

# Technical Bulletin

**Bulletin No.** 018 Rev E  
**Subject:** Connection of Master Valves and Pumps to Controllers  
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**Product Applicability:** RME Sentar, Hawk, Sentar II, Eagle Controllers  
**Engineering Release:** R. A. Olson  
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## 1.0 INTRODUCTION

The attached schematics provide solutions to the common uses of solid-state controllers, to control master valves and pumps. The designs are to be used for reference purposes only; no attempt is made to detail or to specify components, except as necessary to make the concept clear.

**NOTE:** When implementing any of the wiring solutions shown, all codes must be observed as they pertain to your local electrical code requirements.

These solutions are based on sound engineering practices. The implementation methods would be a requirement for most controller manufacturers' where the controller would provide a source of voltage/current for the master valve or pump. Most solid-state controllers (and many mechanical ones) supply voltage/current for the control of master valves and pump. This is a beneficial product feature and provides a cost effect solution for the control of these devices.

The methods outlined below cover a number of possible applications. However, should you run into a unique situation, which is not covered by this Technical Bulletin or should you have any questions, please call Rain Master Irrigation Systems™ at (800) 777-1477.

## 2.0 A SOLID-STATE CONTROLLER CONNECTED TO EITHER A 24 VAC MASTER VALVE OR A PUMP WITH A 24 VAC ACTIVATING COIL

This implementation configuration is shown in FIGURE 1 and is the most common installation.

3.0 A SOLID-STATE CONTROLLER CONNECTED TO A PUMP WITH EITHER A 115 OR A 230 VAC ACTIVATING COIL.

This implementation configuration is shown in FIGURE 2. The relay is required to isolate the 24 VAC circuitry of the controller from the 115 or 230 VAC required by the pump's activating coil.

4.0 MULTIPLE SOLID-STATE CONTROLLERS ARE CONNECTED TO EITHER A 24 VAC MASTER VALVE OR PUMP WITH A 24 VAC ACTIVATING COIL

This implementation is shown in FIGURE 3. It is necessary to isolate the solid-state controllers from each other by the use of relays.

The solid-state controllers are isolated from one another by the relays to avoid a circulating current condition.

Circulating current is created due to the slight differences in output voltage between the solid-state controllers' transformers. As an example, when solid-state Controller 1 is on, it may supply a nominal 24 VAC to its master valve/pump terminals. When solid-state Controller 2 is on, it may supply a nominal 25 VAC to its master valve/pump terminals. This is because no two transformers outputs are exactly alike each controller contains its own transformer which is a source of approximately 24 VAC.

If wires from the master valve/pump terminal of Controller 1 and Controller 2 are tied directly to the pump's coil or master valve solenoid, you have electrically tied the controllers together. However, Controller 1 is trying to supply 24 VAC and Controller 2 is trying to supply 25 VAC. This creates the conditions for circulating current, which in long-term use will damage and/or shorten the life of the master valve solenoid or the pump's coil.

5.0 MULTIPLE SOLID-STATE CONTROLLERS ARE CONNECTED TO A PUMP WITH A 115 OR 230 VAC ACTIVATING COIL.

This implementation is shown in FIGURE 4. It is necessary to isolate the controllers from each other by the use of relays, as well as supply a source of 115 or 230 VAC for activating the coil of the pump.

Isolation is required for the same reasons given in section 4.0 and to prevent the 115 or 230 VAC used at the pump's activating coil from feeding back into the controller's circuitry.

## 6.0 ISOLATION RELAYS

Relays must be selected with the proper electrical characteristics. The relay's coil must be rated for 24 VAC, virtually all controllers provide 24 VAC at their terminal outputs. The relay coil must not draw more current than the controller is capable of supplying at the master valve/pump terminals.

The switch contacts of the relay must be rated to handle both the voltage and current that is to be switched.

The life rating of the relay must be such that it can withstand the number of on/off closures required. As an example, the relay used on Controller 1, shown in Figure 3 would be activated by a Rain Master™ controller as many as 13 times per day, 365 days per year for a total of 4,745 cycles per year. If the relay is to last 25 years then it must be rated for 118,625 cycles minimum.

The various isolation relays noted in this Technical Bulletin can be obtained from Rain Master™ and is available as part number: RLY1.

FIGURE 1

A SOLID-STATE CONTROLLER CONNECTED TO EITHER A 24 VAC MASTER VALVE  
OR PUMP WITH A 24 VAC ACTIVATING COIL

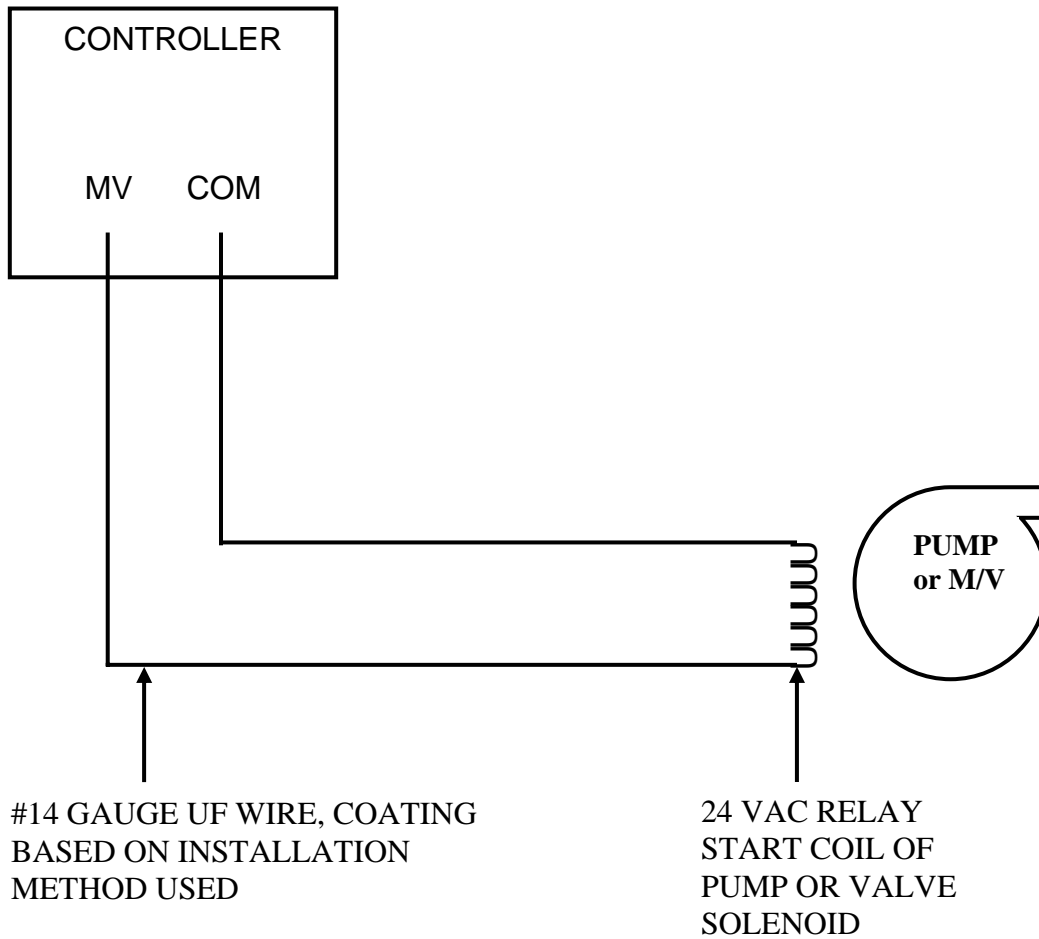
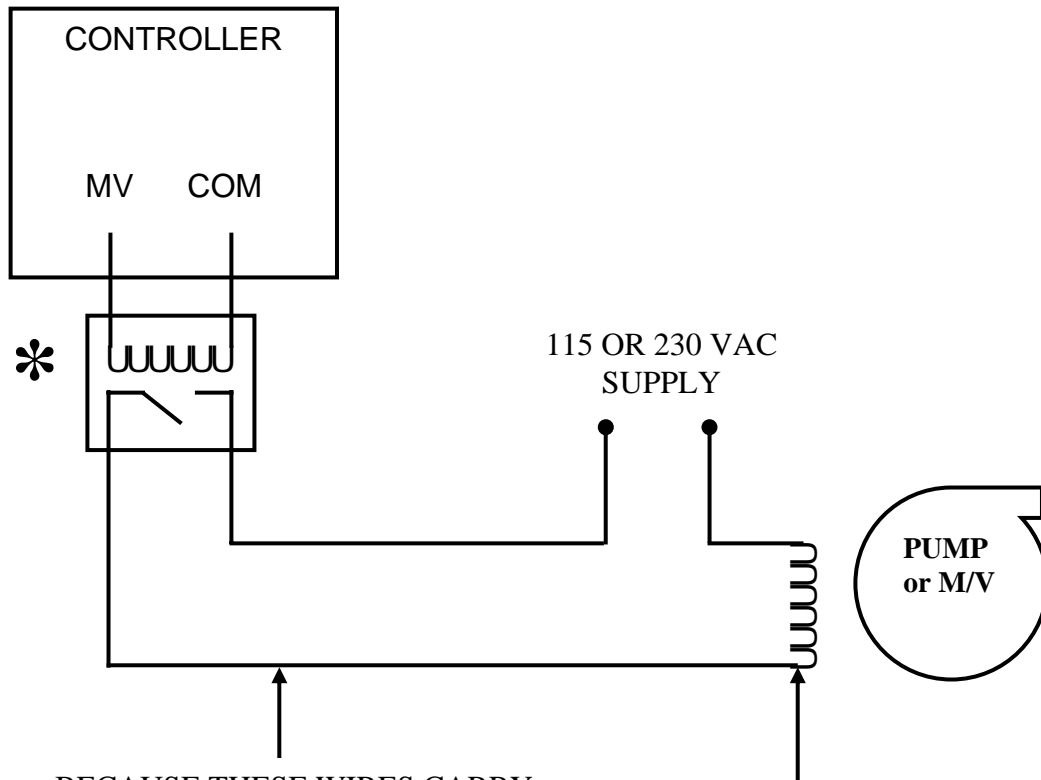


FIGURE 2

A SOLID-STATE CONTROLLER CONNECTED TO EITHER A 24 VAC MASTER VALVE OR A PUMP WITH A 24 VAC ACTIVATING COIL



BECAUSE THESE WIRES CARRY 115 OR 230 VAC, THEY MUST BE WIRED TO LOCAL ELECTRICAL CODE. THIS IS A MORE EXPENSIVE INTSALLATION METHOD.

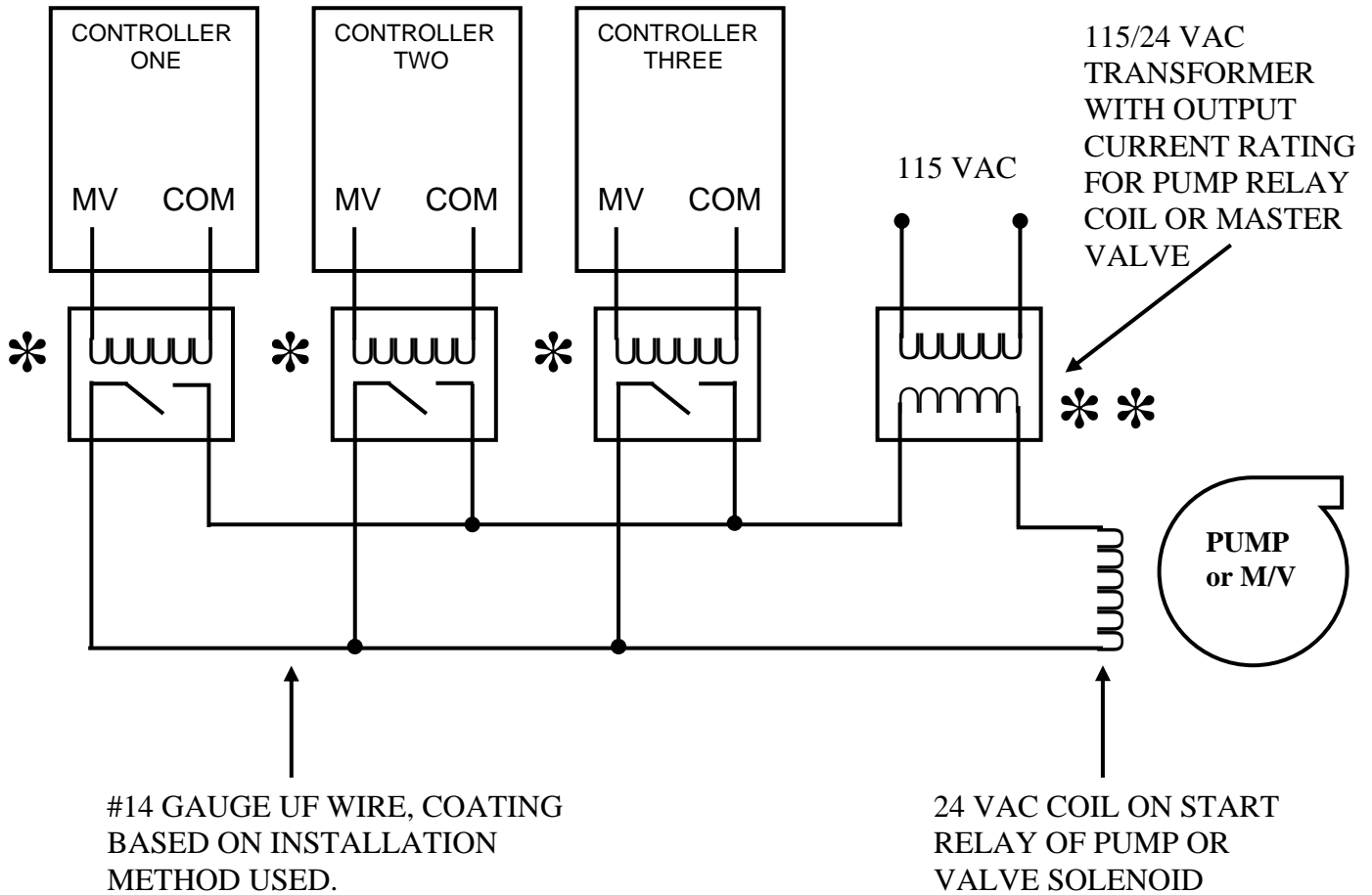
115 OR 230 VAC RELAY START COIL OF PUMP



ISOLATION RELAY AVAILABLE FROM RAIN MASTER PART NUMBER: RLY1.

FIGURE 3

MULTIPLE SOLID-STATE CONTROLLERS ARE CONNECTED TO EITHER A 24 VAC MASTER VALVE OR PUMP WITH A 24 VAC ACTIVATING COIL

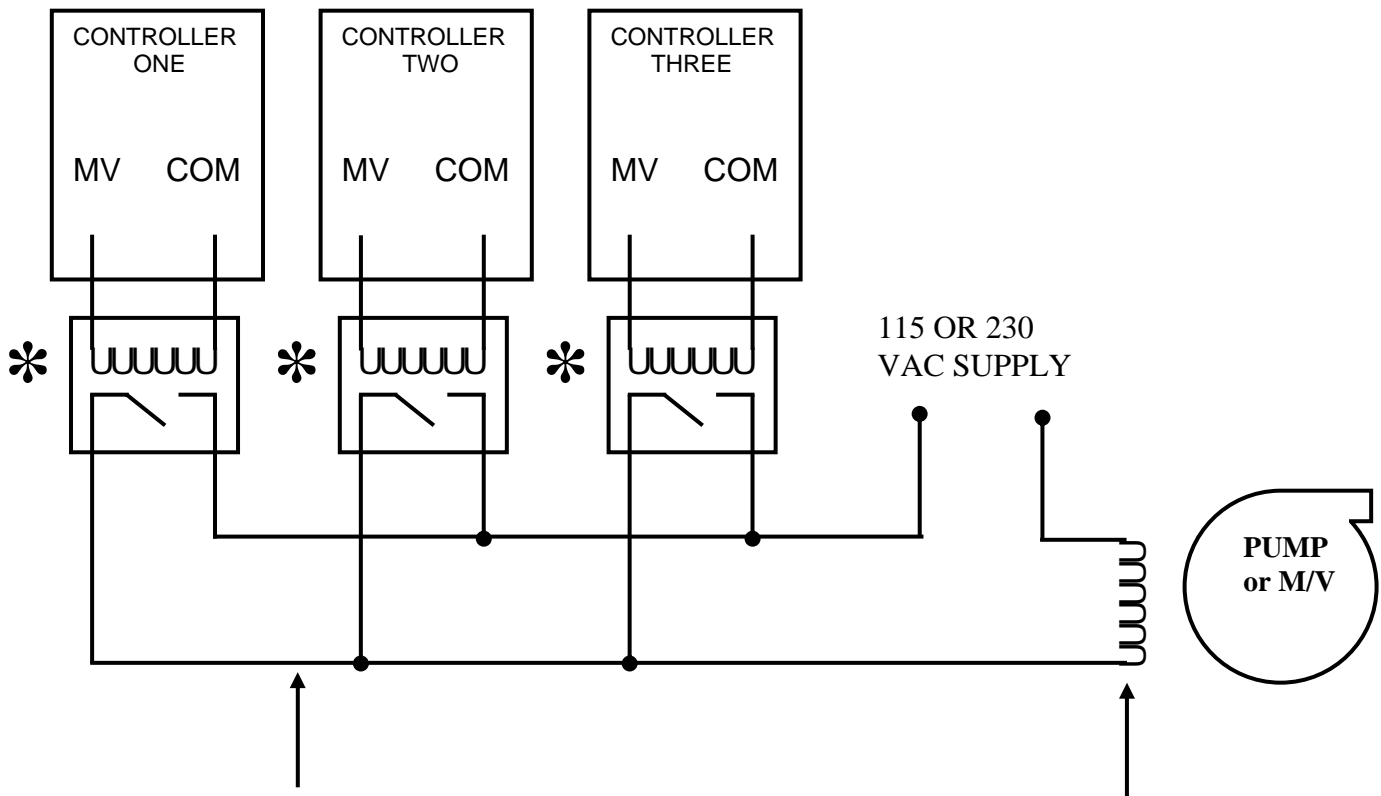


\* ISOLATION RELAY AVAILABLE FROM RAIN MASTER PART NUMBER: RLY1.

\*\* SHOULD BE A U.L. APPROVED TRANSFORMER SUCH AS RAIN MASTER PART NUMBER: 410-0002. MOUNT IN LOCKED NEMA 3R ELECTRICAL ENCLOSURE. GROUND THE ENCLOSURE.

FIGURE 4

MULTIPLE SOLID-STATE CONTROLLERS ARE CONNECTED TO A PUMP WITH A 115 OR 230 VAC ACTIVATING COIL



BECAUSE THESE WIRES CARRY 115 OR 230 VAC, THEY MUST BE WIRED TO LOCAL ELECTRICAL CODE. THIS IS A MORE EXPENSIVE INTSALLATION METHOD.

115 OR 230 VAC COIL ON START RELAY OF PUMP

\* ISOLATION RELAY AVAILABLE FROM RAIN MASTER PART NUMBER: RLY1.

END OF BULLETIN