

**Terko Tecnologías Agropecuarias**  
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## Manual for Installation and Operation





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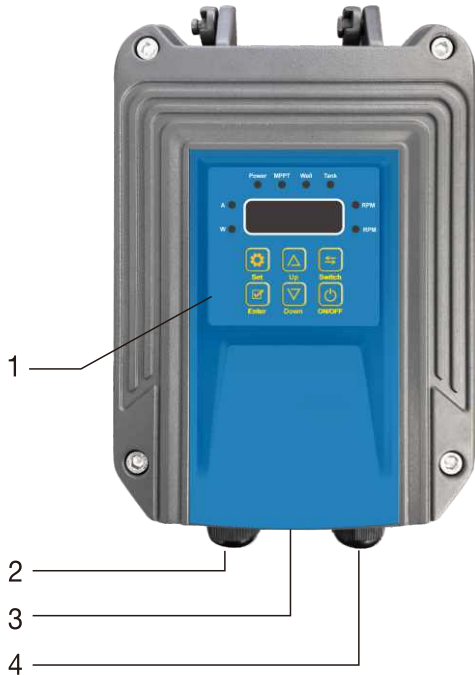


DC Solar submersible pumps and surface pumps are fitted with a permanent magnet,brushless motor,Which enables the efficient use of energy from a wide range of supply options.The pump system offers the perfect water supply solution in remote areas where water is scarce and the power supply is non-existent or unreliable.

This project products are mainly used in fry region for irrigation of agriculture,It can be used for drinking water and living water.The living condition could be much improved.

### Characteristic

- Permanent magnet,brushless motor,saveing energy and offering maximum efficiency.
- NSK bearing with alloy mechanical seal,offering the longer working life.
- Intelligent water shortage protection
- MPPT function offers higher utilization rate of solar energy
- Automatic charging function for batteries
- Automatically start or stop working
- Water proof and leak proof based on double water seal
- Controller maximum operating temperature: 60℃
- Featured fuctions:Soft start protection,High/Low voltage protection.  
Over current/load protection.



- 1.Operation panel
- 2.DC electric cable entrance.
- 3.Pump`s cable entrance.
- 4.Water level sensor cable entrance.









### LED Indicator Light

- Voltage (V): In display mode of Voltage,Pilot lamp will be lighting.
- Speed (V) : In display mode of Speed,Pilot lamp will be lighting.
- Current (A) : In display mode of Current,Pilot lamp will be lighting.
- Power (W) : In display mode of Power,Pilot lamp will be lighting.
- Tank : When tank is full,Pilot lamp will be lighting.
- Well : When well is shortages of water,Pilot lamp will be lighting.
- MPPT: In solar power supply,Pilot lamp will be lighting.
- Power : When pump works,Pilot lamp will be always lighting.

## Key Operation



Key Operation	Function
 Set Set Key	Factory setting parameter, Do not open.
 Enter Enter	Factory setting parameter, Do not open.
 Up Up	RPM setting, each time you press, the RPM will increase for one grade. In fault state, turn off/on the fault display.
 Down Down	RPM setting, each time you press, the RPM will decrease for one grade.
 Switch Switch	In the operation status, you can circularly switch the display mode in voltage(V) -> speed(RPM) -> current(A) -> power(W)
 ON/OFF ON/OFF	Start or stop pump manually.

## Parameters of Controller



Controller	Adaptable Pump	Max Input Current(A)	VOC(V)	Working Voltage Range(V)	Working Temperature (°C)
CN24	Rated 24V Pump	15	50	21 - 50	-15 - 60
CN48	Rated 48V Pump	15	100	42 - 100	-15 - 60
CN72	Rated 72V Pump	15	150	63 - 150	-15 - 60
CN96	Rated 96V Pump	15	200	84 - 200	-15 - 60



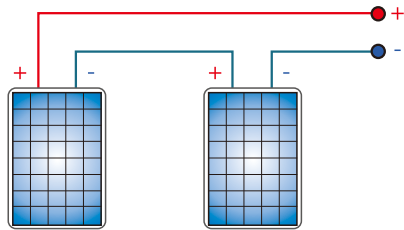
### Caution:

Before the power is on, you must use the instrument to detect the open circuit voltage of solar panels, or apply for series, parallel knowledge to calculate the solar panel open circuit voltage. The open-circuit voltage of solar array must be less than the maximum input voltage of the controller, otherwise it will cause irreversible damage.

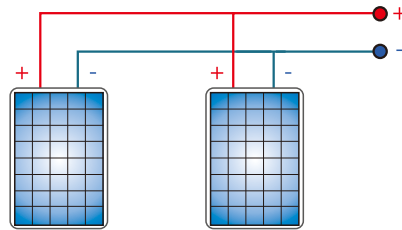
# Solar Panel Wiring



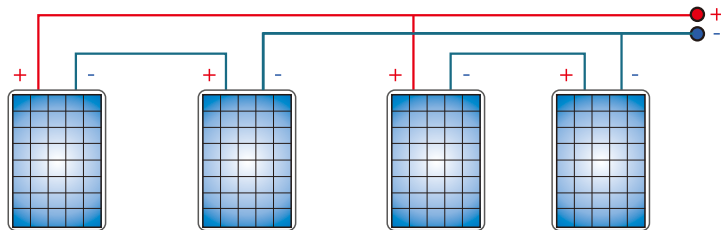
## Series



## Parallel



## Series And Parallel



**Notice:** Solar panel power = Pump power × 1.3

1.3 is a factor, considering the solar strength is not enough in the morning, afternoon or cloudy day. The factor between (1.2 - 1.5) according to different area or actual usage status



- 24V Pump working voltage range: 21 - 50V, VOC can not exceed 50V
- 48V Pump working voltage range: 42 - 100V, VOC can not exceed 100V
- 72V Pump working voltage range: 63 - 150V, VOC can not exceed 150V
- 96V Pump working voltage range: 84 - 200V, VOC can not exceed 200V

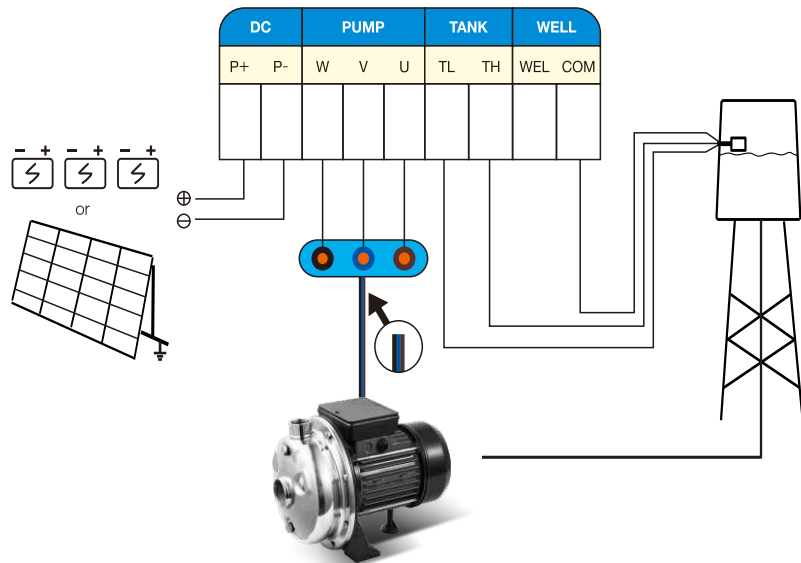
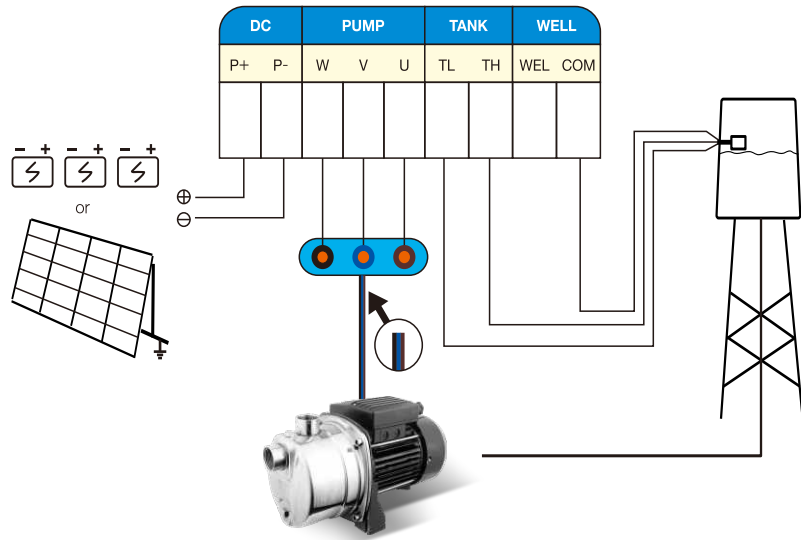
# Cable Size



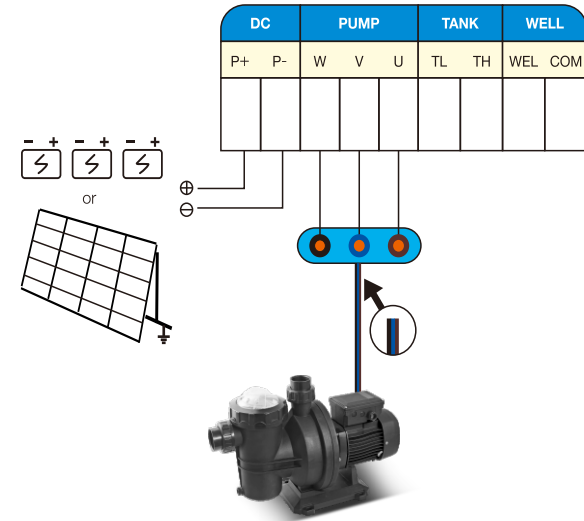
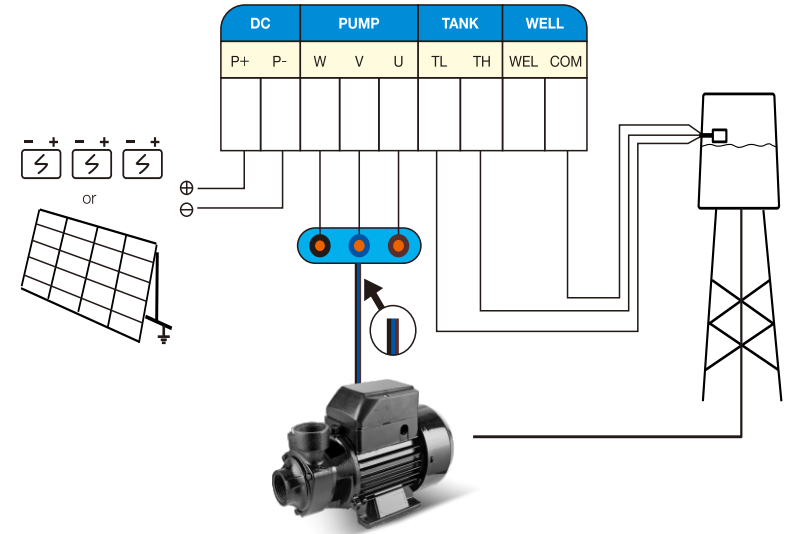
## Cable size recommendation

Pump Voltage	Cable length	Cable length	Cable length	Cable length	Cable length	Cable length
	0~15m	16~30m	31~45m	46~60m	61~75m	76~90m
24V	2.5mm <sup>2</sup>	6mm <sup>2</sup>	/	/	/	/
48V	1.5mm <sup>2</sup>	4mm <sup>2</sup>	6mm <sup>2</sup>	6mm <sup>2</sup>	/	/
72V	1.5mm <sup>2</sup>	2.5mm <sup>2</sup>	4mm <sup>2</sup>	6mm <sup>2</sup>	/	/
96V	1.5mm <sup>2</sup>	2.5mm <sup>2</sup>	2.5mm <sup>2</sup>	4mm <sup>2</sup>	4mm <sup>2</sup>	6mm <sup>2</sup>

# Solar Surface Pump Installation

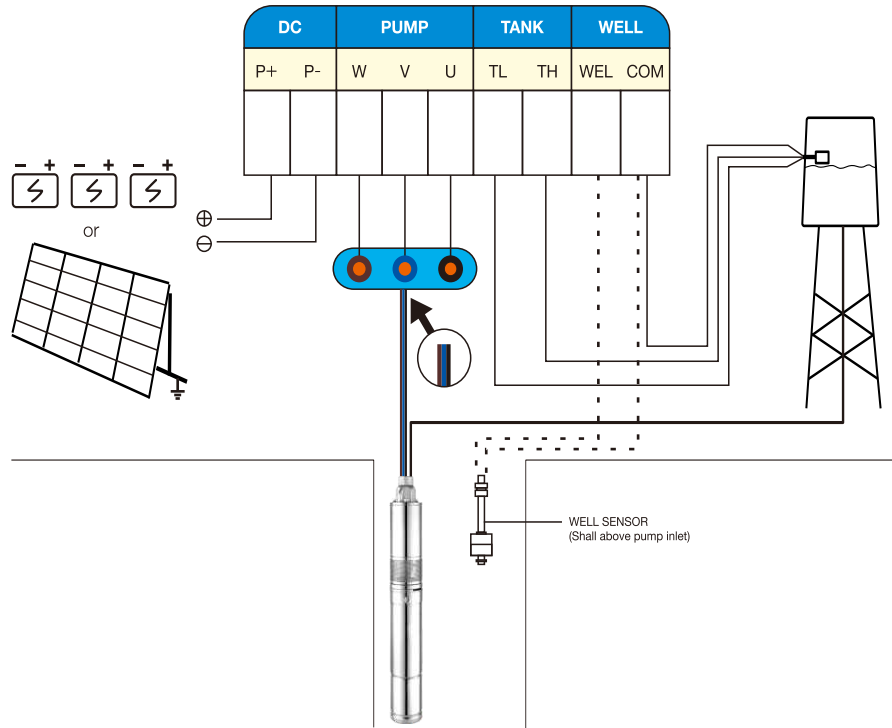


# Solar Surface Pump Installation

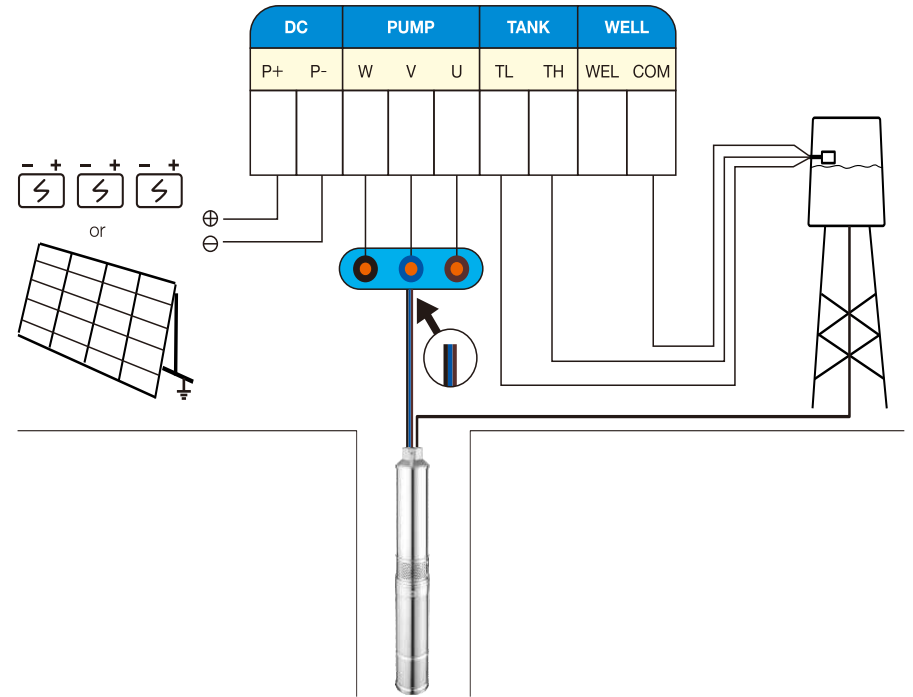


1. Before using the water pump for the first time, please remove the screw and fill the water oumo with water then screw it back. Finally start the pump.
2. Don't reverse the positive and negative of power, otherwise it will not work.
3. Before you start wiring the controller, the power must be cut off.

# Solar Helical Rotor Pump Installation



# Solar Centrifugal Pump Installation





## Pump Start

### 1.Power on to start

Every time pump power on,the system default boot and pump start immediately without testing water tank.

### 2.Button to start

In shutdown state,press the button on/off to turn on the pump without testing water tank.

### 3.Water Shortage of start

If the system boot but the pump stop and water Shortage switch is closed,the pump immediately starts.

(TL signal terminal of the main control board is shorted to the COM terminal.)

## Pump stop

### 1.Float switch mode

In running state,when the water full switch is closed,the pump immediately stops.

(Float switch's 2 cables connect TH and COM terminal and the Tank light is on).

### 2.Low-power protection

If the pump continuously working for a perid then the input power is less than the set power under the current speed and continuously working for 20s,The pump will stop immediately and report P48 fault.After 30 mins the fault will be cleared.



## Pump operation

Every time start the pump,which will automatically identifies the DC(Battery) or PV(Solar panel) power supply mode for 10 seconds. then switch to the corresponding mode to run.The setting speed is invalid during the identification procedure.

### DC Mode(Battery)

In DC mode,the pump speed is adjustable,range from 1000-3000 RPM

The default setting speed is 3000 RPM,The speed can be set by the UP or down keys.

When pump keep running for a long time,DC (battery) power's voltage will be reduced gradually.In order to prevent battery over discharge.when input voltage lower than controller set corresponding protection voltage,pump will stop working automatically.

Model	Protection Voltage(V)
CN24	21
CN48	42
CN72	63
CN96	84



## Pump Operation



### PV Mode(Solar Panel)

For PV mode,pump speed setting is similar as DC mode,maximum speed is also 3000 RPM.

And solar power will also influence pump's speed.MPPT controller will track solar panels's power.

When sunshine is stronger,The input solar power is increasing,pump speed will be higher and vice versa.

In PV mode,If the MPPT indicator light flashes fast,which means the current working points is closer to the maximum working point.If the flashing frequency is slow or not.which means the maximum power point is being tracked.If solar power is insufficient,the pump speed will be reduced gradually,when the speed drop to 600rpm,the pump stops and reports P46 faults after 30 seconds restart again.

When solar power is too insufficient to maintain the current system of starting or running, the output voltage of solar panels will drop rapidly.

When the minimum voltage drops to the lowest voltage of system and lasts for 10s,

Controller will report "PL" Fault.If it still appears "PL" fault after trying continuously 5 times to restart,Please try to start again after 30 mins.

### Reverse connect protection

If the positive and negative of power supply is reversed,the controller will continue to alarm.

## Error Code And Solutions



ITEM	Fault Code	Reasons	Solutions	Recovery process
1	P0	Hardware Over-current	Q:Motor model is mismatch A:choose matching one Q:UVW short circuit connection, A:Re-wiring correctly	Automatic clear 30s later
2	P43	Phase protection	Q:UVW open circuit A:Re-wiring correctly	Automatic clear 30s later
3	P46	Working protection	Q:Motor model is mismatch, A:Choose matching one Q:Pump cable length is too long A:Reduce cable length or increase cable diameter Q:Low powerA:Increase power supply Q:Pump bearing is stuck A:Clean or repair bearing"	Automatic clear 30s later
4	P49	Software Over-current	Q:Pump bearing is stuck A:Clean or repair bearing A:UVW short circuit connection Q:Re-wiring correctly	Automatic clear 30s later
5	P50	Low voltage protection	Q:Low input voltage A:Re-install panels correctly	Voltage gets right, clear immediately
6	P51	High voltage protection	Q:High input voltage A:Re-install panels correctly	Voltage gets right, clear immediately
7	P48	Dry-running protection	Q:The air in the pump is not exhausted totally A:Power-off and re-start 30s later Q:No water in the well, A:Pump will re-start automatically until water supply back	Automatic clear 30mins later or re-power
8	P60	High temperature protection	Q:Temperature of controller MCU more than 90℃ A:Reduce temperature	Automatic clear when temperature gets right
9	E8	Current sampling failure	A:Power-off and re-start 30s later	Re-power to clear
10	PL	Power shortage	Q:Sunlight is not enough A:will re-start until sunlight supply back Q:Solar panel matching error, A:Re-choose panels and install correctly	At the first 5 times, automatic clear 30s later, then turn to 30mins
11	ALARM	Reverse wiring protection	A:Power off and re-wiring correctly.	Power off and re-wiring correctly