INSTALLATION INSTRUCTIONS

iQDrive Split System Heat Pump

The 18 SEER, iQ Drive® split heat pump operates as part of a larger system which can provide temperature, air flow, and humidity control for a residence or other similarly sized building. This system includes this outdoor unit and a compatible indoor unit, typically an air handler with electric strip heat or a gas furnace. The electric or gas heat may serve as backup or auxiliary heat to supplement the heat pump, which is expected to serve as the primary heating means. However, electric or gas heat is not required for this system to operate. Accessory equipment which may be used with the system includes humidifiers, electric or electronic air cleaners, and U/V (ultraviolet) sterilizing lamps.

Refer to the System Operation section within this document for a description of how the heat pump operates. In addition, information for troubleshooting and diagnosing problems is included.

IMPORTANT

ATTENTION INSTALLERS:

It is your responsibility to know this product better than your customer. This includes being able to install the product according to strict safety guidelines and instructing the customer on how to operate and maintain the equipment for the life of the product. Safety should always be the deciding factor when installing this product and using common sense plays an important role as well. Pay attention to all safety warnings and any other special notes highlighted in the manual. Improper installation of the furnace or failure to follow safety warnings could result in serious injury, death, or property damage.

These instructions are primarily intended to assist qualified individuals experienced in the proper installation of this appliance. Some local codes require licensed installation/service personnel for this type of equipment. Please read all instructions carefully before starting the installation. Return these instructions to the customer's package for future reference.

DO NOT DESTROY. PLEASE READ CAREFULLY AND KEEP IN A SAFE PLACE FOR FUTURE REFERENCE.

OTHER REFERENCE DOCUMENTS

- Installation instruction documents for indoor equipment (furnace or air handler, optional humidifier, etc.)
- local wiring and building codes
- Nordyne Application Guideline for Refrigerant Lines Over 75 Feet, document 044B-0600
- Operation/configuration manual for two-stage thermostat (existing or newly installed)

IMPORTANT SAFETY INFORMATION

INSTALLER: Please read all instructions before servicing this equipment. Pay attention to all safety warnings and any other special notes highlighted in the manual. Safety markings are used frequently throughout this manual to designate a degree or level of seriousness and should not be ignored. **WARNING** indicates a potentially hazardous situation that if not avoided, could result in personal injury or death. **CAUTION** indicates a potentially hazardous situation that if not avoided, may result in minor or moderate injury or property damage.

⚠ WARNING:

ELECTRICAL SHOCK, FIRE OR EXPLOSION HAZARD

Failure to follow safety warnings exactly could result in serious injury or property damage.

Improper servicing could result in dangerous operation, serious injury, death or property damage.

- **Before servicing, disconnect all electrical power to the equipment.**
- **When servicing controls, label all wires prior to disconnecting. Reconnect wires correctly.**
- **Verify proper operation after servicing.**

⚠ WARNING:

iQ Drive Split System Heat Pumps are shipped charged with R410A refrigerant and ready for installation. When system is installed according to these instructions, additional refrigerant charging may or may not be required. If repairs make it necessary for evacuation and charging, it should only be attempted by qualified trained personnel thoroughly familiar with this equipment. Under no circumstances should the owner attempt to install and/or service this equipment. Failure to comply with this warning could result in property damage, personal injury, or death.

⚠ CAUTION:

This unit uses refrigerant R-410A. DO NOT use any other refrigerant in this unit. Use of another refrigerant will damage the unit.

⚠ WARNING:

Unless noted otherwise in these instructions, only factory authorized parts or accessory kits may be used with this product. Improper installation, service, adjustment, or maintenance may cause explosion, fire, electrical shock or other hazardous conditions which may result in personal injury or property damage.

⚠ WARNING:

The information listed below and the next page must be followed during the installation, service, and operation of this equipment. Failure to follow safety recommendations could result in possible damage to the equipment, serious personal injury or death.

- The installer must comply with all local codes and regulations which govern the installation of this type of equipment. Local codes and regulations take precedence over any recommendations contained in these instructions. Consult local building codes and the National Electrical Code (ANSI CI) for special installation requirements.
- All electrical wiring must be completed in accordance with local, state and national codes and regulations and with the National Electric Code (ANSI/NFPA 70) or in Canada the Canadian Electric Code Part 1 CSA C.22.1.
- This equipment contains liquid and gaseous refrigerant under high pressure. **DO NOT USE ANY PORTION OF THE CHARGE FOR PURGING OR LEAK TESTING.** Installation or servicing should only be performed by qualified trained personnel thoroughly familiar with this type equipment.
- Installation of equipment may require brazing operations. Installer must comply with safety codes and wear appropriate safety equipment (safety glasses, work gloves, fire extinguisher, etc.) when performing brazing operations.
- Follow all precautions in the literature, on tags, and on labels provided with the equipment. Read and thoroughly understand the instructions provided with the equipment prior to performing the installation and operational checkout of the equipment.
- Use caution when handling this appliance or removing components. Personal injury can occur from sharp metal edges present in all sheet metal constructed equipment.
- Fully annealed, refrigerant grade copper tubing should be used when installing the system. Refrigerant suction line tubing should be fully insulated.
- This unit is designed for outdoor installations only and should be positioned as described on page 3.

PREPARATION

Before proceeding with installation of iQ heat pump equipment, consult with the distributor and homeowner to confirm that the equipment listed on the order is what was ordered, and that it matches labeling on the equipment packaging.

Determine (including consultation with the homeowner) the intended/preferred location for placement of the compressor/outdoor coil unit. Unit envelope dimensions are shown in Figure 1.

This heat pump is designed for outdoor installation only. Unit placement must take into consideration the following clearances:

- A minimum of 12 inches must be provided between each of the four sides and any solid barrier or wall which might block free inlet air flow into the coil. A minimum clearance of 18 inches is required between multiple units.
- The corner of the unit covered by the control access cover must be clear enough to allow comfortable access by a serviceperson.
- The top of the unit must be open and unobstructed to prevent recirculation of outdoor fan discharge air, particularly for air conditioning usage. A minimum distance of 4 feet overhead clearance is recommended. Do not locate the unit in a pit with high walls on all sides.

Locate the unit away from overhangs which would allow water runoff or ice to fall directly onto the heat pump. In low temperature climates, place the unit where it is not directly in prevailing winds. Avoid placing the heat pump near sleeping quarters or windows. As the unit goes through defrost cycles, a change in sound will occur.

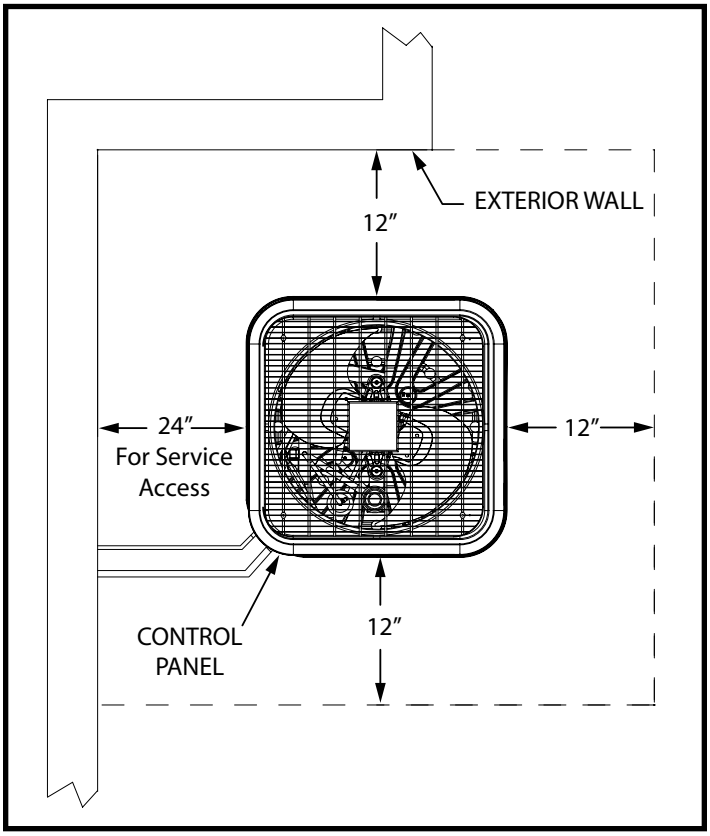


Figure 1. Unit Envelope Dimensions

Slab Mounting

- The preferred unit mounting is on an outdoor slab (concrete or plastic), on the ground, in an area with good drainage unlikely to be affected by heavy runoff, ground settling, or deep snowdrift accumulation.
- The support slab should be level. If the area is subject to heavy snowfall or drift accumulation, the use of a snow stand is recommended as well. Make sure that the drain holes in the bottom of the unit are not obstructed.

Roof Mounting

The method used for roof mounting should be designed so as not to overload roof structures nor transmit noise to the interior of the structure. Refrigerant and electrical lines should be routed through suitably waterproofed openings to prevent leaking into the structure. Make sure that the roof structure can adequately support the weight of the equipment. Consult local building codes for rooftop installations.

After a location has tentatively been selected, trace routing of new (or pre-existing) refrigerant lines (two), and power and control wiring. See further discussion below.

- Maximum recommended length for refrigerant lines: 100 ft.
- Maximum elevation difference, compressor base to indoor coil base (compressor higher or lower): 50 feet. **NOTE:** An oil trap is required for elevations exceeding 50 feet.
- Refrigerant lines should NOT be buried. (in concrete or otherwise).
- Refer to Nordyne Application Guideline for Refrigerant Lines Over 75 Feet document 044B-0600, for piping details.

Once the above information has been confirmed and potential questions regarding location, refrigerant line routing, and wire routing have been resolved, proceed with unpacking the equipment. It is strongly recommended that inspection of the hardware be performed prior to bringing it to the installation site. Inspect for cosmetic as well as functional damage (such as obvious holes or gaps in tubes and joints, cut or pinched wires or wire insulation).

Verify that the iQ Drive® heat pump unit package includes the following:

- Coil/compressor/control unit.
- Packet containing installation instructions and one filter-drier.

ELECTRICAL CONNECTIONS

⚠ WARNING:

ELECTRICAL SHOCK, FIRE OR EXPLOSION HAZARD

Failure to follow safety warnings exactly could result in serious injury or property damage.

Improper servicing could result in dangerous operation, serious injury, death or property damage.

- **Before servicing, disconnect all electrical power to the equipment.**
- **When servicing controls, label all wires prior to disconnecting. Reconnect wires correctly.**
- **Verify proper operation after servicing.**

Electrical Power Wiring

Electrical power wiring shall comply with the current provisions of the National Electrical Code (ANSI/NFPA 70) as supplemented by applicable local building codes. The installer should become familiar with the wiring diagram before making electrical connections to the outdoor unit. An equipment wiring diagram is included in this instruction (Figure 8 (page 13) & Figure 9 (page 14) and inside the unit control panel cover. Refer to the unit rating label located on the exterior of the control box cover for operating voltage, minimum circuit ampacity, and maximum fuse size. See Table 1 for wire sizing.

COPPER WIRE SIZE - AWG (1% VOLTAGE DROP)				
SUPPLY CIRCUIT AMPACITY	SUPPLY WIRE LENGTH - FT			
	UP TO 50	51 - 100	101 - 150	151 - 200
15	14	10	8	6
20	12	8	6	4
25	10	8	6	4
30	10	6	4	4
35	8	6	4	3
40	8	6	4	3
45	6	4	3	2
50	6	4	3	2

Wire Sized based on N.E.C. for 60°C type copper conductors

Table 1. Copper Wire Ampacity Tables

- Electrical connections to the heat pump are made at the bottom of the control panel compartment. Remove the control panel cover to gain access to this compartment. Figure 2 (page 9) shows a typical control panel compartment.
- A properly sized branch circuit and disconnect switch must be installed where it is easily accessible and within line of sight of the outdoor unit.
- Remove the control panel cover. Route the power and ground wires (3 wires, including earth ground) from the disconnect box to the unit. Use of outdoor shielded conduit (metal lined Sealtite®) is required. The electrical conduit opening is located on the right side of the panel forming the bottom of the control compartment. See Figure 2.
- Connect the power wires to **L1** and **L2** box lugs of the contactor, and the ground wire to the grounding lug located to the right of the contactor. Refer to Figure 2 and Figure 3 (page 10). Only copper wires should be used.
- Replace the control panel cover before applying power.

Control Circuit Wiring

The heat pump is designed to operate with a 24 vac Class II control circuit. Control circuit wiring must comply with the latest version of the National Electrical Code (ANSI/NFPA 70) as supplemented by local building codes.

In general, 24 vac control power wiring must be run to interconnect the two-stage thermostat, the indoor unit, and the outdoor unit. The source of the 24 vac is located within the indoor unit (air handler or furnace). The **C** side of this power source may be grounded or ungrounded, typically determined by the indoor equipment electrical design.

In general, 6 wires must be run to the heat pump's control panel. **R**, **C**, and **W2** will connect to the indoor unit. **Y1**, **Y2**, **O**, and **L** (if used) originate at the thermostat. **W2** provides a signal to turn on auxiliary (indoor) heat during a defrost cycle. The optional seventh **L** provides a fault indication for some White-Rodgers thermostats.

Pass each field-run control wire into the hole in the lower left side of the base of the heat pump's control panel compartment. Refer to Figure 2 and Figure 4 (page 10). Connect each of the field-run wires to its corresponding factory wired lead (with stripped ends) using a wire nut or other solderless connector within the low voltage compartment. See Table 2 below.

WIRE COLOR (OUTDOOR UNIT)	ID	FUNCTION	INDOOR CONNECTION
RED	**R**	24VAC	Air Handler or Furnace
BLK	**C**	24 VAC common or ground	
WHT	**W2**	Heat during defrost	
YEL	**Y1**	1st Stage call	Thermostat
BLU	**Y2**	2nd Stage call	
ORN	**O**	Heat (RV)	
BRN	***L**	*Fault indication	

* Usage optional

Table 2. 24 Volt Control Wiring

REFRIGERANT LINE CONNECTIONS

Line Design and Routing

Refrigerant lines must be connected by a licensed EPA certified technician following sound established installation practice. Once the heat pump location has been determined and the unit set in place the refrigerant lines should be routed and connected.

- Refrigerant lines should follow a direct path from the indoor coil to the outdoor unit avoiding sharp bends. When lines pass through walls, make sure to properly seal and support them so that vibration is not transmitted to the structure.
- Refrigerant tubing should be supported in a manner which assures that the tubing will not vibrate or wear as a result of contact with sharp materials or edges during system operation.
- Lines must be clean refrigeration-grade copper.
- Avoid removing caps and plugs from the heat pump or lines until they are ready to be connected.

- Insulate the vapor line with refrigerant line insulation wall thickness ¼" or greater.

Proper system performance and oil management depend on properly selecting the liquid and vapor line sizes. Refer to Table 3 below for the proper size of field supplied lines. The maximum allowable refrigerant line length is 100 ft.

MODEL	LINE SET LENGTHS				
	VAPOR LINE				LIQUID LINE
	UP TO 24 FT.	25 TO 39 FT.	40 TO 75 FT.	75 TO 100 FT.	UP TO 100 FT.
-024K Units	3/4 in. (19 mm)		7/8 in. (22 mm)	1 1/8 in. (29 mm)	3/8 in. (10 mm)
-036K Units	7/8 in. (22 mm)		1 1/8 in. (29 mm)		3/8 in. (10 mm)
-048K Units	7/8 in. (22 mm)	1 1/8 in. (29 mm)			3/8 in. (10 mm)
-060K Units	7/8 in. (22 mm)	1 1/8 in. (29 mm)			3/8 in. (10 mm)

Table 3. Permissible Refrigerant Line Sizes

The maximum vertical elevation between the heat pump and indoor coil is 50 ft. Systems that require more elevation will need to have an oil trap installed in the vapor line. Refer to Nordyne Application Guideline for Refrigerant Lines Over 75 Feet (document 044B-0600) for piping details.

A filter drier is supplied with the heat pump. It is required and recommended that it be installed near the indoor coil.

It is recommended to replace existing refrigerant lines that were previously used for an R-22 system. If the lines are not replaced, they must be properly flushed by a licensed EPA certified technician in accordance with the manufacturer's instructions and established procedures.

Brazing

Use the appropriate safety equipment while brazing. Items such as gloves, safety glasses, proper ventilation, and a fire extinguisher should be used.

1. Route the refrigerant lines from the indoor coil to the service valves on the heat pump. Avoid sharp radius bends and turns. See Figure 5 (page 10)
2. Make sure that the vapor line is properly insulated for the entire length of the run for maximum system efficiency. Improper insulation may also create condensation and result in water damage to the equipment and building structure.
3. Remove the valve cores from the heat pump service valves. Wrap the valves completely with wet rags to protect them from overheating during the brazing operation.
4. Connect both the vapor and liquid lines. Tubes should be round, de-burred and free of debris. Use a phosphorous and copper or silver brazing alloy for the joints. Do not use soft solder with a low melting point.
5. Connect the indoor lines according to the indoor unit instructions. The indoor coil will require the same alloys and wet rags to protect the sensors from excessive heat on the refrigerant lines.
6. Allow the service valves to cool and replace the valve cores.
7. Leak test the connections using low pressure dry nitrogen.

System Evacuation

1. Connect the refrigerant gauge manifold to both the vapor and liquid service valves. Figure 5. Connect the center port to the vacuum pump.
2. Open both manifold valves and start the vacuum pump. After a short time, it is recommended to close the manifold valves and stop the vacuum pump to look for a rapid loss of vacuum. Loss of vacuum indicates that there is a leak in the system. Repeat the leak test if required.
3. Evacuate the system to at least 500 microns to remove non-condensables and water vapor. Close the manifold valves and remove the vacuum pump.
4. Connect the refrigerant tank to the center manifold port of the gauge set. Pressurize the system enough to break the vacuum.
5. Open both service valves by turning the valve stems ¼ turn counterclockwise. The stem will be in line with the tubes. Replace the stem caps and tighten. Proceed with Refrigerant Charging section.

⚠ WARNING:

The heat pump system contains liquid and gaseous refrigerant under pressure. Adjustment of refrigerant charge should only be done by a qualified, EPA certified technician thoroughly familiar with this type of equipment. Under no circumstances should the homeowner attempt to install and/or service this equipment. Failure to comply with this warning could result in equipment damage, personal injury, or death.

Refrigerant Charging

NOTES:

- The unit must be charged at a fixed speed setting. For this purpose the thermostat needs to be wired and powered prior to charging.
- The heat pump is factory charged for field installed lines 15 ft. in length with the matching indoor equipment. Adjustments to the refrigerant charge will be required for other length and tube sizes. For lines longer than 15 ft with a 3/8" OD liquid line, add 0.52 oz. per ft. See Table 4 (page 6).
- Small variations in the temperatures and pressures are normal due to differences in the installation.
- Large variations in the temperatures and pressures could indicate incorrect charge or another problem with a component in the system.

The preferred method of charging is by weighing in the additional refrigerant required. If a charging scale is not available, the next preferred charging method would be to use the sub-cooling method in cooling mode.

Charging Operation

For charging in the field, the unit should be run with a call for second stage cooling (or heating, if the outdoor ambient temperature is below 60° F), with both **Y1** and **Y2** outputs energized. This may be accomplished by setting the thermostat to cool with a setpoint substantially lower than room temperature. This will provide 60 minutes of operation

at the nominal rating speed (interface board display "C4" or "H4") before there is a speed change (to a higher speed). If this speed change occurs before the charging process is complete, turn the system off, then restart the process.

MODEL	2 TON (-024K)	3 TON (-036K)	4 TON (-048K)	5 TON (-060K)
Factory Charge for 15 ft. line set	188 oz	184 oz	282 oz	282 oz
Additional Charge for 40 ft. line set	16 oz	16 oz	18 oz	18 oz
Additional Charge for 75 ft. line set	39 oz	43 oz	44 oz	44 oz
Additional Charge for 100 ft. line set	57 oz	62 oz	63 oz	63 oz

Table 4. Refrigerant Charge Quantities

Alternate Procedure for Charging Heat Pump in Cooling Mode (with outdoor temperatures above 60° F) Based on Subcooling:

While charging based on weight is preferred, this method is acceptable. Use this method when the outdoor temperature is 60° F or higher to verify the correct charge in cooling mode. The indoor temperature should be between 70° F and 80° F.

1. Connect the gauge manifold to the liquid and vapor service valves. See Figure 5 (page 10).
2. Start the system in cooling mode. Allow the system to run 15 minutes to stabilize.
3. Record the liquid refrigerant pressure in psig at the service valve.
4. Record the liquid refrigerant line temperature in °F at the service valve.
5. Using the temperature value recorded, determine the corresponding liquid refrigerant pressure from the upper curve (for cooling) in the charging chart. See Figure 6 (page 11).
   - If the pressure measured in step 3 is less than the required liquid refrigerant pressure determined in step 5, then refrigerant needs to be added.
   - If the pressure measured in step 3 is greater than the required liquid refrigerant pressure determined in step 5, then the system is over-charged.
6. Add or remove charge from the system depending on the measurements recorded. Allow the system to stabilize for 15 minutes before taking the next readings.

Alternate Procedure for Charging Heat Pump in Heating Mode (with outdoor temperatures below 60 °F) Based on Subcooling:

Use this method when the outdoor temperature is 60° F or lower to estimate the correct charge in heating mode. The indoor temperature should be between 65° F and 75° F.

The preferred method of charging is by weighing in the additional refrigerant required. If a charging scale is not available, the correct charge can be estimated by this method. Refrigerant can be stored in the receiver and accumulators and result in an over-charged system. If it is necessary to use this method, follow up service should be scheduled when the temperature is above 60° F, and then charge should be verified in cooling mode.

1. Connect the gauge manifold to the liquid service valve and suction service port located at the left side of the access panel above the liquid service valve. See Figure 5 (page 10).
2. Start the system in heating mode. Allow the system to run 15 minutes to stabilize.
3. Record the liquid refrigerant pressure in psig at the service valve.
4. Record the liquid refrigerant line temperature in °F at the service valve.
5. Using the temperature value recorded, determine the corresponding liquid refrigerant pressure from the lower curve (for heating) in the charging chart. See Figure 6 (page 11).
   - If the pressure measured in step 3 is less than the required liquid refrigerant pressure determined in step 5, then refrigerant needs to be added.
   - If the pressure measured in step 3 is greater than the required liquid refrigerant pressure determined in step 5, then the system is over-charged.
6. Add or remove charge from the system depending on the measurements recorded. Allow the system to stabilize for 15 minutes before taking the next readings.

NOTE: Small variations in charge will have a more significant effect on liquid line pressure in heating mode compared to cooling

SYSTEM OPERATION

Thermostat

The primary control for the overall heating and cooling system is provided by the indoor thermostat. Any standard two-stage heat pump capable thermostat will be sufficient for operation. Refer to the manual for the thermostat selected or installed for configuration and usage details. For this control the "O" signal (operating the reversing or 4-way valve) to the heat pump should be energized for cooling and not for heating.

Run Sequence

After power-up and between cycles (after the preceding shutdown) there will always be a five minute compressor (re)start delay imposed. With a call for heat pump heating or cooling and before the compressor is turned on, the outdoor fan will run for one minute to assure that the outdoor temperature measurement is close to that of the ambient air. The compressor will then ramp up to a speed selected by the capacity control scheme.

The 18 SEER heat pump is a true variable speed unit. Normally the heat pump compressor will operate at one of 5 speeds in cooling and 5 in heating, each predetermined for a balance of optimum efficiency and capacity. The outdoor fan motor will also operate at multiple speeds, following the compressor.

For either heating or cooling mode, the speeds used will depend on several factors, including:

- Whether first or second stage operation is called for by the thermostat (which must be two stage-capable),
- Outdoor ambient temperature.
- The length of time the equipment has been operating during the current cycle
- The operating speed history, for both the current and the previous operating cycles.

DISPLAY	CAPACITY STAGE
C1	Cooling, Stage One Call, Low
C2	Cooling, Stage One Call, Intermediate
C3	Cooling, Stage One Call, Low High
C4	Cooling, Stage Two Call, Nominal High
C5	Cooling, Stage Two Call, Boost
H1	Heating, Stage One Call, Low
H2	Heating, Stage One Call, Intermediate
H3	Heating, Stage One Call, LowHigh
H4	Heating, Stage Two Call, Nominal High
H5	Heating, Stage Two Call, Boost
DL	Startup Delay (5 minutes)
-	System Powered but Idle
DF	In Defrost

Table 5. Interface Board Operating Codes

For example, with a first stage call in cooling, if the setpoint was satisfied quickly (within 20 minutes), the unit will restart the next time at a lower speed. At a low or intermediate speed, if the setpoint is not satisfied within 45 minutes for cooling or 30 minutes for heating, the speed will be increased. If the unit cycles off after having a speed increase, the entire next cycle will be at the higher speed. Also, the outdoor fan will run for an extra minute after the compressor shuts off at the end of a cycle.

The actual current operating compressor speed can be determined by checking the 2-character display on the interface board. Refer to Figure 7 (page 12) and Table 5 (page 7).

Control operation is protected under U.S. patent number US 8,011,199 B1.

Blower Flow Rates

Depending on the indoor equipment installed, blower air flow may be adjustable. When paired with a matching model air handler or gas furnace, the airflow is set by DIP switches on the blower control board, providing one flow for second stage compressor speeds and a lower flow for first stage compressor speeds. Refer to the indoor equipment manuals for instructions on how to select the desired air flows. High stage airflows used for equipment ratings are as follows:

- 2 ton - 800 cfm
- 3 ton - 1200 cfm
- 4 ton - 1350 cfm
- 5 ton - 1500 cfm

Refer to indoor equipment installation instructions for options, operation, and field wiring relating to dehumidification and humidification.

Short Cycle Timer Override

When performing startup tests in cooling or troubleshooting, the 5 minute startup delay can be skipped by shorting the two J4 Test pins indicated in Figure 7 for about 1 second while the compressor is off and waiting to start.

NOTE: Use this feature with forethought because it will also clear the faults stored in memory, which can make troubleshooting more difficult.

Defrost Cycle

This equipment features an adaptive demand defrost in heating mode, which is enabled when the outdoor coil temperature is below 35° F. After approximately 35 minutes of operating in this condition for the first time, a defrost will be forced to check the difference between the coil temperature and outdoor air temperature, with the coil unfrosted. Subsequent defrosts will be triggered when this temperature difference increases (coil temperature drops) by an additional 6° F, referenced to the outdoor ambient at that time. If this has not occurred by 6 hours of operation (with the coil below 35°), a defrost will be run regardless. Following each defrost sequence, the unfrosted air-to-coil temperature difference is rechecked, and that value is used to determine the next defrost trigger temperature. In this way the effect of frosting up is always compared to the unfrosted performance of the coil in its current condition.

During every defrost cycle the compressor first shuts off, the reversing valve shifts, the cycle reverses to heat up the outdoor coil until the coil reaches the defrost termination temperature setting (70° F by default), then the compressor shuts off again for the reversing valve to shift back to the heating mode. During the following 8 minutes (approximately) the unit will heat at nominal speed to perform the coil differential temperature check described above, after which the system will return to normal heating capacity control.

If a defrost termination temperature setting other than 70° is desired, it can be adjusted between 50° F and 80° F by placing a jumper between pairs of pins on J1 near the lower right side of the interface board inside the control panel (Figure 7). A jumper is not required, however.

The defrost cycle may be artificially triggered for service and troubleshooting purposes. With the unit running in heating mode, simply short together the two J4 Test pins shown in Figure 7 for about 1 second. **NOTE:** This will also clear the faults stored in memory. The 2-character display will show "DF" when the defrost cycle is under way.

Low Temperature Lockouts

The control will not permit the unit to operate in cooling mode at ambient temperatures below 50°F. If there is a call for air conditioning when the temperature drops below this point, the unit will shut down (if running), and diagnostic code 29 will be displayed on the interface board. Once this lockout is in effect, the unit can resume cooling after ambient temperature has risen again above 55°F.

The control will not permit the unit to operate in heating mode at ambient temperatures below 0°F. If there is a call for heat pump heating when the temperature drops below this point, the unit will shut down (if running) and the W2 auxiliary heat output will be energized. Heat pump operation will be permitted again when ambient temperature rises above 1°F and 60 minutes have passed. (This delay can be bypassed by temporarily switching the system mode to cooling.) The W2 output will be shut off when either the call is removed or heat pump operation is again permitted.

Auxiliary Heat

The W2 output calling for auxiliary heat (electric strip or gas furnace) will be energized by the heat pump controls during the coil heating phase of each defrost cycle, and whenever there is a call for heat and the heat pump is in a fault condition

or if outdoor air temperature is below the 0°F low temperature lockout (see Low Temperature Lockouts above.). Note that response of the auxiliary heating system to the W2 output will depend upon the wiring and capabilities of that portion of the indoor system equipment.

Diagnostic Display

The interface board located inside the control panel has a two character display which provides information regarding operational status and fault history. When 24 vac control power is provided to the board, the display will show some combination of characters. In order to diagnose a problem with the unit, or to determine its operational status, remove the control panel cover, then observe the 2-character lighted display on the interface board. Refer to Table 5 (page 7) and Table 6 (page 8).

The display will alternate between an operating code (Table 5) and a list of the codes for up to the last 20 different faults or warnings. When this list is being displayed, each diagnostic code in memory will be displayed for 5 seconds. The most recent code will be the first one appearing in the series of codes displayed.

NOTE: If there is a fault that is "active" when the display is viewed, the decimal point to the right of the right side character will be lit.

DISPLAY	CAPACITY STAGE
01	Inverter Power Module Overcurrent
02	General Inverter Drive Fault
03	High Compressor Current
04	Current Sampling Error (Inverter)
05	High Inverter Heat Sink Temperature
06	High DC Bus Voltage (Inverter)
07	Low DC Bus Voltage (Inverter)
08	Low Line Voltage at Inverter
09	Line Overcurrent at Inverter
10	Line Voltage Sampling Error (Inverter)
11	Loss of Communication (Inverter Internal)
12	Inverter Heat Sink Sensor Failure
13	Loss of Communication (Inverter Internal)
14	Loss of Communication (IFB to Inverter)
15	Override, High Compressor Current
16	Override, High Line Current
17	Override, High Inverter Heat Sink Temp
18	Outdoor Fan Motor Fault
19	Low Pressure Switch Open
20	High Compressor Discharge Temperature
21	Interface Board Software Error
22	Sensor Failure - Suction Line Temp
23	Sensor Failure - Compressor Dischg Temp
24	Sensor Failure - Ambient Temperature
25	Sensor Failure - Coil Temp #1, Defrost
26	Sensor Failure - Suction Pressure Transdcr
27	Blower Motor Fault
28	Blower Communication Fault
29	Cooling Low Temp Lockout

Table 6. Interface Board Diagnostic Codes

Fault codes are retained through loss of power. The fault code list in memory can be cleared by shorting the J4 Test pins briefly when the compressor is off. **NOTE:** This action may also have other consequences - See Short Cycle Timer Override and Defrost Cycle sections on page 7.

Whenever there is an "active" fault (as indicated by the right side decimal point LED lit), the "L" output (the brown wire in the 24-volt 7-wire I/O harness) will be energized. This can be used with some specially-equipped thermostats to display a Service Required message. The faults for which this applies are indicated on the diagnostic code label on the interior of the control panel cover.

Other Speed Overrides

When ambient temperature exceeds 110° to 120°F the compressor speed will be reduced to limit current draw. The actual temperature threshold and the number of speed reductions (1 or 2) depends upon the model. Speed will return to the normal level when temperature drops more than 5° below the lowest threshold at which speed was reduced. In addition, any time outdoor ambient temperature exceeds 100°F, the fan will operate at its maximum speed.

Instrumentation

The 18 SEER iQ Drive split heat pump includes instrumentation as listed in Table 7. All items listed are connected to the interface board except for the high pressure switch. Refer to Figure 2 (page 9), Figure 7 (page 12), Figure 8 (page 13), and Figure 9 (page 14). The five temperature sensors are color coded so that the color of the wire insulation matches the color of the connector base on the left side of the circuit board. All temperature sensors are 10k ohm thermistors. The resistances of these sensors (when disconnected from the interface board) may be checked against Figure 6 (page 11) for troubleshooting purposes. Figure 6 shows the thermistor resistance-temperature curve broken into two parts for ease of use.

FUNCTION	TYPE	CONNECTION
High Pressure Switch	Opens 650 ±15 psig, recloses 460 ±15 psig	See Figure 8, and Figure 9
Low Pressure Switch	Opens 20 ±5 psig, recloses 35 ±5 psig	IFB* LP1-LP2
Ambient Air Temp	Thermistor 10KΩ @ 25° C (Fig. 10)	IFB* "OUTDOOR TEMP" (BLK)
Compressor Discharge Temp	Thermistor 10KΩ @ 25° C (Fig. 10)	IFB* "DISCHARGE TEMP" (RED)
Coil Defrost Temp	Thermistor 10KΩ @ 25° C (Fig. 10)	IFB* "COIL #1 TEMP" (WHT)
Coil Saturation Temp	Thermistor 10KΩ @ 25° C (Fig. 10)	IFB* "COIL #2 TEMP" (YEL)
Suction Temp	Thermistor 10KΩ @ 25° C (Fig. 10)	IFB* "SUCTION TEMP" (BLU)

*IFB=Interface Board

Table 7. Instrumentation List

MAINTENANCE

⚠ WARNING:

ELECTRICAL SHOCK, FIRE OR EXPLOSION HAZARD

Failure to follow safety warnings exactly could result in serious injury or property damage.

Improper servicing could result in dangerous operation, serious injury, death or property damage.

- **Before servicing, disconnect all electrical power to the equipment.**
- **When servicing controls, label all wires prior to disconnecting. Reconnect wires correctly.**
- **Verify proper operation after servicing.**

- Inspect the indoor air filter monthly. Clean or replace it at the start of each heating and cooling season or when an accumulation of dust or dirt is visible. If the indoor coil needs to be cleaned, contact a qualified service technician.
- Inspect the condensate disposal line from the indoor coil at the beginning of the cooling season to make sure it is not obstructed.
- Remove any leaves, grass clippings, and debris from the outdoor unit coil, being careful not to damage the aluminum fins. Dirt may be cleared from the coil by using a water hose directed through the discharge fan grille toward the outside of the unit.
- Have a yearly inspection by a qualified service technician to ensure that the system is performing at its optimum level.
- At least once a season open the control panel (with power off) to inspect for and clear out insect structures and/or cobwebs which might impede airflow through the control panel compartment and the air inlet louvers at the bottom of the control compartment.

FIGURES & CHARTS

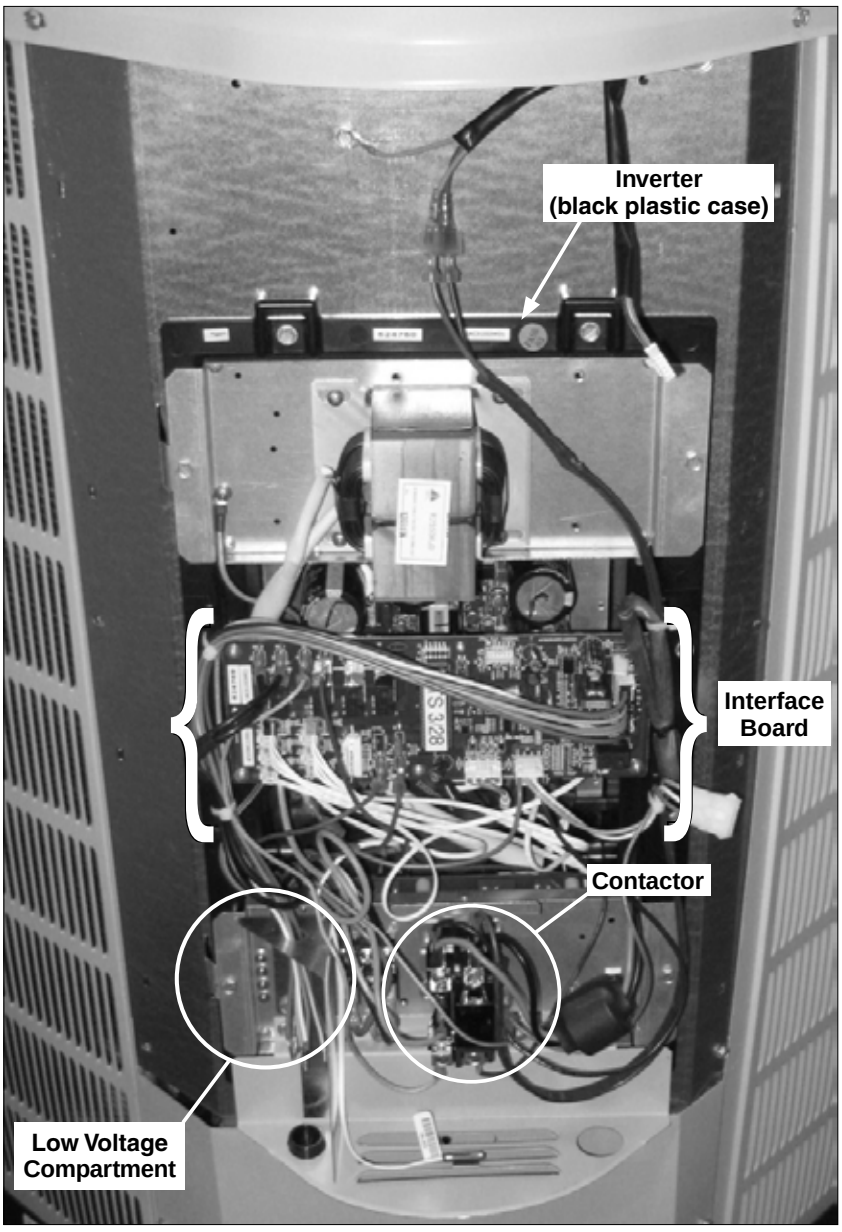


Figure 2. Heat Pump Control Panel (Cover Removed)

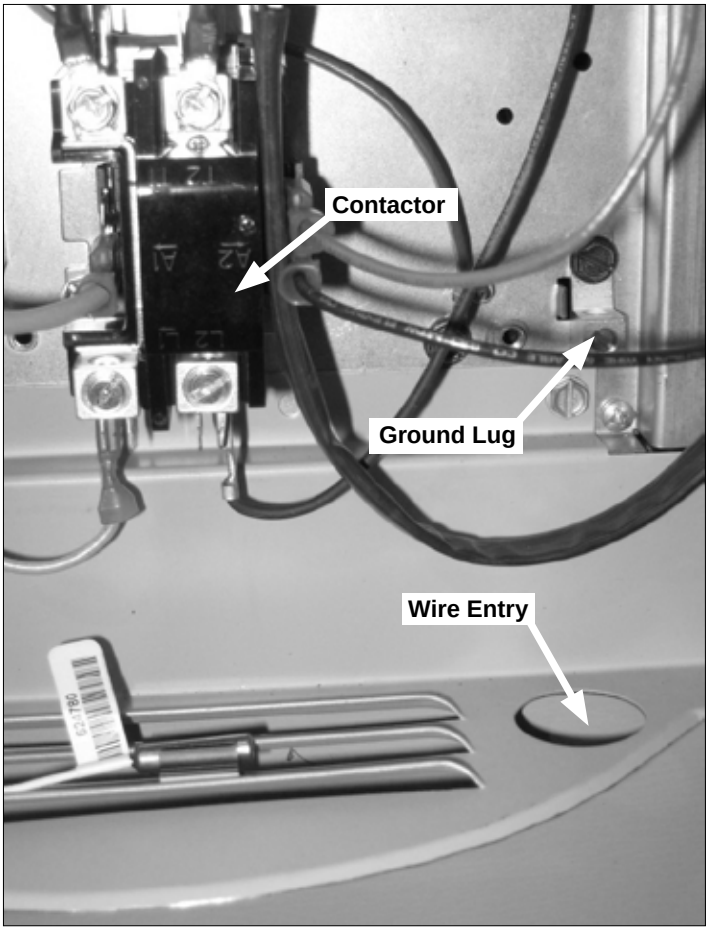


Figure 3. Power Wiring Terminals

Figure 4. Low Voltage Compartment for Control Wiring

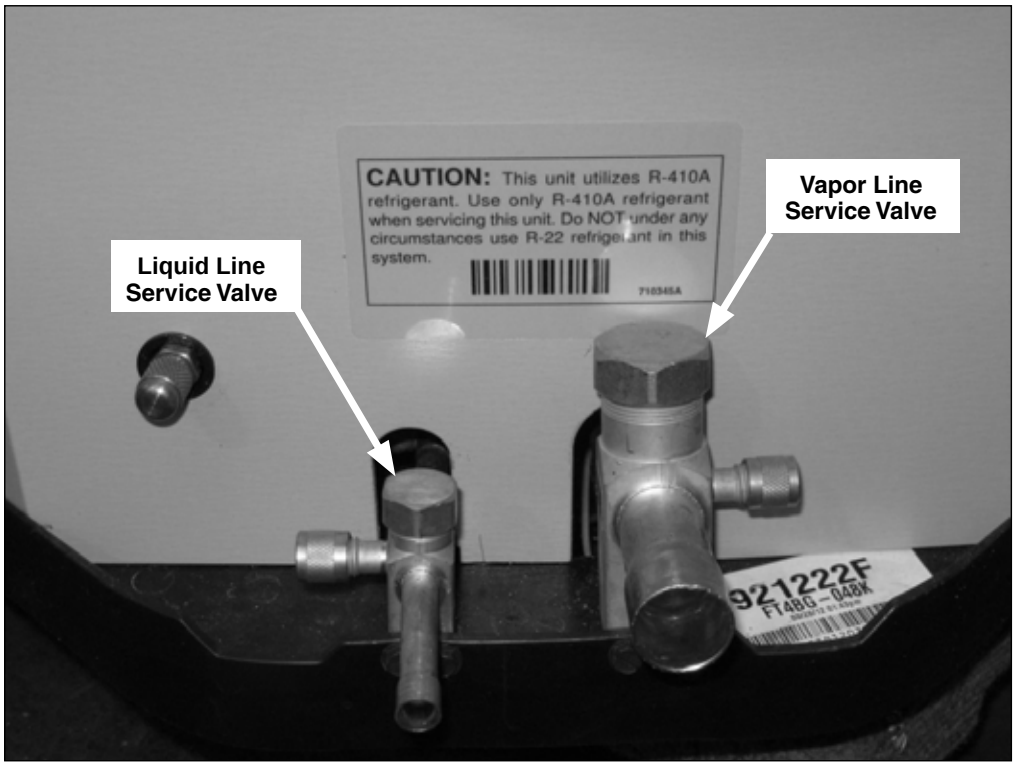
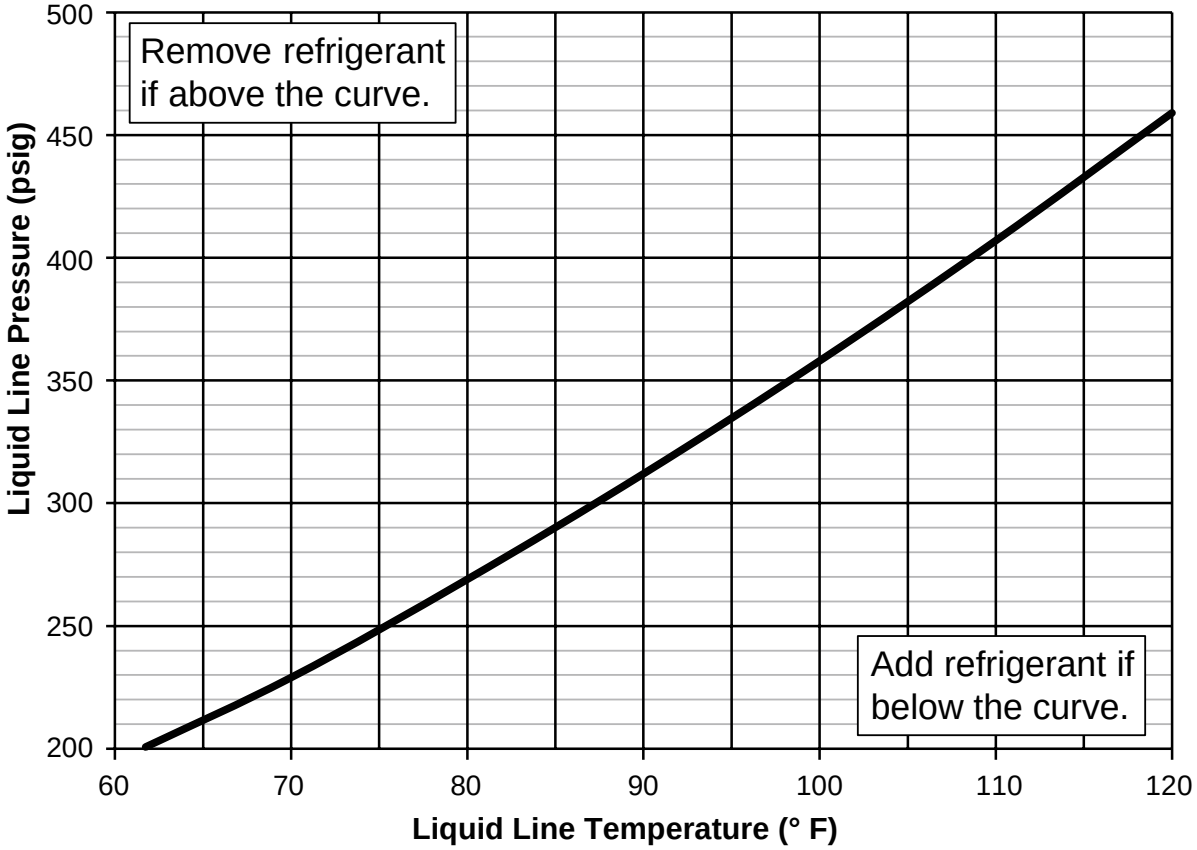


Figure 5. Service Valves

Cooling Charging Chart

(Outdoor Temperature above 60° F)



Heating Charging Chart

(Outdoor Temperature below 60° F, Indoor Temperature 75° F)

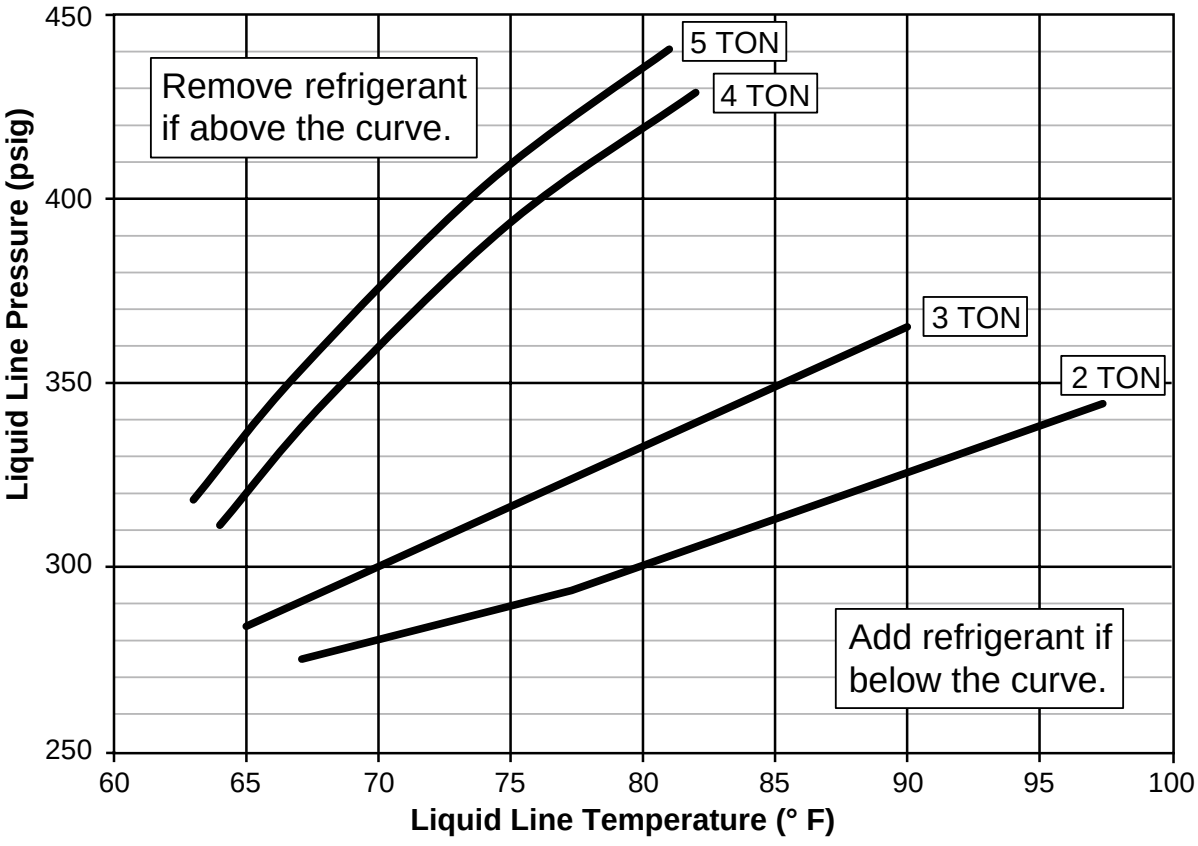


Figure 6. Charging Charts

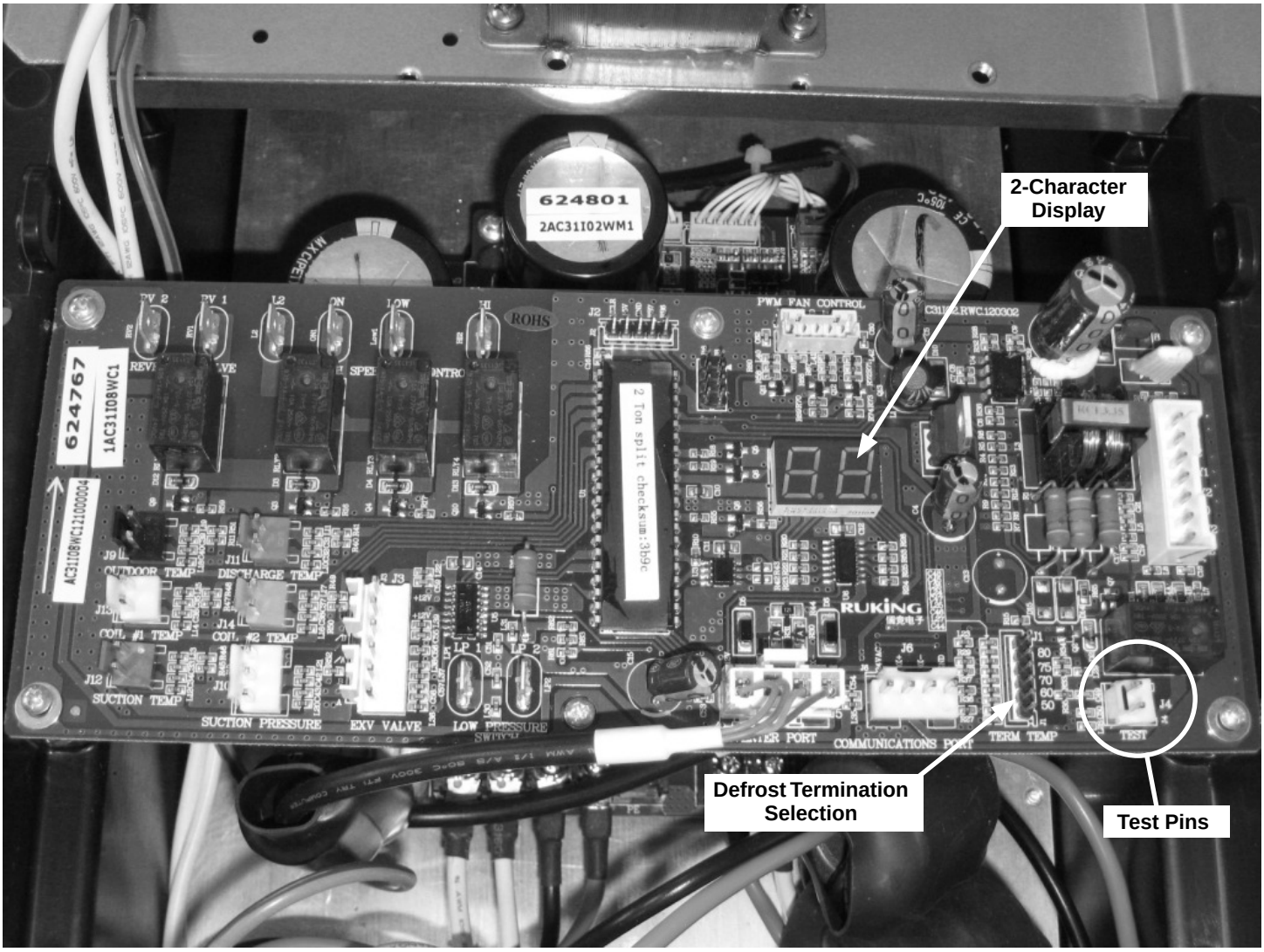


Figure 7. Interface Board in Control Panel

WIRING DIAGRAM

PSH4BG/FT4BG - 2, 3, 4 Ton Split Heat Pump — Line Voltage 208/230 VAC — 1 Phase / 60 Hz

NOTES:

1. Disconnect all power before servicing.
2. For supply connections use copper conductors only.
3. Not suitable on systems that exceed 150 volts to ground.
4. For replacement wires use conductors suitable for 105 deg.C.
5. For ampacities and overcurrent protection, see unit rating plate.
6. Connect to 24 vac/60va/class 2 circuit. See furnace/air handler installation instructions for control circuit and optional relay/ transformer kits.
7. Ferrite chokes are shown by an ellipse enclosing wires. The number of turns per wire through the choke is shown by (2X), for example.

1. Couper le courant avant de faire letretien.
2. Employez uniquement des conducteurs en cuivre.
3. Ne convient pas aux installations de plus de 150 volt a la terre.

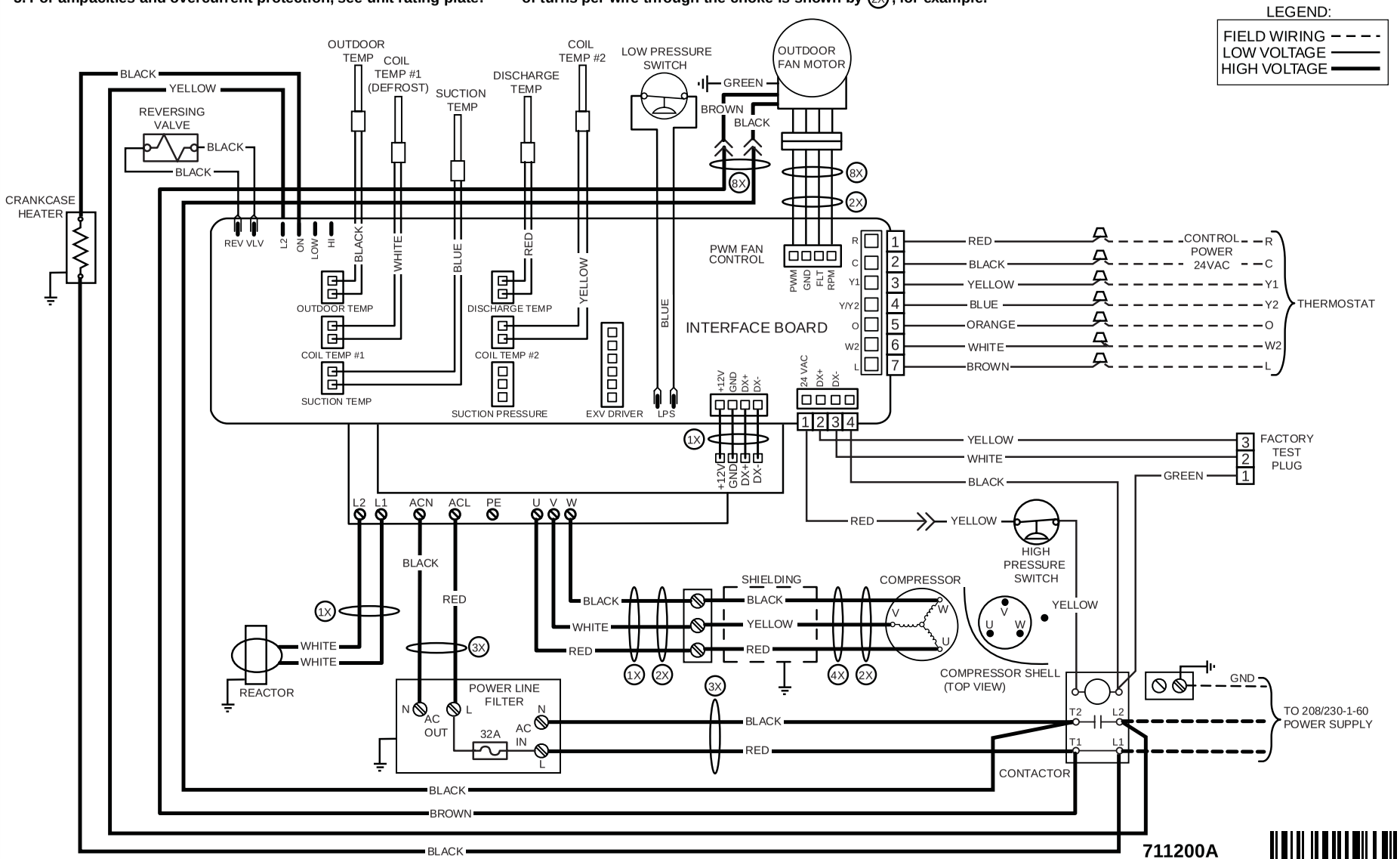


Figure 8. Wiring Diagram (2-4 Ton Models)

711200A
(Replaces 7112000)
04/12

WIRING DIAGRAM

PSH4BG/FT4BG - 5 Ton Split Heat Pump — Line Voltage 208/230 VAC — 1 Phase / 60 Hz

NOTES:

1. Disconnect all power before servicing.
2. For supply connections use copper conductors only.
3. Not suitable on systems that exceed 150 volts to ground.
4. For replacement wires use conductors suitable for 105 deg.C.
5. For ampacities and overcurrent protection, see unit rating plate.
6. Connect to 24 vac/60va/class 2 circuit. See furnace/air handler installation instructions for control circuit and optional relay/ transformer kits.
7. Ferrite chokes are shown by an ellipse enclosing wires. The number of turns per wire through the choke is shown by (2X), for example.

1. Couper le courant avant de faire letretien.
2. Employez uniquement des conducteurs en cuivre.
3. Ne convient pas aux installations de plus de 150 volt a la terre.

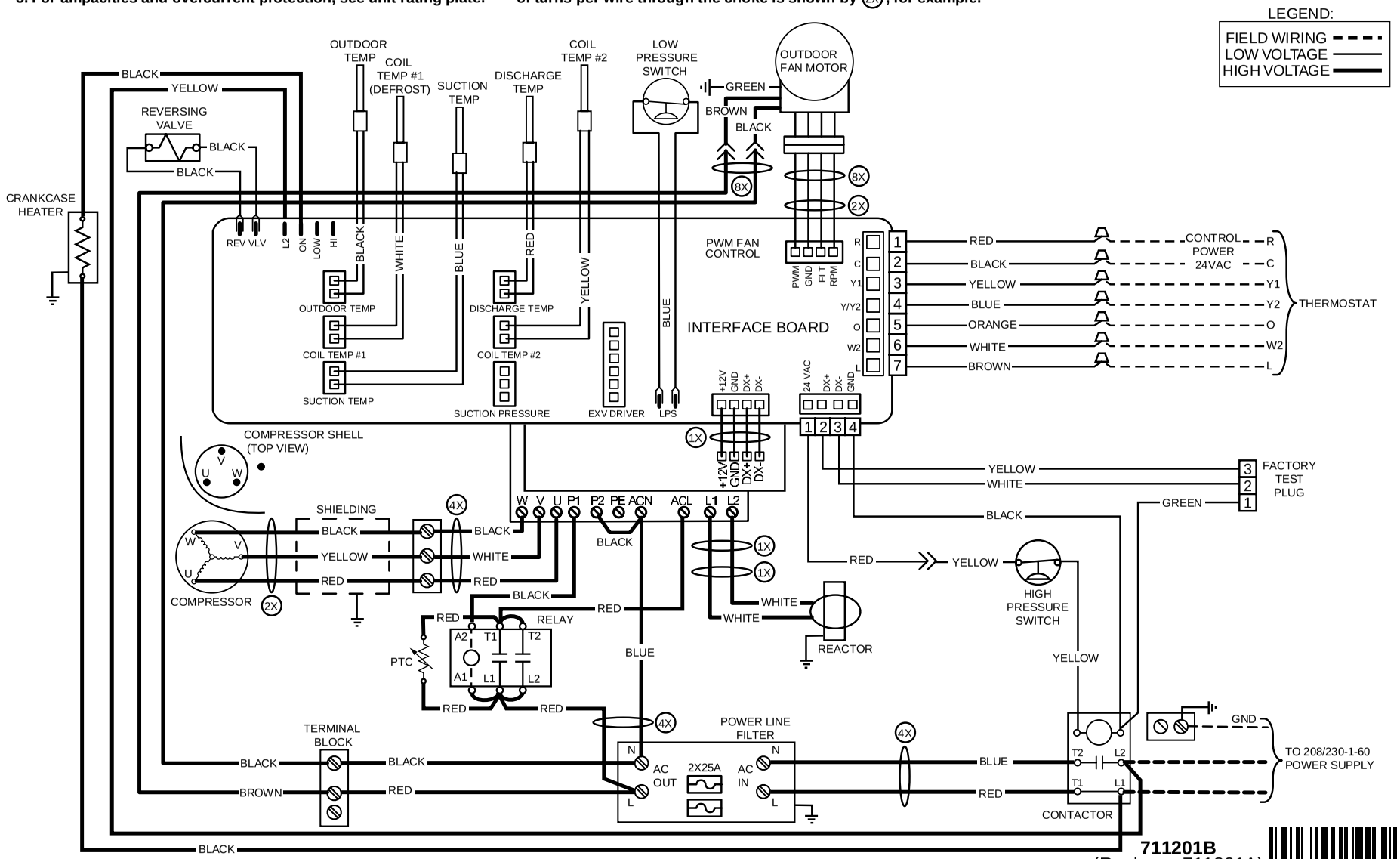
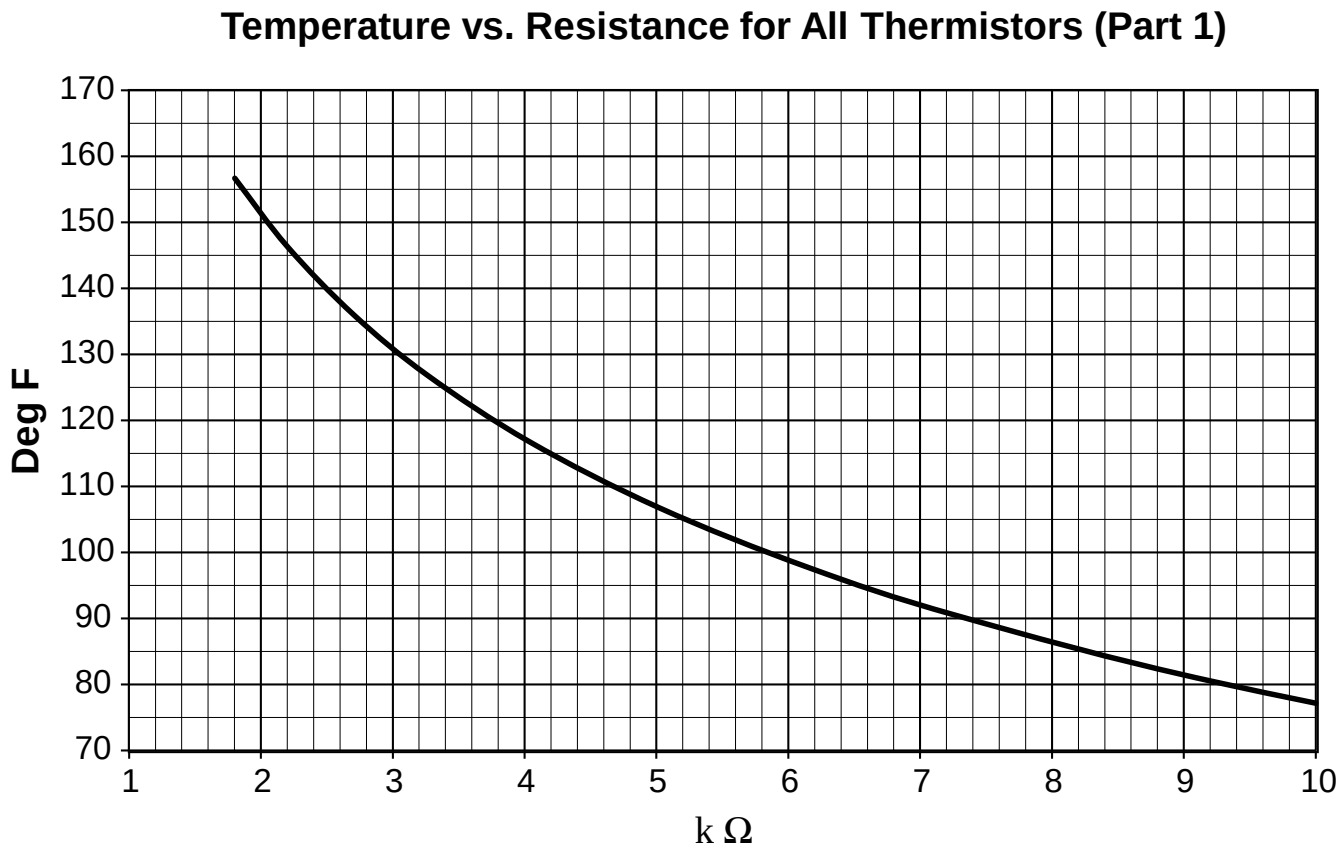


Figure 9. Wiring Diagram (5 Ton Models)

711201B
(Replaces 711201A)
06/13



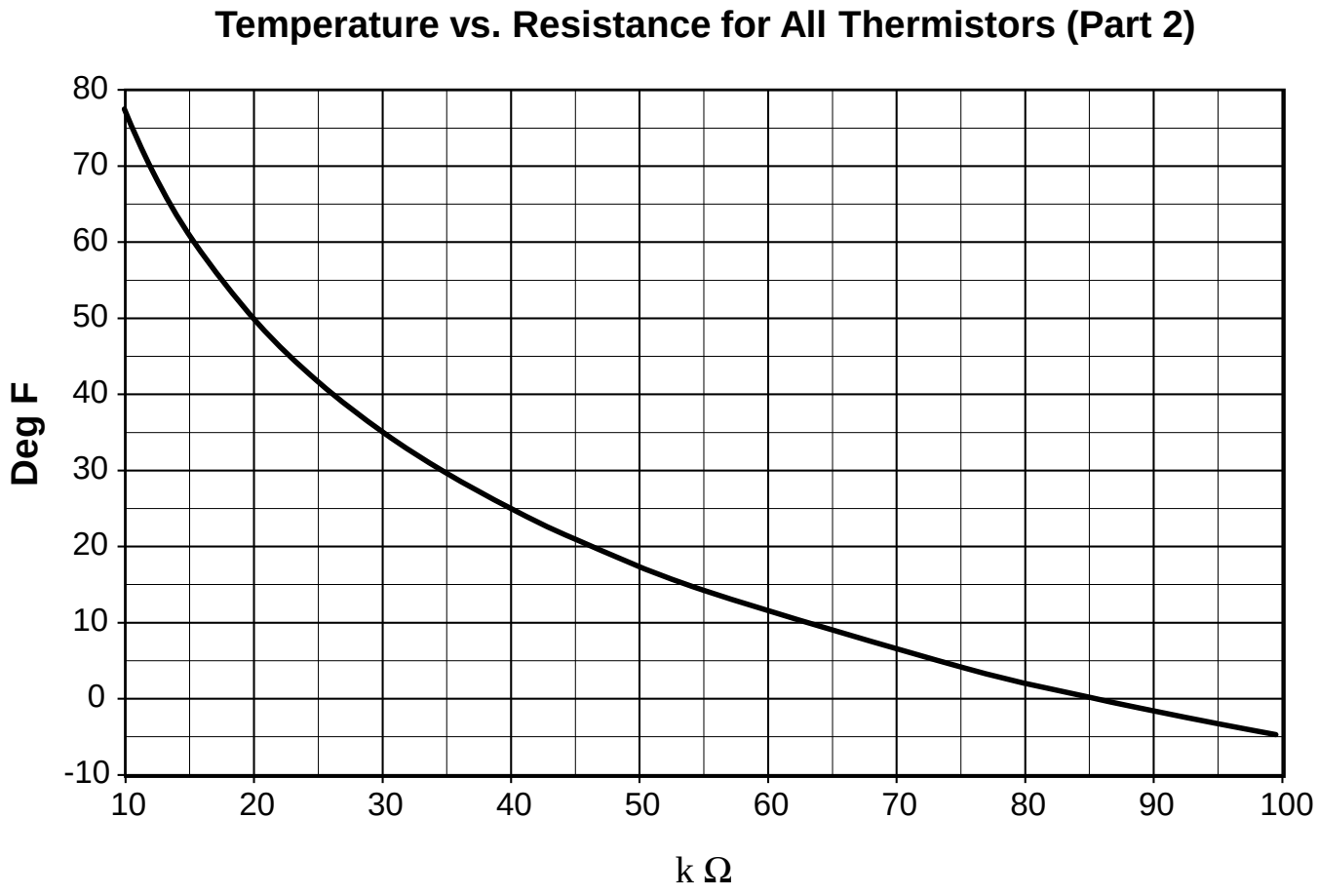


Figure 10. Temperature Sensor Resistance Charts

INSTALLATION / PERFORMANCE CHECK LIST

ATTENTION INSTALLERS:

It is your responsibility to know this product better than your customer. This includes being able to install the product according to strict safety guidelines and instructing the customer on how to operate and maintain the equipment for the life of the product. Safety should always be the deciding factor when installing this product and using common sense plays an important role as well. Pay attention to all safety warnings and any other special notes highlighted in the manual. Improper installation of the furnace or failure to follow safety warnings could result in serious injury, death, or property damage.

These instructions are primarily intended to assist qualified individuals experienced in the proper installation of this appliance. Some local codes require licensed installation/service personnel for this type of equipment. Please read all instructions carefully before starting the installation. Return these instructions to the customer's package for future reference.

INSTALLATION ADDRESS:		
CITY _____	STATE _____	
UNIT MODEL # _____		
UNIT SERIAL # _____		
Unit Installed Minimum clearances per Figure 1 (page 3)?	YES	NO
INSTALLER NAME:		
CITY _____	STATE _____	

PROPOSITION 65 WARNING:

WARNING: This product contains chemicals known to the state of California to cause cancer.

WARNING: This product contains chemicals known to the state of California to cause birth defects or other reproductive harm.

ELECTRICAL SYSTEM		
Electrical connections tight?	YES	NO
Line voltage polarity correct?	YES	NO
Rated Voltage: _____ VOLTS		
L1-L2 Volts: _____ VOLTS		
Max. deviation of voltage from rated volts: _____ VOLTS		
% Volt imbalance: _____ VOLTS		
Blower Motor HP: _____		
Has the thermostat been calibrated?	YES	NO
Is the thermostat level?	YES	NO

REFRIGERATION SYSTEM		
Was unit given 24 hr warm up period for crankcase heaters?	YES	NO
Stage-1 Liquid Pressure (high side) _____		
Stage-1 Suction Pressure (low side) _____		
Has the owner's information been reviewed with the customer?	YES	NO
Has the Literature Package been left with the unit?	YES	NO

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709230A (Replaces 7092300)