

## TESTING YOUR SOLAR SYSTEM

### WARNING:

- Observe positive (+) and negative (-) polarities when connecting solar panels and batteries.
- Photovoltaic panels produce electricity when exposed to light, cover the front of the solar panel when handling the panel other than taking measurements.
- Do not short circuit the battery.
- Short circuit solar panels for testing purposes only and limit short circuit testing to 5 minutes or less

### INTRODUCTION

These instructions will allow you to test your solar panel and charge controller for basic functionality. Prior to conducting any tests it is suggested to verify the system wiring is correct and intact. Check all the connections and terminals for good electrical contact as this is the number one culprit of non-performing systems. If all the connections appear to be in order, check the fuses in the system to ensure they are not blown. If all of these preliminary checks are ok, you will simply need a multimeter capable of measuring voltage (V) and current (A) and sunlight.

### TESTING THE SOLAR PANEL

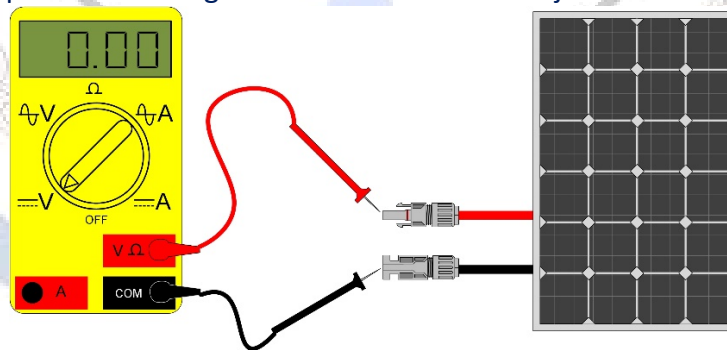
#### **OPEN CIRCUIT VOLTAGE (Voc)**

**IMPORTANT:** Make sure the meter selection is set to measure DC Volts and the test leads are in the correct port to measure DC Volts

If the meter reads OL (overload) during this measurement, it means that meter must be set to a higher DC measurement range. Typical DC measurement ranges on meters are (1) 0-20 VDC (2) 20-200 VDC (3) Above 200 VDC

Disconnect the solar panel completely from the battery and regulator.

While the solar panel is directly in the sunlight, measure the voltage by connecting the negative (COM) test lead from the multimeter to the negative MC4 connector and the positive test lead on the multimeter to the positive MC4 connector. If the measurement is zero, then the junction box on the back of the solar panel should be opened with a flat-head screw driver. Then the measurement can be taken directly from the positive and negative terminals inside the junction box.

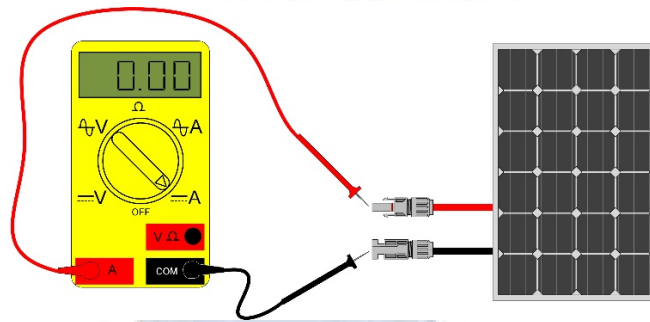


#### **SHORT CIRCUIT CURRENT (Isc)**

**IMPORTANT:** Make sure the meter selection is set to measure DC Amps and the test leads are in the correct port to measure DC Amps. The meter should be set to ~10A.

Disconnect the solar panel completely from the battery and regulator.

While the solar panel is directly in the sunlight, measure the amps directly at the positive and negative MC4 connectors by connecting the negative (COM) test lead from the multimeter to the negative MC4 connector and the positive test lead on the multimeter to the positive MC4 connector.



## TESTING THE CONTROLLER

### OPERATING CURRENT

**IMPORTANT:** Make sure the meter selection is set to measure DC Amps and the test leads are in the correct port to measure DC Amps. The meter should be set to ~10A.

Connect the panel to the charge controller and the charge controller to the battery.

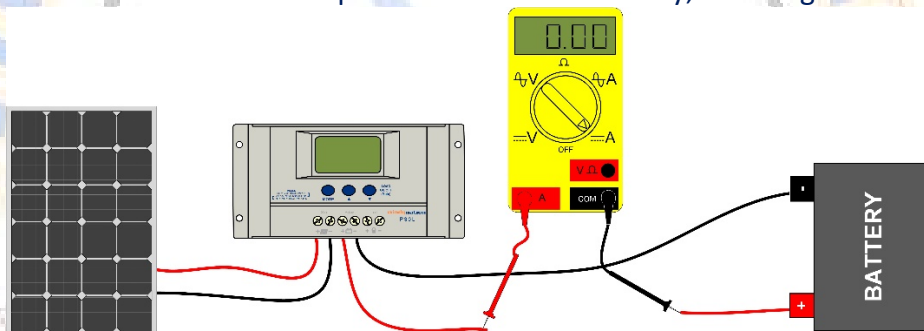
Disconnect the positive cable between the battery and the charge controller.

Measure the current by connecting the positive test lead from the multimeter to the positive cable from the controller and the negative test lead from the multimeter to the positive battery terminal.

This measures the current that the panel and charge controller are passing to the battery.

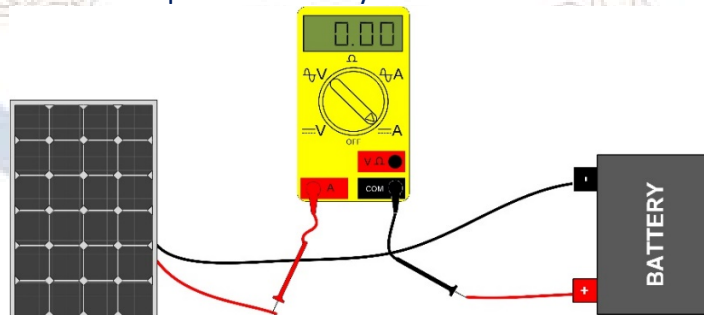
NOTE: If you connect the meter reversed, you will get a negative current showing.

If the battery is full the controller will not pass current to the battery, resulting in a low or zero reading.



Now connect the solar panel directly to the battery without the controller.

Disconnect the positive cable between the battery and the panel. Measure the current by connecting the positive test lead from the multimeter to the positive cable from the controller and the negative test lead from the multimeter to the positive battery terminal.



If there was no current when the regulator was in place, but there is now current present without the controller, then the two main possibilities are (1) Loose cable connection at the charge controller terminals. Disconnect and re-attach the battery and solar cables from the charge controller, making sure that there is solid electrical contact to the charge controller terminals. This is the most common problem. (2) There is a possibility that the charge controller could be faulty.