3inch Helical Rotor Solar Submersible Pump

USER MANUAL

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

CONTENTS

Notes for Safe Operation

■ Before Installation

⚠ WARNING

◎ Do not install or operate damaged controller or with missing parts. Otherwise, it may result in equipment damage or harm life.

◎ **Use correct PV panel configuration according to our technical guide. Otherwise, it may influence pump performance even result damage to system.**

■ Installation

⚠ CAUTION

◎ Install the controller on nonflammable material like metal. Otherwise it may cause a fire.

◎ If the controller is mounted in a protective cabinet, the cabinet needs to set vents to ensure ambient temperature is below 40℃. Otherwise controller may be damaged by high temperature.

◎ **Ensure pump UVW wires are connected to controller UVW terminals correctly.**

◎ **Connect each terminal properly, not too tight or too loose.**

◎ **If level sensor is installed, please keep the sensor vertical and make sure float could move freely.**

◎ **Make sure every joint of extension cable is tight and well waterproof.**

⚠ WARNING

◎ Ensure only qualified personnel to operate the system. Otherwise it can cause an electrical shock or damage to the controller.

◎ Ensure the controller is isolated from power supply by the circuit breaker. Otherwise it may cause a fire.

◎ Do not touch the power input terminals of the controller and the pump's terminals at energized condition. Otherwise it may cause an electrical shock.

■ Operation

⚠ CAUTION

◎ Do not open or remove the front cover of controller during operation. Otherwise it may cause personal injury.

◎ In order to test the pump, the maximum dry-run time can not more than 15s.

◎ **If the pump turning is reversed, change any two lines of pump's UVW three power lines.**

◎ When the pump stopped due to the light shadow, it will restart after 10s when there is enough input power.

■ 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

⚠ WARNING

◎ If failing to follow these instructions, resulting in damage to the pump and controller, can not enjoy the warranty service.

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.

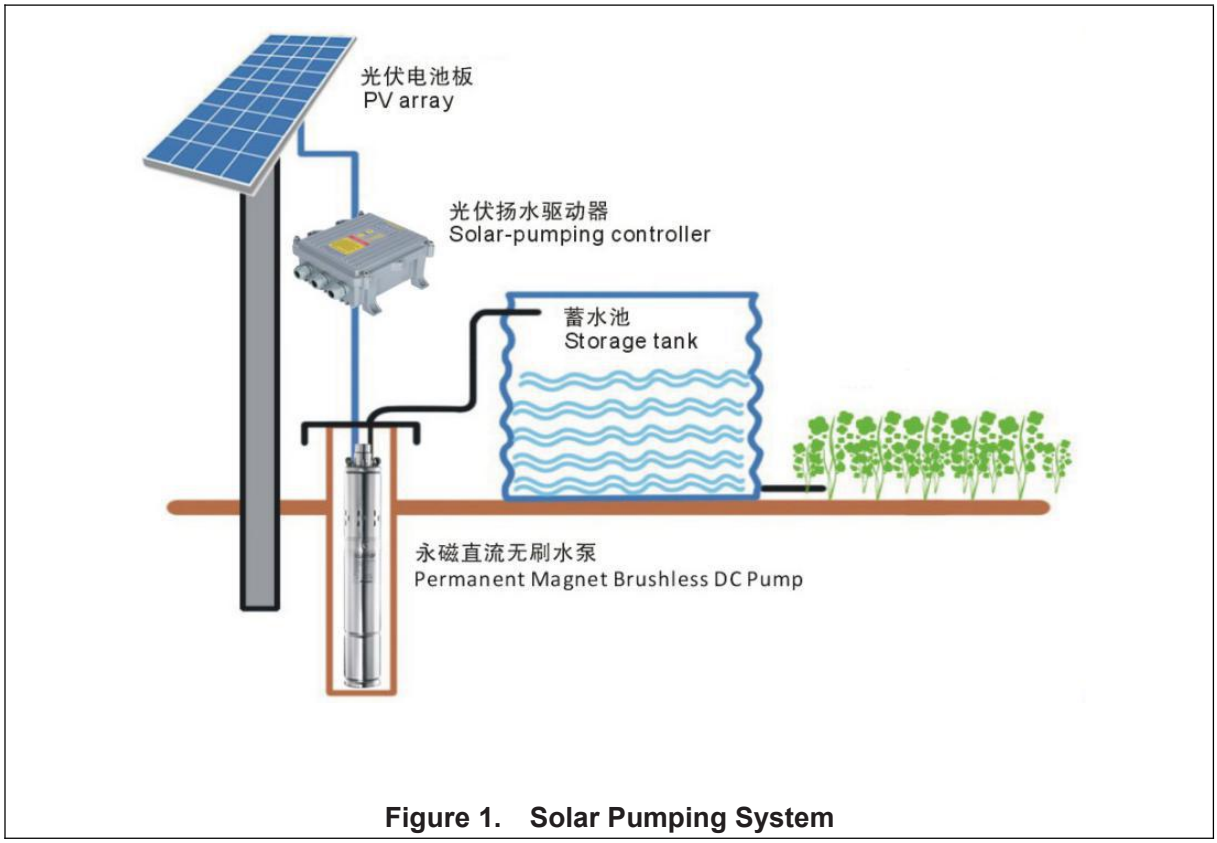


Figure 1. Solar Pumping System

Consists of:

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

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

2.1 Model Instruction

3	S	S	H	1.6	/80	-D36	/400	S
①	②	③	④	⑤	⑥	⑦	⑧	⑨

①	Pump Outline 3inch	②	Submersible Pump
③	Stainless steel helical rotor	④	Helical Rotor Pump
⑤	Max Flow (m^3/h)	⑥	Max Head (m)
⑦	Rate Voltage (V)	⑧	Pump Power (W)
⑨	Die-cast SS Outlet		

2.2 Material of Parts

Parts of Pump	Description of Material
Motor	Permanent Magnet Brushless DC Motor (Without Hall)
Controller	32bit MCU / FOC / Sine Wave Current / MPPT
Controller Shell	Die-cast Aluminum(IP67)
Outlet	304 Die-cast Stainless Steel
Pump Body	304 Stainless Steel
Motor Body	304 Stainless Steel
Bear	NSK
Helical Rotor	316 Stainless Steel
Screw	316 Stainless Steel
Cable	2 Meters / Three-core copper cable /1.5mm^2

2.3 Performance Chart

	Item	Parameter Values
1.	Rate Voltage	36VDC
2.	Rate Power	400W
3.	Max Flow	1.63m^3/h
4.	Max Head	80m

Model	Flow (m^3/h)	0	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8
3SSH1.8/100-D36/500S	Head (m)	103	90	80	70	50	40	30	20	10	0

2.4 Curve

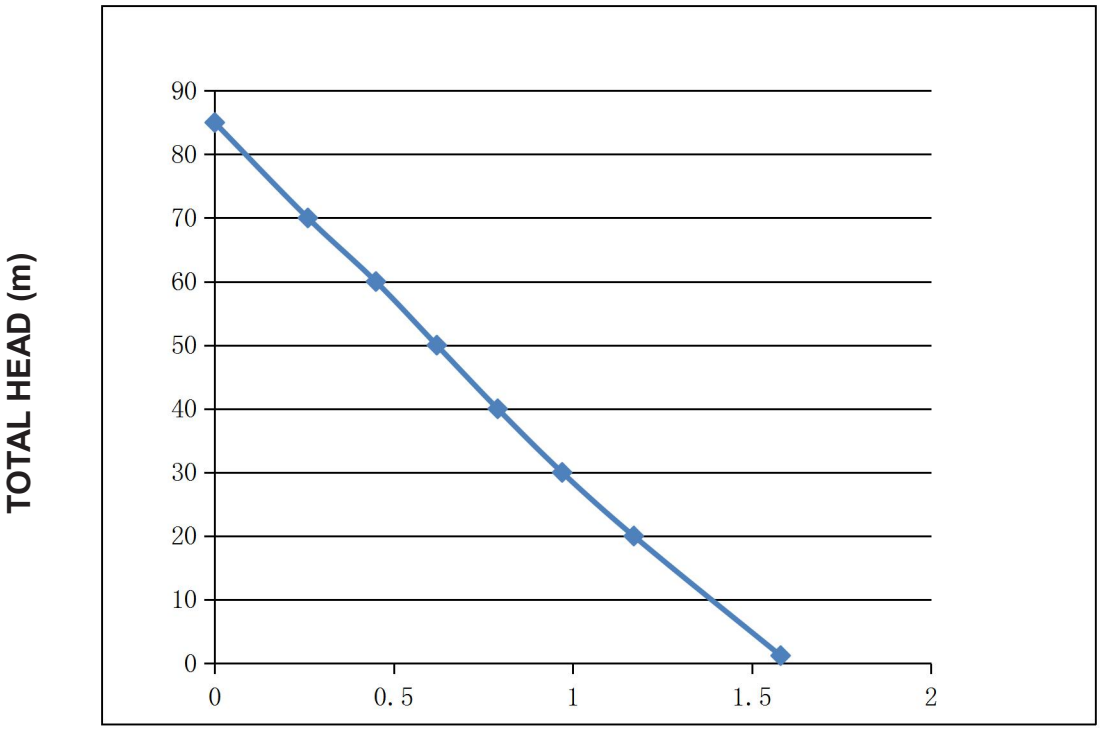


Figure 2. Pump Curve

2.5 Pump Performance

Model	Power (W)	Voltage (VDC)	Max Flow (m3/h)	Max Head (M)	Outlet (in)	Outline (in)
3SSH1.8/100-D36/500S	400	36	1.6	80	0.75	3

2.6 Pump Outline Dimension

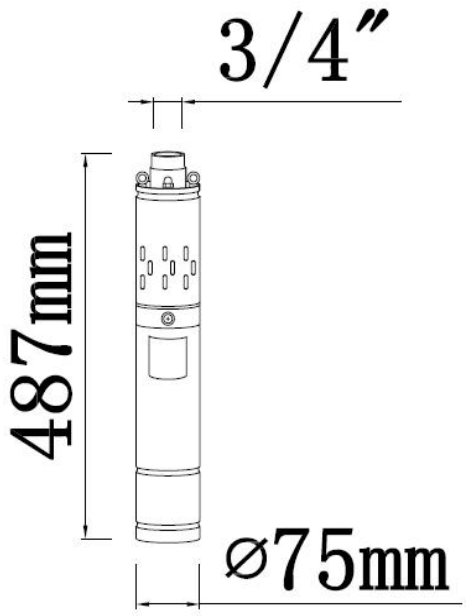


Figure 3. Outline Dimension

3、The JL-197K1500-36 Controller General Information

3.1 Features

The JL-197K1500-36 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-197K1500-36 solar pump controller unit. Verify that the part number is correct and no damage has occurred during transit.

NOTE: JL-197K1500-36 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-197K1500-36 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-197K1500-36 solar pump controller will be operating. Whenever the JL-197K1500-36 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 Foldback

The JL-197K1500-36 solar pump controller is designed for full power operation from a solar array in ambient temperatures up to 45℃. In excess of 45℃ 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-197K1500-36 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-197K1500-36 solar pump controller is optional, not mandatory.

3.2 The Technical Parameters of JL-197K1500-36 Solar Pump Controller

Item		Technical Parameters		
Voltage	Rate Voltage	36 VDC		
	Max Open Voltage	100 VDC		
	Under Protection Voltage	20 VDC		
	Over Protection Voltage	74 VDC		
Current	Rate 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 (IP67)		
Dimension(L*W*H)		197mm*190mm*98mm		
Net Weight		2.1kg		
Cooling Mode		Natural Heat Dissipation		
Operating temperature		-20℃ - +50℃		
Storage conditions		-20℃ - +80℃/5～85%RH(No condensation)		
Operating mode		S1 (Continuous working)		
Adaptive Solar Panel	The Solar Panel of VMP	17~18V	29~30V	35~36V
	The Solar Panel of VOC	21~22V	35~37V	43~44V
	Note: Please find the solar panel connection drawing at page 12 to 13			

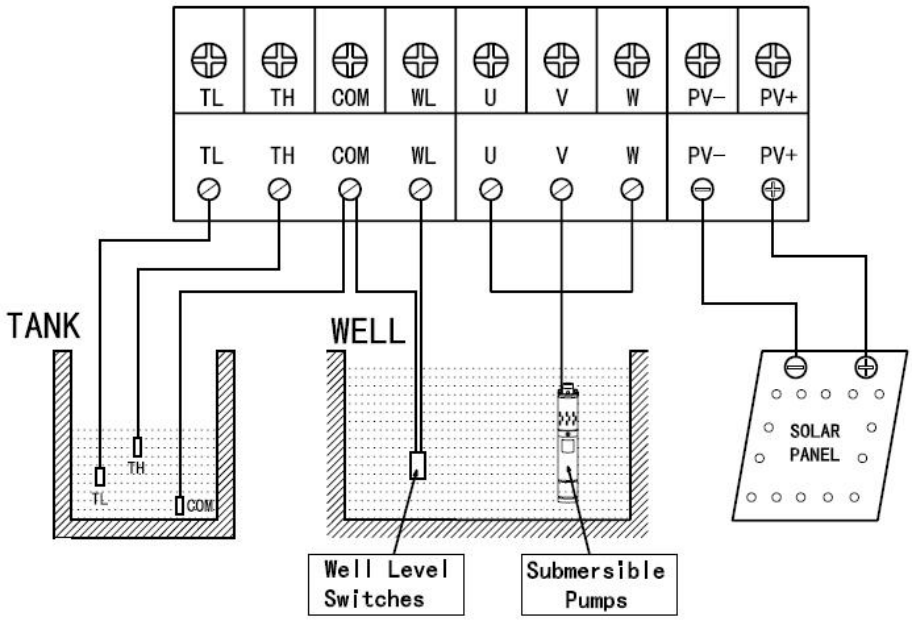
3.3 Operation Mode of JL-197K1500-36 Solar Pump Controller

Push-Button Function Description	
+	Push to Add the Speed
−	Push to Reduce the speed
RUN/STOP	Push to control Run and Stop

Indicator Light Function Description	
5 4 3 2 1	The Speed of the pump display Note: the controller controls the pump run with 5 speeds The 1 display, the run with the lowest speed. The 5 display, the run with the highest speed.
Power Running MPPT Well Tank	Power: Connect to Power display Running: Pump is Running display MPPT: Controller running with MPPT Function display Well : No water in the well display Tank: Full water in the Tank display
MPPT	MPPT: Maximum Power Point Tracking When the controller Power ON, the system Auto work with MPPT MPPT FUNCTION SETTING : When the 5 light, push the + again, MPPT indicator will light

3.4 Connection Way of JL-197K1500-36 Solar Pump Controller

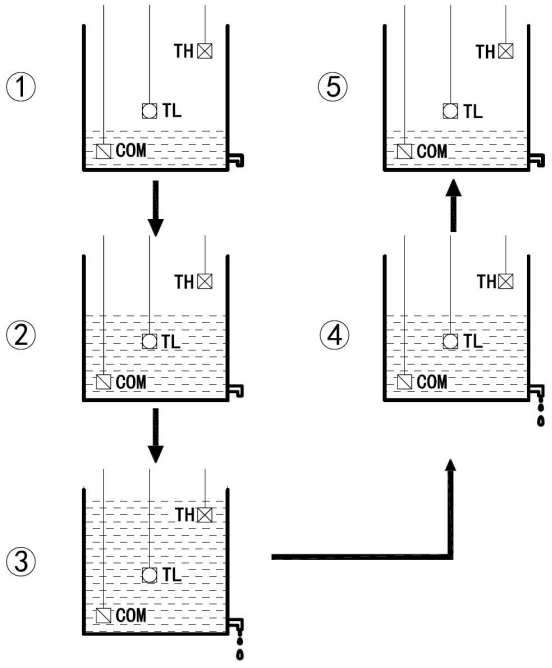
3.4.1 Connection Way with Level Switches



- TL & TH short circuit: Tank is full, Pump stops;
- TL & TH open circuit: Pump runs;
- WL & COM short circuit: No water in well, Pump stops;
- WL & COM open circuit: Pump runs;

  Note: when WL & COM from Short to Open, pump will delay 10min to restart.
- U V W Connect to Pump UVW wires correspondingly;
- PV+ PV- Connect to PV Array correspondingly.

3.4.2 Operation of Tank Level Switches

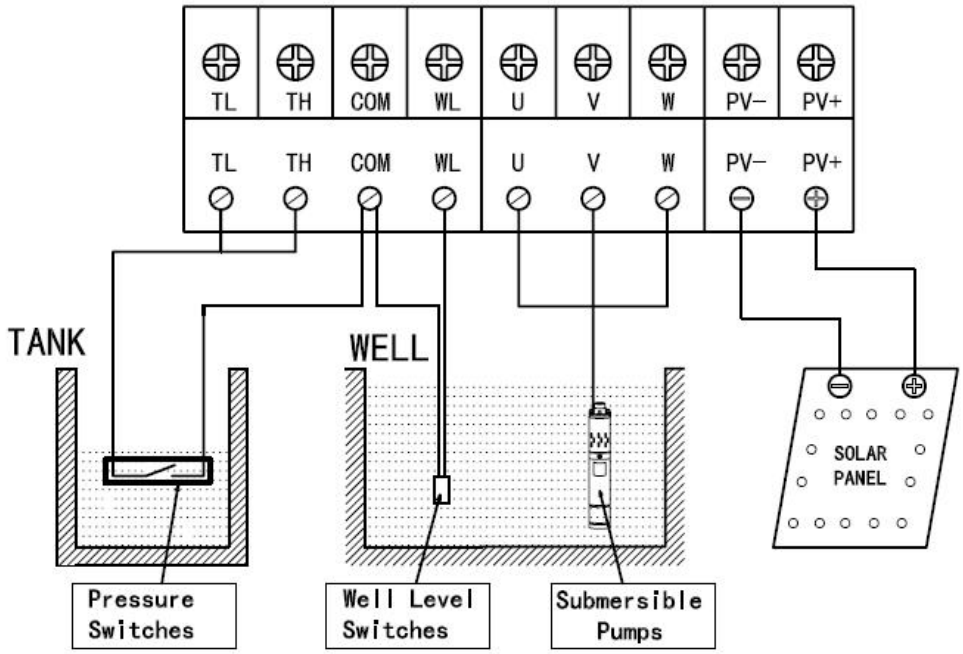


① Pump Runs;
② Pump Keeps Running;
③ Pump Stops;
④ Pump Keeps Stopping;
⑤ Pump Runs again.

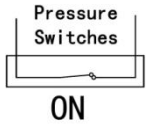
The advantage of using 3 tank level sensors is avoiding the pump start/stop frequently. Pump restarts when the tank water level get below TL.

Please keep 3 tank sensors in different height as showed in the left.

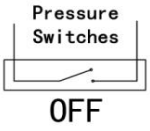
3.4.3 Connection Way with Pressure Switches



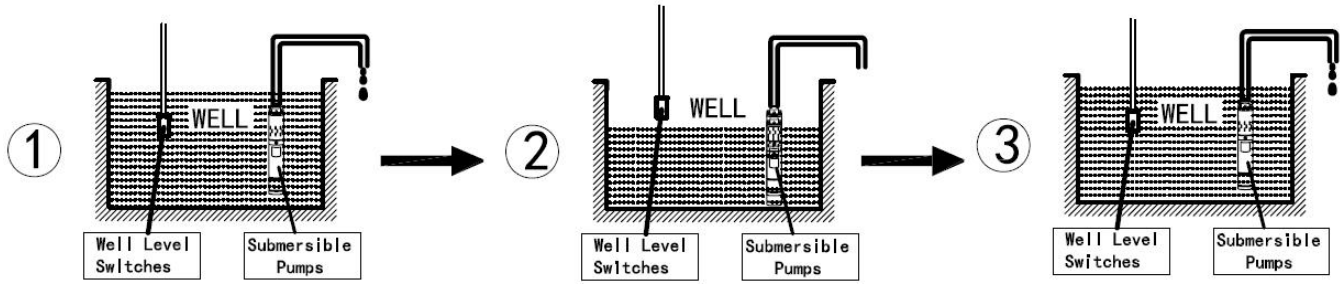
◆ The Pressure Switches ON: The pump STOP



◆ The Pressure Switches OFF: The pump RUNNING



3.4.4 Operation of Well Level Switches



① Pump RUNNING — WL & COM open circuit

② Pump STOPPING — WL & COM short circuit

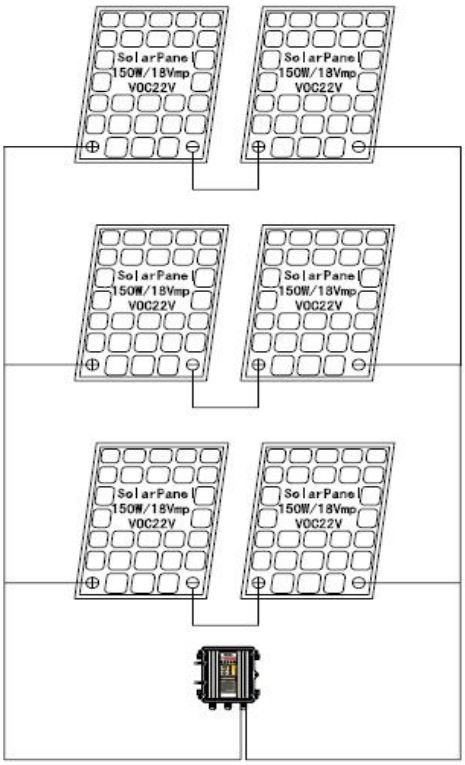
③ **Pump will delay 10min to RUNNING.** — WL & COM from Short to Open

The well water level needs time to get normal.

If you wanna the pump to start immediately when you think the well water is enough for pumping, please push the RUN/STOP button manually.

4. The Solar Panel Configure and Connection way

4.1 Configured by 18Vmp(Voc22V) Solar Panel



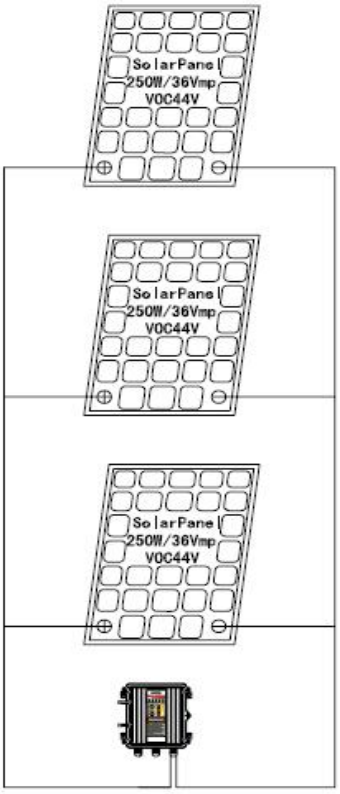
INPUT:

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

OUTPUT:

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

4.3 Configured by 36Vmp(Voc44V) Solar Panel



INPUT:

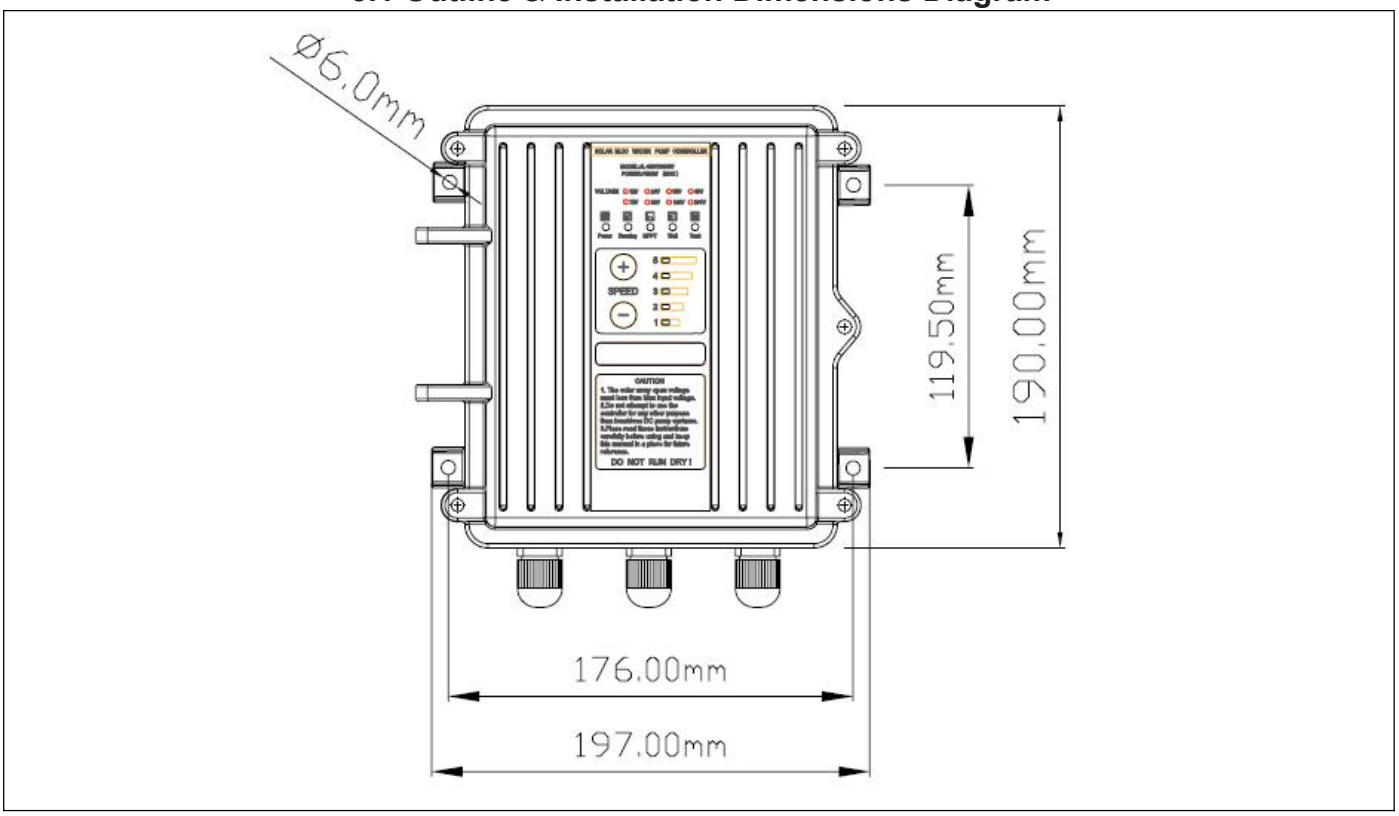
Solar Panel VMP=36Vdc
Solar Panel VOC=44Vdc
Solar Panel Power=250W
Solar Panel Quantity=3PCS

OUTPUT:

VMP=36Vdc
VOC=44Vdc
Power=750W(MAX)

5. Mechanical and Electrical Installation

5.1 Outline & Installation Dimensions Diagram



5.2 Mechanical Installation

5.2.1 Overheat Protection

The protection level of JL-197K1500-36 solar pump controller reached IP67; if in the outdoor, the controller should be installed in a well ventilated place, and avoid direct sunlight and rain. The best installation location is below the solar array, which can prevent the equipment from overheating and performance degradation. Extremely high temperature may cause the controller stop to protect itself.

5.2.2 Location Selection

The JL-197K Series solar pump controller is intended for operation in ambient temperatures up to 60℃. 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.

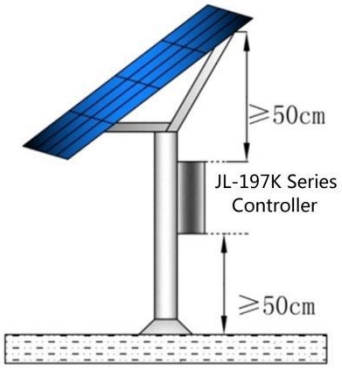


Figure 4. Control Box Location

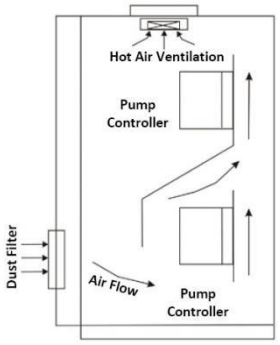


Figure 5. Ventilation Arrangement and Required Distances