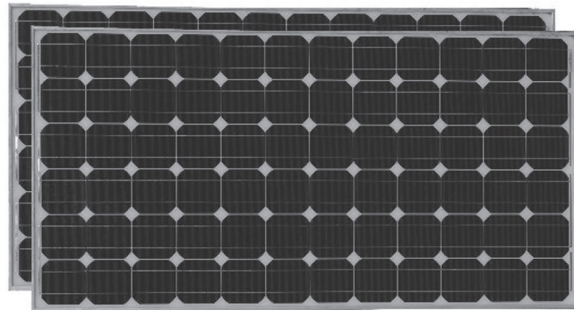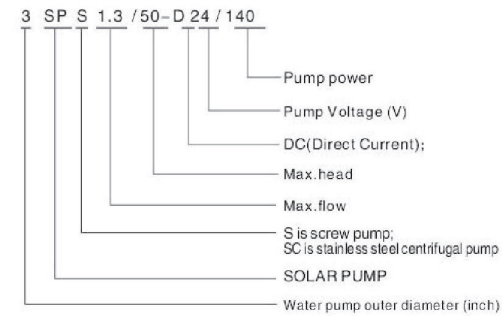# Installation Instruction for Solar Pump

USER MANUAL FOR SPS,SPSC SERIES
SOLAR PUMP AND CONTROLLER BOX

1. MODEL IDENTIFICATION

3 SP S 1.3 /50–D 24 / 140

- Pump power
- Pump Voltage (V)
- DC(Direct Current);
- Max.head
- Max.flow
- S is screw pump;
  SC is stainless steel centrifugal pump
- SOLAR PUMP
- Water pump outer diameter (inch)

2. PUMP SPECIFICATION

Photo	Model	Impeller	solar array voltage (V)	solar array Power (W)	Max Flow (M3/H)	Max Head (M)	Outlet (IN)	With MPPT function Controller	Outer Diameter (MM)
Oil cooling (Motor controller)	3SPS1.0/30-D24/80	Screw	36	110	1	30	0.75"	Yes	76*460
	3SPS1.3/50-D24/140	Screw	36	180	1.3	50	0.75"	Yes	76*460
	3SPS1.5/80-D24/210	Screw	36	280	1.5	80	0.75"	Yes	76*460
	3SPS1.5/95-D24/270	Screw	36	360	1.5	95	0.75"	Yes	76*460
	3SPS1.5/115-D36/500	Screw	54	660	1.5	115	0.75"	Yes	76*460
	3SPS2.3/80-D48/750	Screw	72	960	2.3	80	0.75"	Yes	76*460
	3SPS2.3/120-D48/1000	Screw	72	1320	2.3	120	0.75"	Yes	76*460
	3SPS2.3/140-D72/1300	Screw	108	1680	2.3	140	0.75"	Yes	76*460
Oil cooling (Motor controller)	3SPST1.0/30-D24/80	Screw	36	110	1	30	0.75"	Yes	76*460
	3SPST1.3/50-D24/140	Screw	36	180	1.3	50	0.75"	Yes	76*460
	3SPST1.5/80-D24/210	Screw	36	280	1.5	80	0.75"	Yes	76*460
	3SPST1.5/95-D24/270	Screw	36	360	1.5	95	0.75"	Yes	76*460
	3SPST1.5/115-D36/500	Screw	54	660	1.5	115	0.75"	Yes	76*460
	3SPST2.3/80-D48/750	Screw	72	960	2.3	80	0.75"	Yes	76*460
	3SPST2.3/120-D48/1000	Screw	72	1320	2.3	120	0.75"	Yes	76*460
	3SPST2.3/140-D72/1300	Screw	108	1680	2.3	140	0.75"	Yes	76*460

Photo	Model	Impeller	solar array voltage (V)	solar array Power (W)	Max Flow (M3/H)	Max Head (M)	Outlet (IN)	With MPPT function Controller	Outer Diameter (MM)
	3SPSI1.0/30-D24/80	Screw	36	110	1	30	0.75"	Yes	76*460
	3SPSI1.3/50-D24/140	Screw	36	180	1.3	50	0.75"	Yes	76*460
	3SPSI1.5/80-D24/210	Screw	36	280	1.5	80	0.75"	Yes	76*460
	3SPSI1.5/95-D24/270	Screw	36	360	1.5	95	0.75"	Yes	76*460
	4SPS2.1/50-D24/270	Screw	36	360	2.1	50	1"	Yes	100*480
	4SPS3/60-D36/500	Screw	54	660	3	60	1"	Yes	100*480
	4SPS3.6/80-D48/750	Screw	72	960	3.6	80	1"	Yes	100*480
	4SPS3.8/95-D48/1000	Screw	72	1320	3.8	95	1"	Yes	100*550
	4SPS4.2/110-D72/1300	Screw	108	1680	4.2	110	1"	Yes	100*550
	4SPSC5.0/28-D24/250	Centrifugal (Stainless steel)	36	320	5	28	1.25"	Yes	100*540
	4SPSC5.5/38-D24/400	Centrifugal (Stainless steel)	36	520	5.5	38	1.25"	Yes	100*650
	4SPSC5.5/58-D48/750	Centrifugal (Stainless steel)	72	960	5.5	58	1.25"	Yes	100*680
	4SPSC6.0/72-D48/1000	Centrifugal (Stainless steel)	72	1320	6	72	1.25"	Yes	100*740
	4SPSC6.5/98-D72/1300	Centrifugal (Stainless steel)	108	1680	6.5	98	1.25"	Yes	100*880
	4SPSC10/30-D48/750	Centrifugal (Stainless steel)	72	960	10	30	1.5"	Yes	100*540
	4SPSC10/44-D48/1000	Centrifugal (Stainless steel)	72	1320	10	44	1.5"	Yes	100*650
	4SPSC10/57-D72/1300	Centrifugal (Stainless steel)	108	1680	10	57	1.5"	Yes	100*680
	4SPSC15/21-D48/1000	Centrifugal (Stainless steel)	72	1320	15	21	2"	Yes	100*540
	4SPSC15/28-D72/1300	Centrifugal (Stainless steel)	108	1680	15	28	2"	Yes	100*620
	6SPSC28/26-D72/1300	Centrifugal (Stainless steel)	108	1680	28	26	3"	Yes	125*710
	6SPSC46/7-D72/1300	Centrifugal (Stainless steel)	108	1680	46	7	4"	Yes	125*690

Oil cooling Controller inside
Oil cooling (Motor controller)
Oil cooling (Motor controller)
Oil cooling (Motor controller)

Photo	Model	Impeller	solar array voltage (V)	solar array Power (W)	Max Flow (M3/H)	Max Head (M)	Outlet (IN)	With MPPT function Controller	Outer Diameter (MM)
	4SPSC5/95-D96/1100	Centrifugal (Stainless steel)	(AC110V)/ 144	1440	5	95	1.25"	Yes	100
	4SPSC5/145-D144/1500	Centrifugal (Stainless steel)	216	1800	5	145	1.25"	Yes	100
	4SPSC5/185-D168/1800	Centrifugal (Stainless steel)	252	2240	5	185	1.25"	Yes	100
	4SPSC5/230-D192/2200	Centrifugal (Stainless steel)	288	2880	5	230	1.25"	Yes	100
	4SPSC5/310-D216/3000	Centrifugal (Stainless steel)	(AC220V) / 324	3600	5	310	1.25"	Yes	100
	4SPSC9/65-D96/1100	Centrifugal (Stainless steel)	(AC110V)/ 144	1440	9	65	1.5"	Yes	100
	4SPSC9/100-D144/1500	Centrifugal (Stainless steel)	216	1800	9	100	1.5"	Yes	100
	4SPSC9/125-D168/1800	Centrifugal (Stainless steel)	252	2240	9	125	1.5"	Yes	100
	4SPSC9/158-D192/2200	Centrifugal (Stainless steel)	288	2880	9	158	1.5"	Yes	100
	4SPSC9/271-D216/3000	Centrifugal (Stainless steel)	(AC220V) / 324	3600	9	271	1.5"	Yes	100
	4SPSC13/37-D96/1100	Centrifugal (Stainless steel)	(AC110V)/ 144	1440	13	37	2"	Yes	100
	4SPSC13/56-D144/1500	Centrifugal (Stainless steel)	216	1800	13	56	2"	Yes	100
	4SPSC13/92-D168/1800	Centrifugal (Stainless steel)	252	2240	13	92	2"	Yes	100
	4SPSC13/106-D192/2200	Centrifugal (Stainless steel)	288	2880	13	106	2"	Yes	100
	4SPSC13/148-D216/3000	Centrifugal (Stainless steel)	(AC220V) / 324	3600	13	148	2"	Yes	100
	4SPSC22/53-D168/1800	Centrifugal (Stainless steel)	252	2240	22	53	2"	Yes	100
	4SPSC22/62-D192/2200	Centrifugal (Stainless steel)	288	2880	22	62	2"	Yes	100
	4SPSC22/90-D216/3000	Centrifugal (Stainless steel)	(AC220V) / 324	3600	22	90	2"	Yes	100
	6SPSC35/31-D168/1800	Centrifugal (Stainless steel)	252	2240	35	31	3"	Yes	150
	6SPSC35/45-D192/2200	Centrifugal (Stainless steel)	288	2880	35	45	3"	Yes	150
	6SPSC35/63-D216/3000	Centrifugal (Stainless steel)	(AC220V) / 324	3600	35	63	3"	Yes	150
	6SPSC49/15-D168/1800	Centrifugal (Stainless steel)	252	2240	49	15	3"/4"	Yes	150
	6SPSC49/31-D192/2500	Centrifugal (Stainless steel)	288	3040	49	31	3"/4"	Yes	150
	6SPSC49/42-D216/3000	Centrifugal (Stainless steel)	(AC220V) / 324	3600	49	42	3"/4"	Yes	150
	6SPSC70/20-D192/2500	Centrifugal (Stainless steel)	288	3040	70	20	3"/4"	Yes	150
	6SPSC70/32-D216/3000	Centrifugal (Stainless steel)	(AC220V) / 324	3600	70	32	4"	Yes	150
	6SPSC78/17-D192/2500	Centrifugal (Stainless steel)	288	3040	78	17	4"	Yes	150
	6SPSC78/28-D216/3000	Centrifugal (Stainless steel)	(AC220V) / 324	3600	78	28	4"	Yes	150
	4SPSC14-10F	Centrifugal (Stainless steel)	540	3	25	71	2"	Yes	96*1480
	4SPSC14-13F	Centrifugal (Stainless steel)	540	4	25	91	2"	Yes	96*1805
	4SPSC14-15F	Centrifugal (Stainless steel)	540	5.5	25	102	2"	Yes	96*2025
	4SPSC14-18F	Centrifugal (Stainless steel)	540	5.5	25	125	2"	Yes	96*2220
	4SPSC14-21F	Centrifugal (Stainless steel)	540	7.5	25	140	2"	Yes	96*2495
	4SPSC14-25F	Centrifugal (Stainless steel)	540	7.5	25	168	2"	Yes	96*2755
	6SPSC18-6	Centrifugal (Stainless steel)	540	5.5	33	86	3"	Yes	138*1286
	6SPSC18-7	Centrifugal (Stainless steel)	540	7.5	33	101	3"	Yes	138*1331
	6SPSC18-9	Centrifugal (Stainless steel)	540	7.5	33	129	3"	Yes	138*1471
	6SPSC18-11	Centrifugal (Stainless steel)	540	9.2	33	158	3"	Yes	138*1610
	6SPSC18-13	Centrifugal (Stainless steel)	540	11	33	187	3"	Yes	138*1770

Oil cooling (Motor controller)
Oil cooling (Motor controller)
Oil cooling (Inverter)
Oil cooling (Inverter)

Photo	Model	Impeller	solar array voltage (V)	solar array Power (W)	Max Flow (M3/H)	Max Head (M)	Outlet (IN)	With MPPT function Controller	Outer Diameter (MM)
	6SPSC30-5	Centrifugal (Stainless steel)	540	5.5	49	71	3"	Yes	138*1286
	6SPSC30-7	Centrifugal (Stainless steel)	540	7.5	49	100	3"	Yes	138*1444
	6SPSC30-8	Centrifugal (Stainless steel)	540	7.5	49	114	3"	Yes	138*1478
	6SPSC30-9	Centrifugal (Stainless steel)	540	9.2	49	129	3"	Yes	138*1602
	6SPSC30-11	Centrifugal (Stainless steel)	540	11	49	157	3"	Yes	138*1779
	6SPSC46-1	Centrifugal (Stainless steel)	540	3	68	15	4"	Yes	138*885
	6SPSC46-2	Centrifugal (Stainless steel)	540	4	68	29	4"	Yes	138*1056
	6SPSC46-3	Centrifugal (Stainless steel)	540	5.5	68	44	4"	Yes	138*1286
	6SPSC46-4	Centrifugal (Stainless steel)	540	7.5	68	58	4"	Yes	138*1444
	6SPSC46-5	Centrifugal (Stainless steel)	540	7.5	68	69	4"	Yes	138*1478
	6SPSC46-6	Centrifugal (Stainless steel)	540	9.2	68	83	4"	Yes	138*1602
	6SPSC46-7	Centrifugal (Stainless steel)	540	11	68	93	4"	Yes	138*1779

Photos	Model	Impeller	solar array voltage (V)	solar array Power (W)	MAX. Flow M3/H	MAX. Head M	MAX. Suct M	Inlet/Outlet (IN)	Outer Diameter (MM)
	SJP9/7-D24/370	Plastic	36	480	9	7	5	2"	570*290*390
	SJP17/15-D36/500	Plastic	54	660	17	15	5	2"	570*290*390
	SJP21/19-D48/750	Plastic	72	960	21	19	5	2"	570*290*390
	SJP31/19-D72/1200	Plastic	108	1560	31	19	5	2.5"	670*310*450
	SCPJW5/38-D36/500	Stainless steel	54	660	5	38	8	1"*1"	390*210*300
	SCPJW5/83-D48/750	Stainless steel	72	960	5	83	8	1"*1"	440*200*300
	SCPW5/38-D36/500	Stainless steel	54	660	5	38	8	1"*1"	390*210*300
	SCPW5/83-D48/750	Stainless steel	72	960	5	83	8	1"*1"	440*200*300
	SQB2.2/35-D24/250	Brass	36	320	2.2	35	8	1"x1"	265*135*230
	SQB3.0/50-D36/450	Brass	54	600	3	50	8	1"x1"	320*180*290
	SSGJ3.0/45-D48/750	Plastic	72	960	3	45	9	1"x1"	395*205*305
	SPV18/12-D48/750	Iron	108	960	18	12	/	2"	360*200*540
	SPV28/13-D72/1300	Iron	108	1680	28	13	/	2"	420*220*560

3. OPERATING PRINCIPLE:
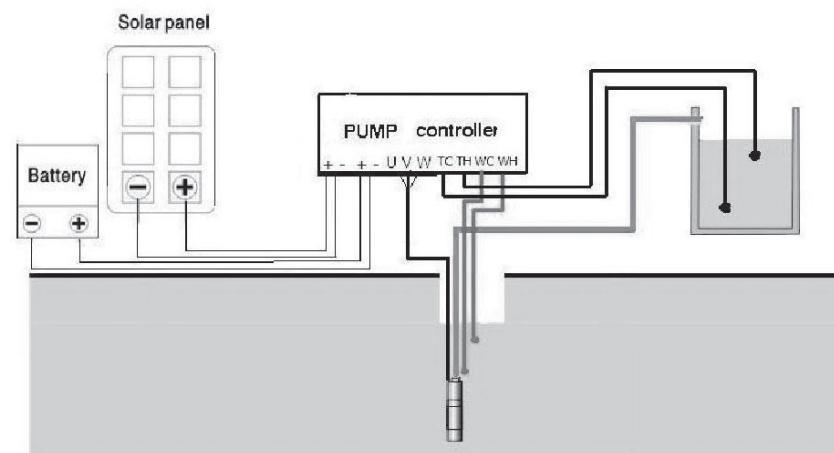
Solar photovoltaic panels convert sunlight to electrical energy, which is passed to the solar pump controller. The solar controller stabilizes the voltage and creates a three phase output to drive the electric motor of the pump. If backup batteries (optional) are available, the controller can charge them. The stored energy can be used at a later date when the sunlight may not be adequate to drive the pump. Sensors are also connected to the controller and can be used to protect the pump from running dry, as well as to turn the pump off automatically when a water tank is full. The system can be remote from traditional power sources and fully automatic with no on-going electricity charges.

(1) Selecting the solar panel of the pumping system

If you have not purchased a complete system from your supplier, the following formulae will be useful. Your pump supplier will be able to help you with panel selection.

a. Solar PV panel (solar panel) selection:

Power of PV panels (watts) =Rated power of pump (watts) x(1. 3 ~ 1.6).

Voltage of solar panel = Rated voltage of pump (volt) x 1. 5

The controller will already be matched to the pump by your supplier.

E.g. A 300 watt pump needs a minimum of 390 watts of PV panels to drive it .(300w x 1.3 = 390w)

b. You may need combinations of panels, especially for the larger pumps. During connection of solar panels, you have to get the solar panels in series to reach the rated voltage of the pump, then in parallel to reach the rated current of the pump.

Panels in parallel double the current and the wattage of the panels

Panels in series double the voltage and the wattage of the panels.

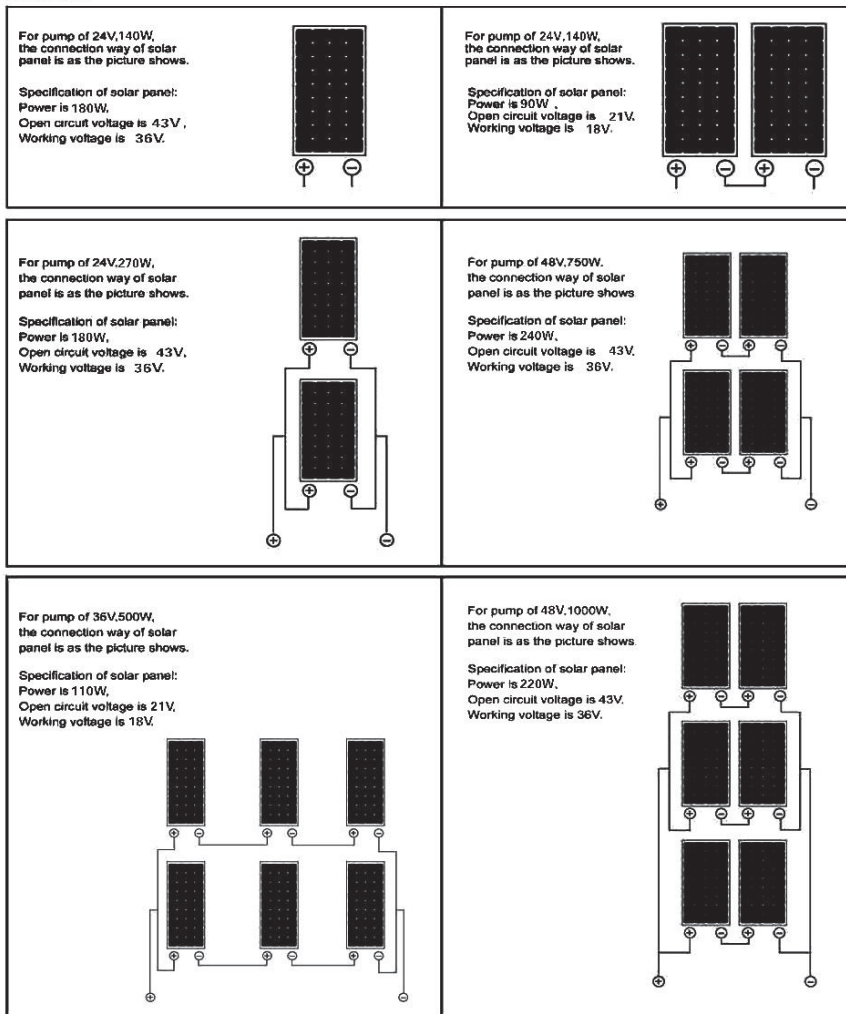Panels in series, add the voltage and the wattage of the panels.

Eg. 2 x 12 volt 100 watt panels in parallel becomes a 12 volt 200 watt system

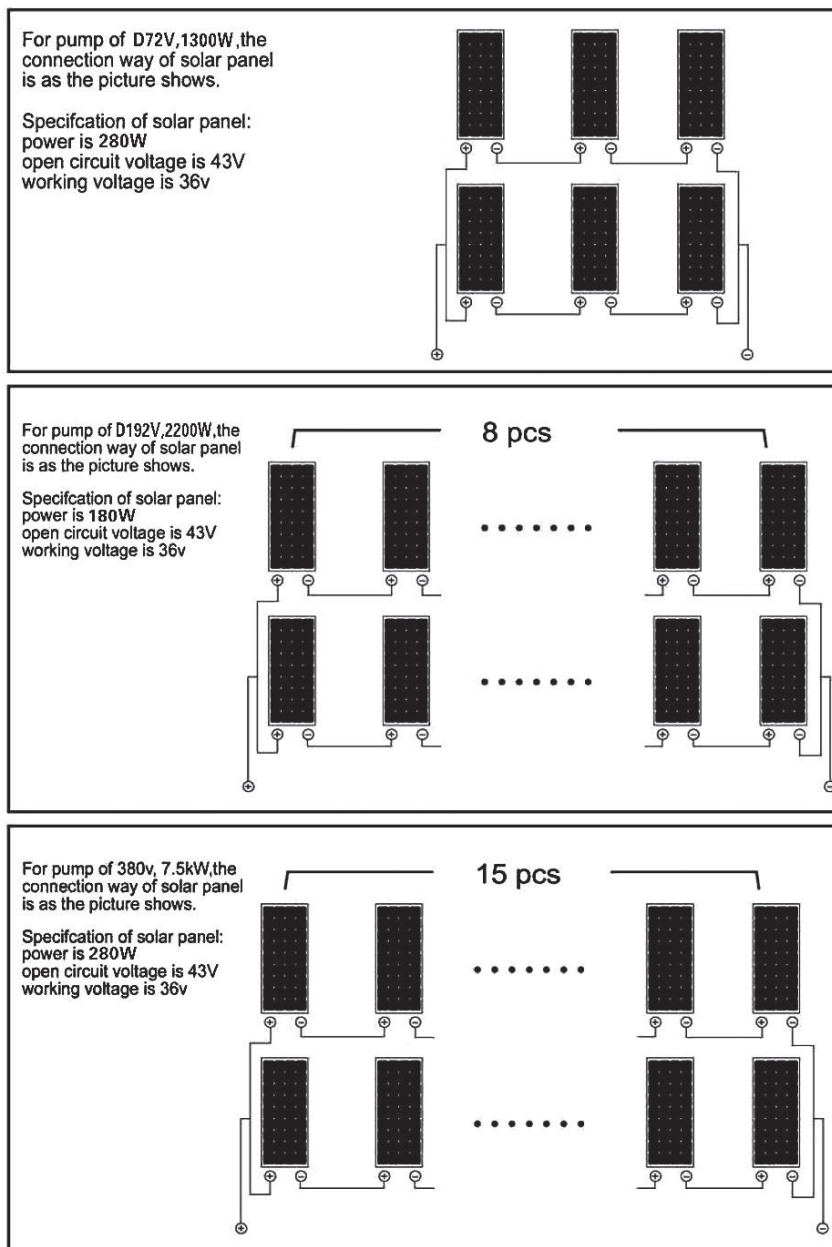2 x 12 volt 100 watt panels in series becomes a 24 volt 200 watt system.

c. You can select and connect solar panels as the following pictures showed:

Please note: Solar panel with oper circuit voltage 43V .working voltage 36V is suitable for pump system of 24V and 48V.

For example:

For pump of 24V,140W, the connection way of solar panel is as the picture shows.

Specification of solar panel:
Power is 180W,
Open circuit voltage is 43V,
Working voltage is 36V.

For pump of 24V,140W, the connection way of solar panel is as the picture shows.

Specification of solar panel:
Power is 90W ,
Open circuit voltage is 21V,
Working voltage is 18V.

For pump of 24V,270W, the connection way of solar panel is as the picture shows.

Specification of solar panel:
Power is 180W,
Open circuit voltage is 43V,
Working voltage is 36V.

For pump of 48V,750W, the connection way of solar panel is as the picture shows

Specification of solar panel:
Power is 240W,
Open circuit voltage is 43V,
Working voltage is 36V.

For pump of 36V,500W, the connection way of solar panel is as the picture shows.

Specification of solar panel:
Power is 110W,
Open circuit voltage is 21V,
Working voltage is 18V.

For pump of 48V,1000W, the connection way of solar panel is as the picture shows

Specification of solar panel:
Power is 220W,
Open circuit voltage is 43V,
Working voltage is 36V.

Please note: Solar panel with open circuit voltage 43,working voltage 36V is suitable for pumpsystem of D72V,– D216V For example:

For pump of D72V,1300W,the connection way of solar panel is as the picture shows.

Specifcation of solar panel:
power is 280W
open circuit voltage is 43V
working voltage is 36v

For pump of D192V,2200W,the connection way of solar panel is as the picture shows.

Specifcation of solar panel:
power is 180W
open circuit voltage is 43V
working voltage is 36v

8 pcs

. . . .

. . . .

For pump of 380v, 7.5kW,the connection way of solar panel is as the picture shows.

Specifcation of solar panel:
power is 280W
open circuit voltage is 43V
working voltage is 36v

15 pcs

. . . .

. . . .

E.g. 2 x 12V/ 100 W panels in parallel → 12 V/200W system

2 x 12V/ 100 W panels in series → 24V/200W system.

c. You can select and connect solar panels as the following pictures showed:

(2) Selecting the battery of the pumping system

You will need to buy battery and battery controller, if you want to pump water when it is not sunny. Please note if you want to add batteries you will need an additional solar charge controller (not supplied in the kit) and you will need to double the number of PV panels. The extra PV panels are required to charge the batteries while the pump is pumping.

The cheapest option is to try and fill an elevated header tank or if you have no elevation locate the tank near a utility power supply so you can pump water from the tank using a mains powered pump.

You must use deep cycle batteries not car batteries. Deep cycle batteries are designed to take much lower continual discharges than regular car batteries. Deep cycle batteries normally have an "amp hour" rating shown as AH, for instance 100AH. Use the following formulas for calculating battery size required for backup.

Please note even with a deep cycle battery discharging it to a low level will shorten its life, this is why we use 60% as a discharge level.

Current drawn by the pump = pump power /the voltage.

In the case of a 24 volt 300 watt pump.

300 watts divided by 24 = 12.5 amps.

2 x 100AH 12volt batteries in series = 100 Ah at 24 volts.

100Ah divided by 12.5 amps x 0.6 = 4.8 hours of backup

Batteries in parallel, add the Ah, voltage stays the same.

Batteries in series, add the voltage, Ah stays the same.

4. PAKING LIST

Open the package and check all the parts have been supplied.

| Product List		
Solar pump	1pc	OR
Controller	1pc	
Impeller	1pc	or /
Cable Connector	4pcs	
Water Level Sensor	2pcs	
Rope	1pc	
Manual	1pc	

5. INSTALLATION

(1) Wiring the pump

Connecting a longer cable to the pump.(Pumping for lower then 50m, cable should be 3mm^2. 4mm^2 cable must be used for higher than 50m.)

Use the parts contained in the cable connector kit (heat-shrink tube and tape) to connect a longer supply wire to the pump. If you don't have a heat gun to shrink the tube, the barrel of your soldering iron will do or you can use a butane torch but with great care so you don't melt the insulation or set it on fire. Bare the insulation back as shown above.
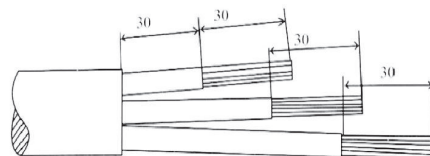
Heat shrink tubing and tape
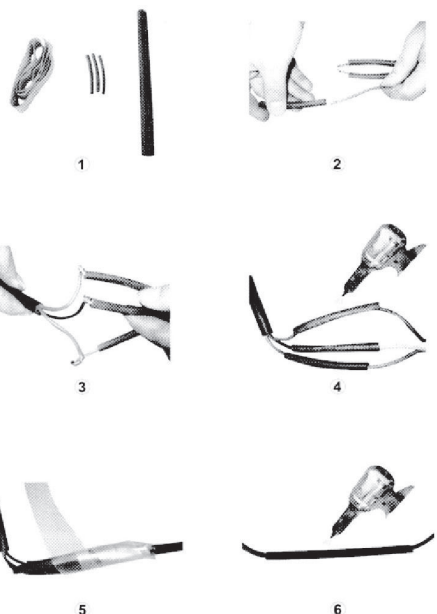
1/ Layout the components needed to make the join.

2/ Put the large diameter piece of heat-shrink over the main cable and then the smaller diameter pieces over the individual wires. Keep the heat-shrink back away from the joints as you solder them. Any heat transfer will prematurely shrink the heat-shrink.

3&4/ Slide the small heat-shrink over the soldered joints and heat using a heat gun or alternative heat source to shrink the sleeve down over the wires.

5/ Wrap the tape over the sealed joints.

6/ Finally slide the large diameter heat-shrink over the completed joint and shrink to it.

Place the pump in water before you start wiring the controller box. This will allow the pump to go through the pre-conditioning required. Do not put the pump in its final position until you have tested it, unless it is easy to see and remove.

(2) Solar pump control box

① Function of solar pump controller box:

a. Low voltage protection (It is automatic)

b. Over voltage protection(It is automatic)

c. Over current protection(It is automatic)

d. Protection for low water level in well (WC,WH sensors)

e. Protection for full water level in tank (TC,TH sensors)

f. Controlling running speed of motor (Speed regulator)

g. Delay for restart working function (Timer regulator is to be set a period of rest time after the pump stops working from low water level protection in well)

h. MPPT function. (Maximum Power Point Tracking)

i. Battery. (Battery can be connected to the controller directly for storing electricity.)

② Technical parameters of controller box

Pump Voltage		24VDC
Rated Current		10A
Controller box Biggest open voltage		100VDC
Max Power		360W
Voltage	Under Voltage	22.0±0.2VDC
	Best Working Voltage	36±0.2VDC
Current	Overload	15A
	Over current	20A
Dimension		147*232*65mm
Weight		1.10kg
Ambient Temperature		-20℃～+50℃
Adaptive Solar Panel	Peak Voltage	36VDC
	Open-circuit Voltage	43VDC
Connection Way		All solar panels in parallel

Table 5-1 24V Controller Box Technical Parameters

Pump Voltage		36VDC
Rated Current		12A
Controller box Biggest open voltage		100VDC
Max Power		700W
Voltage	Under Voltage	22.0±0.2VDC
	Best Working Voltage	54±0.2VDC
Current	Overload	16A
	Over current	20A
Dimension		147*232*65mm
Weight		1.10kg
Ambient Temperature		-20℃～+50℃
Adaptive Solar Panel	Peak Voltage	17.5VDC
	Open-circuit Voltage	22VDC
Connection Way		Each 3 solar panels in series to become a line, then in parallel.

Table 5-2 36V Controller Box Technical Parameters

Pump Voltage		48VDC
Rated Current		13.5A
Controller box Biggest open voltage		100VDC
Max Power		1400W
Voltage	Under Voltage	42.0±0.2VDC
	Best Working Voltage	72±0.2VDC
Current	Overload	18A
	Over current	20A
Dimension		147*232*65mm
Weight		1.10kg
Ambient Temperature		-20℃～+50℃

Adaptive Solar Panel	Peak Voltage	36VDC
	Open-circuit Voltage	43VDC
Connection Way		Each two solar panels in series to become a line, then in parallel.

Table 5-3 48V Controller Box Technical Parameters

Rated Voltage		72VDC
Rated Current		15A
Controller box Biggest open voltage		150VDC
Max Power		1800W
Voltage	Under Voltage	60.0±0.2VDC
	Best Working Voltage	108±0.2VDC
Current	Overload	18A
	Over current	22A
Dimension		147*232*65mm
Weight		1.10kg
Ambient Temperature		-20℃～+50℃
Adaptive Solar Panel	Peak Voltage	36VDC
	Open-circuit Voltage	43VDC
Connection Way		Each 3 solar panels in series to become a line, then in parallel.

Table 5-4 72V Controller Box Technical Parameters

Rated Voltage		96VDC
Rated Current		10A
Controller box Biggest open voltage		300VDC
Max Power		2000W
Voltage	Under Voltage	72.0±0.2VDC

	Best Working Voltage	144±0.2VDC/ (110VAC)
Current	Overload	14A
	Over current	28A
Dimension		320*240*95mm
Weight		2.10kg
Ambient Temperature		-20℃～+50℃
Adaptive Solar Panel	Peak Voltage	36VDC
	Open-circuit Voltage	43VDC
Connection Way		Each 4 solar panels in series to become a line, then in parallel.

Table 5-5 96V Controller Box Technical Parameters

Rated Voltage		144VDC
Rated Current		10A
Controller box Biggest open voltage		300VDC
Max Power		2500W
Voltage	Under Voltage	96.0±0.2VDC
	Best Working Voltage	216±0.2VDC
Current	Overload	14A
	Over current	28A
Dimension		320*240*95mm
Weight		2.10kg
Ambient Temperature		-20℃～+50℃
Adaptive Solar Panel	Peak Voltage	36VDC
	Open-circuit Voltage	43VDC
Connection Way		Each 6 solar panels in series to become a line, then in parallel.

Table 5-6 144V Controller Box Technical Parameters

|		
Rated Voltage		168VDC
Rated Current		10A
Biggest open voltage		400VDC
Max Power		3000W
Voltage	Under Voltage	96.0±0.2VDC
	Best Working Voltage	252±0.2VDC
Current	Overload	15A
	Over current	18A
Dimension		320*240*95mm
Weight		2.1kg
Ambient Temperature		-20℃～+50℃
Adaptive Solar Panel	Peak Voltage	36VDC
	Open-circuit Voltage	43VDC
Connection Way		Each 7 solar panels in series to become a line, then in parallel.

Table 5-7 168V Controller Box Technical Parameters

Rated Voltage		192VDC
Rated Current		10A
Biggest open voltage		450VDC
Max Power		3500W
Voltage	Under Voltage	96.0±0.2VDC
	Best Working Voltage	252±0.2VDC
Current	Overload	15A
	Over current	18A
Dimension		320*240*95mm
Weight		2.1kg
Ambient Temperature		-20℃～+50℃

Adaptive Solar Panel	Peak Voltage	36VDC
	Open-circuit Voltage	43VDC
Connection Way		Each 8 solar panels in series to become a line, then in parallel.

Table 5-8   192V Controller Box Technical Parameters

Rated Voltage		216VDC
Rated Current		10A
Biggest open voltage		450VDC
Max Power		4000W
Voltage	Under Voltage	96.0±0.2VDC
	Best Working Voltage	324±0.2VDC /(220VAC)
Current	Overload	15A
	Over current	18A
Dimension		320*240*95mm
Weight		2.1kg
Ambient Temperature		-20℃～+50℃
Adaptive Solar Panel	Peak Voltage	36VDC
	Open-circuit Voltage	43VDC
Connection Way		Each 9 solar panels in series to become a line, then in parallel.

Table 5-9   216V Controller Box Technical Parameters

Rated Voltage		380VDC
Rated Current		12A
Biggest open voltage		680VDC
Max Power		5000W-11000W
Voltage	Under Voltage	420.0±0.2VDC
	Best Working Voltage	540.0±0.2VDC
Current	Overload	15A-30A
	Over current	18A-40A
Dimension		500*260*185mm
Weight		5kg-18.0kg
Ambient Temperature		-20℃～+50℃
Adaptive Solar Panel	Peak Voltage	36VDC
	Open-circuit Voltage	43VDC
Connection Way		Each 15 solar panels in series to become a line, then all lines in parallel.

Table 5-10 380V Controller Box Technical Parameters

③ Wiring the controller box

**Before you start wiring the control box, switch <u>must be</u> in the off position.**

1/ Wire the pump, panels to the control box as per the wiring diagram below. Both the pump and controller are labeled with "U", "V" and "W". Make sure to be correspondingly connected and not touch with each other.

INSTRUCTION FOR CHARGEABLE PUMP CONTROLLER WITHOUT BATTERY
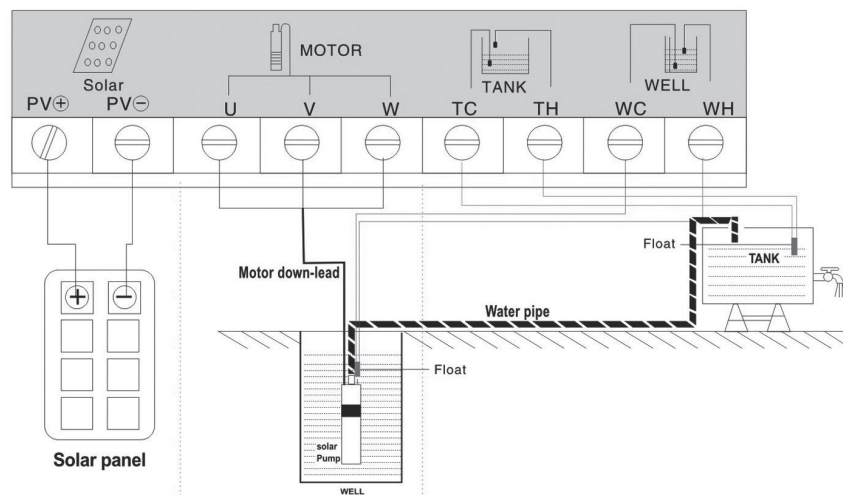
2/If you are intending to use a battery, then the wiring is per the bottom diagram. Make sure the polarity is correct, connecting "+" to"+" and "-" to "-". Charge controllers generally have the following connections. Battery, Panel and Load are either written or in pictorial form. The solar PV input is connected to the load terminals of the charge controller. As a safety margin, we recommend the charge controller be able to supply at least 1.5 times of the pump requirements. Basic formula, Load (amps) = pump wattage / voltage . Amps x1.5 = charge control load.

e.g. A 300 watt 24 volt pump. 300/24 = 15 amps. 15A x 1.5 = 22.5amps. The charge controller must be able to supply 22.5 amps to the load at 24 volts.
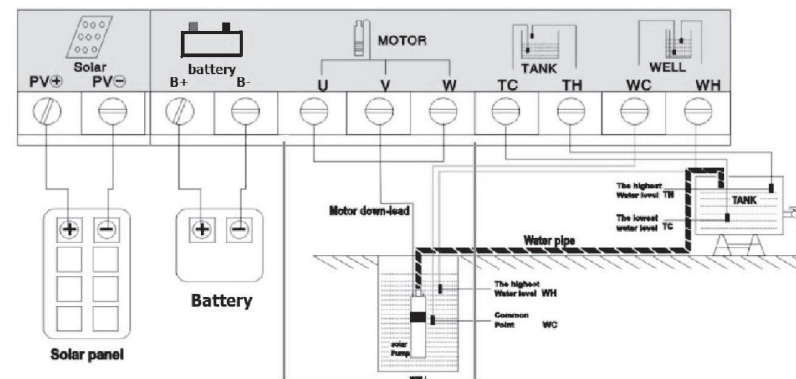
Caution. If wiring a battery ,be very careful not to reverse or short the terminals. The controller will be damaged by reverse electrode. Never connect "B+" to "B-". it will short the terminals and bring heavy current. We advise you remove all metal wrist bands or watches before you start. A short across a metal watch strap will result in it, glowing red hot in seconds, causing very serious burns. Solar PV panels when connected together can also produce a lot of energy, so caution must be exercised here as well. A dark cloth to shade the panels is a good precaution to reduce the power output.

3/ It is important that the water sensors are connected properly. The water low (WH) and water common (WC) are very important because they protect the pump from running dry. Do not link out WH under any circumstances. (the only exception is for troubleshooting) Float also can be used instead of sensors. The installation diagram is presented as showed in the photo.

The sensor terminals TC and TH can be left disconnected if you are not using a header tank or don't care if the water flows out on the ground once the tank is full.

CONTROLLER

Solar mode

Battery mode

fuse
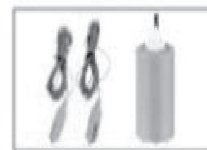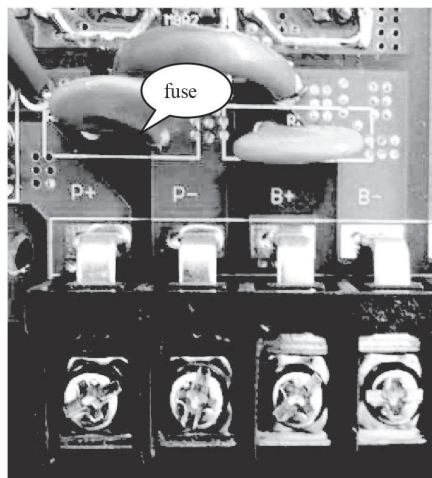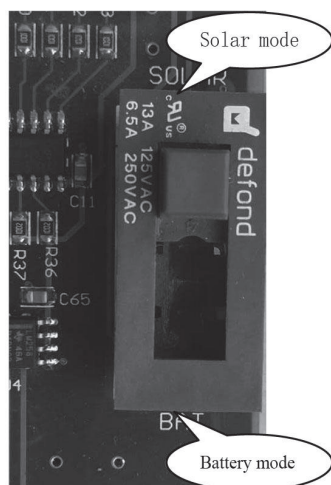
NOTE:

1. Please connect solar panels to P+ and P-,　battery to B+ and B-

2. If solar panels connected, battery is not connected,　please switch to **"solar mode"**

3. If battery is connected, please switch to **" battery mode"**

4. Max. voc from solar panels:
   24V ,36V ,48v of controller,　　VOC: <100V
   72V of controller,　　　　　　VOC: <150V
   96V~216V of controller,　　　VOC: <400V
   there's a fuse to protect the controller from over voltage, see above photo.

Charging function OL
Charging function only can use for RTES5020B controller, Mainly applied to a strict pump-out.
a) After connecting the battery input and solar panels input, turn on the switch to the Solar Panel Mode. At first, all the lights on and then went after 1s clock "SYS" indicator system into self-check. After Pump "self" indicator, Pump running. Finally, the lights flashing MPPT ", "said system into the maximum power point algorithm.
If need to connect the battery, turn on the switch to the Battery Mode.
If no need to use the battery, turn on the switch to the Solar Panel Mode.
b) User can use upper limit of the motherboard maximum output speed potentiometer, Clockwise potentiometer motor speed, Counter-clockwise potentiometer motor speed decreases
c) When the battery power is not enough, Controller will automatically into rechargeable battery mode, This "Pump" indicator and flashing lights and "MPPT ".
This process pump is still in running.

Announcements
a) During the wires connection, please note that must turn off the switch to the middle part "STOP", then the power cut off. Make sure the solar panel input is the final step of insert. The right connection can avoid damage of wrong operation.
b) Please pay attention to the "P+" terminal and "P-"terminal. Voltage between "B+" terminal and "B-"terminal can not be exceed 100V, Or there would be fatal damage to the controller.
c) Please note the solar pumps controller could only match the relevant or recommended solar pumps' models by our company, can not be changed to other models at will.
d) When the pump start running ,please make sure it runs in the correct direction(The water would flow out from the water outlet of the pump is the right direction).The incorrect way not only makes the pumps works irregularly, but also

will cause mechanical damage to the pump by long term running.
e) Water level sensor for the well:
（1）The old-style well water level sensor: It acts in detection the water level of the well. Once the water level is too low and well is going to be dry, the pump will stop pumping. During installation, the sensor connected to the terminal "WC"should installed below the sensor of terminal "WH", sensor of terminal "WH" should be installed above the OUTLET of pump in proper way. The pump will stop working when the water level below the sensor connected to terminal" WH" and the pump will work again until the water level recovery above the sensor connected to terminal" WH" 。When the system detected the underground water level below the "WH" probe, it will reset automatically and stop work. Until the water level above the probe, the system would delay 30 mins, and at the same time, the "WELL" light starts twinkling till the delay finish, the system moves again. At the first electrify of the system and detected the water level is above the "WH" probe, it will runs without any delay.

（2）The New-style float water level sensor (Substitute for "WH""WC") : When user choose float water level sensor instead of the old-style sensor, please connect the two wires of sensor with terminal "WC" and "WH" of the controller.
Attention : Please make sure the float water level sensor vertically bound above the outlet of solar pump or the outlet pipe.

Controller introduction
Control the pumps to pump water and monitor the system working condition
☆No putting in water (electronic component away off water)
☆Two way controls input terminal, and it can connect with sensing equipment such as water level probe (idling protection), pressure switch, teleequipment etc.
☆Maximum voltage:

Model name	MAX. VOC OF SOLAR PANEL
24V~72V controller	100Vdc

☆Controller applies to 24V~ 72 V systems.
☆Start-up requirement of system: solar panel supplies energy: ≥10%
☆Start-up time of motor : ≤10S
☆The switch can automatic switchover of the charge mode and non-charge mode, no need of manual work.
☆Weak power testing, when the system continuously runs 5 seconds, the actual power ≤ 10% rated power of pump, system will automatically turn into weak power, low-power light is on.
☆When the system detects the water level of ground water is less than the water level probe (WH), the system automatically reset, and stop working, until the water level is higher than water level probe (WH), the system will delay 30mins, right now Well L light starts to flicker, until finish the delay time, restart to work. When the power of system is on, and detects the water level is higher than water level probe(WH),it has no delayed time processing, and runs directly.
☆It has function such as electrodepositive protection, overcurrent protection, hyperthermy protection.
☆Solar power transition system Based on MPPT (Maximum power point) arithmetic.
☆When battery voltage is too low, the system will automatically disconnect the power, it will connect the power until the battery voltage returns to normal.
☆Maximum conversion efficiency is 88% (motor and controller).
☆Protection grade: IP54 (Sealed, waterproof)
☆Compared with traditional hardware start-up, software control system start-up makes motor start gently, starting current is smaller.
☆On the condition of identical current and voltage, software control makes the system efficiency increase 10% to 15%.
☆ Controller can prevent the pump starting frequently on the condition of weak soar power through testing the dynamic of solar power, it can protect and extend the worklife of pumps.

Explanation of lights and wiring terminal
Explanation of lights

mark	name	explanation
SYS	power	Green color，the power is ok
Pump	running	Green color，it turns on 20 seconds after the power is connected
MPPT	Max power point	Green color, the system is calculating the max power point
ERR_I	Erroneous current	Red color，over current
Low Power	Erroneous voltage	Yellow color，under voltage
Tank_F	Tank water level alarm	Red color, the tank is full
Well_L	Well water level alarm	Red color, the water in well is unavailable

5. TESTING THE PUMP

Before you testing the pump, the controller box switch <u>must be</u> in the off position.

The pump must be under water at all times and should have been pre-conditioned for at least 15 minutes. Water is the lubrication for the pump. if it is not "preconditioned" properly , the bearings will not be adequately lubricated. <u>Do not attempt to test the pump if even for a moment without being submerged, or permanent damage will occur.</u> You will need a large container so the pump does not pump it dry in seconds.

1/ Attach a durable rope or stainless steel cable to the top of the pump using the mounting hole. Make sure the rope or cable is longer than the depth at which you want to install the pump. This is used to raise and lower the pump. <u>Never use the power cable to do this.</u>

2/ <u>Very important!</u> Attach the WH sensor with a tie wrap to the pump cable so it will be at least 0.5 meters above the pump body when it is installed, the higher the better. The WC sensor needs to be placed below the WH sensor.

3/ Connect the water line and lower the pump into the bore hole, well, stream lake etc. Please note the pump must be operated vertically so the bearings have no excess side thrust on them. Water should be clean with no corrosive materials in it. The pump must be at the correct depth. <u>Do not put the pump any deeper than 20 meters in the water</u>. Depending on the water source, the level can drop when water is drawn off .The sensors need to be placed to account for this, otherwise it will be stopping and starting.

4/ The PV panels need to be in full sun. Turn on the control switch. The pump has a "soft start function". It will start after 6 seconds and then spin up to full speed in the next 6 seconds. If the wiring is correct the pump will restart and the pump will run continuously. If the pump does not pump much water it is possible the wiring of the pump is incorrect and it is running backwards.

5/ Test the sensors at a time. When pulling the "WH " sensor out of the water ,the pump should stop immediately. The pump should start after putting it back into water.

 To test " TH" and "TC" , start the pump with sensors out of the water. Then put in water, The pump should <u>stop</u>. Pull the TH sensor out of the water and the pump should start again.

6. TROUBLE SHOOTING

Problem	Possible solution
System light off	1.Turn power switch on 2. Check if all connections are correct. 3. Contact with your supplier
Water level in water tower is lower than "TH" sensor, but the indicator light of "TANK_F" lights on.	1. Disconnect "TH" wiring terminal and "TC" wiring terminal. 2. If "TANK_F" lights off, it means the problem may be caused by short circuit of the water level sensors. Please change the water level sensors. 3. If "TANK_F" still lights on, please contact with your supplier.
Water level in well is higher than "WH" sensor, but the indicator light of "WELL_L" lights off.	1. Connect "WH" wiring terminal and "WC" wiring terminal directly with a piece of wire to get a short circuit. 2. Then if "WELL_L" lights on, it means the problem may be caused by short circuit of the water level sensors. Please change the water level sensors. 3. If "WELL_L" still lights off, please contact with your supplier.
The indicator lights flicker continuously, and water pump does not run normally	1. It may be caused by the low input voltage. 2. Please increase the input voltage. 3. If the lights still flicker, please contact with your supplier.

7. DOS AND DON'TS

Do keep the pump under water at all times when operating

Do be careful with wiring

Do remove the pump if not used for a long time and wipe the screw and body. Wipe with vegetable oil.

Do make sure the pump has adequate water around it during pumping. If the sensors are activated there will be at least a 3 minute delay between pumping sessions.

Do put your solar PV panels in a sunny position facing true north (southern hemisphere) or true south (northern hemisphere). If the panel angle is fixed then an angle equal to your latitude will be a good compromise.

Don't run the pump out of the water, even momentarily. It will void the warranty

Don't bypass the WH sensor except to troubleshoot

Don't adjust the regulation bolt in the base of the pump. It is factory set. It will void the warranty.

Don't use the pump in dirty water. Premature wear will not be covered by warranty.

Don't disassemble the control box. There are no user parts inside.

Customer record card

Name _____

Address _____

_____

_____

Tel _____

Email _____

Model number _____

Date of purchase_____

Limited 1 year Warranty

1. The manufacturer extends only to the original consumer purchaser a limited warranty against defects in material and workmanship for a period of ONE years from the date of purchase. This warranty covers the pump, controller and sensors.
2. The manufacturer or authorized factory representative will repair, or at its option replace any defective part or parts of the product free of charge. In the event of a malfunction the purchaser must return the product to an authorized dealer/agent at their expense. The warranty is limited to the repair or replacement of the product and the manufacturer or it dealers disclaim all liability for indirect and or consequential damages such as any installation charges.
3. The warranty does not apply when the equipment has not been installed as per the instructions or damage has occurred through abuse, carelessness, improper installation, accident of mishandling during shipment, connecting to an improper voltage or it has been serviced by anyone other than an authorized factory representative.
4. A purchase receipt or invoice for proof of purchase must be presented to claim warranty.
5. All repairs not covered by warranty or outside the warranty period will be charged at normal rates.