INSTALLATION AND MAINTENANCE INSTRUCTIONS

LRP13ACK*EP AND LRP13HPK*EP SERIES UNITS

RESIDENTIAL PACKAGED UNITS

Air Conditioners and Heat Pumps

508686L01
08/2024

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

Do not store combustible materials, including gasoline and other flammable vapors and liquids, near the unit, vent pipe, or warm air ducts. Such actions could cause property damage, personal injury, or death.

This unit is designed for use with R-454B refrigerant only.

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LENNOX INDUSTRIES
DALLAS, TEXAS

(P) 508686L01

⚠ 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

Maximum altitude of application is 10,000 feet (3,200 m) above sea level.

⚠ WARNING

Every working procedure that affects safety means shall only be carried out by competent persons. This appliance is not to be used by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety. Children should be supervised to ensure they do not play with the appliance.

⚠ CAUTION

Leak Detection System installed. Unit must be powered except for service.

⚠ WARNING

Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or loss of life. Installation and service must be performed by a licensed professional HVAC installer or equivalent, service agency, or the gas supplier.

⚠ CAUTION

Servicing shall be performed only as recommended by the manufacturer.

⚠ IMPORTANT

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

⚠ WARNING

For appliances using A2L refrigerants connected via an air duct system to one or more rooms, only auxiliary devices approved by the appliance manufacturer or declared suitable with the refrigerant shall be installed in connecting ductwork.

⚠ WARNING

Ducts connected to an appliance shall not contain a potential ignition source.

⚠ WARNING

- Do not use means to accelerate the defrosting process or to clean, other than those recommended by the manufacturer.
- The appliance shall be stored in a room without continuously operating ignition sources (for example: open flames, an operating gas appliance, or an operating electric heater).
- Do not pierce or burn.
- Be aware that refrigerants may not contain an odor

⚠ WARNING

Auxiliary devices which may be a potential ignition source shall not be installed in the duct work. Examples of such potential ignition sources are hot surfaces with a temperature exceeding 700°C and electric switching devices.

⚠ WARNING

For duct connected appliances, false ceilings or drop ceilings may be used as a return air plenum if a REFRIGERANT DETECTION SYSTEM is provided in the appliance and any external connections are also provided with a sensor immediately below the return air plenum duct joint.

⚠ CAUTION

Any service personnel installing, decommissioning, or performing maintenance on the unit must be properly trained with A2L refrigerants

⚠ IMPORTANT

In addition to conventional charging procedures, the following requirements shall be followed.

- Ensure that contamination of different refrigerants does not occur when using charging equipment. Hoses or lines shall be as short as possible to minimize the amount of refrigerant contained in them.
- Cylinders shall be kept in an appropriate position according to the instructions.

⚠ IMPORTANT

• Ensure that the REFRIGERATING SYSTEM is earthed prior to charging the system with refrigerant.

• Label the system when charging is complete (if not already).

• Extreme care shall be taken not to overfill the REFRIGERATING SYSTEM. Prior to recharging the system, it shall be pressure tested with the appropriate purging gas. The system shall be leak tested on completion of charging, but prior to commissioning. A follow up leak test shall be carried out prior to leaving the site.

⚠ IMPORTANT

When removing refrigerant from a system, either for servicing or decommissioning, it is recommended good practice that all refrigerants are removed safely. When transferring refrigerant into cylinders, ensure that only appropriate refrigerant recovery cylinders are employed. Ensure that the correct number of cylinders for holding the total system charge is available. All cylinders to be used are designated for the recovered refrigerant and labelled for that refrigerant (i. e. special cylinders for the recovery of refrigerant). Cylinders shall be complete with pressure-relief valve and associated shut-off valves in good working order. Empty recovery cylinders are evacuated and, if possible, cooled before recovery occurs.

The recovery equipment shall be in good working order with a set of instructions concerning the equipment that is at hand and shall be suitable for the recovery of all appropriate refrigerants including, when applicable, flammable refrigerants. In addition, a set of calibrated weighing scales shall be available and in good working order. Hoses shall be complete with leak-free disconnect couplings and in good condition. Before using the recovery machine, check that it is in satisfactory working order, has been properly maintained and that any associated electrical components are sealed to prevent ignition in the event of a refrigerant release. Consult manufacturer if in doubt. The recovered refrigerant shall be returned to the refrigerant supplier in the correct recovery cylinder, and the relevant waste transfer note arranged. Do not mix refrigerants in recovery units and especially not in cylinders. If compressors or compressor oils are to be removed, ensure that they have been evacuated to an acceptable level to make certain that flammable refrigerant does not remain within the lubricant. The evacuation process shall be carried out prior to returning the compressor to the suppliers. Only electric heating to the compressor body shall be employed to accelerate this process. When oil is drained from a system, it shall be carried out safely.

⚠ IMPORTANT

Verify cabling will not be subject to wear, corrosion, excessive pressure, vibration, sharp edges or any other adverse environmental effects. The check shall also take into account the effects of aging or continual vibration from sources such as compressors or fans.

⚠ IMPORTANT

When breaking into the refrigerant circuit to make repairs – or for any other purpose – conventional procedures shall be used. However, for flammable refrigerants it is important that best practice be followed and, since flammability is a consideration, procedures such as safely remove refrigerant following local and national regulations, purging the circuit with inert gas, evacuating (optional for A2L), purging with inert gas (optional for A2L), or opening the circuit by cutting or brazing be adhered to. The refrigerant charge shall be recovered into the correct recovery cylinders if venting is not allowed by local and national codes. For appliances containing flammable refrigerants, the system shall be purged with oxygen-free nitrogen to render the appliance safe for flammable refrigerants. This process might need to be repeated several times. Compressed air or oxygen shall not be used for purging refrigerant systems.

For appliances containing flammable refrigerants, refrigerants purging shall be achieved by breaking the vacuum in the system with oxygen free nitrogen and continuing to fill until the working pressure is achieved, then venting to atmosphere, and finally pulling down to a vacuum (optional for A2L). This process shall be repeated until no refrigerant is within the system (optional for A2L). When the final oxygen free nitrogen charge is used, the system shall be vented down to atmospheric pressure to enable work to take place. Ensure that the outlet for the vacuum pump is not close to any potential ignition sources and that ventilation is available.

ETIPR..... 108173-02	charge (lb)	<4	4	6	8	10
	charge (kg)	<1.8	1.8	2.7	3.6	4.5
Minimum Conditioned Area (ft^2)		N/A*	60	90	120	150
Minimum Conditioned Area (m^2)		N/A*	5.6	8.4	11.2	14.0
*Units with refrigerant charge below 4 lb.(1.8 kg) do not require a minimum conditioned room area. -Units supply duct must be connected via air duct system to one or more rooms, totaling minimum conditioned area.						

Table 1. Minimum conditioned area

NOTE *– Multiply values in TAmin table by the Altitude Adjustment Factors to correct TAmin based on installed altitude.*

Altitude Adjustment Factor

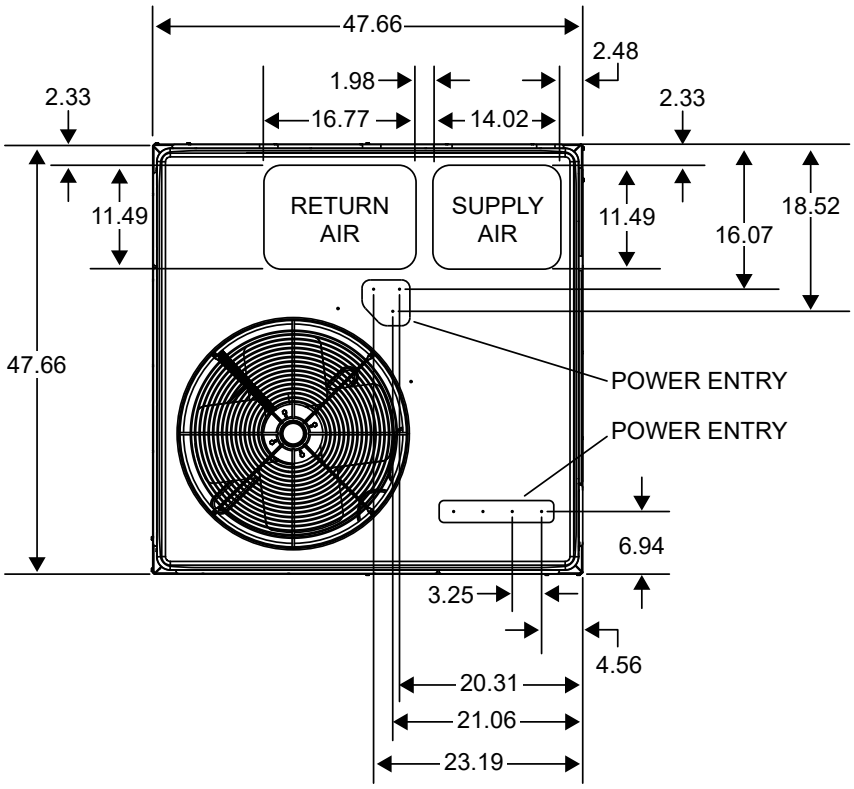
Altitude (m)	0	200	400	600	800	1000	1200	1400	1600
Altitude (ft)	0	660	1310	1970	2620	3280	3940	4590	5250
Adj. Factor	1	1	1	1	1.02	1.05	1.04	1.1	1.12
Altitude (m)	1600	1800	2000	2200	2400	2600	2800	3000	3200
Altitude (ft)	5250	5910	6560	7220	7870	8530	9190	9840	10500
Adj. Factor	1.12	1.15	1.18	1.21	1.25	1.28	1.32	1.36	1.4

Qmin Table			
Refrigerant Charge lb (kg)	**CFM Required**	**Refrigerant Charge lb (kg)**	**CFM Required**
5 (2.3)	135	18 (8.1)	487
6 (2.7)	162	19 (8.6)	514
7 (3.2)	189	20 (9.1)	541
8 (3.6)	216	21 (9.5)	568
9 (4.1)	244	22 (10)	595
10 (4.5)	271	23 (10.4)	622
11 (5)	298	24 (10.9)	649
12 (5.4)	325	25 (11.3)	676
13 (5.9)	352	26 (11.7)	704
14 (6.4)	379	27 (12.2)	731
15 (6.8)	406	28 (12.7)	758
16 (7.3)	433	29 (13.2)	785
17 (7.7)	460	30 (13.6)	812

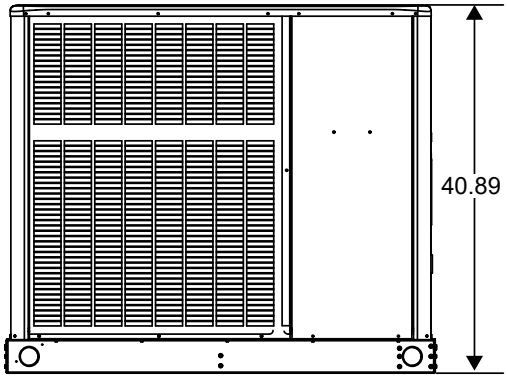
NOTE *– Qmin minimum airflow requirement for refrigerant leak mitigation.*

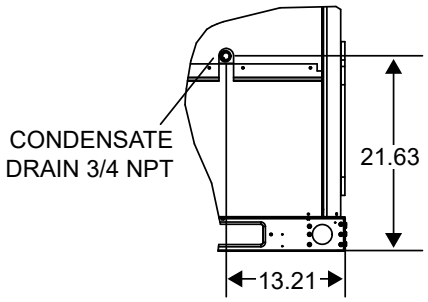
Unit Dimensions (Inches) - Small Base Air Conditioners & Heat Pumps

TOP VIEW

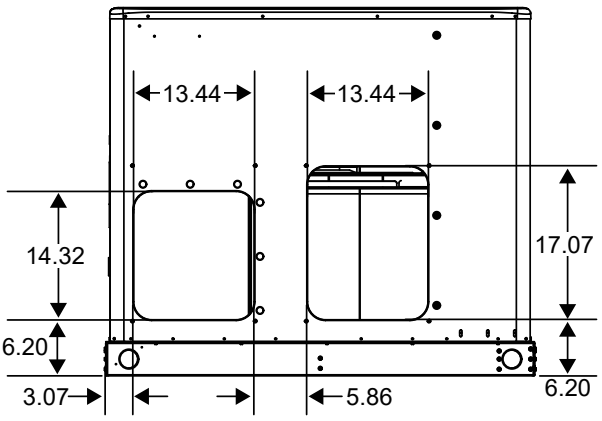


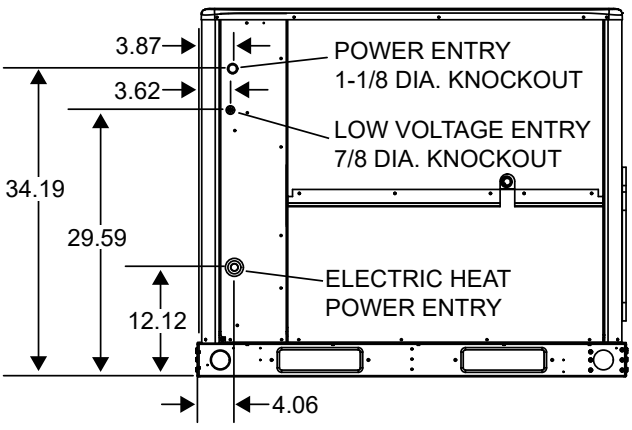
SIDE VIEWS





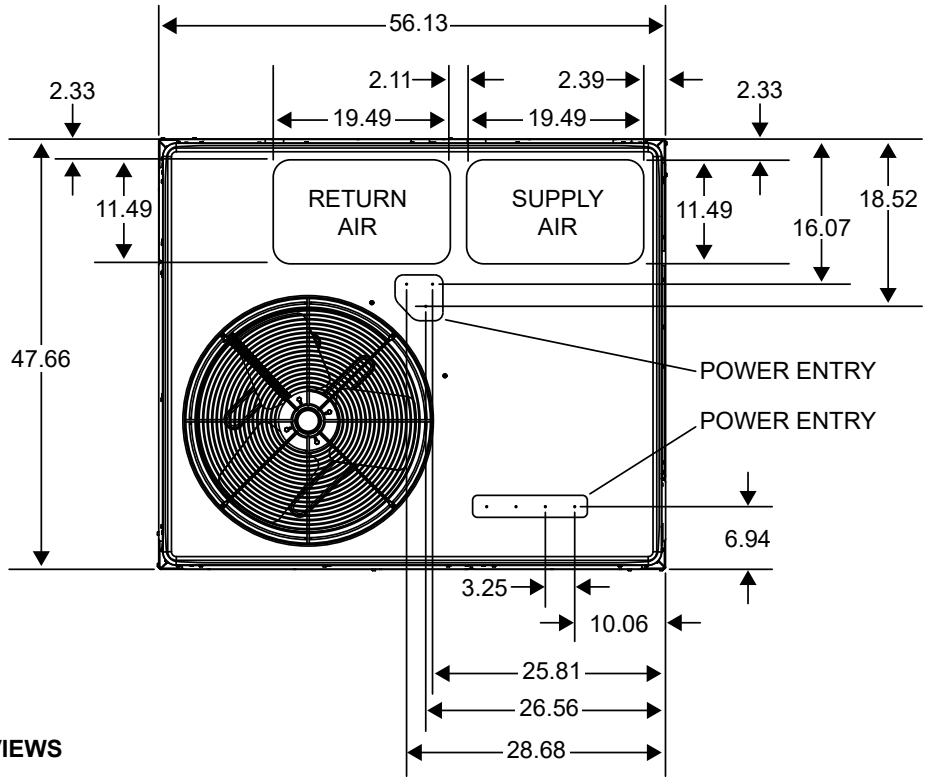
TYPICAL DRAIN LOCATION



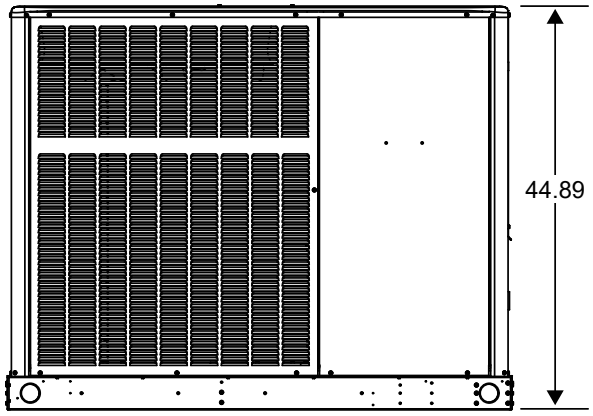


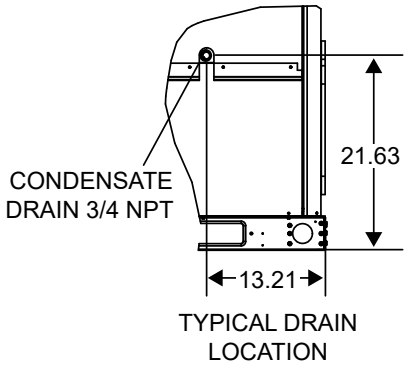
Unit Dimensions (Inches) - Large Base Air Conditioners & Heat Pumps

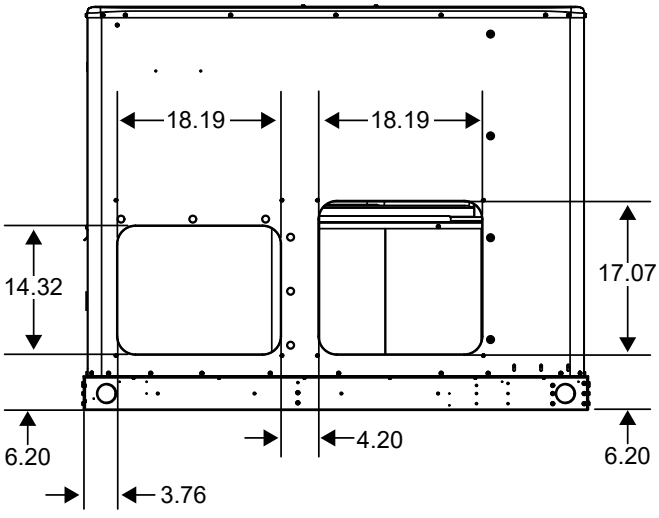
TOP VIEW

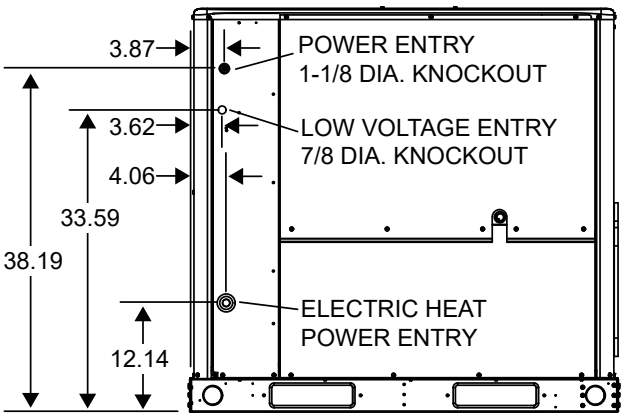


SIDE VIEWS

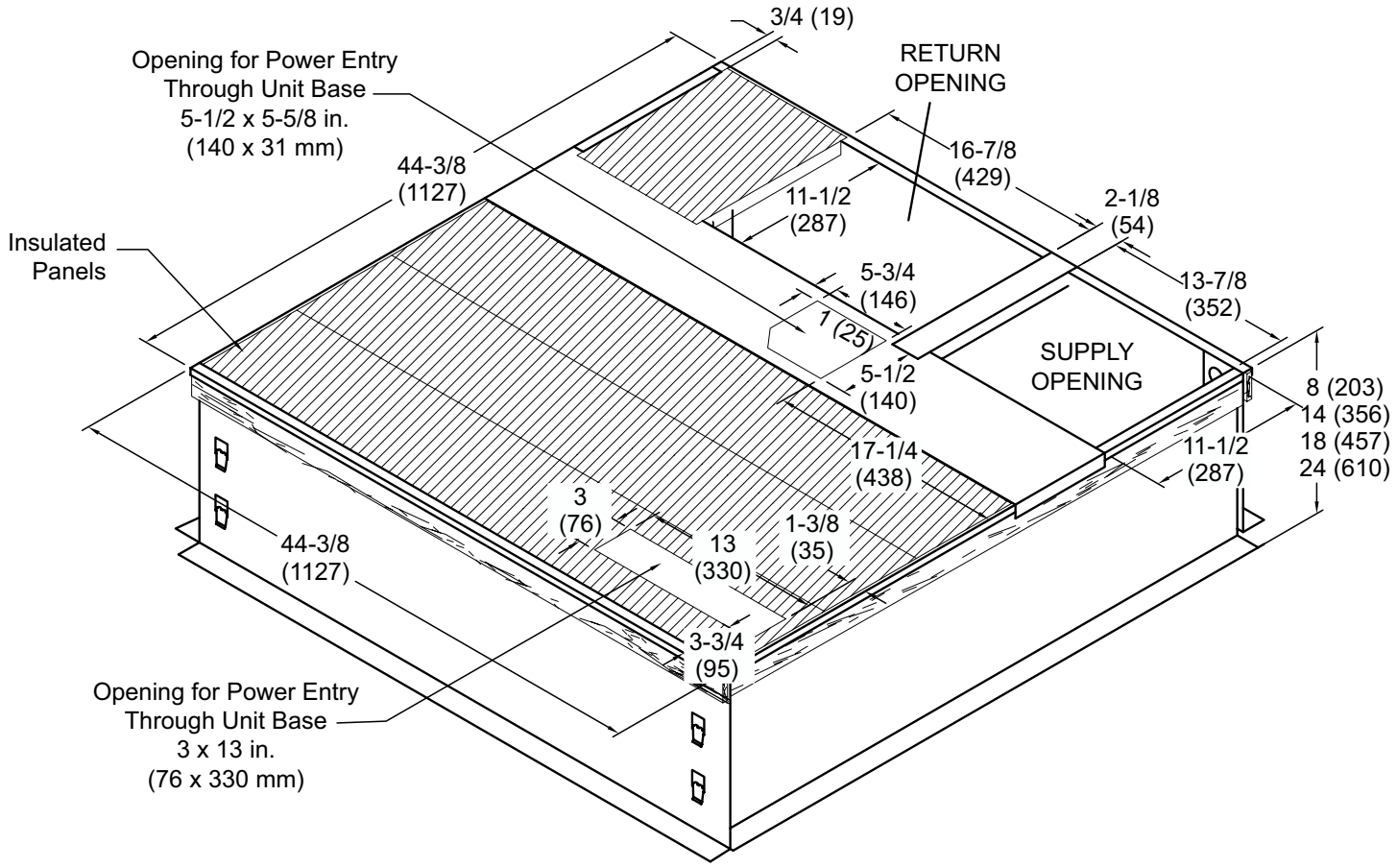






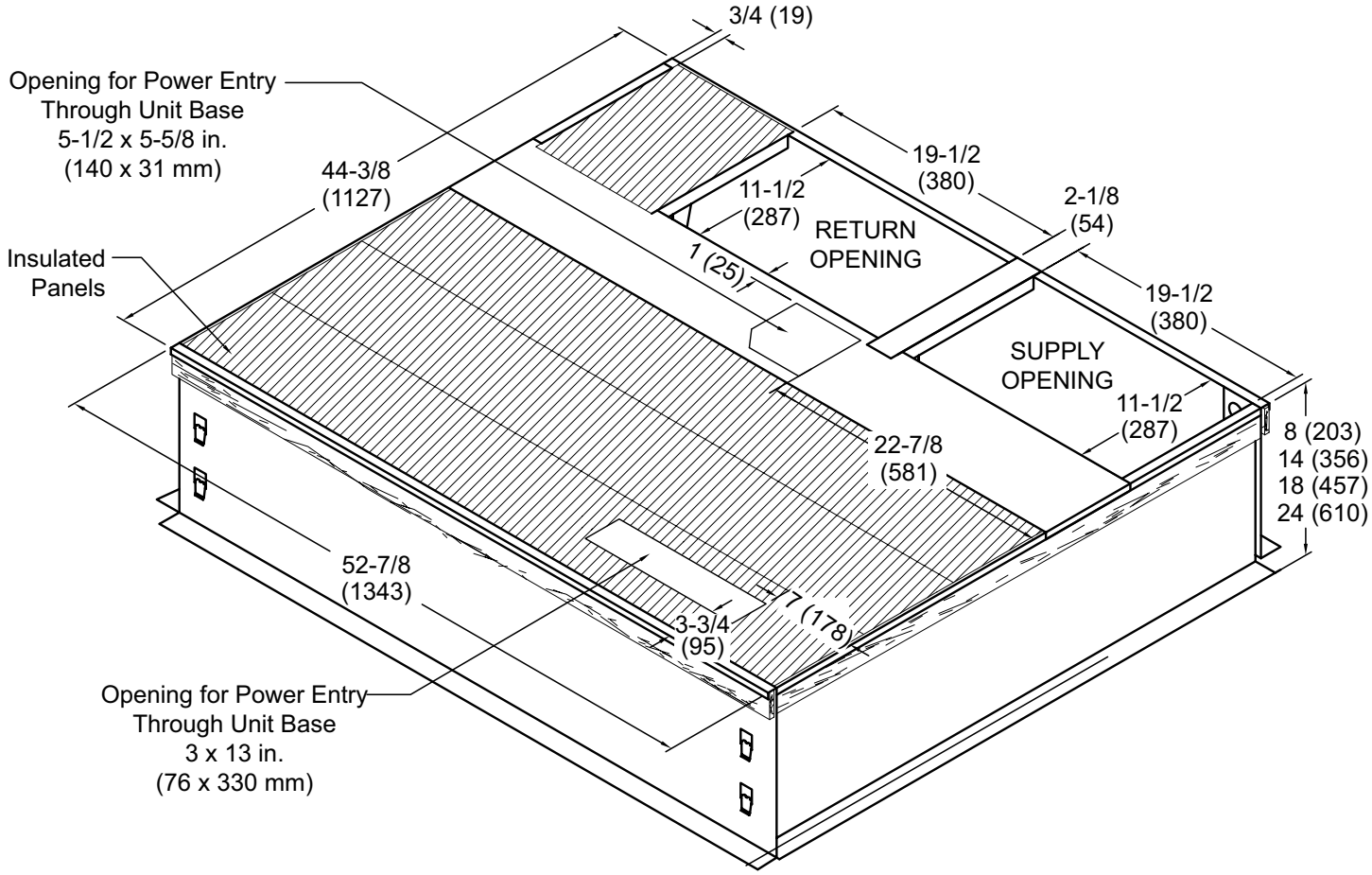


Roof Curb Dimensions (Inches (mm)) -Small Base Air Conditioners & Heat Pumps



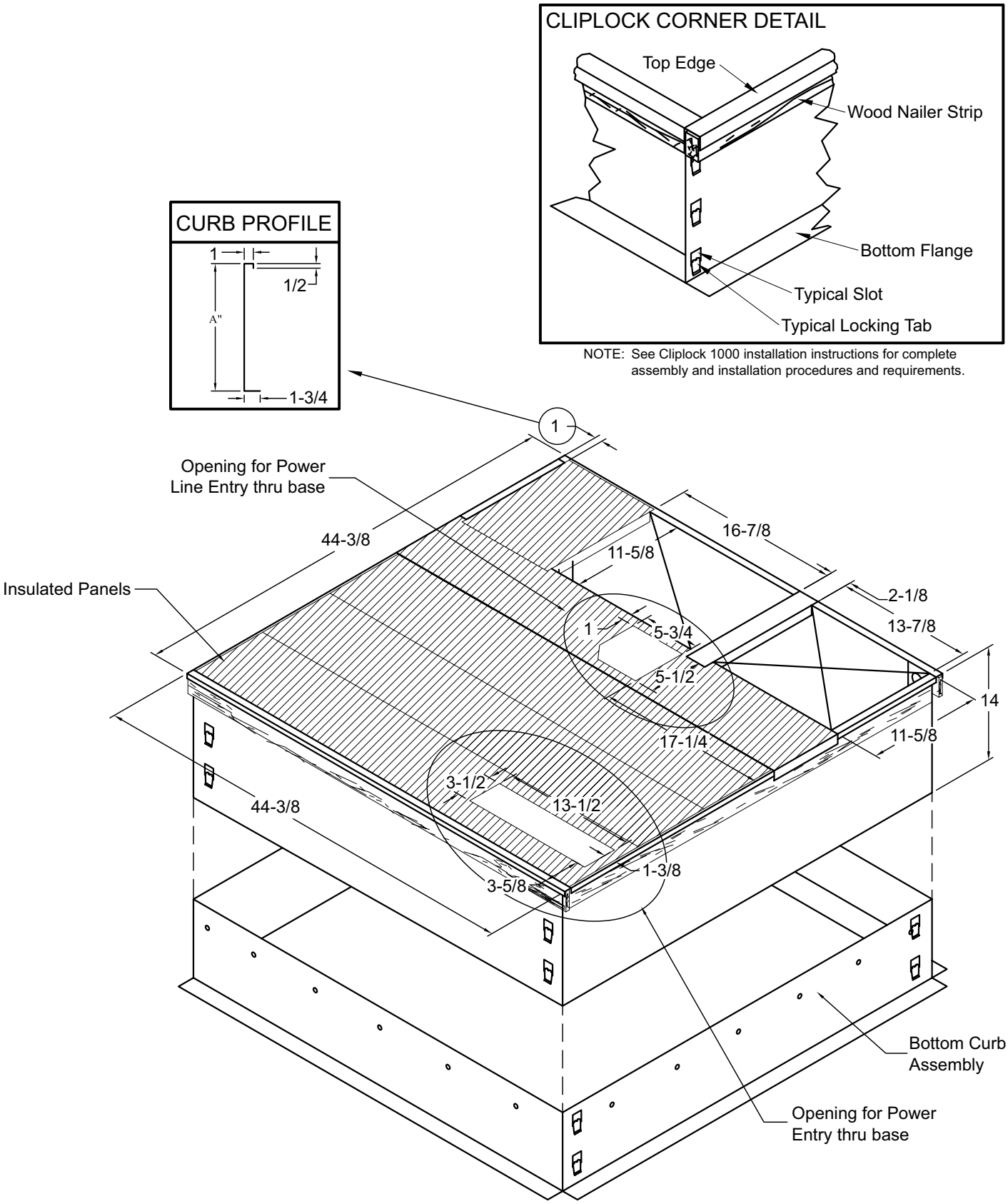
NOTE - Roof deck may be omitted within confines of curb.

Roof Curb Dimensions (Inches (mm)) - Large Base Air Conditioners & Heat Pumps



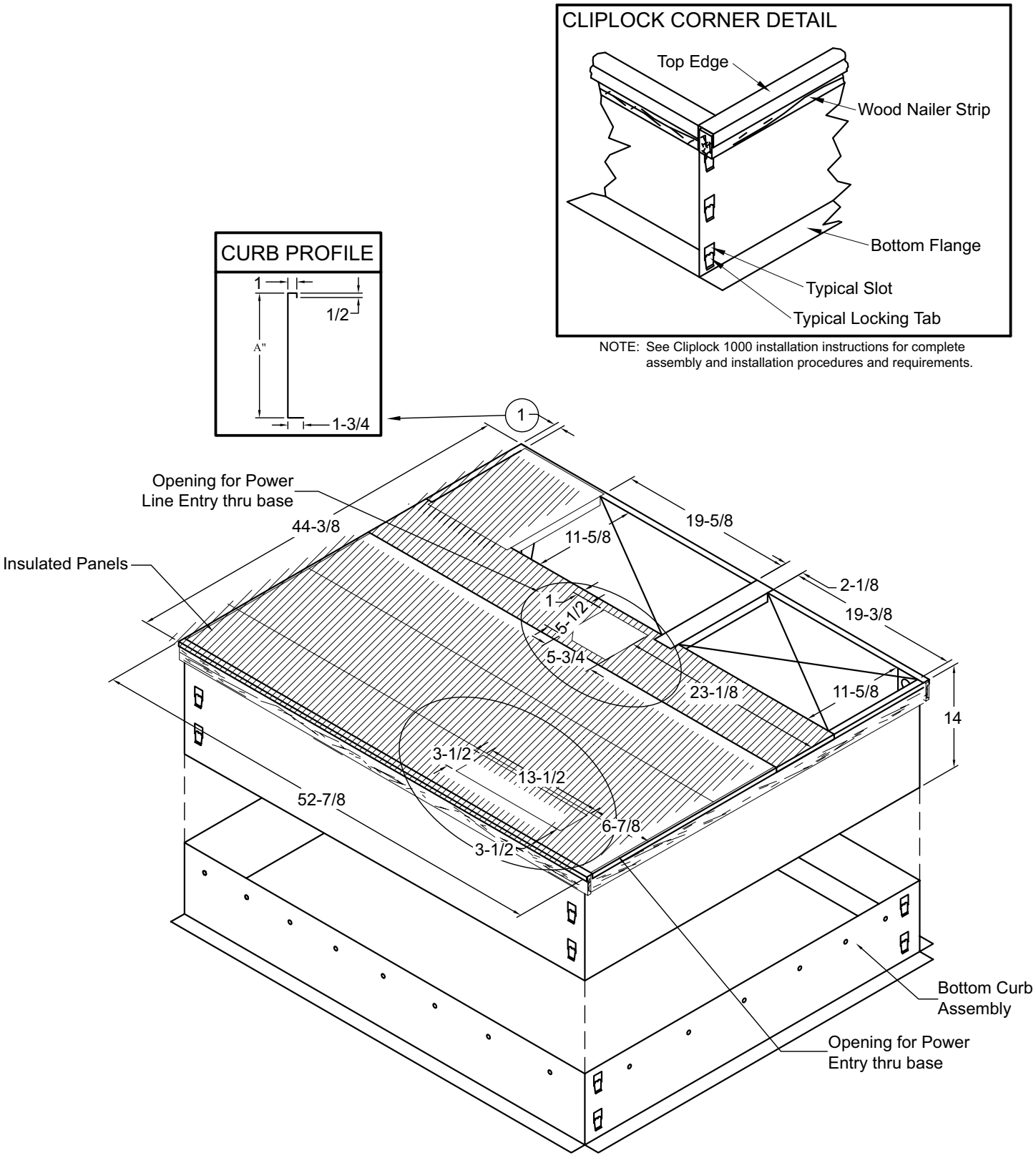
NOTE - Roof deck may be omitted within confines of curb.

Adjustable Roof Curb Dimensions (Inches) - Small Base Air Conditioners & Heat Pumps (Knock-Down Style)



NOTE - Roof deck may be omitted within confines of curb.

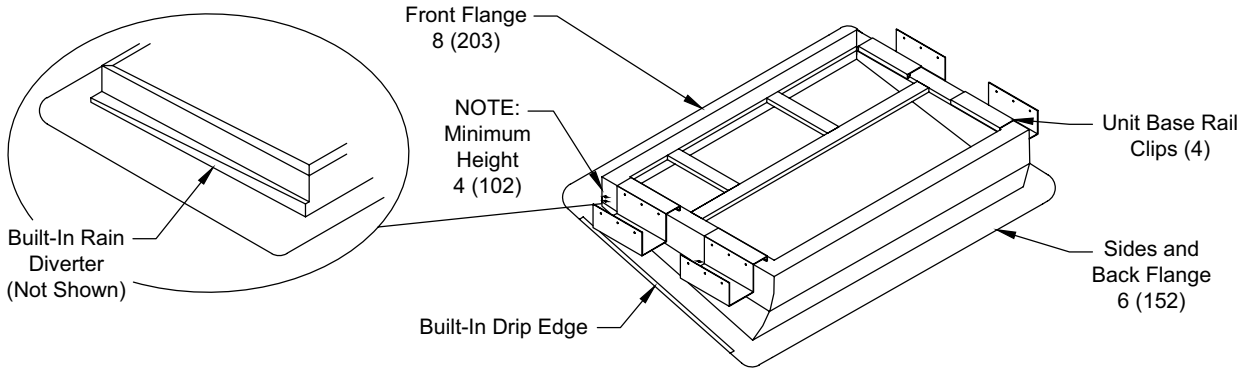
Adjustable Roof Curb Dimensions (Inches) - Large Base Air Conditioners & Heat Pumps (Knock-Down Style)

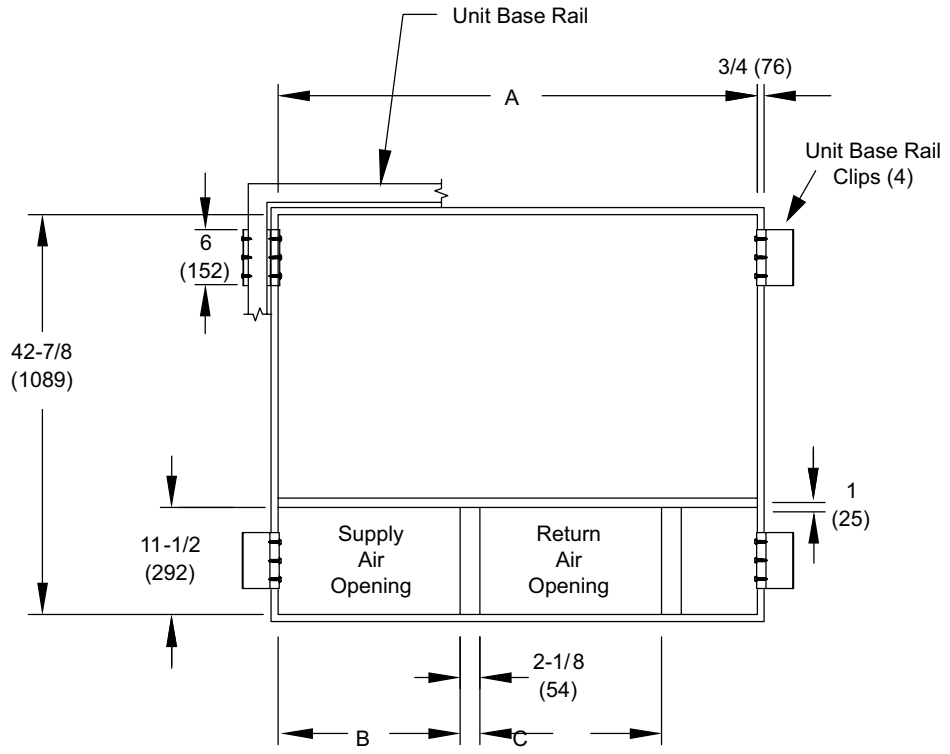


NOTE: See Cliplock 1000 installation instructions for complete assembly and installation procedures and requirements.

NOTE - Roof deck may be omitted within confines of curb.

Adjustable Roof Curb Dimensions (Inches (mm)) - Air Conditioners & Heat Pumps (Welded Style)





Usage	A		B		C	
	in.	mm	in.	mm	in.	mm
24,30,36	42-7/8	1089	13-7/8	352	16-7/8	429
42,48,60	51-3/8	1305	19-1/2	495	19-1/2	495

⚠ 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, Failure to follow instructions will cause damage to the unit. This unit is equipped with an aluminum coil. Aluminum coils may be damaged by exposure to solutions with a pH below 5 or above 9. The aluminum coil should be cleaned using potable water at a moderate pressure (less than 50psi). If the coil cannot be cleaned using water alone, recommends use of a coil cleaner with a pH in the range of 5 to 9. The coil must be rinsed thoroughly after cleaning. In coastal areas, the coil should be cleaned with potable water several times per year to avoid corrosive buildup (salt) to remove any residue from manufacturing processes.

Installing the Unit

Every working procedure that affects safety means shall only be carried out by competent persons. This appliance is not to be used by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety. Examples of such working procedures are breaking into the refrigerating circuit, opening of sealed components, and opening of ventilated enclosures.

- Work shall be undertaken under a controlled procedure so as to minimize the risk of a flammable gas or vapor being present while the work is being performed.
- The area shall be checked with an appropriate refrigerant detector prior to and during work, to ensure the technician is aware of potentially toxic

or flammable atmospheres. Ensure that the leak detection equipment being used is suitable for use with all applicable refrigerants, i. e. non-sparking, adequately sealed or intrinsically safe.

- If any hot work is to be conducted on the refrigerating equipment or any associated parts, the appropriate fire extinguishing equipment shall be available to hand. Have a dry powder or CO2 fire extinguisher adjacent to the charging area.
- No person carrying out work in relation to a refrigerating system which involves exposing any pipe work shall use any sources of ignition in such a manner that it may lead to the risk of fire or explosion. All possible ignition sources, including cigarette smoking, should be kept sufficiently far away from the site of installation, repairing, removing and disposal, during which refrigerant can possibly be released to the surrounding space. Prior to work taking place, the area around the equipment is to be surveyed to make sure that there are no flammable hazards or ignition risks. “No Smoking” signs shall be displayed.
- Ensure that the area is in the open or that it is adequately ventilated before breaking into the system or conducting any hot work. A degree of ventilation shall continue during the period that the work is carried out.
- Pipe-work including piping material, pipe routing, and installation shall include protection from physical damage in operation and service, and be in compliance with national and local codes and standards
- All field joints shall be accessible for inspection prior to being covered or enclosed
- Where electrical components are being changed, they shall be fit for the purpose and to the correct specification. At all times the manufacturer’s maintenance and service guidelines shall be followed. If in doubt, consult the manufacturer’s technical department for assistance. The following checks shall be applied to installations using FLAMMABLE REFRIGERANTS as applicable:

1. The actual refrigerant charge is in accordance with the room size within which the refrigerant containing parts are installed.

2. The ventilation machinery and outlets are operating adequately and are not obstructed.

3. If an indirect refrigerating circuit is being used, the secondary circuit shall be checked for the presence of refrigerant.

4. Markings on the equipment should be visible and legible. Markings and signs that are illegible shall be corrected.

5. Refrigerating pipe or components are installed in a position where they are unlikely to be exposed to any substance which may corrode refrigerant containing components, unless the components are constructed of materials which are inherently resistant to being corroded or are suitably protected against being so corroded.

For systems containing refrigerant, all repair and maintenance to electrical components shall include initial safety checks and component inspection procedures such as that capacitors are discharged in a safe manner to avoid possibility of sparking, that no live electrical components and wiring are exposed while charging, recovering, or purging the system, and that there is continuity of earth bonding. If a fault exists that could compromise safety, then no electrical supply shall be connected to the circuit until it is satisfactorily dealt with. If the fault cannot be corrected immediately but it is necessary to continue operation, an adequate temporary solution shall be used that is reported to the owner of the equipment, so all parties are advised.

NOTE: *Sealed electrical components shall be replaced, not repaired.*

NOTE: *Intrinsically safe components must be replaced, not repaired.*

NOTE: *All maintenance staff and others working in the local area shall be instructed on the nature of work being carried out with work in confined spaces being avoided.*

- Under no circumstances shall potential sources of ignition be used in the searching for or detection of refrigerant leaks. A halide torch (or any other detector using a naked flame) shall not be used. The following leak detection methods are deemed acceptable for all refrigerant systems. Electronic leak detectors may be used to detect refrigerant leaks but, in the case of flammable refrigerants, the sensitivity may not be adequate, or may need re-calibration. (Detection equipment shall be calibrated in a refrigerant-free area.) Ensure that the detector is not a potential source of ignition and is suitable for the refrigerant used. Leak detection equipment shall be set at a percentage of the LFL of the refrigerant and shall be calibrated to the refrigerant employed, and that 25% refrigerant is con-firmed. Leak detection fluids are also suitable for use with most refrigerants but the use of detergents containing chlorine shall be avoided as the chlorine may react with the refrigerant and corrode the copper pipe-work. If a leak is suspected, all naked flames shall be removed/ extinguished. If a leakage of refrigerant is found which requires brazing, all of the refrigerant shall be recovered from the system, or isolated (by means of shut off valves) in a part of the system remote from the leak.
- When breaking into the refrigerant circuit to make repairs – or for any other purpose – conventional procedures shall be used. However, for flammable refrigerants it is important that best practice be followed and, since flammability is a consideration, procedures such as safely remove refrigerant following local and

national regulations, purging the circuit with inert gas, evacuating (optional for A2L), purging with inert gas (optional for A2L), or opening the circuit by cutting or brazing be adhered to. The refrigerant charge shall be recovered into the correct recovery cylinders if venting is not allowed by local and national codes. For appliances containing flammable refrigerants, the system shall be purged with oxygen-free nitrogen to render the appliance safe for flammable refrigerants. This process might need to be repeated several times. Compressed air or oxygen shall not be used for purging refrigerant systems. For appliances containing flammable refrigerants, refrigerants purging shall be achieved by breaking the vacuum in the system with oxygen-free nitrogen and continuing to fill until the working pressure is achieved, then venting to atmosphere, and finally pulling down to a vacuum (optional for A2L). This process shall be repeated until no refrigerant is within the system (optional for A2L). When the final oxygen-free nitrogen charge is used, the system shall be vented down to atmospheric pressure to be able to perform the required work. Ensure that the outlet for the vacuum pump is not close to any potential ignition sources and working area is well ventilated.

Use of Unit During Construction

Use of this unit as a construction heater or air conditioner is not recommended during any phase of construction. Very low return air temperatures, harmful vapors and operation of the unit with clogged or misplaced filters will damage the unit.

If this unit has been used for heating or cooling of buildings or structures under construction, the following conditions must be met or the warranty will be void:

- A room thermostat must control the unit. The use of fixed jumpers that will provide continuous heating or cooling is not allowed.
- A pre-filter must be installed at the entry to the return air duct.
- The return air duct must be provided and sealed to the unit.
- Return air temperature range between 55°F (13°C) and 80°F (27°C) must be maintained.
- Air filters must be replaced and pre-filters must be removed upon construction completion.
- The input rate and temperature rise must be set per the unit rating plate.
- The heat exchanger, components, duct system, air filters and evaporator coil must be thoroughly cleaned following final construction clean-up.
- The refrigerant leak detection sensor must be inspected for dust/debris deposits. Refer to the refrigerant detection sensor kit instructions for additional information.
- The unit operating conditions (including airflow, cooling operation, ignition, input rate, temperature rise and venting) must be verified according to these installation instructions.

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 2. Minimum Clearances

Compressor

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

Roof Curb Installation

If a roof curb is used, follow the manufacturer's installation instructions and be sure that all required clearances are observed (see Clearances section).

Prior to setting the unit on the roof curb, all shipping/ handling components.

Rigging Unit

Exercise care when moving the unit. Do not remove any packaging until the unit is near the place of installation.

1. Connect rigging to the unit base rails using both holes in each corner.
2. All panels must be in place for rigging.
3. Place field-provided spreaders in place. Spreaders must be of adequate strength and length (must exceed unit dimension by 6 inches).

Units may also be moved or lifted with a forklift. **The lengths of the forks of the forklift must be a minimum of 42 inches.**

⚠ CAUTION

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

Unpacking

NOTE: *Some units will be packaged with stacking brackets while other units will be packaged on a pallet.*

1. ***For units packaged with stacking brackets:*** Locate the four stacking brackets at each corner of the top panel. Remove the screws that secure these brackets. All screws must be re-installed. The stacking brackets can be discarded.
2. ***For units packaged on a pallet:*** Remove the unit from the skid.
3. Remove the bag and remaining packaging material, which can be discarded.
4. Locate the four plastic fork slot bumpers on the base rails. Remove the fasteners and bumpers and discard.

⚠ CAUTION

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

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 R-454B refrigerant. Operating pressures for units charged with R-454B are higher than pressures in units charged with HCFC-22. All service equipment MUST be rated for use with R-454B-refrigerant.

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 1 and Figure 2 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.

NOTE: *An optional bottom-entry power kit is available for these units. See the kit instructions for proper installation details.*

⚠ 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.

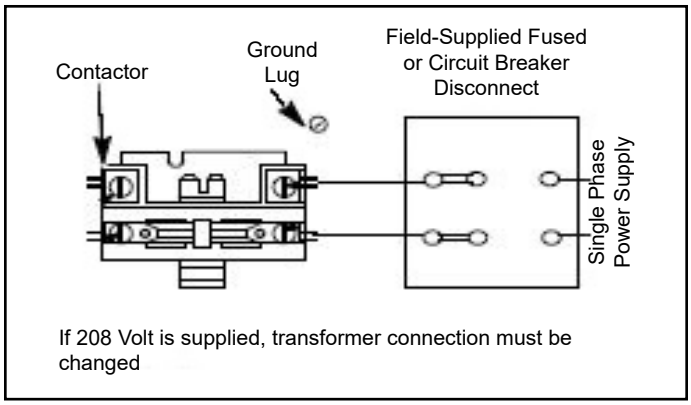


Figure 1. 208/230 Line Voltage Wiring

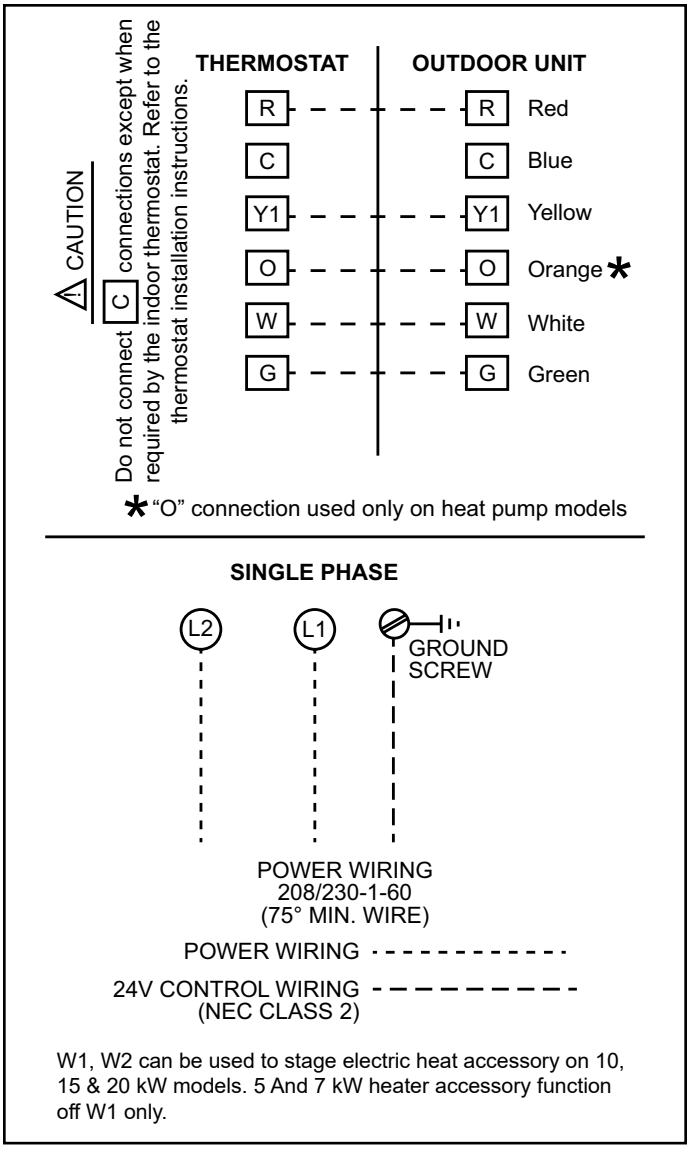


Figure 2. Typical Wiring Connections

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.

Duct System

The duct system should be designed and sized according to the methods in the Air Conditioning Contractors of America (ACCA) manual that is most appropriate to the installation application.

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) or downflow (bottom duct connections). All units are equipped with a drain pan overflow switch that is installed and wired at the factory. Duct attachment screws are intended to go into the duct panel flanges. Duct to unit connections must be sealed and weather proofed.

For horizontal duct systems:

1. Remove the duct covers on side of the unit. They can be discarded.
2. Install the duct system to the unit.

For downflow duct systems:

1. Remove the duct covers on side of the unit. Keep the screws and the covers as they will be re-installed later.
2. Remove the downflow duct covers located inside unit. Remove the four screws securing each cover. Remove the covers from the unit. They can be discarded.
3. Remove screws located between the supply and return air openings that attach the blower deck to the base pan. These screws can interfere with bottom duct connections or roof curb seals. Discard these screws.
4. Install the duct system to the unit.
5. Re-install the duct covers removed in Step 1.

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 3 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 x 1	20 x 20 x 1
42,48,60	20 x 20 x 1	

Table 3. 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.*

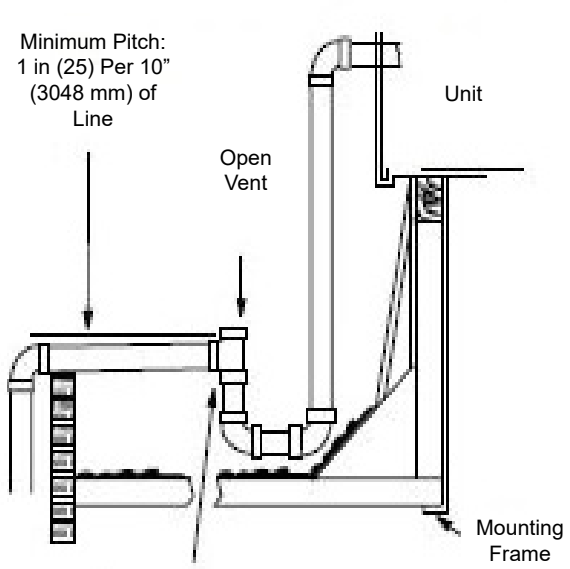
See Figure 3 for proper drain arrangement. The drain line must pitch to an open drain or pump to prevent clogging of the line. Seal around the drain connection with suitable material to prevent air leakage into the return air system.

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.

A Photocatalytic Oxidation (PCO) air purification system is available as a field-installed accessory for this product. A wiring harness for the installation of this accessory has been factory installed. If this accessory is going to be installed, it becomes critical that the system filter be installed ahead of this unit's return. Therefore, see the PCO accessory for filter requirements, plan the installation of filter ahead of this unit, and do not use the internal filter rack described above.



Trap must be deep enough to offset maximum static difference (generally, 3 inches (76 mm) minimum). In addition, the drain line must be supported if longer than 10 feet.

Trap must be primed at start-up.

Figure 3. 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 4):

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 block off 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.

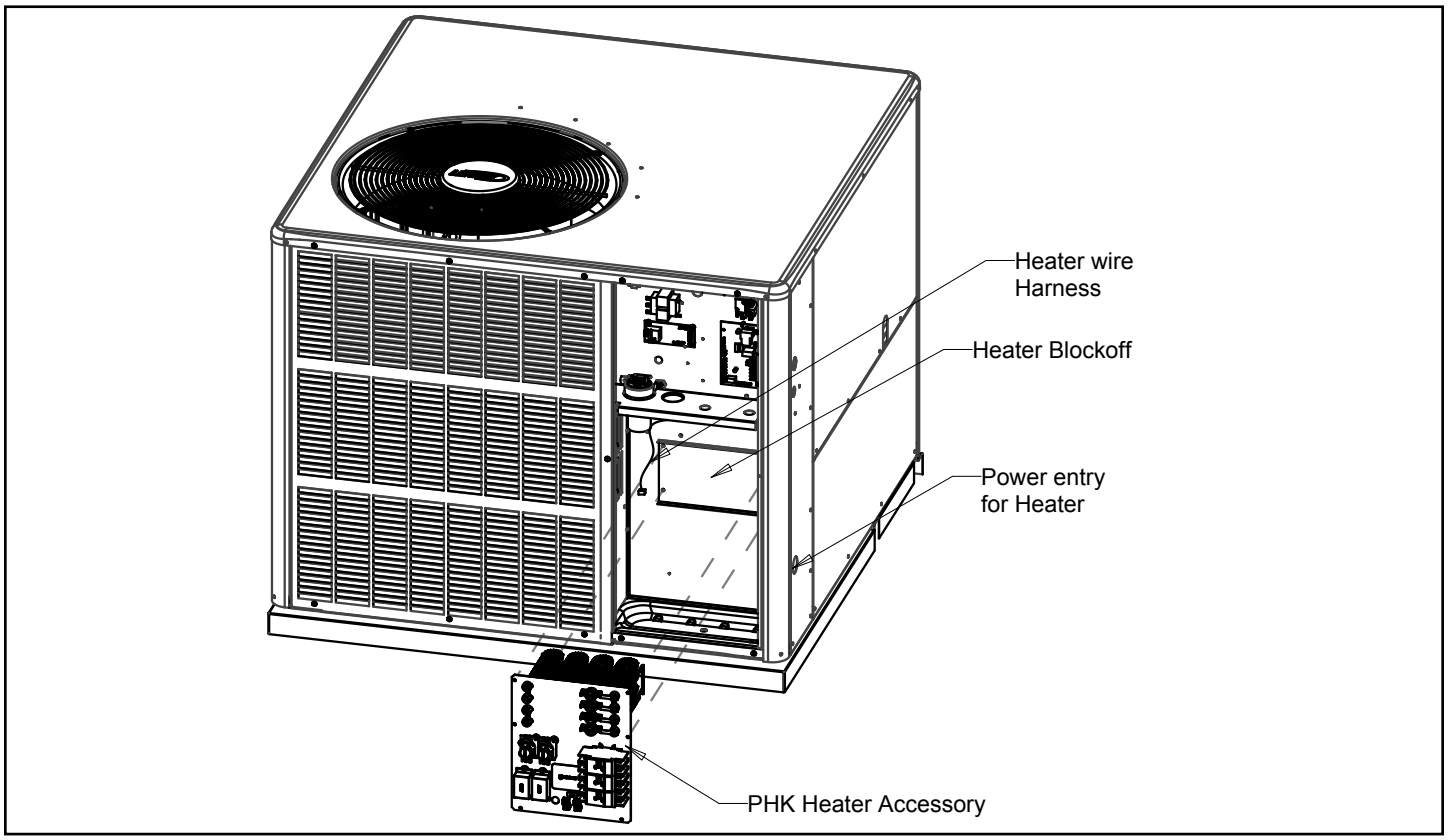


Figure 4. Heater Kit Accessory Installation

Sequence of Operation

RDS Control Check

The RDS Non-Communicating Blower Control Board is equipped with a Test/Reset button. Once the HVAC system has been powered, the system will then run through a purge sequence for five (5) minutes. After the purge sequence is complete, proceed to testing cooling demand and heating demand.

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. **Note:** Only field installed.

Defrost System for 2-ton Heat Pumps

Demand Defrost System

The demand defrost system measures differential temperatures to detect when the system is performing poorly because of ice build-up on the outdoor coil. The system “self-calibrates” when the defrost system starts and after each system defrost cycle. The demand defrost components on the control board are listed below.

NOTE: *The demand defrost system accurately measures the performance of the system as frost accumulates on the outdoor coil. This typically will translate into longer running time between defrost cycles as more frost accumulates on the outdoor coil before the board initiates defrost cycles.*

Defrost System Sensors

Sensors connect to the defrost board through a field–replaceable harness assembly that plugs into the board. Through the sensors, the board detects outdoor ambient and coil fault conditions. As the detected temperature changes, the resistance across the sensor changes. Sensor resistance values can be checked by ohming across pins.

NOTE: *When checking the ohms across a sensor, be aware that a sensor showing a resistance value that is not within the range shown, may be performing as designed. However, if a shorted or open circuit is detected, then the sensor may be faulty and the sensor harness will needs to be replaced.*

Sensor	Temperature Range °F (°C)	Red LED (DS1)	Pins / Wire Color
Outdoor (ambient)	-35 (-37) to 120 (48)	280,000 to 3750	3 & 4 (black)
Coil	-35 (-37) to 120 (48)	280,000 to 3750	5 & 6 (brown)
NOTE: Sensor resistance decreases as sensed temperature increases.			

Table 4. Sensor Temp. / Resistance Range

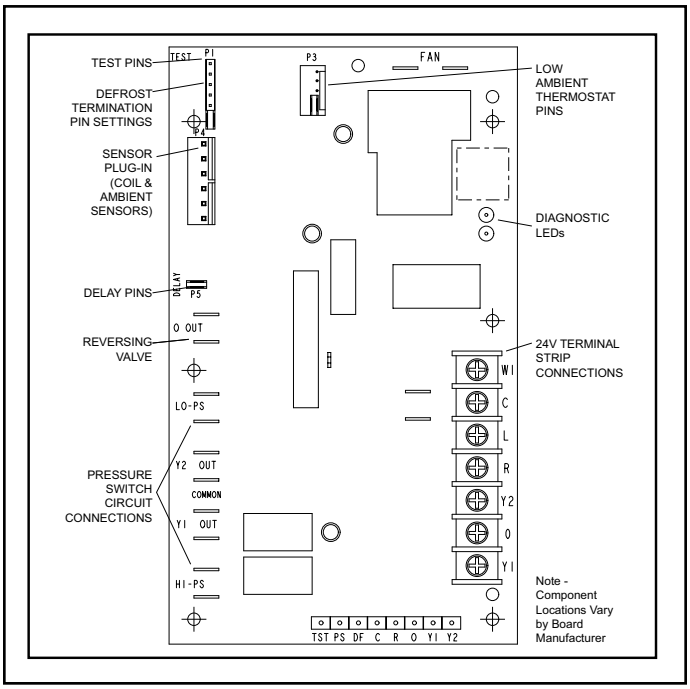


Figure 5. Defrost Control Board (2-Ton Units)

Coil Sensor

The coil temperature sensor considers outdoor temperatures below -35°F (-37°C) or above 120°F (48°C) as a fault. If the coil temperature sensor is detected as being open, shorted or out of the temperature range of the sensor, the board will not perform demand or time/temperature defrost operation and will display the appropriate fault code. Heating and cooling operation will be allowed in this fault condition.

NOTE: *The coil temperature probe is designed with a spring clip to allow mounting to the outside coil tubing. Coil sensor location is important for proper defrost operation.*

Ambient Sensor

The ambient sensor considers outdoor temperatures below -35°F (-37°C) or above 120°F (48°C) as a fault. If the ambient sensor is detected as being open, shorted or out of the temperature range of the sensor, the board will not perform demand defrost operation. The board will revert to time/temperature defrost operation and will display the appropriate fault code. Heating and cooling operation will be allowed in this fault condition.

NOTE: *Within a single room thermostat demand, if 5-strikes occur, the board will lockout the unit. Control board 24 volt power "R" must be cycled "OFF" or the "TEST" pins on board must be shorted between 1 to 2 seconds to reset the board.*

Defrost Temperature Termination Shunt (Jumper) Pins

The defrost board selections are: 50, 70, 90, and 100°F (10, 21, 32 and 38°C). The shunt termination pin is factory set at 50°F (10°C). If the temperature shunt is not installed, the default termination temperature is 90°F (32°C).

Delay Mode

The defrost system has a field-selectable function to reduce occasional sounds that may occur while the unit is cycling in and out of the defrost mode. When a jumper is installed on the DELAY pins, the compressor will be cycled off for 30 seconds going in and out of the defrost mode. Units are shipped with jumper installed on DELAY pins.

NOTE: *The 30 second compressor delay feature (known as the quiet shift)* ***must*** *be deactivated during any unit performance testing. The feature is deactivated by removing the jumper located on the compressor delay pins on the control board mounted inside the unit control box. This feature is optional for the homeowner, but may impact testing performance.*

Defrost Operation

The defrost control system has three basic operational modes: normal, calibration, and defrost.

- **Normal Mode—**The demand defrost system monitors the O line, to determine the system operating mode (heat/cool), outdoor ambient temperature, coil temperature (outdoor coil) and compressor run time to determine when a defrost cycle is required.
- **Calibration Mode—**The board is considered uncalibrated when power is applied to the board, after cool mode operation, or if the coil temperature exceeds the termination temperature when it is in heat mode.

  Calibration of the board occurs after a defrost cycle to ensure that there is no ice on the coil. During calibration, the temperature of both the coil and the ambient sensor are measured to establish the temperature differential which is required to allow a defrost cycle.
- **Defrost Mode—**The following paragraphs provide a detailed description of the defrost system operation.

Defrost Cycles

The control board initiates a defrost cycle based on either frost detection or time.

- **Frost Detection**—If the compressor runs longer than 30 minutes and the actual difference between the clear coil and frosted coil temperatures exceeds the maximum difference allowed by the control, a defrost cycle will be initiated.

  IMPORTANT - *The control board will allow a greater accumulation of frost and will initiate fewer defrost cycles than a time/ temperature defrost system.*
- **Time**—If 6 hours of heating mode compressor run time has elapsed since the last defrost cycle while the coil temperature remains below 35°F (2°C), the control board will initiate a defrost cycle.

Actuation

When the reversing valve is de-energized, the Y1 circuit is energized, and the coil temperature is below 35°F (2°C), the board logs the compressor run time. If the board is not calibrated, a defrost cycle will be initiated after 30 minutes of heating mode compressor run time. The control will attempt to self-calibrate after this (and all other) defrost cycle(s).

Calibration success depends on stable system temperatures during the 20-minute calibration period. If the board fails to calibrate, another defrost cycle will be initiated after 45 minutes of heating mode compressor run time. Once the control board is calibrated, it initiates a demand defrost cycle when the difference between the clear coil and frosted coil temperatures exceeds the maximum difference allowed by the control OR after 6 hours of heating mode compressor run time has been logged since the last defrost cycle.

NOTE: *If ambient or coil fault is detected, the board will not execute the "TEST" mode.*

Termination

The defrost cycle ends when the coil temperature exceeds the termination temperature or after 14 minutes of defrost operation. If the defrost is terminated by the 14-minute timer, another defrost cycle will be initiated after 30 minutes of run time.

Defrost System for 2.5 - 5-ton Heat Pumps

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

Defrost Thermostat

The defrost thermostat is located on the evaporator 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.

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 6).

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.

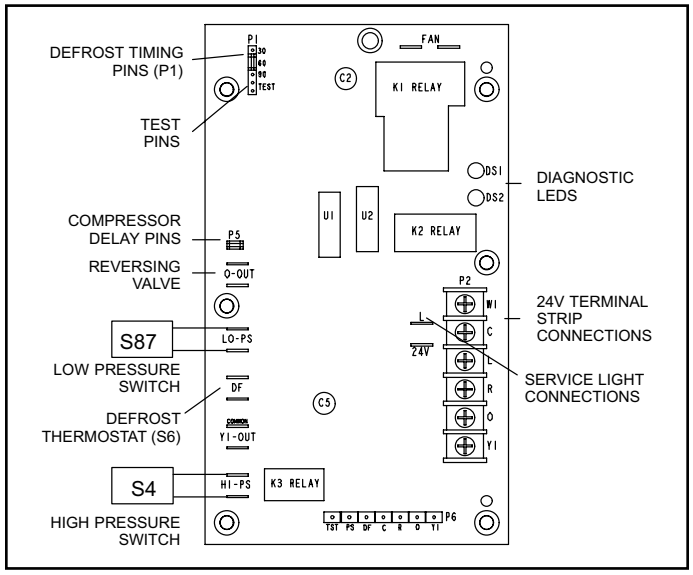


Figure 6. Defrost Control Board (2.5 - 5-Ton Units)

1. An on-board outdoor ambient temperature sensor on the defrost control bypasses the low pressure switch during low ambient temperature below 15°F in heating mode to eliminate nuisance low pressure trips.

   NOTE: *15°F is an approximate temperature, depending upon model and installation location.*

2. A defrost cycle will initiate when there has been a low pressure switch trip; the defrost sensor must be closed and the defrost time interval must not have expired.

At the end of the defrost cycle, when the unit goes back to heating mode, the low pressure switch is checked to see if it has reset. If so, the strikeout is not counted. This prevents lockout during extreme winter conditions. ***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 (Quiet Shift)

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 6).

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 5).

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.

5-Strike Lockout Feature

The internal control logic of the board counts the pressure switch trips only while the Y1 (Input) line is active. If a pressure switch opens and closes four times during a Y1 (Input), the control logic will reset the pressure switch trip counter to zero at the end of the Y1 (Input). If the pressure switch opens for a fifth time during the current Y1 (Input), the control will enter a lockout condition.

The 5-strike pressure switch lockout condition can be reset by cycling OFF the 24-volt power to the control board or by shorting the TEST pins between 1 and 2 seconds. All timer functions (run times) will also be reset.

If a pressure switch opens while the Y1 Out line is engaged, a 5-minute short cycle will occur after the switch closes.

Diagnostic LEDs

The defrost board uses two LEDs for diagnostics. The LEDs flash a specific sequence according to the condition as shown in Table 5.

Defrost Board Diagnostic LEDs		
Green LED (DS2)	**Red LED (DS1)**	**Condition**
OFF	OFF	No Power to Control
Simultaneous slow FLASH		Normal Operation / Power to Control
Alternating Slow FLASH		5-min Anti-Short-Cycle Delay
ON	Slow FLASH	Low Pressure Switch Ignored (Low Ambient)
Fault & Lockout Codes		
OFF	Slow FLASH	Low Pressure Switch Fault
OFF	ON	Low Pressure Switch Lockout
Slow FLASH	OFF	High Pressure Switch Fault
ON	OFF	High Pressure Switch Lockout

Table 5. Defrost Control (CMC1) 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	13	
2.5 Ton	15	
3 Ton	15	
3.5 Ton	13	
4 Ton	14	
5 Ton	16	
Based on outdoor ambient temperature of 82°F, and indoor entering air of 80°F db, 67°F wb.		

Table 6. Air Conditioner Unit Cooling System Performance Values

Model	Suction Superheat +/- 3°	Liquid Subcooling +/- 2°
2 Ton	17	
2.5 Ton	15	
3 Ton		8
3.5 Ton	17	
4 Ton	17	
5 Ton		11
Based on outdoor ambient temperature of 82°F, and indoor entering air of 80°F db, 67°F wb.		

Table 7. Heat Pump Cooling System Performance Values

Model	Liquid Subcooling +/- 2°
2 Ton	27
2.5 Ton	10
3 Ton	11
3.5 Ton	34
4 Ton	39
5 Ton	46
Based on outdoor ambient temperature of 47°F, and indoor entering air of 70°F db.	

Table 8. Heat Pump Heating System Performance Values

Approved Auxiliary Devices

Description	Where Used	Kit Number
Electric Heater 5KW - PHK05BP	All	10W47
Electric Heater 7.5KW - PHK07BP	All	10W48
Electric Heater 10KW - PHK10BP	All	10W49
Electric Heater 15KW - PHK15CP	32, 42, 48, 60	10W50
Electric Heater 20KW - PHK20CP	42, 48, 60	10W51

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 evaporator 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.

Indoor fans are equipped with a permanent magnet constant torque 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.

Evaporator Coil

Dirt and debris should not be allowed to accumulate on the evaporator coil surface or other parts in the air circuit. Cleaning should be as often as necessary to keep 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.**

Do not permit the hot condenser air discharge to be obstructed by overhanging structures or shrubs.

Condenser Coil

Clean condenser coil annually with water and inspect monthly during the cooling season.

Condenser coil may need to be cleaned at startup in case oil from the manufacturing process is found on the condenser coil.

“Prior to service, safety checks are necessary to minimize risk of ignition.

Service will be undertaken under a controlled procedure to minimize risk of flammable gas or vapor being present during maintenance.

Prior to service, area will be checked with an appropriate refrigerant detector.”

Table 9. Cooling Performance - AC Models

80 DB / 67 WB Deg. Return Air		Air Temperature Entering Evaporator Coil, Degree F										
Cooling Input (1000 BTU)	Pressure	65°	70°	75°	80°	85°	90°	95°	100°	105°	110°	115°
24	Suction +/-2 PSIG	118	121	124	127	130	132	134	137	139	141	143
30		126	128	130	132	134	136	139	140	141	143	145
36		118	121	124	127	130	132	135	137	139	140	142
42		125	127	129	131	133	135	137	139	140	142	144
48		124	126	128	131	133	135	138	140	142	144	147
60		120	122	124	127	129	131	134	136	138	140	143
24	Liquid +/- 4 PSIG	218	236	253	273	293	315	337	361	385	411	436
30		220	242	264	296	309	331	354	376	398	420	443
36		235	255	276	297	320	343	366	393	418	445	473
42		230	252	275	298	321	344	368	391	414	437	460
48		239	262	285	308	331	354	378	401	424	447	470
60		220	243	266	288	311	334	357	379	402	425	447
24	Superheat +/-2 DEG F	24	22	20	18	14	13	12	6	3	2	1
30		24	21	18	16	13	11	8	5	2	1	1
36		28	26	23	20	17	14	12	8	3	1	1
42		27	25	22	19	16	13	10.5	7	5	2	1
48		21	19	17	16	14	12	10.5	9	7	5	3
60		26	23	21	18	15	13	10	7	5	2	1

Table 10. Cooling Performance - HP Models

80 DB / 67 WB Deg. Return Air		Air Temperature Entering Evaporator Coil, Degree F										
Cooling Input (1000 BTU)	**Pressure**	**65°**	**70°**	**75°**	**80°**	**85°**	**90°**	**95°**	**100°**	**105°**	**110°**	**115°**
24	Suction	139	141	143	145	147	150	152	155	157	160	163
30		136	138	140	142	145	147	151	153	155	159	162
36		142	142	142	143	143	145	145	148	150	153	155
42		141	141	141	142	143	145	146	151	155	159	164
48		138	139	140	142	143	145	147	151	154	157	161
60		136	136	136	136	137	138	139	141	143	146	148
24	Liquid	234	255	277	299	322	345	370	393	417	442	467
30		253	272	293	314	337	360	385	411	438	465	494
36		245	269	292	316	340	364	390	414	438	464	489
42		241	259	279	300	322	346	369	395	421	448	477
48		263	279	296	316	338	362	384	415	445	477	511
60		257	272	289	308	330	354	383	408	438	470	505

Table 11. Heating Performance - HP Models

70 Deg. F Return Air		Air Temperature Entering Evaporator Coil, Degree F											
Cooling Input (1000 BTU)	**Pressure**	**0°**	**5°**	**10°**	**17°**	**20°**	**25°**	**35°**	**40°**	**47°**	**50°**	**55°**	**60°**
24	Suction	36	41	47	56	60	67	82	91	104	110	120	130
30		34	39	45	53	57	64	79	87	99	104	113	123
36		18	28	37	49	54	63	80	88	101	103	111	118
42		30	37	44	53	58	65	81	89	104	106	115	125
48		38	43	49	57	61	68	82	90	101	108	117	127
60		28	34	40	50	54	61	77	84	95	101	110	119
24	Liquid	297	290	286	286	287	293	313	328	346	368	393	421
30		276	269	265	262	262	264	275	284	302	309	325	343
36		279	275	274	275	276	281	295	305	324	331	347	364
42		344	330	319	311	310	312	327	340	365	378	404	433
48		392	368	350	333	330	328	340	354	375	399	429	465
60		356	357	360	367	372	380	403	417	426	451	471	493

Table 12. Minimum Circulation Airflow

Charge (oz)	60 - 80	80 - 100	100 - 120	120 - 140	140 - 160
Qmin (CFM)	135	169	203	237	271

Table 13. Blower Performance - AC

Model	Blower Tap	CFM @ Ext. Static Pressure in. wc without Filter, Dry Coil									
		0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
24	TAP 1	610	560	525	485	430	0	0	0	0	0
	TAP 2	820	795	760	720	690	650	615	575	540	470
	TAP 3	960	925	885	850	815	780	745	710	675	635
30	TAP 1	850	820	780	745	710	680	630	590	550	515
	TAP 2	1040	1000	970	935	900	875	845	815	770	735
	TAP 3	1140	1105	1075	1045	1015	1000	965	925	890	825
36	TAP 1	850	800	750	700	645	600	550	480	435	0
	TAP 2	1245	1210	1175	1140	1100	1065	1025	975	920	845
	TAP 3	1390	1355	1320	1285	1250	1205	1165	1125	1050	875
42	TAP 1	800	720	640	550	475	390	310	0	0	0
	TAP 2	1470	1410	1360	1300	1260	1210	1155	1095	1000	940
	TAP 3	1600	1555	1510	1470	1430	1390	1340	1265	1210	1155
48	TAP 1	1145	1075	1000	930	850	790	740	670	570	490
	TAP 2	1675	1630	1600	1540	1490	1440	1390	1300	1230	1125
	TAP 3	1775	1735	1700	1660	1605	1555	1515	1455	N/A	N/A
60	TAP 1	1045	970	895	820	745	665	580	480	N/A	N/A
	TAP 2	1855	1810	1770	1725	1680	1630	1595	1550	N/A	N/A
	TAP 3	1965	1920	1875	1835	1785	1750	1710	1665	1615	1570

Table 14. Blower Performance - HP

Model	Blower Tap	CFM @ Ext. Static Pressure in. wc without Filter, Dry Coil									
		0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
24	TAP 1	680	590	550	450	380	N/A	N/A	N/A	N/A	N/A
	TAP 2	890	830	800	760	710	680	640	600	N/A	N/A
	TAP 3	1000	965	930	900	870	835	805	770	740	695
30	TAP 1	680	640	600	570	530	490	N/A	N/A	N/A	N/A
	TAP 2	1100	1070	1050	1020	990	960	930	900	N/A	N/A
	TAP 3	1195	1160	1130	1110	1070	1040	1005	970	935	875
36	TAP 1	860	810	760	710	640	590	550	490	N/A	N/A
	TAP 2	1300	1265	1235	1200	1165	1125	1085	1040	1000	885
	TAP 3	1450	1425	1395	1350	1320	1285	1250	1165	1045	860
42	TAP 1	800	720	640	550	475	390	310	0	0	0
	TAP 2	1470	1410	1360	1300	1260	1210	1155	1095	1000	940
	TAP 3	1580	1540	1505	1460	1415	1370	1320	1235	1135	1060
48	TAP 1	1145	1075	1000	930	850	790	740	670	570	490
	TAP 2	1675	1630	1600	1540	1490	1440	1390	1300	1230	1125
	TAP 3	1840	1800	1760	1720	1670	1615	1555	1500	N/A	N/A
60	TAP 1	1400	1320	1260	1200	1120	1060	980	900	N/A	N/A
	TAP 2	1920	1870	1820	1770	1720	1670	1450	1360	N/A	N/A
	TAP 3	1970	1915	1865	1820	1770	1725	1685	1640	1595	1540

NOTE: *This appliance is tested to 0.58 static with a filter and 0.5 static without a filter.*

FIGURE 7. Example of Clear, Unobstructed Sensor Inlet

Sensor Maintenance

It is recommended to check the state of the sensor every 6 months, at the beginning of each cooling and heating season.

- Ensure that the sensor opening is clear and free of debris.
- Check that the sensor cable is in good condition.
- DO NOT use abrasive cleaning solutions or detergents to clean sensor opening.
- DO NOT use flammable compressed air solutions to clean the sensor opening.
- DO NOT vacuum sensor inlet opening, as this could cause damage to the sensor internal components.
- Replace sensor if the opening is not clean or free of debris.
- When cleaning the evaporator coil, remove sensor from the coil. Follow recommended coil cleaning guidelines as described in installation instructions.

Modes of Operation

The modes of operation for the RDS Non-Communicating Blower Control Board are Initializing, Normal, Leak Detected, and Fault.

Initializing

The RDS Non-Communicating Blower Control Board is establishing connection with the refrigerant detection sensor and is completing an initial five (5) minute purge sequence.

Normal

The HVAC system is functioning normally. The RDS Non-Communicating Blower Control Board has not detected a refrigerant leak.

Leak Detected

When the RDS Non-Communicating Blower Control Board detects a refrigerant leak:

The RDS Non-Communicating Blower Control Board shuts off the (R) input (24VAC power) to the thermostat, which de-energizes the outdoor unit compressor and heat sources, such as gas and/or electric strip heat. No heating or cooling demands will be met.

The RDS Non-Communicating Blower Control Board activates the blower (high speed). The blower purges refrigerant from the cabinet, plenum, and ductwork.

After the RDS Non-Communicating Blower Control Board determines the refrigerant levels are below the safety threshold, the blower will continue to function for an additional seven (7) minutes.

After the blower sequence is complete, the HVAC system resumes normal operation.

***NOTE** – The HVAC system may not maintain a cooling or heating setpoint if a significant leak exists. Any refrigerant leaks that remain unaddressed for an extended time may cause the HVAC system to shut down on a low refrigerant pressure limit condition.*

Fault

When a fault is detected within the RDS Non-Communicating Blower Control Board, the indoor unit blower engages and remains engaged at a constant output until the fault is cleared.

Diagnostic Codes

The RDS Non-Communicating Blower Control Board is equipped with a multi color LED within its enclosure. The LED signals the state of the RDS Non-Communicating Blower Control Board.

See Table 15 to review the diagnostic codes.

TABLE 15. LED Diagnostic Codes

State	LED Diagnostic Code	Action
Initializing	Flashing green[1]	Not Applicable
Monitoring	Solid green with blue flash[2]	Not Applicable
Mitigating (Leak Detected)	Flashing blue	Check coil tubes for leak. Repair the issue and restart the equipment.
Fault/Service	Solid blue, interrupted by issue flash code	Refer to Table 7 for trouble-shooting steps.

Red LED Diagnostic Codes

Red diagnostic codes indicate a specific RDS Non-Communicating Blower Control Board issue. Yellow diagnostic codes indicate the sensor's position (if applicable).

TABLE 16. Red LED Diagnostic Codes

Red Flash	Applies to Individual Sensor(s)	Issue	Action
1	Yes	Sensor indicates fault	Replace the sensor (Cat. # 27J27)
2	No	Spare Code - Unused	Not Applicable
3	Yes	Incompatible sensor type	Replace with a compatible sensor (Cat. # 27J27)
4	Yes	Sensor communications issue	Check sensor connection. Ensure connection is clean and tight.
5	No	R-input not available	Check for 24VAC power connection to the R terminal inputs on the RDSC. R-inputs must be energized for the RDSC to function.
6	No	Invalid configuration of sensor count	Verify the DIP switch setting is correct and matches the number of sensors being used.

Test Button Functionality

The RDS Non-Communicating Blower Control Board is equipped with a Test/Reset button. The Test button can be used to complete several functions, depending on the mode of operation of the RDS Non-Communicating Blower Control Board.

Table 17 lists the functions of the Test button during each mode of operation.

TABLE 17. Test Button Function

Mode of Operation	Press the Test Button to...
Normal	Trigger a leak detection response. Verify all equipment is wired correctly into the RDSC (after installation).
Leak Detected	Reset the RDSC to a normal mode of operation after a previous leak has been detected and purged from the HVAC system.
Fault	Reset the RDSC after troubleshooting and resolving a fault condition. If the fault is not resolved, the RDSC will enter the Fault mode again.

Test Button - Additional Functions

Table 18 lists the additional functions of the Test Button while the RDS Non-Communicating Blower Control Board is functioning within the states of Initializing, Monitoring, Leak Detection, Servicing and Fault. Refer to “Table 15. LED Diagnostic Codes” on the page previous to this one.

TABLE 18. Additional Button Functions

State	Press	Action
Initializing	Short	Skips remaining pre-purge after sensors are recognized by the RDSC
Initializing	Long	Reset control
Monitoring	Short	Clear purge-counter if prior mitigation has occurred; Test mitigation
Monitoring	Long	Reset control
Mitigating	Short	If testing mitigation, end test
Servicing	Short	Reevaluate fault condition - if cleared return to monitoring, otherwise update indicator
Servicing	Long	Reset control
Fault	Short	Reevaluate fault condition - if cleared return to monitoring, otherwise update indicator
Fault	Long	Reset control

Thermostat Compatibility

Thermostats that preserve memory settings are compatible with the RDS Non-Communicating Blower Control Board. Examples include:

- Battery-powered thermostats
- Analog thermostats
- Smart thermostats
- Late-model programmable thermostats
- *Early-generation digital and programmable thermostats may not retain the operation mode and temperature setpoints after a power outage.*

The following scenarios are likely to occur when home occupants are not available to adjust the thermostat setpoints as the system is recovering from leak detection and resuming normal operation:

- Heating could be lost during a cold night
- Cooling could be lost during a hot day
- The thermostat could reset to an incorrect temperature setpoint

Compatibility Verification

Complete the following process to determine whether the thermostat is compatible with the RDS Non-Communicating Blower Control Board.

1 - Change the thermostat’s current setpoint and operating mode.

2 - Power cycle the breaker to the furnace.

NOTE *– Wait five (5) minutes before supplying power to the furnace breaker.*

3 - Note whether the thermostat maintained its setpoints and operating mode.

a. If the thermostat maintained the settings, the thermostat is compatible with the RDS Non-Communicating Blower Control Board.

b. If the thermostat did not maintain its setpoint and/or operating mode, the thermostat is not compatible with the RDS Non-Communicating Blower Control Board. Recommend replacing with a compatible thermostat.

Additional Applications

In zoned applications, all dampers will remain open when the RDS Non-Communicating Blower Control Board is in Fault or Leak Detected mode. Normal heating and cooling demands are permissible, but the blower will remain engaged until the fault condition is addressed.

Zone HVAC System

If the RDS Non-Communicating Blower Control Board is installed in a zone HVAC system, the RDS Non-Communicating Blower Control Board will open all zone dampers if a leak is detected.

NOTE *– Proper wiring of the zone panel to the RDS Non-Communicating Blower Control Board is required for all zone dampers to open.*

After the purge sequence is complete, the zone system will resume normal operation.

External Alarm

(*For applications with external alarms wired directly to the RDS Non-Communicating Blower Control Board.*)

The RDS Non-Communicating Blower Control Board triggers the external alarm system when it enters Leak Detected mode. For alarm notifications, the RDS Non-Communicating Blower Control Board provides a dry relay contact that is rated 3A at 30 VAC/DC.

Start Up Test Procedure

The RDS Non-Communicating Blower Control Board is equipped with a Test/Reset button, see “Test Button Functionality” on page 27. The system will then run through a purge sequence for five (5) minutes. After the purge sequence is complete, proceed to testing cooling demand and heating demand.

Cooling Demand

1 - Prompt a cooling demand at the thermostat.

2 - Press the Test button on the RDS Non-Communicating Blower Control Board.

The system then executes a leak detection response.

3 - Observe the following sequence:

a. The LED indicator flashes the sequence for leak detection (flashing blue).

b. The blower powers up.

c. The outdoor compressor powers down.

4 - Press the Test button to terminate the simulated Leak Detected mode upon test completion.

Heating Demand

1 - Prompt a heating demand at the thermostat.

2 - Press the Test button on the RDS Non-Communicating Blower Control Board.

The system then executes a leak detection response.

3 - Observe the following sequence:

a. The LED indicator flashes the sequence for leak detection (flashing blue).

b. The blower powers up.

c. The outdoor compressor powers down.

4 - Press the Test button to terminate the simulated Leak Detected mode upon test completion.

The installation of the RDS Non-Communicating Blower Control Board is complete after both sequences are successfully completed.

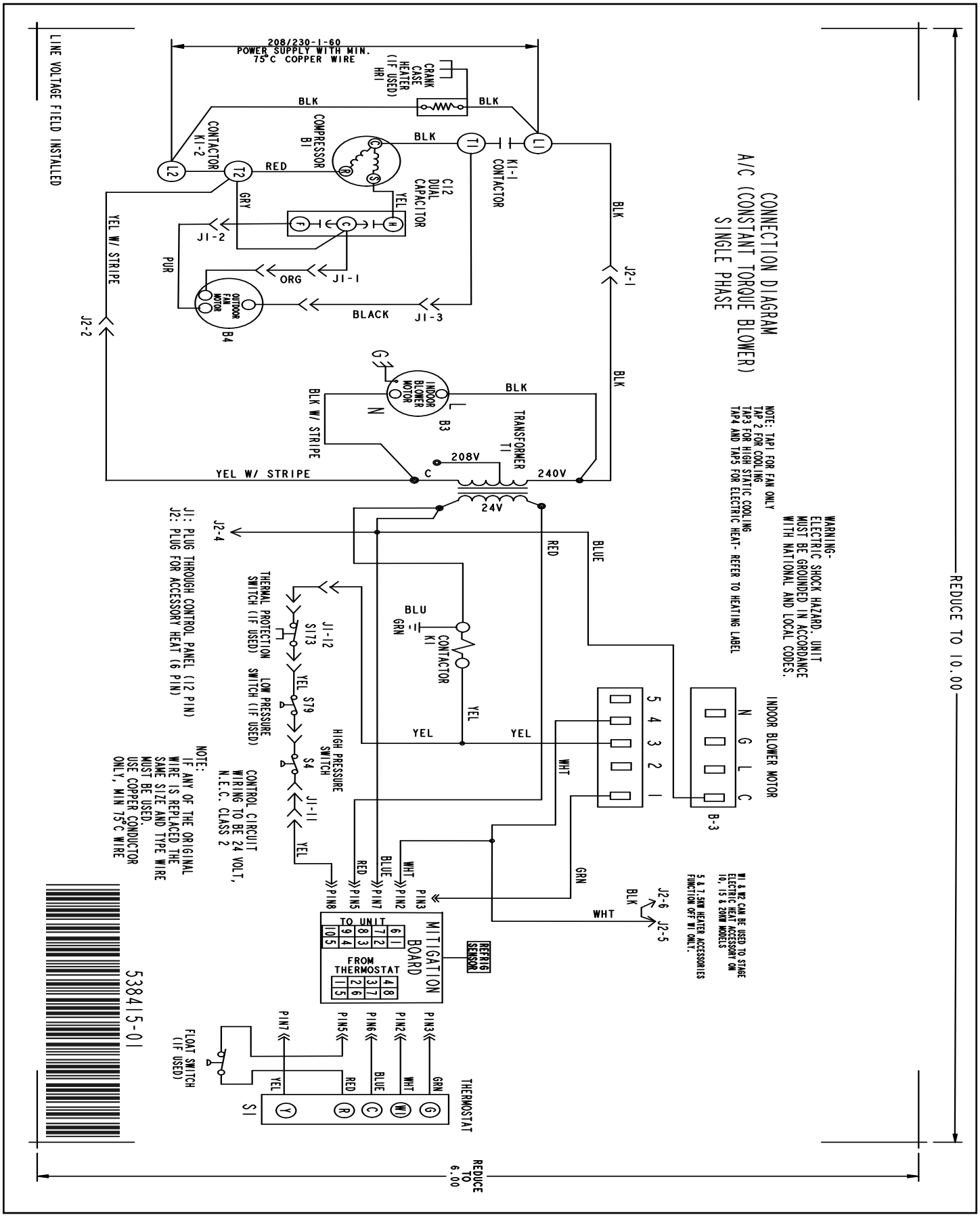


Figure 8. Connections Diagram - A/C Constant Torque

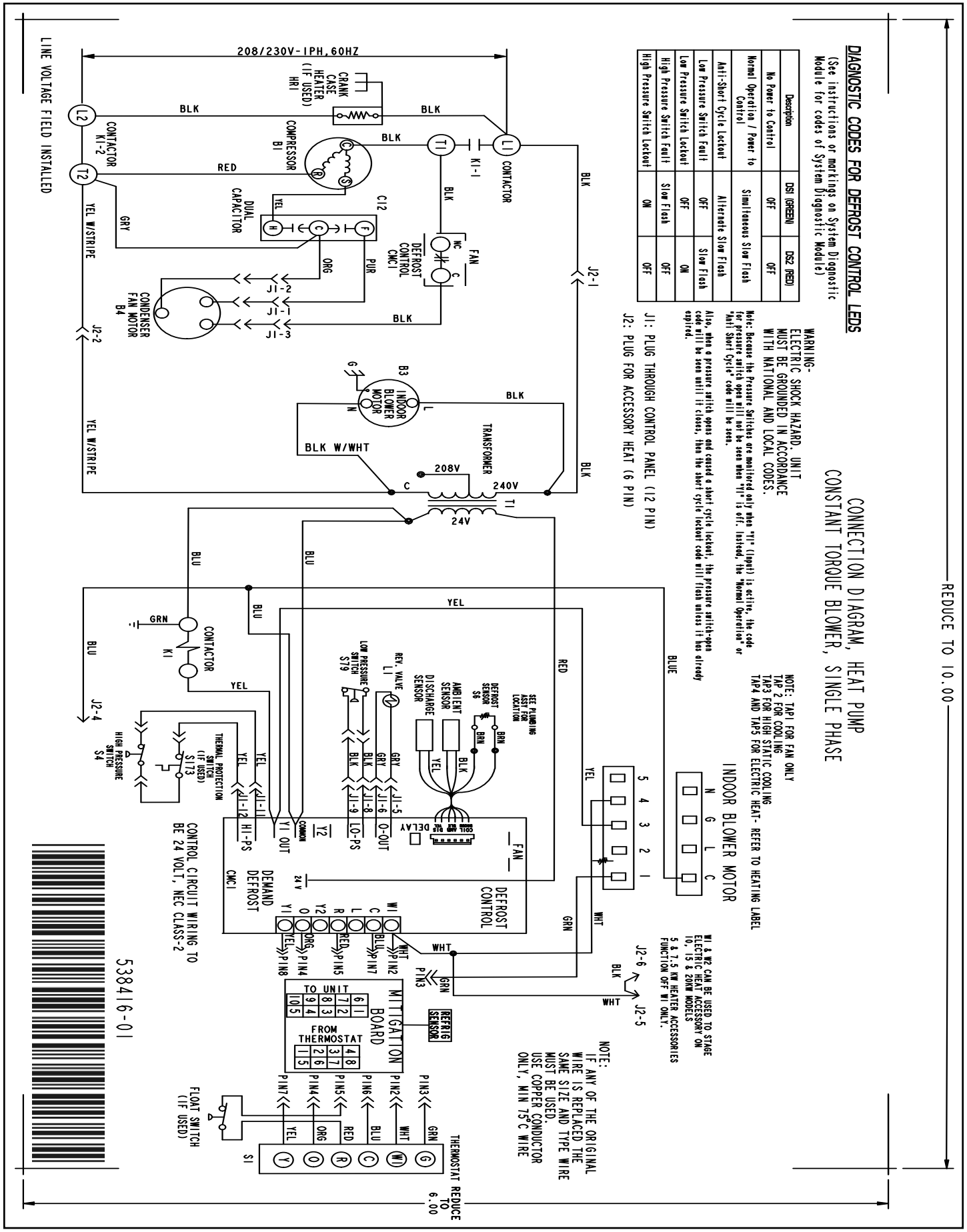
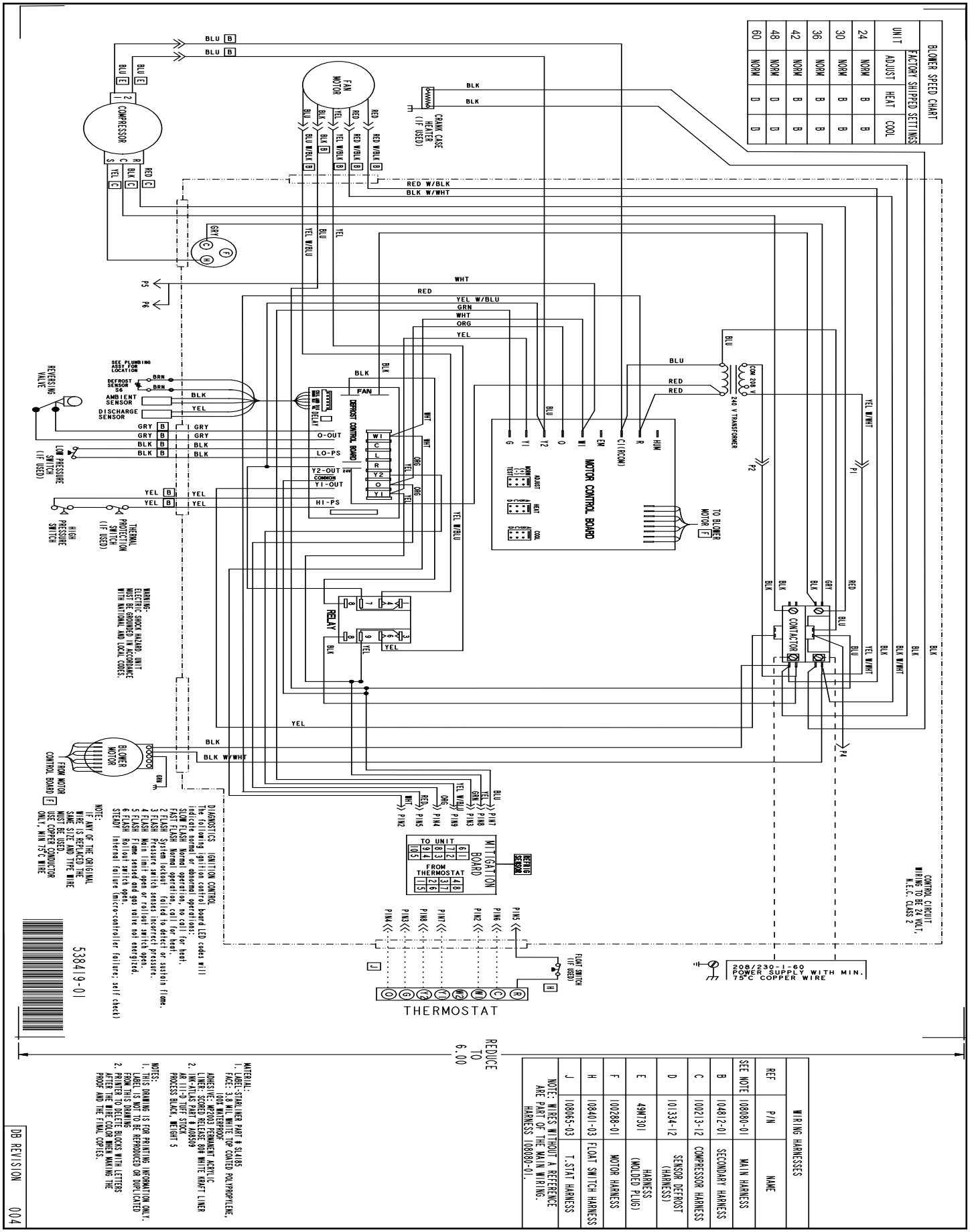


Figure 9. Connections Diagram - Heat Pump Constant Torque (2-ton)



WIRING HARNESSES		
REF	P/N	NAME
SEE NOTE	108080-01	MAIN HARNESS
B	104812-01	SECONDARY HARNESS
C	100213-12	COMPRESSOR HARNESS
D	101334-12	SENSOR DEFROST (HARNESS)
E	49M730	HARNESS (MOLDED PLUG)
F	100288-01	MOTOR HARNESS
H	108401-03	FLOAT SWITCH HARNESS
J	108065-03	T-STAT HARNESS

NOTE: WIRES WITHOUT A REFERENCE ARE PART OF THE MAIN WIRING HARNESS 108080-01.

Figure 10. Connections Diagram - Heat Pump Constant Torque (2.5 and 5-ton)

Decommissioning

Before carrying out this procedure, it is essential that the technician is completely familiar with the equipment and all its detail. It is recommended good practice that all refrigerants are recovered safely.

Prior to the task being carried out, an oil and refrigerant sample shall be taken in case analysis is required prior to re-use of recovered refrigerant. It is essential that electrical power is available before starting decommissioning.

a) Become familiar with the equipment and its operation.

b) Isolate system electrically.

c) Before attempting the procedure, ensure that:

- Mechanical handling equipment is available, if required, for handling refrigerant cylinders;
- All personal protective equipment is available and being used correctly;
- The recovery process is supervised at all times by a competent person;
- Recovery equipment and cylinders conform to the appropriate standards.

d) Pump down refrigerant system, if possible.

e) If a vacuum is not possible, make a manifold so that refrigerant can be removed from various parts of the system.

f) Make sure that cylinder is situated on the scales before recovery takes place.

g) Start the recovery machine and operate in accordance with instructions.

h) Do not overfill cylinders (no more than 80% volume liquid charge).

i) Do not exceed the maximum working pressure of the cylinder, even temporarily.

j) When the cylinders have been filled correctly and the process completed, make sure that the cylinders and the equipment are removed from site promptly and all isolation valves on the equipment are closed off.

k) Recovered refrigerant shall not be charged into another REFRIGERATING SYSTEM unless it has been cleaned and checked.

NOTE: Equipment shall be labelled stating that is has been decommissioned and emptied of refrigerant. The label shall be dated and signed. For appliances containing FLAMMABLE REFRIGERANTS, ensure that there are labels on the equipment stating the equipment contains FLAMMABLE REFRIGERANT.