



NATURAL CURRENT

SunRay Hybrid AC/DC Pumps Instruction Manual

Natural Current - SunRay Engineering

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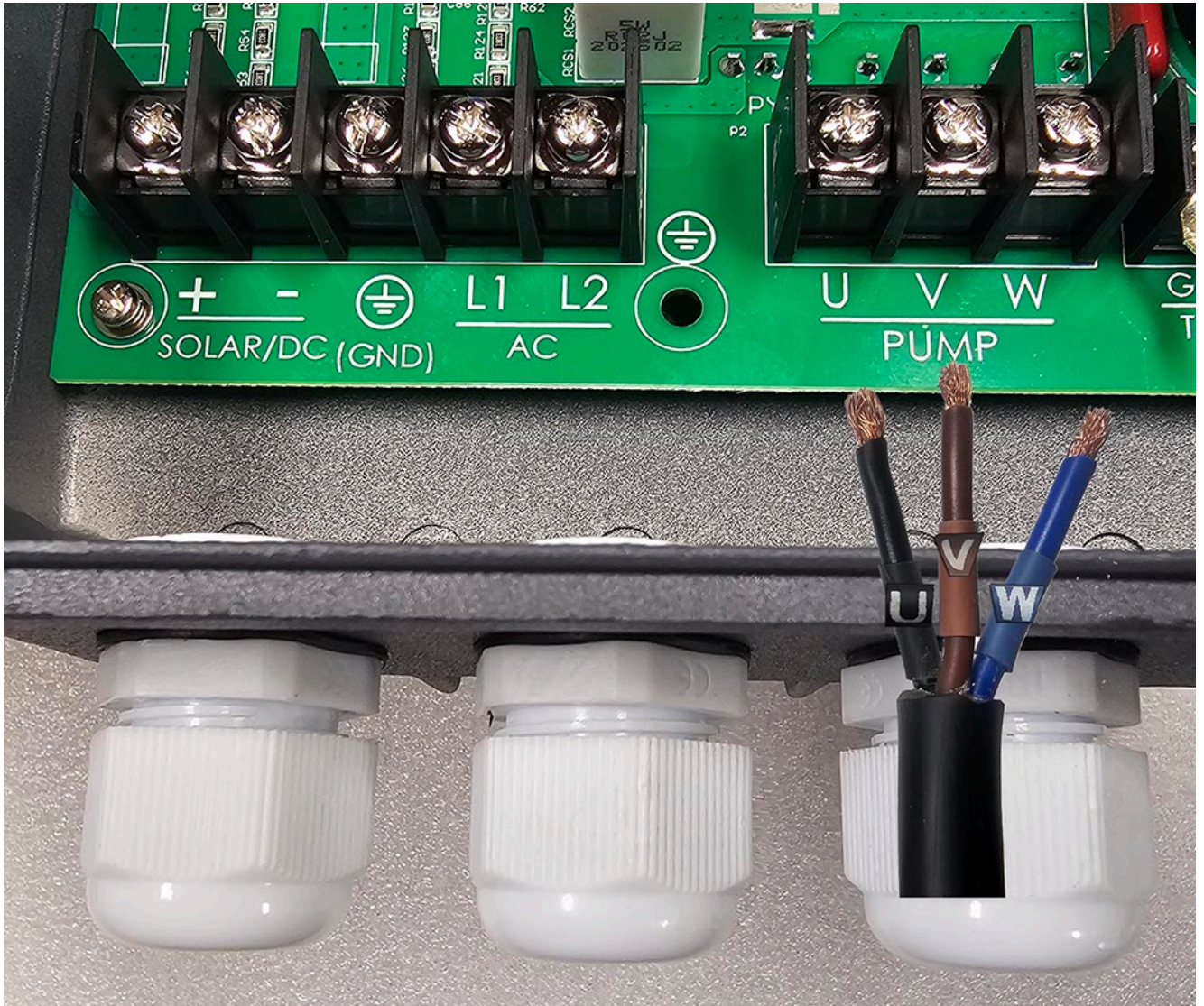
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Introduction

NATURAL CURRENT - SUNRAY Hybrid AC/DC solar motor powers the new pool system for the supply of clean filtered water based on the most widely available utility-grid and renewable energy, the sun. When sunlight is inefficient, AC power can be an input, such as power from the power grid or generator.

By means of the electric power supplied by a series of photovoltaic solar panels and taking advantage of the NC SunRay pump, the system is able to ensure a continuous drawing of water from a suitable source while the solar irradiation conditions may vary.

The NC permanent-magnet motor technology assures high efficiency of the system that, consequently, can require a smaller number of photovoltaic panels in order to work.

It is designed for easy use and requires no maintenance. It is the ideal solution for swimming pools, ponds and supplying water in remote areas, where the normal power supply of electricity from the power grid is inconsistent or completely unavailable.

Features and Protections

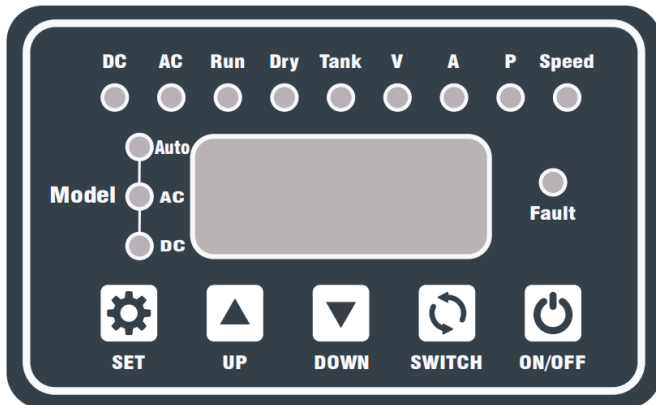
- High efficiency Natural Current motor;
- Accepts AC (50Hz&60Hz) and DC power ;
- High efficiency MPPT and Vector control;
- External controller;
- Display of voltage, current, power, etc;
- Dry protection;
- Over-load protection;
- Over-voltage protection;
- Low-voltage protection;
- Lost Phase protection;
- Stall protection;
- Fault code display.



Controller

LED Lamp Instructions In Panel

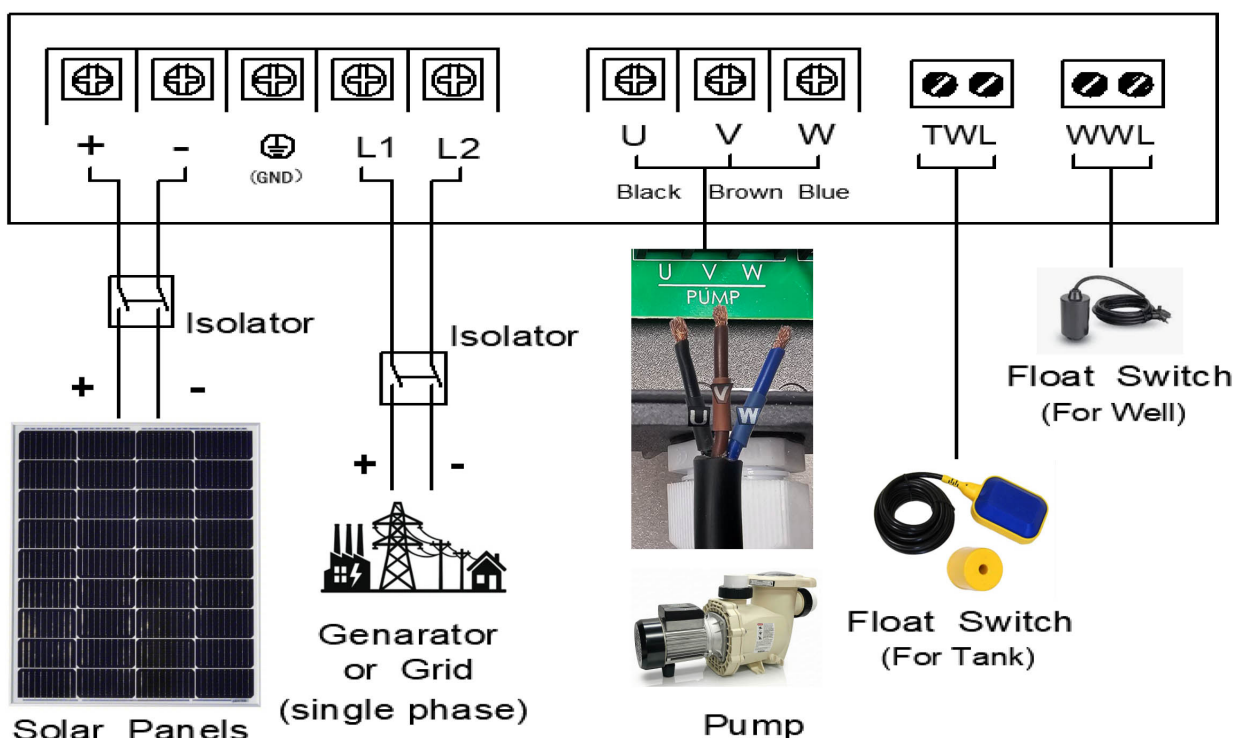
- ◆ LED **【 DC 】** : DC power supply, the indicator is on;
- ◆ LED **【 AC 】** : AC power supply, the indicator is on;
- ◆ LED **【 Run 】** : Controller is turned on, the indicator lights up, Associated with **【 ON/OFF 】**
- ◆ LED **【 Dry 】** : Alarm for pump dry protection, Associated with **WWL** terminals Or **low power** ;



- ◆ LED **【 Tank 】** : Alarm for Water tank full protection , Associated with **TWL** terminals;
- ◆ LED **【 V 】** : When this indicator light is on, Voltage is displayed;
- ◆ LED **【 A 】** : When this indicator light is on, Current is displayed;
- ◆ LED **【 P 】** : When this indicator light is on, Power value is displayed;
- ◆ LED **【 Speed 】** : When this indicator light is on, Speed is displayed;

- ◆ LED **【 Fault 】** : Alarm for Various fault;
- ◆ LED **【 Model--Auto 】** : **AUTO MODE**: Intelligent selection of DC or AC power, DC first.
In **AUTO Model**, AC power is being used, and Led **【 Model--AC 】** flashes once every 3S;
In **AUTO Model**, DC power is being used, and Led **【 Model--DC 】** flashes once every 3S;
- ◆ LED **【 Model--AC 】** : **AC MODE**: power supplied from a Generator or Mains power;
- ◆ LED **【 Model--DC 】** : **DC MODE**: power supplied from a Solar Array or Battery storage;
- ◆ Press **【 SET 】** , Select power supply mode, **AUTO**、 **AC** or **DC MODE**.
- ◆ Press **【 SWITCH 】** , check the **【 V 】** , **【 A 】** , **【 P 】** , **【 Speed 】** cycle.

Electrical Connections



Parameter Setting

Step 1: Enter the setting interface.

- Press and hold **【 SET 】** and **【 SWITCH 】** at the same time for 3 seconds. After 5 seconds countdown, H00 will be displayed

Step 2: Enter parameter change password (Default password H00-12)

Note: please enter correct password before any parameter change process ,or change will useless .

- Press **【 SET 】** to enter H00, and adjust H00 value to 12 through **【 UP 】** and **【 DOWN 】**
- Press and hold **【 SET 】** for 3 seconds to save the parameters and return to H00

Note: Short press 【 SET 】 to return to H00 directly, but the parameter is not saved and does not work.

Step 3: Set various parameters, such as speed, power, etc

Note: Various parameter codes H00 ~ H09, refer to table 1.

- After set H00 value to 12 and save it. Adjust parameter H01-H09 through up and down.
- Press **【 SET 】** to enter Hxx, and adjust Hxx value through **【 UP 】** and **【 DOWN 】**
- Press and hold **【 SET 】** for 3 seconds to save the parameters and return to Hxx

Note: Short press 【 SET 】 to return to Hxx directly, but the parameter is not saved and does not work.

Step 4: Exit the parameter setting interface

- Short Press the **【 SWITCH 】** Exit the setting interface

Note: No operation in the setting interface for 2min, it will exit automatically

Step 5: Restore factory parameters (Default H00-10)

- Set H00 to 10 and save, For specific operation, refer to step 2.

Parameter Code And Default Value

Table 1

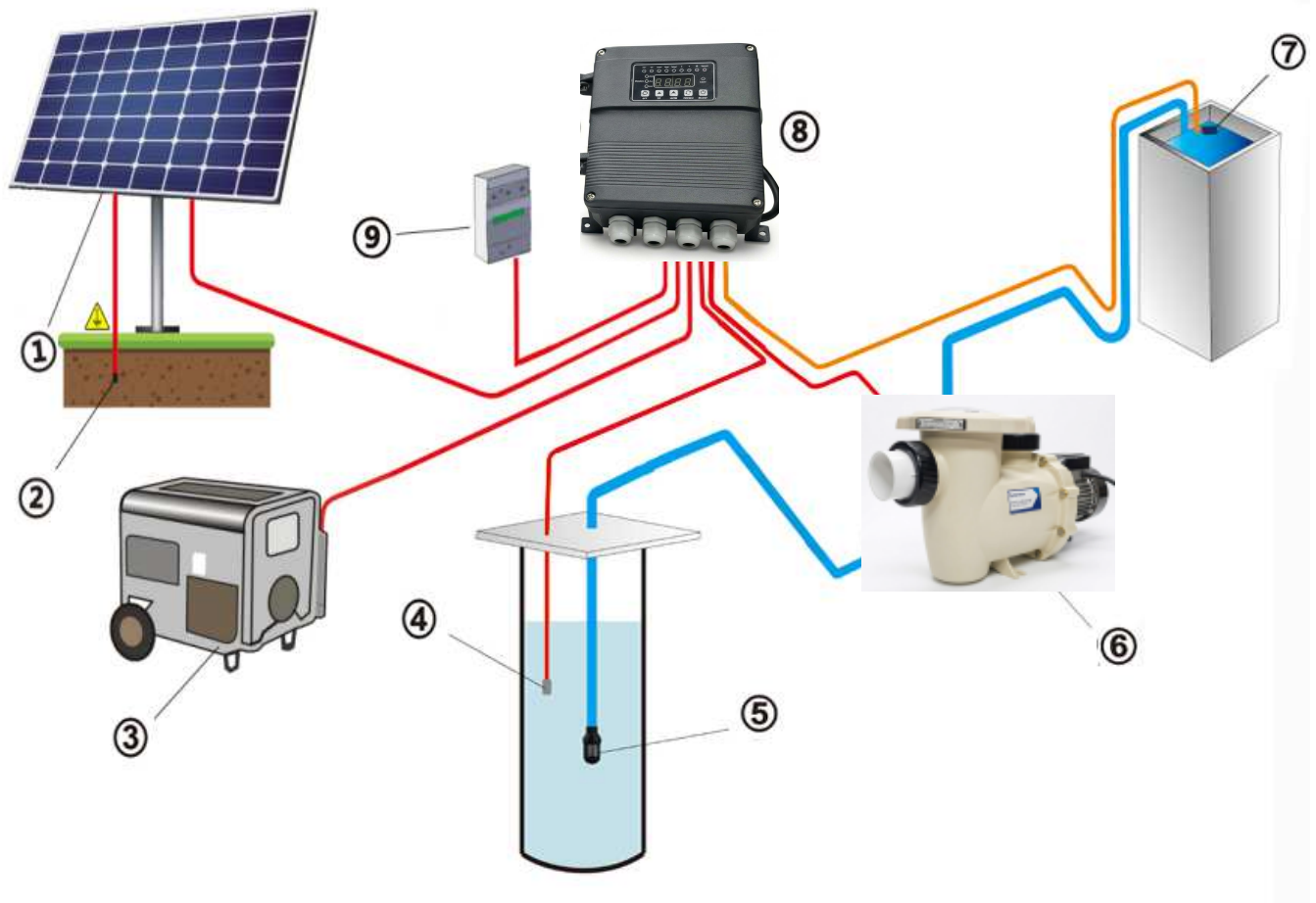
Code	Interpretation	Adjustable range		Default value
H00	10: Restore the factory settings or 12: Change the parameter password	0-12		0
H01	High voltage protection value	450		450V
H02	Low voltage protection value	50		50V
H03	Maximum speed	2500-4200RPM		4000RPM
H04	Tank full recovery time(TWL)	30-1800S		600S
H05	Recovery time of dry protection(WWL)	30-1800S		600S
H06	Recovery time of dry protection(Low power)	300-1800S		1800S
H07	Maximum DC input power	0.5HP	300-750	750W
		0.75HP	300-1000	1000W
		1HP	500-1200	1200W
		1.5HP	500-1800	1800W
		2HP	500-2200	2200W
		3HP	500-3000	3000W

Alarm and Fault code

Table 2

Code	Interpretation	Causes and Solutions
P50	Low voltage protection	◆The Voltage below the requirement
P51	High voltage protection	◆The voltage exceeds the requirement
P48	Dry protection	◆Water shortage in well, low power ◆ WWL “closed” .
P45	Tank Full	◆Water tank full , TWL “Open” .
P02	PFC protection	◆PCB fault, need to return to factory for inspection
P09	U phase over current	◆ Controller U phase output over current or cable too longer
P10	V phase over current	◆ Controller U phase output over current or cable too longer
P11	W phase over current	◆ Controller U phase output over current or cable too longer
P43	Phase Missing Protection	◆Phase loss of controller output; ◆The wiring between the motor and the controller is loose. ◆The cable is damaged and needs to be replaced. ◆ The motor may be damaged. Please check the motor resistance between every 2 items of UVW,exceed 15% is not allowed
P44	Short circuit protection	◆ Short circuit of cable or terminal between motor and controller; ◆ the motor or cable is damaged;
P46	Stall Protection	◆The pump is blocked or jammed; remove the jam ◆ check whether the connection between the pump body and the motor is smooth; motor bearing damage, need to replace the bearing ◆Low Power
P60	Controller High Temperature	◆ Keep good ventilation and heat dissipation near the controller
P20	Abnormal fan	◆ The fan is damaged or jammed; remove the jam or replace the fan
E10	PCB component failure	◆PCB damaged, need to return to factory for inspection
E00	Power mode error	◆ Power mode error,please chose Atuo mode ◆ AC/DC wrongly connected.The L1 / L2 terminals of the controller correspond to AC power, +/- correspond to DC power

System Installation Diagram



- 1、Solar Panel Array
- 2、Grounding pile (Optional)
- 3、Generator (Single phase 220V)
- 4、The Low-Level Float (For Well ,Optional)
- 5、Check valve
- 6、Natural Current SunRay Surface Pump
- 7、The High-Level Float (For Tank ,Optional)
- 8、External Natural Current controller
- 9、SPD(DC-600V), Surge Protection Device (Optional)
- SPD(AC-275V), Surge Protection Device (Optional)



1、NATURAL CURRENT solar pump operation is very simple, please read the manual carefully before use.
 2、Please fill the pump end with water before use. Dry operation is not allowed.

System Installation

Tips for Surface pump

- ◆ Dry operation is strictly prohibited for surface pump.
- ◆ For non the self-priming pump, the suction port must be installed with check valve. Before use, the pump body and suction pipe shall be filled with water.
- ◆ For the self-priming pump, Before use, the pump body shall be filled with water.
- ◆ When the pump is stored for a long time, please rotate the rotor shaft before use to prevent the machine from jamming or damaging the mechanical seal
- ◆ The suction pipe shall not leak air, otherwise water may not come out.

Water Source

The water source must be “clean water” , free from contaminates such as, dirt, dust, loose rocks, decaying organic matter and other foreign bodies that could block the intake screen or fowl the impeller stack. It is recommended to install a check valve with a filter screen cover at the suction

Pump Installed

- ◆ The NCSUNRAY pump is IP54 Rated . it is recommended that the pump is not mounted in direct sunlight or rain, best efforts.
- ◆ Make sure that the suction pipe of the pump is completely submerged in water;
- ◆ The maximum suction head of the pump shall not exceed 8m. During installation, the pump shall not be higher than 8m above the water surface.
- ◆ Allowable operating temperature 0-40℃.
- ◆ When the ambient temperature is lower than the freezing temperature of water, it is necessary to protect the pipeline or discharge the water left in the pump and pipeline.

Installation Of Controller

The NATURAL CURRENT Controller Panel is IP65 Rated however it is recommended that the panel is not mounted in direct sunlight. It is recommended to install on the back of solar panels or in a room or control cabinet with good heat dissipation.

Distance Between Controller And Pump

The farthest installation distance between NATURAL CURRENT controller and motor is 80m. The further installation distance may lead to control failure. In addition, the cable between the motor and the controller will cause power loss. For long distance installation, please thicken the cable specifications as required.

Installation Of The Float

The Low Level Float

- ◆ The low-level float fitted into the **WWL** terminal to prevent dry running.
- ◆ When the water level rises the pump will restart after a 10-minute delay, The display shows the countdown of delay time.



The High Level Float

- ◆ The High-Level float fitted into the **TWL** terminal to prevent the tank is full.
- ◆ To prevent the pump from starting and stopping frequently, adjust the float to a suitable swing range.
- ◆ When the float “closed”, the pump will restart after a 10-minute delay, The display shows the countdown of delay time.



SPD(Surge Protection Device)

The Surge Protection Devices protect the system from lightning. Where lightning damage is likely to occur, SPD must be effectively installed and the system must be effectively grounded.



Please select suitable SPD, AC and DC mode, and the voltage specification should not be lower than the maximum voltage of the system.

Suction Check Valve and water filling before use

Before using the Surface Pump, the pump end and suction pipe must be filled with water. In order to prevent the leakage of water from the suction pipe, it is recommended to install a check valve with net cover at the suction inlet.



Extension Cable Specifications

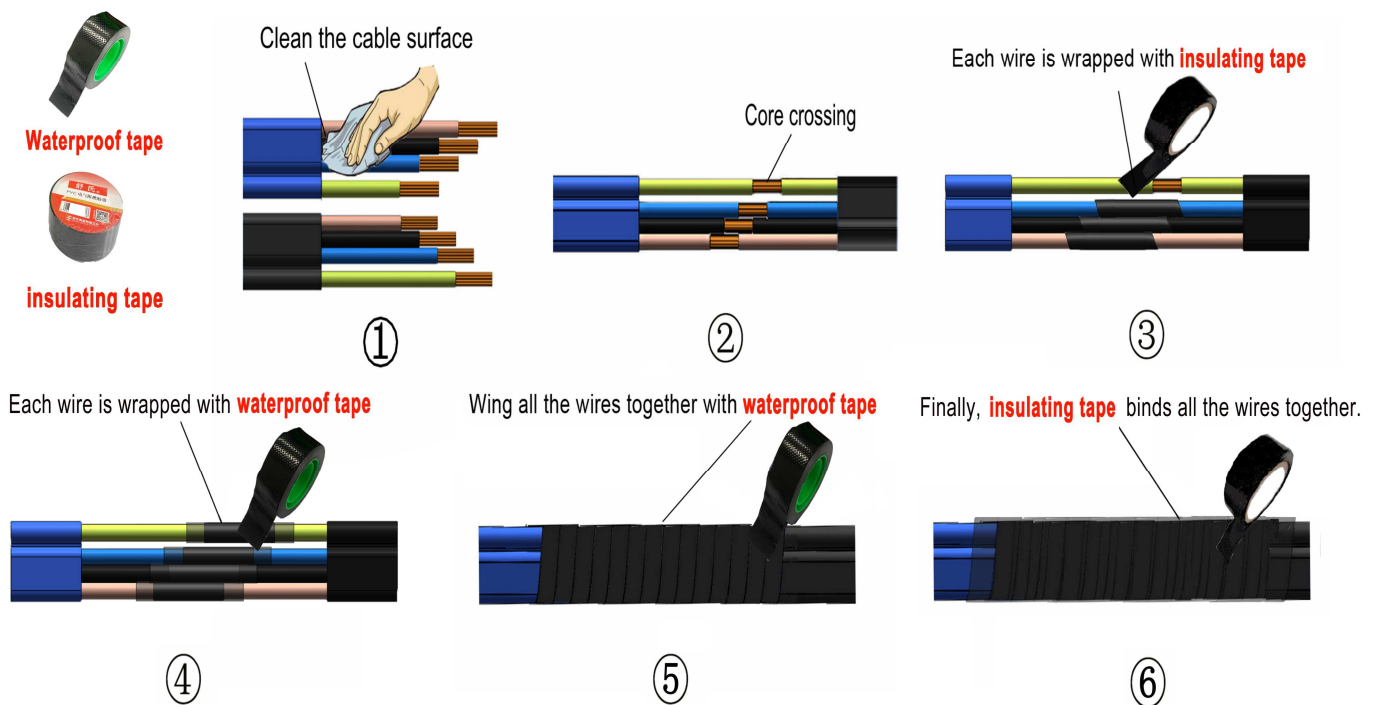
Locate the solar array and the controller as close to your water source as possible. It is important that energy losses are minimised to ensure performance expectations are met.

The distance between the pump and the controller shall not exceed 80m, and the cable shall not be less than 2.5mm²

Extension cable Jointing

The effective contact and waterproof of the joint of the cable extension line are the necessary conditions for the pump system to work for a long time. The wrong method may lead to electric leakage, and cause the pump system can not work or corrosion, and even cause personal injury.

The factory provides an effective wiring method and material, please follow the steps in the picture.



Solar Array Installation



Warning

- The power supply from a DC power source such as solar panels can cause **SERIOUS HARM** or **DEATH** from electrocution
- Use appropriate safety procedures when working on any system component
- Only suitable qualified personnel should carry out electrical connection /disconnection
- Off-grid electrical equipment is subject to applicable regional and national electrical standards
- Always treat solar panels as **LIVE** and handle with care
- Use correctly rated electrical cable and connectors

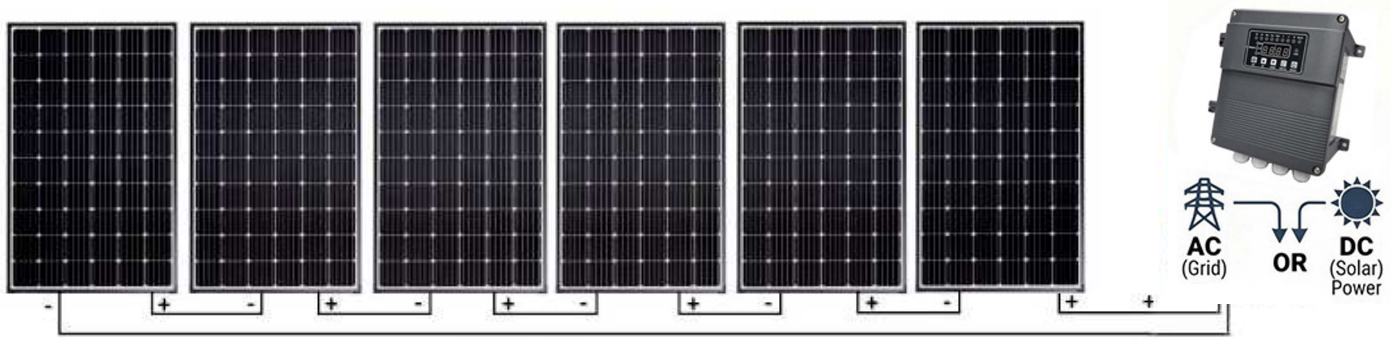
Solar Panel Glossary of Electrical Terms

Table 4

Term	Definition
VOC(V)	Volts open circuit,nothing connected
Vmp(V)	Volts maximum power point,under load
Isc(A)	Amps short circuit
Imp or Impp(A)	Amps maximum power point

Solar Panel Connection(Recommended in series for the Pumps)

In order to make the system more safe and effective, the maximum DC input current of this series of pumps is limited to 10A. Therefore, Solar panel parallel system can not play the maximum efficiency. In General, solar panels in series are recommended.



In series solar panel system, VOC,Vmp and Power are calculated as follows:

- $VOC \text{ of System} = VOC \text{ of each solar panel} \times \text{Number of solar panels};$
- $Vmp \text{ of System} = Vmp \text{ of each solar panel} \times \text{Number of solar panels} ;$
- $\text{Power of System} = \text{Power of each solar panel} \times \text{Number of solar panels}$
- $\text{Current of System} = \text{Current of each solar panel}$

Motor and Controller Input Energy Limitations:

Table 5

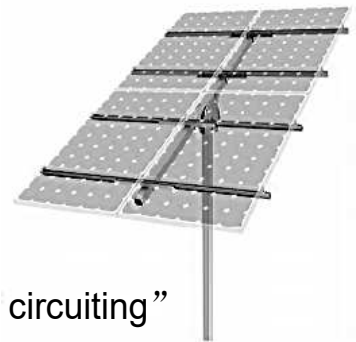
Motor& Controller	AC		SOLAR / DC			Solar panels (340W)	
	Voltage	Max. Current	Vmp	Max. VOC	Max. Current	Accept	best
0.5HP	150-240	10A	60-380	450	10A	(2-10) Pcs	(2-3) Pcs
0.75HP	150-240	10A	60-380	450	10A	(2-10) Pcs	(3-4) Pcs
1HP	150-240	10A	60-380	450	10A	(2-10) Pcs	(3-5) Pcs
1.5HP	150-240	12A	60-380	450	10A	(2-10) Pcs	(4-6) Pcs
2HP	150-240	12A	60-380	450	10A	(2-10) Pcs	(5-7) Pcs
3HP	150-240	12A	60-380	450	10A	(2-10) Pcs	(7-10) Pcs



*The pump system must not exceed the allowable **VOC** voltage , otherwise, it will cause pump damage and even personal damage.Damage caused by incorrect voltage is not Warranty.*

Solar Array Installation Considerations:

- The installation direction of solar panels must be determined according to the installation position. Generally, in the southern hemisphere, the solar panels should face north. In the northern hemisphere, it should face south.
- The solar panel angle should correspond to the latitude of the site. Consult the instructions supplied with the solar array to assist your decision regarding the best angle for your situation.
- Any shading whatsoever will reduce the solar panel(s) performance so locate the panels with this in mind. Panel shadowing is like “open circuiting” a panel.
- Dust or bird droppings will impair the array energy output. Keep panels clean.
- Ensure the array is earthed to ground in the event of lightning strike.



Note

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