Installation Information

Water Piping Connections
Desuperheater Connections
Electrical
Startup Procedures
Troubleshooting
Preventive Maintenance
Model Nomenclature

<table>
<thead>
<tr>
<th>Family</th>
<th>Unit Capacity</th>
<th>Discharge Air Configuration</th>
<th>Return Air Configuration</th>
<th>Voltage</th>
<th>Hot Water Option</th>
<th>Non-Standard Option Details</th>
<th>Non-Standard Options</th>
<th>Filter Options</th>
<th>Coax Options</th>
<th>Blower Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>MBTUH</td>
<td>T = Top Discharge Vertical</td>
<td>L = Left</td>
<td>0</td>
<td>0 = None</td>
<td>Vintage</td>
<td>S = Standard</td>
<td>D = 1&quot; Pleated Disposable</td>
<td>C = Copper</td>
<td>0 = PSC Blower</td>
</tr>
<tr>
<td></td>
<td></td>
<td>E = End Discharge Horizontal</td>
<td>R = Right</td>
<td>1</td>
<td>1 = Hot Water Generation</td>
<td></td>
<td>4 = FX10*</td>
<td></td>
<td>N = Cupronickel</td>
<td>1 = ECM Blower</td>
</tr>
<tr>
<td></td>
<td></td>
<td>S = Side Discharge Horizontal</td>
<td></td>
<td>2</td>
<td>2 = Hot Water Generation</td>
<td></td>
<td>5 = FX10 w/Open N2 Com. Card*</td>
<td></td>
<td></td>
<td>2 = Oversized ECM Blower Option</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Non-Standard Options Details</td>
<td>6 = FX10 w/LonWorks Com. Card*</td>
<td></td>
<td></td>
<td>(040-046 Only)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7 = FX10 w/BacNet Com. Card*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: * FX10 available only on units with PSC blowers without desuperheaters.
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General Installation Information

WARNING: Before performing service or maintenance operations on a system, turn off main power switches to the indoor unit. If applicable, turn off the accessory heater power switch. Electrical shock could cause personal injury.

Safety Considerations
Installing and servicing heating and air conditioning equipment can be hazardous due to system pressure and electrical components. Only trained and qualified service personnel should install, repair or service heating and air conditioning equipment.

Untrained personnel can perform the basic maintenance functions of cleaning coils and cleaning and replacing filters. All other operations should be performed by trained service personnel. When working on heating and air conditioning equipment, observe precautions in the literature, tags and labels attached to the unit and other safety precautions that may apply.

Follow all safety codes. Wear safety glasses and work gloves. Use a quenching cloth for brazing operations and have a fire extinguisher available.

Moving and Storage
Move units in the normal “up” orientation as indicated by the arrows on each carton. Horizontal units may be moved and stored per the information on the carton. Do not stack more than three units in total height. Vertical units may be stored one upon another to a maximum height of two units. Do not attempt to move units while stacked.

When the equipment is received, all items should be carefully checked against the bill of lading to be sure all crates and cartons have been received. Examine units for shipping damage, removing the units from the cartons if necessary. Units in question should also be internally inspected. If any damage is noted, the carrier should make the proper notation on the delivery receipt, acknowledging the damage. Units are to be stored in clean, dry location to prevent damage.

Unit Location
Locate the unit in an indoor area that allows for easy removal of the filter and access panels. Location should have enough space for service personnel to perform maintenance or repair. Provide sufficient room to make water, electrical and duct connection(s). If the unit is located in a confined space, such as a closet, provisions must be made for return air to freely enter the space by means of a louvered door, etc. Any access panel screws that would be difficult to remove after the unit is installed should be removed prior to setting the unit. On horizontal units, allow adequate room below the unit for a condensate drain trap and do not locate the unit above supply piping. Care should be taken when units are located in unconditioned spaces to prevent damage from frozen water lines and excessive heat that could damage electrical components.

Installing Vertical Units
Vertical units are available in left or right air return configurations. Vertical units should be mounted level on a vibration absorbing pad slightly larger than the base to provide isolation between the unit and the floor. It is not necessary to anchor the unit to the floor (see right). If access to the left side of the unit will be limited after installation, remove the two mounting screws on the left side of the control box before setting the unit (leave the two front mounting screws intact). This will allow the control box to be removed with only the two front mounting screws for future service.

Figure 1: Vertical Unit Mounting

Vibration Absorbing Mesh or Air Pad
Installing Horizontal Units

Horizontal units are available with side or end discharge and may be field converted from one to the other by replacing the discharge panel with a new panel which must be ordered separately. Horizontal units are normally suspended from a ceiling by four or six 3/8-inch diameter threaded rods. The rods are usually attached to the unit by hanger bracket kits furnished with each unit.

Lay out the threaded rods per the dimensions in Figure 3. Assemble the hangers to the unit as shown. Securely tighten the brackets to the unit using the weld nuts located on the underside of the bottom panel. When attaching the hanger rods to the bracket, a double nut is required since vibration could loosen a single nut. To allow filter access, one bracket on the filter side should be installed 180° from the position shown in the figure below. The unit should be pitched approximately 1/4-inch towards the drain in both directions to facilitate the removal of condensate. Use only the bolts provided in the kit. The use of longer bolts could damage internal parts.

Some residential applications require the installation of horizontal units on an attic floor. In this case, the unit should be set in a full size secondary drain pan on top of a vibration absorbing mesh. The secondary drain pan prevents possible condensate overflow or water leakage damage to the ceiling. The secondary drain pan is usually placed on a plywood base isolated from the ceiling.

Figure 2: Typical Horizontal Unit Installation

**CAUTION:** Do not use rods smaller than 3/8-inch diameter since they may not be strong enough to support the unit. The rods must be securely anchored to the ceiling.

Figure 3: Hanger Location and Assembly

### Table: Model Dimensions

<table>
<thead>
<tr>
<th>MODEL</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>P010, 013</td>
<td>24.8</td>
<td>42.5</td>
<td>22.5</td>
<td>44.0</td>
<td>–</td>
</tr>
<tr>
<td>P019</td>
<td>24.8</td>
<td>51.5</td>
<td>22.5</td>
<td>53.0</td>
<td>–</td>
</tr>
<tr>
<td>P022, 028, 034</td>
<td>24.8</td>
<td>61.5</td>
<td>22.5</td>
<td>63.0</td>
<td>–</td>
</tr>
<tr>
<td>P040, 046</td>
<td>27.8</td>
<td>70.5</td>
<td>25.5</td>
<td>72.0</td>
<td>29.9</td>
</tr>
<tr>
<td>P056</td>
<td>27.8</td>
<td>75.5</td>
<td>25.5</td>
<td>77.0</td>
<td>29.9</td>
</tr>
<tr>
<td>P066</td>
<td>27.8</td>
<td>80.5</td>
<td>25.5</td>
<td>82.0</td>
<td>29.9</td>
</tr>
</tbody>
</table>

P010-034, 4 hangers included
P040-066, 6 hangers included
**Duct System**

An air outlet collar is provided on vertical top flow units and all horizontal units to facilitate a duct connection. A flexible connector is recommended for discharge and return air duct connections on metal duct systems. Uninsulated duct should be insulated with a minimum of 1-inch duct insulation. Application of the unit to uninsulated ductwork in an unconditioned space is not recommended as the unit’s performance will be adversely affected.

If the unit is connected to existing ductwork, check the duct system to ensure that it has the capacity to accommodate the air required for the unit application. If the duct is too small, as in the replacement of heating only systems, larger ductwork should be installed. All existing ductwork should be checked for leaks and repaired if necessary.

The duct system should be sized to handle the design airflow quietly and efficiently. To maximize sound attenuation of the unit blower, the supply and return plenums should include an internal duct liner of fiberglass or constructed of ductboard for the first 10 feet. On systems employing a sheet metal duct system, canvas connectors should be used between the unit and the ductwork. If air noise or excessive airflow is a problem, the blower speed can be changed (refer to pages 16-17).

![CAUTION: Be sure to remove the shipping material from the blower discharge before connecting ductwork.](image)

**Water Piping**

The proper water flow must be provided to each unit whenever the unit operates. To assure proper flow, use pressure/temperature ports to determine the flow rate. These ports should be located adjacent to the supply and return water connections on the unit. The proper flow rate cannot be accurately set without measuring the water pressure drop through the refrigerant-to-water heat exchanger.

All source water connections on residential units are swivel fittings that accept a 1-inch male pipe thread (MPT). The swivel connector has a rubber gasket seal similar to a rubber hose gasket, which when mated to the flush end of any 1-inch threaded pipe provides a leak-free seal without the need for thread sealing tape or compound. Check to ensure that the rubber seal is in the swivel connector prior to attempting any connection. The rubber seals are shipped attached to the water-line. To make the connection to a ground loop system, mate the brass connector (supplied in CK4L and CK3L connector kit) against the rubber gasket in the swivel connector and thread the female locking ring onto the pipe threads, while maintaining the brass connector in the desired direction. Tighten the connectors by hand, then gently snug the fitting with pliers to provide a leak-proof joint. When connecting to an open loop (ground water) system, thread any 1-inch MPT fitting (SCH80 PVC or copper) into the swivel connector and tighten in the same manner as noted above. The open and closed loop piping system should include pressure/temperature taps for serviceability.

All source water connections on commercial units are standard female pipe thread. Never use flexible hoses smaller than 1-inch inside diameter on the unit. Limit hose length to 10 feet per connection. Check carefully for water leaks.

**Freeze Protection**

Set the freeze protection switch SW2-2 on the printed circuit board for applications using a closed loop antifreeze solution to “LOOP”. On applications using an open loop/groundwater system (or closed loop no antifreeze), set this dip switch to “WELL”, the factory default setting. (Refer to the Dip Switch Field Selection table on page 20.)
**Water Quality**

In ground water situations where scaling could be heavy or where biological growth such as iron bacteria will be present, a closed loop system is recommended. The heat exchanger coils in ground water systems may, over a period of time, lose heat exchange capabilities due to a buildup of mineral deposits inside. These can be cleaned, but only by a qualified service mechanic, as special solutions and pumping equipment are required. Desuperheater coils can likewise become scaled and possibly plugged. In areas with extremely hard water, the owner should be informed that the heat exchanger may require occasional flushing.

Units with cupronickel heat exchangers are recommended for open loop applications due to the increased resistance to build-up and corrosion, along with reduced wear caused by acid cleaning.

<table>
<thead>
<tr>
<th>Material</th>
<th>Copper</th>
<th>90/10 Cupro-Nickel</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>Acidity/Alkalinity</td>
<td>7-9</td>
</tr>
<tr>
<td><strong>Scaling</strong></td>
<td>Calcium and Magnesium Carbonate</td>
<td>(Total Hardness) less than 350 ppm</td>
</tr>
<tr>
<td>Hydrogen Sulfide</td>
<td>Less than .5 ppm</td>
<td>10 - 50 ppm</td>
</tr>
<tr>
<td>(rotten egg smell appears at 0.5 PPM)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sulfates</td>
<td>Less than 125 ppm</td>
<td>Less than 125 ppm</td>
</tr>
<tr>
<td>Chlorine</td>
<td>Less than .5 ppm</td>
<td>Less than .5 ppm</td>
</tr>
<tr>
<td>Chlorides</td>
<td>Less than 20 ppm</td>
<td>Less than 125 ppm</td>
</tr>
<tr>
<td>Carbon Dioxide</td>
<td>Less than 50 ppm</td>
<td>10 - 50 ppm</td>
</tr>
<tr>
<td>Ammonia</td>
<td>Less than 2 ppm</td>
<td>Less than 2 ppm</td>
</tr>
<tr>
<td>Ammonia Chloride</td>
<td>Less than .5 ppm</td>
<td>Less than .5 ppm</td>
</tr>
<tr>
<td>Ammonia Nitrate</td>
<td>Less than .5 ppm</td>
<td>Less than .5 ppm</td>
</tr>
<tr>
<td>Ammonia Hydroxide</td>
<td>Less than .5 ppm</td>
<td>Less than .5 ppm</td>
</tr>
<tr>
<td>Ammonia Sulfate</td>
<td>Less than .5 ppm</td>
<td>Less than .5 ppm</td>
</tr>
<tr>
<td><strong>Total Dissolved Solids (TDS)</strong></td>
<td>Less than 1000 ppm</td>
<td>1000-1500 ppm</td>
</tr>
</tbody>
</table>

| Iron Fouling | None | None |
| (Biological Growth) |
| Iron, Fe^2+ (Ferrous) | | |
| Bacterial Iron Potential | | |
| Iron Oxide | Less than 1 ppm. Above this level deposition will occur. | Less than 1 ppm. Above this level deposition will occur. |

**Erosion**

| Suspended Solids | Less than 10 ppm and filtered for max of 600 micron size | Less than 10 ppm and filtered for max of 600 micron size |

**Threshold Velocity (Fresh Water)**

<table>
<thead>
<tr>
<th>Copper</th>
<th>90/10 Cupro-Nickel</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-8 ft/sec</td>
<td>8-12 ft/sec</td>
</tr>
</tbody>
</table>

**Note:** Grains = PPM divided by 17  •  mg/l is equivalent to PPM

**Condensate Drain**

On vertical units, the internal condensate drain assembly consists of a drain tube which is connected to the drain pan, a 3/4-inch PVC female adapter and a flexible connecting hose. The female adapter may exit either the front or the side of the cabinet. The adapter should be glued to the field-installed PVC condensate piping. On vertical units, a condensate hose is inside all cabinets as a trapping loop; therefore, an external trap is not necessary.

On horizontal units, a copper stub is provided for condensate drain piping connection. An external trap is required (see Figures 4 and 5 below). If a vent is necessary, an open stand pipe may be applied to a tee in the field-installed condensate piping.

**Figure 4: Horizontal Drain Connection**

**Figure 5: Unit Pitch for Drain**
Closed Loop Ground Source Systems

**Note:** For closed loop systems with antifreeze protection, set SW2-2 to the “loop” position (see table on page 32).

Once piping is completed between the unit, flow center and the ground loop (see figure below), final purging and charging of the loop is required. A flush cart (or a 1.5 HP pump minimum) is needed to achieve adequate flow velocity in the loop to purge air and dirt particles from the loop itself. Antifreeze solution is used in most areas to prevent freezing. Flush the system adequately to remove as much air as possible then pressurize the loop to a static pressure of 40-50 PSI (summer) or 50-75 PSI (winter). This is normally adequate for good system operation. Loop static pressure will fluctuate with the seasons. Pressures will be higher in the winter months than during the cooling season. This fluctuation is normal and should be considered when initially charging the system.

After pressurization, be sure to remove the plug in the end of the loop pump motor(s), if applicable, to allow trapped air to be discharged and to ensure that the motor housing has been flooded. Ensure that the loop flow center provides adequate flow through the unit by checking the pressure drop across the heat exchanger and comparing it to the unit capacity data in the specification catalog. Usually 2.5 to 3 GPM of flow per ton of cooling capacity is recommended in earth loop applications. (See wiring diagram attached to the inside of the unit for pump wiring details.)

![Figure 6: Closed Loop, Ground Source Application - Single unit with Flow Center](image)

**Multiple Units on One Flow Center**

When two units are connected to one loop pumping system, pump control is automatically achieved by connecting the SL terminals on connector P2 in both units with 2-wire thermostat wire. These terminals are polarity dependant. The loop pump(s) may be powered from either unit, whichever is more convenient. If either unit calls, the loop pump(s) will automatically start. The use of two units on one flow center is generally limited to a total of 20 GPM capacity.

![Figure 7: Primary/Secondary Hook-up](image)
Open Loop Ground Water Systems

Always maintain water pressure in the heat exchanger by placing water control valves at the outlet of the unit to prevent mineral precipitation. Use a closed, bladder-type expansion tank to minimize mineral formation due to air exposure. Ensure proper water flow through the unit by checking pressure drop across the heat exchanger and comparing it to the figures in Capacity Tables in the Specification Catalog. Normally, about 2 GPM flow rate per ton of cooling capacity (1.5 GPM per ton minimum at 50°F) is needed in open loop systems.

Note: For open loop/ground water systems or systems that do not contain an antifreeze solution, set SW2-Switch #2 to the “WELL” position.

Discharge water from the unit is not contaminated in any manner and can be disposed of in various ways, depending on local building codes (e.g. recharge well, storm sewer, drain field, adjacent stream or pond, etc.). Most local codes forbid using the sanitary sewer for disposal. Consult your local building and zoning department to assure compliance in your area.

The water control solenoid is wired between the common pin #2 connector P1 and pin #3 connector P3, and a jumper wire is connected between R and pin #1 connector P3 (refer to Figure 9). Notice that DIP switch 2-3, located on the PCB, must be switched to the “Comp” position so the valve will operate with the compressor.

Figure 8: Open System - Groundwater Application

Figure 9: Typical single-stage external 24V water solenoid valves (type PPV100 or BPV100) wiring

Note: Switch SW2 - 3 to comp position.
Boiler/Cooling Tower Closed Loop Systems

Boiler/Cooling Tower
The water loop is usually maintained between 60°F and 90°F. Premier units allow 25°F to 110°F EWT for proper heating and cooling operation.
To reject excess heat from the water loop, the use of a closed circuit evaporative cooler or an open type cooling tower with a secondary heat exchanger between the tower and the water loop is recommended. If an open type cooling tower is used without a secondary heat, continuous chemical treatment and filtering of the water must be performed to ensure the water is free from damaging materials.

Water Piping Connections
Units should not be connected to the supply and return piping until the water system has been cleaned and flushed completely. Supply and return water connections are standard female pipe thread on commercial units (1-inch swivel on residential units). Never use flexible hoses with an inside pipe diameter that is smaller than the water connections on the unit and limit the hose length to 10 feet or less per connection. High-pressure flexible hoses provide sound attenuation for both normal unit operating noise and hydraulic pumping noise. Hard piping can also be brought directly to the unit although it is not recommended since no vibration or noise attenuation can be accomplished.
System Cleaning and Flushing

Prior to start up of any heat pump, the water circulating system must be cleaned and flushed of all dirt and debris. If the system is equipped with water shutoff valves, the supply and return runouts must be connected together at each unit location to prevent the introduction of dirt into the unit, (see Figure 10). The system should be filled at the water makeup connection with all air vents open. After filling, vents should be closed.

The contractor should start the main circulator with the pressure reducing valve makeup open. Vents should be checked in sequence to bleed off any trapped air and to verify circulation through all components of the system.

As water circulates through the system, the contractor should check and repair any leaks found in the piping system. Drain(s) at the lowest point(s) in the system should be opened for the initial flush and blowdown, making sure water fill valves are set at the same rate. Check the pressure gauge at the pump suction and manually adjust the makeup water valve to hold the same positive pressure both before and after opening the drain valves. Flushing should continue for at least two hours, or longer if required, until drain water is clean and clear.

The supplemental heater and/or circulator pump, if used, should be shut off. All drains and vents should be opened to completely drain the system. Short circuited supply and return runouts should now be connected to the unit supply and return connections.

Refill the system with clean water. Test the system water for acidity and treat as required to leave the water slightly alkaline (pH 7.5 to 8.5). The specified percentage of antifreeze may also be added at this time. Use commercial grade antifreeze designed for HVAC systems only. Environol™ brand antifreeze is recommended.

Once the system has been filled with clean water and antifreeze (if used), precautions should be taken to protect the system from dirty water conditions. Dirty water will result in system-wide degradation of performance, and solids may clog valves, strainers, flow regulators, etc. Additionally, the heat exchanger may become clogged which reduces compressor service life and can cause premature unit failure. In boiler/tower applications, set the loop control panel set points to desired temperatures. Supply power to all motors and start the circulating pumps. After full flow has been established through all components including the heat rejector (regardless of season), air vented and loop temperatures stabilized, each of the units will be ready for check, test and start up and for air and water balancing.

Note: For closed loop systems with antifreeze protection, set SW2-2 to the “LOOP” position.

Figure 10: Flushing with Water Shutoff Valve Equipped Systems
Desuperheater Connections

Water Tank Preparation

Electric water heaters are recommended for use with the desuperheater in potable water systems. A tank with a 50-gallon minimum capacity should be installed. Multiple tanks may be piped in series to create larger buffer tanks.

Note: Desuperheater pump mounted externally with commercial units; internally in residential units.
Initial Desuperheater Startup

Plumbing Installation

1. Remove drain valve and fitting from water heater.
2. Thread the 3/4-inch NPT x 3 1/2-inch brass nipple into the water heater drain port.
3. Attach the center port of the 3/4-inch FPT tee to the opposite end of the brass nipple.
4. Attach the 1/2-inch SWT x 3/4-inch NPT copper adapter to the side of the tee closest to the unit.
5. Install the drain valve on the tee opposite the adapter.
6. Run interconnecting tubing from the tee to DHW “WATER OUT” at the unit.
7. Cut the cold water “IN” line going to the water heater.
8. Insert the 3/4-inch x 3/4-inch x 1/2-inch reducing solder tee “IN” line with cold water line as shown.
9. Run interconnecting copper tubing between the unit DHW “WATER IN” and the tee (1/2-inch nominal) using (2) 1/2-inch sweat x 1-inch MPT adapters. The recommended maximum distance is 50 ft.
10. To prevent air entrapment in the system, install a vent coupling at the highest point of the interconnecting lines.
11. Insulate all exposed surfaces of both connection water lines with 3/8-inch wall closed cell insulation.

Note: All plumbing and piping connections must comply with local plumbing codes.

Desuperheater Startup

1. Close the drain valve to the water heater.
2. Open the cold water supply to the tank.
3. Open the hot water faucet in the house to bleed air from the system. Close when full.
4. Depress the handle on the pressure relief valve to bleed any remaining air from the tank then close.
5. If so equipped, unscrew the indicator plug on the motor end of the pump until all air is purged from the pump, then tighten the plug. Use vent couplings to bleed air from the lines.
6. Carefully inspect all plumbing for water leaks and correct as required.
7. Before restoring electrical supply to the water heater, adjust the temperature setting on the tank.
   • On tanks with both upper and lower elements, the lower element should be turned down to the lowest setting, approximately 100°F. The upper element should be adjusted to 120°F to 130°F. Depending upon the specific needs of the customer, you may want to adjust the upper element differently.
   • On tanks with a single element, lower the thermostat setting to 120°F.
8. After thermostat(s) is adjusted, replace the access cover and restore electrical supply to the water heater.
9. Make sure that any valves in the desuperheater water circulating circuit are open.
10. Turn on the Premier unit to first stage heating.
11. The DHW pump should be running. Be sure the disable switch for the DHW pump (SW4) is ON. The DHW OFF LED on the unit should not be illuminated.
12. The temperature difference between the water entering and leaving the desuperheater should be 5°F to 15°F. The water flow should be approximately 0.4 GPM per ton of nominal cooling.
13. Allow the unit to heat water for 15 to 20 minutes to be sure operation is normal.
14. When the pump is first started, open the inspection port (if equipped) until water dribbles out, then replace. Allow the pump to run for at least five minutes to ensure that water has filled the circulator properly.

CAUTION: Never operate the DHW circulating pump while dry. If the unit is placed in operation before the desuperheater piping is connected, be sure that the pump switch is set to the OFF position.

Desuperheater Notes: When servicing a unit’s refrigeration circuit, it is always good practice to disable the desuperheater pump. This can be accomplished by using the DHW pump disable switch located on the front of the unit cabinet near the LED annunciator panel. The red DHW OFF LED will illuminate, indicating the DHW pump is disabled.
Electrical Connections

General
Be sure the available power is the same voltage and phase as that shown on the unit serial plate. Line and low voltage wiring must be done in accordance with local codes or the National Electric Code, whichever is applicable.

Unit Power Connection
Connect the incoming line voltage wires to L1 and L2 or L1, L2, and L3 of the contactor as shown in Figures 14 and 15. (For more information, refer to the Unit Electrical Data section in the Specification Catalog SP1555.)

External Loop Pump Power Connection
If the unit is to be used with an external loop pump (FC1 or FC2 flow center), the pump(s) will be connected to the terminals on PB1 in the unit electrical box as shown in Figures 14 and 15. The pumps will automatically be cycled as required by the unit or by an SL signal from another Premier unit sharing the flow center.

Accessory Relay
A set of “dry” contacts has been provided to control accessory devices, such as 2-wire water solenoid valves on open loop installations, electronic air cleaners, humidifiers, etc. This relay contact should be used only with 24 volt signals and not line voltage power. The relay has both normally open and normally closed contacts and can operate with either the fan or the compressor. Use DIP switch SW2-3 to cycle the relay with fan or compressor. The relay contacts are available on terminals #2 and #3 of P3. The default value of the switch is set to operate with fan. For use with electronic air filter.

208 Volt Operation
All Premier units are factory wired for 230 volt operation. There is a switch located on the control box which allows the installer to select 208 volt unit operation. Refer to Figures 14 and 15 below for switch location.
Electronic Thermostat Installation

Position the thermostat subbase against the wall so that it is level and the thermostat wires protrude through the middle of the subbase. Mark the position of the subbase mounting holes and drill holes with a 3/16-inch bit. Install supplied anchors and secure base to the wall. Thermostat wire must be 8-conductor 18 AWG wire. Strip the wires back 1/4-inch (longer strip lengths may cause shorts) and insert the thermostat wires into the connector as shown. Tighten the screws to insure tight connections. The thermostat has the same type connectors, requiring the same wiring. See instructions enclosed in the thermostat for detailed installation and operation information.

Figure 16: Thermostat Wiring

Figure 17: Logic Board Physical Layout

Notes: DIP switch SW2-#8 is required to be in the "OFF" position for the control to recognize the 24VAC thermostat inputs. The second stage compressor wire must be installed between the unit and the thermostat for proper control operation. SW3-2 "OFF" to be used with zoned systems. SW3-2 "ON" to be used for unzoned systems. SW3-4 "OFF" is used with ECM and 17P501A01 Electric Heat board. SW3-4 "ON" is used with ECM2 and 17P514A01 Electric Heat board.
Wiring Schematics

P Series - Single Speed Wiring Schematic - 208-230/60/1, PSC Blower

PREMIER INSTALLATION MANUAL
Notes:
1. Place switch to 240V position to operate unit at 208V.
2. Connections of remote unit that have loop pumps for slave operation.
3. 24V Accessory relay (see SW2 –3 for description of operation).
4. DMAL pump only if hard water generation option.
5. DMAL pump only if hard water generation option.
6. DMAL pump only if hard water generation option.
7. DMAL pump only if hard water generation option.
8. DMAL pump only if hard water generation option.
9. DMAL pump only if hard water generation option.
Wiring Schematics
P Series - Single Speed Wiring Schematic - 208-230/60/3, ECM Blower
97P618-20 10/13/05

Compressor

Transformer Switch

Microprocessor Logic Control (DC Voltage)

NOTE 1
240V 208V
Black/White
Yellow
Black
Blue
Orange
Orange
Pink
Pink
Yellow
Yellow
Pink
Pink
Orange
Orange
White
Tan
Blue
Brown
Orange
Orange
Pink
Pink
Yellow
Yellow
Pink
Pink
Orange
Orange
White
Tan
Blue
Brown

NOTE 2
2 Speed / 1 Speed
Zone (See Note 9)
No RPM / RPM
ECM, EH (See Note 6)
Must be ON

NOTE 3
1
2
3
4
5

NOTE 4

NOTE 5

NOTE 6

NOTE 7

NOTE 8

NOTE 9

Field Selection Dip - #1 On, #6 On, #7 On
Drain pan overflow Lockout
FP thermistor (loop<15°F, well<30°F) Lockout
High Pressure > 380 PSI Lockout
Low Pressure < 15 PSI Lockout
ECM2 RPM < 100 rpm Lockout
Microprocessor malfunction*
HWL thermistor > 130°F
DHW pump switch off

NOTE 10

Current Fault Status

Outputs

Outputs2

Inputs

Inputs / Norm

LED Normal Display Mode

Diagnostic Modes

<table>
<thead>
<tr>
<th>LED</th>
<th>Normal Display Mode</th>
<th>Current Fault Status</th>
<th>Inputs</th>
<th>Outputs</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>SW1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
With optional EA Series Auxiliary Electric Heat Power

Typical schematic shown
Wiring Schematics

P Series - Single Speed Wiring Schematic - 460/60/3, ECM Blower

1. ECM2 RPM < 100 rpm
2. Low Pressure < 15 PSI
3. HWL thermistor > 130°F
4. FP thermistor (loop < 15°F, well < 30°F) Lockout
5. Field Selection Dips - #1 On, #6 On, #7 On
6. 460 VAC input uses a 200 uf, single phase ECM motor and requires a dedicated motor from the service panel.
7. SW4 should be in the OFF position when using ECM motor and 17P501A01.

Legend

- Factory Low voltage wiring
- Field wire voltage wiring
- Optional Mode
- Wiring diagram
- Internal junction
- Quick connect terminal
- Wire nut
- Field wire lug
- Ground
- Relay Contacts - N.O., N.C.

Thermostat

- R - Common
- C - Common
- Y1 - Common
- Y2 - Common
- W - Common
- G - Common
- L1 - Common
- L2 - Common
- L3 - Common

Microprocessor Logic Control (DC Voltage)

- R - Black
- W - Orange
- G - Blue
- Y1 - Pink
- Y2 - Violet
- BL - Brown
- SW1 - White

- CR1 - PWM
- CR2 - N.O., N.C.
- CR3 - N.O., N.C.
- CR4 - N.O., N.C.
- PS - N.O., N.C.
- LP - N.O., N.C.
- HP - N.O., N.C.

Inputs

- Y1 - 0VDC
- Y2 - 0VDC
- W - 24VAC
- G - 24VAC
- C - 24VAC

Outputs

- Y1 - On
- Y2 - Off
- W - Off
- G - Off
- C - Off

Field Select Dips - 46, 47, 48

Notes:

- ECM2 - RPM < 100 rpm
- Low Pressure < 15 PSI
- HWL thermistor > 130°F
- FP thermistor (loop < 15°F, well < 30°F) Lockout
- Field Selection Dips - #1 On, #6 On, #7 On
- 460 VAC input uses a 200 uf, single phase ECM motor and requires a dedicated motor from the service panel.
- SW4 should be in the OFF position when using ECM motor and 17P501A01.
- SW4 should be OFF, #7 On when using ECM motor and 17P501A01.
Wiring Schematics
P Series - Single Speed Wiring Schematic - 460-575/60/3, PSC Blower
97P619-22  10/13/05

NOTE 1
- Connection of remote unit that does not have a loop pump for slave operation.
- Some fan motors may be terminated and wired on motor to change speeds.

NOTE 2
- Two Speed/1 Speed
- Note [See note 4]: No Low/High Heat
- Input #7/8

NOTE 3
- 2 Speed/1 Speed
- 2 Zone [See note 1]: No Low/High Heat
- Output #1/2

NOTE 4
- L1 to white side of capacitor, L2 to white side of motor.
- L1 to white side of capacitor, L2 to yellow side of motor.

Legend
- Current Switch
- Compressor Contactor
- Condensate overflow sensor
- DHW pump relay
- Loop pump relay
- PSC Fan Speed Relay
- PSC Fan Power Relay
- F1 and F2 - Fans
- Freeze protection sensor
- High pressure switch
- Low pressure switch
- Power strip
- Reversing Valve coil
- SW1 - 12 position
- SW2 - 8 position
- SW3 - 6 position
- SW4 - 3 position
- SW5 - 1 position
- SW6 - 5 position
- SW7 - 7 position
- SW8 - 12 position

Notes:
1. 24V Accessory relay see SW6 - 2 for description and wiring
2. Connection of remote unit that does not have a loop pump for slave operation.
3. When using thermostat T43X312, SW6 - 2 should be in the ON position.
4. For fan motors may be terminated and wired on motor to change speeds.
### Fan Performance Data

#### ECM2 Motor

<table>
<thead>
<tr>
<th>MODEL</th>
<th>MAX ESP</th>
<th>AIRFLOW DIP SWITCH SETTINGS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>P019</td>
<td>0.5</td>
<td>300</td>
</tr>
<tr>
<td>P022</td>
<td>0.5</td>
<td>–</td>
</tr>
<tr>
<td>P028</td>
<td>0.5</td>
<td>–</td>
</tr>
<tr>
<td>P034</td>
<td>0.5</td>
<td>–</td>
</tr>
<tr>
<td>P040</td>
<td>0.5</td>
<td>650</td>
</tr>
<tr>
<td>P046</td>
<td>0.5</td>
<td>650</td>
</tr>
<tr>
<td>P040 w/1hp*</td>
<td>0.75</td>
<td>800</td>
</tr>
<tr>
<td>P046 w/1hp*</td>
<td>0.75</td>
<td>800</td>
</tr>
<tr>
<td>P056</td>
<td>0.75</td>
<td>750</td>
</tr>
<tr>
<td>P066</td>
<td>0.75</td>
<td>750</td>
</tr>
</tbody>
</table>

**Notes:**
- Factory settings are at recommended L-M-H DIP switch locations.
- Factory L setting is minimum allowed for cooling.
- M-H settings must be located within shaded CFM range.
- CFM is controlled within 5% up to the maximum ESP.
- Max ESP includes allowance for wet coil and standard filter.
- * With optional 1 HP fan motor.

A 12-position DIP switch package on the control allows the airflow levels to be set for low, medium, and high speed when using the ECM2 blower motor. Only three of the DIP switches can be in the "on" position.

- The first "on" switch (the lowest position number) determines the low speed fan setting.
- The second "on" switch determines the medium speed fan setting.
- The third "on" switch determines the high speed fan setting.

The example to the right shows SW1 on the control board configured for the following P028 airflow settings.

- Low Speed Fan: 500 CFM
- Medium Speed Fan: 700 CFM
- High Speed Fan: 900 CFM
## Fan Performance Data
### PSC Motor

<table>
<thead>
<tr>
<th>MODEL</th>
<th>FAN SPEED</th>
<th>MOTOR HP</th>
<th>AIRFLOW (CFM) AT EXTERNAL STATIC PRESSURE (IN. WG)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.05 0.10 0.15 0.20 0.25 0.30 0.35 0.40 0.45 0.50 0.60 0.70 0.80 0.90 1.00</td>
</tr>
<tr>
<td>P010</td>
<td>H</td>
<td>450</td>
<td>440 420 410 380 360 340 330 310 300 – – – – –</td>
</tr>
<tr>
<td></td>
<td>MH</td>
<td>410</td>
<td>400 380 370 350 330 310 300 280 270 250 240 – – – –</td>
</tr>
<tr>
<td></td>
<td>ML*</td>
<td>370</td>
<td>360 340 330 310 290 280 270 250 230 220 210 200 – –</td>
</tr>
<tr>
<td></td>
<td>L</td>
<td>310</td>
<td>300 280 270 250 240 230 220 210 200 – – – –</td>
</tr>
<tr>
<td>P013</td>
<td>H</td>
<td>450</td>
<td>440 420 410 390 370 350 340 320 310 – – – – –</td>
</tr>
<tr>
<td></td>
<td>MH*</td>
<td>400</td>
<td>390 380 370 350 340 320 310 290 280 – – – – –</td>
</tr>
<tr>
<td></td>
<td>ML</td>
<td>370</td>
<td>360 340 330 310 300 290 280 260 250 – – – –</td>
</tr>
<tr>
<td></td>
<td>L</td>
<td>330</td>
<td>320 310 300 290 280 260 250 230 220 – – – –</td>
</tr>
<tr>
<td>P019</td>
<td>H</td>
<td>790</td>
<td>780 775 770 765 760 740 720 690 670 610 – – – –</td>
</tr>
<tr>
<td></td>
<td>M</td>
<td>720</td>
<td>690 685 680 670 660 650 640 620 600 – – – –</td>
</tr>
<tr>
<td></td>
<td>L</td>
<td>590</td>
<td>570 560 550 545 540 530 520 510 500 – – – –</td>
</tr>
<tr>
<td>P022</td>
<td>H</td>
<td>1020</td>
<td>990 960 930 900 870 850 830 800 770 690 – – – –</td>
</tr>
<tr>
<td></td>
<td>M</td>
<td>860</td>
<td>840 820 800 780 760 740 720 690 670 – – – –</td>
</tr>
<tr>
<td></td>
<td>L</td>
<td>720</td>
<td>700 680 650 640 620 600 580 570 550 – – – –</td>
</tr>
<tr>
<td>P028</td>
<td>H</td>
<td>1120</td>
<td>1100 1070 1050 1040 1030 1020 1010 1000 980 830 – – – –</td>
</tr>
<tr>
<td></td>
<td>M</td>
<td>1020</td>
<td>1000 980 960 920 880 860 840 820 790 – – – –</td>
</tr>
<tr>
<td></td>
<td>L</td>
<td>860</td>
<td>850 840 830 810 800 780 760 740 710 – – – –</td>
</tr>
<tr>
<td>P034</td>
<td>H</td>
<td>1360</td>
<td>1340 1300 1270 1230 1200 1170 1150 1120 1090 990 870 – – – –</td>
</tr>
<tr>
<td></td>
<td>M</td>
<td>1190</td>
<td>1170 1140 1120 1090 1060 1030 1010 970 930 – – – –</td>
</tr>
<tr>
<td></td>
<td>L</td>
<td>1010</td>
<td>990 970 950 940 920 900 880 860 840 – – – –</td>
</tr>
<tr>
<td>P040</td>
<td>H</td>
<td>– –</td>
<td>1730 1700 1670 1650 1620 1580 1540 1490 1400 1290 – – – –</td>
</tr>
<tr>
<td></td>
<td>M</td>
<td>1510</td>
<td>1500 1490 1480 1450 1430 1400 1380 1350 1320 – – – –</td>
</tr>
<tr>
<td></td>
<td>L</td>
<td>1170</td>
<td>1160 1150 1140 1130 1120 1100 1080 1050 1030 – – – –</td>
</tr>
<tr>
<td>P046</td>
<td>H</td>
<td>– –</td>
<td>1870 1820 1780 1750 1720 1680 1630 1580 1450 1330 1190 – – – –</td>
</tr>
<tr>
<td></td>
<td>M</td>
<td>1710</td>
<td>1660 1630 1590 1560 1530 1490 1460 1410 1370 – – – –</td>
</tr>
<tr>
<td></td>
<td>L</td>
<td>1280</td>
<td>1250 1230 1220 1200 1180 1150 1120 1090 1050 – – – –</td>
</tr>
<tr>
<td>P056</td>
<td>H</td>
<td>– –</td>
<td>– – 2180 2160 2130 2100 2070 2040 1990 1910 1810 1690 – – – –</td>
</tr>
<tr>
<td></td>
<td>M</td>
<td>2030</td>
<td>2010 1990 1970 1950 1930 1910 1880 1850 1830 1780 – – – –</td>
</tr>
<tr>
<td></td>
<td>L</td>
<td>1790</td>
<td>1770 1760 1750 1730 1720 1700 1690 1670 1640 – – – –</td>
</tr>
<tr>
<td>P066</td>
<td>H</td>
<td>– –</td>
<td>– – 2540 2520 2490 2460 2430 2410 2320 2230 2130 1980 1820 – – – –</td>
</tr>
<tr>
<td></td>
<td>M</td>
<td>2430</td>
<td>2390 2360 2340 2310 2290 2270 2250 2220 2190 2120 2050 – – – –</td>
</tr>
</tbody>
</table>

**Notes:** Includes allowance for wet coil and clean factory installed filter.

A “ – “ in the table indicates operating range is not recommended.

Factory settings indicated in bold print.

* At 265V, the P010 is shipped on ML and the P013 on MH.
Standard Microprocessor Control Operation

The Premier control system is a microprocessor-based printed circuit board conveniently located in the unit control box for easy accessibility. The microprocessor provides control of the entire unit as well as outputs for status modes, faults, and diagnostics. Low voltage terminal strips provide all necessary terminals for field connections. LEDs are located on the front of the unit for quick inspection without removing any access panels. The control offers optimal space conditioning. The board accepts traditional 24VAC thermostat inputs.

Startup
The unit will not operate until all the inputs and safety controls are checked for normal conditions. At first power-up, a four-minute delay is employed before the compressor is energized.

Component Sequencing Delays
Components are sequenced and delayed for optimum space conditioning performance.

Accessory Relay
An accessory relay on the control board allows for field connection of solenoid valves, electronic air cleaners, etc. The accessory relay has a normally open output and a normally closed output. The accessory relay is factory set to control the optional electronic air-cleaner.

Short Cycle Protection
The control employs a minimum “off” time of four minutes and a minimum “on” time of two minutes to provide for short cycle protection of the compressor.

Loop Pump SL Signals
A signal between multiple Premier control boards at the SL inputs and outputs (SL1-In and Out) will provide for remote control of the loop pump on any unit.

Condensate Overflow Protection
The Premier control board incorporates an impedance sensing liquid sensor at the top of the drain pan. Upon a continuous 30-second sensing of the condensate, compressor operation is suspended (see fault retry), the condensate overflow lockout LED begins flashing, and an output signal (LO) is made available for connection to a “fault” LED at the thermostat.

Shutdown Input
A simple grounded signal to the “shutdown” input on the control board puts the unit into shutdown mode. Compressor, hot water pump and fan operation are suspended.

Safety Controls
The Premier control receives separate signals for a high pressure switch for safety, a low pressure switch to prevent loss of charge damage, and a low suction temperature thermistor for freeze protection. Upon a continuous 30-second measurement of the fault (immediate for high pressure), compressor operation is suspended (see fault retry), the appropriate lockout LED begins flashing, and an output signal (LO) is made available for connection to a “fault” LED at the thermostat.

Testing
The Premier control allows service personnel to shorten most timing delays for faster diagnostics (see field selection DIP switch #1).
Standard Microprocessor Control Operation

Fault Retry
All faults (except for low RPM fault with the ECM2 fan motor) are retried twice before finally locking the unit out. The “fault retry” feature is designed to prevent nuisance calls.

Diagnostics
The Premier control board allows all inputs and outputs to be displayed on the LEDs for fast and simple control board diagnosis (see field selection DIP switches #6 and #7).

Resistance Heat Control
For units equipped with internal electric heaters, the electric heat control module contains the appropriate high-voltage control relays. Control signals energize the relays in the proper sequence, and the LED display board indicates which stages are energized.

Fan Speed Control
A DIP switch on the Premier control allows field selection of low and medium fan speeds for cooling in the dehumidification mode or medium and high fan speeds for cooling in the normal mode (ECM2 version only).

Hot Water High Limit
This mode occurs when the hot water thermistor temperature is at or above 130°F for 30 continuous seconds. The DHW limit status LED on the unit illuminates, and the hot water pump de-energizes. Hot water pump operations resume on the next compressor cycle or after 30 minutes of continuous compressor operation during the current thermostat demand cycle.

Hot Water Pump Switch
When the pump switch is engaged, hot water pump operation is disabled, and the pump status LED on the unit illuminates.

ECM2 Airflow Selection DIP Switches (SW1)
A 12-position DIP switch package on the Premier control allows the airflow levels to be set for low, medium and high speed when using the ECM2 blower motor (refer to the Blower table on page 28).
Only three of the DIP switches can be in the “on” position. The first “on” switch (the lowest position number) determines the “low speed fan” setting. The second “on” switch determines the “medium speed fan” setting, and the third “on” switch determines the “high speed fan” setting.
### DIP Switch Settings

**Field Selection DIP Switches (SW2)**

An eight-position DIP switch package on the control allows the field selectable options shown in the table below.

<table>
<thead>
<tr>
<th>DIP SWITCH NUMBER</th>
<th>DESCRIPTION</th>
<th>OFF POSITION</th>
<th>ON POSITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>SW 2- 1</td>
<td><strong>Service Test Mode</strong></td>
<td>Test Mode</td>
<td>Normal Timing Operation</td>
</tr>
<tr>
<td></td>
<td>Allows field selection of “normal” or “test”</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>operational modes. Test mode accelerates most</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>timing functions 16 times to allow faster</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>troubleshooting. Test mode also allows</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>viewing the current status of the fault inputs</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>on the LED display.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SW 2- 2</td>
<td><strong>Freeze Protection Setting</strong></td>
<td>Loop Water Freeze Protection 15°F</td>
<td>Well Water Freeze Protection 30°F</td>
</tr>
<tr>
<td></td>
<td>Allows field selection of freeze thermistor</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>fault sensing temperatures for well water</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(30°F) or antifreeze-protected (15°F) earth</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>loops.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SW 2- 3</td>
<td><strong>Accessory Relay</strong></td>
<td>Acc Relay Tracks Fan</td>
<td>Acc Relay Tracks Compressor</td>
</tr>
<tr>
<td></td>
<td>Allows field selection of the accessory relay</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>to operate with the compressor or fan.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SW 2- 4</td>
<td><strong>Fan Speed Control</strong></td>
<td>Dehumidification Fan Speeds</td>
<td>Normal Fan Speeds</td>
</tr>
<tr>
<td></td>
<td>Allows field selection of reduced fan speed</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(85% of selected medium and high speed - ECM</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>only) for cooling in the dehumidification</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>mode.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SW 2- 5</td>
<td><strong>Auxiliary Off</strong></td>
<td>Disable Heating Stage 3</td>
<td>Enable Heating Stage 3</td>
</tr>
<tr>
<td></td>
<td>Disables third-stage heating. Full emergency</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>heat would still be available if needed.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SW 2- 6</td>
<td><strong>Diagnostics-Inputs</strong></td>
<td>Diagnostic Inputs/Output Viewed at</td>
<td>Normal Display Viewed at LEDs</td>
</tr>
<tr>
<td></td>
<td>Allows viewing the inputs from the thermostat</td>
<td>LEDs</td>
<td></td>
</tr>
<tr>
<td></td>
<td>to the control board such as Y1, Y2, O, G, W,</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>and SL1-In on the LED display.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SW 2- 7</td>
<td><strong>Diagnostics-Outputs</strong></td>
<td>Diagnostic Outputs Viewed at LEDs</td>
<td>Normal Display Viewed at LEDs</td>
</tr>
<tr>
<td></td>
<td>Allows viewing the outputs from the control</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>board such as compressor, reversing valve,</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>blower, hot water pump, and loop pump on the</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>LED display.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SW 2- 8</td>
<td><strong>Thermostat Selection</strong></td>
<td>24 VAC Thermostats</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>Allows field selection of the type of</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>thermostat being connected to the Premier</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>control. The DIP switch should be in the “off”</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>position for 24VAC thermostats.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## DIP Switch Settings

### Factory Setup DIP Switches (SW3)

A five-position DIP switch package on the control allows the field selectable options shown in the table below.

<table>
<thead>
<tr>
<th>DIP SWITCH NUMBER</th>
<th>DESCRIPTION</th>
<th>OFF POSITION</th>
<th>ON POSITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>SW 3- 1</td>
<td>Single-Speed</td>
<td>Two-Speed Operation</td>
<td>Single-Speed Operation</td>
</tr>
<tr>
<td></td>
<td>Configures the control for single-speed compressor operation and should always be left in the “ON” position.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SW 3- 2</td>
<td>Zoned/Finish on Second Stage</td>
<td>Zoned Systems</td>
<td>Un-Zoned Systems</td>
</tr>
<tr>
<td></td>
<td>Configures control to operate with zoned or un-zoned systems</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SW 3- 3</td>
<td>No RPM/RPM</td>
<td>PSC Fan/RPM Monitoring Disabled</td>
<td>ECM2 Fan/RPM Monitoring Enabled</td>
</tr>
<tr>
<td></td>
<td>Configures the control to monitor the RPM output of an ECM/ECM2 blower motor. When using IntelliZone with a PSC fan motor, the control should be configured for “NO RPM” sensing.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SW 3- 4</td>
<td>AT EH Board and ECM/Premier2 EH Board and ECM2</td>
<td>Electric Heat Control - 17P501A01</td>
<td>Electric Heat Control - 17P514A01</td>
</tr>
<tr>
<td></td>
<td>Configures the control to operate with electric heat control board (17P501A01) and ECM motor or with electric heat board (17P514A01) and ECM2</td>
<td></td>
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</tr>
<tr>
<td>SW 3- 5</td>
<td>Must be on</td>
<td>Future Use</td>
<td>Normal</td>
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</table>
**FX10 Control Operation**  
*(Optional Microprocessor)*

**FX10 Advanced Control**

The Johnson Controls FX10 board is specifically designed for commercial heat pumps and provides control of the entire unit as well as input ports for Open N2, LonTalk, BacNet communication protocols as well as an input port for a user interface. The user interface is an accessory item that can be used to aid in diagnostics and unit setup. A 16-pin low voltage terminal board provides terminals for common field connections. The FX10 Control provides:

- Operational sequencing
- High and low-pressure switch monitoring
- General lockout
- Freeze protection
- Condensate overflow sensing
- Lockout mode control
- Emergency shutdown mode
- Random start and short cycle protection

**Short Cycle Protection**

Allows a minimum compressor "off" time of four minutes and a minimum "on" time of two minutes.

**Random Start**

A delay of 1 to 120 seconds is generated after each power-up to prevent simultaneous startup of all units within a building after the release from an unoccupied cycle or power loss.

**Emergency Shutdown**

A field-applied dry contact can be used to place the control into emergency shutdown mode. During this mode, all outputs on the board are disabled.

**Freeze Protection**

Field selectable for 15° or 30°F (-9° or -1°C)

**Installation Options**

- Stand-alone controlled by standard room thermostat
- Stand-alone with a Zone Temperature Sensor (must have user interface to change set points beyond the allowed +/- 5°F)
- Integrated into BAS by adding communication module

**Inputs/Outputs**

- 6 Analog Inputs
- 12 Digital Inputs
- 9 Digital Output Relays (or 7 relays & 2 triacs)

**Accessory Outputs**

Quantity 2. One cycled with fan, other with compressor.

**Main FX10 Board**  
*(Shown with optional communication card)*

**User Interface**

4 x 20 backlit LCD.

**Optional Plug-in Communication Modules** -

*(compatible with standard BAS protocols)*

- Open N2
- LonTalk
- BacNet

**Display**

Requires DLI Card/Kit. Up to 2 displays, either 1 local and 1 remote, or 2 remote. (A 2-display configuration requires identical displays.) Local display can be up to 3 meters from the controller, power supply, and data communication. Remote display can be up to 300 meters from the controller. Remote display must be independently powered with data communication done via 3 pole shielded cable.

**Control Timing & Fault Recognition Delays**

<table>
<thead>
<tr>
<th>Delay Type</th>
<th>Value</th>
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<tbody>
<tr>
<td>Lead compressor “ON” delay</td>
<td>30 seconds</td>
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<tr>
<td>Lag compressor “ON” delay</td>
<td>60 seconds</td>
</tr>
<tr>
<td>Minimum compressor “ON” time (except for fault condition)</td>
<td>2 minutes</td>
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<tr>
<td>Short cycle delay</td>
<td>4 minutes</td>
</tr>
<tr>
<td>Random start delay</td>
<td>0-120 seconds</td>
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<tr>
<td>High pressure fault</td>
<td>&lt;1 second</td>
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<tr>
<td>Low pressure fault</td>
<td>30 seconds</td>
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<tr>
<td>Freeze protection fault</td>
<td>30 seconds</td>
</tr>
<tr>
<td>Condensate overflow fault</td>
<td>30 seconds</td>
</tr>
<tr>
<td>Low pressure fault bypass</td>
<td>2 minutes</td>
</tr>
<tr>
<td>Freeze protection fault bypass</td>
<td>2 minutes</td>
</tr>
</tbody>
</table>

**Note:** Refer to Submittal Data SD1981, Application Guide AGFX10, or BACnet Protocol Implementation Conformance Statement for more information.
**Startup Procedures**

Before Powering Unit, Check The Following:

- High Voltage is correct and matches nameplate.
- Fuses, breakers and wire size correct.
- Low voltage wiring complete.
- Piping completed and water system cleaned and flushed.
- Air is purged from closed loop system.
- Isolation valves are open, water control valves or loop pumps wired.
- Condensate line open and correctly pitched.
- Black/white and gray/white wires in unit control box have been removed if auxiliary heat has been installed in models 019-066.
- Dip switches are set correctly.
- DHW pump switch is “OFF” unless piping is completed and air has been purged.
- Blower rotates freely – foam shipping support has been removed.
- Blower speed correct (DIP switch setting ECM blowers only).
- Air filter/cleaner is clean and in position.
- Service/access panels are in place.
- Return air temperature is between 50-80°F heating and 60-95°F cooling.
- Air coil is clean.

### Startup Steps

**Note:** Complete the Equipment Startup/Commissioning Check Sheet during this procedure. Refer to thermostat operating instructions and complete the startup procedure.

1. Initiate a control signal to energize the blower motor. Check blower operation. Desuperheater pump should be de-energized.
2. Initiate a control signal to place the unit in the cooling mode. Cooling setpoint must be set below room temperature.
3. First stage cooling will energize after a time delay.
4. Be sure that the compressor and water control valve or loop pump(s) are activated.
5. Verify that the water flow rate is correct by measuring the pressure drop through the heat exchanger using the P/T plugs and comparing to unit capacity data in specification catalog.
6. Check the temperature of both the supply and discharge water. (Refer to the table on page 37.)
7. Check for an air temperature drop of 15°F to 20°F across the air coil, depending on the fan speed and entering water temperature.
8. Decrease the cooling set point several degrees and verify high-speed blower operation.
9. Adjust the cooling setpoint above the room temperature and verify that the compressor and water valve or loop pumps deactivate.
10. Initiate a control signal to place the unit in the heating mode. Heating setpoint must be set above room temperature.
11. First stage heating will energize after a time delay.
12. Check the temperature of both the supply and discharge water. (Refer to the table on page 37.)
13. Check for an air temperature rise of 20°F to 35°F across the air coil, depending on the fan speed and entering water temperature.
14. If auxiliary electric heaters are installed, increase the heating setpoint until the electric heat banks are sequenced on when the thermostat is in the Emergency Heat mode. Check amperage of each element.
15. Adjust the heating setpoint below room temperature and verify that the compressor and water valve or loop pumps deactivate.
16. During all testing, check for excessive vibration, noise or water leaks. Correct or repair as required.
17. Set system to desired normal operating mode and set temperature to maintain desired comfort level.
18. Instruct the owner/operator in the proper operation of the thermostat and system maintenance.
Description of Unit Operation

Note: Fan speed operation below applies only to units equipped with ECM blower motors.

Heating Operation

Heat, 1st Stage (Y1)
The fan motor is started on low speed immediately, the loop pump is energized 5 seconds after the “Y1” input is received, and the compressor is energized on low capacity 10 seconds after the “Y1” input. The fan is switched to medium speed 15 seconds after “Y1” input. The hot water pump is cycled 30 seconds after the “Y1” input.

Heat, 2nd Stage (Y1, Y2)
The hot water pump is de-energized, which directs all heat to satisfying the thermostat, and the fan changes to high speed 15 seconds after the “Y2” input.

Heat, 3rd Stage (Y1, Y2, W)
The first stage of resistance heat is energized 10 seconds after “W” input, and with continuous 3rd stage demand, the additional stages of resistance heat engage sequentially every 5 minutes.

Emergency Heat
The fan is started on high speed, and the first stage of resistance heat is energized 10 seconds after the “W” input. Continuing demand will engage the additional stages of resistance heat sequentially every 2 minutes.

Cooling Operation
In all cooling operations, the reversing valve directly tracks the “O” input. Thus, anytime the “O” input is present, the reversing valve will be energized.

Cool, 1st Stage (Y1, O)
The fan motor is started on low speed immediately, the loop pump is energized 5 seconds after the “Y1” input is received, and the compressor is energized 10 seconds after the “Y1” input. In the ECM2 version, the fan is switched to medium speed 15 seconds after “Y1” input (remains in low speed if in dehumidification mode). The hot water pump is cycled 30 seconds after the “Y1” input.

Cool, 2nd Stage (Y1, Y2, O)
The fan changes to high speed (85% of high speed if in dehumidification mode) 15 seconds after the “Y2” input.

Fan (G only)
The fan starts on low speed. Regardless of fan input “G” from thermostat, the fan will remain on low speed for 30 seconds at the end of each heating, cooling or emergency heat cycle.

Lockout Conditions
During lockout mode, the appropriate unit and thermostat lockout LEDs will illuminate. The compressor, loop pump, hot water pump, and accessory outputs are de-energized. Unless the lockout is caused by an ECM2 low RPM fault, the fan will continue to run on low speed. If the thermostat calls for heating, emergency heat operation will occur.

Lockout modes of any kind can be reset at the thermostat after a 5-second waiting period, which restores normal operation but keeps the unit lockout LED illuminated. Interruption of power to the unit will reset a lockout without a waiting period and clears all lockout LEDs.

High Pressure
This lockout mode occurs when the normally closed safety switch is opened momentarily.

Low Pressure
This lockout mode occurs when the normally closed low pressure switch is opened for 30 continuous seconds.

Freeze Protection (Water Flow)
This lockout mode occurs when the freeze thermistor temperature is at or below the selected freeze protection point (well 30°F or loop 15°F) for 30 continuous seconds.

Condensate Overflow
This lockout mode occurs when the condensate overflow level has been reached for 30 continuous seconds.

Fan RPM
When equipped with an ECM2 fan motor, the Premier control board monitors fan RPM to sense operation. This lockout mode occurs if the fan RPM falls below the low RPM limit (100 RPM) for 30 continuous seconds.
### Operation Logic

<table>
<thead>
<tr>
<th>OPERATION LOGIC DATA</th>
<th>HEATING</th>
<th>COOLING</th>
<th>FAN ON</th>
<th>SL1 - IN ON</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>STG1</td>
<td>STG2</td>
<td>STG3</td>
<td>EMERG</td>
</tr>
<tr>
<td>Compressor</td>
<td>On</td>
<td>On</td>
<td>On</td>
<td>Off</td>
</tr>
<tr>
<td>ECM2 Normal</td>
<td>Med</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>ECM2 Dehumidify</td>
<td>Med</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>PSC</td>
<td>Low</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Rev Valve</td>
<td>Off</td>
<td>Off</td>
<td>Off</td>
<td>Off</td>
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<tr>
<td>Loop Pump</td>
<td>On</td>
<td>On</td>
<td>On</td>
<td>Off</td>
</tr>
<tr>
<td>DHW Pump</td>
<td>On</td>
<td>Off</td>
<td>Off</td>
<td>Off</td>
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<tr>
<td>Aux Heater</td>
<td>Off</td>
<td>Off</td>
<td>Staged</td>
<td>Staged</td>
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<tr>
<td>SL 1 - Out</td>
<td>On</td>
<td>On</td>
<td>On</td>
<td>Off</td>
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<tr>
<td>Emerg LED</td>
<td>On</td>
<td>Off</td>
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<td>On</td>
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<tr>
<td>T-Stat Signal</td>
<td>Y1, Y2, W, Y1, Y2</td>
<td>W</td>
<td>Y1, O</td>
<td>Y1, Y2, O</td>
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</table>

### Typical Water and Air Temperature Changes

<table>
<thead>
<tr>
<th>WATER FLOW RATE</th>
<th>WATER TEMPERATURE CHANGE</th>
<th>AIR TEMPERATURE CHANGE</th>
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<tbody>
<tr>
<td></td>
<td>RISE (CLG)</td>
<td>DROP (HTG)</td>
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<tr>
<td>3 GPM/TON</td>
<td>9-12</td>
<td>4-8</td>
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<tr>
<td>1.5 GPM/TON</td>
<td>20-26</td>
<td>10-17</td>
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### Water Pressure Drop

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<thead>
<tr>
<th>UNIT</th>
<th>GPM</th>
<th>30° EWT</th>
<th>50° EWT</th>
<th>70° EWT</th>
<th>90° EWT</th>
<th>110° EWT</th>
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</tr>
</tbody>
</table>
**Troubleshooting**

**To check the unit control board for proper operation:**

1. Disconnect thermostat wires at the control board.
2. Jumper the desired test input (Y1, Y2, W, O, or G) to the R terminal with the SW2-8 in the “OFF” position to simulate a thermostat signal.
3. If control functions properly:
   - Check for thermostat and field control wiring (use the diagnostic inputs mode).
4. If control responds improperly:
   - Ensure that component being controlled is functioning (Compressor, Blower, Reversing Valve, etc.)
   - Ensure that wiring from control to the component is functioning (use the diagnostic outputs mode).
   - If steps above check properly, replace unit control.

**Note:** Verify that air and water flow rates are at proper levels before servicing the refrigerant circuit.

### LED Definition

<table>
<thead>
<tr>
<th>LED</th>
<th>NORMAL DISPLAY MODE</th>
<th>CURRENT FAULT STATUS</th>
<th>DIAGNOSTIC MODES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Field Selection DIPs:</td>
<td>1-Off, 6-Off, 7-On</td>
<td>INPUTS</td>
</tr>
<tr>
<td>Drain</td>
<td>1-On, 6-On, 7-On</td>
<td>1-Off, 6-Off, 7-On</td>
<td>1-N/A, 6-Off, 7-On</td>
</tr>
<tr>
<td>Water Flow</td>
<td>Drain Pan Overflow Lockout</td>
<td>Drain Pan Overflow</td>
<td>Y1</td>
</tr>
<tr>
<td>Water Flow</td>
<td>FP Thermistor (Loop &lt;15°F Well&lt;30°F) Lockout</td>
<td>FP Thermistor (Loop&lt;15°F, Well&lt;30°F)</td>
<td>Y2</td>
</tr>
<tr>
<td>High Pressure</td>
<td>High Pressure &gt;380 PSI Lockout</td>
<td>High Pressure &gt;380 PSI</td>
<td>O</td>
</tr>
<tr>
<td>Low Pressure</td>
<td>Low Pressure &lt;15 PSI Lockout</td>
<td>Low Pressure &lt;15 PSI</td>
<td>G</td>
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<td>Airflow</td>
<td>ECM2 RPM&lt;100 RPM Lockout</td>
<td>ECM2 RPM &lt;100 RPM</td>
<td>W</td>
</tr>
<tr>
<td>Status</td>
<td>Microprocessor Malfunction</td>
<td>Not Used</td>
<td>SL1</td>
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<td>DHW Limit</td>
<td>HWL Thermistor &gt;130°F</td>
<td>HWL Thermistor &gt;130°F</td>
<td>Not Used</td>
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<tr>
<td>DHW Off</td>
<td>DHW Pump Switch Off</td>
<td>DHW Pump Switch Off</td>
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### Typical Superheat/Subcooling

<table>
<thead>
<tr>
<th>ENTERING WATER TEMPERATURE</th>
<th>HEATING</th>
<th>COOLING</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SUPERHEAT</td>
<td>SUBCOOLING</td>
</tr>
<tr>
<td>30</td>
<td>9 - 14</td>
<td>5 - 9</td>
</tr>
<tr>
<td>50</td>
<td>10 - 14</td>
<td>5 - 9</td>
</tr>
<tr>
<td>70</td>
<td>12 - 16</td>
<td>5 - 8</td>
</tr>
<tr>
<td>90</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

### Typical Suction & Discharge Pressures

<table>
<thead>
<tr>
<th>ENTERING WATER TEMPERATURE</th>
<th>HEATING</th>
<th>COOLING</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SUCTION</td>
<td>DISCHARGE</td>
</tr>
<tr>
<td>30</td>
<td>35 - 45</td>
<td>170 - 200</td>
</tr>
<tr>
<td>50</td>
<td>55 - 65</td>
<td>185 - 220</td>
</tr>
<tr>
<td>70</td>
<td>70 - 90</td>
<td>200 - 240</td>
</tr>
<tr>
<td>90</td>
<td>90 - 110</td>
<td>220 - 260</td>
</tr>
</tbody>
</table>
Preventive Maintenance

Water Coil Maintenance
1. Keep all air out of the water. An open loop system should be checked to ensure that the well head is not allowing air to infiltrate the water line. Lines should always be airtight.
2. Keep the system under pressure at all times. It is recommended in open loop systems that the water control valve be placed in the discharge line to prevent loss of pressure during off cycles. Closed loop systems must have positive static pressure.

Note: On open loop systems, if the installation is in an area with a known high mineral content (125 PPM or greater) in the water, it is best to establish with the owner a periodic maintenance schedule so the coil can be checked regularly. Should periodic coil cleaning be necessary, use standard coil cleaning procedures which are compatible with either the cupronickel or copper water lines. Generally, the more water flowing through the unit the less chance for scaling.

Other Maintenance

Air Coil
To obtain maximum performance, the air coil should be cleaned before startup. A 10% solution of dishwasher detergent and water is recommended for both sides of coil; a thorough water rinse should follow.

CAUTION: Fin edges are sharp.

Fan Motors (ECM & PSC)
Blower Motors are equipped with sealed ball bearings and require no periodic oiling.

Desuperheater Coils
See Water Coil Maintenance section.

Filters
Filters must be clean to obtain maximum performance. They should be inspected monthly under normal operating conditions and be replaced when necessary. Units should never be operated without a filter.

Condensate Drain
In areas where airborne bacteria produce a sludge in the drain pan, it may be necessary to treat chemically to minimize the problem. The condensate drain can pick up lint and dirt, especially with dirty filters. Inspect twice a year to avoid the possibility of overflow.

Air Coil
The air coil must be cleaned to obtain maximum performance. Check once a year under normal operating conditions and, if dirty, brush or vacuum clean. Care must be taken not to damage the aluminum fins while cleaning.

Replacement Procedures

Obtaining Parts
When ordering service or replacement parts, refer to the model number and serial number of the unit as stamped on the serial plate attached to the unit. If replacement parts are required, mention the date of installation of the unit and the date of failure, along with an explanation of the malfunctions and a description of the replacement parts required.

In-warranty Material Return
Material may not be returned except by permission of authorized warranty personnel. Contact your local distributor for warranty return authorization and assistance.