

# **Solar Surface Pumps Instruction Manual**

# Contents

Contents .....	3
Introduction .....	4
Features and Protections: .....	4
Controller .....	5
LED Indicator Instructions on Panel .....	5
Electrical Connections .....	5
Parameter Setting .....	6
Parameter Code And Default Value .....	6
Alarm and Fault code .....	7
System Installation Diagram .....	8
System Installation .....	9
Tips for Surface pump .....	9
Water Source .....	9
Pump Installed .....	9
Installation Of Controller .....	9
Distance Between Controller And Pump .....	10
Installation Of The Float .....	10
SPD( Surge Protection Device ) .....	10
Suction Check Valve and water filling before use .....	10
Extension Cable Specifications .....	11
Extension cable Jointing .....	12
Solar Array Installation .....	13
Warning .....	13
Solar Panel Glossary of Electrical Terms .....	13
Solar Panel Connection(Recommended in series for the Pumps ) .....	13
Motor and Controller Input Energy Limitations: .....	14
Solar Array Installation Considerations: .....	14
Note .....	15

# Introduction

ROCKSOLAR DC Brushless surface pump can be powered by solar panels or batteries directly.

Its DC brushless permanent-magnet motor technology assures high efficiency of the pump and outstanding long lasting maintenance free service time of the pump.

It is designed for easy use and maintenance free for its service time. It is an ideal solution for supplying water in the areas where grid power is not easily accessible and a cost saving solution to replace high power consumption A/C pumps.

## Features and Protections:

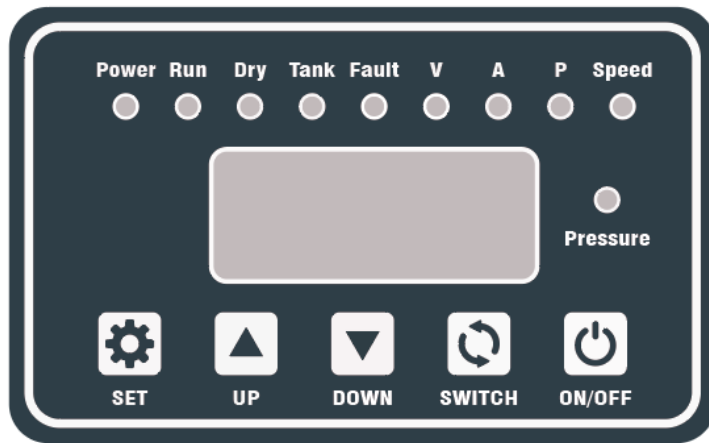
- High efficiency BLDC motor;
- High efficiency MPPT and Vector control;
- Integrated controller on the pump
- Display of voltage, current, power, etc;
- Dry protection;
- Over-load protection;
- Over-voltage protection;
- Low-voltage protection;
- Lost Phase protection;
- Stall protection;
- Error display.



# Controller

## LED Indicator Instructions on Panel

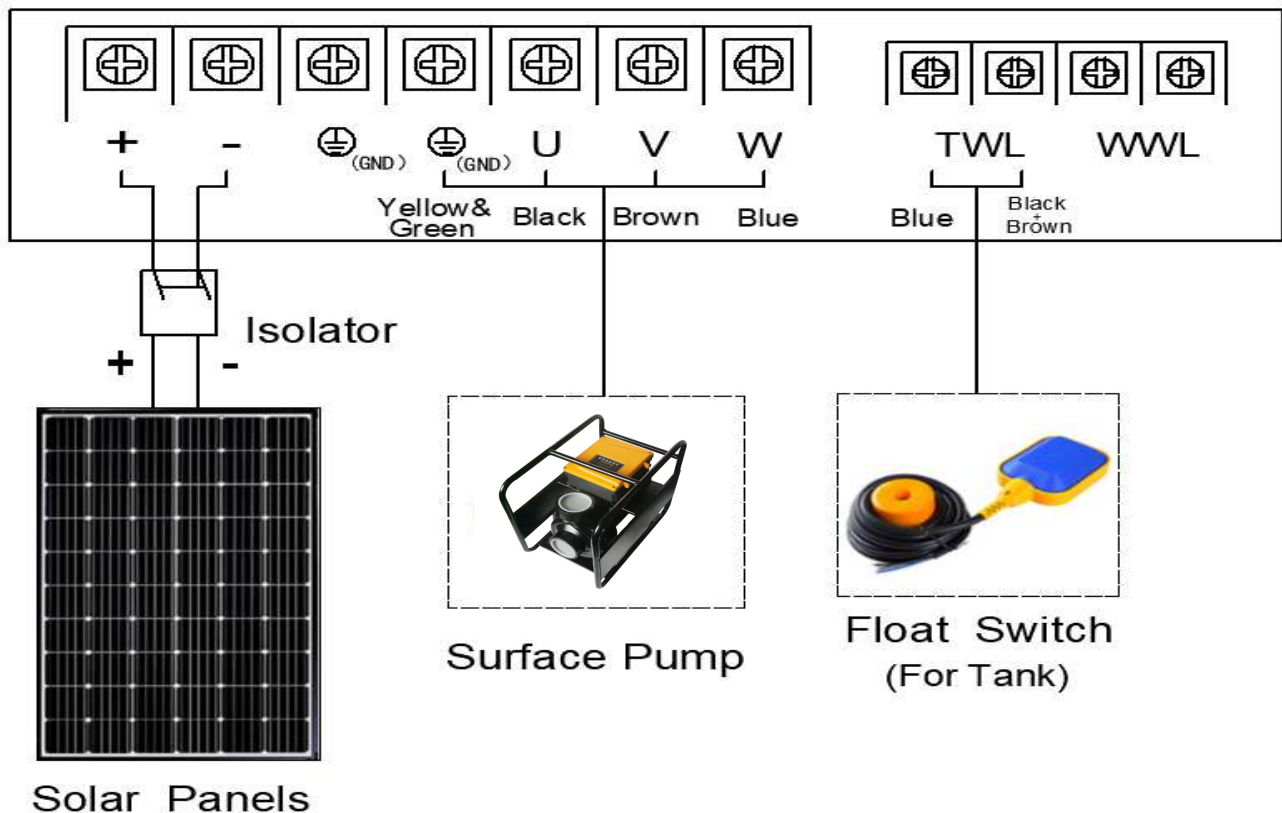
- ◆ LED 【 Power 】 : Input power supply, the indicator is on;
- ◆ LED 【 Run 】 : Controller is turned on, the indicator lights up



- ◆ 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 【 Fault 】 : Alarm for Various fault;
- ◆ 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 【 Pressure 】 : Connected to pressure sensor, not available at present;
- ◆ Press 【 **switch** 】 , check the 【 **V** 】 , 【 **A** 】 , 【 **P** 】 , 【 **Speed** 】 cycle.

## Electrical Connections



*If the maximum VOC voltage is exceeded, the controller will be damaged irreparably. Maximum VOC see page 14 (table5) .*

## 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: If there is 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	450V		450V
H02	Low voltage protection value	60V		60V
H03	Maximum speed	2500-4000RPM		3600RPM
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	1.5HP	500-1800W	1800W
		2HP	500-2200W	2200W
		3HP	500-3000W	3000W
H08	Minimum DC operating power	0-1200W		0(Function Off)
H09	Recovery time of over temperature protection	30-1800S		30S

# 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 of water source, 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 <b>or cable too long</b>
P10	V phase over current	◆ Controller U phase output over current <b>or cable too long</b>
P11	W phase over current	◆ Controller U phase output over current <b>or cable too long</b>
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	AC Power input Or power is lost	◆ Only DC power input is allowed; ◆ The input voltage is unstable
P0	Hardware over current	Short circuit of cable or terminal between motor and controller; Motor and controller model mismatch;
P49	Software over current	Short circuit of cable or terminal between motor and controller; Motor and controller model mismatch;
PL	Low Power	Input power too low; The pump is blocked or jammed; remove the jam.
E8	PCB component failure	PCB damaged,need to return to factory for inspection
Beep alarm	Reverse connection of positive and negative poles	Pay attention to the ± pole of the power supply

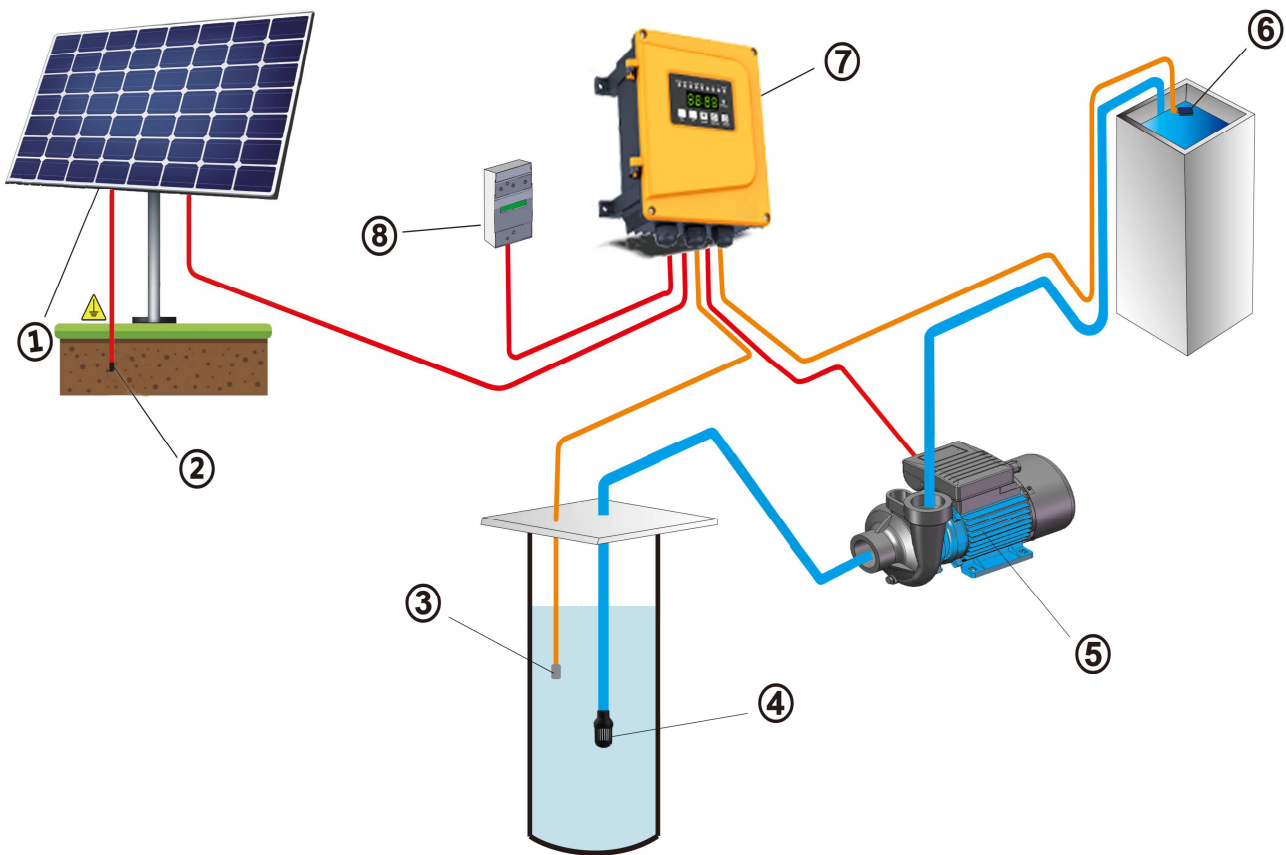
## Automatic recovery time

Error reporting “ P48 ” 2 times of continuous, automatic recovery after 30 minutes.

Error reporting “ PL ” 5 times of continuous, automatic recovery after 30 minutes.

The automatic recovery time of other faults is 30s after the fault is removed.

# System Installation Diagram



- 1、 Solar Panel Array
- 2、 Grounding pile (Optional)
- 3、 The Low-Level Float (For Well ,Optional)
- 4、 Check valve
- 5、 Surface pump
- 6、 The High-Level Float (For Tank ,Optional)
- 7、 Controller
- 8、 SPD(DC), Surge Protection Device (Optional)



**1、 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

- ◆ Pump is IP54 Rated . it is recommended that the pump is not mounted under direct sunlight or exposed to rain.
- ◆ 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.
- ◆ Operating temperature 0-40°C.
- ◆ 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 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 DC SPD, 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.



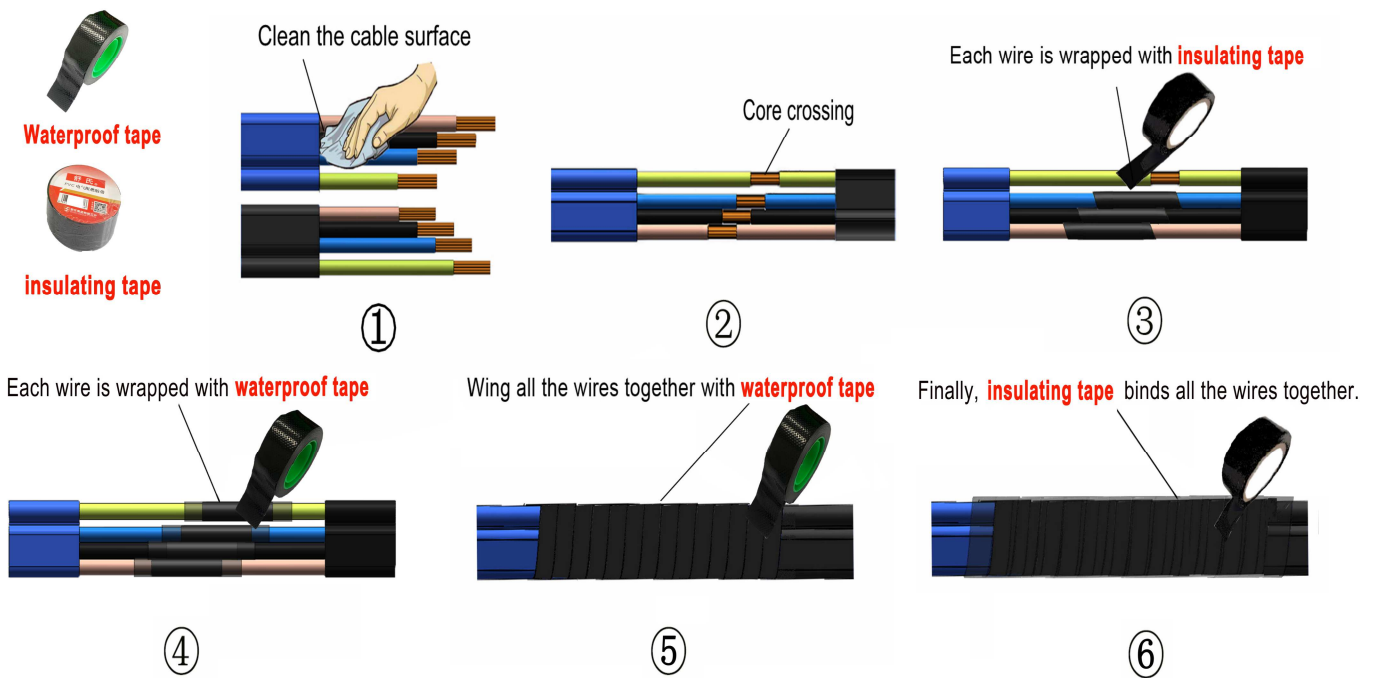
## Extension Cable Specifications

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.

## Extension cable Connection

The effective contact and waterproof of the joint of the cable extension line are the necessary conditions for the pump 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.

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

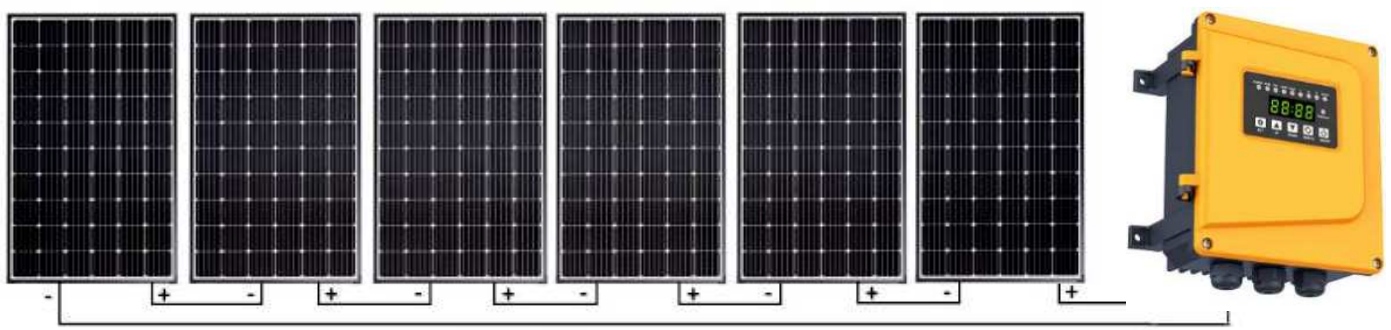
### Solar Panel Glossary of Electrical Terms

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 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:**

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

**Motor and Controller Input Energy Limitations:**

Table 5

Pump	Vmp	Max. VOC	Max. Current	Recommended for solar panels
0.3HP-24V	20-40	48	15A	420W*1
0.5HP-48V	40-76	96	15A	420W*2
0.75HP-72V	65-110	150	15A	420W*3
1HP-96V	80-150	180	15A	420W*4

Motor& Controller	VDC	Best Vmp	Max. VOC	Max. Current	Solar panels (420W)	
					Accept	Best
1.5HP	60-450V	150-240	450	10A	( 2-10 ) Pcs	( 4-6 ) Pcs
2HP	60-450V	180-280	450	10A	( 2-10 ) Pcs	( 5-7 ) Pcs
3HP	60-450V	250-380	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.

