SINGLE PACKAGE
HEAT PUMP/ELECTRIC
MODELS: PHE4 Series
(2-5 Ton)

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<U><U>SECTION I: GENERAL INFORMATION

PHE units are factory assembled heat pumps designed for outdoor installation on a roof top or a slab. Field-installed optional electric heater accessories are available to provide supplemental electric heat combined with electric cooling and heating.

The units are completely assembled on rigid, removable base rails. All piping, refrigerant charge, and electrical wiring is factory installed and tested. The units require only electric power condensate drain and duct connections at the point of installation.

SECTION II: SAFETY

This is a safety alert symbol. When you see this symbol on labels or in manuals, be alert to the potential for personal injury.

Understand and pay particular attention to the signal words DANGER, WARNING, or CAUTION.

DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION indicates a potentially hazardous situation, which, if not avoided, may result in minor or moderate injury. It is also used to alert against unsafe practices and hazards involving only property damage.

WARNING

Improper installation may create a condition where the operation of the product could cause personal injury or property damage.

Improper installation, adjustment, alteration, service or maintenance can cause injury or property damage. Failure to carefully read and follow all instructions in this manual can result in furnace malfunction, death, personal injury and/or property damage. Only a qualified contractor, installer or service agency should install this product.

CAUTION

This product must be installed in strict compliance with the installation instructions and any applicable local, state, and national codes including, but not limited to building, electrical, and mechanical codes.
Due to system pressure, moving parts, and electrical components, installation and servicing of air conditioning equipment can be hazardous. Only qualified, licensed service personnel should install, repair, or service this equipment. Unlicensed personnel can perform basic maintenance functions of cleaning coils and filters and replacing filters. Observe all precautions in the literature, labels, and tags accompanying the equipment whenever working on air conditioning equipment. Be sure to follow all other applicable safety precautions and codes including.

Wear safety glasses and work gloves. Use quenching cloth and have a fire extinguisher available during brazing operations.

**WARNING**

Before performing service or maintenance operations on unit, turn off main power switch to unit. Electrical shock could cause personal injury. 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, service agency or the gas supplier.

**CAUTION**

This system uses R-410A Refrigerant which operates at higher pressures than R-22. No other refrigerant may be used in this system. Gage sets, hoses, refrigerant containers and recovery systems must be designed to handle R-410A. If you are unsure, consult the equipment manufacturer. Failure to use R-410A compatible servicing equipment may result in property damage or injury.

**SECTION III: MODEL NUMBER NOMENCLATURE**

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<th>4</th>
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**1. Model Family**
PHE - packaged heat pump with electric heat,
PCG - packaged A/C with gas heat,
PHG - packaged heat pump with gas heat,
PCE - packaged A/C with electric heat

**2. Nominal Cooling Efficiency**
4 = 14 SEER, 6 = 16 SEER, etc.

**3. Cabinet Size**
A = small 35 x 51, B = large 45 x 51

**4. Nominal Air Conditioning Cooling Capacity BTUx1000**
24 = 24,000 BTU, etc.

**Examples:**
PHE4B4221A is a packaged heat pump, 14 SEER, 3-1/2 ton, large cabinet, 230 volt, single phase model, (first generation, first release).

**5. Gas Heating Input BTU/Hr x 1000**
050 = 50,000 BTU/Hr, input, blank = electric heat

**6. Voltage-Phase-Frequency**
2 = 208/230-1-60, 3=208/230-3-60, 4 = 460-3-60

**7. NOx Approval**
X = low-NOx, blank = not low-Nox

**8. Generation Level**
1 = first generation

**9. Revision Level**
A = original release, B = second release

**SECTION IV: INSTALLATION LIMITATIONS**

These units must be installed in accordance with the following national and local safety codes.

2. Local plumbing and waste water codes and other applicable local codes.

Refer to Tables 2-3 for unit physical data and to Table 5 for electrical data.

If components are to be added to a unit to meet local codes, they are to be installed at the dealer's and/or the customer's expense.

Size of unit for proposed installation should be based on heat loss/heat gain calculations made in accordance with industry recognized procedures such as the Air Conditioning Contractors of America (manual J).
FIGURE 1: Component Location

Table 1: Unit Limitations

<table>
<thead>
<tr>
<th>Model</th>
<th>Unit Voltage</th>
<th>Applied Voltage</th>
<th>Outdoor DB Temp</th>
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<tr>
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<td>208/230-1-60</td>
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<td>252</td>
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<tr>
<td>A24</td>
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<td></td>
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<tr>
<td>A30</td>
<td>208/230-1-60</td>
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<td>252</td>
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<tr>
<td>B36</td>
<td>208/230-1-60</td>
<td>187</td>
<td>252</td>
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<td>208/230-1-60</td>
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<td>252</td>
</tr>
<tr>
<td>B48</td>
<td>208/230-1-60</td>
<td>187</td>
<td>252</td>
</tr>
<tr>
<td>B60</td>
<td>208/230-1-60</td>
<td>187</td>
<td>252</td>
</tr>
</tbody>
</table>
LOCATION
Use the following guidelines to select a suitable location for these units:
1. Unit is designed for outdoor installation only.
2. Outdoor coils must have an unlimited supply of air. Where a choice of location is possible, position the unit on either north or east side of building.
3. Suitable for mounting on roof curb.

**WARNING**
Do not attach supply and return duct work to the bottom of the unit base pan as the drain pan could be compromised.

4. For ground level installation, a level pad or slab should be used. The thickness and size of the pad or slab used should meet local codes and unit weight. Do not tie the slab to the building foundation.
5. Roof structures must be able to support the weight of the unit and its options/accessories. Unit must be installed on a solid, level roof curb or appropriate angle iron frame.
6. Maintain level tolerance to 1/8" across the entire width and length of unit.

**WARNING**
Do not permit overhanging structures or shrubs to obstruct outdoor air discharge outlet.

CLEARANCES
All units require certain clearances for proper operation and service. Refer to Table 4 for the clearances required for construction, servicing and proper unit operation.

RIGGING AND HANDLING
Exercise care when moving the unit. Do not remove any packaging until the unit is near the place of installation. Rig the unit by attaching chain or cable slings to the lifting holes provided in the base rails. Spreader bars, whose length exceeds the largest dimension across the unit, MUST be used across the top of the unit.

**CAUTION**
Before lifting, make sure the unit weight is distributed equally on the rigging cables so it will lift evenly.
Units may be moved or lifted with a forklift. Slotted openings in the base rails are provided for this purpose.

**CAUTION**
If a unit is to be installed on a roof curb other than a Unitary Products roof curb, gasket or sealant must be applied to all surfaces that come in contact with the unit underside.

**CAUTION**
All panels must be secured in place when the unit is lifted. The outdoor coils should be protected from rigging cable damage with plywood or other suitable material.

Table 2: Weights and Dimensions

<table>
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<th>Model</th>
<th>Weight (lbs.)</th>
<th>Center of Gravity</th>
<th>4 Point Load Location (lbs.)</th>
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<td>Operating</td>
<td>X</td>
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<td>382</td>
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<td>397</td>
<td>392</td>
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<td>B36</td>
<td>453</td>
<td>448</td>
<td>29</td>
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<td>B42</td>
<td>476</td>
<td>471</td>
<td>30</td>
</tr>
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<td>B48</td>
<td>501</td>
<td>496</td>
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<td>B60</td>
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**Table 3: Unit Dimensions**

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<th>Model</th>
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<td>51-1/4</td>
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<td>A30</td>
<td>51-1/4</td>
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<tr>
<td>B36</td>
<td>51-1/4</td>
</tr>
<tr>
<td>B42</td>
<td>51-1/4</td>
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<td>51-1/4</td>
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<td>51-1/4</td>
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</table>

**Table 4: Unit Clearances**

<table>
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<th>Direction</th>
<th>Distance (in.)</th>
<th>Direction</th>
<th>Distance (in.)</th>
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<tr>
<td>Top</td>
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<td>36</td>
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<tr>
<td>Side Opposite Ducts</td>
<td>36</td>
<td>Left Side</td>
<td>24</td>
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<tr>
<td>Duct Panel</td>
<td>0</td>
<td>Bottom ^1, ^2</td>
<td>1</td>
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</table>

1. Minimum Clearance of 1 inch all sides of supply air duct for the first 3 foot of duct for 20 & 25 kW, zero inches there after. For all other heaters, zero inch clearance all sides for entire length of duct.
2. Units must be installed outdoors. Overhanging structure or shrubs should not obscure outdoor air discharge outlet.
3. Units may be installed on combustible floors made from wood or class A, B or C roof covering materials.

Note: For units applied with a roof curb, the minimum clearance may be reduced from 1 inch to 1/2 inch? between combustible roof curb material and this supply air duct.
These units are adaptable to downflow use as well as rear supply and return air duct openings. To convert to downflow, use the following steps:

1. Remove the duct covers found in the bottom return and supply air duct openings. There are four (4) screws securing each duct cover (save these screws to use in Step 2).

2. Install the duct covers (removed in step one) to the rear supply and return air duct openings. Secure with the four (4) screws used in step one.

3. Seal duct covers with silicone caulk.

Duct work should be designed and sized according to the methods of the Air Conditioning Contractors of America (ACCA), as set forth in their Manual D.

A closed return duct system shall be used. This shall not preclude use of economizers or ventilation air intake. Flexible duct connectors are recommended in the supply and return duct work to minimize the transmission of vibration and noise.

**CAUTION**

When fastening duct work to the side duct flanges on the unit, insert the screws through the duct flanges only. DO NOT insert the screws through the casing. Outdoor duct work must be insulated and waterproofed.

**NOTICE**

Be sure to note supply and return openings.

Refer to Figures 4 and 5 for information concerning rear and bottom supply and return air duct openings.

**FILTERS**

Proper filter size is very important. Filter size, type and pressure drop should always be considered during duct system design.

Single phase units are shipped without a filter or filter racks. It is the responsibility of the installer to secure a filter in the return air ductwork or install a Filter/Frame Kit.

A filter rack and high velocity filters are standard on three phase units.

Filters must always be used and must be kept clean. When filters become dirt laden, insufficient air will be delivered by the blower, decreasing your units efficiency and increasing operating costs and wear-and-tear on the unit and controls.

Filters should be checked monthly; this is especially important since this unit is used for both heating and cooling.

**CONDENSATE DRAIN**

A condensate trap must be installed in the condensate drain. The plumbing must conform to local codes.

Use Teflon tape or pipe thread compound if needed.

**CAUTION**

Hand tighten only.

**SERVICE ACCESS**

Access to all serviceable components is provided at the following locations:

- Coil guards
- Unit top panel
- Corner posts
- Blower access panel
- Control access panel
- Indoor coil access panel
- Compressor access panel
- Heat section access panel

Refer to Figure 3 for location of these access locations and minimum clearances in Table 4.
Refer to Figure 13 for the R-410A Quick Reference Guide.

**THERMOSTAT**
The room thermostat should be located on an inside wall approximately 60" above the floor where it will not be subject to drafts, sun exposure or heat from electrical fixtures or appliances. Sealant should be used behind thermostat to prevent air infiltration. Follow manufacturer’s instructions enclosed with the thermostat for general installation procedure. Color coded insulated wires (minimum #18 AWG) should be used to connect thermostat to unit. See Figure 6. Do not use power stealing thermostats.

**POWER AND CONTROL WIRING**
Field wiring to the unit must conform to provisions of the current N.E.C. ANSI/NFPA No. 70 or C.E.C. and/or local ordinances. The unit must be electrically grounded in accordance with local codes or, in their absence, with the N.E.C./C.E.C. Voltage tolerances which must be maintained at the compressor terminals during starting and running conditions are indicated on the unit Rating Plate and Table 1.

The wiring entering the cabinet must be provided with mechanical strain relief.

A fused disconnect switch should be field provided for the unit. If any of the wire supplied with the unit must be replaced, replacement wire must be of the type shown on the wiring diagram.

Electrical service must be sized properly to carry the load. Each unit must be wired with a separate branch circuit fed directly from the main distribution panel and properly fused.

Refer to Figures 6 and 7 for typical field wiring and to the appropriate unit wiring diagram for control circuit and power wiring information.

Unit comes wired for 230 volt power. If supply power is 208 volt, wires connected to the control transformer 230V tap must be moved to the 208V tap.

**CAUTION**
This system uses R-410A Refrigerant which operates at higher pressures than R-22. No other refrigerant may be used in this system. Gauge sets, hoses, refrigerant containers and recovery systems must be designed to handle R-410A. If you are unsure, consult the equipment manufacturer. Failure to use R-410A compatible servicing equipment may result in property damage or injury.

**WARNING**
Wear safety glasses and gloves when handling refrigerants. Failure to follow this warning can cause serious personal injury.

Refer to Figure 13 for the R-410A Quick Reference Guide.

** NOTICE**
In some horizontal applications, the service disconnects on the electric heat kits must be rotated 180° so the up position of the disconnect is the ON position. This service disconnect orientation change is required by UL1995, Article 26.19 (in reference to all circuit breakers).
### Table 5: Electrical Data - 208/230-1-60 - Single Source Power

**Single Point Connection Kit Required**

<table>
<thead>
<tr>
<th>Model</th>
<th>Compressor</th>
<th>OD Fan Motor</th>
<th>Blower Motor</th>
<th>Electric Heat Option</th>
<th>MCA (^1)</th>
<th>MOP (^2)</th>
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1. MCA = Minimum Circuit Ampacity.
2. MOP = Maximum Over Current Protection device; must be HACR type circuit breaker or time delay fuse.
Table 6: Electrical Data for 208-1-60 Multi Source Power

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<tr>
<th>Model</th>
<th>Compressor</th>
<th>OD Fan Motor</th>
<th>Blower Motor</th>
<th>Heater Motor</th>
<th>Electric Heat Option</th>
<th>Multi Source: Compressor Circuit and Heat Circuits</th>
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For notes, see Page 10.
### Table 6: Electrical Data for 208-1-60 Multi Source Power (Continued)

<table>
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<tr>
<th>Model</th>
<th>Compressor</th>
<th>OD Fan Motor</th>
<th>Blower Motor</th>
<th>Heater Kit</th>
<th>Electric Heat Option</th>
<th>Multi Source</th>
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<td></td>
<td>RLA</td>
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<td>MCC</td>
<td>FLA</td>
<td>FLA</td>
<td>Circuit #1 Compressor Circuit</td>
</tr>
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<td>Multi Source: Compressor Circuit and Heat Circuits</td>
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**Table 7: Electrical Data for 230-1-60 Multi Source Power**

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<th>Model</th>
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<th>Blower Motor</th>
<th>Heater Kit</th>
<th>Electric Heat Option</th>
<th>Multi Source</th>
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<td></td>
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For notes, see Page 11.
### Table 7: Electrical Data for 230-1-60 Multi Source Power

<table>
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<th>Electric Heat Option</th>
<th>Multi Source: Compressor Circuit and Heat Circuits</th>
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1. **MCA** = Minimum Circuit Ampacity.
2. **MOP** = Maximum Over Current Protection device; must be HACR type circuit breaker or time delay fuse.
SINGLE-POINT WIRING KITS

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<tr>
<th>Single Point Kit P/N</th>
<th>Unit Model Number</th>
<th>Breaker Size</th>
<th>Heat Kit</th>
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<td>PCE4A24</td>
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<td>PCE4A30</td>
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<td>up to 15 kW</td>
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<td>PCE4A36</td>
<td>30 Amp</td>
<td>up to 15 kW</td>
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<td>PHE4A24</td>
<td>25 Amp</td>
<td>up to 13 kW</td>
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<td>S1-2SPWK002</td>
<td>PHE4A30</td>
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</tr>
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<td>PCE4A42</td>
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</tr>
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<td>S1-2SPWK003</td>
<td>PHE4B42</td>
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</tr>
<tr>
<td>S1-2SPWK004</td>
<td>PCE4B48</td>
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<td>up to 20 kW</td>
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<td>S1-2SPWK004</td>
<td>PHE4B48</td>
<td>50 Amp</td>
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<td>S1-2SPWK005</td>
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<td>up to 20 kW</td>
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FOR USE WITH THE FOLLOWING HEATER KITS

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<th>kW 208/240</th>
<th>Volts 208/240</th>
<th>Amps 208/240</th>
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<td>8.7/10.0</td>
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<td>3.6/4.8</td>
<td>280/240</td>
<td>17.3/20.0</td>
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<td>5.76/7.68</td>
<td>280/240</td>
<td>27.7/32.0</td>
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<td>7.2/9.6</td>
<td>280/240</td>
<td>34.6/40.0</td>
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<td>89.2/80.0</td>
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NOTE:
For single circuit heater kits, remove the wires for the second circuit from the single-point block.

FIGURE 8: Single Point Wiring Kits
### Table 8: Physical Data

#### NOMINAL TONNAGE

<table>
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<th>MODELS</th>
<th>A24</th>
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<th>B42</th>
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#### AHRI Cooling Performance

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<tr>
<th>Gross Capacity @ AHRI A point (MBH)</th>
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<th>36.0</th>
<th>41.1</th>
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<th>58.1</th>
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<tr>
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<td>29.0</td>
<td>35.5</td>
<td>40.7</td>
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<td>EER</td>
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<td>1200</td>
<td>1400</td>
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<td>11-13</td>
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#### AHRI Heating Performance

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<tbody>
<tr>
<td>System Power (kW/COP)</td>
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#### Dimensions (inches)

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#### Compressors

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#### Outdoor Coil Data

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#### Indoor Coil Data

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#### Outdoor Fan Data

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<tr>
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<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
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<tr>
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<td>1/10</td>
<td>1/8</td>
<td>1/3</td>
<td>1/3</td>
<td>1/3</td>
<td>1/3</td>
</tr>
<tr>
<td>RPM</td>
<td>850</td>
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<td>850</td>
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#### Direct Drive Indoor Blower Data

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<th>11 x 8</th>
<th>11 x 10</th>
<th>11 x 10</th>
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<td>Centrifugal</td>
<td>Centrifugal</td>
<td>Centrifugal</td>
<td>Centrifugal</td>
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<tr>
<td>Motor HP each</td>
<td>1/2</td>
<td>1/2</td>
<td>1/2</td>
<td>3/4</td>
<td>3/4</td>
<td>1</td>
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<tr>
<td>RPM</td>
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<td>1200 Max</td>
<td>1200 Max</td>
<td>1200 Max</td>
<td>1200 Max</td>
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<tr>
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#### Filters

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<th>B</th>
<th>B</th>
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<tr>
<td>Quantity size</td>
<td>Field-supplied external filters must be sized so as not to exceed 300 fpm air velocity through disposable filters. For internal filter use, a filter rack kit is available. Consult the instructions supplied with that kit for replacement filter sizes. Filter sizes: A=20x20, B=20x30.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
COMPRESSORS
The compressor used in this product is specifically designed to operate with R-410A Refrigerant and cannot be interchanged.

CAUTION
This system uses R-410A Refrigerant which operates at higher pressures than R-22. No other refrigerant may be used in this system.

The compressor uses polyolester (POE oil), Mobile 3MA POE. This oil is extremely hygroscopic, meaning it absorbs water readily. POE oil can absorb 15 times as much water as other oils designed for HCFC and CFC refrigerants. If refrigerant circuit is opened, take all necessary precautions to avoid exposure of the oil to the atmosphere.

POE (polyolester) compressor lubricants are known to cause long term damage to some synthetic roofing materials.

CAUTION
Exposure, even if immediately cleaned up, may cause embrittlement (leading to cracking) to occur in one year or more. When performing any service that may risk exposure of compressor oil to the roof, take precautions to protect roofing.

Procedures which risk oil leakage include, but are not limited to, compressor replacement, repairing refrigerant leaks, replacing refrigerant components such as filter drier, pressure switch, metering device or coil.

Units are shipped with compressor mountings which are factory-adjusted and ready for operation.

CAUTION
Do not loosen compressor mounting bolts.

SECTION V: AIRFLOW PERFORMANCE
Table 9: Airflow - Side Duct Application

<table>
<thead>
<tr>
<th>Model</th>
<th>Motor Speed</th>
<th>0.1 SCFM</th>
<th>0.2 SCFM</th>
<th>0.3 SCFM</th>
<th>0.4 SCFM</th>
<th>0.5 SCFM</th>
<th>0.6 SCFM</th>
<th>0.7 SCFM</th>
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<tbody>
<tr>
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<td>791</td>
<td>739</td>
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<td>668</td>
<td>614</td>
<td>564</td>
<td>518</td>
<td>439</td>
</tr>
<tr>
<td></td>
<td>Low/Medium (2)</td>
<td>849</td>
<td>801</td>
<td>789</td>
<td>733</td>
<td>683</td>
<td>635</td>
<td>590</td>
<td>512</td>
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<td>Medium (3)</td>
<td>927</td>
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<td>871</td>
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<td>772</td>
<td>727</td>
<td>683</td>
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<td>899</td>
<td>855</td>
<td>812</td>
<td>769</td>
<td>696</td>
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<td>1133</td>
<td>1092</td>
<td>1052</td>
<td>1014</td>
<td>976</td>
<td>908</td>
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<td>887</td>
<td>836</td>
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1. Airflow tested with dry coil conditions, without air filters, at 230 volts.
2. Applications above 0.8” w.c. external static pressure are not recommended.
3. Brushless DC high efficiency standard ECM blower motor used for all indoor blower assemblies.
4. Minimal variations in airflow performance data results from operating at 208 volts. Data above may be used in those cases.
5. Heating applications tested at 0.50” w.c. esp, and cooling applications tested at 0.30” w.c. esp per standards.
Table 10: Airflow - Bottom Duct Application

<table>
<thead>
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<th>Model</th>
<th>Motor Speed</th>
<th>External Static Pressure (Inches WC)</th>
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<td>1789</td>
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<td>High (5)</td>
<td>2369</td>
</tr>
</tbody>
</table>

1. Airflow tested with dry coil conditions, without air filters, at 230 volts
2. Applications above 0.8” w.c. external static pressure are not recommended.
3. Brushless DC high efficiency standard ECM blower motor used for all indoor blower assemblies.
4. Minimal variations in airflow performance data results from operating at 208 volts. Data above may be used in those cases.
5. Heating applications tested at 0.50” w.c. esp, and cooling applications tested at 0.30” w.c.esp per standards.

Table 11: Electric Heat Minimum Supply Air

<table>
<thead>
<tr>
<th>Model</th>
<th>Voltage</th>
<th>Minimum Blower Speed for Electric Heat</th>
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<td></td>
<td></td>
<td>Heater kW</td>
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<tr>
<td></td>
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<td>2 5 8 10 13 15 18 20 25</td>
</tr>
<tr>
<td>A24</td>
<td>208/230-1-60</td>
<td>Low #1 Med. Low #2 Med. #3 Med. Hi #4</td>
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<td>A30</td>
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<td>Low #1 Low #1 Med. Low #2 Med. #3 High #5</td>
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<tr>
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<td>208/230-1-60</td>
<td>Low #1 Low #1 Low #1 Med. Low #2 Med. Low #2 Med. Low #2 Med. Hi #4</td>
</tr>
<tr>
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<td>208/230-1-60</td>
<td>Low #1 Low #1 Low #1 Low #1 Med. Low #2 Med. Hi #4 High #5</td>
</tr>
<tr>
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<td>208/230-1-60</td>
<td>Low #1 Low #1 Low #1 Low #1 Low #1 Med. Low #2 Med. Hi #4</td>
</tr>
<tr>
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<td>208/230-1-60</td>
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</table>

Table 12: Electric Heat Multipliers

<table>
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<tr>
<th>Voltage</th>
<th>kW Capacity Multipliers 1</th>
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<tr>
<td>Nominal</td>
<td>Applied</td>
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<td>240</td>
<td>0.75</td>
</tr>
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<td>230</td>
<td>0.92</td>
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</tbody>
</table>

1. Electric heaters are rated at nominal voltage. Use this table to determine the electric heat capacity for heaters applied at lower voltages.
### SECTION VI: OPERATION

The following sequences of operation are based on using a single-stage heat pump thermostat.

#### COOLING SEQUENCE OF OPERATION

1. When the fan switch on the thermostat is in the “ON” position, the 24 volts at “G” will bring on the indoor blower motor at the selected airflow. When the fan switch on the thermostat is in the “AUTO” position, the blower operates only when there is a call for cooling or heating by the thermostat.

2. On a call for cooling, the thermostat sends 24 volts to “Y” and “O” to the defrost control board. The reversing valve solenoid is energized, and after the antishort cycle period is complete contactor coil M is energized. Power is supplied to the compressor and outdoor fan motor, and the reversing valve switched to the cooling position. When the fan switch on the thermostat is in the “AUTO” position the indoor blower motor is energized at the YSPD airflow.

3. When the demand for cooling has been satisfied, the 24 volt “Y” signal is removed, and the M contactor is de-energized. When the fan switch on the thermostat is in the “AUTO” position, the indoor motor ramps down after a 60 second delay.

#### HEATING SEQUENCE OF OPERATION

1. When the fan switch on the thermostat is in the “ON” position, the 24 volts at “G” brings on the indoor blower motor at the GSPD. When the fan switch on the thermostat is in the “AUTO” position, the indoor motor ramps down after a 60 second delay.

2. On a call for heating, the thermostat sends 24 volts to “Y” on the defrost control board. After the anti-short cycle period is complete, the 24 volt signal energizes contactor coil M and power is supplied to the compressor and outdoor fan motor. The reversing valve remains in the heating position. When the fan switch on the thermostat is in the “AUTO” position, the indoor blower is energized at the YSPD.

3. For units equipped with supplementary electric heat, when the heat pump cannot meet the demand, the thermostat “W” sends 24 volts. This signal is sent through the defrost control terminals “W” to “Wout” an energizes the WSPD. The 24 volt signal energizes 1st stage of electric heat.

4. When the heating demand is satisfied, the electric heat is de-energized when the 24 volt “W” signal is removed, and the M contactor is de-energized when the 24 volt “Y” signal is removed. When the fan switch on the thermostat is in the “ON” position, the indoor blower continues to run. When the fan switch is in the “AUTO” position, the indoor blower motor ramps down after a 60 second delay.

Please refer to Table 13 for more information.

#### DEFROST OPERATION

The demand defrost control implements a temperature differential (“delta-T”) demand defrost algorithm. The heat pump is allowed to operate in the heating mode until the combination of outdoor ambient and outdoor coil temperatures indicate that defrosting is necessary. When coil temperature is below the initiate point for the ambient temperature continues for 4-1/2 minutes, the heat pump is put into a defrost cycle. This 4-1/2 minute timer eliminates unnecessary defrost cycles caused by refrigeration surges such as those that occur at the start of a heating cycle.

A timed inhibit feature prevents the system from responding to a call for defrost less than 40 minutes after the initiation of the previous defrost. After the 40 minute inhibit time has expired, temperature conditions must call for defrost continuously for 4-1/2 minutes before a defrost cycle is initiated. A temperature inhibit feature prohibits defrost if the coil temperature is above 40°F. A forced-defrost feature puts the system into a defrost period every 6 hours and 4 minutes of accumulated compressor run-time to recirculate lubricants, unless the coil temperature is above 40°F and the ambient temperature is above 50°F. All defrost timing occurs only while the compressor is on.

### Table 13: Additional Static Resistance

<table>
<thead>
<tr>
<th>Size (Tons)</th>
<th>CFM</th>
<th>Wet Indoor Coil</th>
<th>Economizer</th>
<th>Filter/Frame Kit</th>
</tr>
</thead>
<tbody>
<tr>
<td>24 (2.0)</td>
<td>500</td>
<td>0.01</td>
<td>0.00</td>
<td>0.01</td>
</tr>
<tr>
<td></td>
<td>600</td>
<td>0.01</td>
<td>0.00</td>
<td>0.02</td>
</tr>
<tr>
<td></td>
<td>700</td>
<td>0.01</td>
<td>0.00</td>
<td>0.04</td>
</tr>
<tr>
<td></td>
<td>800</td>
<td>0.02</td>
<td>0.01</td>
<td>0.06</td>
</tr>
<tr>
<td></td>
<td>900</td>
<td>0.03</td>
<td>0.01</td>
<td>0.08</td>
</tr>
<tr>
<td></td>
<td>1000</td>
<td>0.04</td>
<td>0.01</td>
<td>0.10</td>
</tr>
<tr>
<td></td>
<td>1100</td>
<td>0.05</td>
<td>0.01</td>
<td>0.13</td>
</tr>
<tr>
<td></td>
<td>1200</td>
<td>0.06</td>
<td>0.02</td>
<td>0.16</td>
</tr>
<tr>
<td>30 (2.5)</td>
<td>700</td>
<td>0.01</td>
<td>0.00</td>
<td>0.04</td>
</tr>
<tr>
<td></td>
<td>800</td>
<td>0.02</td>
<td>0.01</td>
<td>0.06</td>
</tr>
<tr>
<td></td>
<td>900</td>
<td>0.03</td>
<td>0.01</td>
<td>0.08</td>
</tr>
<tr>
<td></td>
<td>1000</td>
<td>0.04</td>
<td>0.01</td>
<td>0.10</td>
</tr>
<tr>
<td></td>
<td>1100</td>
<td>0.05</td>
<td>0.01</td>
<td>0.13</td>
</tr>
<tr>
<td></td>
<td>1200</td>
<td>0.06</td>
<td>0.02</td>
<td>0.16</td>
</tr>
<tr>
<td></td>
<td>1300</td>
<td>0.07</td>
<td>0.03</td>
<td>0.17</td>
</tr>
<tr>
<td>36 (3.0)</td>
<td>700</td>
<td>0.01</td>
<td>0.00</td>
<td>0.04</td>
</tr>
<tr>
<td></td>
<td>800</td>
<td>0.02</td>
<td>0.01</td>
<td>0.06</td>
</tr>
<tr>
<td></td>
<td>900</td>
<td>0.03</td>
<td>0.01</td>
<td>0.08</td>
</tr>
<tr>
<td></td>
<td>1000</td>
<td>0.04</td>
<td>0.01</td>
<td>0.10</td>
</tr>
<tr>
<td></td>
<td>1100</td>
<td>0.05</td>
<td>0.01</td>
<td>0.13</td>
</tr>
<tr>
<td></td>
<td>1200</td>
<td>0.06</td>
<td>0.02</td>
<td>0.16</td>
</tr>
<tr>
<td>42 (3.5)</td>
<td>1400</td>
<td>0.08</td>
<td>0.04</td>
<td>0.18</td>
</tr>
<tr>
<td></td>
<td>1500</td>
<td>0.06</td>
<td>0.04</td>
<td>0.06</td>
</tr>
<tr>
<td></td>
<td>1600</td>
<td>0.07</td>
<td>0.04</td>
<td>0.07</td>
</tr>
<tr>
<td></td>
<td>1700</td>
<td>0.07</td>
<td>0.04</td>
<td>0.08</td>
</tr>
<tr>
<td></td>
<td>1800</td>
<td>0.08</td>
<td>0.04</td>
<td>0.09</td>
</tr>
<tr>
<td></td>
<td>1900</td>
<td>0.09</td>
<td>0.05</td>
<td>0.10</td>
</tr>
<tr>
<td></td>
<td>2000</td>
<td>0.09</td>
<td>0.05</td>
<td>0.11</td>
</tr>
<tr>
<td>48 (4.0)</td>
<td>1100</td>
<td>0.02</td>
<td>0.02</td>
<td>0.04</td>
</tr>
<tr>
<td></td>
<td>1200</td>
<td>0.03</td>
<td>0.02</td>
<td>0.04</td>
</tr>
<tr>
<td></td>
<td>1300</td>
<td>0.04</td>
<td>0.02</td>
<td>0.05</td>
</tr>
<tr>
<td></td>
<td>1400</td>
<td>0.05</td>
<td>0.03</td>
<td>0.05</td>
</tr>
<tr>
<td></td>
<td>1500</td>
<td>0.06</td>
<td>0.04</td>
<td>0.06</td>
</tr>
<tr>
<td></td>
<td>1600</td>
<td>0.07</td>
<td>0.04</td>
<td>0.07</td>
</tr>
<tr>
<td></td>
<td>1700</td>
<td>0.07</td>
<td>0.04</td>
<td>0.08</td>
</tr>
<tr>
<td></td>
<td>1800</td>
<td>0.08</td>
<td>0.04</td>
<td>0.09</td>
</tr>
<tr>
<td></td>
<td>1900</td>
<td>0.09</td>
<td>0.05</td>
<td>0.10</td>
</tr>
<tr>
<td>60 (5.0)</td>
<td>2000</td>
<td>0.09</td>
<td>0.05</td>
<td>0.11</td>
</tr>
</tbody>
</table>

1. The pressure drop through the economizer is greater for 100% outdoor air than for 100% return air. If the resistance of the return air duct is less than 0.25 IWG, the unit will deliver less CFM during full economizer operation.

Filter pressure drop based on standard filter media tested at velocities not to exceed 300 ft/min.
During the defrost mode, the reversing valve is energized, the outdoor fan is de-energized, the compressor is energized, and the defrost control will provide a 24 volt signal from terminal “Wout” to energize electric heat stage 1, if the unit is so equipped.

For trouble shooting purposes, the defrost cycle can be manually initiated by shorting the “TEST” pins together for 5 seconds while “Y” is energized. After removing the short, defrost will terminate normally during the “TEST” mode.

### Table 14: Demand Defrost Selection

<table>
<thead>
<tr>
<th>Unit</th>
<th>Pin Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>036, 048, 060</td>
<td>1</td>
</tr>
<tr>
<td>024, 030</td>
<td>2</td>
</tr>
<tr>
<td>042</td>
<td>3</td>
</tr>
<tr>
<td>024 Thru 060</td>
<td>2</td>
</tr>
<tr>
<td>024 Thru 060</td>
<td>2</td>
</tr>
</tbody>
</table>

### Heat Pump Safety Switch Operation

The unit is equipped with a safety package. The refrigeration system will be protected against high refrigerant pressure and a loss of charge switch. If either of these safety switches open, the unit will be shut off for the 5 minute anti-short cycle time. Once this has expired, a six hour elapsed run timer begins. If a second opening of a safety switch occurs during this six hour period, the compressor will be locked out.

Resetting the lockout function is accomplished by:

1. Removing power from the control’s thermostat 1st stage (Y) input for longer than 2 seconds.
2. Removing power from “R” for more than 2 seconds.
3. Shorting the “TEST” pins together for more than 2 seconds while “Y” is energized.
4. Shorting the “TEST” pins together for more than 5 seconds while “Y” is de-energized.

### Table 15: Test Pins

<table>
<thead>
<tr>
<th>Test Pin Shorted</th>
<th>Y</th>
<th>no Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 2 sec</td>
<td>Bypass ASCD</td>
<td>Show error coder</td>
</tr>
<tr>
<td>&gt; 5 sec</td>
<td>Forced defrost</td>
<td>Clear error codes</td>
</tr>
</tbody>
</table>

### Table 16: Fault Codes

<table>
<thead>
<tr>
<th>Description</th>
<th>STATUS LED</th>
</tr>
</thead>
<tbody>
<tr>
<td>High pressure switch fault (not in lockout yet)</td>
<td>2 Flashes</td>
</tr>
<tr>
<td>System in high-pressure switch lockout (last mode of operation was normal compressor)</td>
<td>3 Flashes</td>
</tr>
<tr>
<td>System in high-pressure switch lockout (last mode of operation was defrost)</td>
<td>4 Flashes</td>
</tr>
<tr>
<td>System in loss of charge switch lockout (last mode of operation was normal compressor)</td>
<td>5 Flashes</td>
</tr>
<tr>
<td>Low Voltage (&lt;19.2VAC) preventing further relay outputs for &gt; 2 seconds</td>
<td>6 Flashes</td>
</tr>
<tr>
<td>Low Voltage (&lt;16VAC) stopped current relay outputs for &gt; 2 seconds</td>
<td>7 Flashes</td>
</tr>
<tr>
<td>Liquid Line sensor failure (Open or Shorted)</td>
<td>8 Flashes</td>
</tr>
<tr>
<td>Outdoor ambient sensor failure (Open or Shorted)</td>
<td>9 Flashes</td>
</tr>
<tr>
<td>Control Failure</td>
<td>10 Flashes</td>
</tr>
</tbody>
</table>
Electric Heat Limit Switch Operation

6HK single phase heat kits utilize a normally closed line voltage limit switch and a normally closed fusible link. If the fusible link opens, it must be replaced with the appropriate OEM part and the cause must be investigated and corrected.

Table 17: Thermostat Signals

<table>
<thead>
<tr>
<th>Signal</th>
<th>State</th>
<th>Board Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>G</td>
<td>ON</td>
<td>Indoor blower instant on</td>
</tr>
<tr>
<td>G</td>
<td>OFF</td>
<td>Indoor blower off after 60-second delay</td>
</tr>
<tr>
<td>W</td>
<td>ON</td>
<td>Indoor blower instant on</td>
</tr>
<tr>
<td>W</td>
<td>OFF</td>
<td>Electric heat stages on (if so equipped)</td>
</tr>
<tr>
<td>G &amp; W</td>
<td>ON</td>
<td>Indoor blower instant on in heating speed</td>
</tr>
<tr>
<td>G &amp; W</td>
<td>OFF</td>
<td>Electric heat stages on (if so equipped)</td>
</tr>
<tr>
<td>G &amp; Y</td>
<td>ON</td>
<td>Outdoor fan instant on</td>
</tr>
<tr>
<td>G &amp; Y</td>
<td>OFF</td>
<td>Indoor blower instant on in cooling speed</td>
</tr>
<tr>
<td>Y &amp; O</td>
<td>ON</td>
<td>Compressor on (after any anti-short cycle delay)</td>
</tr>
<tr>
<td>Y &amp; O</td>
<td>OFF</td>
<td>System operates in heat pump heating mode</td>
</tr>
<tr>
<td>G &amp; Y &amp; O</td>
<td>ON</td>
<td>Outdoor fan instant on</td>
</tr>
<tr>
<td>G &amp; Y &amp; O</td>
<td>OFF</td>
<td>Indoor blower instant on in cooling speed</td>
</tr>
</tbody>
</table>

* Motor program has 60 second blower off delay on all 5 speed taps.

STARTUP

1. Check the electrical supply voltage being supplied. Be sure that it is within the specified range on the unit data plate.
2. Make sure all electrical connections are tight.
3. If unit is connected to 208 volt supply power, the control transformer must be wired accordingly.
4. Turn unit electrical power on.
5. Set the room thermostat to COOL mode and lower the desired temperature setting lower than the room temperature to create a call for cooling.
6. Measure the total system duct static and set the blower motor cooling speed appropriately per airflow performance tables.
7. If an optional electric heat kit was installed make sure the minimum blower speed required per Table 10 is set.
8. Make sure all units panels are in place and secured, and that an air filter is installed.

EXTERNAL STATIC PRESSURE SETUP

To measure external static pressure:
- Measure the supply air static pressure
- Record this positive number
- Measure the return air static pressure
- Record this negative number
- Treat the negative number as a positive and add the two numbers together
- This is total system static

FIGURE 10: Measuring External Static Pressure
SECTION VII: MAINTENANCE
NORMAL MAINTENANCE

**WARNING**
Prior to any of the following maintenance procedures, shut off all power to the unit, to avoid personal injury.

Periodic maintenance consists of changing or cleaning filters and general cleaning of the outdoor coil.
FILTERS - Inspect once a month. Replace Disposable or clean Permanent Type as necessary. DO NOT replace Permanent Type with Disposable.
MOTORS - Indoor and outdoor fan motors are permanently lubricated and require no maintenance.
OUTDOOR COIL - Dirt 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. If water is used to clean the coil, be sure that the power to the unit is shut off prior to cleaning.

**NOTICE**
DO NOT use a pressure washer as coil fin damage will occur.

**WARNING**
Exercise care when cleaning the coil so that the coil fins are not damaged. Do not permit the hot outdoor air discharge to be obstructed by overhanging structures or shrubs.

**TROUBLESHOOTING**

**WARNING**
Troubleshooting of components necessarily requires opening the electrical control box with the power connected to the unit. Use extreme care when working with live circuit! Check the unit nameplate for the correct range before making any connections with line terminals.

**CAUTION**
The wire number or color and terminal designations referred to may vary. Check the wiring label inside the control box access panel for the correct wiring.
SECTION VIII: TYPICAL WIRING DIAGRAMS

HEAT PUMP WITH OR WITHOUT ELECTRIC HEAT
208/230-1-60

CONNECTION WIRING DIAGRAM

Demand Defrost Fault Codes

<table>
<thead>
<tr>
<th>Flashes</th>
<th>Fault Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>LAMP OFF</td>
<td>NO POWER TO THE CONTROL</td>
</tr>
<tr>
<td>STEADY RED</td>
<td>COMP. OPERATION ACTIVE - COMP. CONTACTOR ENERGIZED</td>
</tr>
<tr>
<td>SLOW RED</td>
<td>CONTROL NORMAL OPERATION - NO CALL FOR COMPRESSOR</td>
</tr>
<tr>
<td>RAPID RED</td>
<td>CONTROL NORMAL OPERATION - ASCD (ANTI SHORT CYCLE DELAY) ACTIVE</td>
</tr>
<tr>
<td>2 RED FLASHES</td>
<td>HIGH-PRESSURE SWITCH FAULT [NOT IN LOCKOUT YET]</td>
</tr>
<tr>
<td>3 RED FLASHES</td>
<td>SYSTEM IN HIGH-PRESSURE SWITCH LOCKOUT [LAST MODE OF OPERATION WAS NORMAL COMPRESSOR]</td>
</tr>
<tr>
<td>4 RED FLASHES</td>
<td>SYSTEM IN LOW-PRESSURE SWITCH LOCKOUT [LAST MODE OF OPERATION WAS NORMAL COMPRESSOR]</td>
</tr>
<tr>
<td>5 RED FLASHES</td>
<td>SYSTEM IN LOW-PRESSURE SWITCH LOCKOUT [LAST MODE OF OPERATION WAS NORMAL COMPRESSOR]</td>
</tr>
<tr>
<td>6 RED FLASHES</td>
<td>LOW VOLTAGE (&lt;19.2 VAC) PREVENTING FURTHER RELAY OUTPUTS FOR &gt; 2 SECONDS</td>
</tr>
<tr>
<td>7 RED FLASHES</td>
<td>LOW VOLTAGE (&lt;16 VAC) STOPPED CURRENT RELAY OUTPUTS FOR &gt; 2 SECONDS</td>
</tr>
<tr>
<td>8 RED FLASHES</td>
<td>LIQUID LINE SENSOR FAILURE [OPEN OR SHORTED]</td>
</tr>
<tr>
<td>9 RED FLASHES</td>
<td>OUTDOOR AMBIENT SENSOR FAILURE [OPEN OR SHORTED]</td>
</tr>
<tr>
<td>10 RED FLASHES</td>
<td>CONTROL FAILURE</td>
</tr>
</tbody>
</table>

NOTES:

1. ALL FIELD WIRING TO BE ACCOMPLISHED FOLLOWING CITY, LOCAL AND/OR NATIONAL CODES IN EFFECT AT THE TIME OF INSTALLATION OF THE UNIT.
2. CAUTION: LABEL ALL WIRES PRIOR TO DISCONNECTION WHEN SERVICING CONTROLS. WIRING ERRORS CAN CAUSE IMPROPER AND DANGEROUS OPERATION. IF ANY OF THE WIRING, AS SUPPLIED WITH THE UNIT, MUST BE REMOVED, IT MUST BE REPLACED WITH TYPE 105 C. 600 VOLT WIRE OR EQUIVALENT CLEARLY RENUMBERED FOR IDENTIFICATION.
3. FACTORY WIRED FOR 230 VOLT SUPPLY POWER. FOR 208 VOLT, MOVE BLACK WIRES FROM THE 230 TO THE 208 VOLT TAP ON THE TRANSFORMER.
4. MOTORS ARE INHERENTLY PROTECTED.
5. SEE UNIT NAMEPLATE FOR MAXIMUM FUSE AND/OR CIRCUIT BREAKER SIZE AND MINIMUM CIRCUIT AMPACITY.
6. SELECT COOLING (YELLOW) BLOWER SPEED THAT WILL DELIVER APPROXIMATELY 400 CFM/TON FOR COOLING AND HEAT PUMP OPERATION.
7. IF ELECTRIC HEATING IS INSTALLED, SELECT A HEATING (WHITE/GRAY) BLOWER SPEED THAT DELIVERS SUFFICIENT AIRFLOW FOR THE AMOUNT (KW) OF HEAT INSTALLED. SEE TABLE IN INSTALLATION INSTRUCTIONS.
8. BLOWER MOTOR SPEED CONNECTIONS SHOWN ARE TYPICAL, BUT MAY VARY BY MODEL AND APPLICATION.

FIGURE 11: Connection Wiring Diagram
1. ALL FIELD WIRING TO BE ACCOMPLISHED FOLLOWING CITY, LOCAL AND/OR NATIONAL CODES IN EFFECT AT THE TIME OF INSTALLATION OF THE UNIT.

2. CAUTION: LABEL ALL WIRES PRIOR TO DISCONNECTION WHEN SERVICING CONTROLS. WIRING ERRORS CAN CAUSE IMPROPER AND DANGEROUS OPERATION. IF ANY OF THE WIRING, AS SUPPLIED WITH THE UNIT, MUST BE REMOVED, IT MUST BE REPLACED WITH TYPE 105 C. 600 VOLT WIRE OR EQUIVALENT CLEARLY RENUMBERED FOR IDENTIFICATION. VERIFY PROPER OPERATION AFTER SERVICING.

3. FACTORY WIRED FOR 230 VOLT SUPPLY POWER. FOR 208 VOLT, MOVE BLACK WIRES FROM THE 230 TO THE 208 VOLT TAP ON THE TRANSFORMER.

4. MOTORS ARE INHERENTLY PROTECTED.

5. SEE UNIT NAMEPLATE FOR MAXIMUM FUSE AND/OR CIRCUIT BREAKER SIZE AND MINIMUM CIRCUIT AMPACITY.

6. SELECT COOLING (YELLOW) BLOWER SPEED THAT WILL DELIVER APPROXIMATELY 400 CFM/TON FOR COOLING AND HEAT PUMP OPERATION.

7. IF ELECTRIC HEATING IS INSTALLED, SELECT A HEATING (WHITE/GRAY) BLOWER SPEED THAT DELIVERS SUFFICIENT AIRFLOW FOR THE AMOUNT (KW) OF HEAT INSTALLED. SEE TABLE IN INSTALLATION INSTRUCTIONS.

8. BLOWER MOTOR SPEED CONNECTIONS SHOWN ARE TYPICAL, BUT MAY VARY BY MODEL AND APPLICATION.

NOTES:

FIGURE 12: Ladder Wiring Diagram
R-410A QUICK REFERENCE GUIDE

Refer to Installation Instructions for specific installation requirements

- R-410A refrigerant operates at 50 - 70 percent higher pressures than R-22. Be sure that servicing equipment and replacement components are designed to operate with R-410A.
- R-410A refrigerant cylinders are rose colored.
- Recovery cylinder service pressure rating must be 400 psig, DOT 4BA400, or DOT BW400.
- Recovery equipment must be rated for R-410A.
- **DO NOT** use R-410A service equipment on R-22 systems. All hoses, gages, recovery cylinders, charging cylinders and recovery equipment must be dedicated for use on R-410A systems only.
- Manifold sets must be at least 700 psig high side, and 180 psig low side, with 550 psig retard.
- All hoses must have a service pressure rating of 800 psig.
- Leak detectors must be designed to detect HFC refrigerants.
- Systems must be charged with liquid refrigerant. Use a commercial type metering device in the manifold hose.
- R-410A can only be used with POE type oils.
- POE type oils rapidly absorb moisture from the atmosphere.
- Vacuum pumps will **not** remove moisture from R-410A refrigerant oils.
- **Do not** use liquid line driers with a rated working pressure rating less than 600 psig.
- **Do not** install suction line driers in the liquid line.
- A liquid line drier is required on every unit.
- **Do not** use a R-22 TXV. If a TXV is to be used, it must be a R-410A TXV.
- Never open system to atmosphere when under a vacuum.
- If system must be opened for service, evacuate system then break the vacuum with dry nitrogen and replace all filter driers.

**FIGURE 13:** R-410A Quick Reference Guide
SECTION IX: START UP SHEET

Residential Package Unit Heat Pump
with Electric Heat Start-Up Sheet

Proper start-up is critical to customer comfort and equipment longevity

<table>
<thead>
<tr>
<th>Start-Up Date</th>
<th>Company Name</th>
<th>Start-Up Technician</th>
</tr>
</thead>
</table>

Owner Information

<table>
<thead>
<tr>
<th>Name</th>
<th>Address</th>
<th>Daytime Phone</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>City</th>
<th>State or Province</th>
<th>Zip or Postal Code</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

Equipment Data

<table>
<thead>
<tr>
<th>Unit Model #</th>
<th>Unit Serial #</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

General Information (Check all that apply)

- Residential
- Commercial
- New Construction
- Retrofit
- Roof level
- Grade level
- Down flow
- Side flow

Unit Location and Connections (Check all that apply)

- Unit is level and installed on:  
  - Slab
  - Roof curb
- Duct connections are complete:  
  - Supply
  - Return
- Condensate drain properly connected per the installation instructions
- Condensate trap has been primed with water

Filters

- Filters installed
- Number of filters
- Filter size
- Filter located inside
- Filter located outside

Additional Kits & Accessories Installed (Check all that apply)

- Refrigerant safety kit
- Low ambient kit
- Anti-recycle timer
- Crank case heater
- Filter frame kit
- Transformer kit
- Economizer
- Roof curb kit
- Burglar bar kit
- Hail guard kit
- Manual fresh air damper kit
- Motorized fresh air damper kit

Electrical Connections & Inspection (Check all that apply)

- Single phase
- Three phase
- 208 volts AC
- 230 volt AC
- 460 volts AC
- 575 volts AC
- Inspect wires and electrical connections
- Transformer wired properly for primary supply voltage
- Ground connected
- Low voltage present at control board "R & C"
- Measured voltage "R" and "C" outdoor unit control board
- Line voltage present at disconnect
- Measured voltage "L1 to L2"
- "L2 to L3"
- "L1 to L3"
- Compressor amperes "L1"
- "L2"
- "L3"
- Total amperes "L1"
- "L2"
- "L3"
- Single stage compressor
- Two stage compressor

Air Flow Setup

<table>
<thead>
<tr>
<th>Blower Type &amp; Set-Up</th>
<th>Premium ECM</th>
<th>ADJUST</th>
<th>DELAY</th>
<th>HEAT</th>
<th>Standard ECM</th>
<th>PSC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>COOL A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>1</td>
<td>Low</td>
</tr>
</tbody>
</table>

|               | A           | B       | C     | D   | Low          | Medium Low | Medium | Medium High | High |

<table>
<thead>
<tr>
<th>Supply static (inches of water column)</th>
<th>Supply air dry bulb temperature</th>
<th>Outside air dry bulb temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Return static (inches of water column)</td>
<td>Return air dry bulb temperature</td>
<td>Return air wet bulb temperature</td>
</tr>
<tr>
<td>Total external static pressure</td>
<td>Temperature drop</td>
<td>Supply air wet bulb temperature</td>
</tr>
</tbody>
</table>
### Refrigerant Charge and Metering Device

- R-410A
- R-22
- TXV
- Fixed Orifice
- TXV# / Orifice size

<table>
<thead>
<tr>
<th>Data plate - lbs / Oz</th>
<th>Suction line temperature</th>
<th>Discharge pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Discharge line temperature</th>
<th>Suction pressure</th>
<th>Liquid line temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Superheat</th>
<th>Subcooling</th>
</tr>
</thead>
<tbody>
<tr>
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</tbody>
</table>

### Electric Heat (Supplemental and Emergency Heat)

<table>
<thead>
<tr>
<th>Electric heat kit - Model number</th>
<th>Serial number</th>
<th>Rated KW</th>
</tr>
</thead>
<tbody>
<tr>
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</table>

- Single Phase
- Three Phase

<table>
<thead>
<tr>
<th>Measured Amperage</th>
<th>Heater 1</th>
<th>Heater 2</th>
<th>Heater 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Measured Voltage</th>
<th>Heater 1</th>
<th>Heater 2</th>
<th>Heater 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Number of elements</th>
<th>Heating return air dry bulb temperature</th>
<th>Heating supply air dry bulb temperature</th>
<th>Air temperature rise</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

### Clean Up Job Site

- Job site has been cleaned, indoor and outdoor debris removed from job site
- Tools have been removed from unit
- All panels have been installed

### Unit Operation and Cycle Test

- Operate the unit through continuous fan cycles from the thermostat, noting and correcting any problems
- Operate the unit through cooling cycles from the thermostat, noting and correcting any problems
- Operate the unit through mechanical heating cycles from the thermostat, noting and correcting any problems
- Operate the unit through emergency heating cycles from the thermostat, noting and correcting any problems

### Owner Education

- Provide owner with the owner's manual
- Explain operation of system to equipment owner
- Explain thermostat use and programming (if applicable) to owner
- Explain the importance of regular filter replacement and equipment maintenance

### Comments and Additional Job Details

...