SOLAR PUMP
Instruction Book

AC/DC auto-switching controller (≤2.2KW)

AC/DC auto-switching controller (3KW~4KW)

AC/DC auto-switching controller (5.5KW-22KW)

Wide Voltage HV Controller

DC controller

Safety instruction

1. It is strictly forbidden to test the pump without the controller, otherwise the motor will be burned.

2. The solar water pump must be connected to our own controller, otherwise the motor will be burned.

3. It is strictly forbidden to connect wires when the power is on, otherwise there will be a risk of electric shock.

4.When the controller is running, it is strictly forbidden to touch or plug the power cord and output motor cord.

5.The water pump and controller must be properly grounded before use, otherwise there will be a risk of electric shock.

Contents

Ⅰ. Selection guide of solar panels

1. Solar panel connection instructions and recommendations

A. Solar panel selection.

Total solar panel power recommendation: (1.2-1.3) times the rated power of the pump

Recommended optimal operating voltage for solar panels: (1.0-1.4) times the rated voltage of the pump.

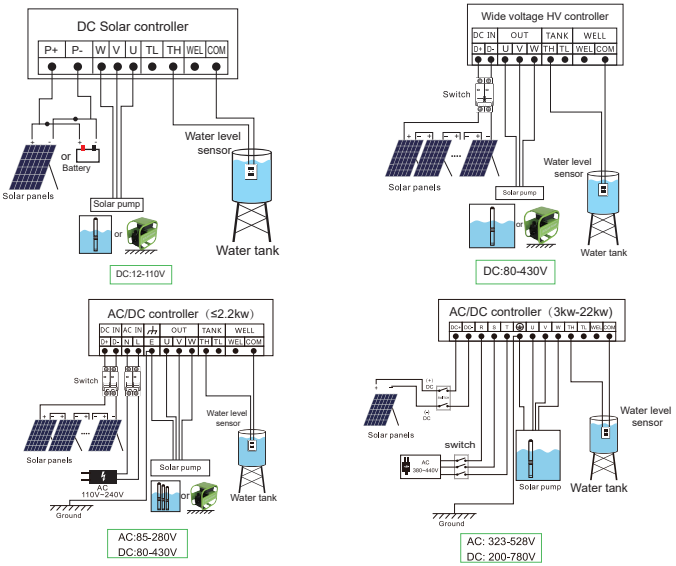
B. For the AC380 controller, when selecting and installing solar panels, the solar panels need to be connected in series, and ensure that the open circuit voltage (Voc) after the solar panels are connected together is less than the maximum limit working voltage of the controller.

2. Three-phase AC power Instructions and Notes

A. For the AC380 controller, the RST interface of the AC side needs to be connected to the RST phase line of three-phase four-wire three-phase power and the earth wire E.

B, If the RST interface of the AC side is not correctly connected to the three-phase AC power supply, such as access to two of the three input lines, or access to the neutral wire and live wire of AC220V/AC110V, the controller can also be turned on at this time. But the controller will not drive the motor, and will report an input phase loss error. If you need to use the AC power supply, the AC port needs to be connected to all the phase lines of the three-phase power supply. Other input methods cannot make the device drive the motor normally.

Ⅱ.Wiring diagram



Wiring diagram of water pump system

III. Working environment and electrical characteristics

Electrical specifications and pump specifications						
Electric control model	**Applicable pump specifications**	**Maximum input current(A)**	**Maximum input voltage DC(V)**	**Minimum input voltage DC(V)**	**Optimal MPPT voltage DC(V)**	**Working environment (℃)**
DF12	Rated 12V pump	17	DC:55V	DC:20V	30-48	-15-60
DF24	Rated 24V pump	17	DC:55V	DC:20V	30-48	-15-60
DF36	Rated 36V pump	17	DC:55V	DC:20V	30-48	-15-60
DF48	Rated 48V pump	17	DC:105V	DC:40V	60-90	-15-60
DF72	Rated 72V pump	17	DC:160V	DC:60V	90-120	-15-60
DF110	Rated 110V pump	17	DC:210V	DC:80V	110-150	-15-60
DF110-750W	Rated 110V pump	17	DC:430V	DC:80V	110-150	-15-60
D150-1.1KW/1.3KW	Rated 150V pump	17	DC:430V	DC:80V	150-190	-15-60
D200-1.5KW	Rated 200V pump	17	DC:430V	DC:80V	200-240	-15-60
D300-2.2KW	Rated 300V pump	17	DC:430V	DC:80V	300-340	-15-60
A110-750W	Rated 110V pump	10.0	DC:430V/ AC:280V	DC:80V/ AC:85V	130-190	-15-60
A150-1.1KW/1.3KW	Rated 150V pump	10.0	DC:430V/ AC:280V	DC:80V/ AC:85V	150-220	-15-60
A200-1.5KW	Rated 200V pump	10.0	DC:420V/ AC:280V	DC:80V/ AC:85V	190-290	-15-60
A300-2.2KW	Rated 300V pump	10.0	DC:420V/ AC:280V	DC:80V/ AC:85V	290-390	-15-60
A380-3KW	Rated 500V pump	17.0	DC:780V/ AC:528V	DC:200V/ AC:323V	520-750	-15-60
A380-4KW	Rated 500V pump	25.5	DC:780V/ AC:528V	DC:300V/ AC:323V	520-750	-15-60
A380-5.5KW	Rated 500V pump	32.0	DC:780V/ AC:528V	DC:300V/ AC:323V	520-750	-15-60
A380-7.5KW	Rated 500V pump	32.0	DC:780V/ AC:528V	DC:300V/ AC:323V	520-750	-15-60
A380-9.2KW	Rated 500V pump	32.0	DC:780V/ AC:528V	DC:300V/ AC:323V	520-750	-15-60
A380-11KW	Rated 500V pump	32.0	DC:780V/ AC:528V	DC:300V/ AC:323V	520-750	-15-60
A380-15KW	Rated 500V pump	32.0	DC:780V/ AC:528V	DC:300V/ AC:323V	520-750	-15-60
A380-18.5KW	Rated 500V pump	32.0	DC:780V/ AC:528V	DC:300V/ AC:323V	520-750	-15-60

Attention:

Be sure to use the instrument to detect the open-circuit voltage of the solar panel before powering up, or calculate the open-circuit voltage of the solar panel according to the knowledge of series and parallel connection. The open-circuit voltage of the solar panel must not exceed the maximum input voltage of the controller, otherwise it will cause irreversible damage.

IV. Operation Panel

1. LED indicator

• Voltage display indicator (V): light on in voltage display mode, otherwise off.

• RPM display indicator (RPM): light on in RPM display mode, otherwise off.

• Current display indicator (A): light on in current display mode, otherwise off.

• Power display indicator (W): light on in power display mode, otherwise off.

• Full water indicator of tank (Tank): light on when the water tank is full, otherwise off.

• Water shortage indicator of well (Well): light on when the well is shortage of water, otherwise off.

• Solar mode running indicator (MPPT): light on when solar powered, otherwise off.

• Power and running indicator (Power): flashing when the pump is stopped and always on when it is running.

2. Key Operation

Key Name	Function
 Set Key	➢Factory parameter setting, unopened.
 Enter	➢Factory parameter setting, unopened.
 Up	➢Running speed setting key, each time you press it, the speed increases by one gear.
 Down	➢Running speed setting key, each time you press it, the speed decreases by one gear.
 Switch	➢In the operation status interface, switch the display mode. The display mode is cyclically switched between voltage (V) -> speed (RPM) -> current (A) -> power (W).
 On/Off	➢In the running state, press the button to stop. ➢In the stop state, press the button to start.

V. Pre-use inspection

1. Before use, check whether the pump is intact, whether there is any looseness, seepage or oil leakage at each connection, whether there is any accidental damage such as bumps and scratches on the cables, and measure the insulation resistance of the pump with a megohmmeter. Should be greater than 2M in cold state.

2. When the length of the cable with the pump is not long enough to be connected, the wire diameter must be larger than the original wire diameter. The joints should be sealed with waterproof tape.

3. Before the pump is officially used, connect the power supply to check whether it starts and runs normally. The pump working direction is counterclockwise. Pay attention to turning it for a short time. It is strictly forbidden to run for a long time in an anhydrous state. Check whether the direction of the pump is correct. If the steering of the three-phase pump is wrong, just adjust any two wires of the power input wires.

VI．Pump operation mode

1. Pump start

1) Power on to start

Each time the power is turned on, when the float switch is not connected, the system starts by default (adjustable in factorymode if need to be memorized).After connecting the float switch, it starts according to the float switch signal.

2) Button to start

Press the run key  to start the pump. After connecting the float switch, start according to the float switch signal.

3) Water shortage of tank to start

When the system is turned on and the water pump is in the shutdown state, after the WELL and COM is disconnected, the TL signal terminal of the main control board is closed, and the water pump starts immediately. Without TL closing signal, wait for 10 minutes.

4) Full water of tank to start

When the system is turned on but the water pump is in the shutdown state, after TH and COM are disconnected, the TL signal terminal of the main control board is closed, and the water pump starts immediately. Without TL closing signal, wait for 10 minutes.

2. Pump stop

1) Float switch signal to stop

In pump running state, when the full water switch in the tank is closed (Tank light is on), the water pump stops immediately. In pump running state, when the water shortage switch in the well is closed (Well light is on), the water pump stops immediately.

2) Dry pumping shutdown

The water pump works continuously for a period of time, if the current power is less than the setting power at the current speed for 20s, it will stop immediately and report P48 fault. 10 minutes later, the fault is cleared.

3) Button to stop

In pump running state, stop the pump by pressing  .

3. Pump operation

Every time the water pump starts, it will recognize the power supply mode of DC (battery) and PV (solar). The recognition time is 20S, and then switch to the corresponding mode to run. During the recognition process, the setting speed is invalid.

1) DC mode (battery)

In DC (battery) mode, the speed of the water pump is adjustable, and the adjustable range is 1000-4000RPM. The default setting speed is 4000RPM, and the speed can be set by  or  key. Each time you press the increment (or decrement) button, the setting speed will increase (or decrease) by one gear. As the water pump runs, the DC (battery) power supply voltage will continue to drop. To prevent excessive discharge, the water pump stops working when the voltage is lower than the corresponding electrical protection voltage.

Model	Protection Voltage (V)
DF12	20
DF24	20
DF36	20
DF48	40
DF72	60
DF110	80
D110-750W	80
D150-1.1KW/1.3KW	120
D200-1.5KW	140
D300-2.2KW	180
A110-750W	84
A150-1.1KW/1.3KW	126
A200-1.5KW	168
A300-2.2KW	210
A380 -3KW	200
A380 -4KW	300
A380 -5.5KW	300
A380 -7.5KW	300
A380 -9.2KW	300
A380 -11KW	300
A380 -15KW	300
A380 -18.5KW	300

2) PV mode

In PV mode, the pump speed setting is similar to DC mode, and the maximum speed (4000RPM) limit is valid. The running speed of the pump is also determined by the current solar panel power. The system tracks the maximum power of the solar panel in real time (namely MPPT). When the sunlight enhances, the output power of the solar panel increases, then the running speed of the water pump increases, and vice versa.

In PV mode, the MPPT indicator flashes. The faster the flashing frequency, it means that the current work is closer to the maximum working point; if the flashing frequency is slower or it does not flash, it means that it is currently climbing to track the maximum power point.

If the solar power is insufficient, the running speed of the water pump will continue to drop. When the speed drops to 600rpm, the water pump will stop and report P46 fault. At the first 5 times, it will try to start every 10S, and the next, retry to start every 10 minutes.

When the solar power is insufficient to maintain the starting or running of the current system, the output voltage of the solar panel will drop rapidly. When it drops to the lowest voltage of the system and lasts for 10S, reports a low power fault "PL". At the first 5 times, it will try to start every 10S, and the next, retry to start every 10 minutes.

4. Speed setting

Power-on default startup speed (adjustable in factory mode), users can set the speed, but it will not be memorized after power-off (adjustable in factory mode if need to be memorized).

Ⅶ．AC/DC switching strategy (The power supply input needs to be connected to solar energy and AC single-phase or three-phase power at the same time)

1. Independent solar power supply

When the solar light is strong, switch to solar power for independent power supply.

2. Simultaneous AC and DC power supply

When the solar light is weak, switch to Simultaneous AC and DC power supply.

3. Solar DC power supply switching to Simultaneous AC and DC power supply conditions

In DC powered working status, when it is detected that the working power is less than the cut-off value (60S of judging anti-shake time), switch to AC power.

4. Simultaneous AC and DC power supply switching to solar DC power supply conditions

(1) In simultaneous AC and DC power supply status, when it is detected that the solar voltage is higher than the set voltage, and the switching waiting time expires, switch to solar power. When the sunlight is enhancing, the waiting time is 15 minutes, and when the sunlight is falling, the waiting time is 30 minutes.

(2) In simultaneous AC and DC power supply status, when AC power is cut off, switch to solar DC power.

5. AC power incoming monitoring

When the solar working voltage cannot meet the independent power supply, and the AC power is in a power-off state, then the AC power is regularly monitored for incoming AC power, and it is switched to AC powered working after AC power is incoming. Wait for 5 minutes to monitor once, then wait for 15 minutes to monitor once, and then monitor every 30 minutes for incoming AC power. When the shutdown button is pressed, the AC power will be monitored immediately after the pump stops.

Model	Voltage of Simultaneous power supply switching to solar DC power (Switching when it is higher than this voltage)	Power of solar DC power switching to AC power (Switching when it is lower than this power)	Waiting time for switching to solar DC power When the sunlight is enhancing.
A110-750W	90V	250W	15
A150-1.1KW/1.3KW	110V	250W	15
A200-1.5KW	150V	250W	15
A300-2.2KW	200V	250W	15
A380 -3KW	400V	1.0KW	15
A380 -4KW	400V	1.0KW	15
A380 -5.5KW	400V	1.0KW	15
A380 -7.5KW	400V	1.0KW	15
A380 -9.2KW	400V	1.0KW	15
A380 -11KW	400V	1.0KW	15
A380 -15KW	400V	1.0KW	15
A380 -18.5KW	400V	1.0KW	15

Ⅷ . Maintenance

1. After the pump has been running for 3000 hours, suggest checking the wearing parts (such as bearings, seals, mechanical seals etc.), otherwise the damage of the mechanical parts will cause greater losses.

2. If the pump is not used for a long time, it should be cleaned and dried, and properly kept in a ventilated and dry place.

IX . Fault information and troubleshooting methods

DC controller fault type			
Fault Code	Fault Description	Causes and Solutions of Fault	Recovery Procedure
P0	Hardware Overcurrent	➢Motor model is mismatched, please choose matching pumps ➢UVW three-phase short-circuit connection, pleaserewire to ensure the normal installation of UVW	Automatically remove after 30s
P43	Phase -lack Protection	UVW three-phase open circuit please rewiring to ensure it reliable contact.	Automatically remove after 30s
P46	Stall Protection	➢Motor model is mismatched , please choose matching pumps ➢Pump extension cord is too long, please reduce the extension cord ➢Power is too low, increase the power supply ➢Pump bearing is stuck, please clean pump bearings	Automatically remove after 30s
P49	Software Overcurrent	➢Water pump bearing stuck, clean pump bearings ➢UVW three phase short-circuit conection, please rewire to ensure the normal installation of UVW	Automatically remove after 30s
P50	Low Voltage Protection	The input voltage is too low, please distibute power refer to the electrical characteristics.	Voltage return to normal, remove the fault immediately
P51	High Voltage Protection	The input voltage is too high, please distribute power refer to the electrical characteristics.	Voltage retum to normal, remove the fault immediately
P48	Dry-run Protection	➢Not all of air in the pump is exhausted, cut off the power, re-power and start the pump drainage after 30 seconds ➢There is no water in the water tank waiting for water, it will restart	Automatically clear after 30 minutes or re-power to clear
P60	High Temperature Protection	The temperature of controller MCU is more than 90° C	Automatically clear after the temperature is normal
E8	Current Sampling Failure	Cut of the power and restart after 30 seconds	Restart the power
PL	Power Shortage	➢No sunlight, waiting for the sunlight to restart ➢Solar panel matching error, refer to the recommendation to match correctly	At the first 5 times, it will remove after 30 seconds, and then 30 minutes to remove

Wide voltage HV controller fault type			
Fault code	Fault description	➢ Causes and solutions of fault.	Recovery precedure
P0	Hardware overcurrent	Motor model is mismatched, please ➢ choose matching pumps. UVW three-phase short-circuit ➢ connection, please rewiring to ensure the normal installation of UVW.	Automatically remove after 30s, try 5 times
P43	Phase protection	➢ UVW three-phase open circuit,please rewire to ensure it reliable contact.	Automatically remove after 30s, try 5 times
P44	Boot failure	➢ Check whether the motor wire is connected well and whether it is stuck.	Automatically remove after 30s
P46	Stall protection	➢ Motor model is mismatched,please choose matching pumps. ➢ Pump extension cord is too long,please reduce the extension cord. ➢ Power is too low, please increase the power supply. ➢ Pump bearing is stuck, please clean pump bearings.	Automatically remove after 30s
P49	Software overcurrent	➢ Motor model is mismatched, please choose matching pumps. ➢ UVW three-phase short-circuit connection, please rewire to ensure the normal installation of UVW.	Automatically remove after 30s
PL	Low voltage protection	➢ The input voltage is too high, refer to theelectrical characteristics of the corresponding model for normal power distribution	Voltage returns to normal and clears immediately
P51	High voltage protection	➢ The input voltage is too high, please distribute power refer to the electrical characteristics.	Voltage returns to normal and clears immediately
P48	Dry-run protection	➢ The air in the water pump is not exhaust-ed, cut off the power supply, re-powering and start the pump drainage after 30s. ➢ No water in pool, wait for water source.restart.	Clear automatica lly after 30 minutes or re-power on to clear
P60	High temperature protection	➢ MCU temperature in the controllerexceeds 90°	Clear automatically when temperature is normal
E8	Current sampling failure	➢ Cut off the power, power on to restart after 30 seconds.	Re-power to clear

AC/DC controller Fault type			
Fault code	Fault description	➢ Causes and solutions of fault.	Recovery precedure
P0	Hardware overcurrent	➢ Motor model is mismatched, please choose matching pumps. ➢ UVW three-phase short-circuit connection, please rewiring to ensure the normal installation of UVW.	Automatically cleared after 30s, try 5 times
P43	Output phase loss protection	➢ UVW three-phase open circuit,please rewire to ensure it reliable contact.	Automatically cleared after 30s at the first 5 times, then try to start again after 30 minutes
P44	Boot failure	➢ Check whether the motor wire is connected well and whether it is stuck.	
P46	Stall protection	➢ Motor model is mismatched,please choose matching pumps. ➢ Pump extension cord is too long,please reduce the extension cord. ➢ Power is too low, please increase the power supply. ➢ Pump bearing is stuck, please clean pump bearings.	Automatically cleared after 30s at the first 5 times, then try to start again after 10 minutes
P51	High voltage protection	➢ The input voltage is too high, please distribute power refer to the electrical characteristics.	After voltage returns to normal, cleared the fault immediately

P48	Dry-run protection	➢ Not all of air in the pump is exhausted, cut off the power, re-power and start the pump drainage after 30 seconds. ➢ There is no water in the water tank waiting for water, it will restart.	Automatically cleared after 10s at the first 3 times, then try to start again after 10 minutes
P60	High temperature protection	➢ The temperature of controller MCU is more than 90℃.	Automatically cleared after the temperature is normal
PL	Low voltage protection/Power shortage	➢ The voltage input is too low, please refer to the electrical characteristics of the corresponding model for normal power distribution. ➢ Solar panel matching error, refer to the recommendation to match correctly.	First 5 times, clear after 30 seconds; And the next, cleared after 30 minutes
P42 (A380 only)	Input phase loss protection	➢ There is an open circuit in the RST input of the three-phase power supply,ensure that after the power is cut off,reconnect the wiring to ensure reliable contact.	Automatically cleared after fault recovery
P45/ P47 (A380 only)	Out-of-step protection/Over-speed protection	➢ Motor model is mismatched,please choose a matching pump. ➢ Pump extension cord is too long,please reduce the extension cord. ➢ Pump bearing is stuck,please clean pump bearings.	Automatically cleared after 30s at the first 5times,then try to start again after 30 minutes
P59 (A380 only)	Abnormal power supply mode selection	➢ When the controller selects the power supply mode set by P0.2,the corresponding power input cannot be detected,then the fault code will be reported,Please confirm whether the power supply mode selection matches with the controller wiring.	Automatically cleared after fault recovery