

INSTALLATION AND MAINTENANCE INSTRUCTIONS

TARG AND TPRG SERIES UNITS

RESIDENTIAL PACKAGED UNITS

Air Conditioners and Heat Pumps

507722-01

12/2016



THIS MANUAL MUST BE LEFT WITH THE HOMEOWNER FOR FUTURE REFERENCE

⚠ WARNING

Installation and servicing of air conditioning equipment can be hazardous due to internal refrigerant pressure and live electrical components. Only trained and qualified service personnel should install or service this equipment. Installation and service performed by unqualified persons can result in property damage, personal injury, or death.

⚠ WARNING

For your safety, do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance. Such actions could result in property damage, personal injury, or death.



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⚠ WARNING

If this unit is to be installed in a mobile or manufactured home application, the duct system must be sized to achieve static pressures within the manufacturer's guidelines. All other installation guidelines must also be followed. Failure to do so may result in equipment damage, personal injury, and improper performance of the unit.

Comfort-Aire / Century

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⚠ CAUTION

The installation of this appliance must conform to the requirements of the National Fire Protection Association; the National Electrical Code, ANSI/NFPA No. 70 (latest edition) in the United States; the Canadian Electrical Code Part 1, CSA 22.1 (latest edition) in Canada; and any state or provincial laws or local ordinances. Local authorities having jurisdiction should be consulted before installation is made. Such applicable regulations or requirements take precedence over the general instructions in this manual.

Save these instructions for future reference

WARNING

Improper installation, adjustment, alteration, service, or maintenance can cause injury or property damage. Refer to this manual. For assistance or additional information, consult a qualified installer or service agency.

Installation

These instructions explain the recommended method of installation of the packaged heat pump and air conditioner units and associated electrical wiring.

This unit is designed and approved for use as a self-contained air-to-air outdoor heat pump and air conditioner system.

The units are factory-equipped with a transformer and blower control for applications without auxiliary heat. Electric heat accessory kits (PHK-) can be ordered for field installation of additional heat where required.

These instructions, and any instructions packaged with mating components and/or accessories, should be carefully read prior to beginning installation. Note particularly any **CAUTIONS** or **WARNINGS** in these instructions and all labels on the units.

These instructions are intended as a general guide only, for use by qualified personnel and do not supersede any national or local codes in any way. Compliance with all local, state, provincial, or national codes pertaining to this type of equipment should be determined prior to installation.

Inspection of Shipment

Upon receipt of equipment, carefully inspect it for possible shipping damage. If damage is found, it should be noted on the carrier's freight bill. Take special care to examine the unit inside the carton if the carton is damaged. File a claim with the transportation company.

If any damages are discovered and reported to the carrier, **DO NOT INSTALL THE UNIT, as claim may be denied.**

Check the unit rating plate to confirm specifications are as ordered.

Limitations

The unit should be installed in accordance with all national and local safety codes.

Limitations of the unit and appropriate accessories must also be observed.

The unit must not be installed with any ductwork in the outdoor air stream. The outdoor fan is not designed to operate against any additional static pressure.

Location

The unit is designed to be located outdoors with sufficient clearance for free entrance to the air inlet and discharge air openings. The location must also allow for adequate service access.

The unit must be installed on a solid foundation that will not settle or shift. Adequate structural support must be provided. Install the unit in level position. Isolate the base from the building structure to avoid possible transmission of sound or vibration into the conditioned space.

The heat pump unit foundation should be raised to a minimum of 3" above finish grade. In areas that have prolonged periods of temperature below freezing and snowfall, the heat pump unit should be elevated above the average snow line. Extra precaution should be taken to allow free drainage of condensate from defrost cycles to prevent ice accumulation. The unit should not be located near walkways to prevent possible icing of surface from defrost condensate.

Avoid placing the unit near quiet areas, such as sleeping quarters or study rooms. Normal operating sound levels may be objectionable if the unit is placed near certain rooms.

For improved start-up performance, the indoor coil should be washed with suitable detergent to remove any residue from manufacturing processes.

Roof Curb Installation

If a roof curb is used, follow the manufacturer's Installation Instructions and be sure that all required clearances are observed.

Rigging and Handling

CAUTION

Before lifting a unit, make sure that the weight is distributed equally on the cables so that it will lift evenly.

Exercise care when moving the unit. Do not remove any packaging until the unit is near the place of installation. An optional lifting lug kit may be purchased separately for use in rigging the unit for lifting. Spreaders whose length exceeds the unit depth dimension by 6 inches **MUST** be used across the top of the unit.

Units may also be moved or lifted with a forklift while still in the factory-supplied packaging. **The lengths of the forks of the forklift must be a minimum of 42".**

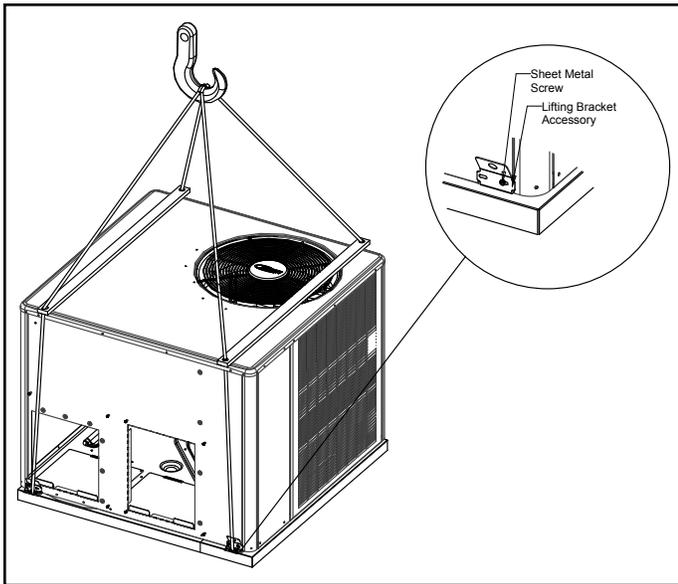


Figure 1. Rigging Unit

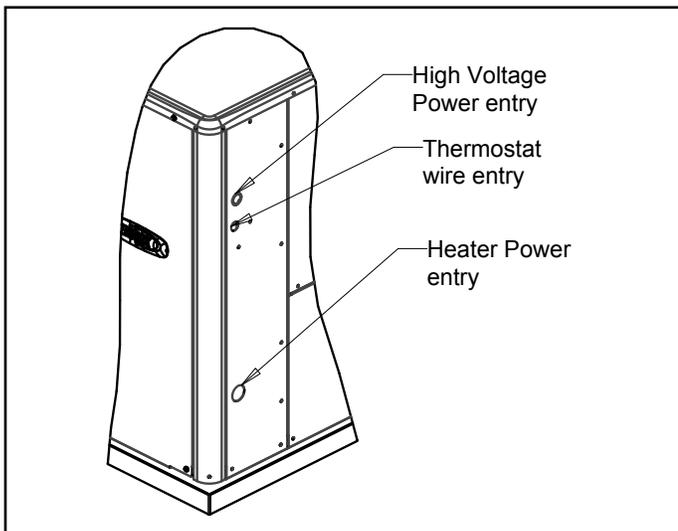


Figure 2. Typical Field Wiring

⚠ CAUTION

As with any mechanical equipment, personal injury can result from contact with sharp sheet metal edges. Be careful when you handle this equipment.

Unpacking

Carefully remove outer packaging material and discard.

Locate the four (4) shipping brackets that attached the unit to the wood pallet and remove. Locate the supply duct corner and seal the shipping openings in the base from the underside with silicone or other approved sealant to prevent air leakage during unit operation.

Service Access

Access to all serviceable components is provided by four removable panels: upper access panel (for blower, ID coil, and optional filter), auxiliary heat access, control access panel, and compressor access.

⚠ WARNING

This unit is charged with HFC-410A refrigerant. Operating pressures for units charged with HFC-410A are higher than pressures in units charged with HCFC-22. All service equipment **MUST** be rated for use with HFC-410A refrigerant.

Clearances

All units require certain clearances for proper operation and service. Refer to Table 1 for the minimum clearances to combustibles required for construction, servicing, and proper unit operation.

In the U.S., units may be installed on combustible floors made from wood or class A, B, or C roof covering material.

In Canada, units may be installed on combustible floors. Units must be installed outdoors.

Do not permit overhanging structures or shrubs to obstruct condenser air discharge outlet.

	Clearance to Combustibles	Clearance for Service Access
Front of unit	0 in.	24 in.
Back of unit	0 in.	0 in.
Left side	0 in.	24 in.
Right side	0 in.	24 in.
Base of unit	0 in.	0 in.
Top of unit	0 in.	48 in.

For any future service, installer must provide access to screws of top and rear panels.

Table 1. Minimum Clearances

Compressor

Units are shipped with compressor mountings factory adjusted and ready for operation. **Do not loosen compressor mounting bolts.**

Electrical Wiring

All field wiring must be done in accordance with National Electrical Code recommendations, local codes, and applicable requirements of UL Standards, or in accordance with Canadian Electrical Code recommendations, local codes, or CSA Standards. Power wiring, disconnect means, and over-current protection are to be supplied by the installer. Refer to the unit rating plate for maximum over-current protection and minimum circuit ampacity, as well as operating voltage. The power supply must be sized and protected according to specifications supplied.

The unit must be grounded with a separate ground conductor. See Figure 4 for typical field wiring connection. The wiring diagram can be found on the unit inside the access panel. Low voltage control wiring are terminal strip or pigtail leads located on the main control box and are color-coded to match the connection called out on the wiring schematic.

⚠ CAUTION

When connecting electrical power and control wiring to the unit, waterproof-type connectors must be used so that water or moisture cannot be drawn into the unit during normal operation.

Units are factory wired for a 230-volt power supply. If power supply is 208 volts, it will be necessary to change a wire connection on the unit transformer from 240V terminal to 208V terminal as shown on the wiring diagram.

Use only copper conductors.

If any of the original unit wiring is replaced, the same size and type wire must be used.

Thermostat

The room thermostat should be located on an inside wall where it will not be subject to drafts, sun exposure, or heat from electrical fixtures or appliances. Follow the manufacturer's instructions enclosed with the thermostat for general installation procedure. Color-coded insulated wires (#18 AWG) should be used to connect the thermostat to the unit. A minimum of five wires are required for proper installation.

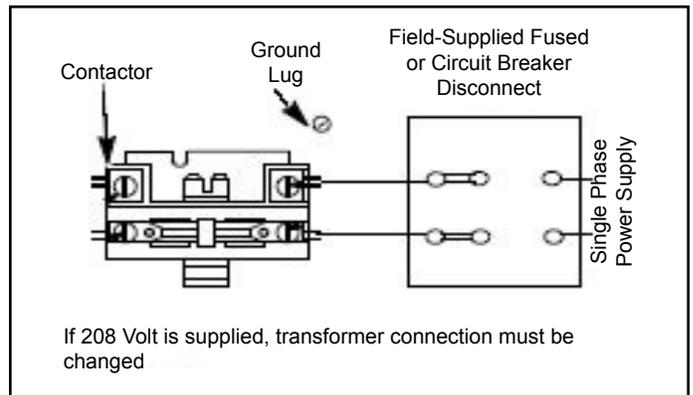


Figure 3. 208/230 Line Voltage Wiring

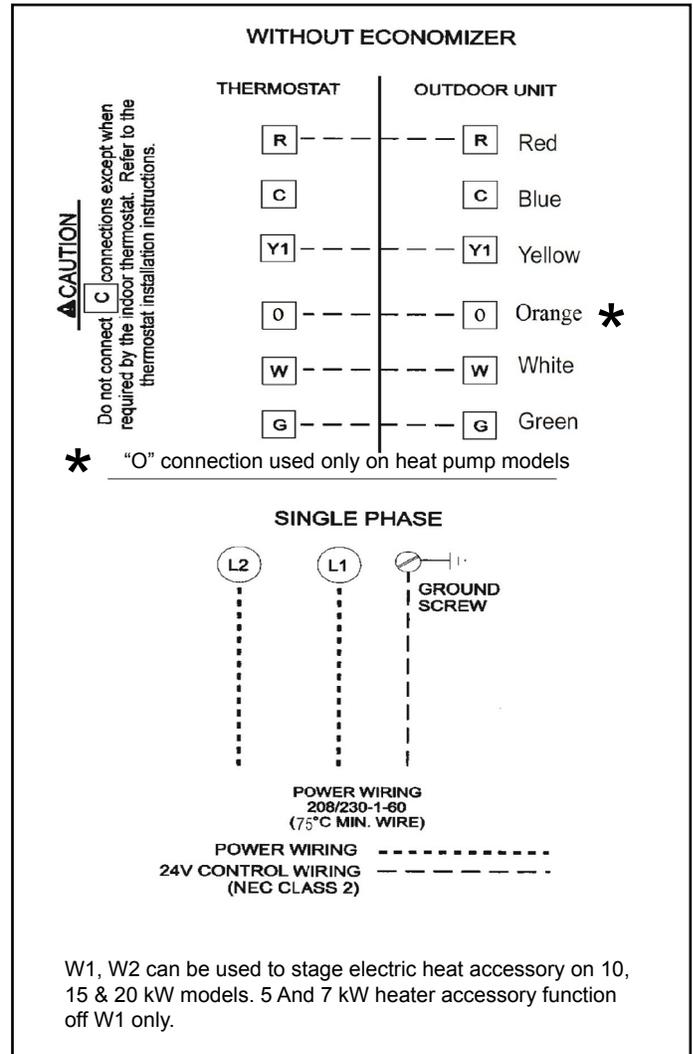


Figure 4. Typical Wiring Connections

Duct System

Duct system should be designed and sized according to the methods in Manual Q of the Air Conditioning Contractors of America (ACCA).

A closed return duct system shall be used. This shall not preclude use of economizers or outdoor fresh air intake. It is recommended that supply and return duct connections at the unit be made with flexible joints.

The supply and return air duct systems should be designed for the CFM and static requirements of the job. **They should not be sized to match the dimensions of the duct connections on the unit.**

The unit is shipped ready for horizontal flow (side duct connections). Before attaching side ducts, bend perforated duct tabs out to assist with duct alignment and attachment. Duct attachment screws are intended to go into the duct panel. Duct to unit connections must be sealed and weather proofed.

If downflow duct system is desired, a downflow conversion kit is required, and the following conversion is required.

1. Using a knife, cut following the marked cut lines on the unit base insulation to access bottom metal covers underneath the insulation.
2. Remove the screws securing the bottom covers and discard the bottom covers (supply and return).
3. Remove screws located between the supply and return openings that attach the blower deck to the base, and discard these screws. These screws can interfere with bottom duct connections or roof curb seals.
4. Secure side duct covers provided in the downflow conversion kit over the side duct openings (use dimples on back panel to locate cover attachments).
5. Install drain pan overflow switch and wire according to downflow conversion kit instructions.

Filters

Air filters are not supplied with the unit. A field-provided air filter must always be installed ahead of the evaporator coil and must be kept clean or replaced. Dirty filters will reduce the airflow of the unit.

An optional filter rack kit may be purchased separately for installation inside the unit's coil compartment. Air filter sizes are shown in Table 2 for use with filter rack kit.

NOTE:

The filter rack must be installed prior to installation of the unit in applications where access to the rear panel is limited.

Unit Model	Filter 1	Filter 2
24,30,36	14 X 20	20 X 20
42,48,60	20 X 20	20 X 20

Table 2. Unit Air Filter Sizes - inches

Condensate Drain

This package unit is equipped with a 3/4" FPT coupling for condensate line connection. Plumbing must conform to local codes. Use a sealing compound on male pipe threads.

Do not operate unit without a drain trap. The condensate drain is on the negative pressure side of the blower; therefore, air being pulled through the condensate line will prevent positive drainage without a proper trap.

The condensate drain line must be properly trapped, routed to a suitable drain and primed prior to unit commissioning.

NOTE: *Install drain lines and trap so they do not block service access to the unit.*

See Figure 5 for proper drain arrangement. The drain line must pitch to an open drain or pump to prevent clogging of the line. Seal around the drain connection with suitable material to prevent air leakage into the return air system.

To prime trap, pour several quarts of water into drain, enough to fill drain trap and line.

CAUTION

Drain lines should be hand-tightened only. Do not use tools to tighten fitting into drain.

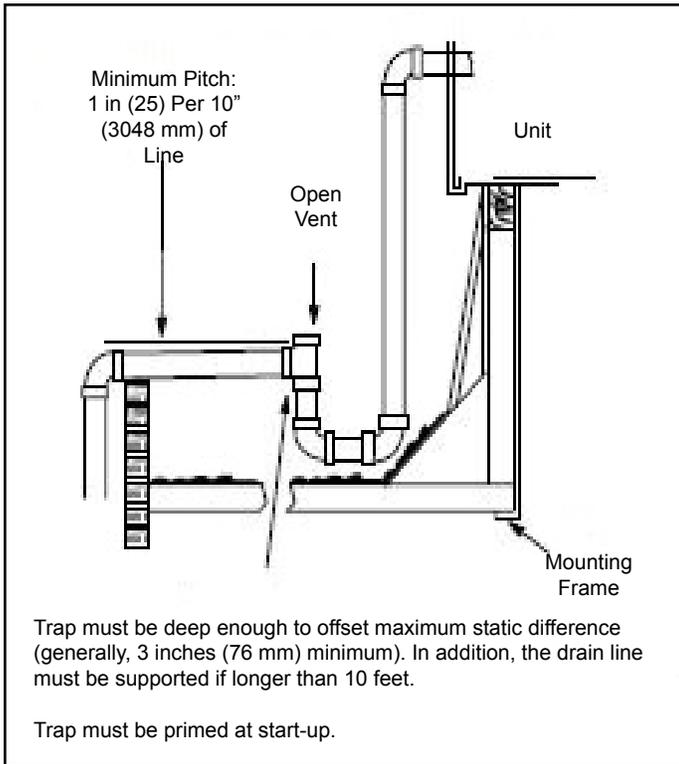


Figure 5. Typical Condensate Drain Connection

Crankcase Heater (if used)

Some models may be equipped with a crankcase heater to prevent excessive migration of liquid refrigerant into the compressor during off cycles. Power must be maintained to the unit to keep this feature active.

Except as required for safety while servicing, **do not open the system disconnect switch.**

Heater Kit Accessory (if used)

The unit is fully equipped for cooling operation without auxiliary heat. A heater kit accessory may also be used. To install the heater kit accessory (see Figure 6):

1. Disconnect the power and open the main control access.
2. Disconnect the plug separating the high voltage wire harness. Remove the high voltage wire harness plug and discard.
3. Remove the heater blockoff by removing the four screws holding it in place.
4. Insert the heater into the control panel and fasten in the same mounting holes.
5. Plug the heater wiring harness into the wire harness on the control assembly. Field wiring of the auxiliary heater is separate from the unit power supply. Wire the power supply wiring for the heater to the appropriate connections on the heater kit.

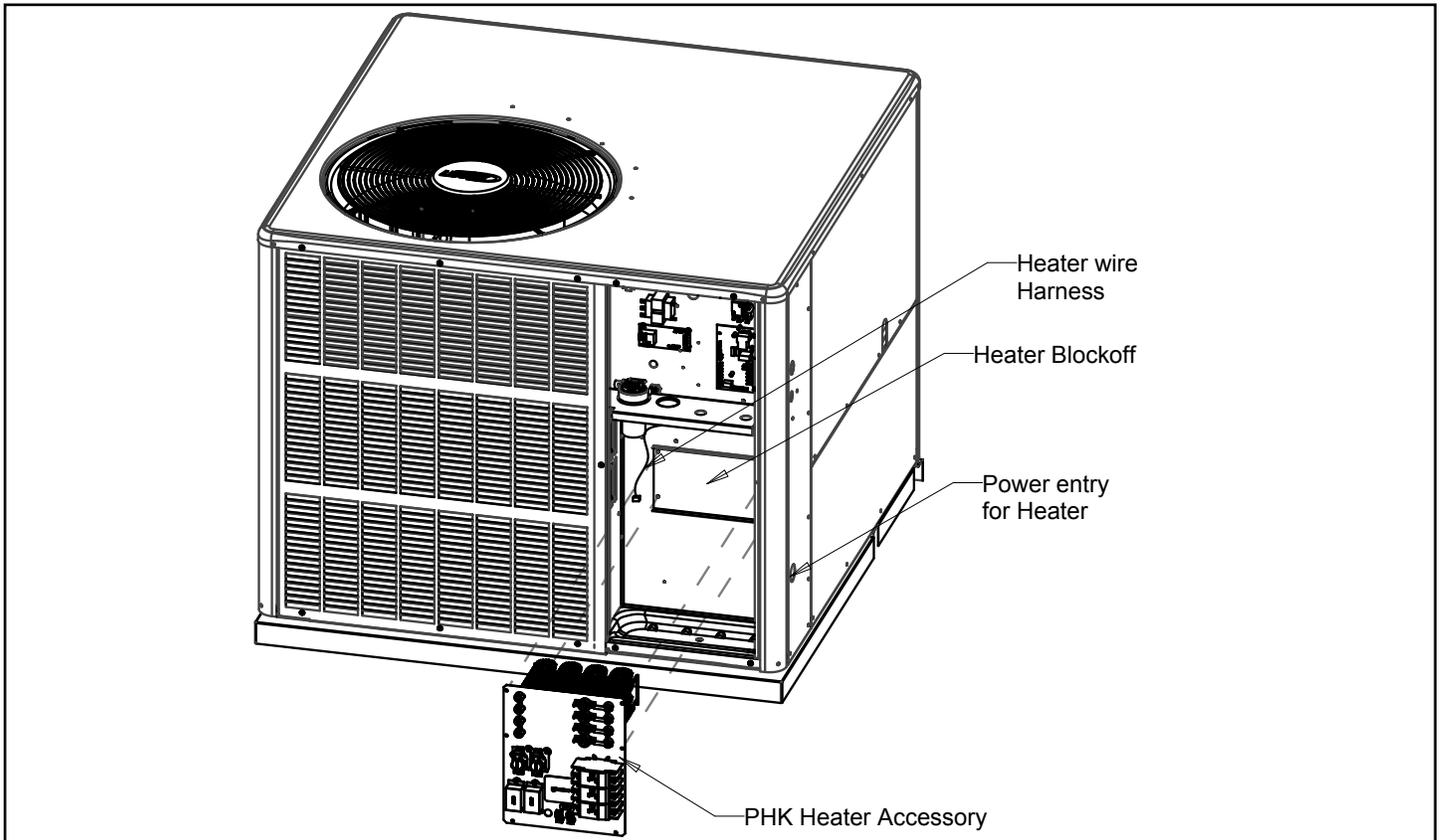


Figure 6. Heater Kit Accessory Installation

Sequence of Operation

Cooling

When the thermostat is in the cooling mode, the O circuit is powered, which energizes the reversing valve. Upon cooling demand, the thermostat closes circuit R and Y. Closing R and Y closes the unit contactor, starting the compressor and outdoor fan. The thermostat automatically closes the R to G circuit, which brings on the indoor blower at the same time. Upon satisfying cooling demand, the thermostat will open the above circuits and open the main contactor, stopping the compressor and outdoor fan. If the unit is equipped with a delay timer, the blower will continue to operate for 60 to 90 seconds, which improves system efficiency.

Heating - Heat Pump Stage

Upon heating demand, the thermostat closes circuit R to Y, which closes the unit contactor, starting the compressor and outdoor fan. The reversing valve is not energized in the heating mode. The thermostat again automatically brings on the indoor fan at the same time. Upon satisfying heating demand, the thermostat opens above circuits and stops unit operation.

Heating - Auxiliary Electric Heat

Upon heating demand for auxiliary electric heat, the thermostat closes circuit R to W, which energizes the heater sequencers as well as the indoor blower. Upon satisfying auxiliary heat demand, the thermostat opens above circuits and heating elements sequence off; blower continues to operate until all heating elements have turned off.

Defrost System

The defrost system includes two components: the defrost thermostat and the defrost control.

Defrost Thermostat

The defrost thermostat is located on the outdoor coil. When the defrost thermostat senses 35°F or cooler, the thermostat contacts close and send a signal to the defrost control board to start the defrost timing. It also terminates defrost when the liquid line warms up to 60°F.

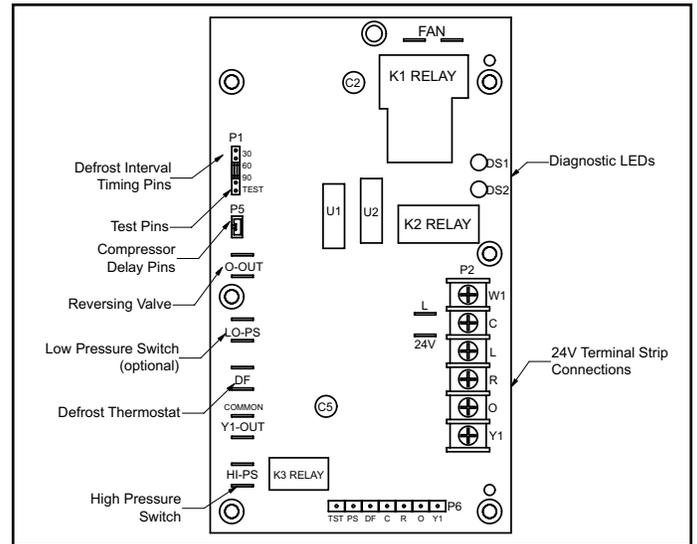


Figure 7. Defrost Control Board

Defrost Control

The defrost control board includes the combined functions of time/temperature defrost control, defrost relay, diagnostic LEDs and terminal strip for field wiring connections (see Figure 7).

The control provides automatic switching from normal heating operation to defrost mode and back. During the compressor cycle (call for defrost), the control accumulates compressor run time at 30, 60, 90 minute field-adjustable intervals. If the defrost thermostat is closed when the selected compressor run time interval ends, the defrost relay is energized and the defrost begins.

Defrost Control Timing Pins

Each timing pin selection provides a different accumulated compressor run time period during one thermostat run cycle. This time period must occur before a defrost cycle is initiated. The defrost interval can be adjusted to 30 (T1), 60 (T2), or 90 (T3) minutes. **It is intended that this product should be set at the 60-minute time interval at initial installation.** If the timing selector jumper is not in place, the control defaults to a 90-minute defrost interval. The maximum defrost period is 14 minutes and cannot be adjusted.

NOTE:

For geographic areas that experience low temperature and high humidity conditions (below 35°F and above 80% RH), the defrost timer pin must be field set at installation to a 60 or 30 minute defrost interval to ensure reliable system operation while in heating mode.

A test option is provided for troubleshooting. The test mode may be started any time the unit is in the heating mode and the defrost thermostat is closed or jumpered. If the jumper is in the TEST position at power up, the control will ignore the test pins. When the jumper is placed across the TEST pins for 2 seconds, the control will enter the defrost mode. If the jumper is removed before an additional 5-second period has elapsed (7 seconds total), the unit will remain in defrost mode until the defrost thermostat opens or 14 minutes have passed. If the jumper is not removed until after the additional 5-second period has elapsed, the defrost will terminate and the test option will not function again until the jumper is removed and reapplied.

Compressor Delay

The defrost board has a field-selectable function to reduce occasional sounds that may occur while the unit is cycling in and out of the defrost mode. The compressor will be cycled off for 30 seconds going in and out of the defrost mode when the compressor delay jumper is removed.

NOTE: The 30-second “off” cycle is not functional when jumpering the TEST pins.

Time Delay

The defrost control includes a compressor timer, which ensures the compressor is off for a minimum amount of time between operating cycles.

The timed-off delay is 5 minutes long. The delay helps to protect the compressor from short cycling in case the power to the unit is interrupted or a pressure switch opens. The delay is bypassed by placing the timer select jumper across the TEST pins for 0.5 seconds.

Pressure Switch Circuit

High and low pressure switches are connected to the defrost control board on heat pump models. Air conditioning models have a high pressure switch installed in line with compressor contactor coil (see Figure 7).

During a single demand cycle, the defrost control will lock out the unit after the fifth time that the circuit is interrupted by any pressure switch wired to the control board. In addition, the diagnostic LEDs will indicate a locked-out pressure switch after the fifth occurrence of an open pressure switch (see Table 3).

The unit will remain locked out until power to the board is interrupted, then re-established, or until the jumper is applied to the TEST pins for 0.5 seconds.

NOTE: The defrost control board ignores input from the low pressure switch terminals as follows:

- During the TEST mode
- During the defrost cycle
- During the 90-second start-up period

- For the first 90 seconds each time the reversing valve switches heat/cool modes

If the TEST pins are jumpered and the 5-minute delay is being bypassed, the LO PS terminal signal is not ignored during the 90-second start-up period.

Diagnostic LEDs

The defrost board uses two LEDs for diagnostics. The LEDs flash a specific sequence according to the condition as shown in Table 3.

Mode	Green LED (DS2)	Red LED (DS1)
No Power to Board	Off	Off
Normal Operation/ Power to Board	Simultaneous Slow Flash	
Anti-Short Cycle Lockout	Alternating Slow Flash	
Low Pressure Switch Fault	Off	Slow Flash
Low Pressure Switch Lockout	Off	On
High Pressure Switch Fault	Slow Flash	Off
High Pressure Switch Lockout	On	Off

Table 3. Defrost Control Board Diagnostic LEDs

System Performance

This equipment is a self-contained, factory optimized refrigerant system, and should not require adjustments to system charge when properly installed. If unit performance is questioned, perform the following checks.

Ensure unit is installed per manufacturer’s instructions and that line voltage and air flow is correct. Refer to the following tables for proper performance value. The indoor metering device varies by model; when checking performance of a unit using an orifice for metering, refer to the suction superheat value to judge performance. When checking performance of a unit that uses an expansion valve for metering, refer to the subcooling value to judge system performance.

If the measured performance value varies from table value allowance, check internal seals, service panels and duct work for air leaks, as well as restrictions and blower speed settings. If unit performance remains questionable, remove

system charge, evacuate to 500 microns, and weigh in refrigerant to nameplate charge. It is critical that the exact charge is re-installed. Failure to comply will compromise system performance.

If unit performance is still questionable, check for refrigerant related problems, such as blocked coil or circuits, malfunctioning metering device or other system components.

Model	Suction Superheat +/- 3°	Liquid Subcooling +/- 2°
2 Ton		10
2.5 Ton		14
3 Ton	13	
3.5 Ton	12	
4 Ton	14	
5 Ton	17	

Based on outdoor ambient temperature of 82°F, and indoor entering air of 80°F db, 67°F wb.

Table 4. Air Conditioner Unit Cooling System Performance Values

Model	Suction Superheat +/- 3°	Liquid Subcooling +/- 2°
2 Ton	18	
2.5 Ton	16	
3 Ton	14	
3.5 Ton		9
4 Ton		8
5 Ton		5

Based on outdoor ambient temperature of 82°F, and indoor entering air of 80°F db, 67°F wb.

Table 5. Heat Pump Cooling System Performance Values

Model	Liquid Subcooling +/- 2°
2 Ton	25
2.5 Ton	15
3 Ton	11
3.5 Ton	22
4 Ton	24
5 Ton	28

Based on outdoor ambient temperature of 47°F, and indoor entering air of 70°F db.

Table 6. Heat Pump Heating System Performance Values

Maintenance

WARNING

Before performing maintenance operations on the system, shut off all electrical power to the unit. Turn off accessory heater power switch if applicable. Electrical shock could cause personal injury or death.

Periodic inspection and maintenance normally consists of changing or cleaning the filters and cleaning the outdoor coil. On occasion, other components may also require cleaning.

Filters

Filters are not supplied with the unit. Inspect once a month. Replace disposable or clean permanent type as necessary. Do not replace permanent type with disposable.

Motors

Indoor and outdoor fan and vent motors are permanently lubricated and require no maintenance.

Some models may be equipped with a permanent magnet, constant torque indoor blower motor. These motors remain energized and are controlled by 24V signals. For high static applications, use tap 3 for cooling speed and tap 5 for heating speed. Refer to the heater install label for limitations to blower tap selection on heating speeds.

Outdoor Coil

Dirt and debris should not be allowed to accumulate on the outdoor coil surface or other parts in the air circuit. Cleaning should be as often as necessary to keep the coil clean. Use a brush, vacuum cleaner attachment, or other suitable means. If water is used to clean the coil, be sure the power to unit is shut off prior to cleaning. Care should be used when cleaning the coil so that the coil fins are not damaged.

Wiring Diagrams

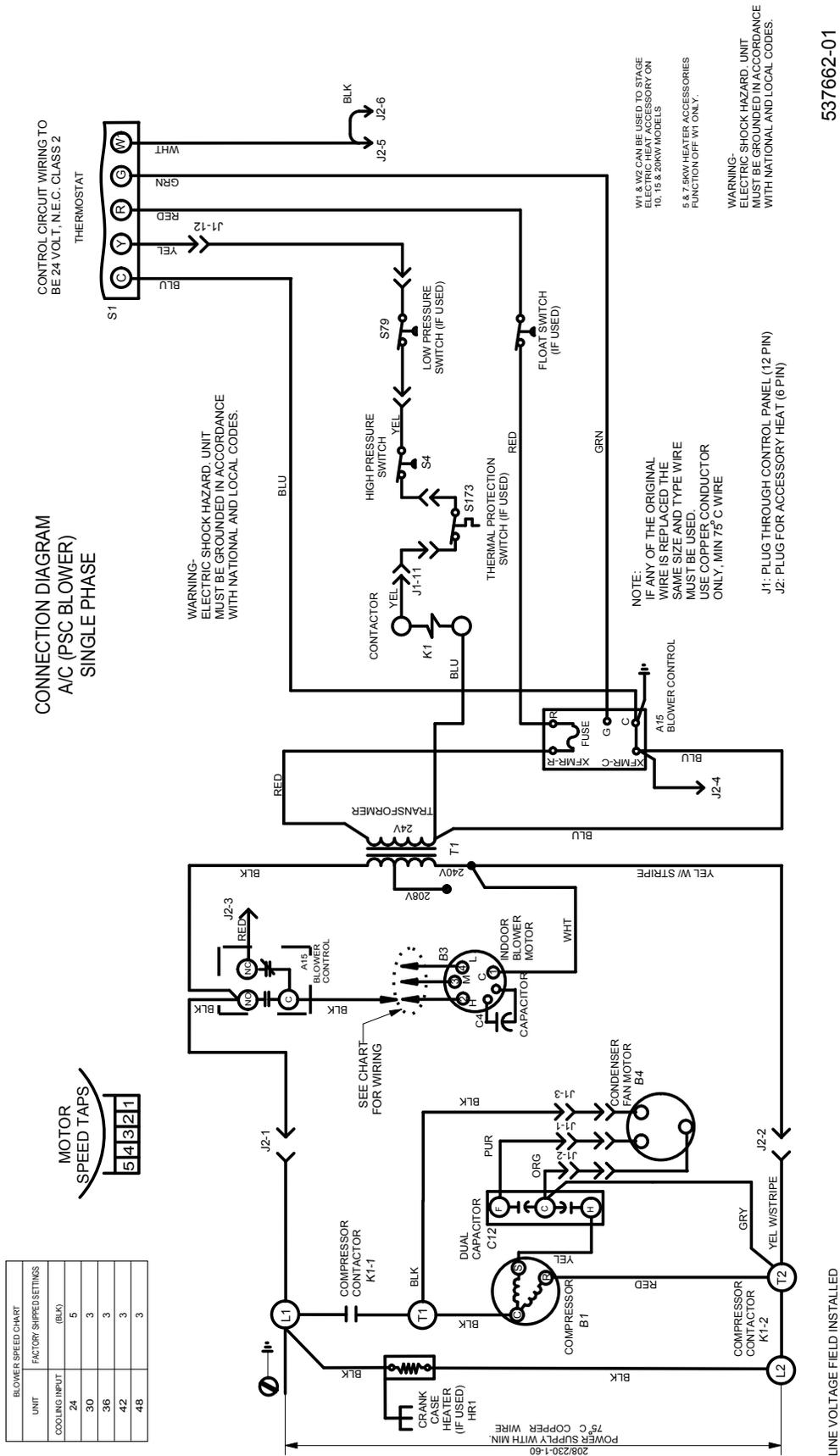
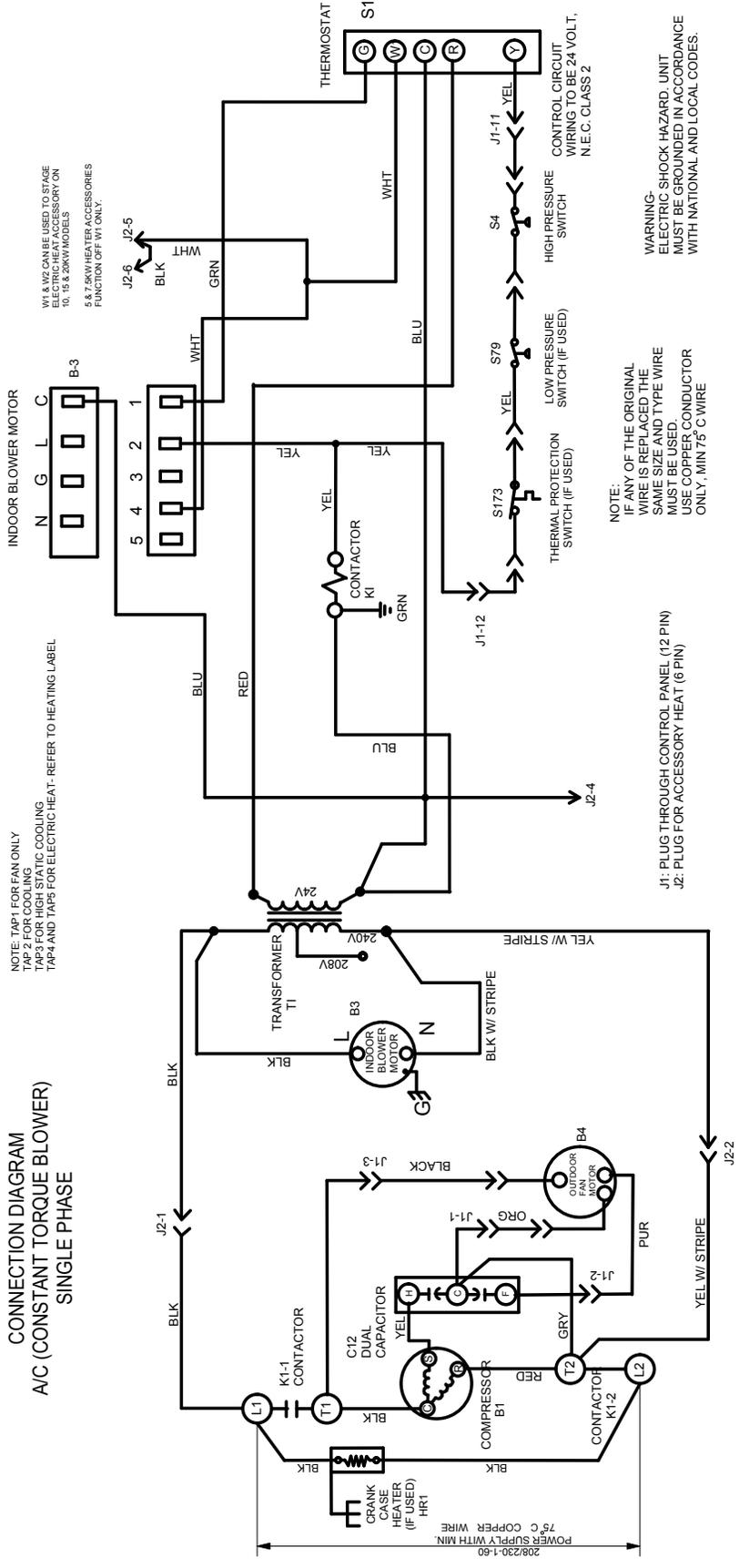


Figure 8. Connections Diagram - A/C PSC



NOTE: TAP1 FOR FAN ONLY
 TAP2 FOR COOLING
 TAP3 FOR HIGH STATIC COOLING
 TAP4 AND TAP5 FOR ELECTRIC HEAT - REFER TO HEATING LABEL

INDOOR BLOWER MOTOR
 N G L C
 1 2 3 4 5

NOTE: IF ANY OF THE ORIGINAL WIRE IS REPLACED THE SAME SIZE AND TYPE WIRE MUST BE USED. USE COPPER CONDUCTOR ONLY, MIN 75° C WIRE

WARNING: ELECTRIC SHOCK HAZARD. UNIT MUST BE GROUNDED IN ACCORDANCE WITH NATIONAL AND LOCAL CODES.

NOTE: IF ANY OF THE ORIGINAL WIRE IS REPLACED THE SAME SIZE AND TYPE WIRE MUST BE USED. USE COPPER CONDUCTOR ONLY, MIN 75° C WIRE

LINE VOLTAGE FIELD INSTALLED

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Figure 9. Connections Diagram - A/C Constant Torque

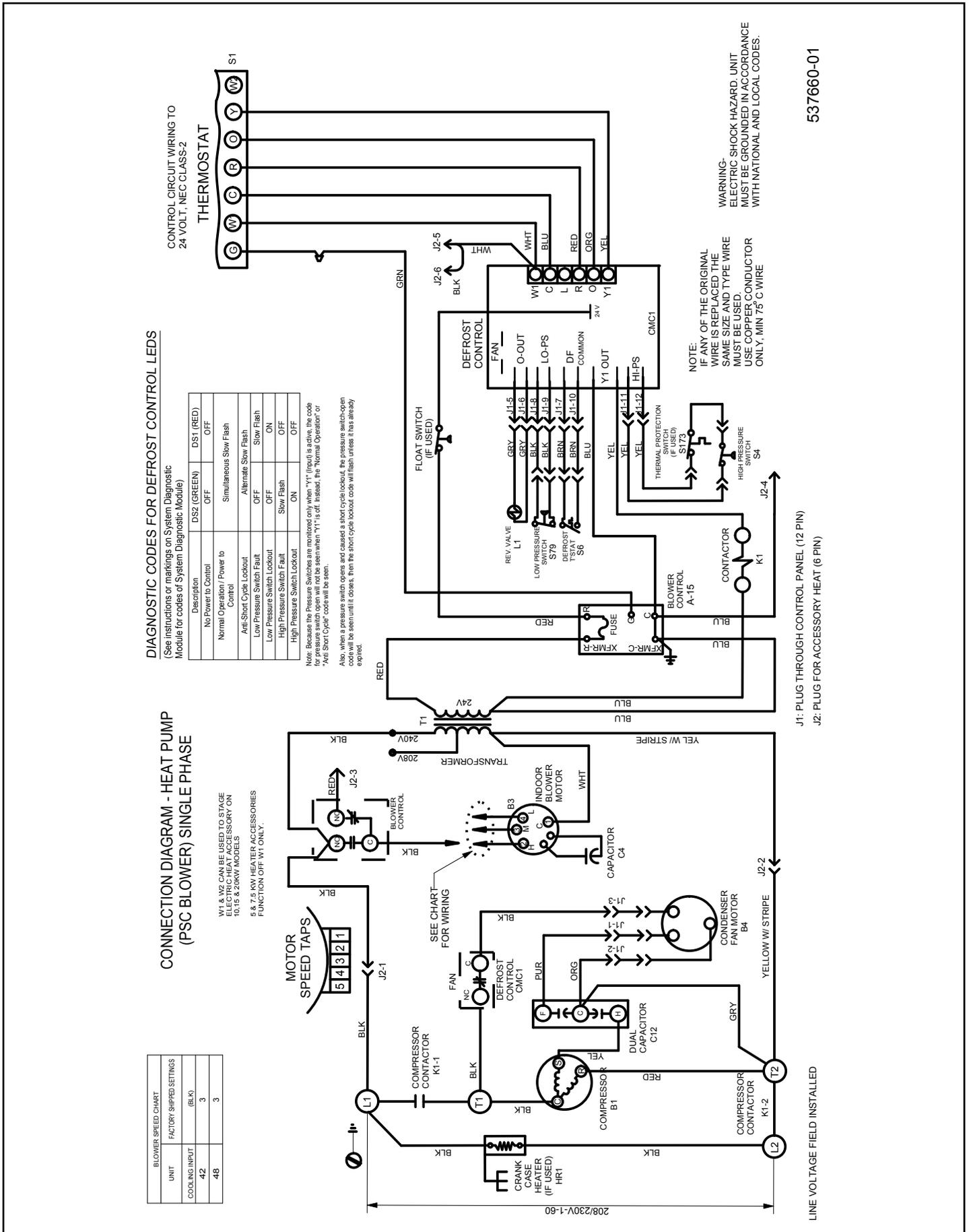


Figure 10. Connections Diagram - Heat Pump PSC

DIAGNOSTIC CODES FOR DEFROST CONTROL LEDS

(See instructions or markings on System Diagnostic Module for codes of System Diagnostic Module)

Description	DS1 (GREEN)	DS2 (RED)
No Power to Control	OFF	OFF
Normal Operation / Power to Control	Simultaneous Slow Flash	
Anti-Short Cycle Lockout	Alternate Slow Flash	Slow Flash
Low Pressure Switch Lockout	OFF	ON
High Pressure Switch Lockout	Slow Flash	OFF
High Pressure Switch Lockout	ON	OFF

Note: Because the Pressure Switches are monitored only when "Y1" (lpu) is active, the code for pressure switch open will not be seen when "Y1" is off. Instead, the "Normal Operation" or "Anti Short Cycle" code will be seen.

Also, when a pressure switch opens and causes a short cycle lockout, the pressure switch open code will be seen until it closes, then the short cycle lockout code will flash unless it has already expired.

J1: PLUG THROUGH CONTROL PANEL (12 PIN)
 J2: PLUG FOR ACCESSORY HEAT (6 PIN)

CONNECTION DIAGRAM, HEAT PUMP CONSTANT TORQUE BLOWER, SINGLE PHASE

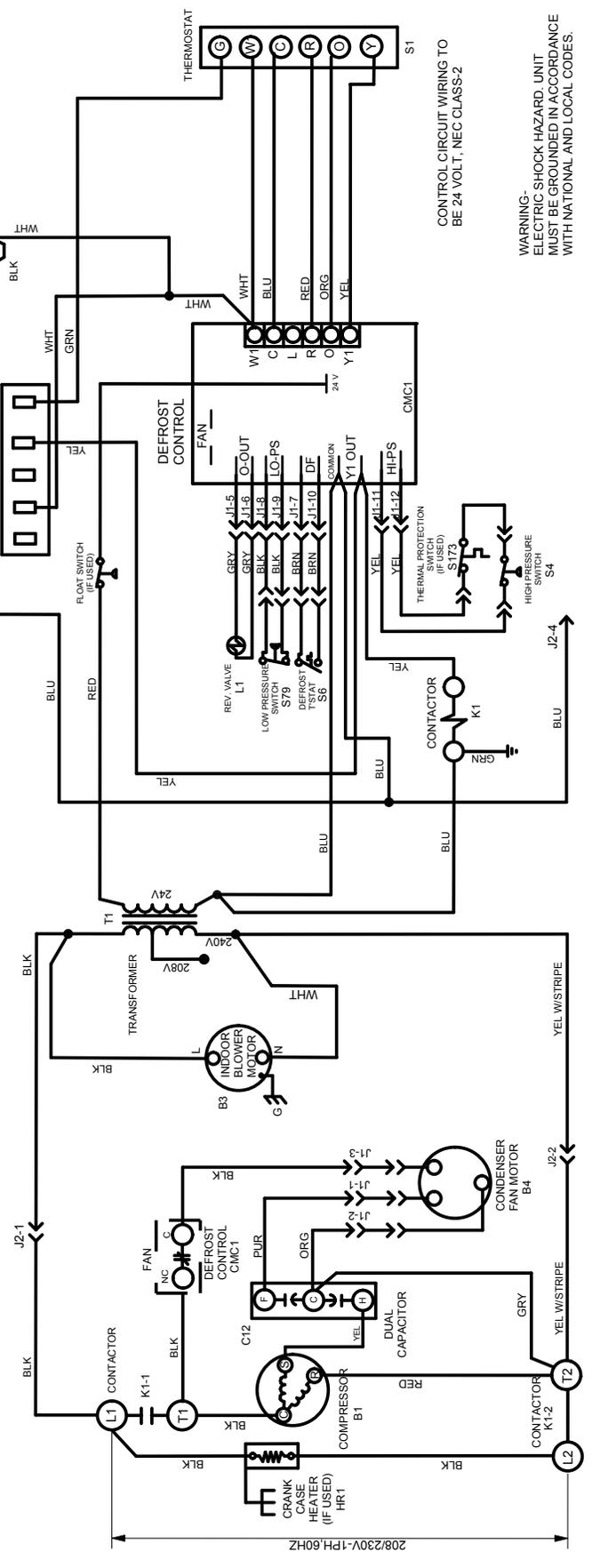
NOTE: TAP1 FOR FAN ONLY
 NOTE: TAP2 FOR HIGH STATIC COOLING
 TAP3 FOR HIGH STATIC COOLING
 TAP4 AND TAP5 FOR ELECTRIC HEAT- REFER TO HEATING LABEL

INDOOR BLOWER MOTOR



W1 & W2 CAN BE USED TO STAGE ELECTRIC HEAT ACCESSORY ON 10, 15 & 20KW MODELS
 5 & 7.5 KW HEATER ACCESSORIES FUNCTION OFF W1 ONLY.

NOTE: IF ANY OF THE ORIGINAL WIRE IS REPLACED THE SAME SIZE AND TYPE WIRE MUST BE USED.
 USE COPPER CONDUCTOR ONLY, MIN 75 C WIRE



CONTROL CIRCUIT WIRING TO BE 24 VOLT, NEC CLASS-2

WARNING- ELECTRIC SHOCK HAZARD. UNIT MUST BE GROUNDED IN ACCORDANCE WITH NATIONAL AND LOCAL CODES.

LINE VOLTAGE FIELD INSTALLED

537661-01

Figure 11. Connections Diagram - Heat Pump Constant Torque