

## Application Bulletin

This bulletin includes wiring diagrams for open loop (well water) applications for geothermal heat pumps with 24VAC controls and Infinity/Evolution controls. Consult the heat pump installation manual for required flow rates, minimum water quality standards, and other heat pump related requirements.




**WARNING: MAKE SURE THAT HEAT PUMP POWER IS DISCONNECTED AND THE AREA AROUND PIPING CONNECTIONS IS COMPLETELY DRY BEFORE WIRING VALVES OR CONNECTING TO HEAT PUMP.**

### 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.**

## Typical Open Loop Piping

Open loop systems require a water solenoid valve to turn on the water when the heat pump compressor is energized, and to turn off the water when the compressor is off. A slow-closing motorized valve (MVBR3F or MVBR4F) is recommended to help reduce water hammer. A flow regulator limits water flow to avoid using more water than the heat pump requires, which wastes water and increases pumping costs. A hose kit provides vibration isolation, as well as convenient fittings to install P/T (pressure/temperature) plugs for checking water temperature and pressure drop at startup and during troubleshooting. Figure 1 shows the typical piping arrangement for a single solenoid valve. For single speed heat pumps and smaller two-stage heat pumps (3 tons and smaller), one valve is typical. For larger two-stage heat pumps, there is an opportunity to save a significant amount of energy (and avoid wasting water) with the use of two solenoid valves, one for first stage, and both for second stage (Figure 2).

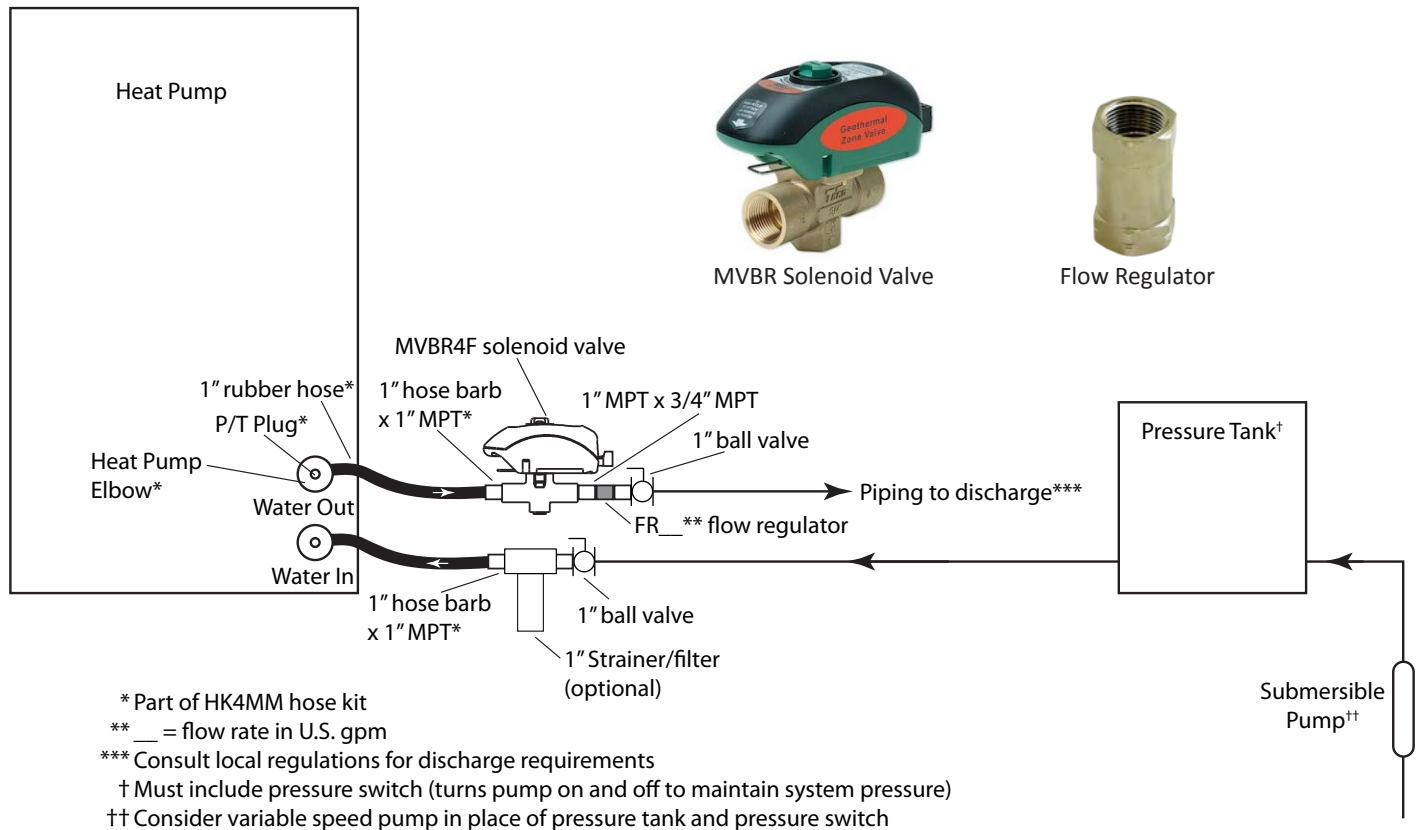
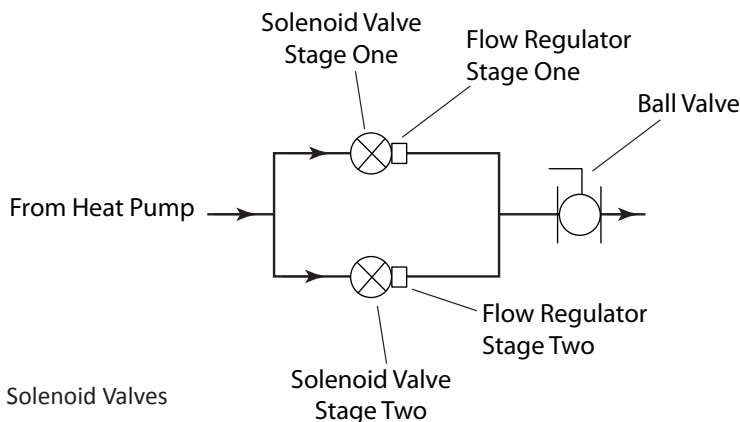


Figure 1: Single Solenoid Valve



NOTE: In first stage the top solenoid is open; in second stage both solenoid valves are open.

Figure 2: Two Solenoid Valves

# Wiring Diagrams for Open Loop Systems

The diagrams below provide wiring for 24VAC and communicating controls for one valve and two valve systems. Consult the heat pump installation manual for additional details on sequence of operation and other requirements.

## 24VAC Controls

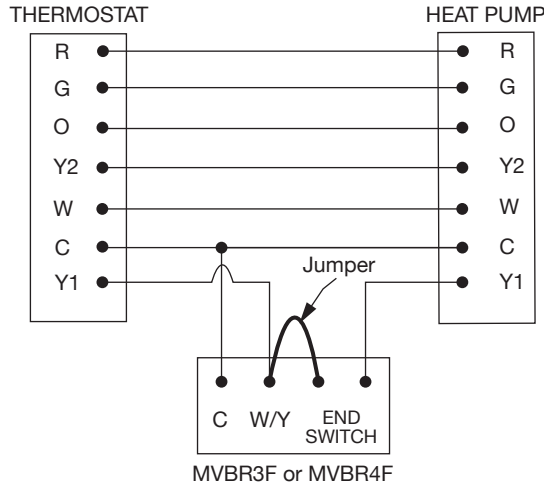


Figure 3: Single Solenoid Valve

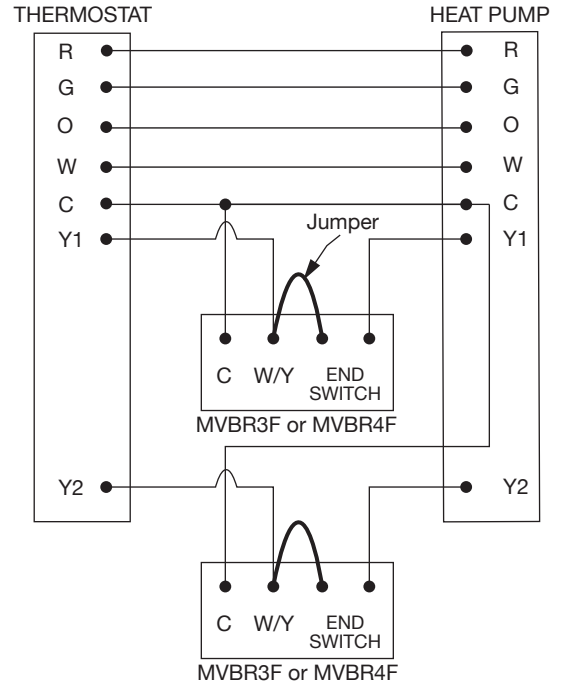


Figure 4: Two Solenoid Valves

## Communicating Controls

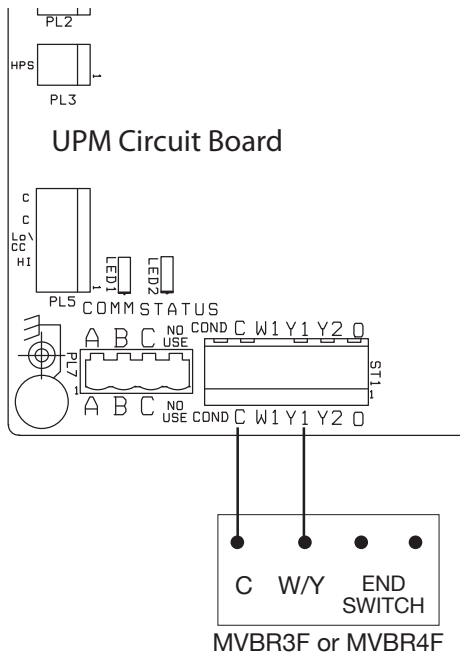


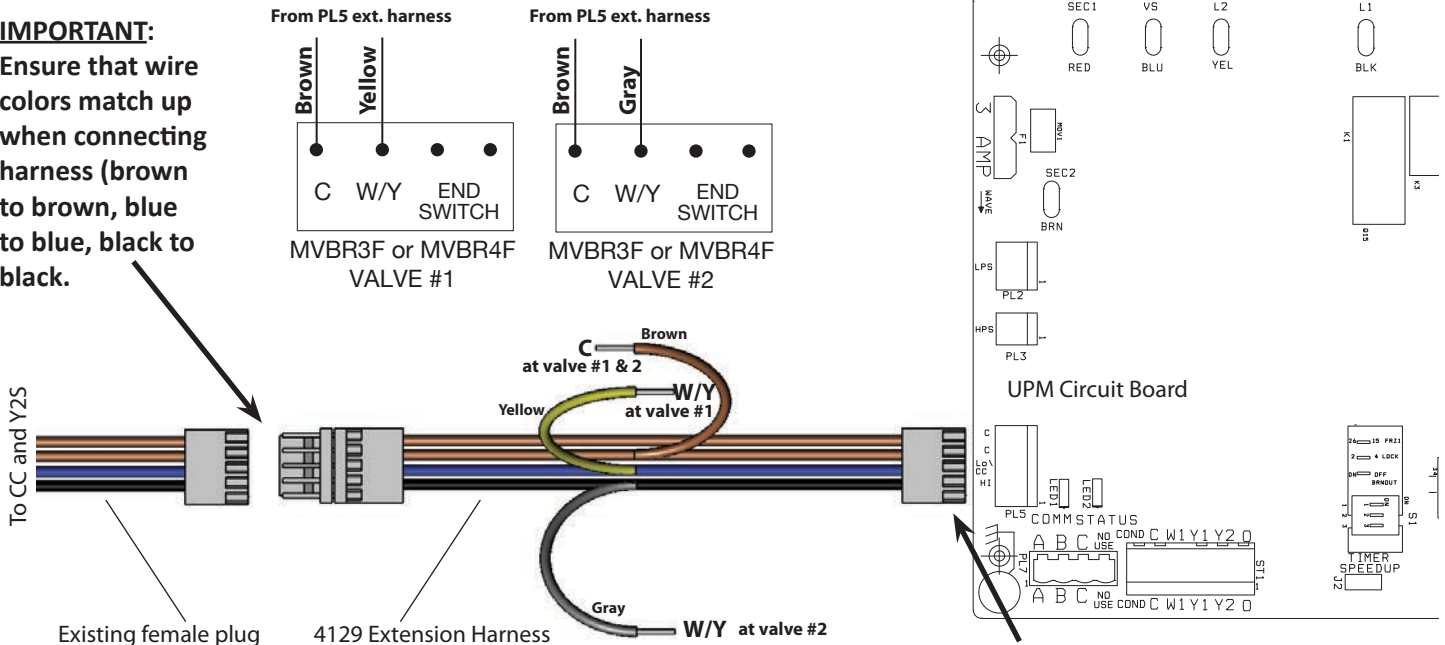
Figure 5: Single Solenoid Valve

### Communicating controls notes:

1. The UPM board includes a delay at terminal Y1 (connector ST1) that delays the compressor from starting after receiving a call from the thermostat to provide time for the valve to fully open. Therefore, the end switch is not used for communicating controls.
2. For systems with two valves, see Figure 6.

**IMPORTANT:**

Ensure that wire colors match up when connecting harness (brown to brown, blue to blue, black to black).



**IMPORTANT:** Position plug with brown wire on top and plastic plug (no wire in socket) on the bottom.

Figure 6: Two Solenoid Valves

Communicating controls notes:

1. Y2 (connector ST1) is used for a utility curtailment input, and is not available for use as an output for the second valve. However, the wiring harness extension (part # 4129) used for variable speed flow centers (closed loop applications) provides a second stage connection as shown above (gray/brown wires). The wiring kit should be used for systems with two solenoid valves (yellow wire for stage 1, gray wire for stage 2, brown wire for common to both valves).
2. The UPM board delays the compressor from starting after receiving a call from the thermostat to provide time for the valve to fully open. Therefore, the end switch is not used for communicating controls.

### Transformer Sizing

Each MVB3R3F/MVB4R4F valve may use up to 11.5 VA. Verify heat pump installation manual to ensure that heat pump transformer is large enough for heat pump controls, water solenoid valve(s), and any other accessories. Other water solenoid valves may have higher VA requirements than the MVB3R3F and MVB4R4F valves.