

RAIN  BIRD®



TI-DSA500 Digital Clamp Meter
TROUBLESHOOTING GUIDE

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WARNING

This booklet is only intended to be a guide for using this product with other Rain Bird products. Carefully read and follow the manufacturer's instructions regarding safety precautions and warranty information.

FOR TECHNICAL SUPPORT

800-247-3782 (USA and Canada only)



The World's Leader in Irrigation

Troubleshooting Guide for Zone Irrigation Systems

This Troubleshooting Guide will assist you in the location of fault in an irrigation control system related to power supply or valve control wires. There are corresponding instructions on how to use the test tool to accomplish steps that require their use.

- Step 1** Make sure the master water supply is turned on. Keep in mind the water supply may be controlled by either a manual or electric master valve.
- Step 2** Make sure any shut-off devices, such as a rain sensor, are disabled or disconnected.
- Step 3** Turn the controller on and sequence the clock through the different stations. If nothing is working, skip to Step 6. If some of the stations are working, proceed to Step 4. If all of the stations are working, then you don't have any troubleshooting to do at the controller.
- Step 4** Make a list of all of the stations that are not functioning properly. Measure the output voltage for each station using a Multi-Meter (Rain Bird Model TI-DM200, TI-DM400 or TI-DSA500) and the instructions provided. See Page 8 of this guide. If the power is in range at every station (24-28 VAC), proceed to Step 5. If the power is correct when you test some stations, but not others, you may need to have your controller repaired. Take your controller to an authorized distributor.
- Step 5** Turn the controller off to test the resistance at each station. Use the following table to diagnose the problem that each station may have.

0-5 ohms	Fully Shorted Solenoid
8-20 ohms	Shorted Solenoid or Multiple Valves
20-60 ohms	Normal
> 60 ohms	Bad Connection, Splices, Nicked Wires, Open Solenoid or Broken Wire

- Step 5** (Continued from previous page)
Use the instructions provided to test any valves (or solenoids or wires) on the stations with faulty resistance measurements (Page 9 of this guide). A Rain Bird Tone and Probe Kit (Model TI-TPK) or a Rain Bird Wire Sorter (Model TI-WS6) can be helpful in locating broken wires and diagnosing your system. The "snap-around" feature of Rain Bird's Model TI-DSA500 Multi-Meter allows you to check the current of field wiring without disconnecting it (Page 11 of this guide).
- Step 6** Turn the controller off and remove the cover. Check the fuse using a Multi-Meter (Rain Bird Model TI-DM200, TI-DM460 or TI-DSA500) and the instructions provided (Page 6 of this guide). If the fuse is good, proceed to Step 7. If the fuse is bad, replace it and start again at Step 3.
- Step 7** Check the 120 V power being supplied to the controller according to the instructions provided (Page 5 of this guide). If the 120 V power is in range (105-129 VAC), proceed to Step 8. If the power is out of range, have an electrician troubleshoot the wiring to the controller. Once the 120 V power has been restored, start again at Step 3.
- Step 8** Check the output of the transformer supplying power to your controller according to the instructions provided with your Multi-Meter (Page 6 of this guide). If the transformer's power output is in range (24-28 VAC), you may need to have your controller repaired. If the transformer's output is out of range, you may have a bad transformer.

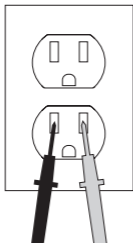
Voltage Check of 120V Input

SET METER TO	600 V_{AC}
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PROBE CONNECTIONS	BLACK COM	RED VΩ
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For Standard Outlets:

- 1) Insert probes into outlet one at a time.
- 2) Observe voltage reading on TI-DSA500 display.
- 3) Remove probes from outlet



For hard wired controllers:

- 1) Turn power off at main circuit breaker.
- 2) Disconnect the wire nuts inside of the controller where the power lines connect to the transformer.
- 3) Make sure the wire nuts are not touching each other or anything else.
- 4) Turn power back on.
- 5) Touch a probe to each wire nut to check power
- 6) Observe voltage reading on TI-DSA500 display
- 7) Turn power back off,
- 8) Reconnect the lines inside of the controller
- 9) Turn power back on.

Acceptable range: 105-129V (AC)

Voltage Check of Transformer (fig. 1)

SET METER TO	600 V $\tilde{\sim}$	
PROBE CONNECTIONS	BLACK COM	RED V Ω

- 1) Hold one probe to each of the power lines that run into the terminal strip from the transformer. Be careful not to touch the probes together.
- 2) Check the reading on your multimeter.

Acceptable range: 24-28V (AC)

Resistance Check at Fuse (fig. 2)

SET METER TO	Ω / ∞)	
PROBE CONNECTIONS	BLACK COM	RED V Ω

- 1) Remove cover of controller.
- 2) Remove each fuse to test it.
- 3) Touch one probe to each side of the fuse.
- 4) Check the reading on your multimeter.

Acceptable range: Very low or zero (Ohms): OK.

A high value or Over-Range Indication (OL) indicates a bad fuse.

Note: The TI-DSA500 will make a beeping noise when the reading is below $50 \pm 35 \Omega$ in this mode.

Voltage Check at Battery (fig. 3)

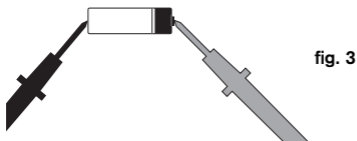
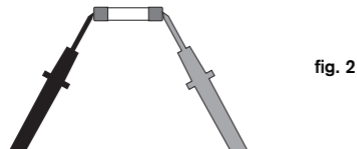
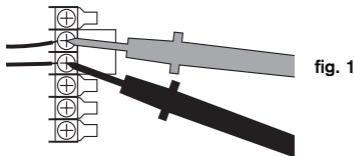
SET METER TO	600 V $\overline{\text{DC}}$	
PROBE CONNECTIONS	BLACK COM	RED V Ω

- 1) Remove cover from the controller and remove the DC battery.

- 2) Insert black and red test leads into COM and the $V\Omega$ terminal.
- 3) Place selector switch to $600V_{DC}$.
- 4) Touch one probe to the metal lead on each side of the battery.
- 5) Check the reading on your multimeter.
- 6) Replace the battery.

CAUTION: Avoid electrical shock or instrument damage by not exceeding $10V_{dc}$ while in battery test mode.

Acceptable battery test range: Varies by battery type and manufacturer. A negative value only indicates that the (+) probe is on the (-) terminal.



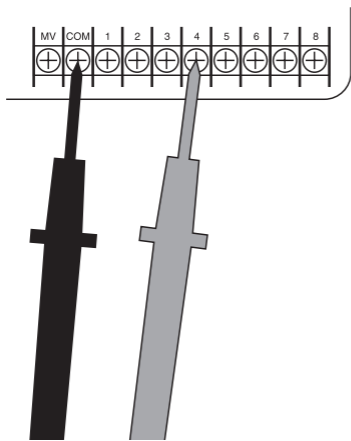
Voltage Check of Station Output

SET METER TO **600 V \tilde{A} C**

PROBE CONNECTIONS **BLACK COM** **RED V Ω**

- 1) Check to see if a rain sensor or other shut-off device is connected to the controller. If so, disable or disconnect the sensor before performing further troubleshooting.
- 2) Remove cover of controller to expose terminal strip.
- 3) Turn controller to manual mode and activate the station or master valve (MV) to be checked.
- 4) Touch (insert) one probe to the terminal labeled COM (for common).
- 5) Touch the other probe to the terminal of the station (or MV) to be checked.
- 6) Check the reading on your multimeter.

Acceptable range: 24-28V (AC)



Resistance Check of Each Station

SET METER TO	Ω / \cdot)	
PROBE CONNECTIONS	BLACK COM	RED V Ω

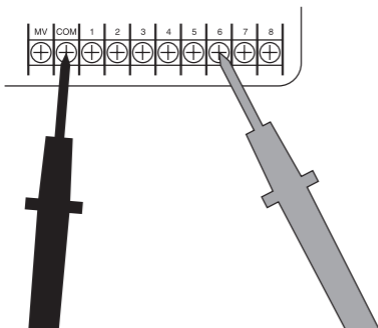
CAUTION: TURN CONTROLLER OFF

Remove cover of controller to expose terminal strip.

- 1) Touch (insert) one probe to the terminal labeled COM (for common).
- 2) Touch the other probe to the terminal of the station (or MV) to be checked.
- 3) Check the reading on your multimeter.

Acceptable range: 20-60 Ohms

Less than 20 indicates a short or crossed wires, more than 60 indicates a broken wire, bad splice or bad solenoid. Note that stations with several valves will have proportionately lower resistance. For example, a station with two valves connected will show half the resistance.



Note: The TI-DSA500 will make a beeping noise when the reading is below $50 \pm 35 \Omega$ in this mode.

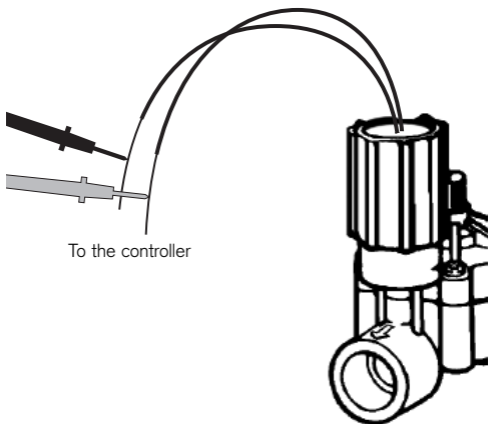
Voltage Check of Each Valve

SET METER TO	600 V_{AC}
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PROBE CONNECTIONS	BLACK COM	RED V_Ω
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- 1) At the controller, turn on the station of the valve to be tested.
- 2) Touch each probe to an exposed part of each of the two splice wires leading into the solenoid. If it is easier, disconnect the solenoid and just check the voltage drop across the two wires coming from the controller.
- 3) Check the reading on your multimeter.

Acceptable range: 24-28V (AC)



Current Check of Station Wires

SET METER TO	40A$\tilde{\sim}$
PROBE CONNECTIONS	BLACK COM RED VΩ

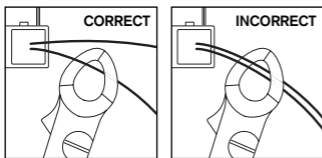
WARNING

- Do not make measurement on a circuit with a voltage higher than 600 VAC. Otherwise, shock hazard or damage to the instrument or equipment under test may result.
 - Transformer jaw tips are designed to minimize the possibility of shorting conductors in the circuit under test. If equipment under test has exposed conductive parts, however, extra precaution should be taken to avoid possible shorting.
 - Do not make measurement with the battery compartment cover removed.
 - Do not make current measurement with the test leads connected to the instrument.
- 1) Set the function selector switch to 40A position.
 - 2) Press the trigger to open the transformer jaws and clamp around one conductor only.
 - 3) Observe the reading on the display.

Acceptable ranges: For standard AC solenoid valves the current will be zero for valves that are off and range between X and XX when on.

Note:

- During current measurement, keep the transformer jaws fully closed. Otherwise, accurate measurement cannot be made. The maximum conductor size is 30mm in diameter.
- When measuring a larger current, the transformer jaws may buzz. This does not affect the instrument's accuracy.



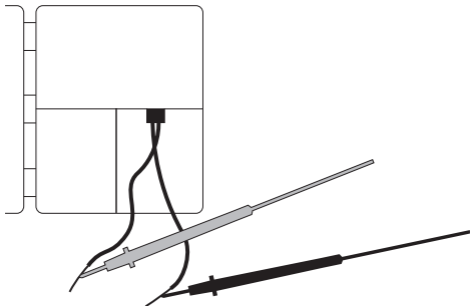
Voltage Check of Pump Relay

SET METER TO	600V$\tilde{\sim}$
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PROBE CONNECTIONS	BLACK COM	RED VΩ
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- 1) At the controller, turn on the station or master valve (MV) that controls the pump relay to be tested.
- 2) At the pump relay, expose a part of each of the two wires coming out of the relay.
- 3) Touch a probe to each of the exposed wires.
- 4) Check the reading on your multimeter.

Acceptable range: 24-28 V (AC)



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