



Installation and Operation Manual

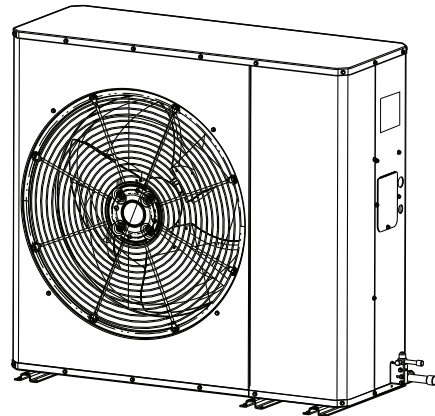
Side Discharge HP Models

For coastal applications where units are installed within one (1) mile of salt water, epoxy coated models are recommended. These models have an 8 week lead time after order.

4TWL5024N1000A
4TWL5030N1000A
4TWL5036N1000A
4TWL5042N1000A
4TWL5048N1000A

Epoxy Coated Model

4TWL5024N1COTA
4TWL5030N1COTA
4TWL5036N1COTA
4TWL5042N1COTA
4TWL5048N1COTA



Note: "Graphics in this document are for representation only. Actual model may differ in appearance."

▲ SAFETY WARNING

Only qualified personnel should install and service the equipment. The installation, starting up, and servicing of heating, ventilating, and air-conditioning equipment can be hazardous and requires specific knowledge and training. Improperly installed, adjusted or altered equipment by an unqualified person could result in death or serious injury. When working on the equipment, observe all precautions in the literature and on the tags, stickers, and labels that are attached to the equipment.



SAFETY SECTION

Important — This document contains service information. This is customer property and is to remain with this unit. Please return to service information pack upon completion of work.

⚠ WARNING

HAZARDOUS VOLTAGE!

Failure to follow this Warning could result in property damage, severe personal injury, or death.

Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power cannot be inadvertently energized.

⚠ WARNING

REFRIGERANT OIL!

Failure to follow this Warning could result in property damage, severe personal injury, or death.

These units use R-410A refrigerant which operates at 50–70% higher pressures than R-22. Use only R-410A approved service equipment. Refrigerant cylinders are painted a “Rose” color to indicate the type of refrigerant and may contain a “dip” tube to allow for charging of liquid refrigerant into the system. All R-410A systems use a POE oil that readily absorbs moisture from the atmosphere. To limit this “hydropscopic” action, the system should remain sealed whenever possible. If a system has been open to the atmosphere for more than 4 hours, the compressor oil must be replaced. Never break a vacuum with air and always change the driers when opening the system for component replacement. For specific handling concerns with R-410A and POE oil, reference Retrofit Bulletin TRN-APG02-EN.

⚠ CAUTION

HOT SURFACE!

May cause minor to severe burning. Failure to follow this Caution could result in property damage or personal injury.

Do not touch top of compressor.

⚠ CAUTION

CONTAINS REFRIGERANT!

Failure to follow proper procedures can result in personal illness or injury or severe equipment damage.

System contains oil and refrigerant under high pressure. Recover refrigerant to relieve pressure before opening system.

⚠ CAUTION

GROUNDING REQUIRED!

Failure to inspect or use proper service tools may result in equipment damage or personal injury. Reconnect all grounding devices. All parts of this product that are capable of conducting electrical current are grounded. If grounding wires, screws, straps, clips, nuts, or washers used to complete a path to ground are removed for service, they must be returned to their original position and properly fastened.

⚠ WARNING

SERVICE VALVES!

Failure to follow this warning will result in abrupt release of system charge and may result in personal injury and/or property damage. Extreme caution should be exercised when opening the Suction and Liquid Line Service Valve. Turn valve stem counterclockwise only until the stem contacts the rolled edge. No torque is required.

⚠ WARNING

BRAZING REQUIRED – IF USING MECHANICAL CONNECTIONS, ENSURE LEAK TEST IS NEGATIVE!

Failure to inspect lines or use proper service tools may result in equipment damage or personal injury. If using existing refrigerant lines make certain that all joints are brazed, not soldered.

⚠ WARNING

Warning!

This product can expose you to chemicals including lead which are known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov

Important: If using other than copper pipe, follow manufacturer’s installation instructions. Joints must be brazed or other UL/IMC/URMC approved joint that meets pressure requirements.



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Unit Location Considerations

Table 1. Unit Dimensions (in inches) and Weight

Models	H x D x W (in)	A	B	C	D	E	F	Weight * (lb)
4TWL5024N1	36.75 x 17 1/2 x 47	32.75	47.0	36.75	17.5	19.5	20.5	197
4TWL5030N1	36.75 x 17 1/2 x 47	32.75	47.0	36.75	17.5	19.5	20.5	197
4TWL5036N1	36.75 x 17 1/2 x 47	32.75	47.0	36.75	17.5	19.5	20.5	199
4TWL5042N1	36.75 x 17 1/2 x 47	32.75	47.0	42.75	17.5	19.5	20.5	239
4TWL5048N1	36.75 x 17 1/2 x 47	32.75	47.0	42.75	17.5	19.5	20.5	239

* Weight values are estimated (uncrated).

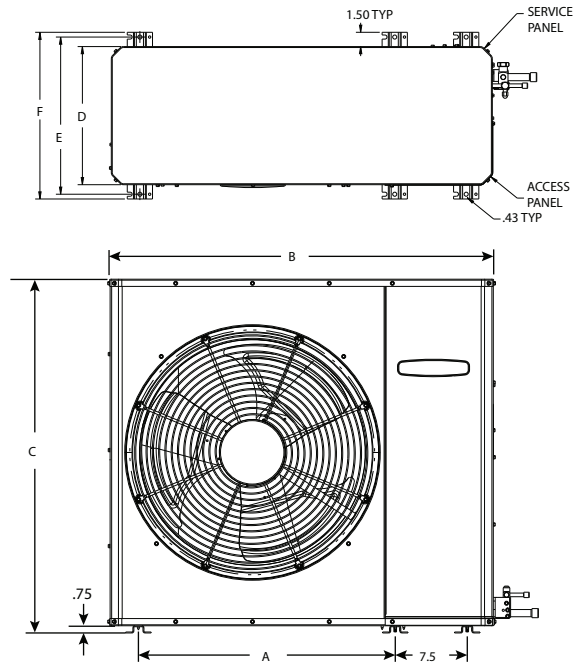
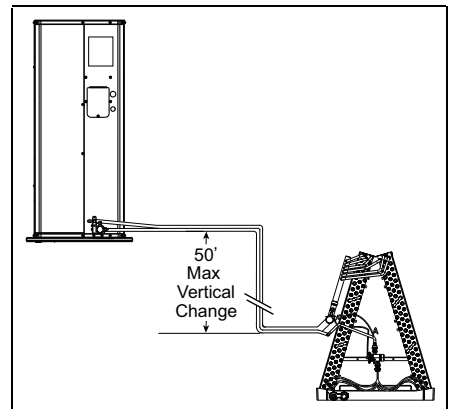
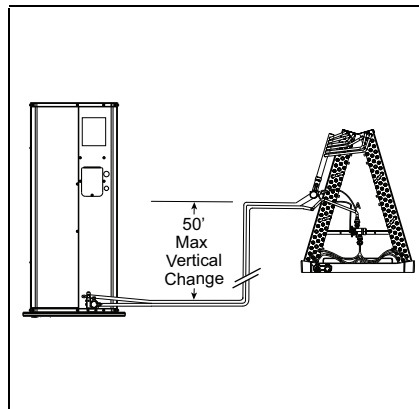
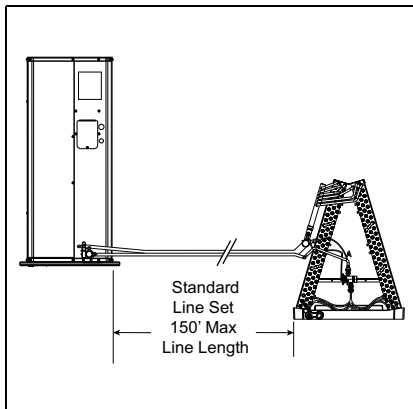


Table 2. Refrigerant Piping Limits

1. The maximum length of refrigerant lines from outdoor to indoor unit should NOT exceed 150 feet.
2. The maximum vertical change should not exceed 50 feet.
3. Service valve connection diameters are shown in "Refrigerant Line and Service Valve Connection Size Chart."



Unit Location Considerations

Table 3. Suggested Locations for Best Reliability

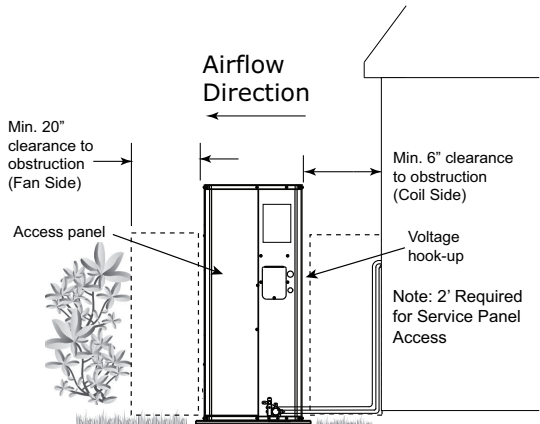
<ul style="list-style-type: none"> Do not locate close to bedrooms as operational sounds may be objectionable. Avoid locations near windows and similar areas where condensation and freezing defrost vapor can annoy a customer. The coil side of the outdoor unit must be a minimum of 6" from any wall or surrounding shrubbery to ensure adequate airflow. 	
<ul style="list-style-type: none"> A 36" minimum clearance is required on the line voltage electrical service side access panel to any wall or obstruction. For ease of service maintenance, provide 24" clearance in front of the control box (access panel) and any other side requiring service. It is recommended to leave a minimum clearance of 2" above unit for future top removal. 	

Table 4. Cold Climate Considerations

<p>Note: It is recommended that these precautions be taken for units being installed in areas where snow accumulation and prolonged below-freezing temperatures occur.</p> <ul style="list-style-type: none"> Units should be elevated 3–12 inches above the pad or rooftop, depending on local weather. This additional height will allow drainage of snow and ice melted during defrost cycle prior to its refreezing. Ensure that drain holes in unit base pan are not obstructed, preventing drainage of defrost water. If possible, avoid locations that are likely to accumulate snow drifts. If not possible, a snow drift barrier should be installed around the unit to prevent a build-up of snow on the sides of the unit.
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Table 5. Coastal Considerations

<p>If installed within one mile of salt water, including seacoasts and inland waterways, models with epoxy coated coils are available. Model numbers with "COT" in the eleventh (11) through thirteenth (13) digits represent epoxy coated coil. These models have an 8 week lead time after order.</p>

Unit Preparation

<ol style="list-style-type: none"> Check for damage and report promptly to the carrier any damage found to the unit. To remove the unit from the pallet, remove wood screws from mounting brackets.

Setting Up the Unit

Table 6. Pad Installation

<p>When installing the unit on a support pad, such as a concrete slab, consider the following:</p> <ul style="list-style-type: none"> The pad should be at least 1" larger than the unit on all sides. The pad must be separate from any structure. The pad must be level. The pad should be high enough above grade to allow for drainage. The pad location must comply with National, State, and Local codes. <p>Important:</p> <ul style="list-style-type: none"> Unit can be secured to the pad if there is concern of the unit tipping.

Important: Heat Pump models should never be stacked!



Unit Location Considerations

Refrigerant Line Considerations

Table 7. Refrigerant Line and Service Valve Connection Sizes

Model	Rated Line Sizes		Service Valve Connection Sizes	
	Vapor Line	Liquid Line	Vapor Line Connection	Liquid Line Connection
4TWL5024N1	3/4	3/8	3/4	3/8
4TWL5030N1	3/4	3/8	3/4	3/8
4TWL5036N1	7/8	3/8	7/8	3/8
4TWL5042N1	7/8	3/8	7/8	3/8
4TWL5048N1	7/8	3/8	7/8	3/8

Table 8. Factory Charge

The outdoor condensing units are factory charged with the system charge required for the outdoor condensing unit, ten (10) feet of tested connecting line, and the smallest rated indoor evaporative coil match. Always verify proper system charge via subcooling (TXV/EEV) or superheat (fixed orifice) per the unit nameplate.

Table 9. Required Refrigerant Line Length

Determine required line length and lift. You will need this to determine the subcooling charging corrections later in the installation process.

Total Line Length = _____ Ft.

Total Vertical Change (lift) = _____ Ft.

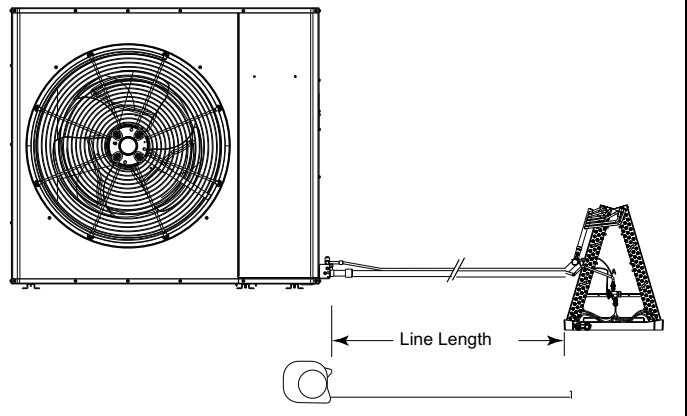


Table 10. Refrigerant Line Insulation

Important: The Vapor Line must always be insulated. DO NOT allow the Liquid Line and Vapor Line to come in direct (metal to metal) contact.

Note: The gas line must always be insulated. Insulating the liquid line through attic spaces may benefit system performance by minimizing heat gain in the liquid line.

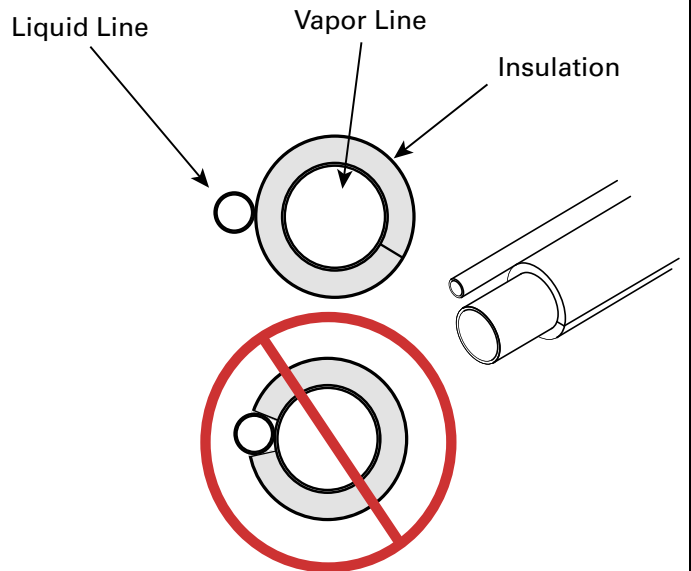


Table 11. Reuse Existing Refrigerant Lines

⚠ CAUTION
<p>REFRIGERANT! Failure to inspect or use proper service tools may result in equipment damage or personal injury. If using existing refrigerant lines make certain that all joints are brazed, not soldered.</p> <p>For retrofit applications, where the existing indoor evaporator coil and/or refrigerant lines will be used, the following precautions should be taken.</p> <ul style="list-style-type: none"> • Ensure that the indoor evaporator coil and refrigerant lines are the correct size. • Ensure that the refrigerant lines are free of leaks, acid, and oil. <p>Important: For more information, Refer to Refrigerant Piping Application Guide, SS-APG006F-EN, or Refrigerant Piping Software Program.</p>

Table 12. Refrigerant Line Routing Precautions

<p>Important: Comply with National, State, and Local Codes when isolating line sets from joists, rafters, walls, or other structural elements.</p> <p>Important: Take precautions to prevent noise within the building structure due to vibration transmission from the refrigerant lines.</p> <p>For Example:</p> <ul style="list-style-type: none"> • When the refrigerant lines must be fastened to floor joists or other framing in a structure, use isolation type hangers. • Isolation hangers should also be used when refrigerant lines are run in stud spaces or enclosed ceilings. • Where the refrigerant lines run through a wall or sill, they should be insulated and isolated. • Isolate the lines from all duct work. • Minimize the number of 90° turns.
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Table 13. Isolation From Joist/Rafter

<p>Secure Vapor Line from joists using isolators every 8 ft. Secure Liquid Line directly to insulated Vapor Line using tape, wire, or other appropriate method every 8 ft.</p>

Unit Location Considerations

Table 14. Isolation In Wall Spaces

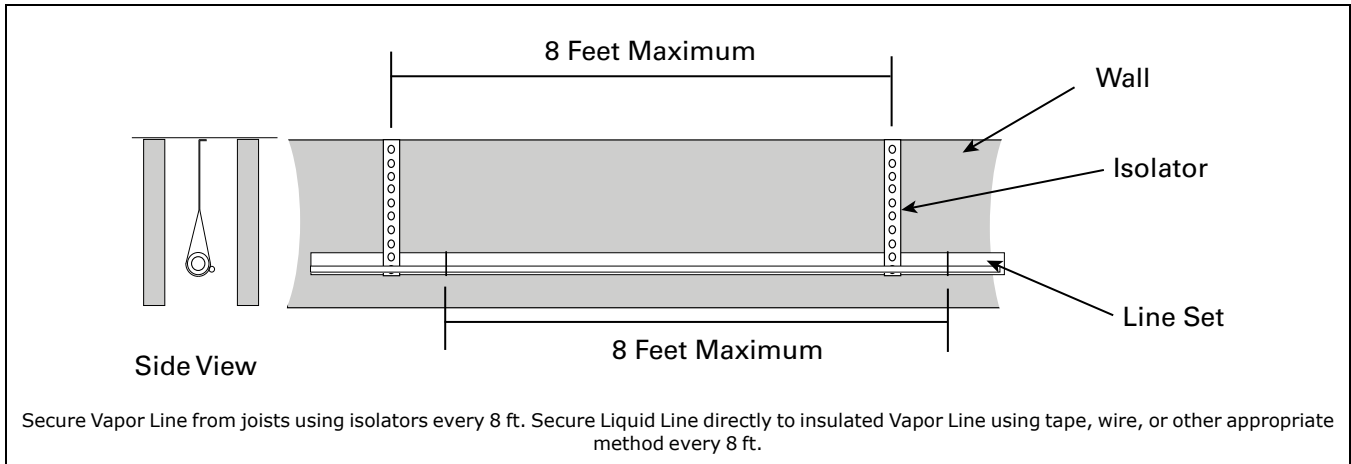
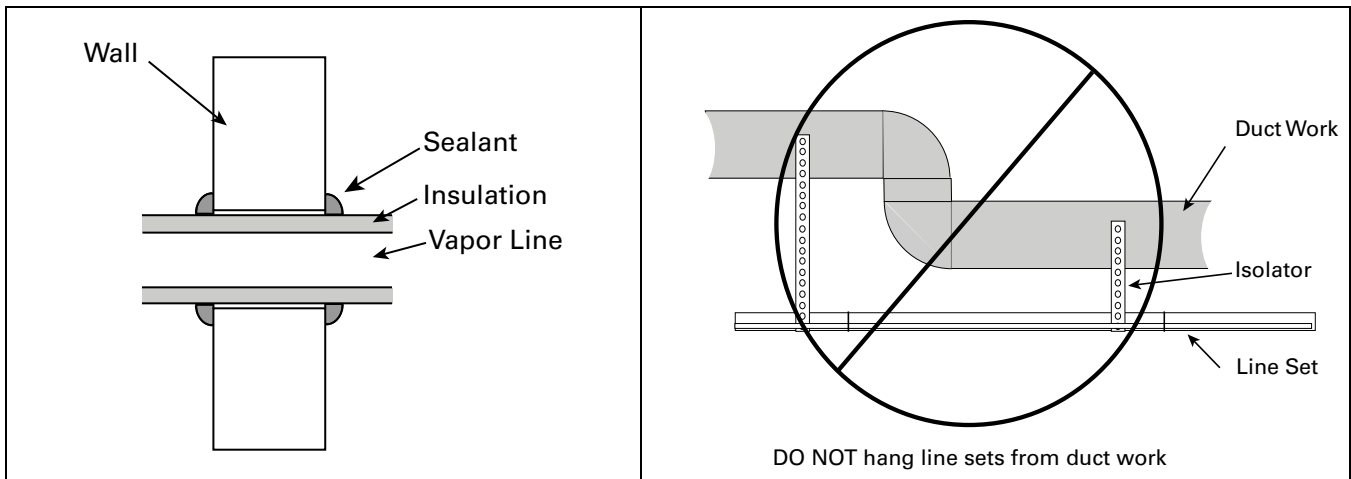


Table 15. Isolation Through Wall



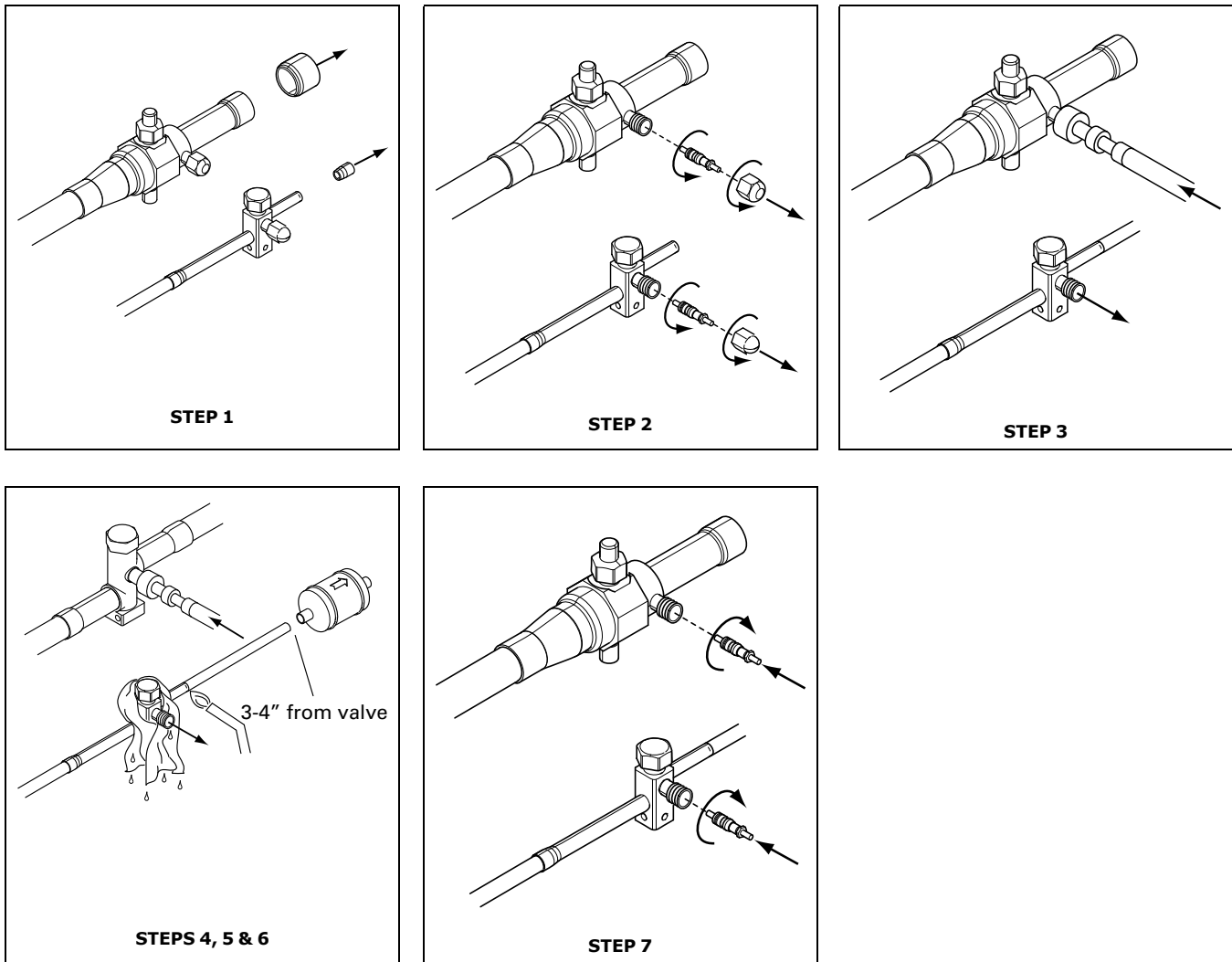
Refrigerant Line Brazing

Table 16. Braze the Refrigerant Lines

1. Remove caps or plugs. Use a deburring tool to debur the pipe ends. Clean both internal and external surfaces of the tubing using an emery cloth.
2. Remove the pressure tap cap and valve core from each service valves.
3. Purge the refrigerant lines and indoor coil with dry nitrogen.
4. Wrap a wet rag around the valve body to avoid heat damage and continue the dry nitrogen purge.
5. Braze the refrigerant lines to the service valves.
 - a. For Units shipped with a field-installed external drier, check liquid line filter drier's directional flow arrow to confirm correct direction of refrigeration flow (away from outdoor unit and toward evaporator coil) as illustrated. Braze the filter drier to the Liquid Line.
6. Continue the dry nitrogen purge. Do not remove the wet rag until all brazing is completed.

Important: Remove the wet rag before stopping the dry nitrogen purge.

Note: Precautions should be taken to avoid heat damage to base pan during brazing. It is recommended to keep the flame directly off of the base pan.
7. Replace the pressure tap valve cores after the service valves have cooled.



Refrigerant Line Leak Check

Table 17. Check for Leaks

1. Pressurize the refrigerant lines and evaporator coil to 150 PSIG using dry nitrogen.
2. Check for leaks by using a soapy solution at each brazed location.

Note: Remove nitrogen pressure and repair any leaks before continuing.

Refrigerant Line and Indoor Coil Evacuation

Important: Do not open the service valves until the refrigerant lines and indoor coil leak check and evacuation are complete.

1. Evacuate until the micron gauge reads no higher than 350 microns, then close off the valve to the vacuum pump.
2. Observe the micron gauge. Evacuation is complete if the micron gauge does not rise above 500 microns in one (1) minute.
3. When evacuation is complete, blank off the vacuum pump and micron gauge, and close the valves on the manifold gauge set.

Service Valves

Table 18. Open the Gas Service Valve

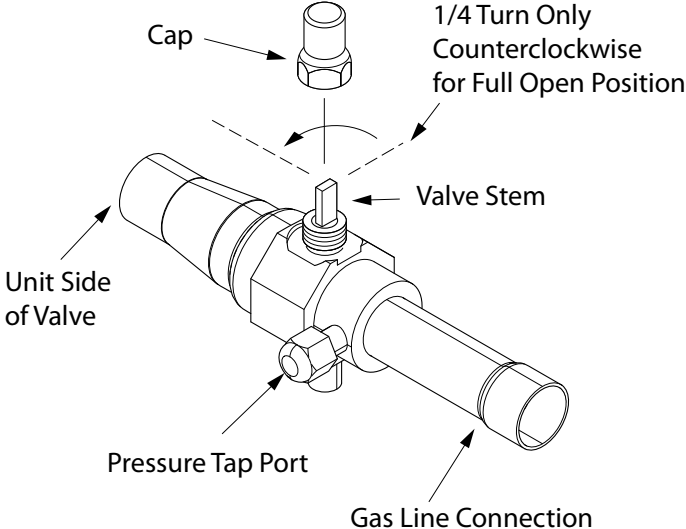
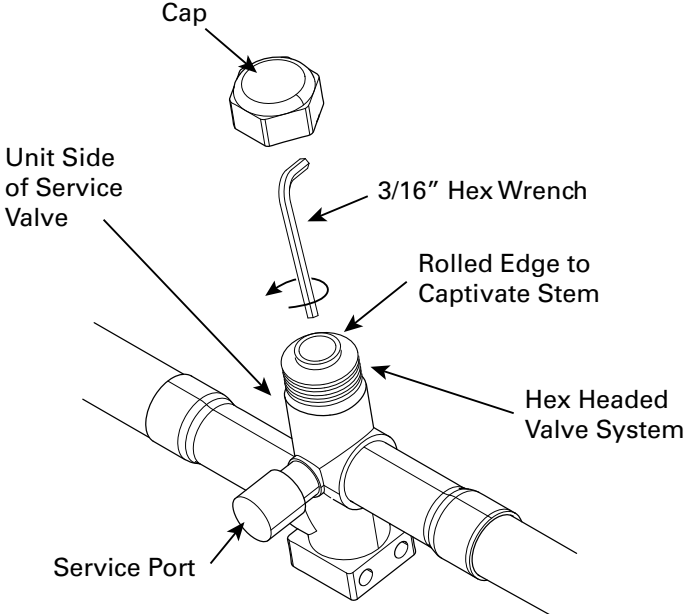
<p>Important: Leak check and evacuation must be completed before opening the service valves.</p> <p>Note: Do not vent refrigerant gases into the atmosphere.</p> <ol style="list-style-type: none"> 1. Remove valve stem cap. 2. Using a wrench, turn valve stem 1/4 turn counterclockwise to the fully open position. 3. Replace the valve stem cap to prevent leaks. Tighten finger tight plus an additional 1/4 turn. 	
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Table 19. Open the Liquid Service Valve

<div style="background-color: black; color: white; padding: 5px; text-align: center;"> <p>⚠ WARNING</p> <p>SERVICE VALVES!</p> <p>Failure to follow this warning will result in abrupt release of system charge and may result in personal injury and/or property damage. Extreme caution should be exercised when opening the Suction and Liquid Line Service Valve. Turn valve stem counterclockwise only until the stem contacts the rolled edge. No torque is required.</p> </div> <p>Important: Leak check and evacuation must be completed before opening the service valves.</p> <ol style="list-style-type: none"> 4. Remove service valve cap. 5. Fully insert 3/16" hex wrench into the stem and back out counterclockwise until valve stem just touches the rolled edge (approximately five (5) turns). 6. Replace the valve cap to prevent leaks. Tighten finger tight plus an additional 1/4 turn. 	
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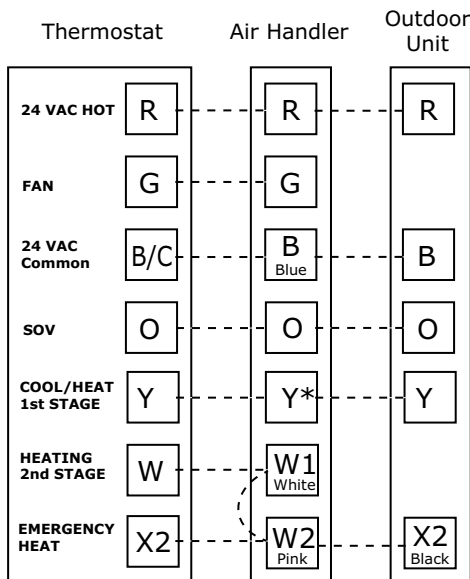
Electrical – Low Voltage Non Communicating

Table 20. Low Voltage Maximum Wire Length

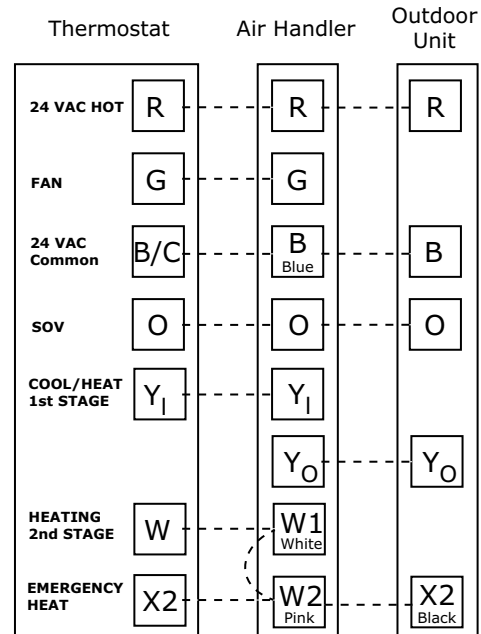
<p>The table defines the maximum total length of low voltage wiring from the outdoor unit, to the indoor unit, and to the thermostat.</p> <p>Note: The use of color coded low voltage wire is recommended to simplify connections between the outdoor unit, the control, and the indoor unit.</p>	24 VOLTS	
	WIRE SIZE	MAX. WIRE LENGTH
	18 AWG	150 Ft.
	16 AWG	225 Ft.
	14 AWG	300 Ft.

Low Voltage Hook-up Diagrams

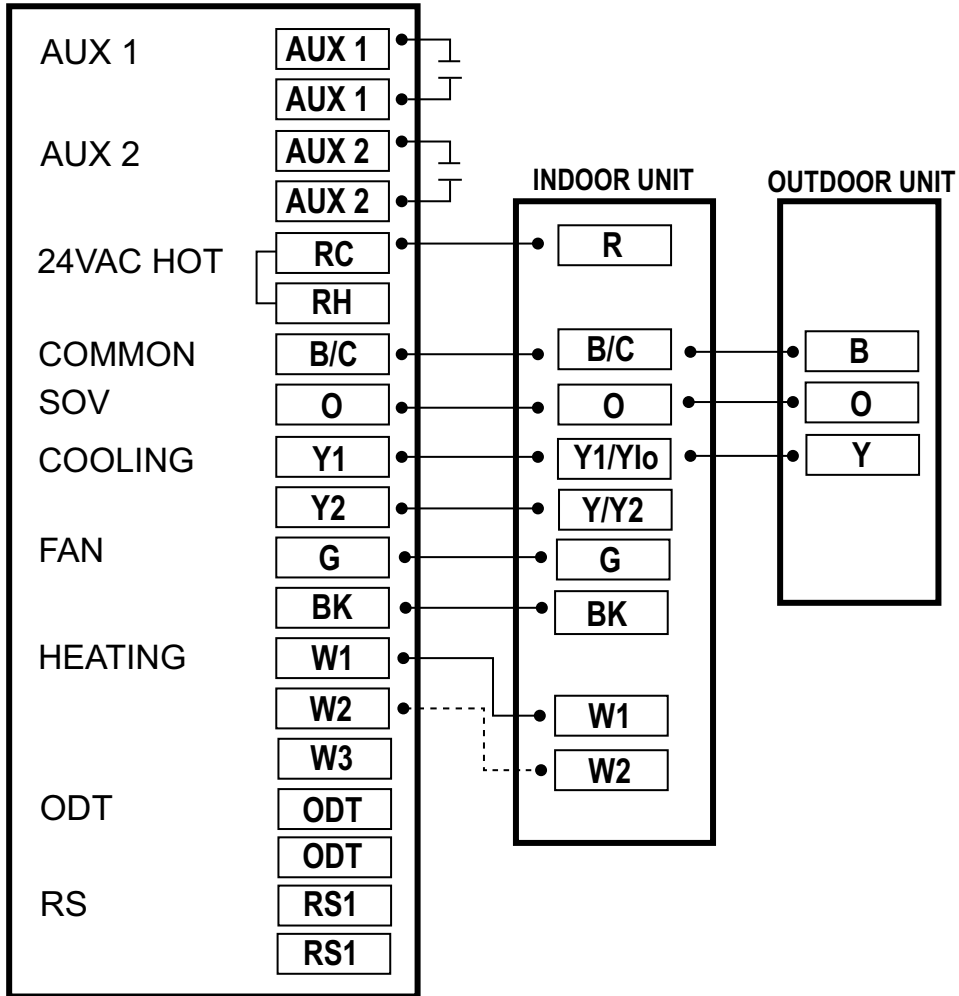
With TEM 3, 4, 6, 8



With TAM 4, 5, 7, 9



- Units with pigtails require wirenuts for connections.
- In AC systems for multiple stages of electric heat, jumper W1 and W2 together if comfort control has only one stage of heat.
- * Y2 for TEM6

2 Stage HP Thermostat


Electrical – High Voltage

Table 21. High Voltage Power Supply

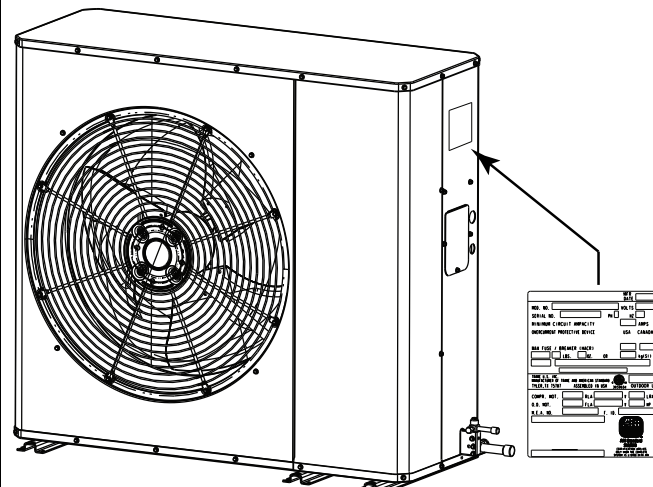
<p style="text-align: center;">⚠ WARNING</p> <p>LIVE ELECTRICAL COMPONENTS! Failure to follow this Warning could result in property damage, severe personal injury, or death. Follow all electrical safety precautions when exposed to live electrical components. It may be necessary to work with live electrical components during installation, testing, servicing, and troubleshooting of this product.</p> <p>The high voltage power supply must agree with the equipment nameplate.</p> <p>Power wiring must comply with national, state, and local codes.</p> <p>Follow instructions on unit wiring diagram located on the inside of the control box cover.</p>	
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Table 22. High Voltage Disconnect Switch

<p style="text-align: center;">⚠ WARNING</p> <p>HIGH LEAKAGE CURRENT! Failure to follow this Warning could result in property damage, severe personal injury, or death. Earth connection essential before connecting electrical supply.</p> <p>Install a separate disconnect switch at the outdoor unit.</p> <p>For high voltage connections, flexible electrical conduit is recommended whenever vibration transmission may create a noise problem within the structure.</p>	<p style="text-align: center;">⚠ WARNING</p> <p>HAZARDOUS VOLTAGE! Voltage may be present with power disconnected due to high winds causing fan rotation. See Technical Manual for servicing instructions.</p>
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Table 23. High Voltage Disconnect Switch

<p>Ground the outdoor unit per national, state, and local code requirements.</p>	
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System Start Up

1. Set the system thermostat to OFF.
2. Turn on electrical power disconnect(s) to apply power to the indoor and outdoor units.
3. Wait one (1) hour before starting the unit if compressor crankcase heater accessory is used and the Outdoor Ambient is below 70°F.
4. Set the system thermostat to ON.

System Charge Adjustment

Table 24. Temperature Measurements (Systems can be rated with TXV, EEV or Piston. Ensure charging method is correct).

Check the outdoor temperatures.

Subcooling using **“Charging Mode-Cooling”** is the only recommended method of charging between 55 ° F and 120° F ambient outdoor temperature.

Note: For Superheat (In Cooling Mode), refer to the Superheat Charging Table

For best results the indoor temperature should be kept between 70° F to 80° F.

Table 25. Subcooling Charging Corrections

Determine the final subcooling value using total Line Length and Lift — See Required Refrigerant Line Length and the Subcooling Charging Corrections Charts.

Subcooling Charging Correction Worksheet

Total Line Length (ft) _____

Total Vertical Charge (lift) _____
(Values from — Required Refrigerant Line Length)

Design Subcooling Value _____
(from nameplate)

Final Subcooling Value _____

Subcooling Charging in Cooling between 55° F and 120° OD Ambient

Trane has always recommended installing Trane approved matched indoor and outdoor systems.

The benefits of installing approved indoor and outdoor split systems are maximum efficiency, optimum performance and the best overall reliability.

The following charging methods are therefore prescribed for matched systems with indoor TXVs/EEVs.

1. Subcooling (in the cooling mode) is the only recommended method of charging above 55° ambient temperatures.
2. For best results — the indoor temperature should be kept between 70° to 80° F. Add system heat if needed.
3. At startup, or whenever charge is removed or added, the system must be operated for a minimum of (20) minutes to stabilize before accurate measurements can be made.
4. Measure Liquid Line Temperature and Refrigerant Pressure at service valves.
5. Determine total refrigerant line length, and height (lift) if indoor section is above the condenser.
6. Determine the Design Subcooling Charging Temperature from the unit nameplate.
7. Locate this value in the appropriate column of the Subcooling Charging Table. Locate your liquid line temperature in the left column of the table, and the intersecting liquid line pressure under your nameplate subcool value column. Add refrigerant to raise the pressure to match the table, or remove refrigerant to lower the pressure. Again, wait (20) minutes for the system conditions to stabilize before adjusting charge again.
8. When system is correctly charged, you can refer to System Pressure Curves to verify typical performance.

Subcool Charging Charts

Figure 1. 2.0 and 2.5 Ton Models

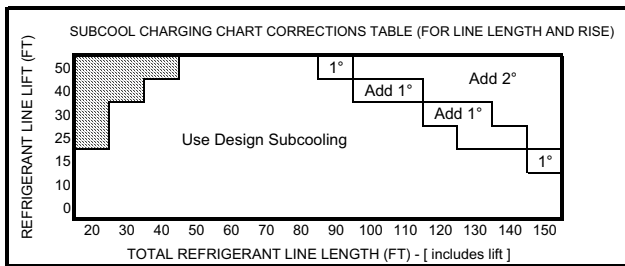


Figure 2. 3.0 Ton Models

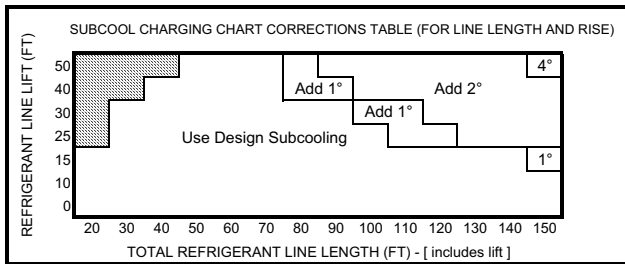
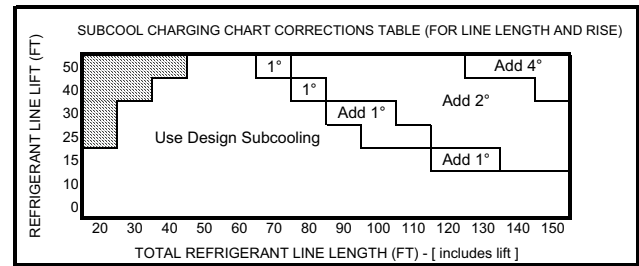


Figure 3. 3.5 and 4.0 Ton Models



Charging the Unit

Table 26. Stabilize the system

1. Wait 20 minutes for the system condition to stabilize between adjustments.

Note: When the Liquid Line Temperature and Gage Pressure approximately match the chart, the system is properly charged.

2. Remove gauges.
3. Replace service port caps to prevent leaks. Tighten finger tight plus an additional 1/4 turn.

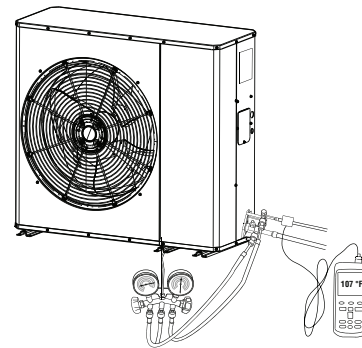
Table 27. Proper Gage Pressure

Measure the liquid line temperature and pressure at the outdoor unit's service valve.

Measure Liquid Line Temp = _____ °F

Liquid Gage Pressure = _____ PSI

Final Subcooling Value = _____ °F



System Start Up

Table 28. Verify Performance

<p>4. Refer to "Pressure Curves," p. 26 to verify typical performance.</p>	<p style="text-align: center;">PRESSURE CURVE SAMPLE</p> <p>The figure contains four graphs arranged in a 2x2 grid. The top row is for Cooling @ 1450 SCFM and the bottom row is for Heating @ 1350 SCFM. The left column shows Discharge Pressure (PSIG) vs. Outdoor Temperature (Degree F), and the right column shows Suction Pressure (PSIG) vs. Outdoor Temperature (Degree F). Each graph includes curves for Indoor Wet Bulb (WB) and Indoor Dry Bulb (DB) temperatures, with a note to 'TOP TO BOTTOM' and 'LEFT TO RIGHT'.</p>
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Table 29. Proper Gage Pressure

<p>Adjust refrigerant level to attain proper gage pressure.</p> <p>Add refrigerant if the Liquid Gage Pressure is lower than the chart value.</p> <ol style="list-style-type: none"> 5. Connect gauges to refrigerant bottle and unit as illustrated. 6. Purge all hoses. 7. Open bottle. 8. Stop adding refrigerant when liquid line temperature and Liquid Gage Pressure match the charging chart. <p>Note: Recover refrigerant if the Liquid Gage Pressure is higher than the chart value.</p>	<p>The diagram shows a refrigerant charging station with a bottle, gauges, and hoses connected to the service ports of an outdoor HVAC unit. A digital thermometer is also shown displaying 107°F.</p>
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Table 30. System Information

<p>9. Record system pressures and temperatures after charging is complete.</p> <p>Outdoor model number = _____</p> <p>Measured Outdoor Ambient = _____ °F</p> <p>Measured Indoor Ambient = _____ °F</p> <p>Measured Liquid Line Temp = _____ °F</p> <p>Measured Suction Line Temp = _____ °F</p>	<p>Indoor Wet Bulb = _____ °F</p> <p>Liquid Gage Pressure = _____ PSIG</p> <p>Suction Gage Pressure = _____ PSIG</p>
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Refrigerant Charging Chart and Checkout Procedures

Table 31. R-410A Refrigerant Charging Chart

LIQUID TEMP (°F)	DESIGN SUBCOOLING (°F)						
	8	9	10	11	12	13	14
	LIQUID GAGE PRESSURE (PSI)						
55	179	182	185	188	191	195	198
60	195	198	201	204	208	211	215
65	211	215	218	222	225	229	232
70	229	232	236	240	243	247	251
75	247	251	255	259	263	267	271
80	267	271	275	279	283	287	291
85	287	291	296	300	304	309	313
90	309	313	318	322	327	331	336
95	331	336	341	346	351	355	360
100	355	360	365	370	376	381	386
105	381	386	391	396	402	407	413
110	407	413	418	424	429	435	441
115	435	441	446	452	458	464	470
120	464	470	476	482	488	495	501
125	495	501	507	514	520	527	533

Table 32. Checkout Procedures

The final phase of the installation is the system Checkout Procedures. The following list represents the most common items covered in a Checkout Procedure. Confirm all requirements in this document have been met.

<ul style="list-style-type: none"> <input type="checkbox"/> All wiring connections are tight and properly secured. <input type="checkbox"/> Voltage and running current are within limits. <input type="checkbox"/> All refrigerant lines (internal and external to equipment) are isolated, secure, and not in direct contact with each other or structure. <input type="checkbox"/> All braze connections have been checked for leaks. A vacuum of 350 microns provides confirmation that the refrigeration system is leak free and dry. <input type="checkbox"/> Final unit inspection to confirm factory tubing has not shifted during shipment. Adjust tubing if necessary so tubes do not rub against each other or any component when unit runs. <input type="checkbox"/> Ductwork is sealed and insulated. <input type="checkbox"/> All drain lines are clear with joints properly sealed. Pour water into drain pan to confirm proper drainage. Provide enough water to ensure drain trap is primed. 	<ul style="list-style-type: none"> <input type="checkbox"/> Supply registers and return grilles are open, unobstructed, and air filter is installed. <input type="checkbox"/> Indoor blower and outdoor fan are operating smoothly and without obstruction. <input type="checkbox"/> Indoor blower motor set on correct speed setting to deliver required CFM. "Blower and fan set screws are tight." <input type="checkbox"/> Cover panels are in place and properly tightened. <input type="checkbox"/> For gas heating systems, manifold pressure has been checked and all gas line connections are tight and leak free. <input type="checkbox"/> For gas heating systems, flue gas is properly vented. <input type="checkbox"/> System functions safely and properly in all modes. <input type="checkbox"/> Owner has been instructed on use of system and given manual.
--	--



Defrost Control

Defrost Control

The demand defrost control measures heat pump outdoor ambient temperature with a sensor located outside the outdoor coil. A second sensor located on the outdoor coil is used to measure the coil temperature. The difference between the ambient and the colder coil temperature is the difference or delta-T measurement. This delta-T measurement is representative of the operating state and relative capacity of the heat pump system. Measuring the change in delta-T determines the need for defrost. The coil sensor also serves to sense outdoor coil temperature for termination of the defrost cycle.

Fault Detection

A fault condition is indicated by the flashing Fault LED light on the defrost control board located inside the heat pump control box.

In normal operation, the status LED will flash once each second when idle or twice each second with a call for heating or cooling.

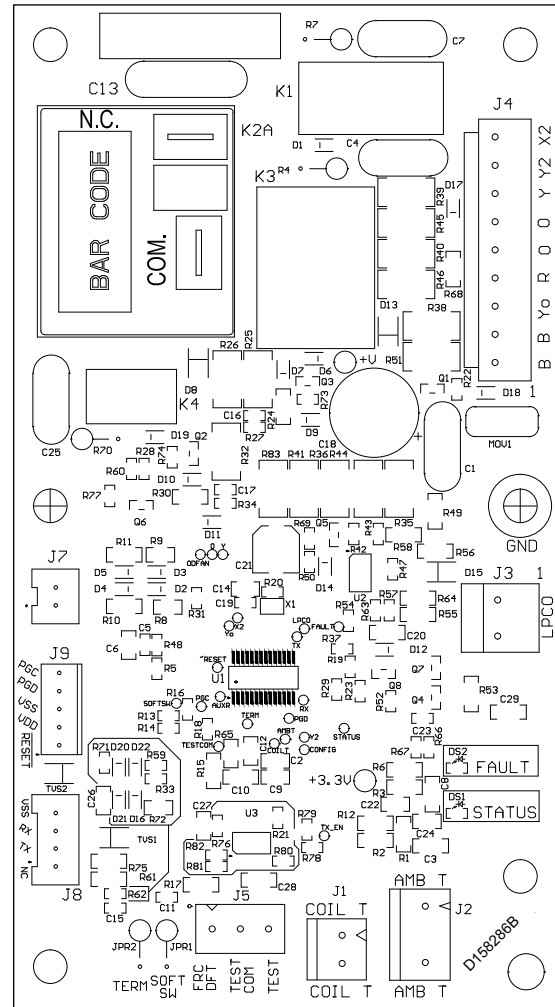
PIN Identification

1. TEST_COMMON (Shorting any of the other pins to this pin causes the function of the other pin to be executed. Leaving this pin open results in the normal mode of operation).
2. FRC_DFT = Forced Defrost (Short TEST_COMMON to this pin speeds up all defrost. Remove the short after defrost initiates).

Defrost Control Checkout

Normal operation requires:

- a. Status LED on board flashing 1 time/second in standby or 2 times/second with a call for heating or cooling.
- b. 24V AC between R & B
- c. 24V AC between Y, Y0 & B with unit operating
- d. Defrost initiation when FRC_DFT pin is shorted to TEST_COMMON pin.



Test Sensors

Measure the temperature the subject sensor is exposed to. If the sensor is mounted on a tube, place the lead on an Annie A-8 (or equiv.) temperature tester on the same tube near the sensor and insulate the bulb.

Unplug the sensor and measure the resistance with a good quality ohmmeter (Simpson 260 or equiv.). Read the value as quickly as possible to prevent the meter current from changing the resistance reading.

Using the chart, locate (as close as possible) the actual sensor temperature. The measured resistance should be relatively close to the resistance value shown in the chart.

Table 33. Defrost Control Thermistor Table

TEMP °F	TEMP °C	THERMISTOR RESISTANCE (OHMS)	Volts DC
-15.00	-26.11	135976	2.50
-10.00	-23.33	115112	2.40
-5.00	-20.56	97745	2.29
0.00	-17.78	83247	2.17
5.00	-15.00	71108	2.05
10.00	-12.22	60916	1.93
15.00	-9.44	52333	1.81
20.00	-6.67	45076	1.69
25.00	-3.89	38927	1.56
30.00	-1.11	33703	1.45
35.00	1.67	29253	1.33
40.00	4.44	25452	1.22
45.00	7.22	22198	1.12
50.00	10.00	19405	1.02
55.00	12.78	17002	0.93
60.00	15.56	14930	0.85
65.00	18.33	13138	0.77
70.00	21.11	11586	0.70
75.00	23.89	10238	0.63
80.00	26.67	9065	0.57
85.00	29.44	8043	0.52
90.00	32.22	7150	0.47
95.00	35.00	6368	0.42
100.00	37.78	5682	0.38
105.00	40.56	5079	0.35
110.00	43.33	4548	0.31
115.00	46.11	4079	0.28
120.00	48.89	3665	0.26
125.00	51.67	3298	0.23
130.00	54.44	2972	0.21
135.00	57.22	2683	0.19

Example:

Sensor temp. = 19°F

Measured Resistance = 46K ohms

This sensor is good since the measured value is relatively close to the chart value.

Table 34. DEMAND DEFROST QUICK SPECS

COMPRESSOR	SCROLL	SCROLL
MNEMONIC NO CNT	CNT08177	CNT08176
GROUP NOMENCLATURE (a)	D161244G01	D161246G02
SUPERSEDURE CNT	07824	07825
OD FAN TYPE - PSC/ECM	PSC	ECM
	1-SPD	1-SPD
DEFROST ENABLED: Y = ON COIL TEMPERATURE	≤52 °F (b)	≤52 °F
DEFROST PERMIT: Y = ON COIL TEMPERATURE	≤32 °F	≤32 °F
MIN DEFROST TIME (MINUTES)	1	1
TARGET DEFROST TIME (MINUTES)	4	4
MAX TIME OVERRIDE (MINUTES +)	15	15
DEFROST TERMINATE COIL TEMPERATURE (Factory Setting)	47°F	47°F
DEFROST HI TERMINATE COIL TEMPERATURE (Cut Jumper 2)	70° F	70°F
SOV SWITCH-OVER DELAY AFTER DEFROST TERM. (SECONDS)	12	12
DEFEAT SWITCH-OVER DELAY (SECONDS) (Cut Jumper 1)	0	0
LOW AMBIENT HEAT PUMP LOCK OUT	-12°F	-12°F
LOW AMBIENT HEAT PUMP RESUME	-3	-3
LPCO INPUT TO CONTROL	YES	YES
LPCO BYPASS IN/OUT DEFROST (MINUTES)	3	3

(a) GROUP suffix for drawing number D

(b) ≤ (EQUAL OR LESS THAN)

Table 35. LED FAULT CODES

LED FAULT CODES	FAULT DESCRIPTION	DEFROST CONTROL BEHAVIOR
1 FLASH	Ambient Temp Sensor is out of range (open/shorted)	Initiate defrost after every 60 minutes of runtime. Defrost will terminate on coil temp. See Note 1 & 2.
2 FLASH	Coil Temp Sensor is out of range (open/shorted)	Initiate a 15 minute forced defrost after every 60 minutes of runtime. See Note 1 & 2.
3 FLASH	Low Pressure Switch is open	3 flash goes away when/if LPCO closes.
4 FLASH	Hard Lock Out (can only be cleared with a low voltage power cycle)	Occurs after 9 th trip of LPCO. See Note 6.

Defrost Control

Table 35. LED FAULT CODES (continued)

LED FAULT CODES	FAULT DESCRIPTION	DEFROST CONTROL BEHAVIOR
5 FLASH	Soft Lock Out	5 flash goes away after soft lockout period expires. See Note 2.
6 FLASH	Defrost cycles too close together	Heating short cycle fault triggers 6 flash. The system will follow 10 adaptive time heating cycles and then return to demand defrost.
9 FLASH	Low Ambient Soft Lockout. Outdoor temperature dropped below 3°F. (OFF at -12°F/ON at 3°F)	Outdoor temperature is below -12°F. See Note 5.

1. Initiate Adaptive/Timed Limp Mode so long as Coil Temp Sensor is functional. Monitor actual time in defrost and add or reduce run time until next forced defrost based on achieving a 4 minute (+/-1) defrost period.
2. This defrost control utilizes a safety strategy called "Adaptive Limp Mode". Adaptive limp mode is defined as a timed heating mode following rapid defrosts (accumulated heating times between defrost totaling less than 15 minutes). Once invoked the DFC will limit defrost periods and maximize heating capacity. While in adaptive limp mode the DFC will monitor heating and defrost periods for no longer than 10 cycles. The DFC will then release the board to demand defrost; however, if the LPCO trips while in limp mode the system will initiate a soft lockout and exit limp mode.

If both Coil Temp Sensor and Ambient Temp Sensor have failed, initiate a 5 minute forced defrost every 60 minutes of run time. This in conjunction with the normal low pressure trip, will initiate a soft lockout.

- a. A short heating cycle that enters defrost in 15 minutes or less and/or enters two more defrosts with less than 15 minutes of accumulative run time each will enter an Adaptive Limp Mode (6 Flash).
- b. Coil sensor failure will initiate a Timed Limp Mode. This will be accompanied by a 2 flash. The DFC will initiate defrost after 60 minutes of accumulated heating runtime and terminate after a 5 minute defrost. The limp mode will clear after the sensor fault is cleared.
- c. Ambient sensor failure will initiate an Adaptive Timed Limp Mode. This will be accompanied by a 1 flash. The DFC will initiate defrost after 60 minutes of accumulated heating runtime and force a defrost, which will terminate on coil

temp. The limp mode will clear after the sensor fault is cleared.

- d. This could be caused by a condenser fan motor failure, low charge or other reasons.
3. The first 15 minute soft lockout the system will return to normal operation. Should this continue to operate in this manner there will be a 30 minute soft lockout and so on. At the end of the lockout process, if a hard lock is necessary, a 4 flash will be announced and system operation is interrupted. If the ambient temperature climbs above 40°F for more than 30 minutes this clears this fault count and resumes normal operation.
 - a. If or when normal operation is restored after the ambient temperature climbs above 40°F for more than 30 minutes and another LP trip is monitored on the 9th trip this will initiate a hard lockout that will not be cleared by temperature or time.
 4. Once ambient drops to -12 or lower wait 5 minutes before soft lockout begins. During soft lockout the Y signal passes through to the X2 output. Resume operation when ambient temperature rises to -3°F or higher and after 5 minute soft lockout period expires. LPCO should reset around 5°F.
 5. During a Hard Lockout, the X2 relay opens so that the Y signal **does not** pass through.

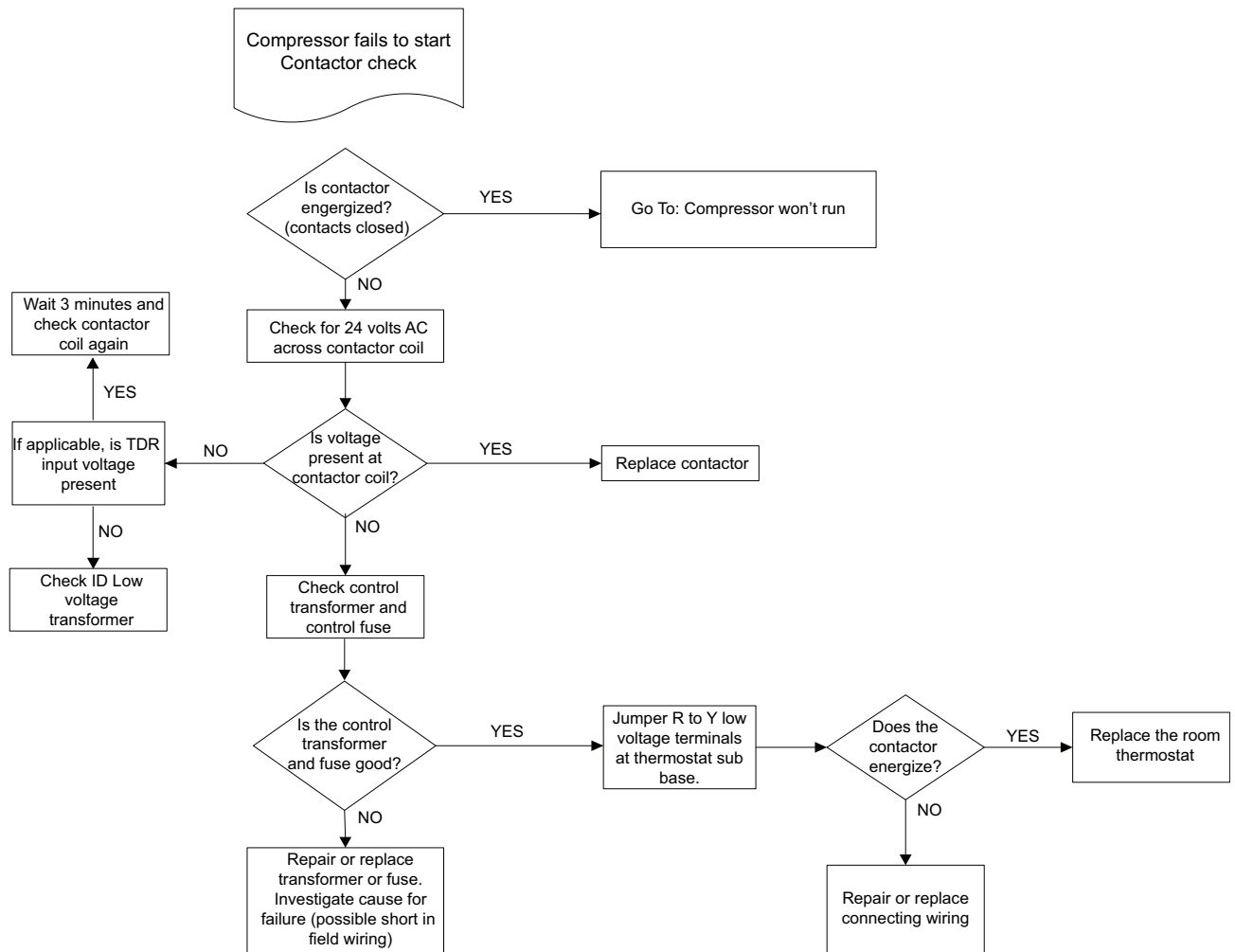
LPCO	HEATING Mode	Flash Code
1 st Trip	15 minute soft lock-out period	5 and 6 flash
2 nd Trip	30 minute soft lock-out period	5 and 6 flash
3 rd Trip	45 minutes soft lock-out period	5 and 6 flash
4 th – 8 th Trip	18 hour soft lock-out period	5 and 6 flash
9 th Trip (a)	Hard lock-out	4 flash

(a) If LPCO is open, a 3 flash can accommodate any of the faults above and will clear when the LPCO closes.

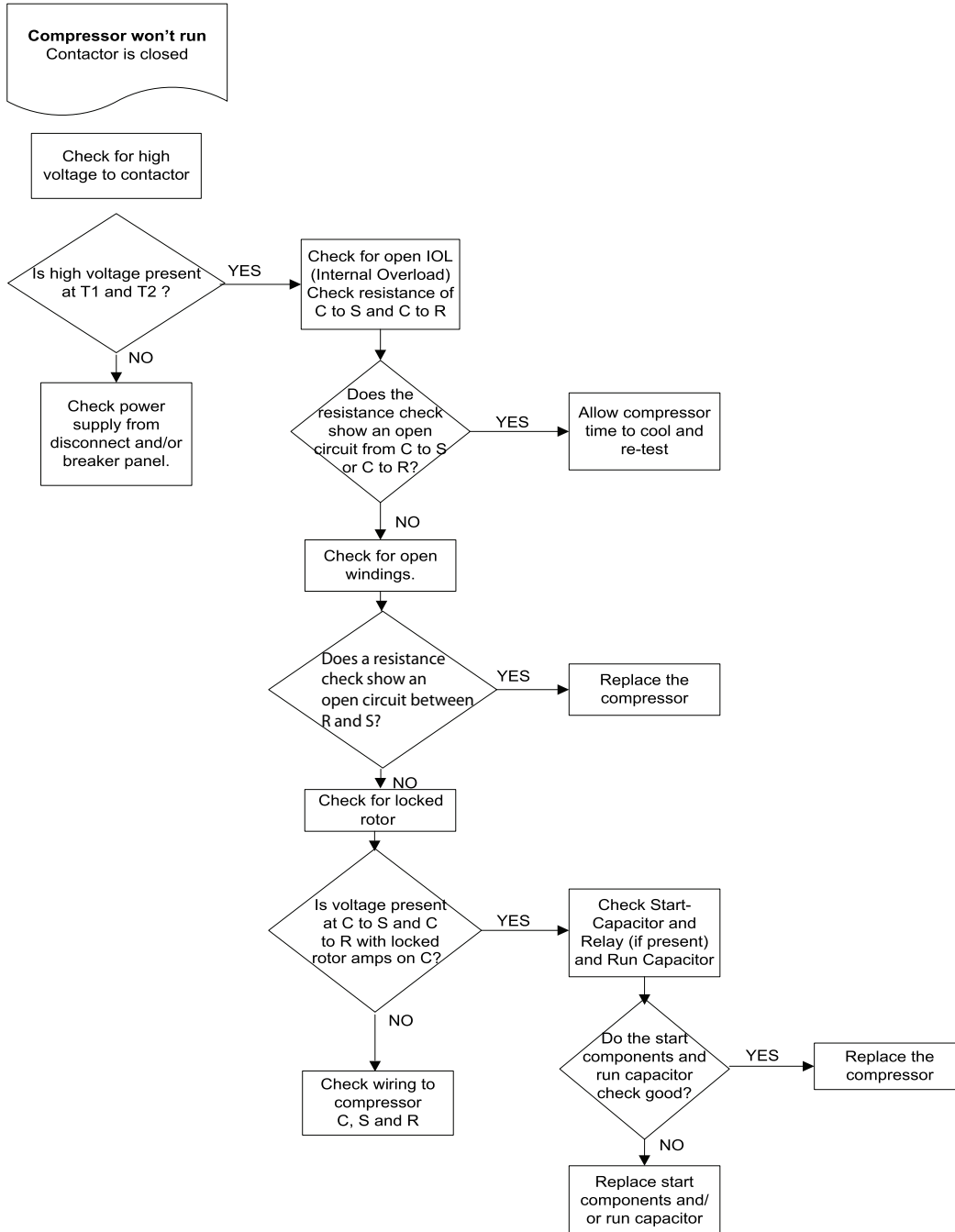
LPCO	COOLING Mode	Flash Code
1 st Trip	15 minute soft lock-out period	5 and 6 flash
2 nd Trip	30 minute soft lock-out period	5 and 6 flash
3 rd Trip	18 hour soft lock-out period	5 and 6 flash
4 th Trip	18 hour soft lock-out period	4 flash

Note: Once the LPCO closes, the 3 flash fault will not continue showing – only 5 flash if in the soft-lockout period.

Troubleshooting



Troubleshooting



Wiring Diagrams

Figure 4. 2.0, 2.5 and 3.0 Ton Models

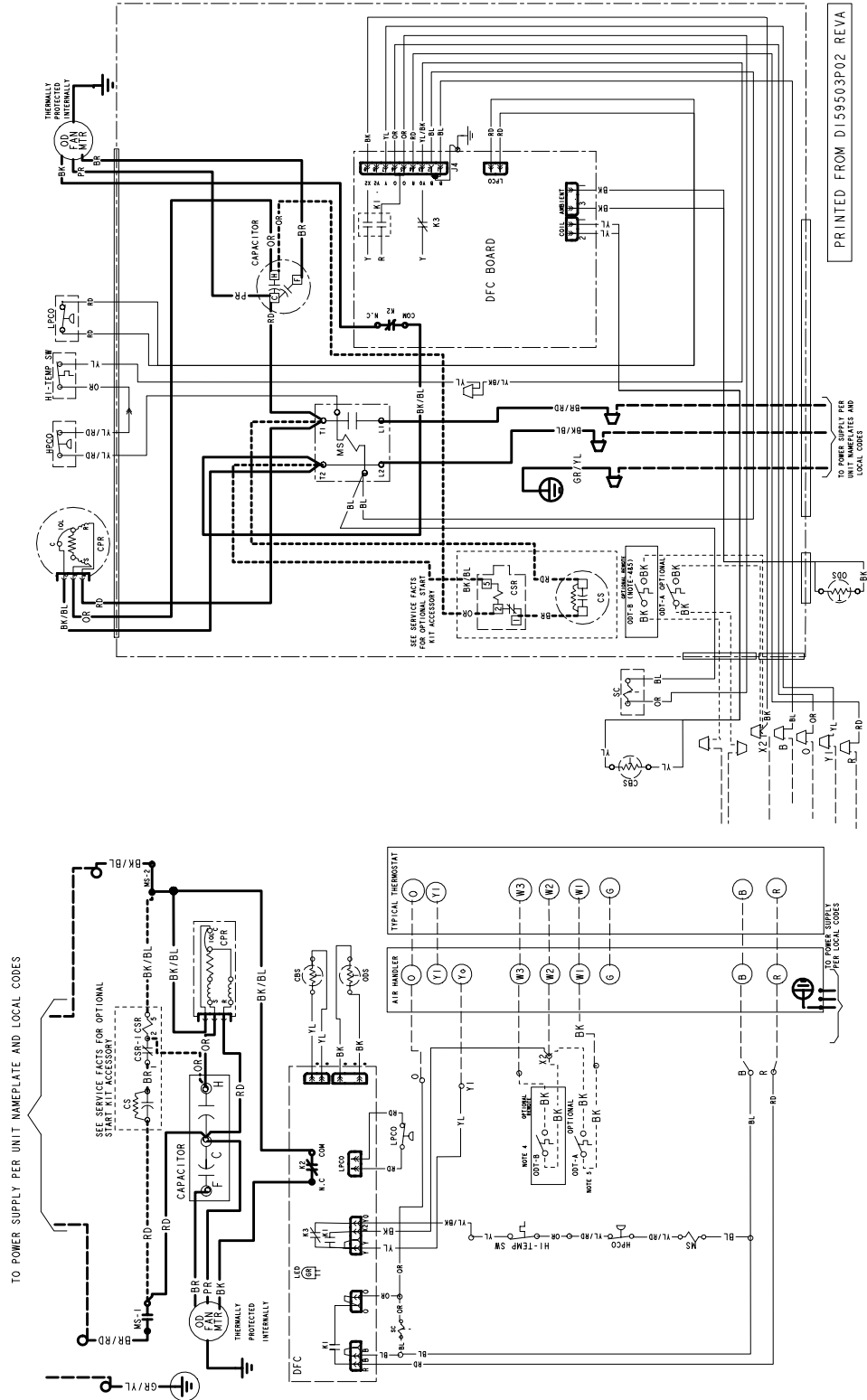
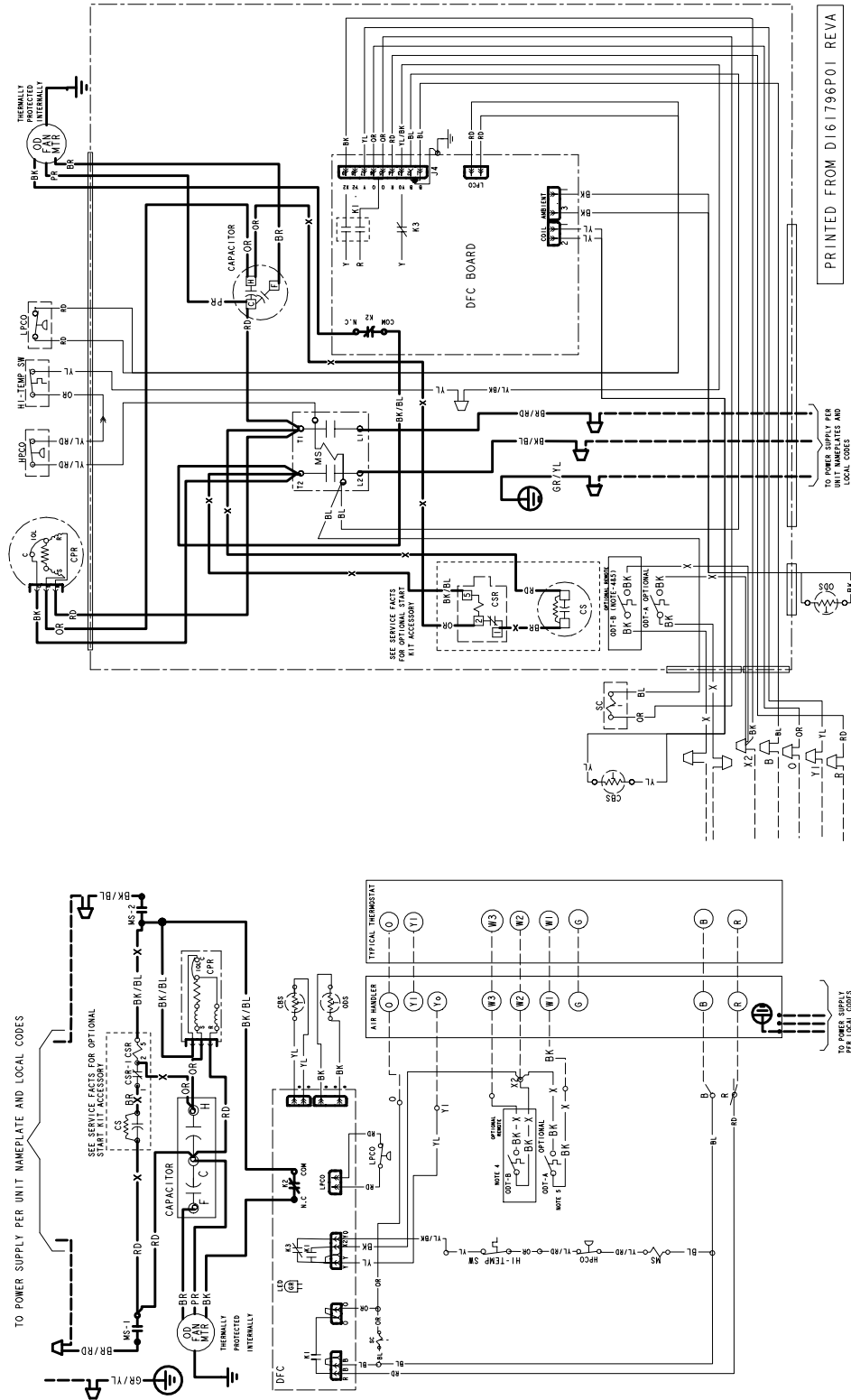


Figure 5. 3.5 and 4.0 Ton Models



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NOTES:

1. BE SURE POWER SUPPLY AGREES WITH EQUIPMENT NAMEPLATE.
2. POWER WIRING AND GROUNDING OF EQUIPMENT MUST COMPLY WITH LOCAL CODES.
3. LOW VOLTAGE WIRING TO BE NO. 18 AWG MINIMUM CONDUCTOR.
4. ODT-B MUST BE SET LOWER THAN ODT-A
5. IF ODT-A IS NOT USED, ADD JUMPER BETWEEN W1 AND W2 AT AIR HANDLER

LEGEND

24 V } FACTORY WIRING	RELAY CONTACT (N.O)
LINE V }	RELAY CONTACT (N.C)
24 V } FIELD WIRING	THERMISTOR
LINE V }	TEMP ACTUATED SWITCH
24 V } FIELD INSTALLED	PRESSURE ACTUATED SWITCH
LINE V } FACTORY WIRING	MOTOR WINDING
FIELD INSTALLED FACTORY WIRING	POL. PLUG FEMALE HOUSING (MALE TERMINALS)
MAGNETIC COIL	POL. PLUG MALE HOUSING (FEMALE TERMINALS)
GROUND	SINGLE INLINE CONNECTION
JUNCTION	
CAPACITOR	
WIRE NUT OR CONNECTOR	
TERMINAL	
TRANSFORMER	
FUSE	
TERMINAL BLOCK/BOARD	
ACR A/C RECTIFIER	
CBS COIL BOTTOM SENSOR	
CF FAN CAPACITOR	
CN WIRE CONNECTOR	
CPR COMPRESSOR	
CR RUN CAPACITOR	
CS STARTING CAPACITOR	
CSR CAPACITOR SWITCHING RELAY	
DFC DEFROST CONTROL	
EEV ELECTRONIC EXP VALVE	
EEVC ELECTRONIC EXP VALVE CONTROL	
F INDOOR FAN RELAY	
HPCO HIGH PRESSURE CUTOUT SWITCH	
IOL INTERNAL OVERLOAD PROTECTOR	
LPCO LOW PRESSURE CUTOUT SWITCH	
MS COMPRESSOR MOTOR CONTACTOR	
ODA OUTDOOR ANTICIPATOR	
OFT OUTDOOR FAN THERMOSTAT	
ODS OUTDOOR TEMPERATURE SENSOR	
ODT OUTDOOR THERMOSTAT	
P-TRD PRESSURE TRANSDUCER	
SC SWITCH OVER VALVE SOLENOID	
SM SYSTEM ON-OFF SWITCH	
TDL DISCHARGE LINE THERMOSTAT	
TDR TIME DELAY RELAY (5 SEC DELAY ON)	
TNS TRANSFORMER	
TEMP SENSOR, TEMPERATURE	
Y2C HIGH CAPACITY CONTROL RELAY	

COLOR OF WIRE
 BK/BL
 COLOR OF MARKER

BK BLACK RD RED OR ORANGE
 BL BLUE WH WHITE GR GREEN
 BR BROWN YL YELLOW PR PURPLE
 PK PINK

⚠ WARNING

HAZARDOUS VOLTAGE!
 DISCONNECT ALL ELECTRICAL POWER INCLUDING REMOTE DISCONNECTS BEFORE SERVICING.
 Failure to disconnect power before servicing can cause severe personal injury or death.

⚠ CAUTION

USE COPPER CONDUCTORS ONLY!
 UNIT TERMINALS ARE NOT DESIGNED TO ACCEPT OTHER TYPES OF CONDUCTORS.
 Failure to do so may cause damage to the equipment.

FOR CANADIAN INSTALLATIONS
 POUR INSTALLATIONS CANADIENNES

CAUTION: NOT SUITABLE FOR USE ON SYSTEMS EXCEEDING 150V-TO-GROUND
 ATTENTION: NE CONVIENT PAS AUX INSTALLATIONS DE PLUS DE 150 V A LA TERRE



Pressure Curves

COOLING PERFORMANCE CAN BE CHECKED WHEN THE OUTDOOR TEMP IS ABOVE 65 DEG F.
 TO CHECK COOLING PERFORMANCE, SELECT THE PROPER INDOOR CFM, ALLOW PRESSURES TO STABILIZE. MEASURE INDOOR WET BULB TEMPERATURE, OUTDOOR TEMPERATURE, DISCHARGE AND SUCTION PRESSURES. ON THE PLOTS LOCATE OUTDOOR TEMPERATURE (1); LOCATE INDOOR WET BULB (2); FIND INTERSECTION OF OD TEMP. & ID W.B. (3); READ DISCHARGE OR SUCTION PRESSURE IN LEFT COLUMN (4).

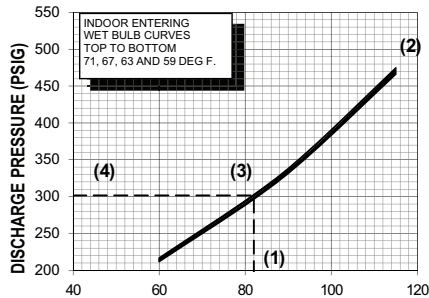
EXAMPLE: (1) OUTDOOR TEMP. 82 F.
 (2) INDOOR WET BULB 67 F.
 (3) AT INTERSECTION
 (4) DISCHARGE PRESSURE @ 900 CFM IS 302 PSIG.
 (5) SUCTION PRESSURE @ 900 CFM IS 139 PSIG.

ACTUAL:
 DISCHARGE PRESSURE SHOULD BE +/- 10 PSI OF CHART
 SUCTION PRESSURE SHOULD BE +/- 3 PSIG OF CHART

PRESSURE CURVES FOR 4TWL5024N

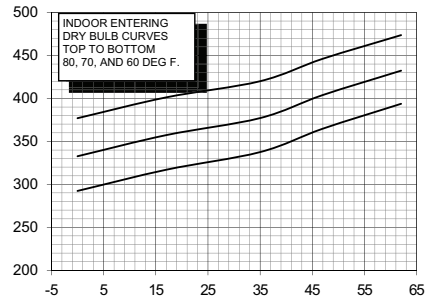
TEM4A0B30S31+TDR

Cooling @ 900 SCFM

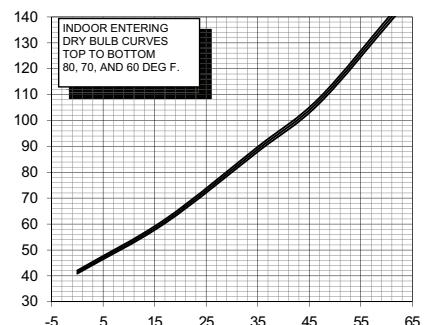
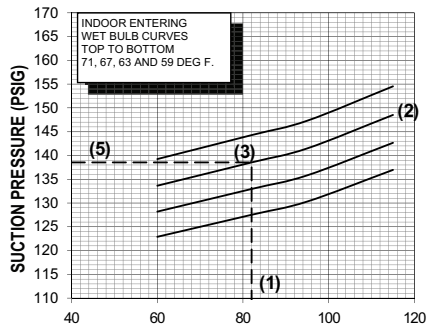


TEM4A0B30S31+TDR

Heating @ 900 SCFM



OUTDOOR TEMPERATURE (Degree F)

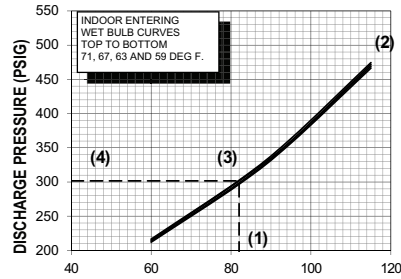


OUTDOOR TEMPERATURE (Degree F)

PRESSURE CURVES FOR 4TWL5030N

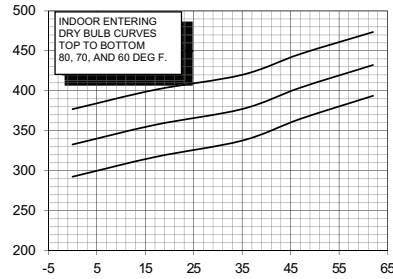
TEM4A0B30S31+TDR

Cooling @ 900 SCFM

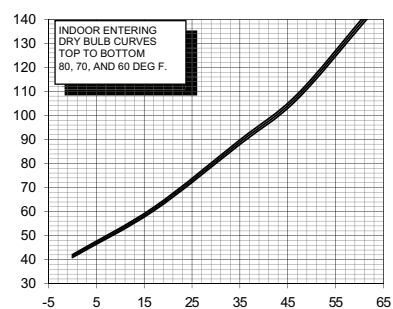
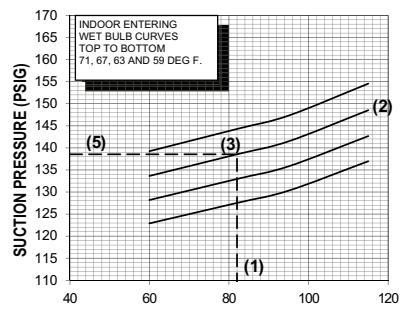


TEM4A0B30S31+TDR

Heating @ 900 SCFM



OUTDOOR TEMPERATURE (Degree F)

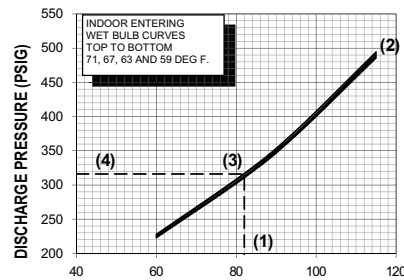


OUTDOOR TEMPERATURE (Degree F)

PRESSURE CURVES FOR 4TWL5036N

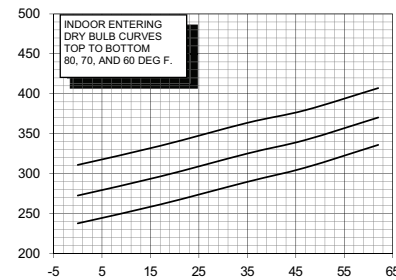
TEM4A0C36S41+TDR

Cooling @ 1250 SCFM

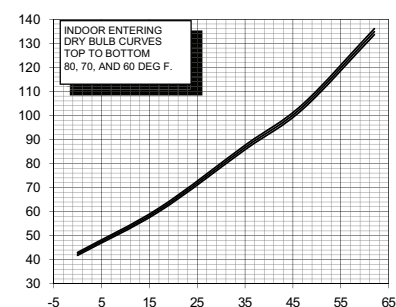
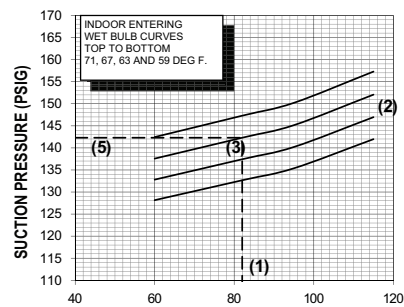


TEM4A0C36S41+TDR

Heating @ 1250 SCFM



OUTDOOR TEMPERATURE (Degree F)

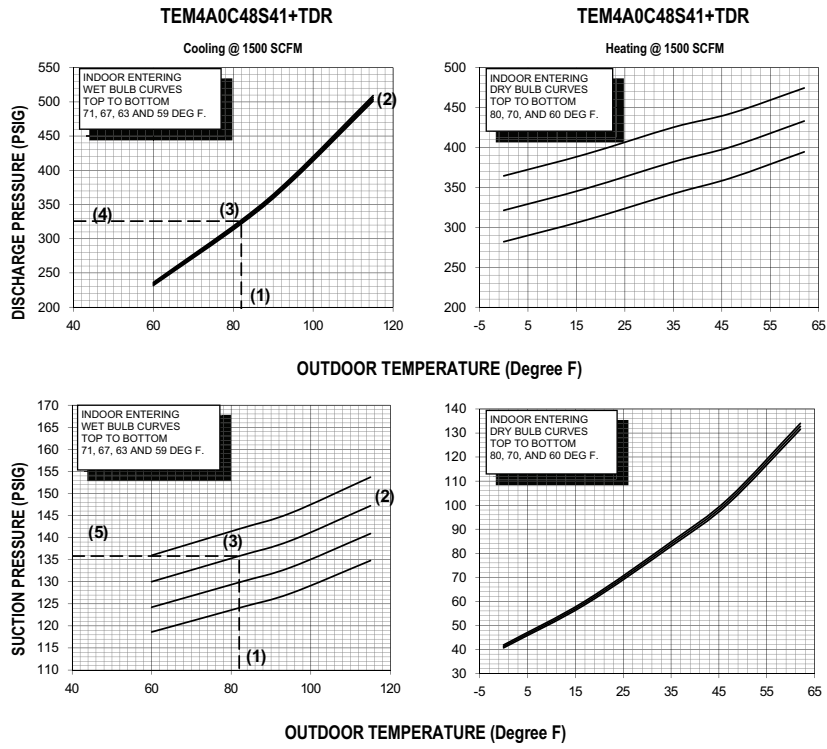


OUTDOOR TEMPERATURE (Degree F)

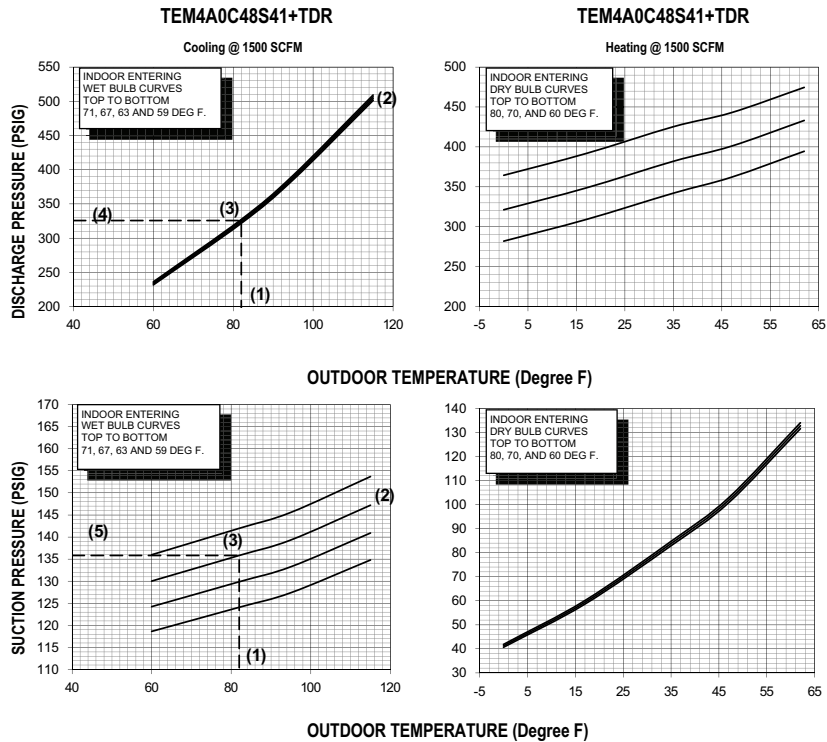


Pressure Curves

PRESSURE CURVES FOR 4TWL5042N

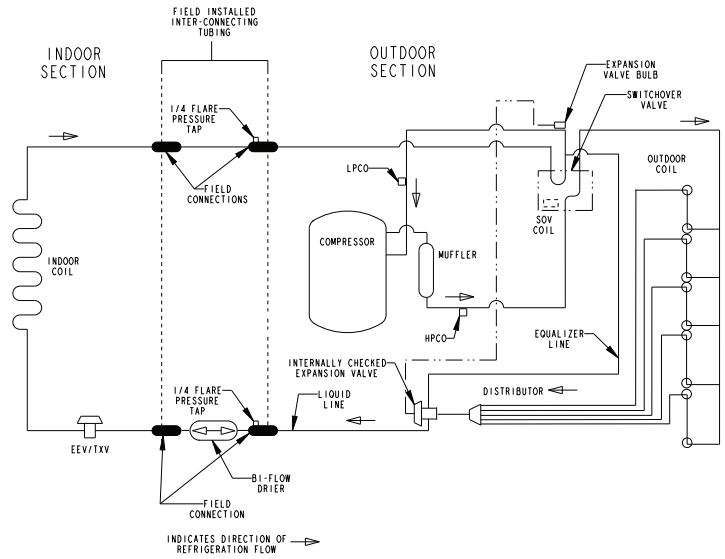


PRESSURE CURVES FOR 4TWL5048N

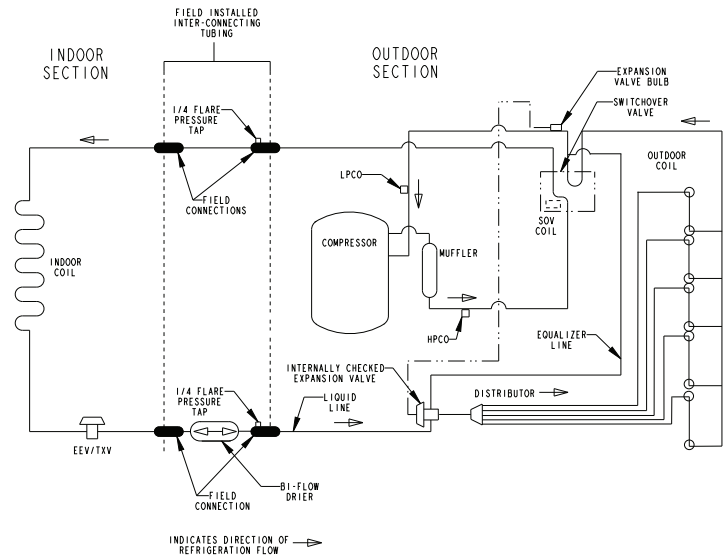




Refrigerant Circuits (only for reference)



COOLING REFRIGERATION CYCLE



HEATING REFRIGERATION CYCLE



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