

Resistance or OHMs Testing: Solenoids or a solenoid wire path will read between 20 – 75ohms.

Open Circuit

Indicates a **break in the circuit**. Current cannot complete a path. Devices (valves, controller, etc.) will not receive power. Cannot measure resistance because there is no wire path to measure. **Meter reads “infinity” or 0 ohms.**

- Cut wires
- Open switches
- Corroded wire splices
- Loose wire connections
- Blown fuses
- Surge damaged solenoids, transformers, or motor winding.

Short Circuit

Indicates **absence of sufficient resistance**. Current is taking a “shorter” path than it should. Meter will measure less than expected resistance. Amperage or current flow will drastically increase, causing fuse or circuit breaker to blow.

- Melted or cut insulation in solenoids, motor windings, field wires, or transformers.
- Damage allowing wires to touch unintended pathway to ground.

Partial Open

Indicates **excessive resistance**. Current interfered with or restricted along the path. Meter will measure more than expected resistance. Under operation amperage will increase and voltage will decrease. Components run hotter leading to future failure. Depending on severity, valves may not function.

- Poor or corroded wire connections
- Skinned wires (ground fault)
- Failing solenoids
- Loose wire connections
- Constrictions in wire.

Controller Troubleshooting

Does the controller display function?

YES Turn on stations and measure voltage between the Common and the station terminals.

Do you read 24 to 29 volts? YES: The controller is OK. Move on to the field wires

NO Test between the incoming power leads.

Do you read 24 to 29 volts.

YES Replace the controller panel.

NO Test the power source.

Do you read between 106 to 129 volts?

YES Replace the transformer.

Does the Controller exhibit odd operations?

YES Check the programs. Did that fix the issue? **Yes:** Controller is OK.

NO Do a RESET.

Did the reset stop the erratic operations?

Yes Controller is OK. If other issues remain, check the field wiring.

NO Replace the controller panel.



Field Wiring Tests *Power to stations must be off.*

1. Disconnect **common** wire(s).
2. Touch Black meter lead to the common wire and Red meter lead to station terminal to be tested.

GOOD Wire Path: A reading **between 20 and 75 Ohms** indicates a good wire path and solenoid.

Rule of thumb: Add 0.5-1 ohms to the expected solenoid ohms for the wire resistance. Wire Resistance per 1,000 feet;

- 6 0.3952
- 8 0.6281
- 10 0.9988
- 12 1.59
- 14 2.82
- 16 4.02
- 18 8.39
- 20 10.1

Be AWARE: Multiple Valves per Wire Path:

Readings will be a corresponding fraction of normal expected ohms.

- 1 Solenoid = 20 to 75 ohms.
- 2 solenoids = 10 to 35 ohms.
- 3 solenoids = 7 to 25 ohms.

Open, Short, or Partial: A reading below 20 or above 75 ohms indicates an open, short, or partial. Can be along the wire path and/or in the solenoid. Continue testing;

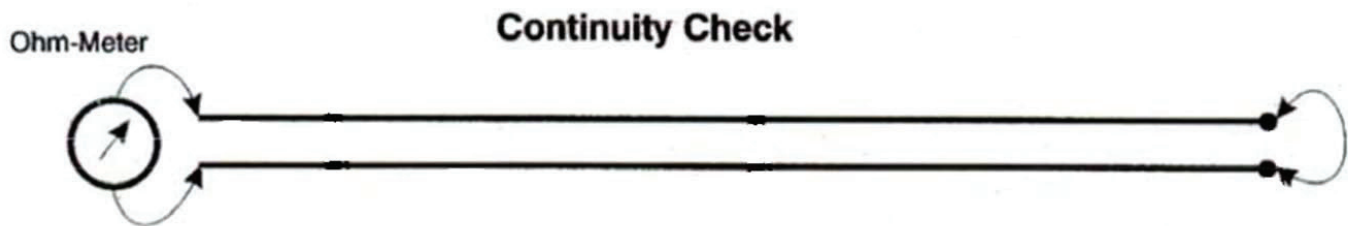
Test the Solenoid

1. Cut or disconnect the wires at the solenoid.
2. Test solenoid's resistance.

Good if between 20 to 75 Ohms. Replace if not.

Testing the Wire

1. Disconnect field wires from solenoid and attach both field wires together.
2. At the controller, check resistance across the common and station wire.



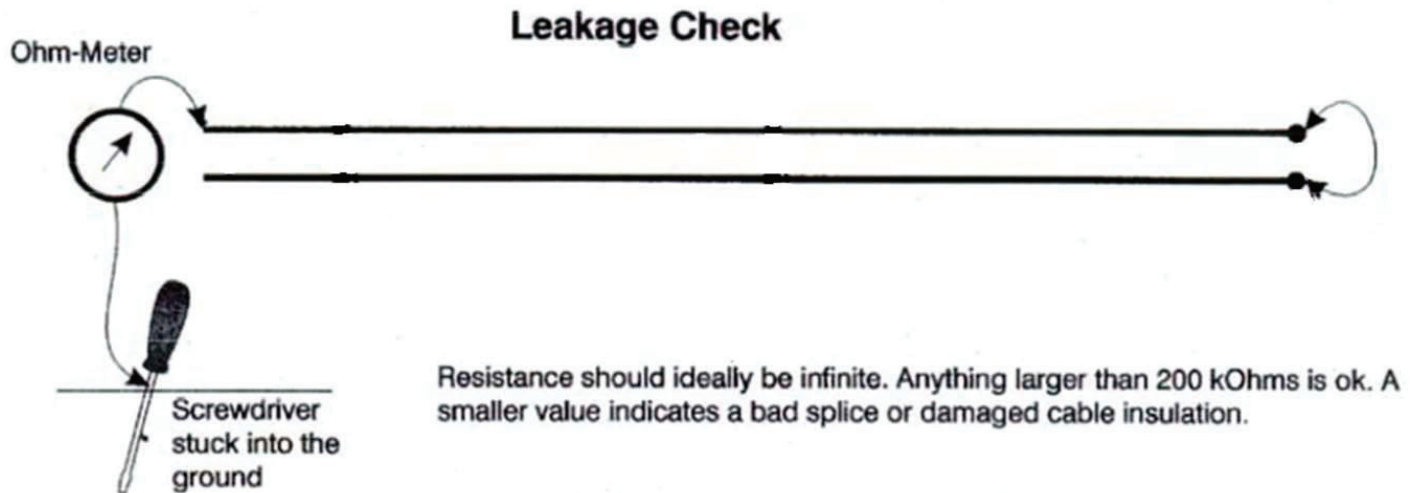
You can calculate the loop resistance on basis on the length of your cable. Usually Ohmmeters are not very precise at such low resistances. Values will normally be less than 10 Ohms. Look for readings considerably larger which would indicate a bad splice or damaged cable.

OPEN: Open if 0 or infinite ohms. Find the cut wire(s) or bad wire splice(s).

Reading more than 9 Ohms

PARTIAL or GROUND FAULT: If suspecting partials or a ground fault. Check for ground fault first.

1. Leave field wire ends at solenoid attached together.
2. At the controller;
 - a. Run a wire to ground. A ground rod is ideal. A large screw driver firmly planted in the ground can work.
 - b. Check resistance between the wire running to ground and the station wire in question.



No GROUND FAULT: If readings are Infinite or well above 200k Ohms.

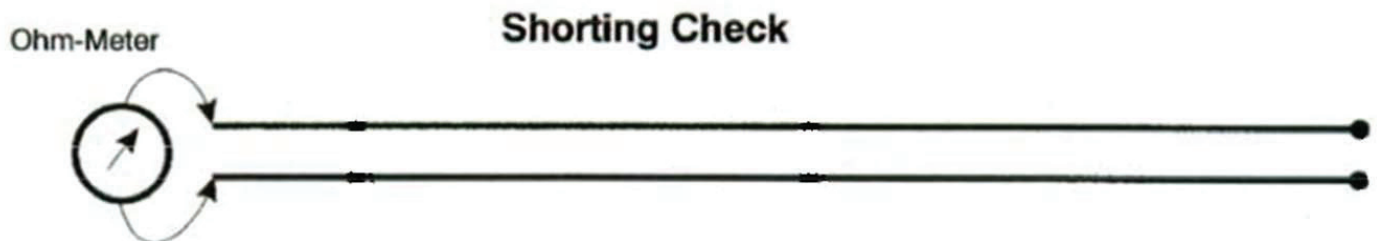
GROUND FAULT: If readings are less than 200k Ohms. Find the bare or skinned wire touching the soil. Use a Ground Fault locator to simplify.

PARTIAL: If no ground fault is detected, yet Ohms readings during the Continuity Check are high, then partial(s) exist along the wire path. Find the bad wire splices.

Reading very low Ohms

SHORT: If reading very low ohms during Continuity Check.

1. Detach the field wires at the solenoid. Do not allow the wires to touch each other or the soil.
2. At the controller, check resistance across the common and station wire.



Resistance should be infinite.

GOOD: Read 0 or Infinite ohms reading.

SHORT: If reading any ohms. A connection between the wires exists. Find the short in wire path. Likely skinned wires or miswiring.