Installation, Operation and Maintenance Instructions

NOTE: Read the entire instruction manual before starting the installation.

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SAFETY CONSIDERATIONS

Improper installation, adjustment, alteration, service, maintenance, or use can cause explosion, fire, electrical shock, or other conditions which may cause death, personal injury, or property damage. Consult a qualified installer, service agency, or your distributor or branch for information or assistance. The qualified installer or agency must use factory-authorized kits or accessories when modifying this product. Refer to the individual instructions packaged with the kits or accessories when installing. Follow all safety codes. Wear safety glasses, protective clothing, and work gloves. Use quenching cloth for brazing operations. Have fire extinguisher available. Read these instructions thoroughly and follow all warnings or cautions included in literature and attached to the unit. Consult local building codes and current editions of the National Electrical Code (NEC) NFPA 70. In Canada, refer to current editions of the Canadian electrical code CSA 22.1.

Recognize safety information. This is the safety-alert symbol. When you see this symbol on the unit and in instructions or manuals, be alert to the potential for personal injury. Understand these signal words; DANGER, WARNING, and CAUTION. These words are used with the safety-alert symbol. DANGER identifies the most serious hazards which will result in severe personal injury or death. WARNING signifies hazards which could result in personal injury or death. CAUTION is used to identify unsafe practices which would result in minor personal injury or product and property damage. NOTE is used to highlight suggestions which will result in enhanced installation, reliability, or operation.

**WARNING**

ELECTRICAL SHOCK HAZARD

Failure to follow this warning could result in personal injury or death. Before installing, modifying, or servicing system, main electrical disconnect switch must be in the OFF position. There may be more than 1 disconnect switch. Lock out and tag switch with a suitable warning label.

**WARNING**

UNIT OPERATION AND SAFETY HAZARD

Failure to follow this warning could result in personal injury or equipment damage. Puron® refrigerant systems operate at higher pressures than standard R-22 systems. Do not use R-22 service equipment or components on Puron® refrigerant equipment.
GENERAL DESCRIPTION

The GW Water-to-Water Heat Pumps provide the best combination of performance and efficiency available. All units are performance certified to American Heating and Refrigeration Institute (AHRI) ISO Standard 13256-2. All GW Water-to-Water Heat Pumps conform to UL1995 standard and are certified to CAN/CSA C22.2 No 236 by Intertek-ETL. The GW Water-to-Water Heat Pumps are designed to operate with entering fluid temperature between 30°F to 90°F in the heating mode and between 50°F to 110°F in the cooling mode.

IMPORTANT: A heat pump operating under extreme conditions will have limitations on air/fluid flow rates and/or temperatures.

UNIT INSTALLATION

LOCATION AND SELECTION

Install the unit in an indoor area that allows easy access to the panels, and has enough room for service personnel to perform maintenance or repair. Provide sufficient room to make fluid, electrical, and duct connection(s).

IMPORTANT: These units are not approved for outdoor installation; therefore, they must be installed inside a structure in a conditioned space. Do not locate in areas that are subject to freezing.

INSTALLATION

The series unit must be mounted level on a vibration absorbing pad slightly larger than the base to minimize vibration transmission to the building structure. It is not necessary to anchor the unit to the floor (see Fig. 2).

MOVING AND STORAGE

If the equipment is not needed for immediate installation upon its arrival at the job site, it should be left in its shipping carton and stored in a clean and dry area. Units must only be stored or moved in the normal upright position as indicated by the “UP” arrows on each carton at all times.

CAUTION

UNIT DAMAGE HAZARD

Failure to follow this Caution could result in unit damage.

50°F Minimum Entering Water Temperature (EWT) is recommended for water applications with sufficient water flow to prevent freezing. Antifreeze solution is required for all closed-loop applications and EWT below 50°F.

Geothermal applications should have sufficient antifreeze solution to protect against extreme conditions and equipment failure. Frozen water coils are not covered under warranty. Other equivalent methods of temperature control are acceptable.
Piping
Supply and return piping must be as large as the unit connections on the heat pump (larger on long runs).
Flexible hoses should be used between the unit and the rigid system to avoid possible vibration.
IMPORTANT: Never use flexible hoses of a smaller inside diameter than that of the fluid connections on the unit.

Units are supplied with either a copper or optional cupro-nickel. Water to refrigerant Heat Exchanger. Copper is adequate for ground water that is not high in mineral content (See Table 5).

NOTE: Proper testing is required to ensure the well water quality is suitable for use with water source equipment. When in doubt, use cupro-nickel (see Table 5: Water Quality Table).

In conditions anticipating moderate scale formation or in brackish water a cupro-nickel heat exchanger is recommended.
Both the supply and discharge water lines will sweat if subjected to low-water temperature. These lines must be insulated to prevent damage from condensation.

All manual flow valves used in the system must be ball valves. Globe and gate valves must not be used due to their high-pressure drop and poor throttling characteristics.

Ball valves should be installed in the supply and return lines for unit isolation and unit water flow balancing.

**CAUTION**

UNIT DAMAGE HAZARD

Failure to follow this caution could result in unit equipment damage.
Never exceed the recommended water flow rates as per AHRI ratings since serious damage or erosion of the water-to-refrigerant heat exchanger could occur.

Always check carefully for water leaks and repair appropriately.
Units are equipped with female pipe thread fittings. Consult Unit Dimensional Drawings in this document.

IMPORTANT: Teflon tape sealer should be used when connecting water piping connections to the units to ensure against leaks and possible heat exchanger fouling.

IMPORTANT: Do not overtighten the connections

Electrical
Refer to electrical component box layout. (See Fig. 3)

IMPORTANT: Field wiring must comply with local and national electric codes.

**CAUTION**

UNIT OPERATION DAMAGE HAZARD

Failure to follow this caution could result in unit damage or improper operation.
Power to the unit must be within the operating voltage range indicated on the unit’s nameplate or on the performance data sheet.
Operation of unit on improper line voltage or with excessive phase imbalance will be hazardous to the unit, constitutes abuse and may void the warranty.

Properly-sized fuses or HACR circuit breakers must be installed for branch circuit protection. See the unit nameplate for maximum fuse or breaker size.

The unit is provided with a concentric knock-out for attaching common trade sizes of conduit. Route power supply wiring through this opening. Always connect the ground lead to the grounding lug provided in the control box and power leads to the line side of compressor contactor as indicated on the wiring diagrams.

Low voltage field wiring should enter a grommet on the right. High voltage should enter a grommet on the left. Keep separation from low and high voltage. Copper conductors only.
SPECIFIC APPLICATION CONSIDERATIONS
Well Water Systems

Copper is adequate for ground water that is not high in mineral content. Should your well driller express concern regarding the quality of the well water available or should any known hazards exist in your area, we recommend proper testing to ensure the well water quality is suitable for use with water source equipment (See Table 5 - Water Quality table). In conditions anticipating moderate scale formation or in brackish water a cupro-nickel heat exchanger is recommended. In well water applications, water pressure must always be maintained in the heat exchanger. This can be accomplished with either a control valve or a bladder-type expansion tank.

When using a single water well to supply both domestic water and the heat pump, care must be taken to ensure that the well can provide sufficient flow for both. In well water applications, a slow-closing solenoid valve must be used and installed on the leaving-water side of coaxial to prevent water hammer. Solenoid valves should be connected across Y1 and C for all. Make sure that the VA draw of the valve does not exceed the contact rating of the controls (See Fig. 4).

[1] Pressure Tank
[2] Ball Valves
[3] Solenoid Valve
[4] Hose Kit
[5] P/T Kit
[6] Load-Side Connections
[7] Low-Voltage Control Connection
[8] Vibration Pad
[9] Line-Voltage Control Connection

Fig. 4 – Typical well water setup
Geothermal Systems

Closed-loop and pond applications require specialized design knowledge. No attempt at these installations should be made unless the dealer/loop installer has received specialized training. Using factory recommended accessories in the Geothermal Accessories Catalog makes the installation of flow centers easy. Anti-freeze solutions are utilized when low-evaporating conditions are expected to occur. Refer to the flow center or flush cart installation manuals for specific instructions.

![Diagram of Geothermal System Setup]

This diagram shows a typical installation and is for illustration purposes only. Ensure access to Heat Pump is not restricted.

1. Polybutylene or Polyethelene with insulation
2. Flow Center
3. Ground loop connection kit
4. P/T ports
5. Load-side connection
6. Low-voltage control connection
7. Vibration pad
8. Line voltage disconnect

Fig. 5 – Typical Geothermal System Setup
POST-INSTALLATION SYSTEM CHECKOUT
After completing the installation and before energizing the unit, the following system checks MUST be made:

1. Verify that the supply voltage to the heat pump is in accordance with the nameplate ratings.
2. Make sure that all electrical connections are tight and secure.
3. Check the electrical fusing and wiring for the correct size.

4. Verify that the low-voltage wiring between the thermostat and the unit is correct.
5. Verify that the water piping is complete and correct.
6. Check that the water flow is correct and adjust if necessary.
7. Verify that vibration isolation has been provided.
8. Ensure the unit is serviceable.
9. Confirm that all access panels are secured in place.

SYSTEM OPERATION
UNIT START-UP
IMPORTANT: Be aware that initial start-up is best in cooling mode, and condensation may be generated on system/application piping during cooling mode. Precautions should be taken to remove condensate/condensation to avoid property damage.

1. Set the thermostat to the highest setting.
2. Set the thermostat system switch to “COOL.” The reversing valve solenoid should energize. The compressor should not run.
3. Reduce the thermostat setting approximately five degrees below the room temperature.
4. Verify the heat pump is operating in the cooling mode.
5. Turn the thermostat system switch to the “OFF” position. The unit should stop running and the reversing valve should de-energize.
6. Leave the unit off for approximately five minutes to allow for system equalization.
7. Turn the thermostat to the lowest setting.
8. Set the thermostat switch to “HEAT.”
9. Increase the thermostat setting approximately five degrees above the room temperature.
10. Verify the heat pump is operating in the heating mode.
11. Set the thermostat to maintain the desired space temperature.
12. Check for vibrations, leaks, etc.

Also see Initial Start-Up of a HRP System in this document.

SEQUENCE OF OPERATION
Cooling Mode
Energizing the “O” terminal energizes the unit reversing valve thus placing the unit into cooling mode. When the thermostat calls for first-stage cooling (Y1) the loop pump or solenoid valve, if present, is energized and the first stage of the compressor capacity starts.

When the thermostat calls for second-stage cooling (Y2) the second stage (or full-compressor capacity) is initiated. Once the thermostat is satisfied, the compressor shuts down accordingly.

Heating Mode
The first two stages of heating (Y1 & Y2) operate in the same manner as cooling but with the reversing valve de-energized. Once the thermostat is satisfied, the compressor shuts down.
OPTIONS

Heat Recovery Package (HRP)
The heat recovery package is a factory-installed option on GW series heat pumps. The HRP can be used to heat potable water during unit operation using waste heat from the compressor discharge gas. In some cases, the HRP can provide most or all of the hot water requirements for a typical home when installed in a conditioned space and no risk for freezing water in HRP loop is present.

The HRP consists of three major components:
• Double-wall, vented refrigerant-to-water heat exchanger
• Circulating pump
• Control circuit

The heat exchanger is rated for use with potable water and is acceptable for use as a domestic water heating device in most building codes.

The pump circulates water between the domestic hot water tank and HRP heat exchanger in the Heat Pump. The control circuit ensures that the HRP only operates when there is available heat from the compressor and when the water is within a safe temperature range of below 120°F. When the heat pump compressor operates, the HRP will monitor the temperature of the discharge gas from the compressor. Once discharge gas is hot enough to provide useful heat to the domestic water tank, the circulating pump will be enabled, drawing water from the tank, through the HRP heat exchanger and then depositing the heated water back into the tank. If the water temperature reaches 140°F, the circulating pump is disabled to prevent over heating of the domestic water. The HRP is provided with an on/off switch in case the end user desires that the HRP be inactivated (typically during the winter months when space heating is most important).

UNIT DAMAGE HAZARD
Failure to follow this caution may result in unit damage.
If the heat recovery unit is installed in an area where freezing may occur, the unit must be drained during winter months to prevent heat exchanger damage.
Heat exchanger ruptures that occur due to freezing will void the heat recovery package warranty along with the heat pump warranty.

ACCESSORIES

Pump/Valve Relay
The factory-installed pump relay can be used to energize a supply pump or solenoid valve when there is a call for compressor operation. This relay can be used to switch either high- or low-voltage power.

NOTE: See the Geothermal Accessories Catalog for the complete list of accessories available.
HEAT RECOVERY PACKAGE (HRP) SETUP

Water Tank Preparation
1. Turn off electrical or fuel supply to the water heater.
2. Attach garden hose to water tank drain connection and run other end of hose out doors or to an open drain.
3. Close cold water inlet valve to water heater tank.
4. Drain tank by opening drain valve on the bottom of the tank, then open pressure relief valve or hot water faucet.
5. Once drained the tank should be flushed with cold water until the water leaving the drain hose is clear and free of sediment.
6. Close all valves and remove the drain hose.
7. Install HR water piping.

IMPORTANT: All piping from HRP to domestic water tank must be copper.

All hot water piping MUST be a minimum of 3/8” O.D. copper tubing to a maximum distance of 15 feet. For distances beyond 15 feet but not exceeding 60 feet use 1/2” copper tube. Separately insulate all exposed surface of both connecting water lines with 3/8” wall closed-cell insulation. Install isolation valves on supply and return to the heat recovery.

Refer to local codes for other requirements. Remove the check valve/heat trap valve on the cold inlet dip tube of the heating tank, or the storage tank for dual tank application. Removing this valve will prevent damage to the HRP circulator. It is recommended to hard pipe a heat trap in lieu of this valve for additional energy savings. Install an air bleed, venting waste valve (or other fitting that allows air purge for initial install) on the HRP piping at the highest point. Use a 50 - 80 gallon water heater, or two 50-gallon water heaters connected in series (preferred method) as shown. (See Fig. 6).
**Water Tank Refill**

1. Open the cold water supply to the tank.
2. Open a hot water faucet to vent air from the system until water flows from the faucet, then close.
3. Press the hot water tank pressure relief valve handle to ensure there is no air remaining in the tank.
4. Carefully inspect all plumbing for water leaks. Correct as required.
5. Be sure all air is purged from the HRP piping.
6. Before restoring the power or fuel supply to the water heater, adjust the temperature setting on the tank thermostat(s) to ensure maximum utilization of the heat available from the refrigeration system and conserve the most energy. On tanks with both upper and lower elements and thermostats, the lower element should be turned down to 100°F, while the upper element should be adjusted to 120°F. Depending upon the specific needs of the customer, you may need to adjust the upper element differently. On tanks with a single thermostat, lower the thermostat setting to 120°F or the “LOW” position. After thermostat adjustments are completed, replace access cover and restore electrical or fuel supply to water heater.

**Initial Start-Up of a HRP System**

**IMPORTANT:** Make sure all valves in the heat recovery water piping system are open. **NEVER OPERATE THE HR PUMP DRY.**

1. Turn on the heat pump. The HR pump should not run if the compressor is not running.
2. Turn HR switch to the “ON” position. The pump will operate if entering water temperature to HR is below 120°F.
3. The temperature difference between the water entering and leaving the heat recovery should be 5° to 15°F.
4. "Burp" the HRP pump by unscrewing the slotted bleed screw during pump operation. Tighten screw when air is bled, and water begins to drip. **Do not over-tighten.**
5. Allow the unit to operate for 20 to 30 minutes to ensure it is functioning properly. The pump should shut off when the water temperature entering the heat recovery reaches 120°F.
SAFETY DEVICES AND UPM CONTROLLER

W024, GW036, W048, and GW060 models are equipped with the Unit Protection Module (UPM).

1. Board Power Indicator
2. UPM Status LED Indicator (Fault Status)
3. Water Source Coil Freeze Protection Temperature Selection (R30, FREEZE 1)
4. Load Water Coil Freeze Protection Temperature Selection (R24, FREEZE 2)
5. UPM Board Settings
6. Source Coax Freeze Connection (FREEZE 1)
7. Load Coax Freeze Connection (FREEZE 2)
8. LCD Unit Display Connection (Not Applicable to Water-to-Water Units)
9. 24VAC Power Input (R)
10. Compressor Contact Output (Y1 Output)
11. High-Pressure Switch Connection
12. Call for Compressor (Y1 24VAC Input)
13. Low-Pressure Switch Connection
14. 24VAC Power Common (C)
15. Condensate overflow Sensor (Not Applicable to Water-to-Water Units)
16. Dry Contact
17. UPM Ground Standoff

NOTE: When a malfunction light is used for diagnostic purposes, the connection is made at the dry contact connection terminals of the UPM board. Shown in Fig. 7.

NOTE: If the thermostat is provided with a malfunction light powered off of the common (C) side of the transformer, a jumper between “R” and “COM” terminal of “ALR” contacts must be installed.

The GW Series is equipped with the Unit Protection Module (UPM) that controls the compressor operation and monitors the safety controls that protect the unit.

Safety controls include the following:

• Water-side freeze protection sensor, mounted close to condensing water coil, monitors refrigerant temperature between condensing water coil and thermal expansion valve. If temperature drops below or remains at freeze limit trip for 30 seconds, the controller will shut down the compressor and enter into a soft-lockout condition. The default freeze limit trip is 26°F; however, this can be changed to 15°F by cutting the R30 or Freeze1 resistor located on top of DIP switch SW1 (Refer to Fig. 7, item 3 for resistor location), refer to Fig. 8 for sensor location.

NOTE: The UPM Board Dry Contacts are Normally Open (NO).

UNIT DAMAGE HAZARD

Failure to follow this caution could result in unit damage.

If the unit is employing a fresh water system (no anti-freeze protection), it is extremely important to have the Freeze1 R30 resistor set to 26°F (do not cut R30 resistor) in order to shut down the unit at the appropriate leaving water temperature and protect your heat pump from freezing if a freeze sensor is included.

Table 1 – UPM Board Factory Default Settings

<table>
<thead>
<tr>
<th>UPM Board Factory Default Settings</th>
<th>Temp</th>
<th>Lockout</th>
<th>Reset</th>
<th>Alarm</th>
<th>Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>TEMP</td>
<td>26°F</td>
<td>2</td>
<td>Y</td>
<td>PULSE</td>
<td>NO</td>
</tr>
</tbody>
</table>
The UPM Board includes the following features:

- **ANTI-SHORT CYCLE TIMER**: 5-minute delay on break timer to prevent compressor short cycling.
- **RANDOM START**: Each controller has an unique random start delay ranging from 270 to 300 seconds on initial power up to reduce the chance of multiple unit simultaneously starting at the same time after power up or after a power interruption, thus avoiding creating large electrical spike.
- **LOW-PRESSURE BYPASS TIMER**: If the compressor is running and the low-pressure switch opens, the controller will keep the compressor ON for 120 seconds. After 2 minutes if the low-pressure switch remains open, the controllers will shut down the compressor and enter a soft lockout. The compressor will not be energized until the low-pressure switch closes and the anti-short cycle time delay expires. If the low-pressure switch opens 2 or 4 times in 1 hour, the unit will enter a hard lockout. In order to exit hard lockout power to the unit would need to be reset. The reset signal is either a Y or R signal depending on the position of the dip switch as shown in Table 2. If the reset is set to R, the board must be manually powered off and powered back on to exit the hard lock out.
- **BROWNOUT / SURGE / POWER INTERRUPTION PROTECTION**: The brownout protection in the UPM board will shut down the compressor if the incoming power falls below 18 VAC. The compressor will remain OFF until the voltage is above 18 VAC and ANTI-SHORT CYCLE TIMER (300 seconds) times out. The unit will not go into a hard lockout.
- **MALFUNCTION OUTPUT**: Alarm output is Normally Open (NO) dry contact. If pulse is selected the alarm output will be pulsed. The fault output will depend on the dip switch setting for "ALARM." If it is set to "CONST," a constant signal will be produced to indicate a fault has occurred and the unit requires inspection to determine the type of fault. If it is set to "PULSE," a pulse signal is produced and a fault code is detected by a remote device indicating the fault. For blink code explanation, see Table 9. The remote device must have a malfunction detection capability when the UPM board is set to "PULSE."
- **TEST DIP SWITCH**: A test dip switch is provided to reduce all time delays settings to 10 seconds during troubleshooting or verification of unit operation.

## CAUTION

**UNIT DAMAGE HAZARD**

Failure to follow this caution may result in unit damage.

Operation of unit in test mode can lead to accelerated wear and premature failure of components. The "TEST" switch must be set back to "NO" after troubleshooting/servicing.

- **FREEZE SENSOR**: The default setting for the freeze limit trip is 26°F (sensor number 1); however, this can be changed to 15°F by cutting the R30 resistor located on top of the Dip switch SW1. Since Freeze Sensor 2 is dedicated to monitor the load side coil it is recommended to leave the factory default setting on the board. The UPM controller will constantly monitor the refrigerant temperature with the sensor mounted close to the condensing water coil between the thermal expansion valve and water coil. If temperature drops below or remains at the freeze-limit trip for 30 seconds, the controller will shut the compressor down and enter into a soft-lockout condition. Both the status LED and the Alarm contact will be active. The LED will flash (3 times) the code associated with this alarm condition. If this alarm occurs 2 times (or 4 if Dip switch is set to 4) within an hour the UPM controller will enter into a hard-lockout condition. It will constantly monitor the refrigerant temperature with the sensor mounted close to the evaporator between the thermal expansion valve and evaporator coil as shown in Fig. 8. If temperature drops below or remains at the freeze limit trip for 30 seconds, the controller will shut the compressor down and enter into a soft-lockout condition. Both the status LED and the Alarm contact will be active. The LED will flash 6 times the code associated with this alarm condition. If this alarm occurs 2 times (or 4 if Dip switch is set to 4) within an hour the controller will enter into a hard-lockout condition.

**IMPORTANT**: The freeze sensor will not guard against the loss of water. A flow switch is recommended to prevent unit from running if water flow is lost or reduced.

- **INTELLIGENT RESET**: If a fault condition is initiated, the 5-minute delay on break time period is initiated and the unit will restart after these delays expire. During this period the fault LED will indicate the cause of the fault. If the fault condition still exists or occurs 2 or 4 times (depending on 2 or 4 setting for Lockout dip switch) before 60 minutes, the unit will go into a hard lockout and requires a manual lockout reset.

- **LOCKOUT RESET**: A hard lockout can be reset by turning the unit thermostat off and then back on when the “RESET” dip switch is set to “Y” or by shutting off unit power at the circuit breaker when the “RESET” dip switch is set to “R.”
SAFETY DEVICES AND UPM II CONTROLLER

The GW120 Model is equipped with the Unit Protection Module II (UPM II).

Fig. 9 – UPM II controller board

1. Board Power Indicator
2. UPM II Status LED Indicator (Fault Status)
3. Circuit 1 Freeze Protection Temperature Selection (R17)
4. Circuit 2 Freeze Protection Temperature Selection (R77)
5. UPM II Board Settings
6. Circuit 1 Freeze Connection
7. Circuit 2 Freeze Connection
8. 24VAC Power Input (R)
9. Compressor Contactor 1 Output Circuit
10. Compressor Contactor 2 Output Circuit
11. High-Pressure Circuit 1 Switch Connections
12. Call for Compressor (Y1 24VAC Input)
13. Low-Pressure Circuit 1 Switch Connections
14. Low-Pressure Circuit 2 Switch Connections
15. Call for Compressor 2 (Y1 24VAC Input)
16. High-Pressure Circuit 2 Switch Connections
17. Condensate Overflow Sensor (Not applicable for Water-to-Water Units)
18. Dry Contact
19. Chassis Ground Connection

IMPORTANT: When a malfunction light is used for diagnostic purposes, the connection is made at the dry contact connection terminals of the UPMII board. Shown in Fig. 9.

The UPM II controls the compressor operations and monitors the safety controls that protect the unit.

Safety controls include the following:

- **High-pressure switches**: located in the refrigerant discharge lines and wired across terminals HP1 and HP2 on the UPM II.
- **Low-pressure switches**: located in the unit refrigerant suction lines and wired across terminals LP1 and LP2 on the UPM II.
- **Water-side freeze protection sensors**: mounted close to the load and source condensing water coils, monitor refrigerant temperature between condensing water coils and thermal expansion valves. If temperature drops below or remains at freeze limit trip for 30 seconds, the controller will shut down the compressors and enter into a soft-lockout condition. The default freeze limit trip is 26°F; however, this can be changed to 15°F by cutting the R17 Freeze1 resistor and the R77 Freeze2 resistor located on top of DIP switch SW1 (Refer to Fig. 9, item [3] for resistor location), refer to Fig. 10 for sensor location.

NOTE: The UPM II Board Dry Contacts are Normally Open (NO).

UNIT DAMAGE HAZARD

Failure to follow this caution could result in unit damage.

If the unit is employing a fresh water system (no anti-freeze protection), it is extremely important to have the Freeze1 R17 and Freeze2 R77 resistor set to 26°F (do not cut R17 or R77 resistor) in order to shut down the unit at the appropriate leaving water temperature and protect your heat pump from freezing if a freeze sensor is included.

Table 3 – UPM II Board Factory Default Settings

<table>
<thead>
<tr>
<th>Setting</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>TEMP</td>
<td>26°F</td>
</tr>
<tr>
<td>LOCKOUT</td>
<td>2</td>
</tr>
<tr>
<td>RESET</td>
<td>Y</td>
</tr>
<tr>
<td>ALARM</td>
<td>PULSE</td>
</tr>
<tr>
<td>TEST</td>
<td>NO</td>
</tr>
</tbody>
</table>

Table 4 – UPM DIP Switch Selectable Positions

<table>
<thead>
<tr>
<th>Setting</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lockout</td>
<td>4 2</td>
</tr>
<tr>
<td>Reset</td>
<td>R Y</td>
</tr>
<tr>
<td>Alarm</td>
<td>Cont Pulse</td>
</tr>
<tr>
<td>Test</td>
<td>Yes No</td>
</tr>
</tbody>
</table>

For Reference Only
The UPMII Board includes the following features:

- **ANTI-SHORT CYCLE TIMER**: 5-minute delay on break timer to prevent compressor short cycling.

- **RANDOM START**: Each controller has a unique random start delay ranging from 270 to 300 seconds on initial power up to reduce the chance of multiple unit simultaneously starting at the same time after power up or after a power interruption, thus avoiding creating large electrical spike.

- **LOW-PRESSURE BYPASS TIMER**: If the compressor is running and the low-pressure switch opens, the controller will keep the compressor ON for 120 seconds. After 2 minutes if the low-pressure switch remains open, the controllers will shut down the compressor and enter a soft lockout. The compressor will not be energized until the low-pressure switch closes and the anti-short cycle time delay expires. If the low-pressure switch opens 2 or 4 times in 1 hour, the unit will enter a hard lockout. In order to exit hard lockout power to the unit would need to be reset. The reset signal is either a Y or R signal depending on the position of the dip switch as shown in Table 4. If the reset is set to R, the board must be manually powered off and powered back on to exit the hard lockout.

- **BROWNOUT/SURGE/POWER INTERRUPTION PROTECTION**: The brownout protection in the UPM II board will shut down the compressor if the incoming power falls below 18 VAC. The compressor will remain OFF until the voltage is above 18 VAC and ANTI-SHORT CYCLE TIMER (300 seconds) times out. The unit will not go into a hard lockout.

- **MALFUNCTION OUTPUT**: Alarm output is Normally Open (NO) dry contact. If pulse is selected the alarm output will be pulsed. The fault output will depend on the dip switch setting for "ALARM." If it is set to "CONST," a constant signal will be produced to indicate a fault has occurred and the unit requires inspection to determine the type of fault. If it is set to "PULSE," a pulse signal is produced and a fault code is detected by a remote device indicating the fault. For blink code explanation, see Table 10. The remote device must have a malfunction detection capability when the UPM II board is set to "PULSE."

**NOTE**: If 24 VAC output is needed, R must be wired to ALR-COM terminal; 24 VAC will be available to the ALR-OUT terminal when the unit is in the alarm condition.

- **TEST DIP SWITCH**: A test dip switch is provided to reduce all time delays settings to 10 seconds during troubleshooting or verification of unit operation.

**CAUTION**

**UNIT DAMAGE HAZARD**

Failure to follow this caution could result in unit damage. Operation of unit in test mode can lead to accelerated wear and premature failure of components. The "TEST" switch must be set back to "NO" after troubleshooting/servicing.

**FREEZE SENSOR**: The default setting for the freeze limit trip is 26°F; however, this can be changed to 15°F by cutting the R17 and R77 resistors located on top of the DIP switch SW1. The UPM II controller will constantly monitor the refrigerant temperature with the sensor mounted close to the water coils between the thermal expansion valve and water coil. If temperature drops below or remains at the freeze-limit trip for 30 seconds, the controller will shut the compressor down and enter into a soft-lockout condition. Both the status LED and the Alarm contact will be active. The LED will flash (3 times) the code associated with this alarm condition. If this alarm occurs 2 times (or 4 if Dip switch is set to 4) within an hour the UPM II controller will enter into a hard-lockout condition. It will constantly monitor the refrigerant temperature with the sensor mounted close to the evaporator between the thermal expansion valve and evaporator coil as shown in Table 10. If temperature drops below or remains at the freeze limit trip for 30 seconds, the controller will shut the compressor down and enter into a soft-lockout condition. Both the status LED and the Alarm contact will be active. The LED will flash 6 times the code associated with this alarm condition. If this alarm occurs 2 times (or 4 if Dip switch is set to 4) within an hour the controller will enter into a hard-lockout condition.

**IMPORTANT**: The freeze sensor will not guard against the loss of water. A flow switch is recommended to prevent unit from running if water flow is lost or reduced.

- **INTELLIGENT RESET**: If a fault condition is initiated, the 5-minute delay on break time period is initiated and the unit will restart after these delays expire. During this period the fault LED will indicate the cause of the fault. If the fault condition still exists or occurs 2 or 4 times (depending on 2 or 4 setting for Lockout dip switch) before 60 minutes, the unit will go into a hard lockout and requires a manual lockout reset.

- **LOCKOUT RESET**: A hard lockout can be reset by turning the unit thermostat off and then back on when the “RESET” dip switch is set to “Y” or by shutting off unit power at the circuit breaker when the “RESET” dip switch is set to “R.”
### Table 5 – Water Quality Table

<table>
<thead>
<tr>
<th>POTENTIAL PROBLEM</th>
<th>Water Characteristic</th>
<th>Acceptable Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Copper</td>
</tr>
<tr>
<td></td>
<td>pH (Acidity/Alkalinity)</td>
<td>7–9</td>
</tr>
<tr>
<td>SCALING</td>
<td>Hardness (CaCO₃, MgCO₃)</td>
<td>&lt; 350 ppm</td>
</tr>
<tr>
<td></td>
<td>Ryznar Stability Index</td>
<td>6.0–7.5</td>
</tr>
<tr>
<td></td>
<td>Langelier Saturation Index</td>
<td>-0.5 – +0.5</td>
</tr>
<tr>
<td>CORROSION</td>
<td>Hydrogen Sulfide (H₂S)</td>
<td>&lt; 0.5 ppm*</td>
</tr>
<tr>
<td></td>
<td>Sulfates</td>
<td>&lt; 125 ppm</td>
</tr>
<tr>
<td></td>
<td>Chlorine</td>
<td>&lt; 0.5 ppm</td>
</tr>
<tr>
<td></td>
<td>Chlorides</td>
<td>&lt; 20 ppm</td>
</tr>
<tr>
<td></td>
<td>Carbon Dioxide</td>
<td>&lt; 50 ppm</td>
</tr>
<tr>
<td></td>
<td>Ammonia</td>
<td>&lt; 2 ppm</td>
</tr>
<tr>
<td></td>
<td>Ammonia Chloride</td>
<td>&lt; 0.5 ppm</td>
</tr>
<tr>
<td></td>
<td>Ammonia Nitrate</td>
<td>&lt; 0.5 ppm</td>
</tr>
<tr>
<td></td>
<td>Ammonia Hydroxide</td>
<td>&lt; 0.5 ppm</td>
</tr>
<tr>
<td></td>
<td>Ammonia Sulfate</td>
<td>&lt; 0.5 ppm</td>
</tr>
<tr>
<td></td>
<td>Dissolved Solids</td>
<td>&lt; 1,000 ppm</td>
</tr>
<tr>
<td>IRON FOULING</td>
<td>Iron (Fe²⁺ Iron Bacteria Potential)</td>
<td>&lt; 0.2 ppm</td>
</tr>
<tr>
<td></td>
<td>Iron Oxide</td>
<td>&lt; 1 ppm</td>
</tr>
<tr>
<td>EROSION</td>
<td>Suspended Solids</td>
<td>&lt; 10 ppm, &lt; 600 µm size**</td>
</tr>
<tr>
<td></td>
<td>Maximum Water Velocity</td>
<td>6 ft/sec</td>
</tr>
</tbody>
</table>

* No "rotten egg" smell present at < 0.5 ppm H₂S.
** Equivalent to 30 mesh strainer
# TROUBLESHOOTING

## IMPORTANT:
A possible fault may be one or a combination of causes and solutions. Check each cause and verify each before making any conclusion.

## Table 6 – Unit Troubleshooting

<table>
<thead>
<tr>
<th>PROBLEM</th>
<th>POSSIBLE CAUSE</th>
<th>CHECKS AND CORRECTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENTIRE UNIT DOES NOT RUN</td>
<td>Power Supply Off</td>
<td>Close disconnect, apply power</td>
</tr>
<tr>
<td></td>
<td>Blown Fuse/Tripped Breaker</td>
<td>Replace fuse or rest circuit breaker. If using fuses, ensure they are the correct size.</td>
</tr>
<tr>
<td></td>
<td>Voltage Supply Low</td>
<td>If voltage is below minimum voltage specified on unit data plate, contact local power company.</td>
</tr>
<tr>
<td>UNIT OFF DUE TO HIGH-PRESSURE CONTROL</td>
<td>Discharge Pressure is Too High</td>
<td>If in “COOLING” mode: Lack of or inadequate water flow. Entering water temperature is too warm. Scaled or plugged condenser. If in “HEATING” mode: Lack of or inadequate load side fluid flow.</td>
</tr>
<tr>
<td></td>
<td>Refrigerant Charge</td>
<td>The unit is overcharged with refrigerant. Reclaim refrigerant, evacuate and recharge with factory recommended charge.</td>
</tr>
<tr>
<td></td>
<td>High-Pressure Switch</td>
<td>Check for a defective or improperly calibrated high-pressure switch.</td>
</tr>
<tr>
<td></td>
<td>High-Pressure Fault</td>
<td>If the unit has UMC and a 40°F freeze sensor is being used, this sensor is in series with HP switch and this will show as a HP fault and not a freeze fault.</td>
</tr>
<tr>
<td>UNIT OFF TO LOW-PRESSURE CONTROL</td>
<td>Suction Pressure Too Low</td>
<td>If in “COOLING” mode: Lack of or inadequate Source side fluid. flow. Entering water temperature is too cold. If in “HEATING” mode: Lack of or inadequate water flow. Entering water temperature is too cold. Scaled or plugged condenser.</td>
</tr>
<tr>
<td></td>
<td>Refrigerant Charge</td>
<td>The unit is low on refrigerant. Check for refrigerant leak, repair, evacuate and recharge with factory recommended charge.</td>
</tr>
<tr>
<td></td>
<td>Low-Pressure Switch</td>
<td>Check for defective or improperly calibrated low-pressure switch.</td>
</tr>
<tr>
<td></td>
<td>Low-Pressure Fault</td>
<td>If the unit has UMC and the DPS option is being used, this sensor is in series with LP switch and this will show as a LP fault and not a DPS fault.</td>
</tr>
<tr>
<td>UNIT SHORT CYCLES</td>
<td>Unit Oversized</td>
<td>Recalculate heating and or cooling loads.</td>
</tr>
<tr>
<td></td>
<td>Thermostat</td>
<td>If the thermostat is installed near a supply air grill, relocate thermostat. Adjust the heat anticipator.</td>
</tr>
<tr>
<td></td>
<td>Wiring and Controls</td>
<td>Check for defective or improperly calibrated low-pressure switch.</td>
</tr>
<tr>
<td>INSUFFICIENT COOLING OR HEATING</td>
<td>Unit Undersized</td>
<td>Recalculate heating and or cooling loads. If excessive, possibly adding insulation and shading will rectify the problem.</td>
</tr>
<tr>
<td></td>
<td>Fluid Flow</td>
<td>Check for the lack of adequate fluid flow.</td>
</tr>
<tr>
<td></td>
<td>Refrigerant Charge</td>
<td>Refrigerant charge low causing inefficient operation.</td>
</tr>
<tr>
<td></td>
<td>Compressor</td>
<td>Check for defective compressor. If discharge is too low and suction pressure is too high, compressor is not pumping properly. Replace compressor.</td>
</tr>
<tr>
<td></td>
<td>Reversing Valve</td>
<td>Defective reversing valve creating bypass of refrigerant from discharge of suction side of compressor. Replace reversing valve.</td>
</tr>
<tr>
<td></td>
<td>Operating Pressures</td>
<td>Compare unit operation pressures to the pressure/temperature chart for the unit.</td>
</tr>
<tr>
<td></td>
<td>TXV</td>
<td>Check TXV for possible restriction or defect. Replace if necessary.</td>
</tr>
<tr>
<td></td>
<td>Moisture, Non-condensables</td>
<td>The refrigerant system may be contaminated with moisture or non-condensables. Reclaim refrigerant, replace filter dryer, evacuate the refrigerant system, and recharge with factory recommended charge.</td>
</tr>
</tbody>
</table>
**Table 7 – HRP Troubleshooting**

<table>
<thead>
<tr>
<th>Problem</th>
<th>Possible Cause</th>
<th>Checks and Corrections</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO FLOW LOW FLOW</td>
<td>No Power</td>
<td>Check the power supply.</td>
</tr>
<tr>
<td></td>
<td>On/Off Switch Position</td>
<td>Set switch to “ON” position.</td>
</tr>
<tr>
<td></td>
<td>Compressor Contactor</td>
<td>Engage the heat pump contactor.</td>
</tr>
<tr>
<td></td>
<td>Broken or loose wires</td>
<td>Repair or tighten the wires.</td>
</tr>
<tr>
<td></td>
<td>Air Lock</td>
<td>Purge the air from piping system.</td>
</tr>
<tr>
<td></td>
<td>Stuck Pump Shaft/Impeller</td>
<td>Remove the pump cartridge and clean.</td>
</tr>
<tr>
<td></td>
<td>Defective Pump</td>
<td>Replace the pump.</td>
</tr>
<tr>
<td></td>
<td>Kinked or Undersized Water Piping</td>
<td>Repair the kink and check for proper line size.</td>
</tr>
<tr>
<td>HIGH-WATER TEMPERATURE</td>
<td>Water Temp Limit Closed</td>
<td>Check for a stuck limit switch.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Check for a sensor not securely attached to the line.</td>
</tr>
<tr>
<td>LOW HEAT OUTPUT</td>
<td>Scaled or Fouled Heat Exchanger</td>
<td>Clean the heat exchanger.</td>
</tr>
</tbody>
</table>

**Unit Lockouts**

Periodic lockouts almost always are caused by water flow problems. The lockout (shutdown) of the unit is a normal protective measure in the design of the equipment. If continual lockouts occur call a mechanic immediately and have them check for: water flow problems, water temperature problems. Use of the pressure and temperature charts for the unit may be required to properly determine the cause.
## ELECTRICAL DATA

**Table 8 – Electric Data Table**

<table>
<thead>
<tr>
<th>Model</th>
<th>Voltage Code</th>
<th>Rated Voltage</th>
<th>Voltage Min/Max</th>
<th>Compressor</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>QTY</td>
<td>RLA</td>
</tr>
<tr>
<td>W024</td>
<td>1</td>
<td>208–230/60/1</td>
<td>197/253</td>
<td>1</td>
</tr>
<tr>
<td>W036</td>
<td>1</td>
<td>208–230/60/1</td>
<td>197/253</td>
<td>1</td>
</tr>
<tr>
<td>W048</td>
<td>1</td>
<td>208–230/60/1</td>
<td>197/253</td>
<td>1</td>
</tr>
<tr>
<td>W060</td>
<td>1</td>
<td>208–230/60/1</td>
<td>197/253</td>
<td>1</td>
</tr>
<tr>
<td>GW120</td>
<td>1</td>
<td>208–230/60/1</td>
<td>197/253</td>
<td>2</td>
</tr>
</tbody>
</table>

### UPM LED STATUS INDICATOR (Blink Code) DATA

The LED status indicator is found on the UPM boards. See Fig. 7 for the UPM Board.

**Table 9 – UPM LED Status Indications**

<table>
<thead>
<tr>
<th>Indication Color</th>
<th>Blinks</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GREEN</td>
<td>Solid</td>
<td>18–30 VAC power is present</td>
</tr>
<tr>
<td>RED</td>
<td>1</td>
<td>High-pressure lockout</td>
</tr>
<tr>
<td>RED</td>
<td>2</td>
<td>Low-pressure lockout</td>
</tr>
<tr>
<td>RED</td>
<td>3</td>
<td>Freeze 1 sensor lockout</td>
</tr>
<tr>
<td>RED</td>
<td>4</td>
<td>Condensate overflow</td>
</tr>
<tr>
<td>RED</td>
<td>5</td>
<td>Brownout</td>
</tr>
<tr>
<td>RED</td>
<td>6</td>
<td>Freeze 2 sensor lockout</td>
</tr>
</tbody>
</table>

**Table 10 – UPM II LED Status Indications**

<table>
<thead>
<tr>
<th>Indication Color</th>
<th>Blinks</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GREEN</td>
<td>Solid</td>
<td>18–30 VAC power is present</td>
</tr>
<tr>
<td>RED</td>
<td>1</td>
<td>High-pressure lockout — Circuit 1</td>
</tr>
<tr>
<td>RED</td>
<td>2</td>
<td>Low-pressure lockout — Circuit 1</td>
</tr>
<tr>
<td>RED</td>
<td>3</td>
<td>High-pressure lockout — Circuit 2</td>
</tr>
<tr>
<td>RED</td>
<td>4</td>
<td>Low-pressure lockout — Circuit 2</td>
</tr>
<tr>
<td>RED</td>
<td>5</td>
<td>Freeze sensor lockout</td>
</tr>
<tr>
<td>RED</td>
<td>6</td>
<td>Condensate overflow</td>
</tr>
<tr>
<td>RED</td>
<td>7</td>
<td>Brownout</td>
</tr>
</tbody>
</table>
MAINTENANCE

WARNING

ELECTRICAL SHOCK HAZARD
Failure to follow this warning could result in personal injury or death. Before installing, modifying, or servicing system, main electrical disconnect switch must be in the OFF position. There may be more than 1 disconnect switch. Lock out and tag switch with a suitable warning label.

An annual “checkup” by a trained and qualified HVAC mechanic is required. Complete the Unit Start-up Checklist when performing the annual maintenance checkup. Recording the performance measurements of volts, amps, and water temperature differences for both heating and cooling is recommended. This data should be compared to the information on the unit’s data plate and the data taken at the original startup of the equipment.

DECOMISSIONING INFORMATION

Only trained and qualified technicians are allowed to decommission and dispose of equipment following the requirements of the Local Authority Having Jurisdiction (AHJ).

WARNING

PERSONAL INJURY AND ENVIRONMENTAL HAZARD
Failure to follow this warning could result in personal injury or death. Relieve pressure and recover all refrigerant before system repair or final unit disposal. Use all service ports and open all flow-control devices, including solenoid valves. Federal regulations require that you do not vent refrigerant to the atmosphere. Recover during system repair or final unit disposal.
FOR REFERENCE ONLY Actual unit wiring may vary from this example. Always refer to the wiring diagram attached to the unit.
Manufacturer reserves the right to change, at any time, specifications and designs without notice and without obligations.

FOR REFERENCE ONLY. Actual unit wiring may vary from this example. Always refer to the wiring diagram attached to the unit.

STANDARD COMPONENTS LEGEND:
- FS = FREEZE SENSOR
- HPS = HIGH PRESSURE SWITCH
- LPS = LOW PRESSURE SWITCH
- RV = REVERSING VALVE (HEAT PUMPS)
- RVR = REVERSING VALVE PILOT RELAY
- TSR = THERMISTOR SWITCHING RELAY
- Y2S = 2ND STEP SOLENOID

OPTIONAL COMPONENTS LEGEND:
- CCH = CRANKCASE HEATER
- HRM = HEAT RECOVERY PACKAGE
- HRP = HEAT RECOVERY PUMP
- HML = HOT WATER LIMIT
- SWT = ON/OFF SWITCH OVERLOAD PROTECTION

NOTES:
1. SEE UNIT NAME PLATE FOR ELECTRICAL RATING.
2. ALL FIELD WIRING MUST BE IN ACCORDANCE WITH N.E.C.—N.F.P.A. #70, COPPER CONDUCTORS ONLY.
3. 208/230V UNITS ARE FACTORY WIRED FOR 230V OPERATION. FOR 208V OPERATION, REMOVE ORG LEAD AND REPLACE WITH RED LEAD, CAP ALL UNUSED LEADS.
4. UPM-1 INCLUDES BUILT IN: 270-300 SECOND RANDOM START 300 SECOND DELAY ON BREAK 120 SECOND LOW PRESSURE BYPASS
5. "TEST" DIP SWITCH REDUCES DELAYS TO 10 SEC WHEN SET TO "YES" MUST BE SET TO "NO" FOR NORMAL OPERATION.
6. "FREEZE SENSOR" WILL OPERATE AT 28°F BY DEFAULT, IF 15°F OPERATION IS REQUIRED JUMPER R30 (FS1) AND R24 (FS2) MUST BE OUT IF FREEZE SENSOR IS NOT INSTALLED A JUMPER SHALL BE INSTALLED BETWEEN THE FREEZE SENSOR TERMINALS.
7. "ALARM OUTPUT" DIP SWITCH MUST BE SET TO "PULSE" IF BLANKING T-STAT SERVICE LIGHT IS DESIRED
8. DEFAULT SETTINGS FOR UPM BOARD FROM FACTORY SHOWN. ALSO SEE INSTALLATION MANUAL
9. ALARM OUTPUT IS NORMALLY OPEN (NO) DRY CONTACT. IF 24 VAC IS NEEDED, CONNECT R TO ALR-COM TERMINAL, 24VAC WILL BESENDED ON THE ALR-OUT WHEN THE UNIT IS IN ALARM CONDITION. OUTPUT WILL BE PULSED IF PULSE IS SELECTED.
DIMENSIONAL DRAWINGS

**UNIT FRONT**

**LEFT SIDE**

<table>
<thead>
<tr>
<th>MODEL SIZE</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>J</th>
<th>K</th>
<th>L</th>
<th>M</th>
<th>N</th>
<th>P</th>
<th>Q</th>
<th>R</th>
<th>S</th>
<th>T</th>
<th>WATER CONN</th>
<th>HRP CONN</th>
</tr>
</thead>
<tbody>
<tr>
<td>024</td>
<td>24</td>
<td>32.5</td>
<td>24</td>
<td>2.70</td>
<td>2.50</td>
<td>13.70</td>
<td>2.50</td>
<td>3.25</td>
<td>1.95</td>
<td>14.25</td>
<td>1.95</td>
<td>7.15</td>
<td>11.0</td>
<td>4.25</td>
<td>6.55</td>
<td>8.05</td>
<td>9.55</td>
<td>1.25</td>
<td>3/4 FPT</td>
<td>1/2 FPT</td>
</tr>
<tr>
<td>036</td>
<td>24</td>
<td>32.5</td>
<td>24</td>
<td>2.30</td>
<td>2.55</td>
<td>14.30</td>
<td>2.65</td>
<td>3.80</td>
<td>2.67</td>
<td>15.80</td>
<td>2.67</td>
<td>7.24</td>
<td>11.1</td>
<td>4.31</td>
<td>5.80</td>
<td>8.05</td>
<td>10.3</td>
<td>1.25</td>
<td>3/4 FPT</td>
<td>1/2 FPT</td>
</tr>
<tr>
<td>048</td>
<td>24</td>
<td>32.5</td>
<td>24</td>
<td>2.90</td>
<td>2.19</td>
<td>16.90</td>
<td>2.19</td>
<td>3.10</td>
<td>2.17</td>
<td>17.10</td>
<td>2.17</td>
<td>7.24</td>
<td>11.1</td>
<td>4.31</td>
<td>5.80</td>
<td>8.05</td>
<td>10.3</td>
<td>1.25</td>
<td>1 FPT</td>
<td>1/2 FPT</td>
</tr>
<tr>
<td>060</td>
<td>24</td>
<td>32.5</td>
<td>24</td>
<td>2.90</td>
<td>2.19</td>
<td>16.90</td>
<td>2.19</td>
<td>3.10</td>
<td>2.17</td>
<td>17.10</td>
<td>2.17</td>
<td>7.24</td>
<td>11.1</td>
<td>4.31</td>
<td>5.80</td>
<td>8.05</td>
<td>10.3</td>
<td>1.25</td>
<td>1 FPT</td>
<td>1/2 FPT</td>
</tr>
</tbody>
</table>

**NOTES:** All dimensions within +/- 0.125"

Specifications subject to change without notice.

Manufacturer reserves the right to change, at any time, specifications and designs without notice and without obligations.
GW Series: Installation, Operation and Maintenance Instructions

Manufacturer reserves the right to change, at any time, specifications and designs without notice and without obligations.

<table>
<thead>
<tr>
<th>MODEL SIZE</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>J</th>
<th>K</th>
<th>L</th>
<th>M</th>
<th>WATER CONN.</th>
</tr>
</thead>
<tbody>
<tr>
<td>120</td>
<td>37.75</td>
<td>27.25</td>
<td>8.13</td>
<td>8.00</td>
<td>10.53</td>
<td>32.75</td>
<td>20.13</td>
<td>13.50</td>
<td>17.63</td>
<td>3.75</td>
<td>46.00</td>
<td>28.00</td>
<td>1-1/4&quot; PPT</td>
</tr>
</tbody>
</table>

NOTES: All dimensions within +/- 0.125"
Specifications subject to change without notice.