

SOLAR SUBMERSIBLE PUMP USER MANUAL

MODEL: 3SSH1.8/100-D36/500S

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NOTES FOR SAFE OPERATION

■ BEFORE INSTALLATION

WARNING

- ⊙ Do not install or operate damaged controller/pump or with missing parts.
- ⊙ Ensure only qualified personnel to operate the system. Otherwise it may cause an electrical shock or damage to the pump and controller.
- ⊙ Use correct PV panel configuration and cable size following the technical guide strictly. Otherwise, it may influence pump performance even result in damage to pump and controller.
- ⊙ Maximum submersible depth of pump should ≤ 40 Mtrs. Otherwise, pump body may deform and the flow and head performance may reduce due to the high water pressure.

■ INSTALLATION

CAUTION

- ⊙ Install the controller in nonflammable material like metal. Otherwise it may cause a fire.
- ⊙ The protective cabinet must prevent from moisture, insect or dust accumulation, which may cause abnormal working condition of controller.
- ⊙ The protective cabinet needs to set vents to ensure ambient temperature is below 45°C. High temperature will damage the controller components.
- ⊙ Use antistatic wrist strap while doing wiring. DO NOT touch the control board with hand directly. Static electricity on human body will cause breakdown on some components instantaneously.
- ⊙ Ensure PV array's positive (PV+) and negative (PV-) are connected to controller's PV+ and PV- terminals correspondingly.
- ⊙ Ensure pump's U V W wires are connected to controller's U V W terminals correspondingly. Otherwise, the motor will run in reverse, and cannot give normal flow and head.
- ⊙ DO NOT make pump's U V W wires short circuit. It may cause the fuse blow out.
- ⊙ CONNECT EACH TERMINAL TIGHT. Otherwise, the large contact resistance and the operating current will cause the terminal to heat up severely.
- ⊙ Make sure every joint of extension cable is tight and well waterproof.

WARNING

- ⊙ Using dc breaker and surge protection device for safe purpose. Surge may cause big instantaneous current and make the fuse blow out.
- ⊙ DO NOT touch any terminals at energized condition. Otherwise it may cause an electrical shock.

■ OPERATION

CAUTION

- ⊙ Do not open or remove the front cover of controller during running. It may cause personal injury.
- ⊙ In order to test the pump, the maximum DRY-RUN time should ≤ 15 seconds.
- ⊙ If the pump turning is reversed, change any two lines of pump's UVW wires.

■ MAINTENANCE AND INSPECTION

WARNING

- ⊙ Only qualified or authorized professional personnel can maintain, replace and inspect the system. Otherwise it may cause damage or personal injury.
- ⊙ Wait at least 10 minutes after the power failure, or ensure there is no residual voltage before carry out maintenance and inspection. Otherwise it may cause damage or personal injury.

■ AFTER-SALES

- ⊙ If failing to follow above necessary instructions, resulting in damage to the system or personnel, it's not available to enjoy free warranty service from supplier.

1、How It Works

Solar pumping system serves to provide water in remote applications where electrical grid power is either unreliable or unavailable. BLDC solar pump controller can direct use the DC power from PV array, and drive the brushless DC pumps. In sunny days, the pumping system can continuously pump water. There is no need of batteries or other energy storage devices. It's recommended to pump water to a reservoir for storage.

A float switch can be installed in the water tower to control the pump operation. And install a low-level probe in well to detect the well water so that pump will stop when there is no water. Figure 1 shows a typical diagram of the solar pumping system, including major parts and components.

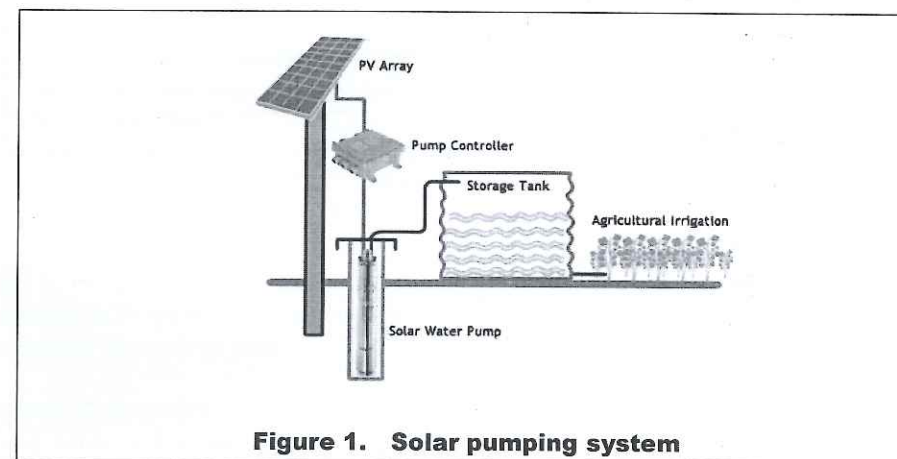


Figure 1. Solar pumping system

Consists of:

- PV Array
- Solar Power Pump Controller
- Solar Power Submersible Pump
- Water Source Level Switches
- Tank Level Switches

2、 3SSH1.8/100-D36/500S Pump Description

2.1 Material of Parts

Parts of Pump	Description of Material
Motor	Full Oil Permanent Magnet Brushless DC Motor (Without Hall)
Controller	32bit MCU / FOC / Sine Wave Current / MPPT
Controller Shell	Die-cast Aluminum
Outlet/Inlet	Die-cast 304 Stainless Steel
Pump Body	304 Stainless Steel
Motor Body	304 Stainless Steel
Helical Rotor	304 Stainless Steel
Screw	304 Stainless Steel
Cable	3 Cores / 2 Meters / 1.5mm ²

2.2 Pump Specification

Item	Parameter Values
Rated Voltage	36 VDC
Rate Power	500 W
Max. Flow	1.8 m ³ /h
Max. Head	100 Mtrs.
Outlet Size	0.75 inch
Outline Size	3 inch

2.3 Pump Performance

Model	Head (Mtrs.)	20	30	40	50	60	70	80	90	100
		Flow (m ³ /h)	1.4	1.2	1.0	0.8	0.7	0.6	0.4	0.2

3、 JL-197K1500 Controller General Information

3.1 FEATURES

The JL-197K1500 solar pump controller is designed with the high standard of reliability expected of products. The controller attempts to drive the pump and motor to deliver water even under adverse conditions, reducing output as necessary to protect the system components from damage, and only shutting down in extreme cases. Full operation is restored automatically whenever abnormal conditions subside.

Inspection

Before you begin, inspect the JL-197K1500 solar pump controller unit. Verify that the part number is correct and no damage has occurred during transit.

NOTE: JL-197K1500 solar pump controller is the component of solar pumping system which has other two components, PV array and Brushless DC pump.

Protection Features

Electronic monitoring gives the controller the capability to monitor the system and automatically shut down in the event of:

- Dry well conditions – with low level switch
- Bound pump – with auto-reversing torque
- High Voltage Surge
- Low Input Voltage
- Open motor circuit
- Short circuit
- Over heat

NOTE: This controller provides motor overload protection by preventing motor current from exceeding rating current and by limiting the duty cycle in the event of low water level. This controller does not provide over temperature sensing of the motor.

System Diagnostics

The JL-197K1500 solar pump controller continuously monitors system performance and detects a variety of abnormal conditions. In many cases, the controller will compensate as needed to maintain continuous system operation; however, if there is high risk of equipment damage, the controller will protect the system from the fault condition. If possible, the controller will try to restart itself when the fault condition subsides.

Motor Soft-Start

Normally, when there is a demand for water and power is available, the JL-197K1500 solar pump controller will be operating. Whenever the JL-197K1500 solar pump controller detects a need for water, the controller always “ramps up” the motor speed while gradually increasing motor voltage, resulting in a cooler motor and lower start-up current compared to conventional water systems. This will not harm the motor due to the controller's soft-start feature.

Over Temperature Fold back

The JL-197K1500 solar pump controller is designed for full power operation from a solar array in ambient temperatures up to 45°C. In excess of 45°C temperature conditions, the controller will reduce output power in an attempt to avoid shutdown. Full pump output is restored when the controller temperature cools to a safe level.

Level Control Switch

The JL-197K1500 solar pump controller can access two water level switches(well level sensor and tank level sensor) to detect remotely and control the pump automatically. Level switch for JL-197K1500 solar pump controller is optional, not mandatory.

3.2 TECHNICAL PARAMETERS

Item	Technical Parameters	
Voltage	Rated Voltage	36 VDC
	Max Open Voltage	80 VDC
	Under Protection Voltage	20 VDC
	Over Protection Voltage	68 VDC
Current	Rated Current	12 A
	Over Protection Current	15 A
	Peak Protection Current	18 A
MCU and Controller Mode	32bit MCU / FOC / Sine Wave Current / MPPT	
Shell	Die-cast Aluminum	
Dimension	197mm*190mm*98mm	
Weight	2.1kg	
Cooling Mode	Natural Heat Dissipation	
Operating temperature	-20°C ~ +50°C	
Storage conditions	-20°C ~ +80°C / 5 ~ 85%RH(No condensation)	
Operating mode	S1 (Continuous working)	

3.3 LABEL DESCRIPTION

BLDC SOLAR PUMP CONTROLLER

Voltage
 ● DC ● AC ● GPRS ● WIFI ● BATTERY
 ● 12V ● 24V ● 36V ● 48V ● 60V
 ● 72V ● 90V ● 120V ● 220V ● 300V

Power Running MPPT Well Tank

5
+
4
SPEED 3
2
-
1

RUN / STOP

CAUTION
 1. The solar array open voltage must less than Max input voltage.
 2. Do not attempt to use the controller for any other purpose than brushless DC pump systems.
 3. Please read these instructions carefully before using and keep this manual in a place for future reference.
 DO NOT RUN DRY!

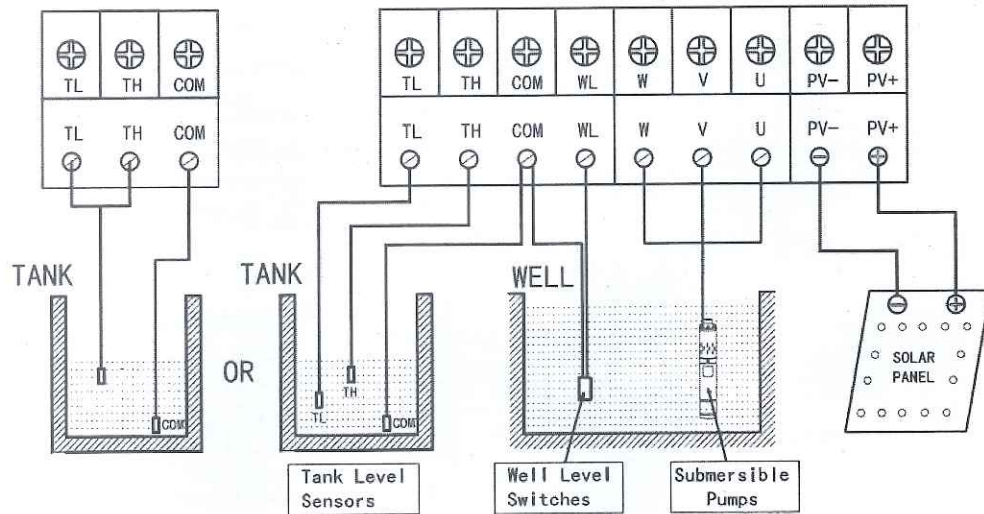
<ul style="list-style-type: none"> ● DC ● AC ● GPRS ● WIFI ● BATTERY ● 12V ● 24V ● 36V ● 48V ● 60V ● 72V ● 90V ● 120V ● 220V ● 300V 	<ul style="list-style-type: none"> ● Rated Voltage
<p>Power Running MPPT Well Tank</p>	<ul style="list-style-type: none"> ● Power: Light on, power connected ● Running: Light on, motor running ● MPPT: MPPT mode indicator light ● Well: Well level indicator light ● Tank: Tank level indicator light
<p>MPPT</p>	<ul style="list-style-type: none"> ● Push + at speed 5 to MPPT mode
<p>SPEED 3</p>	<ul style="list-style-type: none"> ● Speed Control ● Push + to add speed ● Push - to reduce speed
<p>RUN / STOP</p>	<ul style="list-style-type: none"> ● Push to RUN or STOP
<p>CAUTION 1. The solar array open voltage must less than Max input voltage. 2. Do not attempt to use the controller for any other purpose than brushless DC pump systems. 3. Please read these instructions carefully before using and keep this manual in a place for future reference. DO NOT RUN DRY!</p>	<ul style="list-style-type: none"> ● Cautions shall be noticed

3.4 LIGHT INDICATION

LIGHT	BEHAVIOURS	CAUSE
<p>Power</p>	<ul style="list-style-type: none"> ● Light off 	<ol style="list-style-type: none"> No power input: <ol style="list-style-type: none"> Power line has a break (open circuit) PV+ and PV- terminal wrong connected Controller power system damaged
<p>Running</p>	<ul style="list-style-type: none"> ● Flickering for long time 	<ol style="list-style-type: none"> Not enough power input Motor phase default <ol style="list-style-type: none"> UVW wires joint non water-proof Terminal poor contact Pump cable too long or too thin Motor insulation failure
<p>MPPT Well Tank</p>	<ul style="list-style-type: none"> ● Flickering together 	<ol style="list-style-type: none"> Inside temperature over 80°C, go to over temperature protection

3.5 WIRING INSTRUCTIONS

3.5.1 TOTAL DIAGRAM OF TERMINALS



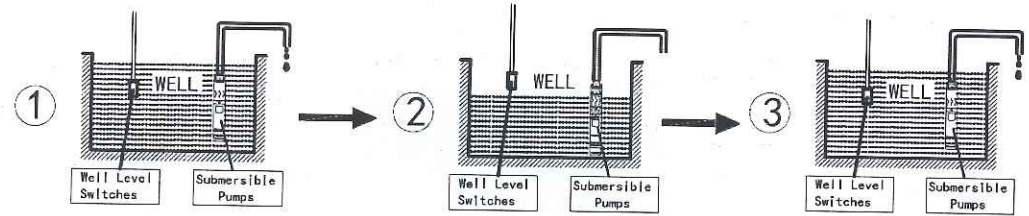
TERMINALS

- PV+
- PV-
- U V W
- TL & TH & COM
- WL & COM

CONNECT WITH

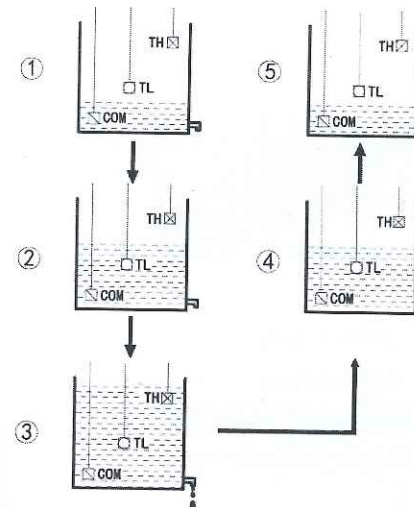
- PV panel PV+
- PV panel PV-
- Pump motor U/V/W wires
- Tank water level sensor
- Well (borehole) water level sensor

3.5.2 OPERATION OF WELL LEVEL SENSOR



- ① Pump runs WL & COM short circuit
- ② Pump stops WL & COM open circuit
- ③ Delay 10-15 min to run WL & COM from open to short
- ※ Push RUN/STOP button manually, system restarts immediately.

3.5.3 OPERATION OF TANK LEVEL SENSOR



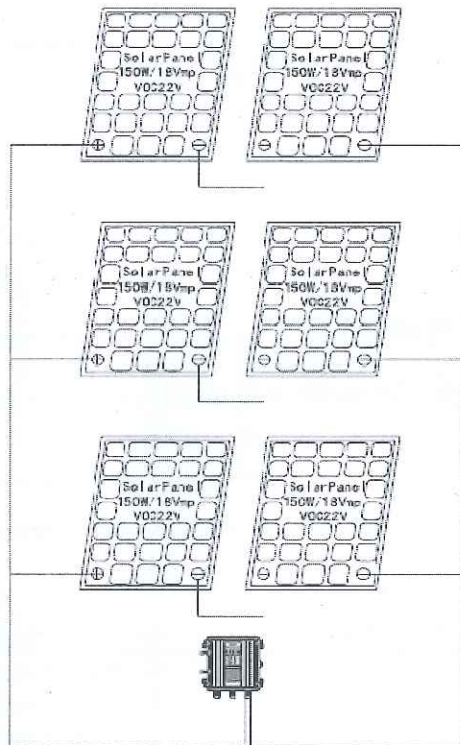
- ① Pump Runs;
- ② Pump Keeps Running;
- ③ Pump Stops;
- ④ Pump Keeps Stopped;
- ⑤ Pump Runs again.

Sensor TL and COM is for detecting low water level.
 Sensor TH and COM is for detecting high water level.

Using 3 tank level sensors avoids the pump start/stop frequently.

4. Solar Panel Configure and Connection way

4.1 Configured by 18Vmp(22Voc) Solar Panel



INPUT:

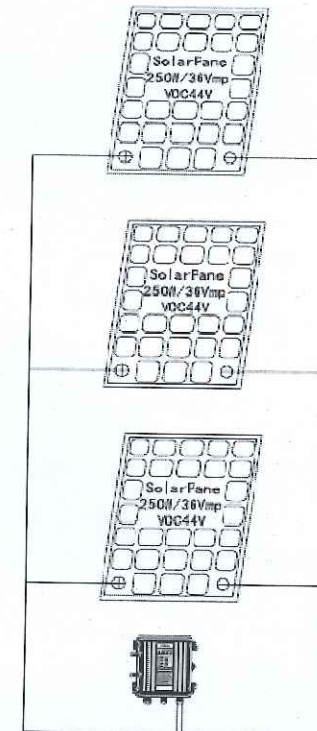
Solar Panel VMP=18Vdc
 Solar Panel VOC=22Vdc
 Solar Panel Power=150W
 Solar Panel Quantity=6PCS

OUTPUT:

VMP=36Vdc
 VOC=44Vdc
 Power=900W(MAX)

4. Solar Panel Configure and Connection way

4.3 Configured by 36Vmp(44Voc) Solar Panel



INPUT:

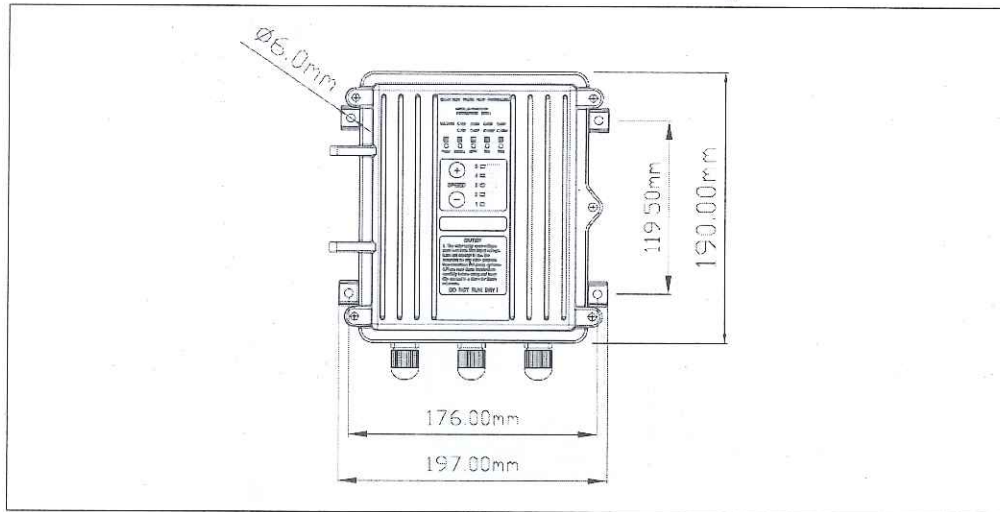
Solar Panel VMP=36Vdc
 Solar Panel VOC=44Vdc
 Solar Panel Power=300W
 Solar Panel Quantity=3PCS

OUTPUT:

VMP=36Vdc
 VOC=44Vdc
 POWER=900W(MAX)

5. Mechanical and Electrical Installation

5.1 Outline & Installation Dimensions Diagram



5.2 Mechanical Installation

5.2.1 Overheat Protection

If in the outdoor, the controller shall be installed in a well ventilated place, and avoid direct sunlight and rain. Extremely high temperature may cause the controller stop to protect itself. **Using dc breaker and surge protection device for safe purpose. Surge may cause big instantaneous current and make the fuse blow out.**

5.2.2 Location Selection

The JL-197K Series solar pump controller is intended for operation in maximum ambient temperatures up to 45°C. In order to avoid overheating caused by the failure, it is recommended to install the controller in a shadow position.

The JL-197K Series solar pump controller must be installed into a control box which has a tight enclosure to avoid direct sunshine, rain, dust, moisture, animals, plants, etc. The control box should have a bottom gland plate for installing wire cord or conduit. To decide the size of control box, please refer to the following Figure 4.

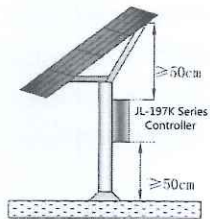


Figure 4. Control Box Location

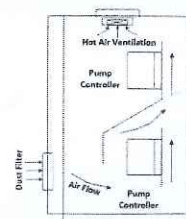


Figure 5. Ventilation Arrangement & Required Distances