cyber rain

APPLICATION NOTE 2012

Using Relays with Cyber-Rain Controllers

2/16/2012

Abstract: Relays can be used with Cyber-Rain controllers to protect circuitry when sharing valves, to drive pumps, increase current to specific zones, share flow sensors, and decouple controllers from the field.

Sharing Solenoids

A common use for a relay with Cyber-Rain Irrigation Controllers is to share a solenoid with another device (such as a second controller) without the possibility of feeding electricity into the second device if both devices are activated at the same time. This scenario comes up often when master valves are present at a site.

In this scenario, the relay is used to decouple the controller(s) from the solenoid, thus preventing damage to the controller. A normally open, single pole single throw 24VAC relay (like the relay shown in Figure 1) should be used. The controller's master valve port will be connected to the first coil/energizing terminal, and the controller's common port will be connected to the second coil terminal. A 24VAC power supply must now be connected to terminal A of the switch. The controller's 24VAC power can be spliced into for this purpose, but we recommend using a second power transformer. Terminal B should now be connected to the control line that leads to the master valve. Finally, connect the common line of the master valve to the common line of the 24VAC power adapter.

Figure 1: N.O. Relay

The process described above must be repeated for every controller that is to share the solenoid. They will all share a single 24VAC transformer, but one relay must be used for each device. The following figure is an example of how to hook up three controllers to share a single master valve in this fashion.

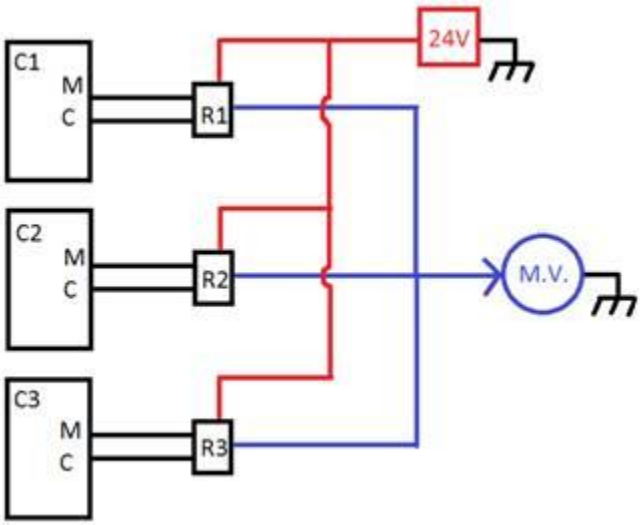

Figure 2: Three Controllers Share Single M.V.

Imperial Technical Services offer an "IsoRelay" that is specially designed to share a solenoid between two or more devices. A power transformer is not needed with the IsoRelay, as it uses the power supplied by the controller. One IsoRelay must be purchased for each device that is to share a solenoid.

If you'd like to learn more about the IsoRelay or purchase one, please contact Imperial Technical Services:

IMPERIAL TECHNICAL SERVICES

Office: (714) 696-7526

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luism@imperialsprinkler.com

Pump Start Relay

When using a Cyber-Rain Irrigation Controller to start a pump, a *pump start relay* must be used to supply adequate power to the pump. Pump start relays are common devices that can be purchased at most irrigation hardware stores. They consist of an industry standard 24VAC coil voltage relay that opens or closes a switch designed for 110VAC, 60Hz power (in the United States).

Figure 3: Hunter Pump Start Relay

The pump start relay's coil terminals should be connected to the master valve and common terminals of the Cyber-Rain controller. Follow the instructions provided by the pump start relay manufacturer to complete the installation. As high voltage power is used, caution must be taken to ensure the safety of the installer. Please follow all safety instructions provided by the manufacturer.

Increasing Current to a Specific Zone

If your Cyber-Rain Irrigation Controller is alerting you of an over-current, or you are aware that the solenoid(s) you are using require more power than can be supplied by the controller, a relay can be used to boost the current to the specific zone. *Please note that any electrical shorts or open circuit failures in the zone will not be detected by the controller if this is performed.*

In this application, a 24VAC single pole, single throw (SPST) normally open relay should be used. The Cyber-Rain Controller's master valve and common ports will be connected to the coil/energizing terminals of the relay. The first switch terminal of the relay will be connected to the zone wire that is connected to the load that requires more power

than the controller can deliver. The second switch terminal will be connected to the power transformer that will be used to power the zone. A 24VAC power transformer with at least 2A (RMS) max current should be chosen. The ground wire of the power transformer must be connected to the common line of the zone wire that is to be powered.

The following schematic is an example of how to use an external power supply to power a single zone.

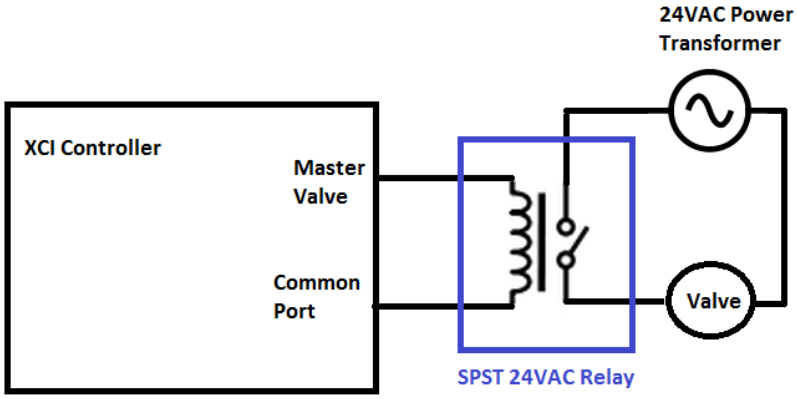


Figure 4: External Power Source for Single Zone

The following relay and relay socket is recommended by Cyber-Rain:

001 814-0445 RJ2S-CL-A24 Vendor: IDEC CORPORATION

Desc: Relay;E-Mech;Gen Purp;DPDT;Cur-Rtg 8A;Ctrl-V 24AC;Vol-Rtg 250/30AC/DC;Plug-In RoHS Compliant: Has always been Compliant

002 814-0467 SJ2S-05B Vendor: IDEC CORPORATION

Desc: Socket, Relay; DPDT,Standard Screw Terminal RoHS Compliant: Has always been Compliant

Wiring Instructions for RJ2S-CL-A24 + SJ2S-05B Relay and Socket:

RELAY PIN	Connect to
1	Controller Common “C” Wire Harness Pin
8	Controller Master Valve “M” Wire Harness Pin
3	First Wire of new Power Transformer
4	Wire leading to Master Valve

After making these connections, connect the 2nd transformer wire directly to the master valve’s 2nd wire. This can be accomplished by connecting the 2nd transformer wire to the field common, it the 2nd master valve wire is connected to the field common. It would be best to remove the master valve from the field common if possible and connect it directly to the transformers second wire if possible. Here is a schematic:

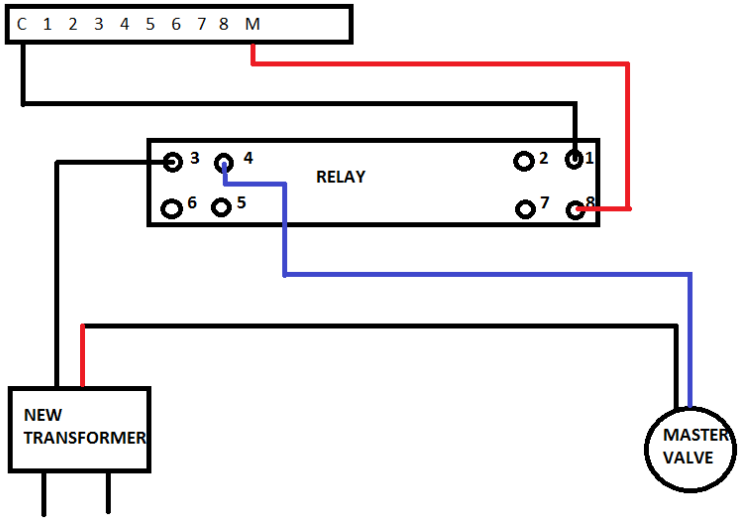
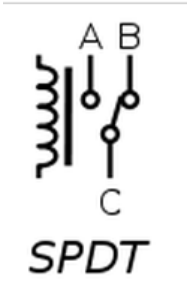


Figure 5: Pin Diagram IDEC Relay + Socket

Sharing Flow Sensors

Sometimes it is desired to use a single flow sensor to read the flow of two or more controllers. This should generally be avoided if possible, and it is recommended that each controller have its own flow sensor. Although generally discouraged, it is possible to use a relay to share a single flow sensor between two controllers. If this is done, it is important to note that if both controllers are activated at the same time flow can be unpredictable and thus over-flow alerts may be thrown which can cause watering to abruptly stop.

A "double throw" relay must be used in this instance. An example is shown below:



Double throw relays have two coil terminals and three switch terminals. One terminal, in this case Terminal C, is shared with the other two terminals. Terminals B and C will be normally closed, and terminals A and C will be normally open. When the relay is energized, Terminals A and C will connect, and Terminals B and C will disconnect.

The coil/energizing terminals of the relay should be connected to the first controller's master valve and common ports. The left pin the first controller's flow port should be connected to the negative (or ground) wire of the flow sensor. The right pin of the controller's flow sensor port should be connected to Terminal A of the relay. The second controller's left pin of the flow sensor port should also be connected to the ground/negative wire of the flow sensor, but its right pin should now be connected to Terminal B. The shared terminal of the relay (in our example Terminal C) should go to the flow sensor's positive wire.

When the first controller is energized, the relay is energized, and the flow switch flips, causing the flow sensor to be connected to Terminal A, which is connected to the first controller. When the first controller is not in use, the flow sensor will be connected to the second controller, which will read any overflows that occur when neither controller is in use.

The following figure illustrates how to wire two controllers to one flow sensor using a single SPDT relay:

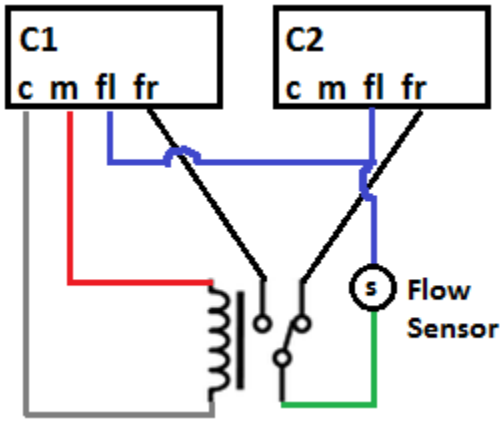


Figure 6: Two Controllers Sharing Single Flow Sensor

Cyber-Rain recommends the following relays, which are available from Allied Electronics:

- RJ2S-CL-A24 IDEC DPDT 24VAC Relay
- SJ2S-05B Socket for IDEC Relay

In addition, Creative Sensor Technologies offer a relay known as an "Iso-Flow" that is used to isolate two controllers using a single flow sensor.

For more information about the "Iso-Flow", visit http://www.creativesensortechnology.com/

Decoupling Controller From the Field

If it is desired that a controller be completely decoupled from all of its zones in order to use a second power source to power an entire site, Imperial Technical Services offers a decoupling board that allows for multiple zones to be powered by an external power supply other than the controller's power. In this case, the controller would not be able to determine what current was flowing through any of the zones.

The following image shows a isolating relay array designed for 12 zones:

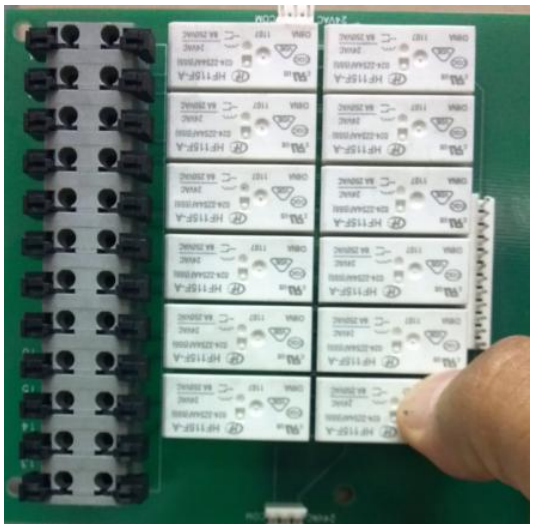


Figure 7: Imperial Relay Array

They also offer 24 zone boards if additional zones must be powered by an external power source.