

# ebosun

## **Solar Pumps Instruction Manual**

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# Introduction

**ebosun** solar engine drives new water supply system based on the most available renewable energy, the sun. When sunlight is insufficient, alternating current input, such as mains electricity or a generator, can be used.

Using electrical energy supplied by a series of photovoltaic panels and taking advantage of the combination of a submersible pump in series or screw pump, the system is able to guarantee a continuous extraction of water from a suitable source while solar irradiation conditions may vary.

Permanent magnet motor technology ensures high system efficiency, which can require fewer PV panels to operate.

It is designed for ease of use and requires no maintenance. It is the ideal solution for supplying water in remote areas, where the normal electricity supply from the mains is irregular or not available at all.

## Features and Protections

- High efficiency BLDC motor;
- It supports alternating current (50 Hz and 60 Hz) and direct current;
- High efficiency MPPT and vector control;
- External controller;
- Display of voltage, current, power, etc;
- Engine full of water (no contamination from leaks);
- Thrust bearing system;
- Dry protection;
- Overload protection;
- Overvoltage protection;
- Low voltage protection;
- Phase loss protection;
- Protection against clogging;
- Display of the fault code.



# Extreme Pump

Multistage centrifugal type with radial or semi-axial impellers. Pump and motor directly coupled with rigid coupling. 4 inch NEMA standard connection installation.

Impellers mounted on floating clearance rings made of low abrasion synthetic material, and technopolymer diffusers giving the pump high wear resistance. stainless steel and plastic impellers or SUS304 or SUS316 available.

Pump casing, shaft and coupling, strainer and cable sheath in stainless steel. Base support and upper head in micro-cast AISI 304 stainless steel; check valve incorporated in the head.

The innovative wet end design gives the pump superior sand handling capability and provides maintenance-free operation.

Stainless steel pump end or plastic impeller pump end available.

# Engine

This series of motors are high efficiency BLDC motors specially designed for solar pump system. adopt shielding structure, all stainless steel material, welding process, ensure long-term high reliability of the motor, maintenance free. bearing system of

water-filled structure, which ensures a more efficient operation.

Stable and longer service life. No oil, cleaner and no pollution.

All motor types are different. When using them, pay attention to the correspondence between voltage and power requirements. The centrifugal pump motor is from 1000 rpm to 4000 rpm depending on the input power and load.

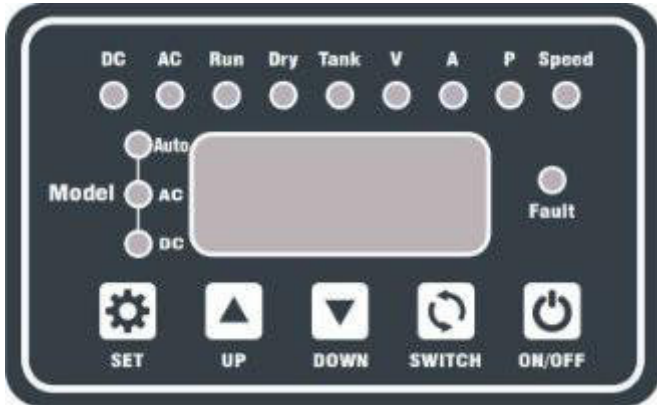
These are some of the installation parameters used:

- ◆ The maximum depth of immersion is 150m;
- ◆ The sediment content of the water source shall not exceed 120 g/m<sup>3</sup> ; .
- ◆ Recommended water temperature 0 to 40°C ;
- ◆ Maximum axial thrust 3000N.

# Controller

## Instructions for LED lamps in the panel

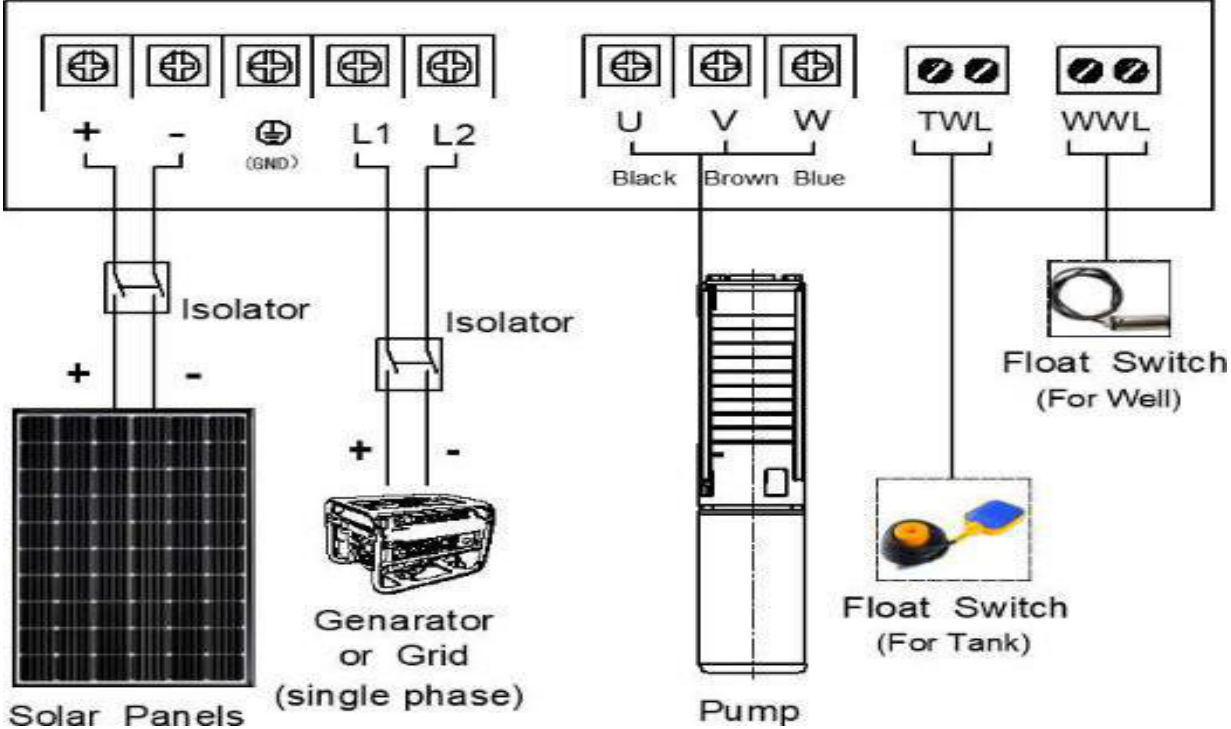
- ◆ LED【 DC】: DC power supply, indicator is on;
- ◆ LED【 AC】: AC power supply, indicator is on;
- ◆ LED【 Run 】 : Controller turns on, indicator lights up,Associated with 【 ON/OFF】.
- ◆ LED【 Dry】 Dry pump protection alarm, Associated with low WWLO terminals. power ;



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

- ◆ LED【 Fault】 : Alarm for several faults ;
- ◆ LED【 Model--Auto】 : AUTO MODE: Intelligent selection of DC or AC power, DC first. In the AUTO model, AC power is being used, and the 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】 : MODOAC:Power supplied from a Generator or Mains power supply;
- ◆ LED【 Model--DC】 : MODOCC:Power supplied from a Solar Array or Battery Storage;
- ◆ Press 【 SET】. Select the power mode,AUTO, AC or DC MODE.
- ◆ Press【SWITCH】. Check the cycle 【 V】, 【 A】, 【 P】, 【Speed】.

# Electrical connections



## Parameter Setting

**Step 1:** Access the configuration 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 the password to change a meter pair ( Default password is a H00- 12 )

*Note:* Please enter the correct password prior to any change process of a meter pair, or the change will be invalid.

- Press 【 SET 】 to enter H00, and set the H00 value to 12 by 【 UP 】 and 【DOWN】.
  - Press and hold 【 SET 】 for 3 seconds to save the parameters and return to H00
- Note:* Briefly press 【 SET 】 to return to H00 directly, but the parameter is not saved and does not work.

**Step 3:** Adjust various parameters, such as speed, power, etc.

*Note:* Various torque digits are metres H00 ~ H09, see table 1.

- Then set the H00 value to 12 and save it. Adjust parameters H01-H09 up and down.
  - Press 【 SET 】 to enter Hxx, and adjust the value of Hxx by 【 UP 】 and 【DOWN】.
  - Press and hold 【 SET 】 for 3 seconds to save the parameters and return to Hxx
- Note:* Briefly press 【 SET 】 to return to Hxx directly, but the parameter is not saved and does not work.

**Step 4:** Exit the parameterisation interface

- Briefly press the 【SWITCH】. Exit the setting interface.

*Note :* If no operation is performed on the configuration interface for 2min, it will exit automatically.

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

- Set H00 to 10 and save, For specific operations, see step 2.

## Parameter code and value default value

Table 1

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

## Alarm code and fault

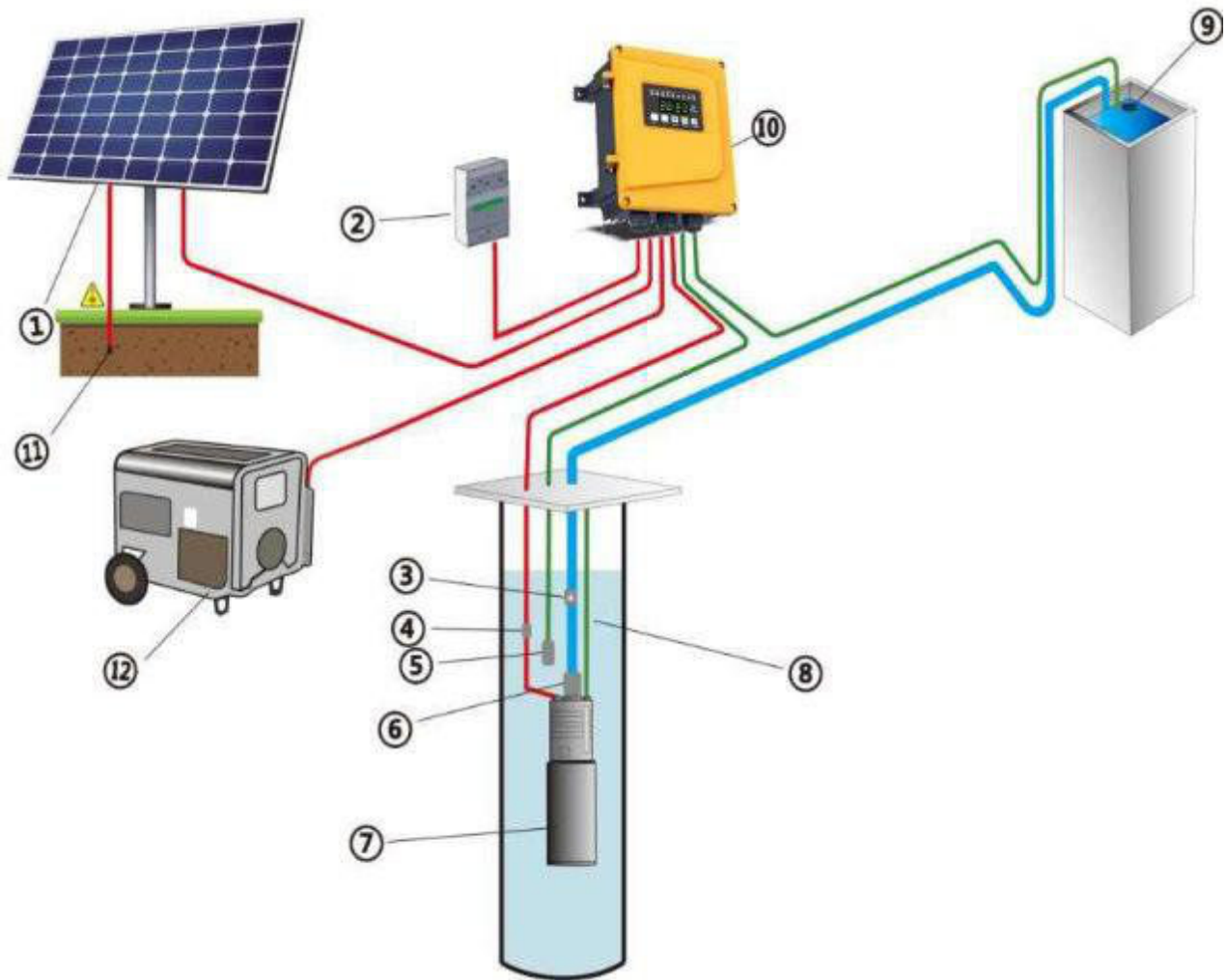
Table 2

Code	Interpretation	Causes and solutions
P50	Protection against low voltage	◆ Tension below the requirement
P51	High voltage protection	◆ Tension exceeds requirements
P48	Dry protection	◆ Shortage of water in the well, low power ◆ WWL "closed" .
P45	Full tank	◆ Water tank full, TWL "Open" .
P02	PFC protection	◆ Faulty printed circuit board, must be sent back to the factory for inspection.
P09	Phase overcurrent U	◆ Controller phase U output overcurrent
P10	V phase over current	◆ Controller phase V output overcurrent
P11	Phase overcurrent W	◆ Controller phase output overcurrent W
P43	Phase failure protection	◆ Phase loss of the regulator output; ◆ Wiring between motor and controller is loose. ◆ The cable is damaged and must be replaced. ◆ The motor may be damaged. Please check the resistance of the motor between every 2 articles of UVW, exceeding 15% is not permitted.
P44	Short-circuit protection	◆ Short circuit of the cable or terminal between the motor and the controller; ◆ the motor or cable is damaged;
P46	Loss protection	◆ Pump is blocked or clogged; remove the blockage ◆ check that the connection between the pump body and the motor is correct ; . ◆ damage to the motor bearing, need for replacement the bearing
P60	High temperature controller	◆ Maintain good ventilation and heat dissipation. heat near the controller
P20	Abnormal fan	◆ Fan is damaged or clogged; remove the fan; remove the clogging or replace the fan
E10	Failure of a component of the printed circuit board	◆ PCB damaged, needs to be returned to the factory for repair. inspection



E00	Power mode error	<ul style="list-style-type: none"><li>◆ Power mode error, please elija mode. Atuo</li><li>◆ Terminals L1/L2 of the controller correspond to AC current, +/- correspond to AC current. to direct current</li></ul>
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## System installation Diagram



- 1、 Group of solar panels
- 2、 SPD(DC-600V), surge protection device (optional)
- SPD (AC-275V), overvoltage protection device (optional)
- 3、 Check valve (optional)
- 4、 Waterproof wiring assembly
- 5、 The Low Level Float ( For Well, Optional)
- 6、 Sacrificial anode ( Optional )
- 7、 Water pump and BLDC engine end
- 8、 Safety rope
- 9、 The High Level Float ( For Tank ,Optional)
- 10、 External controller
- 11、 Ground stack ( Optional )
- 12、 Generator (single phase 220V)



The operation of the SAMKING solar pump is very simple, please read the manual carefully before use.

# System Installation

## Water Source

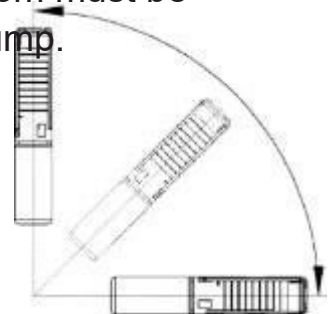
The water source must be "clean water", free of contaminants such as dirt, dust, loose stones, decaying organic matter and other foreign bodies that may block the inlet screen or foul the impeller basin. The sand content should not exceed 120 g/m<sup>3</sup> of pumped water.



The new bore must be clean before installation. NEVER use a worm pump to dewater a new borehole. The warranty does not cover failure or wear due to abrasives in the water.

## Installed Pump

- ◆ Before putting the pump in the well, test it in the reservoir to make sure it is working normally;
- ◆ Make sure that the pump is completely submerged in water;
- ◆ When installing the pump, a certain distance to the bottom must be maintained. Prevent sand from burying and damaging the pump.
  - In shaft, pump and bottom maintain 1.5 m;
  - In open water, such as a river, keep 0.3 m.
- ◆ Permissible installation angle of the pump 0-90°.
- ◆ Permissible operating temperature 0-40°C .

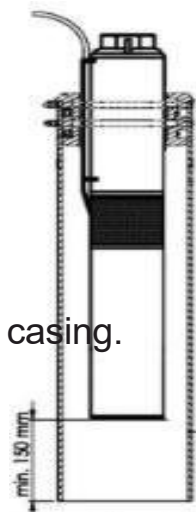


## Heat dissipation requirements for pump installation

In all installation positions, the Solar motor must be completely submerged and there must be a minimum water flow through the motor during operation of 8 cm/sec before entering the pump suction.

To induce the correct water flow through the engine, a flow inducer sleeve must be used when:

- ◆ Well diameter too large in relation to the motor diameter to induce a correct flow rate.
- ◆ The engine and pump are in open water.
- ◆ The motor and pump are located in a rock shaft or under the casing.
- ◆ The auger is top-fed (water enters into the intake without bypassing the engine).
  - ◆ The motor and pump are fixed to the screens.



## Float installation

### The low level float

- ◆ The low level float is installed in the WWL terminal to avoid the



dry running. It is an option for the pump

centrifugal pump, but **must be** installed for the screw pump to avoid dry running.



- ◆ The low level float must be installed vertically 150 mm above the pump outlet.

- ◆ When the water level rises, the pump will restart after a delay of 10 minutes, The display shows the delay time countdown.

### The high-level float

- ◆ The high level float installed in the TWL terminal to prevent the tank from being full.

◆ To prevent the pump from starting and stopping frequently, adjust the float to a suitable range of oscillation.

- ◆ When the float is "closed", the pump will restart after a delay of 10 minutes, The display shows the delay time countdown.



## SPD (Surge Protective Device)

Surge protective devices protect the system from lightning. Where lightning damage is likely to occur, SPDs must be installed effectively and the system must be effectively grounded.



Select the appropriate SPD, in AC and DC mode, and the voltage specification must not be lower than the maximum system voltage.

- ◆ DC SPD Nominal voltage 600V ;
- ◆ Rated AC SPD voltage 275 V.

### Driver installation

The SAMKING controller panel has an IP65 degree of protection, however, it is recommended not to mount the panel in direct sunlight. It is recommended to install it on the back of solar panels or in a control room or cabinet with good heat dissipation.

### Distance between controller and pump

The maximum installation distance between the SAMKING controller and the engine is 400 m. A greater installation distance can lead to control faults. In addition, the cable between the motor and the controller will cause power loss. For long distance installation, please thicken the cable specifications as necessary.

### Check valves

Check valve can effectively prevent the impact damage caused by water hammer on the pump, it is recommended to install a check valve every 70m of head.

vertical of the pipe.

Areas where water freezes in winter, When installing the check valve, it is necessary to take into account the drainage of the pipe or the protection of the pipe.



## Cable extension Specifications

It is important to minimise energy losses to ensure that performance expectations are met.

The following parameters are calculated on the basis of a power loss of not more than

8% and voltage drop not exceeding

Table 3

5%.

Input power	Cable Specification ( mm <sup>2</sup> )				
	2.5	4	6	10	16
	Maximum permissible cable length (má m ) )				
0.5 HP	44	70	104	135	200
0.75HP	50	76	120	187	230
1HP	60	87	132	193	280
1.5 HP	75	105	150	217	348
2HP	82	122	183	304	400
2.5 HP	95	139	209	348	400
3HP	109	174	261	400	



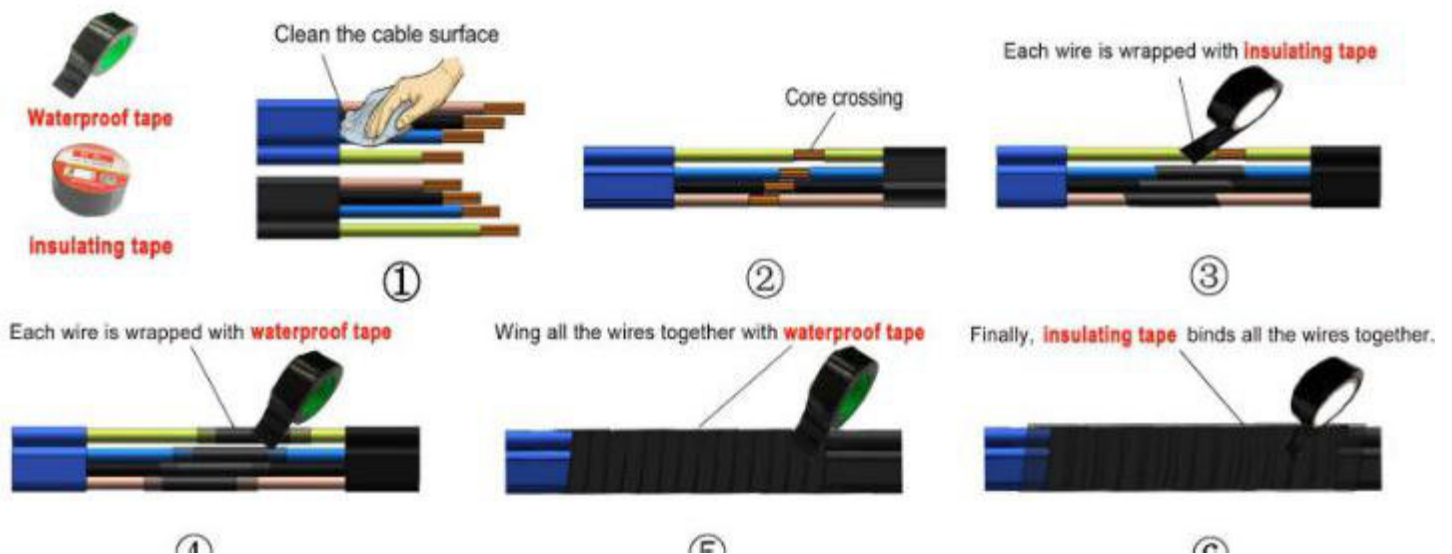
- ◆ Total cable length measured from the solar panel to the pump motor.
- ◆ The distance between the engine and the controller must not exceed 400 m.
- ◆ Do not use the cable to support the weight of the pump or put any strain on the cable. The cable must be kept relaxed.

The lowering cable should be fixed at three metre intervals with a suitable underwater tape and the cable should have some slack between each interval.

## Cable extension cable Splice

Effective contact and tightness of the cable extension line joint are the necessary conditions for the pumping system to work for a long time. Incorrect method may result in electrical leakage, and make the pumping system unable to 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

- Power from a direct current source, such as solar panels, can cause **DANGER** or **DEATH** by electrocution
  - Use proper safety procedures when working on any component of the system.
  - The electrical connection may only be carried out by qualified personnel.
- /disconnection
- Off-grid electrical equipment is subject to applicable regional and national electrical standards.
  - Always treat solar panels as **LIVE** and handle them with care.
  - Use electrical cables and connectors with the correct rating Glossary of

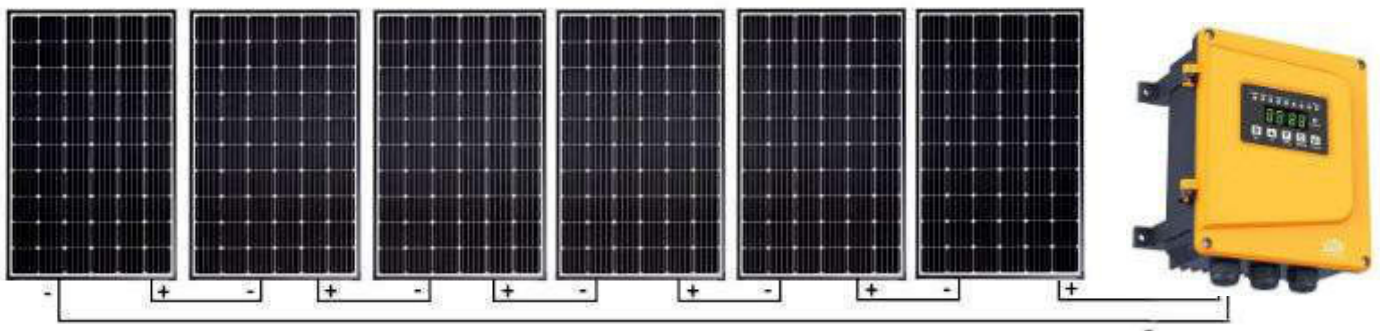
electrical terms

Table 4

Deadline	Definition nó
VOC(V)	Volts open circuit, nothing connected
Vmp(V)	Volts maximum power point, under load
Isc(A)	Short circuit amps
Imp or Impp(A)	Amperes maximum power point

## Solar panel connection (recommended in series for pumps )

To make the system safer and more efficient, the maximum DC input current of this pump series is limited to 10A. Therefore, the parallel solar panel system cannot perform at maximum efficiency. On



In general, solar panels in series are recommended.

In a system of solar panels in series, VOC, Vm and Power are calculated as follows:

- System VOC = VOC of each solar panel × Number of solar panels;
- Vmp of the system = Vmp of each solar panel × Number of solar panels ;
- Power of the system = Power of each solar panel × Number of solar panels
- System current = Current of each solar panel

Motor and controller input power

Limitations:

Table 5

Motor and controller	CA		SOLAR/ CC			Solar panels (340 W)	
	Tensi ó	Má x. Current	Vmp	Má x. VOC	Má x. Corriente	Accept	best
0.5 HP	150-240	10A	60-380	450	10A	( 2-10 ) Parts	( 2-3 ) Parts
0.75HP	150-240	10A	60-380	450	10A	( 2-10 ) Parts	( 3-4 ) Parts
1HP	150-240	10A	60-380	450	10A	( 2-10 ) Parts	( 3-5 ) Parts
1.5 HP	150-240	12A	60-380	450	10A	( 2-10 ) Parts	( 4-6 ) Parts
2HP	150-240	12A	60-380	450	10A	( 2-10 ) Parts	( 5-7 ) Parts
2.5 HP	150-240	12A	60-380	450	10A	( 2-10 ) Parts	( 7-10 ) Parts
3HP	150-240	12A	60-380	450	10A	( 2-10 ) Parts	( 7-10 ) Parts

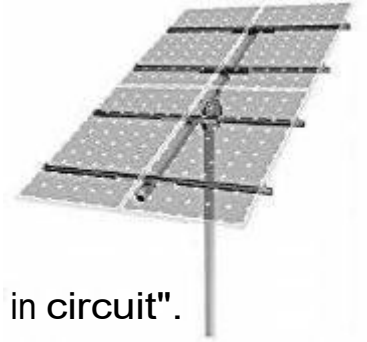


The pumping system must not exceed the permissible VOC voltage, otherwise it will cause damage to the pump and even personal injury.



## Installation of solar farms Considerations:

- The installation direction of the solar panels should be determined according to the installation position. Generally, in the southern hemisphere, the solar panels should face north. In the northern hemisphere, they should face south.
- The angle of the solar panel should correspond to the latitude of the site. Refer to the instructions supplied with the solar panel to decide the best angle for your situation.
- Any kind of shade will reduce the performance of the solar panels, so it is recommended to place the solar panel in the right place.



- panels with this in mind. The shading of panels is like "open a panel.
- Dust or bird droppings impair the energy production of the array. Keep the panels clean.
- Make sure that the set is earthed in case of a lightning strike.

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