



## Creative Sensor Technology

June 26, 2019

### Troubleshooting guide for Pathway systems

The Pathway system is a proven method to add a flow sensor and master valve to an existing irrigation system. By using existing zone valve wires as a communications path between the irrigation controller and a location near the POC, the need to install new wire can be all but eliminated.

The installation of the Pathway system is detailed in the installation guide. The instructions are extensive but cannot include all the variations of controllers, connected devices or existing wiring configurations. Before attempting to install a Pathway, read through the installation guide completely. Then follow the wiring instructions carefully. Make sure you connect the commons to all the required terminals and maintain polarity on the power supply. If you have questions, call CST or email us at [sales@creativesensortechnology.com](mailto:sales@creativesensortechnology.com)

#### #1 Power Supply Polarity

A. Many Pathway problems with communications, blowing fuses or damaging components can be traced to a lack of knowledge about AC power sources. People wrongly assume that there is no polarity and that there is no difference in the wires of an alternating current power source. This is not true and just as there is a black wire called the Hot or Load wire and a white wire called the Neutral or Common in 110 volt systems, there is a difference in the low voltage leads exiting a step down transformer even if they are the same color. Because the Pathway system uses the existing valve common wiring as one side of its communication path, then the other side has to be maintained as the power, hot or load side. Some irrigation controllers clearly mark the power terminal and common terminals of their auxiliary power connection while others do not. Similarly, some transformers in the irrigation controller or separate power supplies use the same color wire insulation or have unmarked terminals.

B. Before connecting a Pathway to a power source, make sure you identify which terminal or lead is the Hot one and which is the Common. A quick way to do this is to connect one lead of a multimeter to one of the transformer output leads or terminals. Connect the other lead of the multimeter to ground or the neutral wire. Turn on the power, if the multimeter reads zero, then you have connected to the common lead of the transformer. If the multimeter reads the transformer output voltage then you are connected to the hot lead. Turn the power off, connect the multimeter to the other transformer lead to repeat the test. The reverse reading should appear on the multimeter confirming which output lead is your hot one. Always connect the Hot wire of the power supply to the top "L" terminal of the Pathway power input.

P.O. Box 426, Rochester, MA 02770-0426  
Phone: 508 • 763 • 8100 • Fax: 508 • 763 • 8102  
[www.creativesensortechnology.com](http://www.creativesensortechnology.com)



## #2. . Start-up problems.

A. When you first apply power to the Pathway system, the Power, Network and Flow LEDs should all blink on and off three times, then the Power and Network LEDs should continue to blink.

B. If they blink once or don't blink at all, immediately shut off the power.- something is mis-wired.

C. Remove the Power supply leads from the Pathway Controller Module (CM). Check the Power supply leads with a multimeter- you should have around 26 VAC.

D. When you re-attach, see that the Hot (or Load) wire is connected to the Power Supply L terminal, and the Common wire from the Power Supply is connected to Power Supply C terminal of the Pathway.

E. If the Power wire polarity was wired correctly before you checked it, then assume there is still a problem. Remove wires from the Network and valve input terminals of the CM.

F. Try powering up Pathway again-. If still no LEDs check fuse located on circuit board. Remove Pathway cover by removing four screws in corners of the top of the enclosure. Fuse is a Little Fuse # F2474, Slo Blo 1.5 A 250 V 2AG fuse. Replace if blown.

G. Try powering up again, if LED's do not display start-up sequence, CM is damaged, return to CST

H. If LEDs do display start up sequence. This confirms CM is OK.

I. Next confirm that Field Module (FM) is OK. Remove FM from host valve box and bring it back to CM location. With Power to the CM Off , attach Purple lead from the FM to the Network Load terminal of the CM and the Blue lead to the Network Common terminal of the CM. Power up CM and see if the LED start-up sequence repeats. If it does, then watch for continuous blinking of the red Power LED and green Network LEDs as long as power is applied. If they continue blinking this confirms that both modules are operational.

J. Next start reconnecting groups of wires. Always power off the CM, then make the wire connections, then power back on to check.

K. Start with the Field Module, attaching the two network wires first. Make sure the wire that was the zone valve Hot wire (the one that came from the controller valve station terminal connects to the Purple Lead and the wire that was the host valve Common connects to the Blue lead of the FM . Then go back to the Controller module and attach the zone valve Hot wire that was removed from the controller zone valve terminal to the Network Load terminal. Then connect the valve Common wire coming back from the host valve location to the CM Network C terminal. At this point, it is not necessary to connect any other wires or commons. Power up the Pathway again, and check to see the start-up sequence, then the continual flashing of both the Power and Network LEDs. This confirms that you have two-way communication and you can proceed. If you have only a solid green Network LED, you have a problem with the wire path. You may find the leads were reversed in another zone valve location. Check all splices between the controller and the host valve for a reversed connection. Repair if necessary.

L. Next, start at the CM connecting Commons to all terminals. When connecting the commons, I always suggest attaching a short wire lead from the CM Network C terminal, the CM Master or Zone valve C terminal (either one, they are jumpered together inside the CM), and another lead from the controller Valve Common terminal and joining all of these four leads to the Common wires coming in from the field (if there are more than one) with one large wire nut. This way you get a good tight splice and don't stress the terminal blocks by trying to jam more than one lead into each one. After connecting all the Common connections, power up the Pathway system again to confirm that the network is providing two way communication. (Green LED continues to blink). If there is a problem with communications or the fuse blows again, there is a problem within the Common wiring, check the splices starting at the controller and work to the field module.



M. When the Common wiring checks out finish by wiring the valve and flow sensor connections from the controller to the CM and from the FM to the valve solenoids and flow sensor. Test again.

N. If the master valve or solenoid valve will not stay energized and cycles on then off then on again, it is indicating that your power supply transformer is not able to supply enough current to operate everything. You will need a larger transformer in the controller or as a separate power supply. Calculate the load of all the valves that are operating and add 50 milliamps for the Pathway and flow sensor.

### **#3 Problems with an installed system**

A. If a Pathway system that has been installed and working suddenly fails, then something has changed: an electrical surge from a storm damaged wire or components, someone changed a solenoid on a valve, some damage was done to the field wiring by construction. Look for the obvious.

B. Check the power supply by disconnecting it from the Pathway and testing with a multimeter.

C. If Power is available, reconnect and turn on power. Is there a startup sequence shown by the LEDs? If not check the fuse.

D. If there is a startup sequence, does the Network LED flash continuously? If not the problem may be in the Field Module or the Field wiring. If it does, then the problem may be with a solenoid on the master valve and/or the flow sensor.

E. Repeat the steps in #2 above to isolate the problem.

### **#4 Test sequence for bench testing Pathway components returned from the field.**

A. Connect the Pathway Controller Module to a known power source, power up for start-up sequence. If none, check fuse. Replace with a Little Fuse # F2474, Slo Blo 1.5 A 250 V 2AG fuse and retest.

B. If start-up sequence works, connect Network terminals to a Field Module that is known to be working. Look for continuous flashing LEDs to confirm communication is two-way.

C. To Test valve inputs, apply 24 volt power to valve terminals on CM. LEDs next to the valve should illuminate on both CM and FM. For a further test, check wire leads on FM with a multimeter. The pair with the illuminated LED should measure 24 volts AC,

D. Finally, test the flow input by tapping the red and black leads on the FM together, the Flow LED on both modules should illuminate.

E. These tests verify that you have both modules working correctly and the problem may be in the field wiring.

F. If you now have a working CM and FM you can then test other units to determine if they are OK. Use the working CM to test all the other FMs and a working FM to test all the other CMs.

G. By performing these tests, the working Pathway systems can be returned to the field with the knowledge that further problems may be found in the field wiring or installed valves and flow sensors. The remaining, none working modules can be sent back to CST for repair or replacement.