

Irrigation System Troubleshooting: General Guidelines

Electrical Troubleshooting

- Electricity and water analogies—
 - Voltage is the force that moves the current down the wire—pressure is the force that moves water through a pipe
 - Amps is the flow of electrons down a wire—water, in gallons per minute (or hour) is the flow in a pipe
 - Ohms are the measure of resistance in different wire sizes which results in voltage loss—friction loss in a pipe network results in pressure loss
- Ohm's Law—
 - Volts = Amps (I) x Ohms (R)
 - Amps = Volts/Ohms
 - Ohms = Volts/Amps
- Watts = Volts x Amps (Volt-Amps)

Controller

- Controller must be “ON” when checking voltage
- Check the power supply—it may not be 120V or 115V as you would expect
- Check the transformer primary and secondary voltage—transformer output may not be 24V. The reason is that transformers in irrigation controllers are “step-down” transformers and reduce the input by a ratio of 5:1 (check the manufacturer's specifications). So, for example 115V of input will be reduced to 23V output. Or 110V input will be reduced to 22V output. Electric valves require a minimum voltage to operate properly. Most valves require at least 21V (see manufacturer's specs) to operate properly, so wire sizing is important.

Valve Wire Sizing (Maximum One-Way Distance in Feet Between Controller and Valve)							
Ground Wire	Control Wire						
	18	16	14	12	10	8	6
18	850	1040	1210	1350	1460	1540	1590
16	1040	1340	1650	1920	2150	2330	2440
14	1210	1650	2150	2630	3080	3450	3700
12	1350	1920	2630	3390	4170	4880	5400
10	1460	2150	3080	4170	5400	6670	7690
8	1540	2330	3450	4880	6670	8700	10530
6	1590	2440	3700	5400	7690	10530	13330

- Turn on individual stations and check for voltage output
- Be aware of controller station output in amps (check manufacturer's specs)
- Typical Solenoid Inrush Current—0.3 Amps
- Typical Solenoid Holding Current—0.15 Amps

Field Wiring

- The controller must be “OFF” when using an ohmmeter.

Expected ohm readings for various situations:

	OHMS OF RESISTANCE	
	One Valve Zone	Two Valve Zone
Normal Circuit	20--60	10--25
Open Circuit	OL	OL
Short Circuit	1--5	1--5
Partial Short Circuit	8--12	5--10
Partial Connection	60--80	50--70