



PRO SERIES INSTALLATION MANUAL

READ ME
Designed for
both pros and
beginners!



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PRO SERIES QUICKSTART MANUAL

The following manual provides you with the fundamentals that you'll need to correctly install your RPS Pro Series Solar Pump System.

RPS has pre-programmed and calibrated your system in advance to make it easy for the amateur and professional alike. Besides making a few terminal and plumbing connections, there is little more required.

We don't cover plumbing or the steps to lower your pump as this can be done in the same manner as a traditional AC submersible pump.

With that said, if you would like to discuss this process in more detail, or have other questions, please do reach out to an RPS engineer.

We're a friendly bunch!

SYSTEM COMPONENTS

- 1. PUMP MOTOR** — Heavy 3 Phase motor with 4 threaded bolts that will connect to your pump end using the 4 included nuts. Wires from the motor will run up through the metal sleeve along the side of the pump end after it is bolted together.
- 2. PUMP END** — This pump end is spun by the motor below it. After they are attached together using the included nuts, be sure to attach a safety rope to the top of the pump for backup to the wire and the drop pipe to hold most of the weight as you lower the pump in the well. Pump end: _____
- 3. PUMP CONTROLLER** — This large sturdy controller is the brains of the system. It is preprogrammed for your pump and motor and will adjust the speed of the pump's motor based on the available power from the sun. The pump controller is waterproof but protecting it from direct sun and weather is still encouraged.
- 4. FLOAT SWITCH** — This can be used in a storage tank to tell controller to stop pumping when the tank is full. Wires can be extended with any two strand wire. Wire gauge is not important, as they are signal wires but common wire gauges are between 16 to 24 gauge.
- 5. 1¼" MALE NPT TO BARBED INSERT COUPLING** — The corrosion-resistant stainless steel fitting allows for the connection to high pressure 1¼" black poly pipe. 200+ psi recommended for Pro750D kits. Use 2 or 3 good hose clamps to attach. Best to warm up the poly pipe with a heat gun prior to clamping. **TIP:** use a socket set or 5/16" Driver Socket nut to get the hose clamps tighter.
- 6. SOLAR CONNECTOR WIRES** — 2 wires with MC4s. These will connect your panels to your controller. There are 2x 20 foot lengths of solar extension cable to connect the panels to the top of

6. SOLAR CONNECTOR WIRES (CONTINUED)

the DC disconnect and 2x 1.5 foot lengths of solar extension cables to connect the controller to the bottom of the DC disconnect.

7. DC CUT-OFF SWITCH — This external switch allows you to safely sever the electrical connection between your array and the controller. We may ask you to perform this function when troubleshooting and performing a hard reset if controller settings need to be changed.

8. SOLAR PANELS — Each panel has a Positive (male) and Negative (female) MC4 Connector allowing for quick connection to each other, the controller and the DC cut-off switch. Depending on the system HP or your personal preference you received large or small panels with your kit. In

9. PROGRAMMING KEYBOARD — Most systems will be installed and operated without ever opening the packet containing these. More information can be obtained to assist with troubleshooting by connecting and navigating with the keyboard and should be done upon request by an RPS engineer. See keyboard control and navigation section for more details.



Warning: Risk of Electric Shock

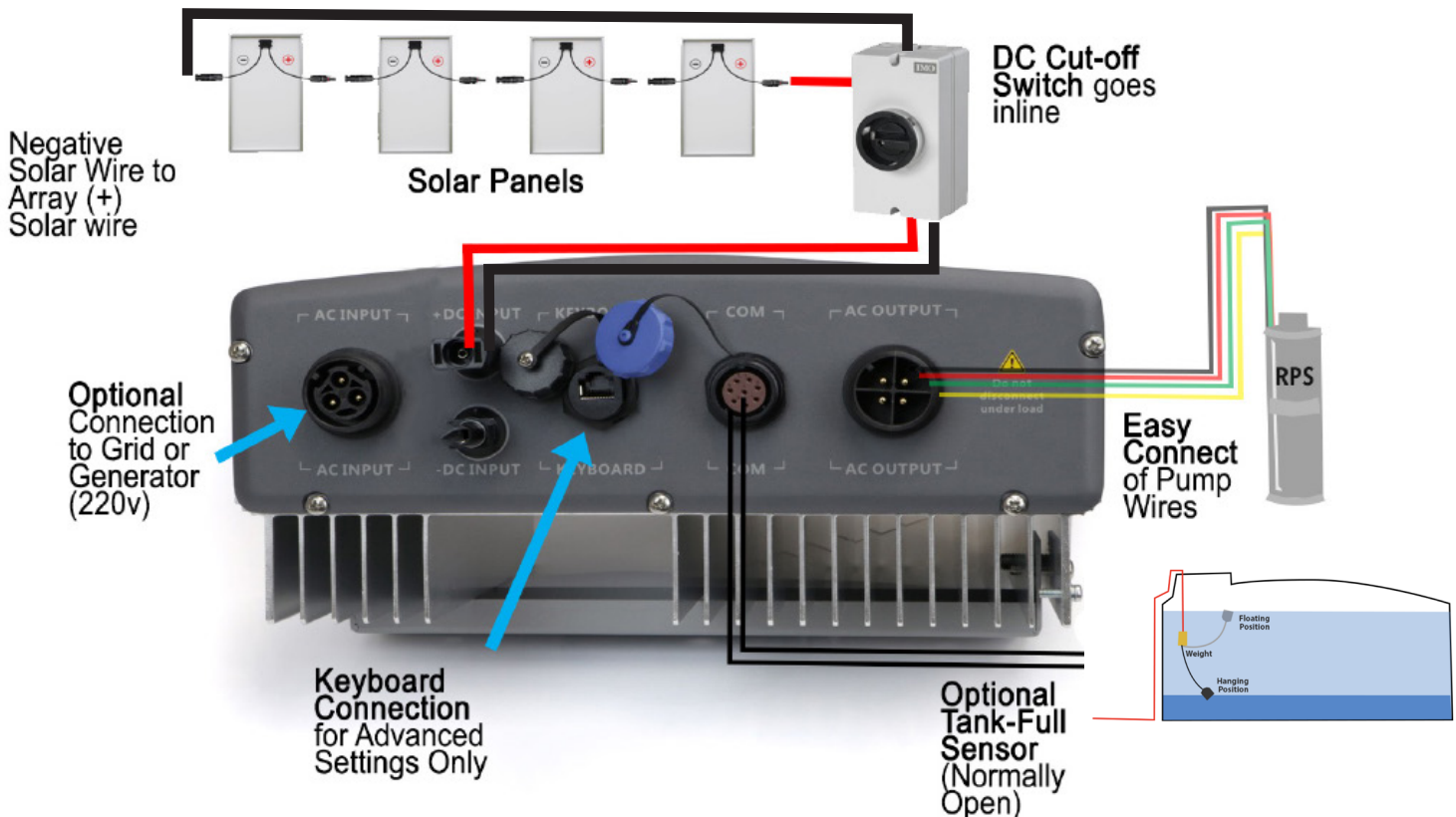
Solar panels and batteries can produce a significant amount of energy, which can cause electric shock. Whenever you're working with wiring or connections, make sure:

- The DC cut-off switch is in the proper position
- Solar panels are at least partially covered
- There are no exposed wires

Be sure to ground the system for safety and to prevent damage to equipment.

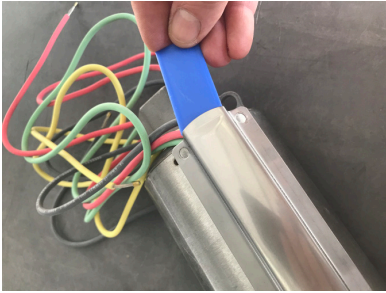
Remember, safety first! RPS is not liable for damage or injuries that result from improper installation technique. If you're unsure about the safety of any step in this manual, please call an RPS Engineer.

OVERVIEW

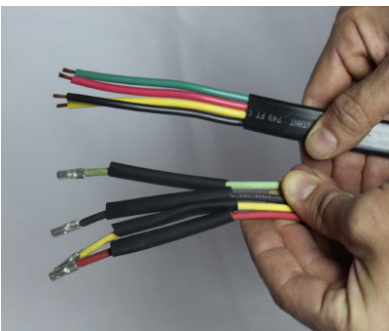


1. Wiring Your Pump

Most applications will require a longer pump cable, with a custom length for each installation. Use a three conductor + ground (four wires), submersible pump cable, 10 and 12 gauge are most common. Both stranded and solid wire can be used. Be sure to record the colors of the wires when adding wire. The extension wire will connect to the controller through the watertight 4 pin connector. Green is Ground. Bolt the pump and motor together. Remove the wire protector on the side of the pump side by side without crossing over.




Place the blue anti-chafe bushing between the protector and wires. Use the provided splice kit (adhesive lined heat-shrink tubing and butt splices) to connect a longer cable to the pump. If you don't have a heat gun to shrink the tubing, you can use a butane lighter, but make sure not to melt the tubing.



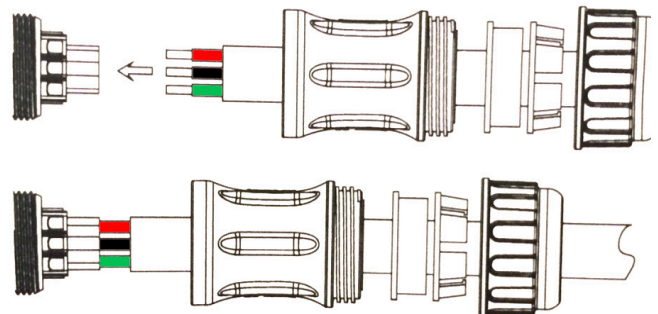
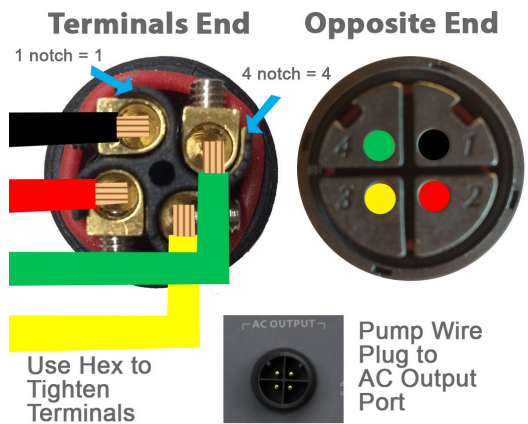
Your well pump's extended wiring will connect up into the AC Output terminal at the base of your controller using the included 4 prong plug. Wiring shown below. Generally these 3 phase motors are set up to spin the correct direction with the following color coding.

***If when system is up and running you are getting less water than expected, you can power down the system, switch the 1 and 2 wires, then power it back up.

Pump Wire	Your Drop Wire	Terminal
Black		1
Red		2
Yellow		3
Green 		4

Single Phase Motors (retrofit only)
Red (1), Yellow (2), Black (3), Green (4)

Pump Wire Plug



2. Connecting Your Solar Panels

CAUTION: Connecting the panels in series will produce voltages greater than 100V! Remove metallic jewelry and wedding bands when working with high voltage. Do not work with exposed wires when the system is energized.

Connect the solar panel cables with MC4 connectors only. Use the DC Cut-off switch in OFF position when installing. Solar panels can produce a significant amount of energy, which can cause electric shock. The MC4 solar panel connectors are the safest way to make the final connections. In the rare occasion you are working with exposed wires connected to the solar panels, it is recommended to cover the solar panels with a dark cloth to minimize power production.

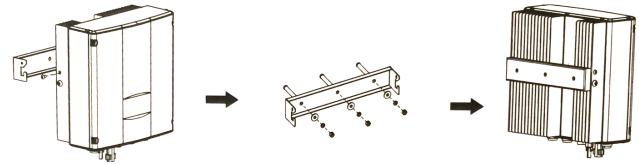
Your solar panels will be converting sunlight into electrical energy, which provides power to the solar pump controller. Your panels will face south and tilt towards the sun. More information on fixed or seasonal 'tilt' is available on our website under mounting. Each solar panel comes with connectors on the wire ends called MC4 connectors. They have a male end(+) and a female end (-) and fit snugly together for a waterproof seal.

With all Pro Series systems, you'll be connecting + wires to - wires in 'series' (panels can be oriented in different patterns for mounting purposes though) For RPS Pro Series systems 500, 750, 1000, 1500, 2000, 3000 you will connect your included solar panels IN SERIES. Controller Diagram on page 3 shows 4 panels in series with the + and - wires going through the DC cut-off switch.

The positive (+) and negative (-) wires from your solar array will come into the DC Cut-off switch from the top. The short MC4 jumper wires included in your kit will connect at the bottom of the DC cut-off switch. All connections will be prepared before making the final connection to the DC inputs on the bottom of the solar pump controller.

Mount your solar panels away from all possible shade, facing south at the proper tilt angle for your latitude. Ask an RPS Engineer if you have questions about mounting.

3. Mounting Your Controller



The mounting plate on the backside of the controller can be detached, positioned and mounted in place with the included hardware. The controller hangs on the mounting plate with set screws on the side to prevent it from coming loose. The controller should be set as vertically as possible with at least 12 inches on all sides to provide ample room for cooling.

4. Connecting Your Wires

When setting up the system, make the connections to the controller in the following order. Leave Keyboard Connection Port empty and covered unless instructed by RPS Engineer.

1. Connect the four pin Pump Wire Plug to AC Pump Output
2. Connect Tank Sensor Wire into COM port. If no tank sensor, leave port empty and covered.
3. Connect your MC4 extension cables to the bottom



5. System Grounding

It is important to ground the entire solar well pump system to ensure proper safety and to prevent damage in the event of a lightning strike but also to prevent static buildup. In lightning prone areas, this is especially important and a long dedicated copper ground rod should be installed near the solar panels and controller. If the well casing is metal and local code allows, it can be used for an Earth ground, instead of dedicated ground rod.

Connect the solar panel frames (there are dedicated grounding holes), controller enclosure (which will connect to your controller's ground terminal on the right side), support poles, any solar panel supports and all other metal parts to Earth ground, using adequately sized copper wire. In most cases, the solar panel mounting can be used to ground the panel frames. **IMPORTANT:** Connect both solar panels and controller enclosure (ground screw on right side!) to a single grounding rod! Do not connect the sensors, well pump connections, or solar panel returns (-) to Earth ground. Use a multimeter to confirm proper grounding of the various components. In the event of a lightning strike, check the system for damage, confirm the ground wires are still intact and re-check the metallic components for proper grounding.

6. Tank Sensor

The tank level sensor included in the kit connects to the solar pumping controller using the blue connector with the pigtail. It connects to the COM port (also blue) on the underside of the controller. The pigtail is a jacketed bundle of two smaller wires. Each of the two wires is preconfigured to connect to the correct switch inputs. Since the system will pump when there is no sensor plugged in (Normally open) You'll want to use the two wires on your float sensor that close the circuit when the float

is floating. When the float is hanging, the float should be telling the controller to pump and the circuit will be open. (This usually excludes the blue wire but a multimeter will give you a quick verification). Strip the outer jacket to expose the two 18 gauge wires and strip ¼" of insulation on each wire to expose the conductor. Use the included splice kit to connect to the two float switch wires. Alternatively you may have chosen to operate your pump off a pressure switch. Use some two wire sensor cable to connect between the blue connector and either of the two adjacent terminals on the pressure switch.

If you wish to run for the duration of the solar day no connection to the pump controller using the blue switch input plug. Simply leave the weatherproof cover on and proceed to the part of the installation.



7. Adding an AC Power Source

**** Contact RPS Engineer to Activate this Feature ****

Upon activation, your controller allows you to switch between solar power and 220v AC (Generator or Grid) automatically. You'll be plugging into the AC Input Port on the bottom of your controller. You are going to wire out the Neutral and connect two hots (L1 and L2) to the L and N terminals in the 3 prong plug supplied in your kit.

8. Initial Start-up

After the DC shut-off is switched to the ON position the first indication of startup will be on the controller's LED display on the front cover. The Green LED will blink while the controller starts up followed by the green LED transitioning to a solid when the pump begins to rotate and accelerate up to its maximum RPM.

Depending on the flow of your pump and the depth of your well it could take up to a couple minutes before the water reaches the surface. The pump has been programmed to automatically start when solar power is sufficient and power is supplied to the controller.

If you are now getting water at the surface and you estimate the volume is what you may expect from the pump end and horsepower your system was designed to operate at you can proceed with last remaining steps for your installation, clean up, and monitor your system for the next few days to ensure the system is automatically starting and delivering water.

If you have waited and water is still not emerging from your drop pipe please proceed to the next section to troubleshoot your problem and gather information before calling our knowledgeable support engineers to help you out.

9. Indicator Lights

RUN - Green LED - Steady green light means pump motor is running normally between the minimum and maximum frequency. Blinking means it's still in startup mode.

STOP - Amber LED - This is a normal stop condition. When the Stop light is illuminated an external condition is telling the system not to pump water. Pumping will resume as soon as the condition is resolved. The three most common conditions causing a stop condition are the tank is full, there is insufficient light, and a low water condition has been detected by the pump in the well and is waiting for a preprogrammed time before it can resume.

ERROR - Red LED - If the Error light is illuminated it means a Fault condition has occurred within the controller. Usually it indicates there is insufficient power to the controller to power up the pump (check that your solar panels are in full sun with zero shade) It can also indicate a system or programming fault that will place the controller in Standby to protect it. A fault condition can be transient in which case resetting the controller by cutting off power with the DC cut-off, waiting 60 seconds (no lights on!) and then powering back on will resolve the fault. If the fault occurs repeatedly you will need to connect your Keypad to the controller to read out the fault condition displayed on the red sevensegment LED on the keypad.

10. Keypad Connection & Operation

The Keypad included with your Pro System is used to check system runtime parameters, read fault status or stop condition details, or reprogram the controller if system components change. Use the included connector cable and plug it into the back of the keypad. Unscrew the cover from the keyboard port and plug it in with the controller in the ON state. If you are identifying a fault condition connect the keyboard and read the fault before performing a soft reset on the controller which will clear the fault. In most cases the system can run without ever having to connect the keypad.



10. Keypad Connection & Operation (Continued)




Indicator	Status	LED
Run/Tune	Stop	Off
	Autotune	Flashing
	Run	On
FWD/REV	Clockwise Rotation (FWD)	Off
Local/Remote	Auto mode	Flashing
	Manual mode	Off
Trip	No Fault	Off
	Pre-alarm	Flashing
	Fault	On

Display Units

Frequency	top LED illuminated
RPM	top two LEDs illuminated
Current	middle LED illuminated
Percent	lower two LEDs illuminated
Voltage bottom	LED illuminated

Operational State Parameters

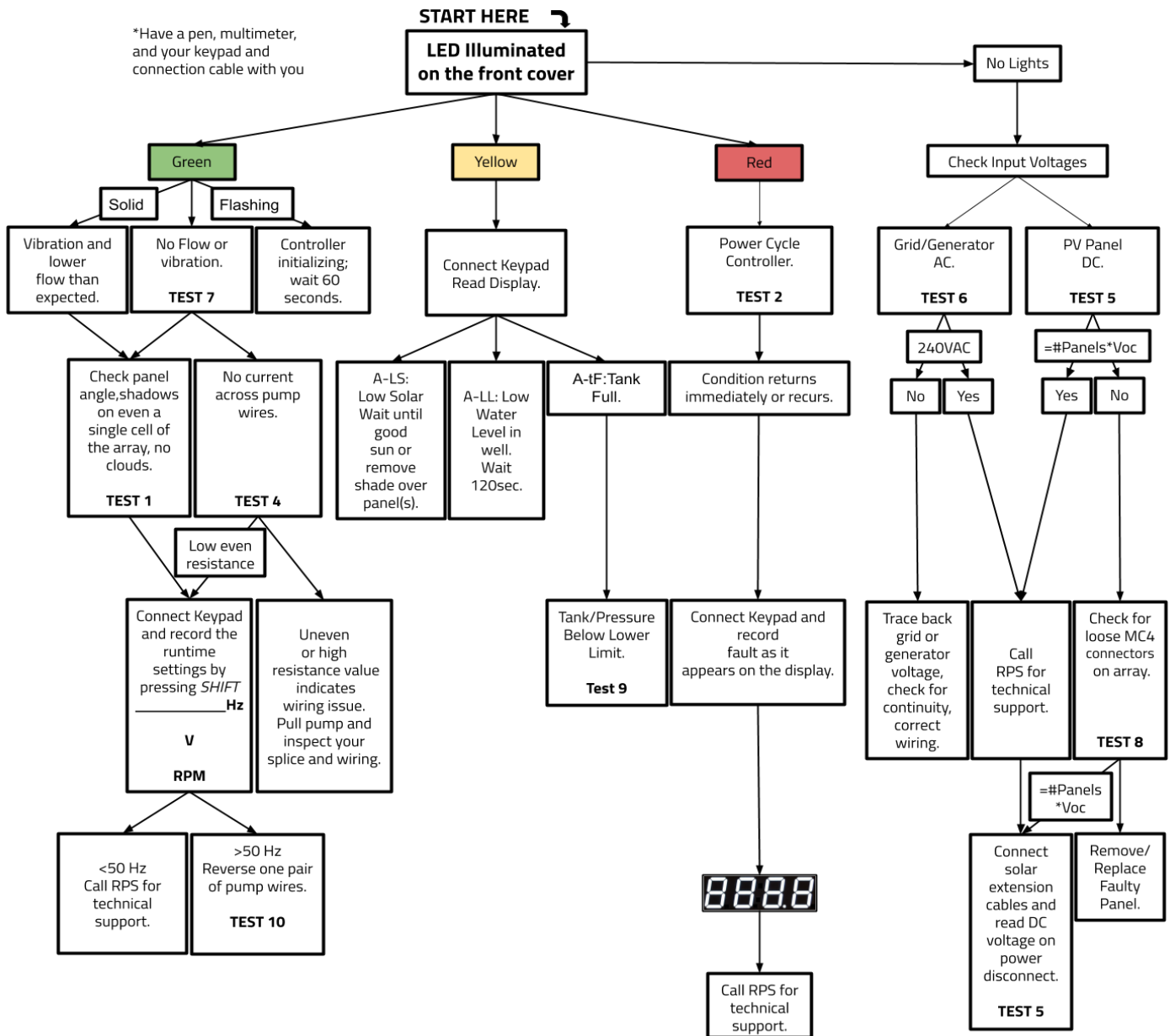
The Keypad displays state parameters which assists in troubleshooting and system performance. **To view these values connect the keypad to the controller while the system is running and press the  button to advance through the values.** All values other than set frequency and bus voltage will change in real time depending on solar conditions, time of day, and panel angle. The Keypad will display the values, after connecting, in the following order:

Running Frequency	The frequency your pump is currently running at.
Set Frequency	The frequency your pump wants to run at. RPS systems run at 60HZ when there is sufficient solar power.
Bus Voltage	Intermediate voltage value after coming from the grid/ generator or solar input and before conversion to three phase AC output
Output Voltage	The voltage across the pump leads
Output Current	The current available to the pump
Pump RPM	The speed the pump is currently rotating.

TROUBLESHOOTING FLOWCHART

If you run into issues with your RPS Pro system don't worry! Our engineers are available to take your call and help you get water moving. Before you get one on the phone there are some tests and checks you can do to find the root cause or obtain information the engineer may ask you to get started. This may help you solve your issue or speed up the troubleshooting process with the engineer.

For additional help, call us at 888.637.4493.



TESTING/ TROUBLESHOOTING

TEST 1 — CHECK SOLAR PANELS. May need solar panel adjustment. Refer to 'Tilt Angles' in the manual for your season and latitude. Is there cloud cover? Is it late or early in the day? Is there even a small amount of shade on the panels? Adjust panels to be in full sun and free from shade, and/or check back when there is more sunlight.

TEST 2 — HARD RESET. Turn off disconnect, Power Down Generator. Leave disconnected until LEDs on front cover power down then re-energize the system.

TEST 3 — READ RUNTIME PARAMETERS HZ TEST. Plug in keyboard, press hit SHIFT key to cycle to the Hz, Voltage, and RPM setting. Ideally between 40 and 60hz. We can increase the minimum value but on solar it is usually as high as it can be with the power available.

TEST 4 — PUMP WIRES. Set your multimeter to Ohms (resistance) and measure the resistance between each pump wire (1 to 2, 2 to 3, 1 to 3) They should be roughly the same and all should test open when referencing Ground(4 to 1,2,3)

TEST 5 — SOLAR INPUT VOLTAGE. Set your multimeter to VDC Test before DC cutoff switch and after, should have 100+ volts DC, Under 400 VDC

TEST 6 — AC INPUT VOLTAGE. Set your multimeter to VAC AC input should be 220v to 240v AC single phase.

TEST 7 — CURRENT TO PUMP. Plug in keyboard, hit shift key to cycle to the A setting. Reading should be at least 4 Amps. Optionally use the clamp on an ammeter around a single pump wire.

TEST 8 — PANEL VOLTAGE. If your panel voltage is insufficient to power the controller then we need to identify the weak or bad electrical connection. Disconnect your MC4 panel wires and begin by testing the open circuit voltage of a single panel by inserting the leads into the MC4 connectors and reading the voltage. Repeat with the next panel continuing to build voltage until the faulty connection or panel causes the voltage to drop.

TEST 9 — SENSOR WIRING. If you are reading a tank full alarm but your level/ pressure is low first remove the sensor input. If the condition resolves this indicates a short in the wire run or has the wrong wires connected. Set your multimeter to Ohms (resistance) and measure the resistance on pins 1 and 3 on the sensor plug. Lift and drop the float to observe resistance changes.

TEST 10 — REVERSE PUMP WIRING. We always size the pump to provide water over the average pump end value. If your pump is spinning at 60Hz and starting normally but you are not getting water it could indicate the pump is spinning backwards. Reverse the first two leads so the new wire order on the plug terminals is 1-Red 2-Black 3-Yellow 4-Ground. If this does not correct the problem return the wires to the order specified in the manual on page 4.

NOTES





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