

INSTALLATION INSTRUCTIONS

Single Package Heat Pump - Two Stage, R-410A



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 & KEEP IN A SAFE PLACE FOR FUTURE REFERENCE.

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IMPORTANT SAFETY INFORMATION

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 indoor blower.
 - When servicing controls, label all wires prior to disconnecting. Reconnect wires correctly.
 - Verify proper operation after servicing.
-

WARNING:

These units are fully charged with R-410A refrigerant and ready for installation. When a system is installed according to these instructions, no refrigerant charging is required. If repairs make it necessary for evacuation and charging, it should only be attempted by qualified, trained personnel thoroughly familiar with this equipment. Some local codes require licensed installation service personnel to service 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.

WARNING:

Do not place combustible material on or against the unit cabinet. Do not place combustible materials, including gasoline and any other flammable vapors and liquids, in the vicinity of the unit.

WARNING:

PROPOSITION 65 WARNING: This product contains fiberglass wool, a product known to the state of California to cause cancer. Disturbing the insulation of this product during installation, maintenance, or repair will expose you to fiberglass wool.

- Breathing this material may cause respiratory irritations or may cause lung cancer.
 - Fiberglass wool may also cause eye irritation, skin sensitization, or other allergic responses in susceptible individuals.
 - Always wear goggles, disposable gloves, long sleeved shirt, and appropriate breathing protection when working near this insulation. If contact with skin occurs, wash immediately with soap and water. In case of contact with eyes, flush immediately with water for at least 15 minutes. Contact a physician if needed.
-

WARNING:

The information listed below and on the next page must be followed during the installation, service, and operation of this unit. Unqualified individuals should not attempt to interpret these instructions or install this equipment. Failure to follow safety recommendations could result in possible damage to the equipment, serious personal injury or death.

- Before beginning the installation, verify that the unit model is correct for the job. The unit model number is printed on the data label.
- This equipment contains liquid and gaseous refrigerant under high pressure. 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.
- The installer should become familiar with the units wiring diagram before making any electrical connections to the unit. See the unit wiring label or [Figure 15 \(page 16\)](#), [Figure 16 \(page 17\)](#), & [Figure 17 \(page 18\)](#).
- 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.

REQUIREMENTS & CODES

- All electrical wiring must be completed in accordance with local, state & 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.
- 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 C1) for special installation requirements.
- Air Ducts must be installed in accordance with the standards of the National Fire Protection Association “Standards for Installation of Air Conditioning and Ventilation Systems” (NFPA 90A), “Standard for Installation of Residence Type Warm Air Heating and Air Conditioning Systems” (NFPA 90B), these instructions, and all applicable local codes.
- Consult [Table 2 \(page 8\)](#), and the rating plate for the proper circulating air flow and temperature rise. It is important that the duct system be designed to provide the correct flow rates and external pressure rise. An improperly designed duct system can result in nuisance shutdowns, and comfort or noise issues.
- **This unit is designed for outdoor installations only and should be installed as described in Locating the Heat Pump.**

GENERAL INFORMATION

Single packaged heat pumps are ready for easy and immediate installation and can be readily connected into the high static duct system of a home. This unit is completely assembled, wired, and run tested at the factory. The only connections needed for installation are the supply and return ducts, the line voltage, and thermostat wiring. Use of components other than those specified may invalidate AHRI Certification, Code Agency Listing, and limited warranty on the air conditioner.

Before You Install this Unit

- ✓ The cooling load of the area to be conditioned must be calculated and a system of the proper capacity selected. It is recommended that the area to be conditioned be completely insulated and vapor sealed.
- ✓ Check the electrical supply and verify the power supply is adequate for unit operation. If there is any question concerning the power supply, contact the local power company.
- ✓ All units are securely packed at the time of shipment and upon arrival should be carefully inspected for damage prior to installing the equipment at the job site. Verify coil fins are straight. If necessary, comb fins to remove flattened or bent fins. Claims for damage should be filed immediately with the carrier.
- ✓ Please consult your dealer for maintenance information and availability of maintenance contracts. Please read all instructions before installing the unit.

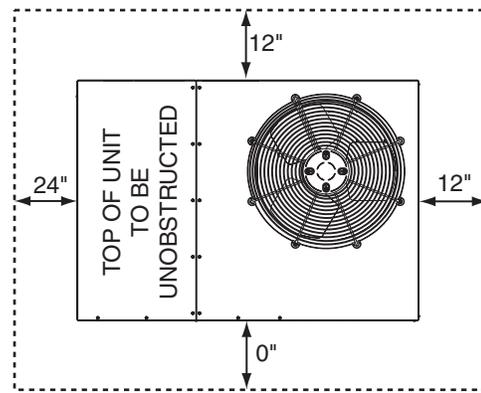


Figure 1. Minimum Unit Clearances

Locating the Heat Pump

- Survey the job site to determine the best location for mounting the outdoor unit. Select a solid, level position, preferably on a concrete slab, slightly above the grade level, and parallel to the home. If possible, select a site for the unit that is as close as possible to the proposed return grille location. **DO NOT PLACE UNIT UNDER THE HOME.**
- The unit should be located with consideration of minimizing the length of the supply and return ducts with no sharp radius bends. If practical, place the heat pump and its ducts in an area where they will be shaded from the afternoon sun, when the heat load is greatest.
- Consideration should also be given to availability of electric power, service access, noise, and shade.
- Overhead obstructions, poorly ventilated areas, and areas subject to accumulation of debris should be avoided. The hot condenser air must be discharged up and away from the home, and if possible, in a direction with the prevailing wind. Do not place the unit in a confined space. See [Figure 14 \(page 15\)](#) and [Table 4 \(page 15\)](#) for unit dimensions.
- Sufficient clearance for unobstructed airflow through the outdoor coil must be maintained in order to achieve rated performance. For minimum clearances to obstructions, see [Figure 1](#).

Minimum Clearances

Minimum clearances MUST be maintained from adjacent structures to provide room for proper servicing and air circulation. DO NOT install unit in a confined or recessed area that will allow discharge air from the unit to re-circulate into the condenser air inlet, through the coil. See [Figure 1](#).

Service Access Clearance:

Blower access panel side	24"
Electrical compartment access panel side	12"
Clearance between overhang and top of unit	72"
Clearance around condenser coil area to wall or shrubs (excludes duct panel side).....	12"

Clearances to Combustibles:

Combustible Base (wood or Class A, B, or C)	
Roof Covering Material.....	0"
Supply & return Air Ducts	0"
Duct Connection SSide	0"

Air Duct System

Air ducts should be installed in accordance with the standards of the National Fire Protection Association “Standard for Installation of Air Conditioning and Ventilation Systems” (NFPA 90A), “Standard for Installation of Residence Type Warm Air Heating and Air Conditioning Systems” (NFPA 90B), these instructions, and all applicable codes. NFPA publications are available by writing to: National Fire Protection Association, Batterymarch Park, Quincy, ME 02269 or visit www.NFPA.org on the web.

- Design the duct work according to methods described by the Air Conditioning Contractors of America (ACCA).
- The supply duct system, including the number and type of registers, will have much more effect on the performance of the system than any other factor. The duct must be sufficiently large to conduct an adequate amount of air to each register. See [Figure 2](#).
- Duct work should be attached directly to the unit flanges for horizontal applications.
- For highly resistive duct systems it may be necessary to add an additional return air duct and or supply to achieve maximum performance and prevent coil icing and refrigerant flood back.
- **The heat pump system will not cool or heat the home if air is lost to the outside through leaks in the duct system. Ducts that are collapsed or restricted by foreign objects will also prevent adequate air flow.**
- All duct work passing through unconditioned space must be properly insulated to minimize duct losses and prevent condensation. Use insulation with an outer vapor barrier. Refer to local codes for insulation material requirements.

Unconditioned Spaces

All duct work passing through unconditioned space must be properly insulated to minimize duct losses and prevent condensation. Use insulation with an outer vapor barrier. Refer to local codes for insulation material requirements.

The heat pump system will not cool or heat the home if air is lost to the outside through leaks in the duct system. Ducts that are collapsed or restricted by foreign objects will also prevent adequate air flow.

HEAT PUMP INSTALLATION

Unpacking the Unit

It is recommended that the unit be unpacked at the installation site to minimize damage due to handling.

CAUTION:

Do not tip the unit on its side. Oil may enter the compressor cylinders and cause starting trouble. If unit has been set on its side, restore to upright position and do not run for several hours. Then run unit for a few seconds. Do this three or four times with five minutes between runs.

1. Remove the bands from around the unit.
2. Unfold the top and bottom cap flanges.
3. Carefully remove the top cap and tube.

Installing Return & Supply Air Collars

If the supply and return collars are supplied with the unit, they will be located in the supply duct. They can be easily positioned over the unit openings and secured with sheet metal screws. See [Figure 3 \(page 6\)](#).

- The diameter of the return duct collar is 14".
NOTE: 2 ton units are designed with 12" returns.
- The diameter of the supply duct collar is 12".
- Before permanently installing the collars, it is recommended you pre-fit them over the openings first to determine best fit and alignment.

Return Duct

1. Assemble the collar by overlapping the two ends.
NOTE: One end of the collar is slotted and the opposite end has two small holes. Position the end with small screw holes underneath the slotted end.
2. Fasten the collar ends with two self drilling sheet metal screws.
3. Position the collar over the opening. Align the four holes in the collar with the four dimples or holes (depending on unit model) in the panel.
4. Secure the collar to the rear panel using self tapping screws (10-16x.5).

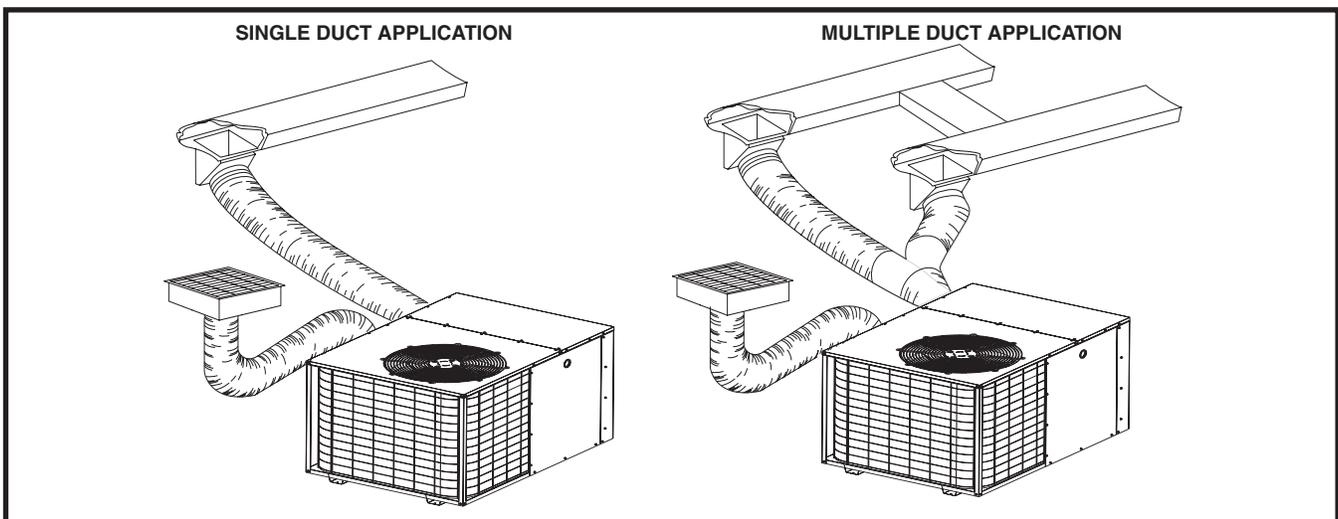


Figure 2. Typical Duct Applications

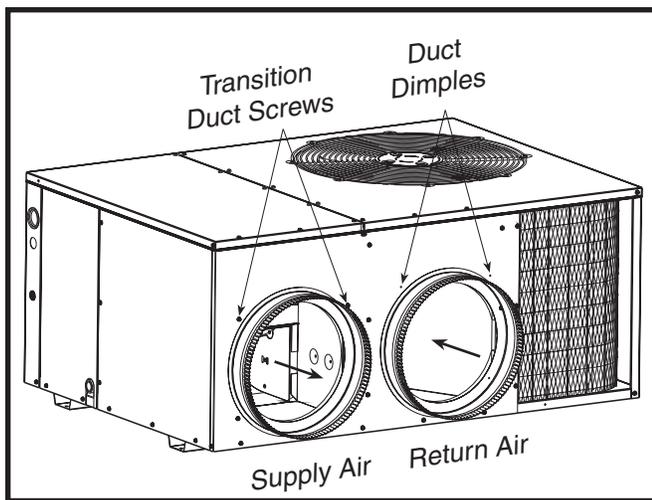


Figure 3. Return & Supply Air Collars

Supply Duct

1. Assemble the collar by overlapping the two ends.
NOTE: One end of the collar is slotted and the opposite end has two small holes. Position the end with small screw holes underneath the slotted end.
2. Fasten the collar ends with two self drilling sheet metal screws.
3. Position the collar over the opening and align the 4 holes in the collar with the 4 holes (or dimples depending on model) in the rear panel.
4. Using self-drilling screws (10-16x.5), secure the collar to the rear panel.

Connecting Return & Supply Air Flexible Ducts

- Flexible ducts may be cut to the required length and spliced with sheet metal sleeves and clamps. **Keep all ducts as short and straight as possible. Avoid sharp bends.** Please follow all instructions packed with duct.
- Flexible ducts can be secured to the corresponding collars with the provided clamps. After the inner duct is connected to the collar, pull the insulation and plastic sleeve over the connection and clamp. **NOTE:** To prevent a loss in cooling capacity, make sure all connections are tight.
- Homes with multiple supply ducts (or special applications), a Y fitting is available for dividing the supply air to different areas of the home for more efficient cooling. **NOTE:** For maximum performance, insulate the Y fitting.

Locating & Installing the Return Air Assembly

To simplify installation, locate and install the return air assembly first. See [Figure 4](#). If desired, the return opening can be located inside a closet with louvered doors that has an open area equal to or greater than a 12" x 20" grille. The return air grille can be placed in the wall of a closet and the ducted into the filter box through a boxed-in area at the closet floor level. **Make sure the filter is readily accessible.**

NOTE: The return air box with grille and filter should not be located in heavy traffic areas like hallways or center of rooms. A good spot is in a corner or under a table, if a minimum two inch clearance is available.

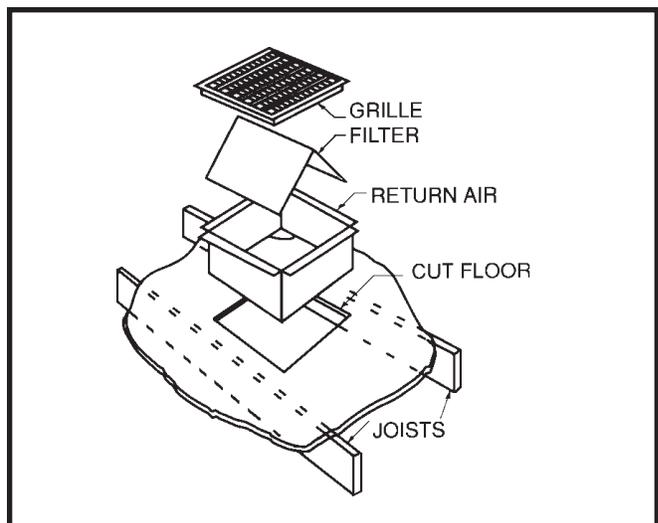


Figure 4. Return Air Assembly

1. Start the installation from under the home by cutting a small hole in the sub-floor. Determine how the floor joist location will affect cutting the opening needed for the return air box. **NOTE:** Floor joists are generally located on 16" centers, leaving 14-3/8" between joists.
2. After measuring the return air box (approximately 12-1/4" x 20-1/4"), cut the hole through the floor so that the box will fit between the floor joists. Care should be taken when cutting through carpeting to avoid snags. **NOTE:** In most installations it will be necessary to cut a similar hole in the fiberboard directly under the hole in the floor. However, if the floor is more than ten inches deep, it will only be necessary to cut a hole for the collar on the return air box or for the insulated duct.
3. Set the box into the opening and fasten with screws or nails.
4. Install the filter and return air grille in place.

Locating & Installing the Supply Damper(s)

When locating the supply damper(s), carefully check floor joists and frame members that could interfere with the installation of the damper or flexible duct. Ideally, the damper ([Figure 5 \(page 7\)](#)) should be located in the bottom of the main duct, forward of center of the home, at least three feet from the nearest register. The round supply opening in the slanted side of the damper should face the side of the home where the heat pump is located.

1. Locate the center of the heat duct by cutting a small hole in the fiberboard below the duct at the desired location.
2. Cut a hole approximately 3/4" larger than the damper opening in the fiberboard.
3. Cut a 9-1/8" x 13-1/8" hole in the duct and bend over all tabs flat on the inside of the heat duct.
4. Insert the damper into the duct and bend over all tabs flat on the inside of the heat duct.
5. Seal the opening between the fiberboard and damper or flexible duct.

ELECTRICAL CONNECTIONS

WARNING:

To avoid electric shock, personal injury, or death, turn off the electric power at the disconnect or the main service panel before making any electrical connections.

- Electrical connections must be in compliance with all applicable local codes and ordinances, and with the current revision of the National Electric Code (ANSI/NFPA 70).
- For Canadian installations the electrical connections and grounding shall comply with the current Canadian Electrical Code (CSA C22.1 and/or local codes).

Pre-Electrical Checklist

- ✓ Verify that the voltage, frequency, and phase of the supply source match the specifications on the unit rating plate.
- ✓ Verify that the service provided by the utility is sufficient to handle the additional load imposed by this equipment. Refer to the unit wiring label for proper high and low voltage wiring.
- ✓ Verify factory wiring is in accordance with the unit wiring diagram. See [Figure 15 \(page 16\)](#), [Figure 16 \(page 17\)](#), & [Figure 17 \(page 18\)](#). Inspect for loose connections.

Grounding

WARNING:

The unit cabinet must have an uninterrupted or unbroken electrical ground to minimize personal injury if an electrical fault should occur. Do not use gas piping as an electrical ground!

This unit must be electrically grounded in accordance with local codes or, in the absence of local codes, with the National Electrical Code (ANSI/NFPA 70) or the CSA C22.1 Electrical Code. Use the grounding lug provided in the control box for grounding the unit.

Line Voltage

- It is recommended that the line voltage to the unit be supplied from a dedicated branch circuit containing the correct fuse or circuit breaker for the unit.
- **An electrical disconnect must be located within sight of and readily accessible to the unit.** This switch shall be capable of electrically de-energizing the outdoor unit. See unit data label for proper incoming field wiring. Any other wiring methods must be acceptable to authority having jurisdiction.
- Provide power supply for the unit in accordance with the unit wiring diagram, and the unit rating plate.
- Connect the line-voltage leads to the terminals on the contactor inside the control compartment. Extend leads through power wiring hole. See [Figure 7](#). Connect L1 & L2 directly to the contactor.
- Use only copper wire for the line voltage power supply to this unit as listed in [Table 1 \(page 8\)](#). Use proper

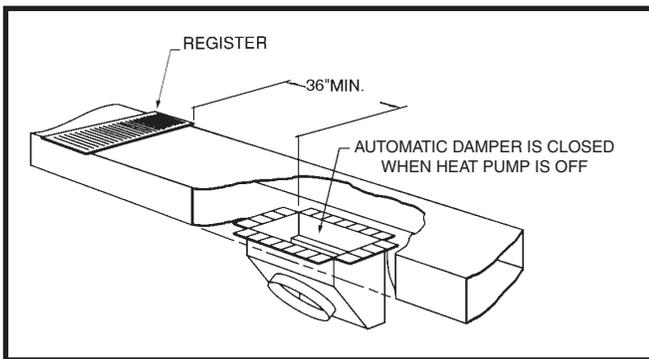


Figure 5. Supply Damper

Condensate Drainage

A 3/4" condensate fitting extends out of the side of the unit as shown in [Figure 6](#). The drain trap, shipped in the electrical compartment, must be installed to prevent water from collecting inside the unit.

1. Thread the elbow provided with the unit into the drain connection until hand tight.
2. Connect the condensate tubing onto the fitting, forming a trap ([Figure 6](#)) near the drain connection.
3. Route the condensate tube from the trap to a suitable drain. **NOTE:** For proper drainage, make sure the trap is level to the ground and tubing outlet is below trap level.

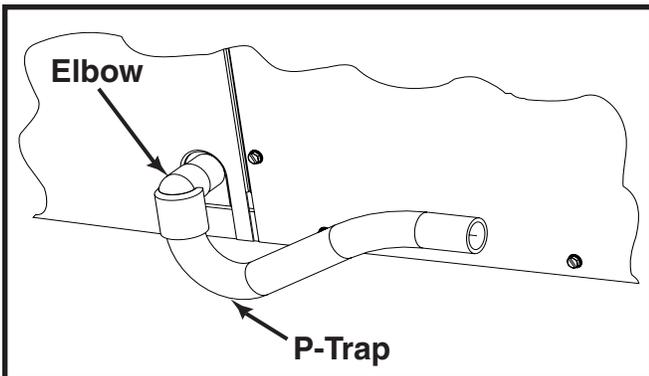


Figure 6. Drain Trap

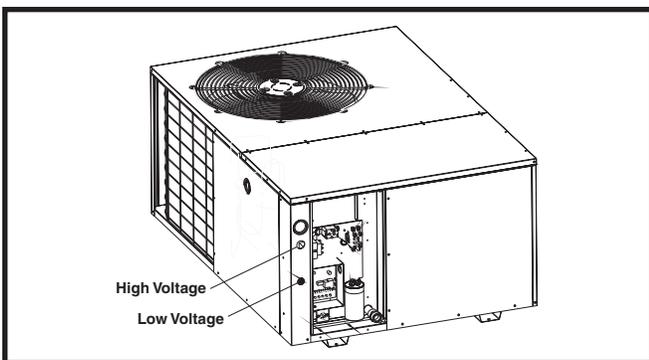


Figure 7. Power Entry

SUPPLY WIRE LENGTH (FEET)				SUPPLY CIRCUIT AMPACITY
200	150	100	50	
6	8	10	14	15
4	6	8	12	20
4	6	8	10	25
4	4	6	10	30
3	4	6	8	35
3	4	6	8	40
2	3	4	6	45
2	3	4	6	50
2	3	4	6	55
1	2	3	4	60

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

Table 1. Copper Wire Size AWG (1% voltage drop)

code agency listed conduit and a conduit connector for connecting the supply wires to the unit. Use of rain tight conduit is recommended.

- See the unit wiring label for proper high and low voltage wiring. Make all electrical connections in accordance with all applicable codes and ordinances. See [Figure 15 \(page 16\)](#), [Figure 16 \(page 17\)](#), & [Figure 17 \(page 18\)](#).

Overcurrent Protection

Overcurrent protection must be provided at the branch circuit distribution panel and sized as shown on the unit rating label and according to applicable local codes. Generally, the best fuse or breaker for any heat pump is the smallest size that will permit the equipment to run under normal usage and provide maximum equipment

protection. Properly sized fuses and breakers also prevent nuisance trips during unit startup.

If a fuse blows or a breaker trips, always determine the reason. Do not arbitrarily install a larger fuse or breaker and do not, in any case, exceed the maximum size listed on the data label of the unit.

Blower Speed

For optimum system performance and comfort, it may be necessary to change the factory speed setting. See [Table 2](#) for factory settings. **NOTE:** This model has a High Efficiency ECM Motor with 5 speed taps.

WARNING:

To avoid electric shock, personal injury, or death, turn off the electric power at the disconnect or the main service panel before making any electrical connections.

1. Disconnect all electrical power to the unit and remove the service panel.

CAUTION:

Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation. Verify proper operation after servicing.

2. Locate the **orange**, **red** and **blue** wires terminated to the blower motor. The **orange** wire controls the low speed cooling and heating operations, the **blue** wire

MODEL NUMBER	MOTOR TAP	EXTERNAL STATIC PRESSURE DROP (IN WC)															
		0.1		0.2		0.3		0.4		0.5		0.6		0.7		0.8	
		CFM	HEAT RISE	CFM	HEAT RISE	CFM	HEAT RISE	CFM	HEAT RISE	CFM	HEAT RISE	CFM	HEAT RISE	CFM	HEAT RISE	CFM	HEAT RISE
X24K	Tap T1*	686	46	651	49	621	51	589	54	530	60	477	-	431	-	382	-
	Tap T2**	926	34	884	36	861	37	827	38	785	40	734	43	676	47	622	51
	Tap T3***	1184	27	1161	27	1134	28	1109	28	1075	29	1041	30	1002	32	962	33
	Tap T4	1383	23	1360	23	1330	24	1303	24	1277	25	1246	25	1215	26	1137	28
	Tap T5	1537	21	1510	21	1487	21	1459	22	1437	22	1412	22	1382	23	1350	23
X36K	Tap T1*	1004	31	972	33	938	34	897	35	845	37	779	41	739	43	668	47
	Tap T2***	1167	27	1132	28	1100	29	1061	30	1020	31	979	32	921	34	851	37
	Tap T3**	1355	23	1320	24	1282	25	1247	25	1209	26	1168	27	1121	28	1066	30
	Tap T4	1510	21	1477	21	1441	22	1403	23	1366	23	1330	24	1288	25	1243	25
	Tap T5	1648	19	1614	20	1578	20	1544	20	1512	21	1473	21	1434	22	1393	23
X48K	Tap T1*	1108	29	1063	30	1031	31	987	32	939	34	894	35	850	37	808	39
	Tap T2***	1108	29	1063	30	1031	31	987	32	939	34	894	35	850	37	808	39
	Tap T3**	1666	19	1629	19	1587	20	1572	20	1542	20	1507	21	1477	21	1431	22
	Tap T4	1884	17	1824	17	1795	18	1762	18	1730	18	1707	19	1671	19	1634	19
	Tap T5	1979	16	1948	16	1925	16	1892	17	1861	17	1834	17	1804	18	1766	18
X60K	Tap T1***	923	34	875	36	799	40	735	43	677	47	623	51	579	55	543	58
	Tap T2*	1335	24	1295	24	1259	25	1214	26	1183	27	1144	28	1117	28	1063	30
	Tap T3	1754	18	1721	18	1684	19	1660	19	1634	19	1597	20	1568	20	1541	21
	Tap T4**	2045	15	2022	16	1983	16	1950	16	1921	16	1894	17	1869	17	1826	17
	Tap T5	2253	14	2218	14	2187	14	2153	15	2117	15	2091	15	2057	15	2021	16

* Denotes factory set low cooling & heating speed
 ** Denotes factory set high cooling & heating speed
 *** Denotes factory set auxiliary heating speed

Table 2. Airflow Data

controls high speed cooling and heating operations and the **red** wire controls the electric heating operation.

⚠ CAUTION:

To avoid personal injury or property damage, make certain that the motor leads cannot come into contact with any metal components of the unit.

3. Verify the required speed from the airflow data found in [Table 2 \(page 8\)](#). Place appropriate wire on the appropriate motor speed tap for the required airflow.
4. Check all factory wiring per the unit wiring diagram and inspect the factory wiring connections to be sure none loosened during shipping or installation.

Thermostat Connections

- The heat-cool thermostat is equipped with a system HEAT-COOL switch, which provides a positive means of preventing simultaneous operation of the heating and cooling units. The thermostat is also equipped with an ON-AUTO fan switch which allows the home owner to operate the indoor blower when air circulation is desired.
- Connect the low voltage wires to the respective terminals on the thermostat base. See [Figure 8](#) and the thermostat instruction sheet for more detailed wiring information.
- The thermostat should be mounted about 5 feet above the floor on an inside wall. **DO NOT** install the thermostat on an outside wall or any other location where its operation may be adversely affected by radiant heat from fireplaces, sunlight, or lighting fixtures, and convective heat from warm air registers or electrical appliances. Refer to the thermostat manufacturer's instruction sheet for detailed mounting information.

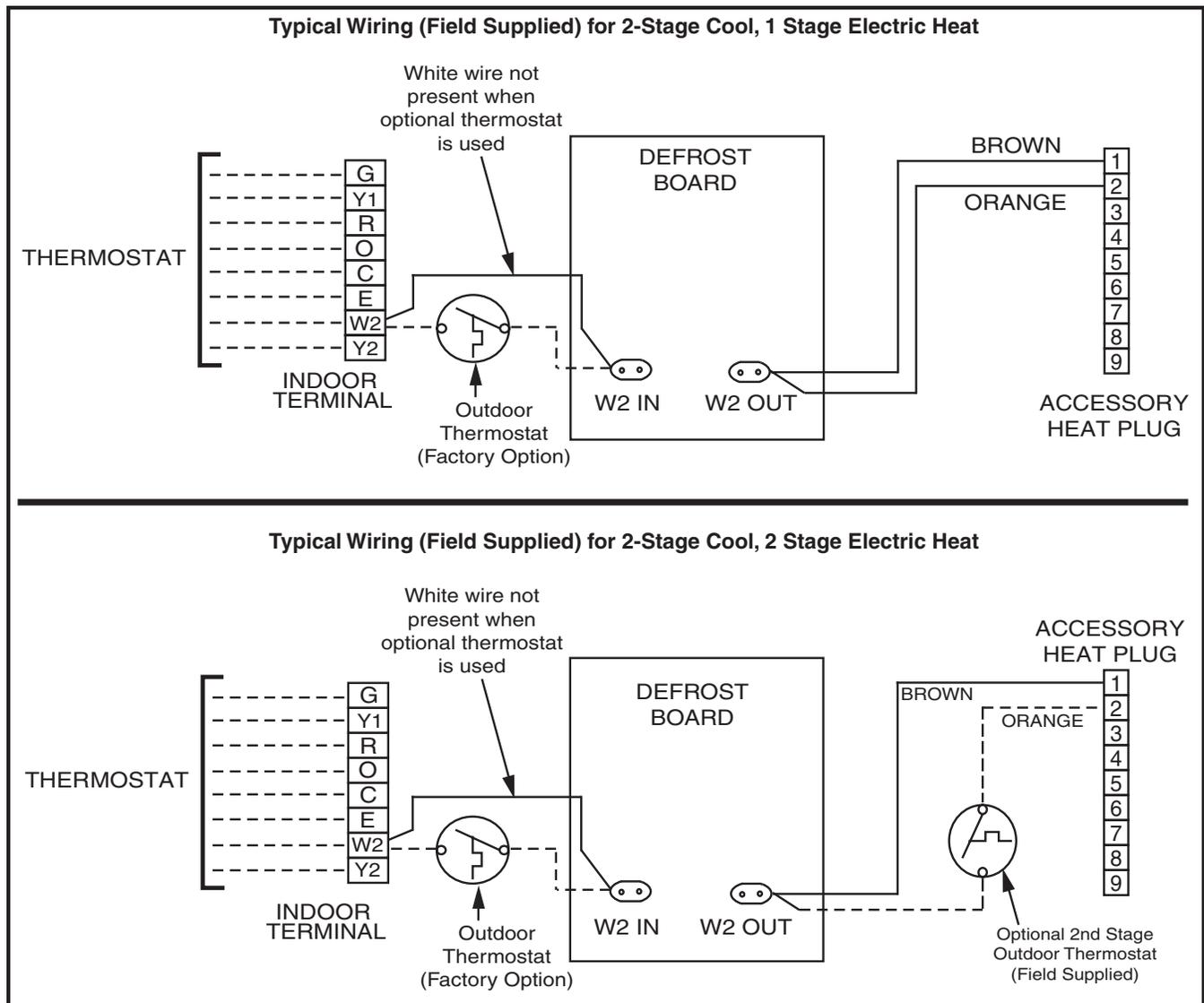


Figure 8. Typical Heat Pump Thermostat Connections

2-Speed Outdoor Fan Motor (Select Models)

If the unit utilizes a 2-speed condenser fan motor, this motor will operate on low speed when in low cooling/heating, and on high speed when in high cooling/heating.

Ambient Sensor Mounting

For optimum performance of the heat pump system, the ambient sensor (Figure 9) must be mounted on the outside of the unit.

1. Remove the mounting bracket and all hardware included in the packet.
2. Remove star bushing from 7/8" hole in corner panel of the unit.
3. Route the ambient sensor through the 7/8" hole in the corner panel of the unit, and then through the 7/8" hole in the mounting bracket.
4. Route the sensor through the star bushing. Use the star bushing to secure the mounting bracket to the unit.
5. Secure the ambient sensor inside the plastic clip and secure it to the mounting bracket with the screw and nut provided.
6. Install one spacer next between the plastic clip and mounting bracket.
7. Bend the mounting bracket into position. Install the mounting bracket to the unit using the screw in the corner panel.

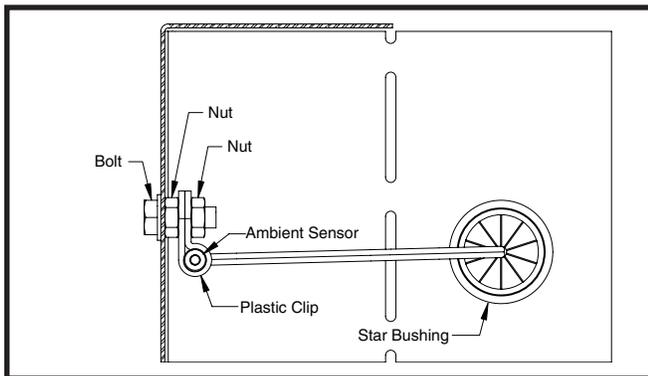


Figure 9. Ambient Sensor Mounting

JUMPER POSITION	STATUS TYPE	DIAGNOSTIC DESCRIPTION
5C	Operating Status	Anti Short Cycle Timer
C 1	Operating Status	Cooling, 1st Stage
C 2	Operating Status	Cooling, 2nd Stage
H 1	Operating Status	Heating, 1st Stage
H 2	Operating Status	Heating, 2nd Stage
dF	Operating Status	Defrost
--	Operating Status	Power On, No Call for Operation

Table 3. Control Board Status Indicators

Defrost Control Board Test Pins

- Placing a jumper between the test pins for less than 1 second will bypass the Anti-Short Cycle Timer.
- Placing a jumper between the test pins for more than 1 second will force the unit into a defrost cycle. As soon as the jumper is removed, the defrost cycle will end as determined by the typical criteria.
- To determine operating status or fault conditions, refer to Table 3 for diagnostic description.

Clearing Defrost Board Fault Codes

- Fault codes can be removed from memory through the use of the test pins. This is accomplished by shorting the two test pins momentarily (more than 1 second) while there is no Y1 IN input present.
- Without resetting using the test pins, the fault codes will stay in the board's memory continuously (even through loss of power) for 7 days.

Electric Heat Package (optional)

This heat pump is shipped without an auxiliary electric heat kit installed. If electric heat is desired, an accessory heater kit must be field installed. Refer to Table 2 (page 8) for blower speeds.

- Select the correct size heat package for the installation. See specifications sheet for available kits and application. Install the heater kit according to the to the installation instructions provided with the kit.
- Installation is most easily accomplished before making duct or electrical connections.

Outdoor Thermostat (Factory Option)

Select models are equipped with an outdoor thermostat from the factory. This prevents the operation of supplemental electrical resistance heat at outdoor temperatures above 40° F, except for defrost operation.

Models without an outdoor thermostat have a white wire from **W2** on the terminal strip to **W2** on the defrost board for the use of supplemental electrical resistance heat for a **W2** or **E** call. For models with an outdoor thermostat, this wire may be field supplied and installed on units that are not HUD compliant. For additional info refer to Title 24: Housing and Urban Development - Subpart H, Section 3280.714, Paragraph 1, Item ii.

A jumper wire is supplied from **W2** to **E** on the terminal strip on all models.

STARTUP & ADJUSTMENTS

Pre-Start Checklist

The following check list should be observed prior to starting the unit.

- √ Is the unit level? Unit should be level or slightly slanted toward the drain for proper condensate drainage.
- √ Is the unit installed with the proper clearances as listed in [Figure 1 \(page 4\)](#)?
- √ Is the wiring correct according to the wiring diagram and electrical codes?
- √ Are all the wiring connections tight? Check the condenser fan to make sure it turns freely.
- √ Is the overcurrent protection properly sized?
- √ Is the thermostat wired correctly? Is it installed in a proper location?

Start-Up Procedure

The control circuit consists of an anti-short cycle timer that will not let the compressor start at power up before five minutes have elapsed.

1. Set the system mode to OFF and the temperature mode to its highest setting.
2. Turn power on at the disconnect switch.
3. Set the system mode to ON or COOL.
4. Set the temperature mode below room temperature. Verify that the indoor blower, outdoor fan, and compressor energize and the cooling function starts.
5. Verify the discharge air grilles are adjusted and the system air is balanced.
6. Verify the duct work has no air leaks.
7. Verify the condensate drain is installed correctly and functions properly.
8. Set the temperature mode above room temperature. The unit should stop.
9. Instruct the homeowner on unit and thermostat operation and filter servicing.

Air Circulation

Leave the thermostat system mode on OFF, and set the fan mode to ON. Blower should run continuously. Check the air delivery at the supply registers and adjust register openings for balanced air distribution. Examine ductwork for leaks or obstruction if insufficient air is detected.

Set the thermostat fan mode to AUTO. The blower should stop running.

System Heating

Set the thermostat system mode to HEAT and the fan mode to AUTO. Change the thermostat temperature selector above the existing room temperature and check for the discharge of warm air at the supply registers.

System Cooling

Set the thermostat's system mode to COOL and the fan mode to AUTO. Change the thermostat temperature selector below the existing room temperature. Allow the cooling system to operate for several minutes and check for the discharge of cool air at the supply registers.

Short Cycle Protection

The control circuit is equipped with a time-delay feature for protection against short cycling. With the system operating in the cooling mode, gradually raise the thermostat temperature setting until the system de-energizes. Immediately lower the thermostat temperature to the original setting and verify that the indoor blower is energized. After approximately 5 minutes, the compressor and the outdoor fan will energize.

Emergency Heat

1. Set the thermostat's system mode to EM HT and the fan mode to AUTO (intermittent air) or ON (continuous air).
2. Set the thermostat's temperature selector above the existing room temperature and check the following:
 - The thermostat auxiliary heat light (RED) is on.
 - The compressor and the fan should not run; low voltage circuit remains energized.
 - The blower runs according to the thermostat's fan mode setting.

Forced Defrost Mode (Field Test)

- When the **TEST** terminals are shorted for more than 3 seconds, with the **Y1** input active and pressure switches closed, the ACST will be eliminated and the compressor contactor output energizes. The control will be placed into a forced defrost mode.

NOTE: The coil temperature sensor does not need to be cold when the unit is forced into defrost.

- If the short across the TEST pins exist, the unit will stay in DEFROST as long as the short remains or until the TERMINATE TIME is reached (11 minutes). This will happen regardless of coil temperature.

Anti Short Cycle Timer Test

The 5 minute time delay feature can be bypassed by shorting the **TEST** pins together.

Heating Mode

When the **TEST** pins are shorted together for more than 1 second, the control will switch between defrost mode and heating mode as described in the Forced Defrost Mode procedure section.

Cooling Mode

When the **TEST** pins are shorted together for more than 1 second, the Anti Short Cycle Timer will be bypassed.

COMPONENT FUNCTIONS

Low Pressure Switch (Select Models) - This safety switch is factory installed and located in the suction line internal to the unit. The switch is designed to protect the compressor if a loss of charge occurs. Under normal conditions, the switch is closed.

If the suction pressure falls below 5 psig, then the switch will open and de-energize the unit. The switch will close again once the suction pressure increases above 20 psig. The low pressure switch interrupts the thermostat inputs to the unit.

NOTE: When the switch opens and then closes, there will be a 5 minute short cycling delay before the unit can energize.

High Pressure Switch - This safety switch is factory installed and located in the compressor discharge line internal to the unit. The switch is designed to de-energize the system when very high pressures occur during abnormal conditions. Under normal conditions, the switch is closed.

If the discharge pressure rises above 650 psig, the switch will open and de-energize the unit. The switch will close again once the discharge pressure decreases to 460 psig. The high pressure switch interrupts the thermostat inputs to the unit.

NOTE: When the switch opens and then closes, there will be a 5 minute short cycling delay before the unit can energize.

UNIT MAINTENANCE

WARNING:

To prevent electrical shock, personal injury, or death, disconnect all electrical power to the unit before performing any maintenance or service. The unit may have more than one electrical supply.

Proper maintenance is important to achieve optimum performance from the heat pump. The ability to properly perform maintenance on this equipment requires certain mechanical skills and tools. If you do not possess these skills, contact your dealer for maintenance. Consult your local dealer about the availability of maintenance contracts. Routine maintenance should include the following:

- Inspect and clean or replace air filters at the beginning of each heating and cooling season, or more frequently if required.
- Inspect the condensate drain and outdoor coil at the beginning of each cooling season. Remove any debris. Clean the outdoor coil and louvers as necessary using a mild detergent and water. Rinse thoroughly with water.
- Inspect the electrical connections for tightness at the beginning of each heating and cooling season. Service as necessary.

CAUTION:

The unit should never be operated without a filter in the return air system. Replace disposable filters with the same type and size.

- Do not attempt to add additional oil to motors unequipped with oil tubes. The compressor is hermetically sealed at the factory and does not require lubrication.

REFRIGERANT CHARGING

CAUTION:

This heat pump contains liquid and gaseous refrigerant under pressure. Adjustment of refrigerant charge should only be attempted by qualified, trained personnel thoroughly familiar with the equipment and safe responsible refrigerant handling procedures. 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.

- The unit must be charged while both first and second stages are operating.
- To achieve rated capacity and efficiency the compressor must be exposed to refrigerant for at least 24 hours prior to running and then must be run for a minimum of 12 hours. If Charging in Cooling Mode, see Refrigerant Charging Charts: .

Charging the Unit in AC Mode

(with Outdoor Temperatures Above 65° F)

1. With the system operating at steady-state, measure the suction and liquid refrigerant pressures (in psig) at the service valves.
2. Measure the compressor discharge temperature (° F).
3. Use [Figure 10 \(page 13\)](#), [Figure 11 \(page 13\)](#), [Figure 12 \(page 14\)](#), & [Figure 13 \(page 14\)](#) to verify system conditions (during cooling mode) for proper charge amount.

Charging the Unit in Heating Mode

1. Evacuate the refrigerant system.
2. Weigh in the proper charge as indicated on the unit rating label. Unit charge **NEVER** be verified in cooling season.
3. Verify the unit is operating properly according to the System Heating section on [page 11](#).

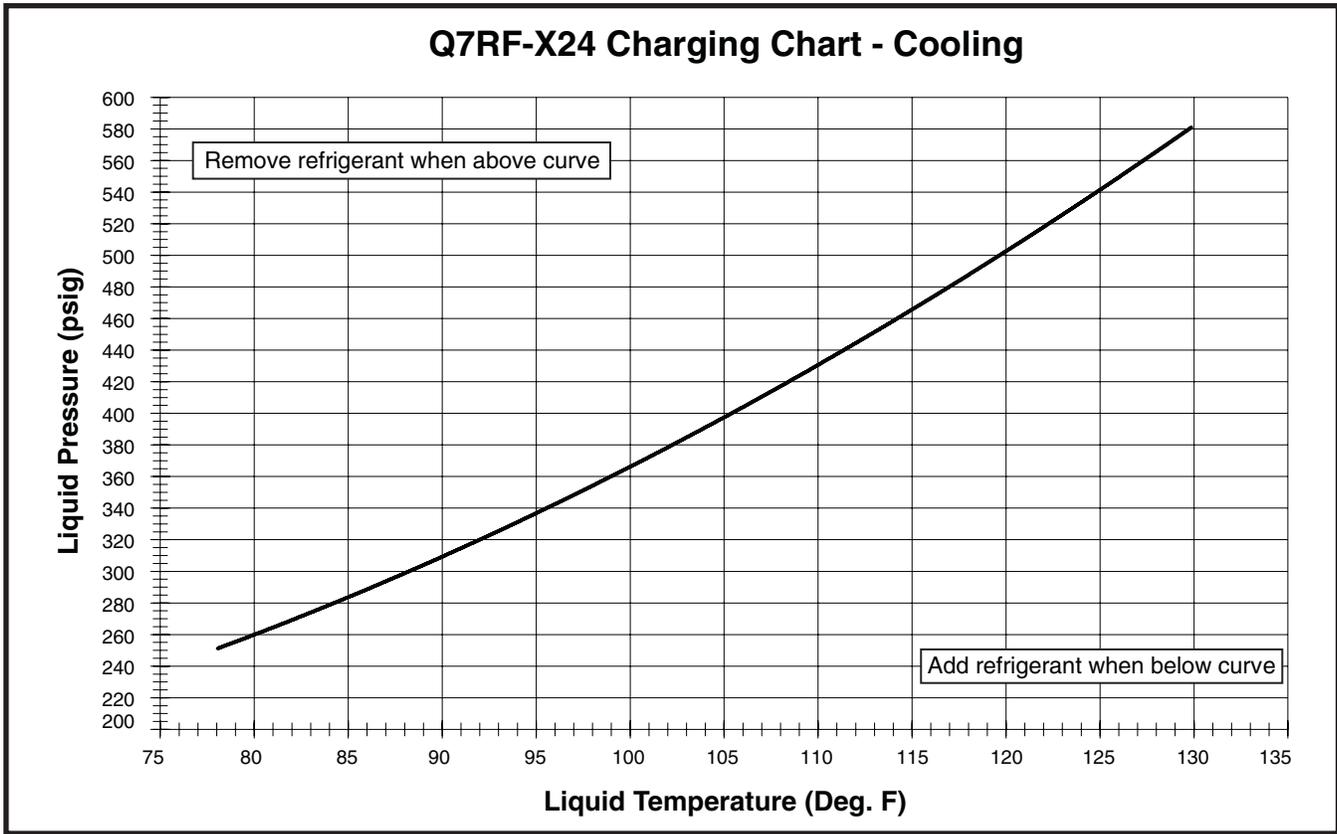


Figure 10. Charging Chart for 2 Ton Units

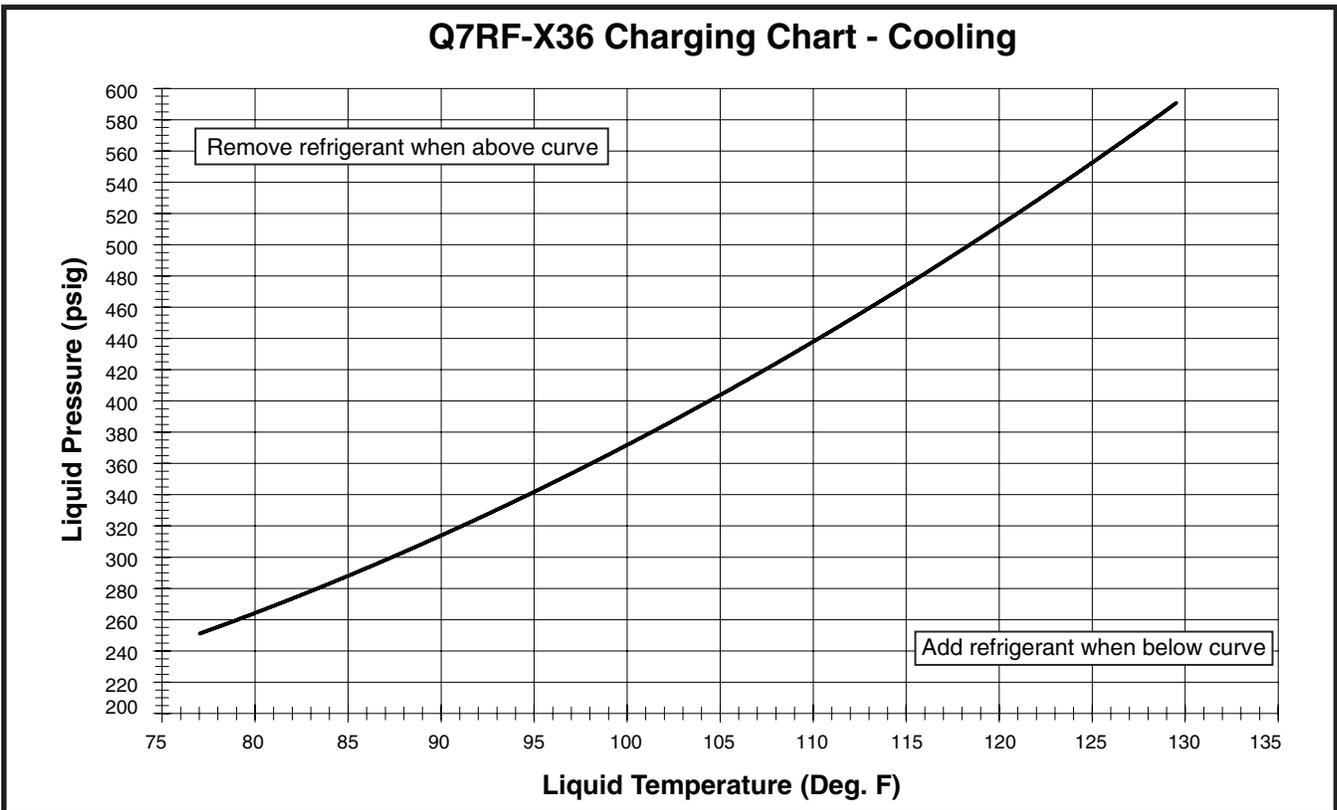


Figure 11. Charging Chart for 3 Ton Units

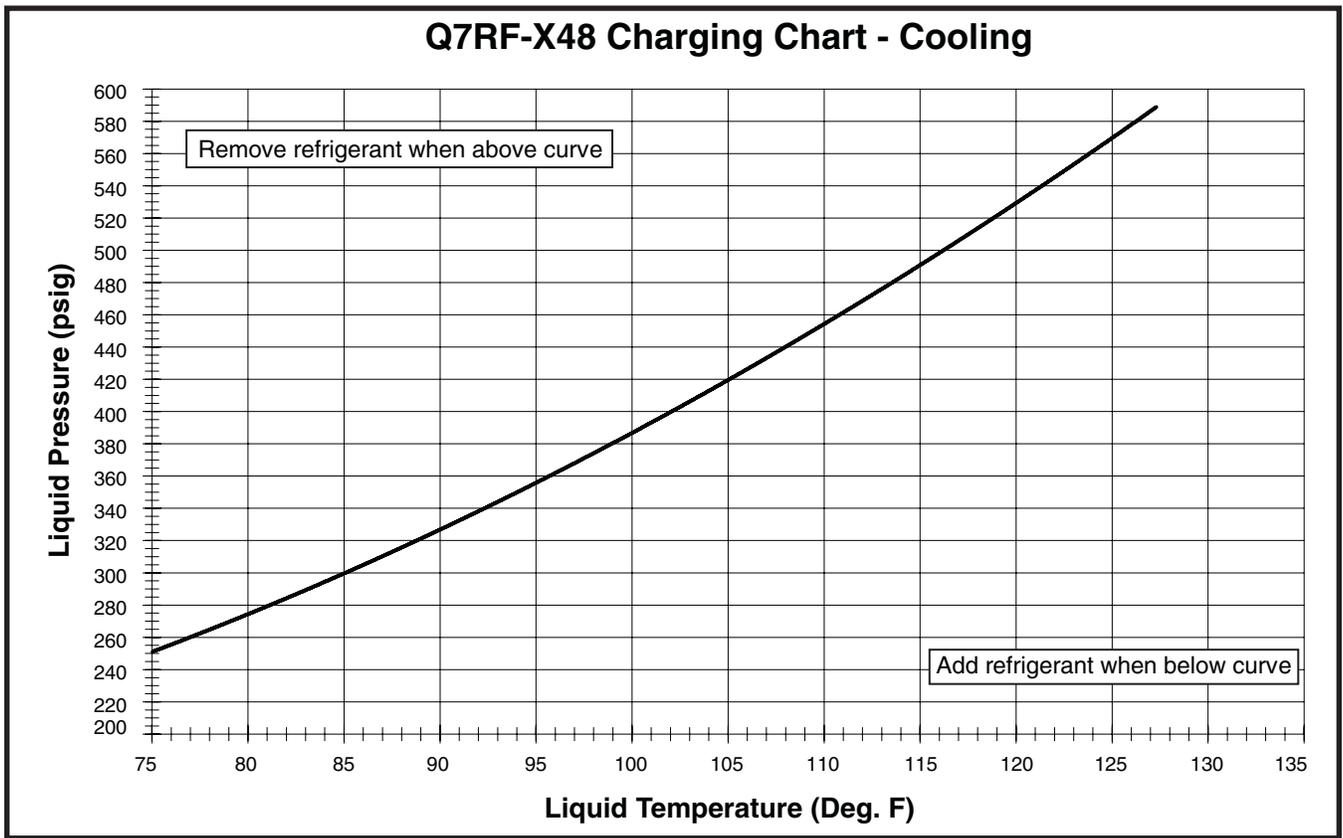


Figure 12. Charging Chart for 4 Ton Units

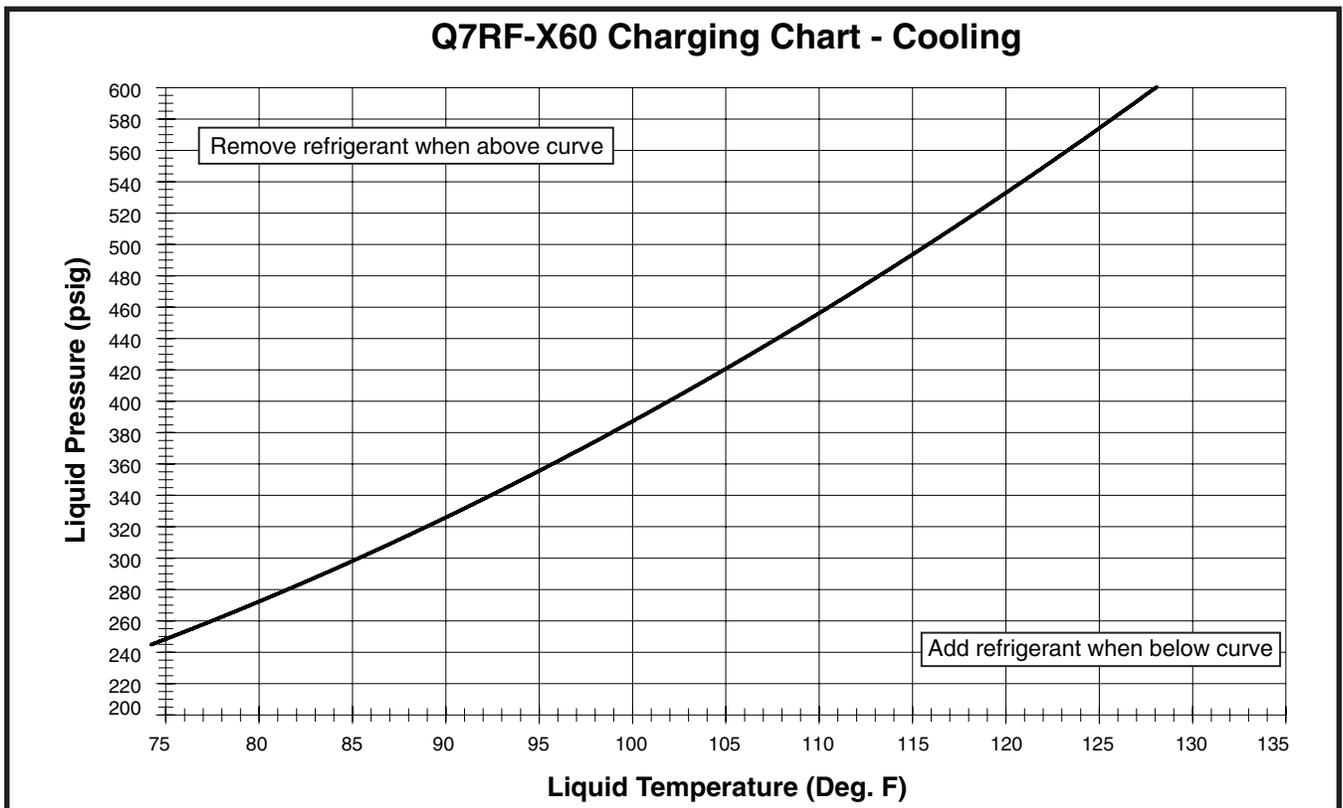


Figure 13. Charging Chart for 5 Ton Units

FIGURES & TABLES

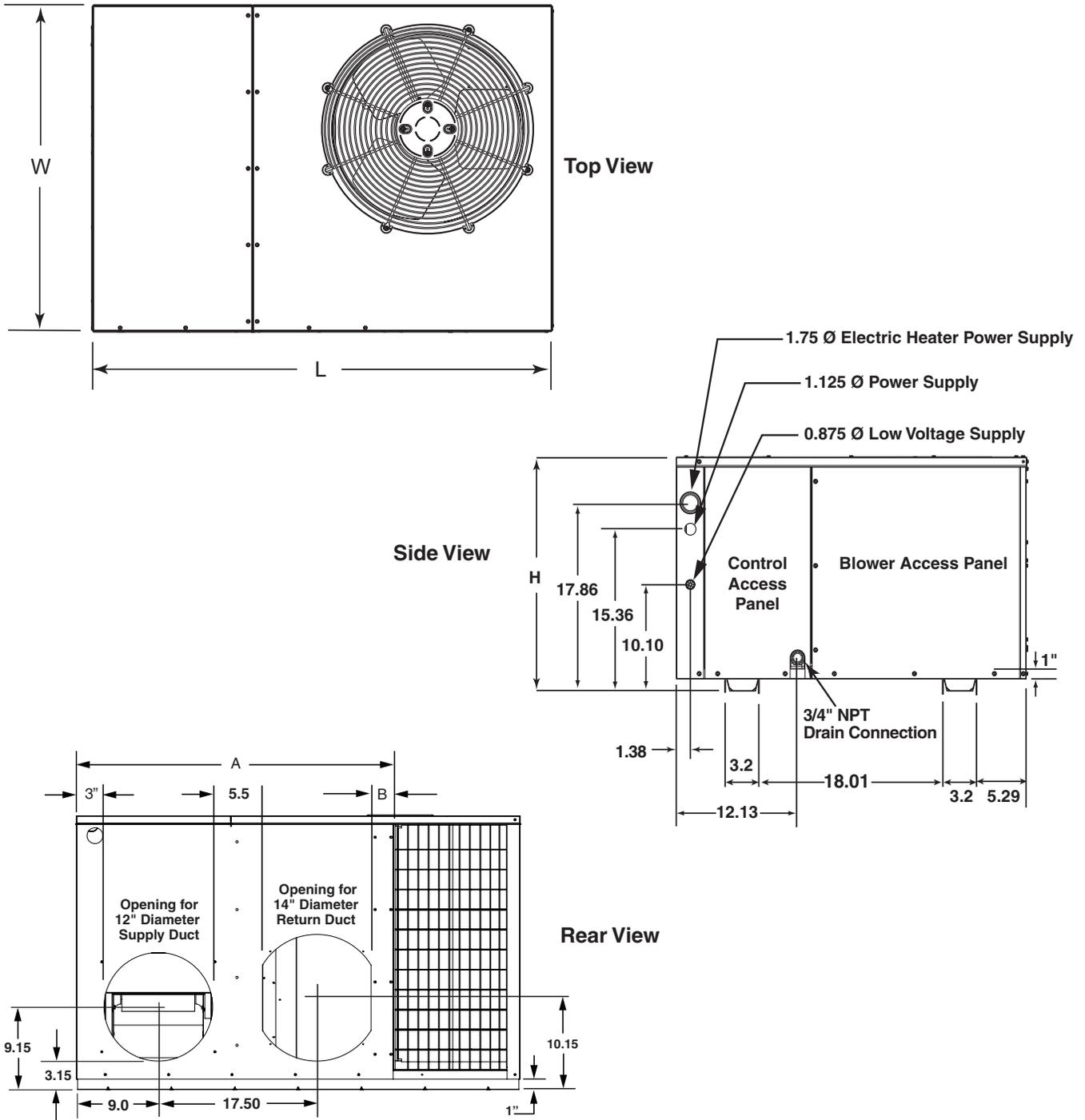


Figure 14. Unit Dimensions

MODEL NUMBER	LENGTH (L)	WIDTH (W)	HEIGHT (H)	A	B
X24KA	49"	35"	30.2"	29.00"	2.48"
X36KA	49"	35"	38.2"	35.02"	2.48"
X48KA	63"	35"	38.2"	35.02"	2.48"
X60KA	63"	35"	38.2"	35.02"	2.48"

Table 4. Physical Data

Wiring Diagrams

WIRING DIAGRAM

SMALL PACKAGED HEAT PUMP - SINGLE PHASE 2 TON AND 3 TON

208/230 VOLT

NOTES:

1. Disconnect all power before servicing.
2. For supply connections use copper conductors only.
3. Not suitable on systems that exceed 150V to ground.
4. For replacement wires use conductors suitable for 105°C.
5. Low Pressure Switch jumpered from LP1 to LP2 (on select models)

1. Couper le courant avant de faire letrétine.
2. Employez uniquement des conducteurs en cuivre.
3. Ne convient pas aux installations de plus de 150V a la terre.
4. Remplacement pour utiliser les fils conducteurs adapté à 105°C.
5. Contacteur de basse pression sur une sélection de modèles ou ponté du LP1 et LP2.

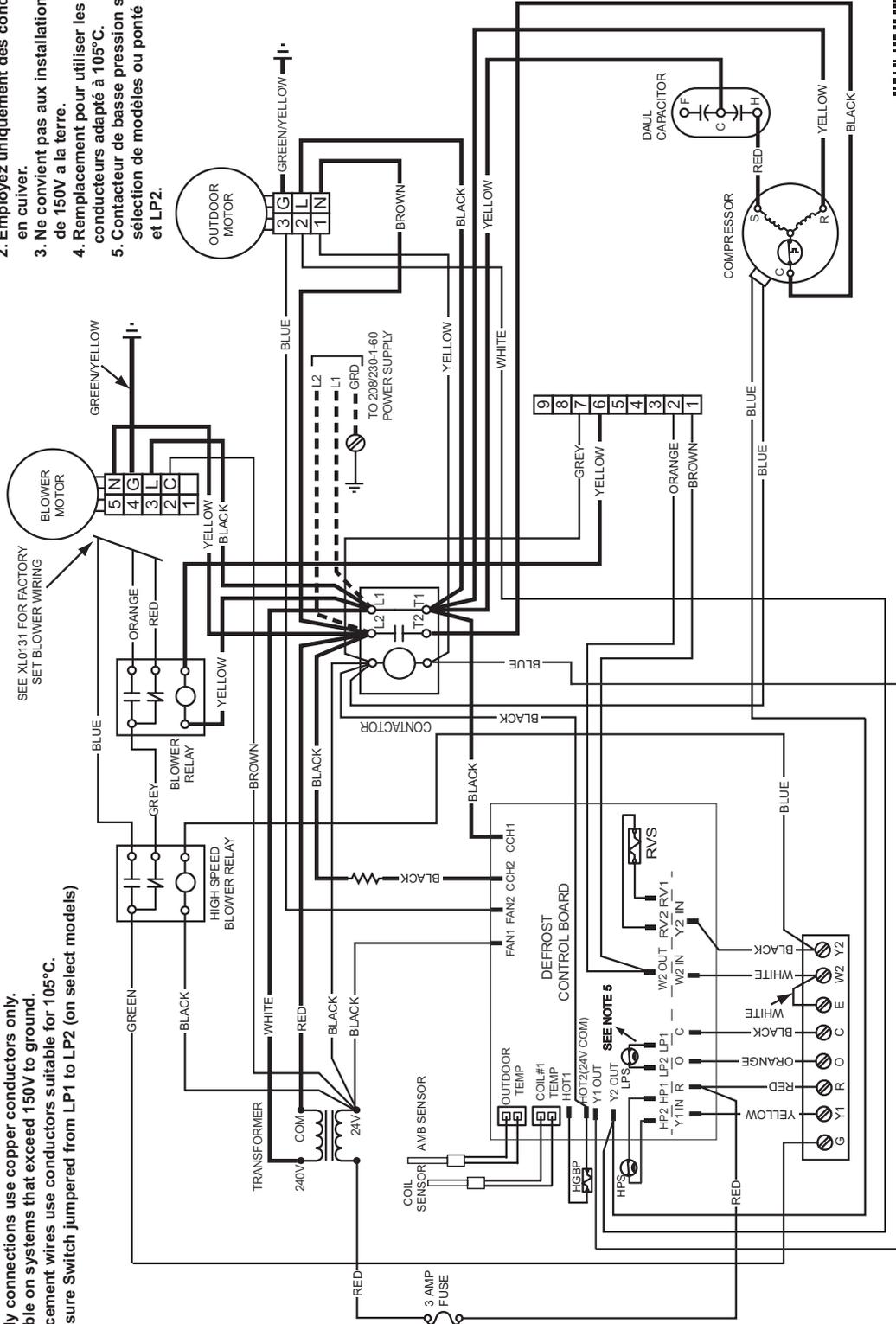


Figure 15. W.D. for 2 & 3 Ton Models

WIRING DIAGRAM

SMALL PACKAGED HEAT PUMP - SINGLE PHASE 4 TON

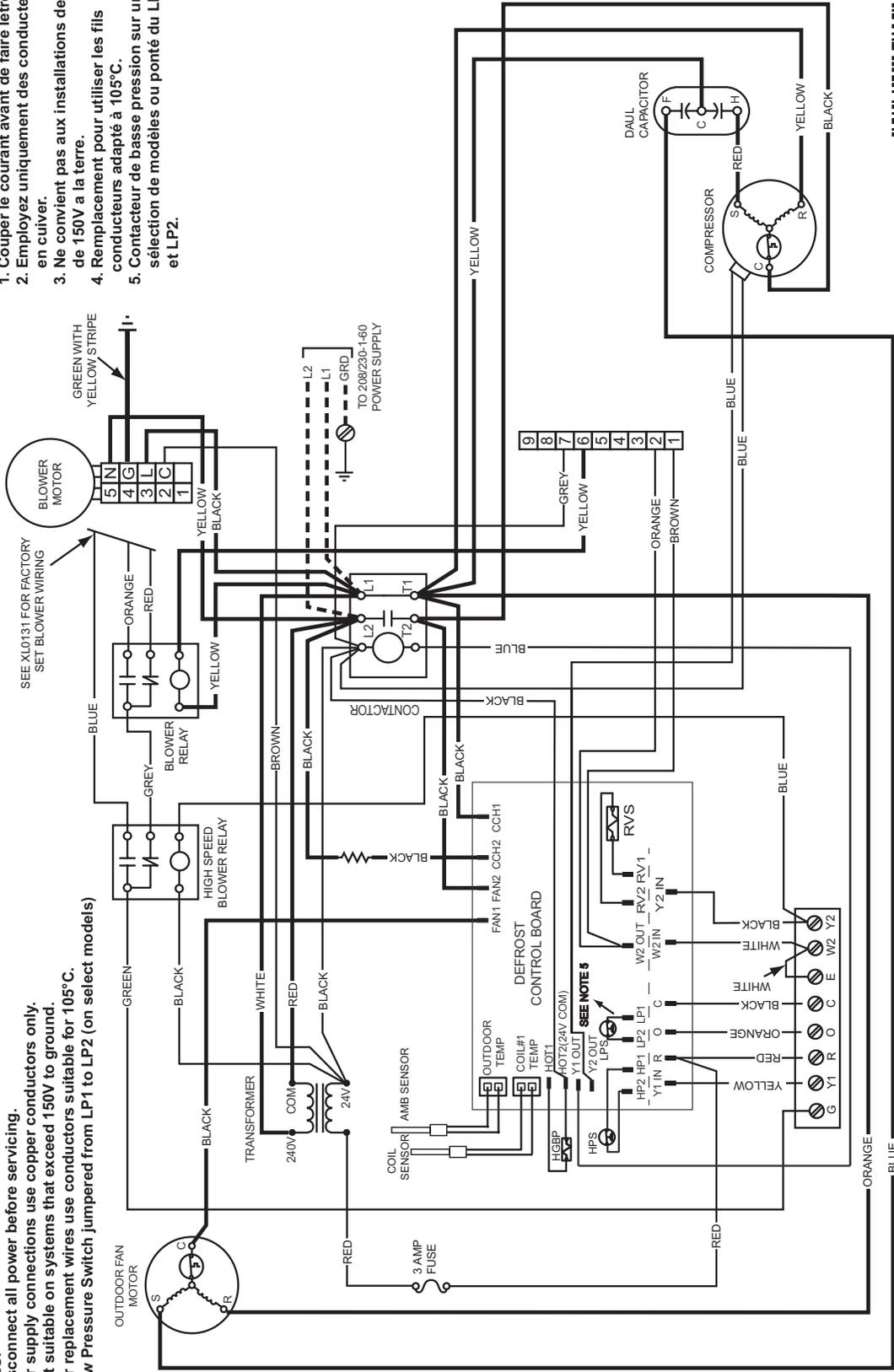
4 TON

208/230 VOLT

NOTES:

1. Disconnect all power before servicing.
2. For supply connections use copper conductors only.
3. Not suitable on systems that exceed 150V to ground.
4. For replacement wires use conductors suitable for 105°C.
5. Low Pressure Switch jumpered from LP1 to LP2 (on select models)

1. Couper le courant avant de faire le retréte.
2. Employez uniquement des conducteurs en cuivre.
3. Ne convient pas aux installations de plus de 150V a la terre.
4. Remplacement pour utiliser les fils conducteurs adapté à 105°C.
5. Contacteur de basse pression sur une sélection de modèles ou ponté du LP1 et LP2.



LEGEND:
 FIELD WIRING - - - -
 LOW VOLTAGE - - - -
 HIGH VOLTAGE - - - -



Figure 16. W.D. for 4 Ton Models

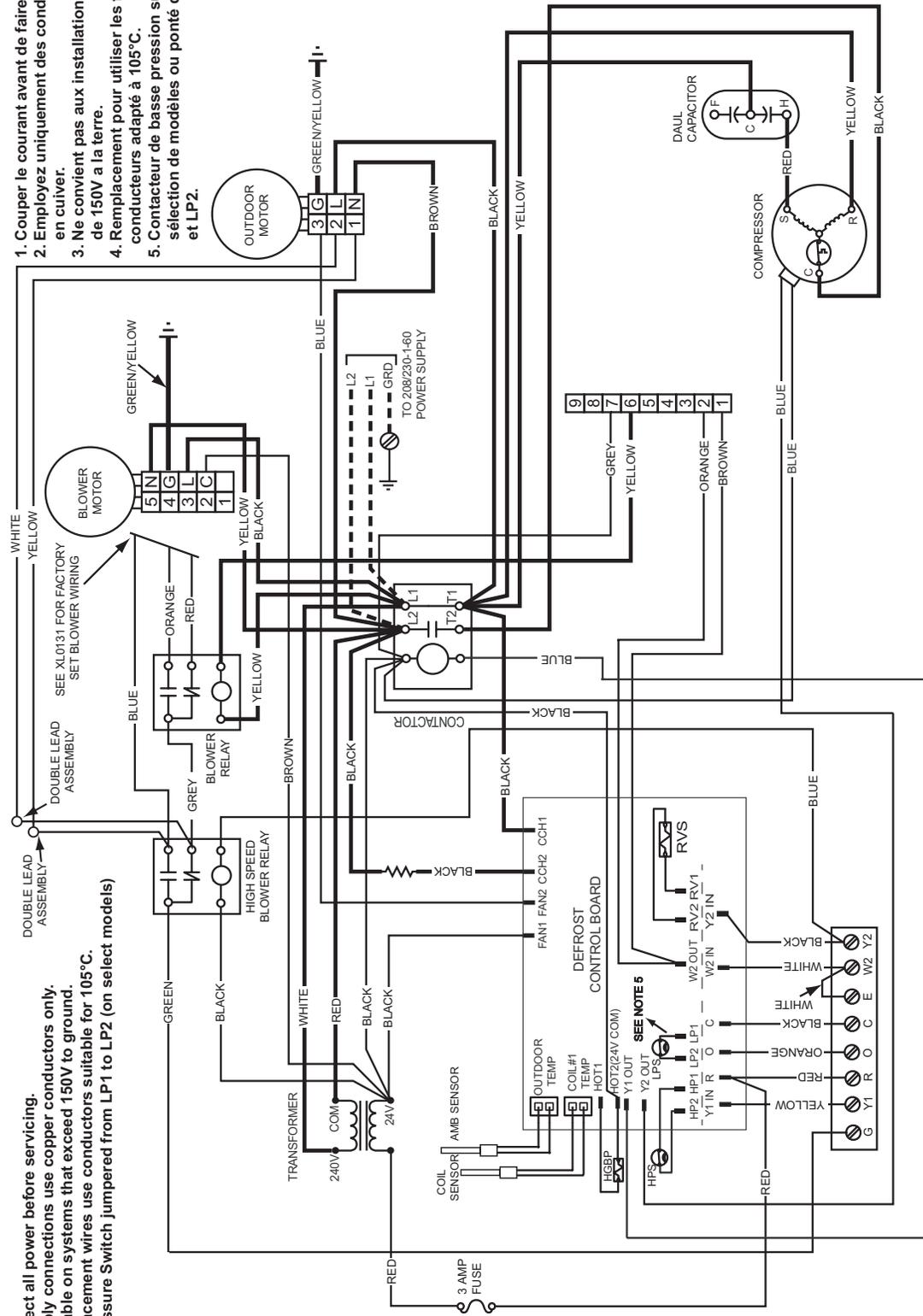
WIRING DIAGRAM

SMALL PACKAGED HEAT PUMP - SINGLE PHASE 5 TON

208/230 VOLT

1. Couper le courant avant de faire le rewire.
2. Employez uniquement des conducteurs en cuivre.
3. Ne convient pas aux installations de plus de 150V a la terre.
4. Remplacement pour utiliser les fils conducteurs adaptés à 105°C.
5. Contacteur de basse pression sur une sélection de modèles ou ponté du LP1 et LP2.

1. Disconnect all power before servicing.
2. For supply connections use copper conductors only.
3. Not suitable on systems that exceed 150V to ground.
4. For replacement wires use conductors suitable for 105°C.
5. Low Pressure Switch jumpered from LP1 to LP2 (on select models)



LEGEND:
 FIELD WIRING ———
 LOW VOLTAGE - - -
 HIGH VOLTAGE - · -

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Figure 17. W.D. for 5 Ton Models

INSTALLATION CHECKLIST

INSTALLATION ADDRESS:		
CITY _____	STATE _____	
UNIT MODEL # _____		
UNIT SERIAL # _____		
Unit Installed Minimum clearances per Figure 1 (page 4)?	YES	NO
INSTALLER NAME:		
CITY _____	STATE _____	
Has the owner's information been reviewed with the customer?	YES	NO
Has the Literature Package been left with the unit?	YES	NO

VENTING SYSTEM		
Is the vent hood installed?	YES	NO
Is vent hood free from restrictions	YES	NO
Filter(s) secured in place?	YES	NO
Filter(s) clean?	YES	NO

REFRIGERATION SYSTEM		
Was unit given 24 hr warm up period for crankcase heaters (if applicable)?	YES	NO
Stage-1 Liquid Pressure (high side) _____		
Stage-1 Suction Pressure (low side) _____		

ELECTRICAL SYSTEM		
Electrical connections tight?	YES	NO
Line voltage polarity correct?	YES	NO
Rated Voltage: _____ VOLTS		
L1-L2 Volts: _____ VOLTS		
Has the thermostat been calibrated?	YES	NO
Is the thermostat level?	YES	NO
Is the heat anticipator setting correct?	YES	NO

INSTALLER: PLEASE LEAVE THESE INSTRUCTIONS WITH THE OWNER.



IMPORTANT - This product has been designed and manufactured to meet ENERGY STAR criteria for energy efficiency. However, proper refrigerant charge and proper air flow are critical to achieve rated capacity and efficiency. Installation of this product should follow the manufacturer's refrigerant charging and air flow instructions. Failure to confirm proper charge and airflow may reduce energy efficiency and shorten equipment life.

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