CONTENTS

Precautions for safe use ——— 01

Technical performance parameters ——— 03

Protection function description ——— 03

Installation guide ——— 04

Description of the operation board ——— 07

Trial run ——— 08

Fan Description ——— 09

Maintenance method ——— 10

Fault codes and their meanings ——— 11

2. Technical performance parameters

MODEL NO. / PARAMETER	24V	36V	48V	72V	110V	150V	220V	300V
Rated Voltage	24VDC	36VDC	48VDC	72VDC	110VDC	150VDC	220VDC	300VDC
Rated Current	12A	12A	12A	12A	10A	10A	10A	10A
Maximum Operating Current	15A	15A	15A	15A	12A	12A	12A	12A
Open Circuit Voltage Input	20V-60A	24V-60A	30V-90A	50V-150A	80V-230A	100V-430A	100V-430A	100V-60A
Max. Open Circuit Voltage	70V	70V	100V	150V	230V	430V	430V	430V
Overvoltage Protection Value	≥70V±5%	≥70V±5%	≥100V±5%	≥150V±5%	≥230V±5%	≥430V±5%	≥430V±5%	≥430V±5%
Overvoltage Restoration Value	≤60V±5%	≤60V±5%	≤95V±5%	≤140V±5%	≤210V±5%	≤410V±5%	≤410V±5%	≤410V±5%
Minimum Input Voltage	20V	24V	30V	50V	80V	100V	100V	200V
Undervoltage Protection Value	≤20V±5%	≤20V±5%	≤30V±5%	≤50V±5%	≤80V±5%	≤100V±5%	≤100V±5%	≤200V±5%
Undervoltage Restoration Value	≥21V±5%	≥22V±5%	≥33V±5%	≥55V±5%	≥90V±5%	≥110V±5%	≥110V±5%	≥210V±5%
Maximum Power	300W±5%	450W±5%	700W±5%	850W±5%	1200W±5%	1600W±5%	2200W±5%	3000W±5%

Table 1. Technical performance parameters

3. Protection function description

Conservation project	Illustrate
Peverse polarity protection	The solar pane1 "P+" and "P-" reverse connection will protect, and it will recover after positive connection.
Load overcurrent and short circuit protection	If the load overcurrent peak exceeds 20A, it will be protected by software immediately. If there is a hardware short circuit at startup, the hardware protection wil1 be carried out immediately, and it wil1 return to normal after troubleshooting.
IPM module over temperature protection	DC110V controller: When the internal temperature of the IPM module reaches 98°(±10%), it will automatically reduce the power to 800W (±10%) until the internal temperature of the IPM module drops to 65° (±10%) to recover. If the temperature of the IPM module exceeds 110° (±10%), it will stop and resume at 65°(±10%).
over temperature protection	DC150V controller: When the temperature of the power device reaches 95° (±10%), it will be over-temperature protected, and it will be restored when it is lower than 70°(±10%).
Temperature sensor error protection	DC150V controller: When the temperature sensor collects wrong data, enter the temperature sensor error protection.
Overvoltage and	0vervoltage protection: When the input voltage exceeds the

Over temperature protection	overvoltage protection value,the protection will resume after the input voltage drops to the overvoltage recovery value. Under-voltage protection: When the input voltage is lower than the under-voltage protection value,the protection will resume after the input voltage rises to the under-voltage recovery value. For specific parameters, please refer to the technical performance in Table 1.
Stall protection	After the motor is blocked, it will trigger the blocking protection, and it will recover after troubleshooting.

Table 2. Protection function description

4. Installation guide

4.1. Wiring terminal diagram

DC 24V 36V 48V 72V 110V 150V 220V 300V:
Icons and descriptions

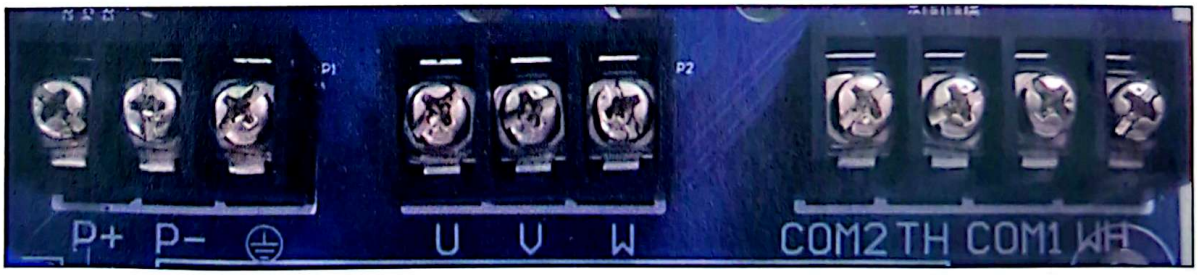

Figure 1

Terminal	Illustrate
P+	Connect to the positive terminal of the solar panel
P-	Connect to the negative terminal of the solar panel
PE ⏚	Attached to piles that go into the ground
U	Connecting the water pump cable 1
V	Connecting the water pump cable 2
W	Connecting the water pump cable 3

COM2	Connect to the common terminal of the water level sensor of the water tank
TH	Connecting the Tank High Level Sensor
COM1	Connect to the public end of the well water level sensor
WH	Connect Well Low Water Sensor
FAN+	Connect to the positive pole of the fan (only applicable to DC150V 220V 300V controller)
FAN-	Connect to the negative pole of the fan (only applicable to DC150V 220V 300V controller)

Table 3. Terminal Description

4.2. Indicator light description

Indicator name	LED status	Indicator Status Description								Recovery Time
		24V	36V	48V	72V	110V	150V	220V	300V	
SYS	always bright	System power supply is normal								
PUMP	always bright	Pump start								
MPPT	flashing	MPPT mode								
ERR_I	always bright	The digital tube displays the fault code. For specific fault details, please refer to the fault code and its meaning.								
	flashing	Low power auto recovery wait time								≥10min
WATER	always bright	Tank full/Water shortage of well								
	flashing	Waiting for pumping								≥15min
AC	always bright	Automatically switch to AC power supply								
DC	flashing	Automatically switch to DC power supply								

Table 4. Description of Indicator Lights

4.3. Description of water level sensor

Water tank level sensor: The water tank water level sensor plays a role in detecting the water level of the water tank. Pumping is stopped once the water level in the tank gets too high and there is a danger of overflowing. When installing, the "COM2" terminal and "TH" terminal are connected to the water level sensor, and the water level sensor is installed near the top of the water tank. When the water level exceeds the connected sensor, stop pumping Immediately, the display panel will display E0013, and the Tank_ F indicator light will be yellow; it will automatically restart after 15 minutes (±5 minutes) after the water level recovers, and the Tank_F indicator light will flash during the waiting period, and it will turn off after restarting.

Well water level sensor: The well water level sensor plays. a role in detecting the water level of the well, and stops pumping once the water level of the well is too low and is drained. When installing, the "COM1" terminal and "WH" terminal are connected to the water level sensor and installed above the water pump outlet. When the water level is lower than the connected sensor, stop pumping immediately, the display panel will display E0012, and the WELL_L indicator light will be yellow; the water level will be restored. After 15 minutes (±5 minutes), it will automatically restart, and the WELL_L indicator will flash during the waiting period, and then turn off after restarting. (Note: If the water level sensor is not connected, the "COM1" terminal and "WL" terminal need to be short-circuited.)

High and low water level protection at the same time: When the well water level sensor detects that there is no water in the well and the tank water level sensor detects that the water tank is full, it will trigger high and low water level protection at the same time, the pump will stop pumping water, E0014 will be displayed on the display panel, and the WELL_L and Tank_F indicators will be bright yellow; 15 minutes after the water level recovers (±5 min) to restart automatically, the WELL_L and Tank_F indicators will flash during the waiting period, and will go out after restarting.

5. Description of the operation panel

5.1. Button description

NO.	Button	Illustrate
1		Start and stop button, when the controller is powered on, it is in the start state by default.
2		Scroll up to view or set RPM +100.
3		Scroll down to view or set RPM to-100.
4		Press the setting button  to enter the setting speed interface.

Table 5. Button function

5.2. Description of digital tube display

Phenomenon	Illustrate
The SYS indicator light is green, and the digital tube displays"OFF".	In the stop state, press the"ON/OFF" button to start
Nixie tube display "P XXX"	Motor power display interface
Nixie tube display "C XX.X"	System current display interface
Nixie tube display "U XXX"	System voltage display interface
Nixie tube display "N XXXX"	Motor speed display interface
The ERR_I indicator light is red, and the digital tube displays "E XXXX"	The system is abnormal and enters the error code display interface (see the fault code and its meaning for details)
Nixie tube display "H. XXXX"	The system enters the speed setting interface

Table 6. Digital tube display instructions

6. Trial run

6.1. Key inspection items before operation

- Whether the fixing screws of the controller are tightened and whether the connectors are loose.
- Whether the line connection is correct, especially check the connection of the power supply.
- Check whether the water pump and controller are effectively grounded.
- Make sure there is no short circuit.

6.2. Trial run method

Connect the system according to the "**Typical Wiring Schematic**" in the "Installation Guide". The system status and indications are listed in the following table in sequence:

No.	Indicator light	System status
1	"SYS" light is on	Power on the system
2	"PUMP" lights up	pump start
3	"PUMP+MPPT" lights up	MPPT start

Note: 1. If there is no sensor device, various water level states can be simulated by short-circuiting the water level terminals according to "Water Level Sensor Instructions".

7. Fan Description

DC150V 220V 300V: When the temperature of the radiator is higher than 50°, the fan will be turned on automatically, and when the temperature of the radiator is lower than 40, the fan will be turned off automatically.

8. Maintenance method

8.1. Periodic inspection items

- Whether the voltage of each battery panel in the solar module system is in the corres ponding normal range;
- Whether all terminals and connectors are loose;
- Whether there is dust, iron filings and corrosive liquid inside the controller;
- Whether there is any abnormal sound or vibration during the operation of the water pump.

8.2. Precautions during maintenance

- The input power of the controller must be disconnected before maintenance;
- The disassembled metal parts cannot be placed in the controller to prevent short circuit of the circuit board;
- After maintenance or repair, keep the inside of the controller clean to prevent the intrusion of dust or liquid.

9. Fault codes and their meanings

Error code	Solution
E001: Overcurrent	1. You can try power off and restart 2. Check whether the 3-phase motor wire is short-circuited. 3. Try to replace the controller.
E002: Stalled	1. You can try power off and restart 2. Check whether there are foreign objects in the water pump part, and impurities block the water inlet 3. Check whether the motor rotation is abnormal 4. Try to replace the controller.
E003: Stall+overcurrent	1. Try power off and restart 2. Check whether there are foreign objects in the water pump part, and impurities block the water inlet 3. Check whether the motor rotation is abnormal 4. Try to replace the controller.
E004: Undervoltage Protection	1. Check whether the matching board meets the requirements 2. Waiting for recovery, refer to Table 1 for specific values

E005: Overvoltage Protection	1. Check whether the matching board meets the requirements 2. Wait for voltage to recover, refer to Table 1 for specific values
E008: Over temperature protection	1. When the temperature of the power device is lower than 70°(±10%), it will recover 2. Replace the temperature sensor
E009: Temperature sensor error protection	1. Check the temperature sensor plug 2. Replace the temperature sensor
E010: Low Power	Wait for 10min (±3min) and then restart automatically
E012: Low Water Level	Refer to 4.2
E013: High Water Level	Refer to 4.2
E014: High and low water level	Refer to 4.2