

INSTALLATION AND OPERATION MANUAL



aquatec

SOLAR PUMP CONTROLLER APC-30-250



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Introduction

The Aquatec APC-30-250 is designed specifically to be an interface between a photovoltaic array, and the Aquatec SWP series submersible pumps. It is a solid-state power converter that optimizes and protects the solar well pump. The controller automatically extends pump run time by the use of current boosting, and provides protection from excessive Voltage and Current, as well as dry-running.

Precautions

- Read Documentation thoroughly
- Hire a qualified installer if not familiar with safe practices
- Disengage power while working. Handling live wires could result in personal injury and/or product damage
- Don't exceed voltage limit of the pump controller
- Ensure that polarity of electrical connections is not criss-crossed or reversed on terminal block;

Positive to Positive (red) and Negative to Negative (black) for input and output connections

- Mount the pump controller vertically, in a well-ventilated location
- Shield from direct sunlight exposure
- Keep electronics dry

Features

- Weather resistant housing
- Can be powered directly from either a solar panel or battery
- Low water cut-out via switchless sensing
- Over Voltage Protection (manually adjustable)
- Over Current Protection
- Maximum power point tracking
(Regulation of array voltage to match pump load)
- Linear Current Boosting to match pump load requirements
- Power output adjustability for pump flow control
- System power switch
- LED status indicators for system power, pump running, low water, open load and over current
- Grounding terminal block
- Terminal for remote tank switch

Installation & Operation

- See pump manual for additional system requirements and recommendations.
- Ensure Solar Panel Array is delivering minimum voltage requirements stated on page 8 section 2.
- Controller Location: The solar pump controller can be mounted indoors or outdoors. It should be placed in a protected location, mounted vertically close to the well, and oriented to limit direct sunlight exposure.
- Wiring: Be sure that wires are not “live” when being connected. A power disconnect switch is recommended. In the absence of a switch, the panels should be blocked from sunlight when making electrical connections.

A grounding block terminal is located in the lower left portion of the controller. This can be used to for grounding connections per local codes.

- Use proper cable glands to ensure that the controller housing remains sealed
- All equipment should be installed prior to making electrical connections to the solar controller.
- All materials and work must comply with national and local regulations
- Please refer to the following instructions for proper operation:
 1. Connect and ensure matching positive and negative lead connections from solar panel and pump leads to corresponding controller terminals per the wiring diagram.

Please note:

Improper connections or reverse polarity will cause damage to electrical components and render controller unusable.

2. Solar Panel Voltage Selector:

The controller is equipped with a switch to select solar panel voltage. Place dip switch 1 to “OFF” for 30V panel (180W Min) or “ON” for 36V panel (200W Min). The controller will allow operation of the pump as long as the minimum supplied voltage is 27.5V for 30V panel or 30.5V for 36V panel. The controller software automatically optimizes LCB with either selection. Maximum voltage input is 40V.

3. Battery Power Mode:

Place dip switch #2 to the “ON” position to override dip switch #1 and activate battery mode.

The controller will allow operation of the pump as long as incoming battery power is at least 23.5V, thus protecting the battery from excessive draw down. Maximum battery voltage input is 40V.

4. Output Voltage (Motor Speed Control):

This function is used to regulate output voltage to protect the pump and to regulate flow rate of the pump to match the well draw-down. Using a voltmeter, verify incoming voltage is present. If voltage not present, re-check electrical connections. With incoming power verified, turn controller main power switch to the “ON” position (up). Using a voltmeter, verify voltage output at pump terminals. Use the trim pot labelled “Output Voltage” to decrease (CCW) to 20V or

increase (CW) to 30V maximum output voltage as required. If the pump is drawing the well water level down too fast, the trimpot can be adjusted counterclockwise to reduce the flow of the pump.

5. Open Load:

If there is an open circuit condition from the controller terminals to the pump, the “Power Out LED” will fast blink until the open condition has been cleared. Resistance at the pump motor should be approximately 5.4 ohms. If resistance is not ok, contact Aquatec.

6. Tank Float Switch:

The pump controller can accommodate an optional tank float switch. The switch can be set to either a normally closed or normally open function. Use dip switch 3 to select the applicable function. When set to the “ON” position, a closed switch indicates a full tank. When set to the “OFF” position, an open switch indicates a full tank.

Please note: In the absence of a float switch, the dip switch should be in the “ON” position or the pump will not run.

7. Automatic Over-Current Protection:

The controller will stop pump operation when the current draw reaches approximately 5.2 Amps. The over-current red LED will fast blink, and the pump will stop. After approximately 60 seconds, the

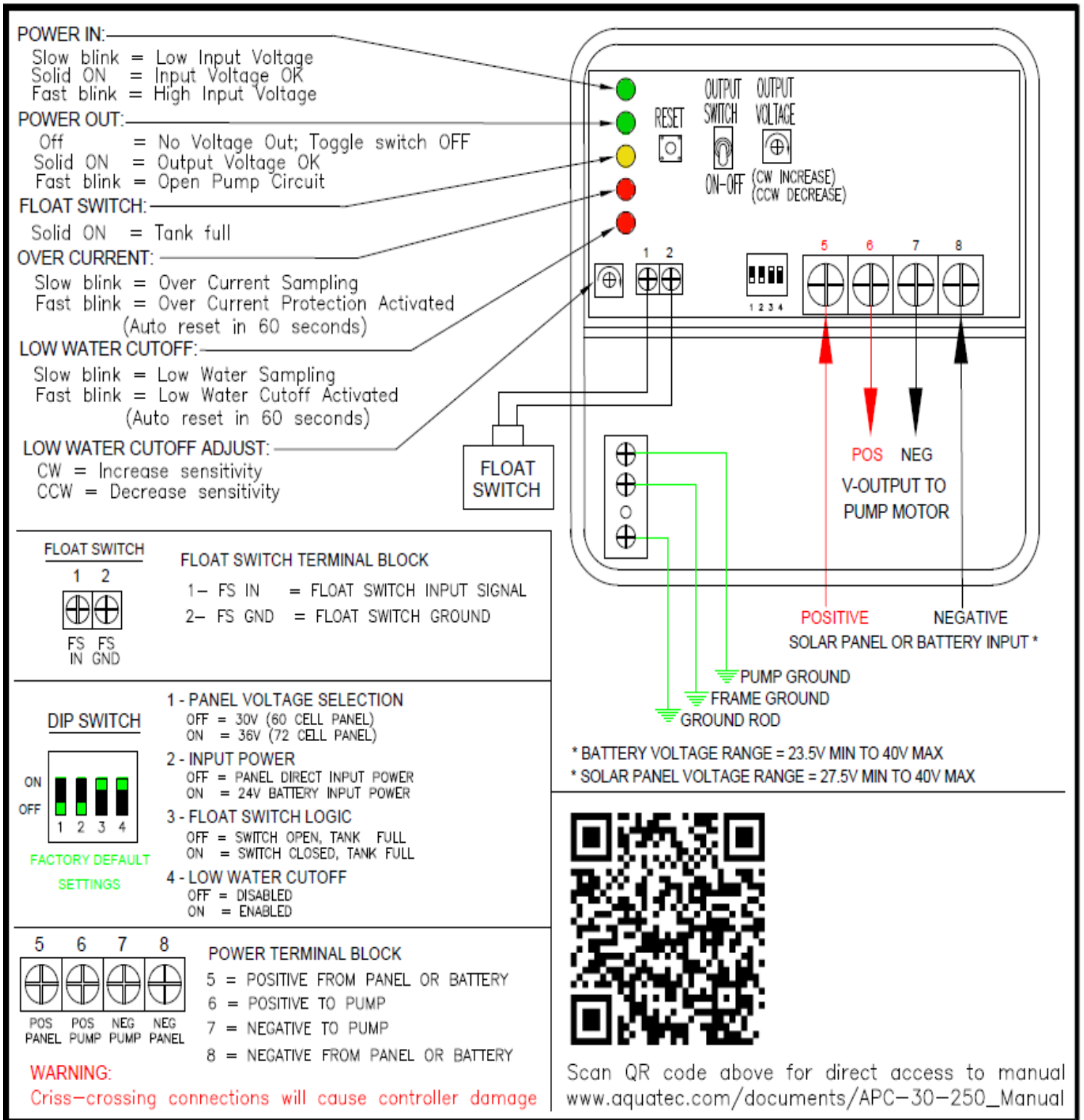
pump will restart automatically. This cycle will repeat itself until the over-current condition is cleared.

8. Low Water Cut-off (LWC):

The controller features a low water cut-off that will automatically cut power to the pump when well water has been drawn down below the pump inlet. The pump will cycle ON for 10 seconds and OFF for 60 seconds until the problem is cleared. The feature is enabled by setting dip switch 4 to the “ON” position.

The calibration of this feature is performed as follows:

- a. Place dip switch 4 to the “ON” position.
- b. With the pump running, raise it above the water line.
- c. Turn trimpot labelled “LWC” to full counter-clockwise position.
- d. Slowly turn trimpot clockwise until “Low Water Cut-Off” indicator LED (red) blinks. After a 10 second delay the pump will stop.
- e. Lower pump below the water line. The pump will re-start after approximately 60 seconds.
- f. Raise pump above water line. If calibration was successful, the pump will shut off after a 10 second time delay. If not, repeat the calibration process.



Please note: Factory default dip switch settings are as shown above.

LED Quick Reference Guide

POWER IN -----	GREEN
POWER OUT -----	GREEN
FLOAT SWITCH -----	YELLOW
OVER CURRENT -----	RED
LOW WATER CUTOFF -----	RED

LED	STATUS	DESCRIPTION
POWER IN	OFF	No Operation
	ON (Solid)	Normal Operation
	ON (Slow blink)	Low Input Voltage Condition - See page 8 Section 2
	ON (Fast blink)	High Input Voltage Condition - See page 8 Section 2
POWER OUT	OFF	No Operation
	ON (Solid)	Normal Operation
	ON (Fast blink)	Open Load Condition - See page 9 Section 5
FLOAT SWITCH	OFF	Normal Operation
	ON (Solid)	Float Switch Activated. Tank Full. Pump OFF See page 9 Section 6
OVER CURRENT PROTECTION	OFF	Normal Operation
	ON (Slow blink)	Over current sampling
	ON (Fast blink)	Over Current Protection Activated. Pump will keep cycling ON and OFF every 60 seconds until problem is cleared - See page 9 Section 7
LOW WATER CUTOFF (LWC)	OFF	Normal Operation
	ON (Slow blink)	Low water supply sampling
	ON (Fast blink)	Low Water Supply Level Activated. Pump will keep cycling ON and OFF every 60 seconds until problem is cleared - See page 10 Section 8

Troubleshooting Guide

Fault	Possible Cause	How to Correct
Controller not powering up	1) Wire connection fault	1) Inspect wire connections and fuses
	2) Low voltage	2) Check array for proper voltage
Pump will not operate	1) Faulty power supply	1) Ensure adequate power supply
	2) Wire connection fault	2) Inspect wire connections and fuses
	3) Low voltage (Power In LED slow flashing)	3) Ensure minimum voltage supplied: 27.5V minimum for 30V (60 cell panel) 30.5V minimum for 36V (72 cell panel) 23.5V minimum for 24V (Battery Mode)
	4) High Voltage (Power In LED fast flashing)	4) Ensure maximum voltage supplied: 40V Maximum for Panel Array and Battery
	5) Float switch dip switch is in wrong setting	5) Refer to page 9 Section 6 for setting instructions
	6) Low water cutout is active (LWC LED fast flashing)	6) Ensure pump is fully submerged in water and draws 0.5 Amps minimum
	7) Open load (Power Out LED fast flashing)	7) Inspect wire connections at controller and pump motor. Resistance at pump motor connections should be approx. 5.4 Ohms
Pump operates but there is no flow or reduced flow	1) Low voltage	1) Check power supply for proper voltage
	2) Supply out	2) Ensure pump is installed below the water level (maximum submergence 100ft/30mtr)
	3) Clogged filter screen	3) Clean debris from pump suction screen
	4) fluid path in plumbing is restricted or damage/leaking	4) Check for pinched hose or clogged tubing Check for tubing/clamp leaks or tears
	5) Pump is worn	5) Inspect components
	6) Voltage Out control trimpot is not	6) See page 7 for calibration instructions
Pump draws high current	1) Improper electrical connection	1) Refer to diagram
	2) Faulty insulation or splice	2) Replace faulty materials
	3) Fluid path in plumbing is restricted	3) Check for pinched, clogged or frozen hose
	4) Pump rotor locked	4) Contact Aquatec

Technical Specifications

- Model: APC-30-250
- Max Load Power: 250 Watts
- Max Load Current: 5.3 Amps
- Max Input Open Circuit Voltage: 48 Volts
- Max Regulated Output Voltage: 30 Volts
- Enclosure Dimensions: 6.55" x 6.13" x 3.75"
- Shipping Weight: 2.0 lbs.

WARRANTY

Aquatec International, Inc. (“Aquatec”) warrants its products to be free from defects in material and workmanship under the following terms:

All Aquatec APC solar pump controllers: The warranty will last for a period of eighteen months from date of manufacture. Aquatec’s obligation under this warranty shall be limited to replacing or repairing at Aquatec’s discretion, any such product or part which must be returned to Aquatec’s factory with a Return Material Authorization Number (RMA), transportation charges approved by Aquatec or prepaid, and which upon examination, is found to Aquatec’s satisfaction to have been defective under the terms of this warranty. No credit will be allowed against future purchases for items returned as defective under the terms of Aquatec’s warranty.

This warranty does not extend to any products, which have been altered or modified outside the Aquatec factory, nor does it apply to units that are returned in an unassembled condition. The warranty guarantees that products will perform to Aquatec’s specifications throughout the life of the warranty. The warranty does not cover abnormal use. If the returned product is found not to be defective under the conditions of this warranty, a charge will be made for repair or replacement.

This is a Limited Warranty. It covers the product only and the extent of the coverage is limited to the cost of the product. As the manufacturer has no control over shipping, handling and installation, the warranty cannot cover any damage caused by these factors.

This warranty is in lieu of all other warranties, expressed or implied, and no person is authorized to give any other warranty or assume obligation or liability in Aquatec’s behalf. Aquatec shall not be liable for any indirect, incidental or consequential damages of any kind incurred by the reason of the use or sale of any defective product and part.

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