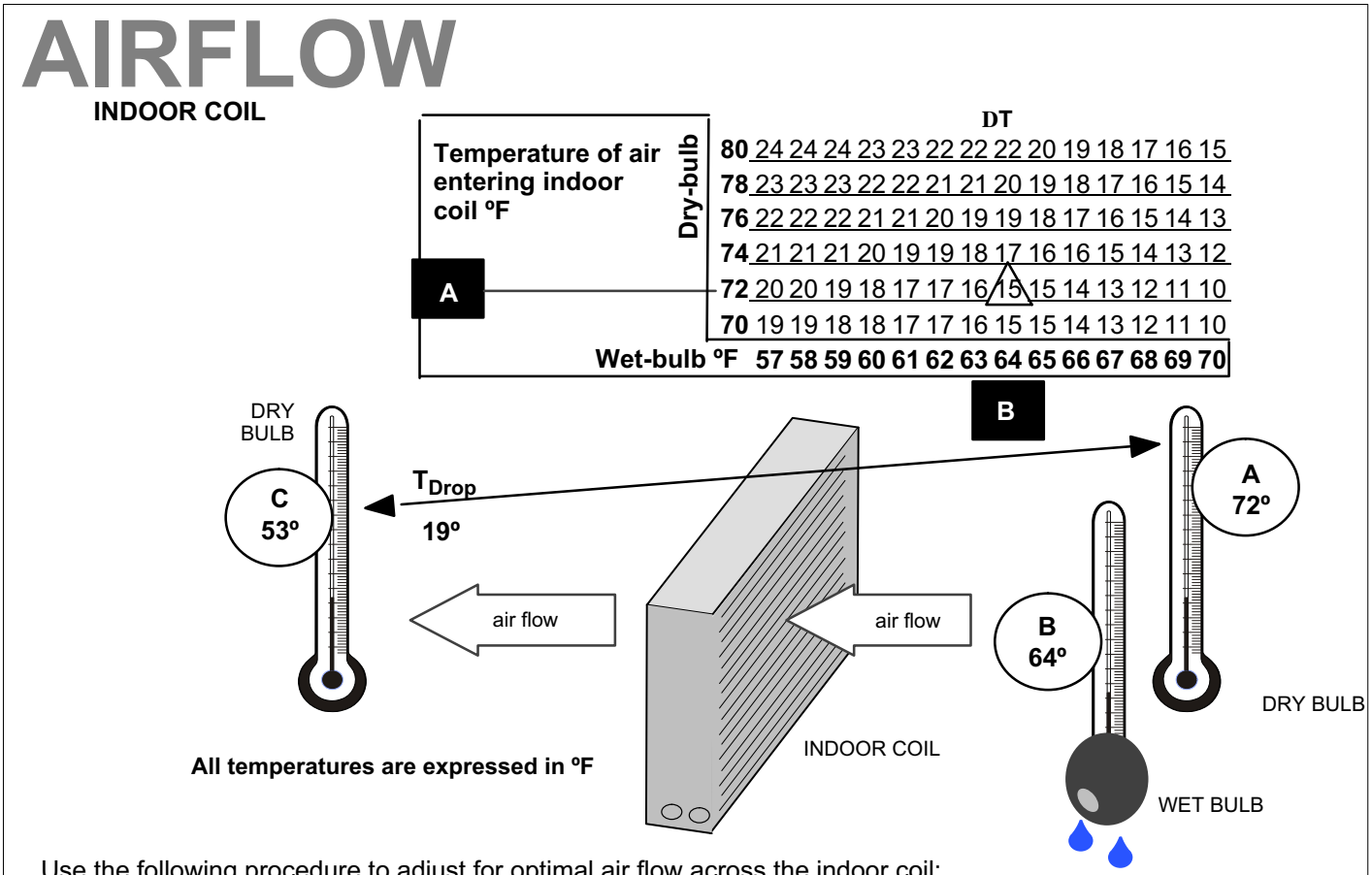


Figure 28. Gauge Set Setup and Connections

ADDING OR REMOVING REFRIGERANT

This system uses HFC-410A refrigerant which operates at much higher pressures than HCFC-22. The pre-installed liquid line filter drier is approved for use with HFC-410A only. Do not replace it with components designed for use with HCFC-22. This unit is NOT approved for use with coils which use capillary tubes or fixed orifices as a refrigerant metering device.

Check airflow using the Delta-T (DT) process using the illustration in figure 29.



Use the following procedure to adjust for optimal air flow across the indoor coil:

1. **Determine the desired DT** — Measure entering air temperature using dry bulb (**A**) and wet bulb (**B**). **DT** is the intersecting value of **A** and **B** in the table (see triangle).
2. **Find temperature drop across coil** — Measure the coil's dry bulb entering and leaving air temperatures (**A** and **C**). Temperature Drop Formula: ($\mathbf{T_{Drop}}$) = **A** minus **C**.
3. **Determine if fan needs adjustment** — If the difference between the measured $\mathbf{T_{Drop}}$ and the desired **DT** ($\mathbf{T_{Drop}}$**–DT**) is within ±3º, no adjustment is needed. See example below:

Assume **DT** = 15 and **A** temp. = 72º, these **C** temperatures would necessitate stated actions:

Cº	T_{Drop}	–	DT	=	ºF	*ACTION*
53º	19	–	15	=	4	*Increase the airflow*
58º	14	–	15	=	-1	*(within ±3º range) no change*
62º	10	–	15	=	-5	*Decrease the airflow*

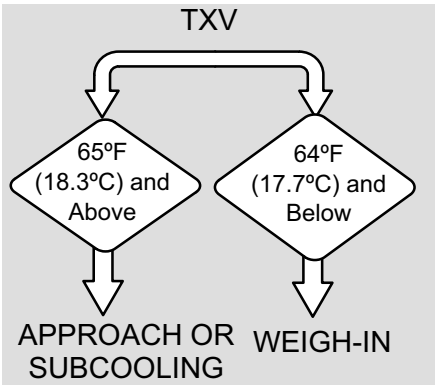
Changing air flow affects all temperatures; recheck temperatures to confirm that the temperature drop and DT are within ±3º.

4. **Adjust the fan speed** — See indoor unit instructions to increase/decrease fan speed.

Figure 29. Checking Indoor Airflow over Evaporator Coil using Delta-T Chart

Use **WEIGH IN** to initially charge a system when the outdoor unit is void of charge. To verify charge and add or remove refrigerant use either **APPROACH** or **SUBCOOLING** methods.

START: Determine the correct charge method:



WHEN TO CHARGE?

- Warm weather best
- Can charge in colder weather

CHARGE METHOD? Determine by:

- Outdoor ambient temperature

REQUIREMENTS:

- Sufficient heat load in structure
- Indoor temperature between 70-80ºF (21-26ºC)
- Manifold gauge set connected to unit
- Thermometers:
  - to measure outdoor ambient temperature
  - to measure liquid line temperature
  - to measure suction line temperature

Figure 30. Determining Charge Method

WEIGH IN

CHARGING METHOD 64ºF (17.7ºC) and Below

CALCULATING SYSTEM CHARGE FOR OUTDOOR UNIT VOID OF CHARGE

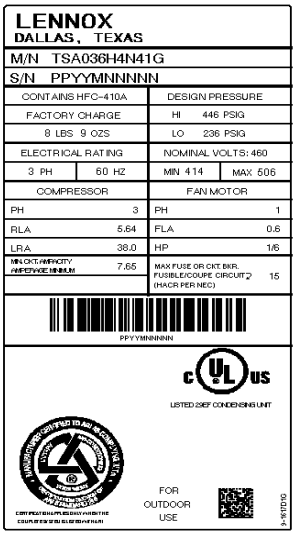
If the system is void of refrigerant, first, locate and repair any leaks and then weigh in the refrigerant charge into the unit. To calculate the total refrigerant charge:

Amount specified on nameplate

Adjust amount. for variation in line set length listed on line set length table below.

Total charge

_____ ± _____ = _____



Refrigerant Charge per Line Set Length

Liquid Line Set Diameter	Ounces per 5 feet (g per 1.5 m) adjust from 15 feet (4.6 m) line set*
3/8” (9.5 mm)	3 ounce per 5' (85 g per 1.5 m)

*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.

NOTE — Insulate liquid line when it is routed through areas where the surrounding ambient temperature could become higher than the temperature of the liquid line or when pressure drop is equal to or greater than 20 psig.

NOTE — The exampled nameplate is for illustration purposes only. Use data listed on actual unit nameplate for charging.

Figure 31. Using HFC-410A Weigh In Method

APPROACH

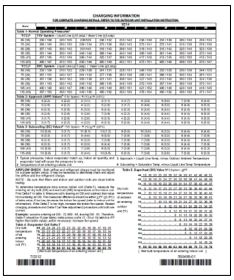
TEST AND CHARGE METHOD

65ºF (18.3ºC) and Above

If refrigerant added or removed, retest to confirm that unit is properly charged

If value is greater than shown (high approach), add refrigerant; if less than shown (liquid temp too close to ambient temp, low approach), remove refrigerant.

APPº (Approach) Values(F:+/-1.0° [C: +/-0.6°])*



1. Confirm proper airflow across coil using figure 29.
2. Compare unit pressures with unit charging sticker, *Normal Operating Pressures*.
3. Use APPROACH to correctly charge unit or to verify the charge is correct.
4. Set thermostat to call for heat (must have a cooling load between 70-80ºF (21-26ºC).
5. Connect gauge set.
6. When heat demand is satisfied, set thermostat to call for cooling.
7. Allow temperatures and pressures to stabilize.
8. Record outdoor ambient temperature:

   AMBº =_____
9. Record line temperature:

   LIQº = _____
10. Subtract to determine approach (APPº):

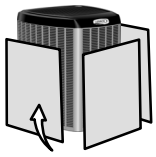
    LIQº_____ - AMBº _____ = APPº_____
11. Compare results with applicable charging sticker located on unit access panel or copy located at the end of this manual. See table 13 for to determine applicable charging information for specifiic model.

Figure 32. Using Approach Test and Charge Method

SUBCOOLING

TEST AND CHARGE METHOD

65ºF (18.3ºC) and Above



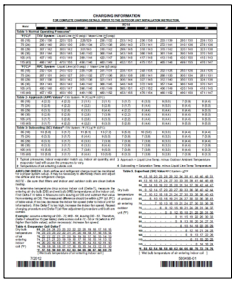
CARDBOARD OR PLASTIC SHEET

BLOCK OUTDOOR COIL: [sometimes necessary with lower temperatures] Use cardboard or plastic sheet to restrict the airflow through the outdoor coil to achieve pressures from 325-375 psig (2240-2585 kPa). Higher pressures are needed to check charge. Block equal sections of air intake panels and move coverings sideways until the liquid pressure is in the above noted ranges.

If refrigerant added or removed, verify charge using the approach method

If value is greater than shown, remove refrigerant; if less than shown, add refrigerant

SCº (Subcooling) Values (F:+/-1.0° [C: +/-0.6°])



1. Confirm proper airflow across coil using figure 29.
2. Compare unit pressures with unit charging sticker, *Normal Operating Pressures*.
3. Use SUBCOOLING to correctly charge unit or to verify the charge is correct.
4. Set thermostat to call for heat (must have a cooling load between 70-80ºF (21-26ºC)
5. Connect gauge set
6. Measure outdoor ambient temperature
7. When heat demand is satisfied, set thermostat to call for cooling
8. Allow temperatures and pressures to stabilize.

   NOTE - If necessary, block outdoor coil to maintain 325 - 375 psig.
9. Record liquid line temperature:

   LIQº = _____
10. Measure liquid line pressure and use the value to determine saturation temperature (see table 12):

    SATº = _____
11. Subtract to determine subcooling (SCº):

    SATº_____ - LIQº _____ = SCº _____
12. Compare results with applicable charging sticker located on unit access panel or copy located at the end of this manual. See table 13 for to determine applicable charging information for specific model.

Figure 33. Using Subcooling Test and Charge Method

Table 12. HFC-410A Temperature (°F) - Pressure (Psig)

°F	°C	Psig	°F	°C	Psig
-40	-40.0	11.6	**60**	15.6	170
-35	-37.2	14.9	**65**	18.3	185
-30	-34.4	18.5	**70**	21.1	201
-25	-31.7	22.5	**75**	23.9	217
-20	-28.9	26.9	**80**	26.7	235
-15	-26.1	31.7	**85**	29.4	254
-10	-23.3	36.8	**90**	32.2	274
-5	-20.6	42.5	**95**	35.0	295
0	-17.8	48.6	**100**	37.8	317
5	-15.0	55.2	**105**	40.6	340
10	-12.2	62.3	**110**	43.3	365
15	-9.4	70.0	**115**	46.1	391
20	-6.7	78.3	**120**	48.9	418
25	-3.9	87.3	**125**	51.7	446
30	-1.1	96.8	**130**	54.4	476
35	1.7	107	**135**	57.2	507
40	4.4	118	**140**	60.0	539
45	7.2	130	**145**	62.8	573
50	10.0	142	**150**	65.6	608
55	12.8	155			

APPENDIX A - UNIT CHARGING STICKERS

This section contains all published charging stickers for the various versions of this model. Below is a table listing the applicable sticker to unit model number.

Table 13. Applicable Charging Sticker by Unit Model Number

Unit Model Number	Unit Charging Sticker Numbers
SL18XC1-XXX-230-01	**580692-01**
Charging stickers referenced above are located at the end of this manual.	