

INSTALLATION AND OPERATION MANUAL



aquatec

SOLAR PUMP CONTROLLER

APC-30-250



Table of Contents

Introduction.....	Page 3
Precautions.....	Page 4
Features.....	Page 5
Installation and Operation.....	Page 6
Wiring Diagram.....	Page 11
LED Light Quick Reference Guide.....	Page 12
Trouble Shooting.....	Page 13
Technical Specifications.....	Page 14
Notes on your installation.....	Page 15
Warranty.....	Page 16

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 reversed
(Red +, Black -)
- 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.

3. Battery Power Mode:

The controller will allow operation of the pump as long as incoming battery power is at least 24.5 VDC, thus protecting the battery from excessive draw down. Place dip switch 2 to the “ON” position to activate this mode.

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 trimpot 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 counter-clockwise to reduce the flow of the pump.

5. 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.

6. Low Water Cut-off (LWC):

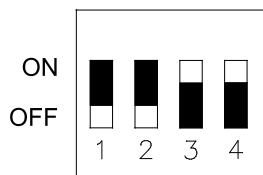
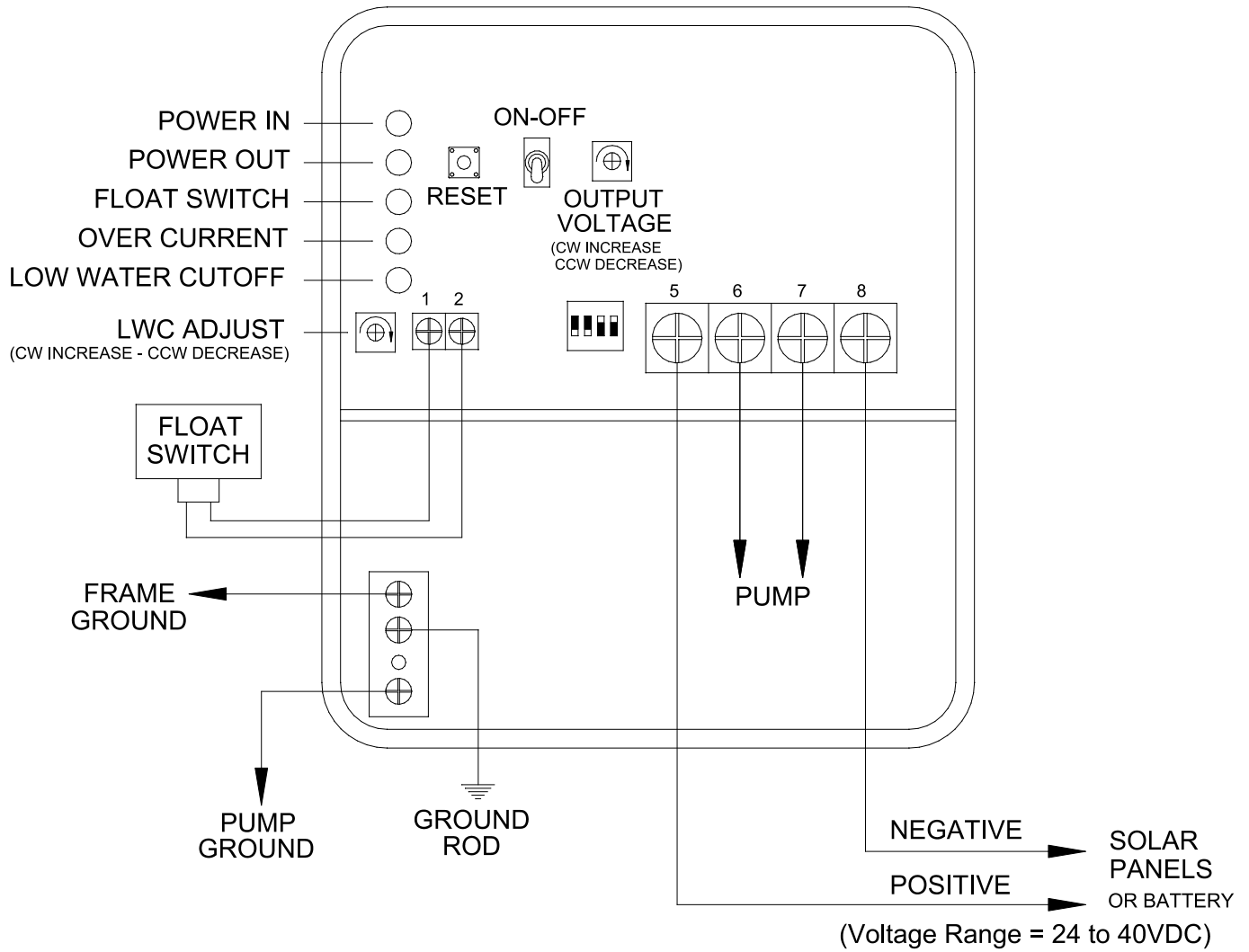
The controller features a low water cut-off that will automatically cut power to the pump when well water has been drawn down below the pump inlet. The pump will cycle ON for 10 seconds and OFF every minute until problem is cleared. The feature is enabled by setting dip switch 4 to the “ON” position.

The calibration of this feature is performed as follows:

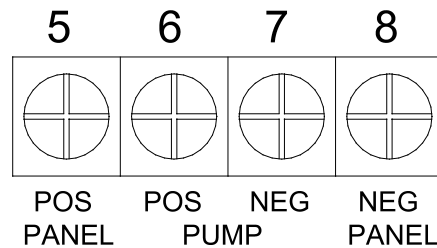
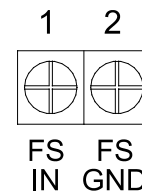
- a. Place dip switch 4 to the “ON” position.
- b. With the pump running, raise it above the water line.
- c. Turn trimpot labelled “LWC” to full counter-clockwise position.
- d. Slowly turn trimpot clockwise until “Low Water Cut-Off” indicator LED (red) turns on. After a 10 second delay the pump will stop.
- e. Lower pump below the water line. The pump will start after approximately one minute.
- 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.

7. Automatic Over-Current Protection:

The controller will stop pump operation when the current draw reaches approximately 5 amps. The over-current red LED will light up and the pump will stop within 5 seconds of an over-current condition. After approximately 1 minute, the pump will restart automatically. This cycle will repeat itself until the over-current condition is cleared.



- 1 - PANEL VOLTAGE SELECTION**
On = 36V (72 CELL PANEL)
Off = 30V (60 CELL PANEL)
- 2 - INPUT POWER**
On = BATTERY INPUT POWER
Off = PANEL DIRECT INPUT POWER
- 3 - FLOAT SWITCH LOGIC**
On = SWITCH CLOSED, TANK FULL
Off = SWITCH OPEN, TANK FULL
- 4 - LOW WATER CUTOFF ON/OFF**



Note: Factory default dip switch settings are as shown above.

LED Light Quick Reference Guide

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

FEATURE	LED STATUS	DESCRIPTION
POWER IN	POWER IN LED: OFF	No Operation.
	POWER IN LED: ON (Solid)	Normal Operation.
	POWER IN LED: ON (Blinking)	Low Voltage Condition - See page 8 Section 2.
POWER OUT	POWER OUT LED: OFF	No Operation.
	POWER OUT LED: ON (Solid)	Normal Operation.
FLOAT SWITCH	FLOAT SWITCH LED: OFF	Normal Operation.
	POWER IN LED: ON (Solid)	Float Switch Activated. Tank Full. Pump OFF.
	FLOAT SWITCH LED: ON (Solid)	
LOW WATER CUTOFF (LWC)	LWC LED: OFF	Normal Operation.
	POWER IN LED: ON (Solid) LWC LED: ON (Solid)	Low Water Supply Level Activated when pump draws air and about 0.7 Amps. Pump will keep cycling every 45 seconds until problem is cleared.
OVER CURRENT PROTECTION	OVER CURRENT LED: OFF	Normal Operation.
	POWER IN LED: ON (Solid) OVER CURRENT LED: ON (Solid)	Over Current Protection Activated when pump draws 5.3 Amps or higher. Pump will keep cycling every 45 seconds until problem is cleared.

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 - See page 8 section 2
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 flashing)	3) Ensure minimum voltage supplied - 27.5V minimum for 30V (60 cell panel) - 30.5V minimum for 36V (72 cell panel) - 24.5V minimum for 24V Battery
	4) Float switch dip switch is in wrong setting	4) See page 10 for setting instructions
	5) Voltage control trimpot is not properly adjusted	5) See page 9 for calibration instructions
	6) Low water cutout (LWC) is active (red light on)	6) Ensure pump is completely submerged and drawing 0.7 amps minimum
	7) Open pump load	7) Inspect pump wire connections - Ensure load resistance from pump is approximately 5.4 Ohms
	"Power In" LED flashes "Low Water" LED is on solid)	
Pump operates but there is no flow or reduced flow	1) Low Voltage	1) Check power supply for proper voltage
	2) Water Supply Out	2) Ensure pump inlet is installed below the water level (maximum submergence 100 ft / 30 meters)
	3) Clogged filter screen	3) clean debris from pump suction screen
	4) fluid path in plumbing is restricted or damaged/leaking	4) Check for pinched hose or clogged tubing. Check for tubing/clamp leaks or tears
	5) Pump is worn	5) Inspect pump components
Current draw high	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 hose, clogged or frozen tubing
	4) Pump rotor locked	4) Contact Aquatec

Technical Specifications

- Model: APC-30-250
- Max Load Power: 250 Watts
- Max Load Current: 5 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 Water Systems, 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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