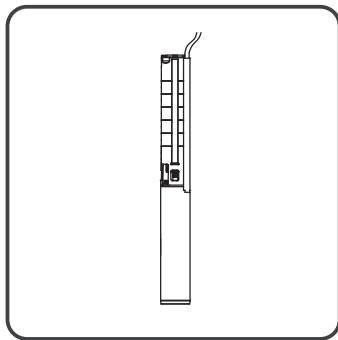
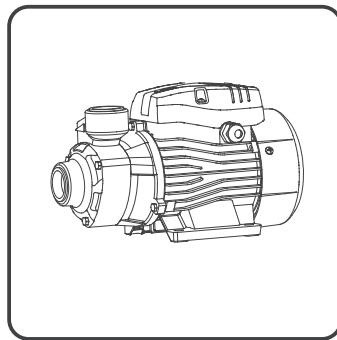




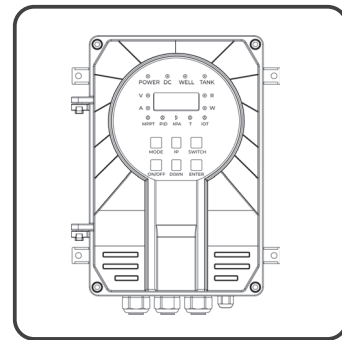
AC/DC Solar Water Pumping System Original Instruction Manual



LPY



AP/AC/XKP



DSFP



www.leosolars.com
www.leopump.com

Dear Customer,

Thank you for choosing LEO Solar Water Pump Systems!

This product integrates advanced photovoltaic technology with efficient pump drive technology, specifically designed for applications such as agricultural irrigation, domestic water supply, livestock watering, and water provision in off-grid remote areas. As a pioneer in clean energy water solutions, the LEO solar water pump system has gained widespread recognition from users around the world for its high efficiency, energy saving, intelligent stability, and easy installation.

Please carefully read this manual to ensure optimal product performance. It covers safety precautions, product overview, installation, operation, and maintenance guidelines. Our professional support team is ready to assist you.

We wish LEO solar pumps bring continuous clean water to your life, and look forward to building a greener, low-carbon future together!

Contents

1. Safety Precautions	1
1.1 Inverter Safety Precautions	1
1.2 Pump Safety Precautions	4
2. Product Information	5
2.1 Model Description	5
2.2 Use Conditions	5
2.3 Technical Data	6
2.4 Appearance and Dimension	8
3. Pump Installation	9
4. Inverter Operation Instructions	14
4.1 Wiring Instructions	14
4.2 Interface Instructions	20
4.3 Parameter Tuning Guidance	28
5. Maintenance	35
6. Fault Codes and Troubleshootings	35
7. Appendix	40
Appendix 1: Solar Panel Configuration Table	40
Appendix 2: Pump cable size recommendation table	41
Appendix 3: Head Loss (m) Per 100m Steel Pipe	42

1. Safety Precautions

To ensure your personal safety, equipment safety, and property security, read and follow this chapter carefully before using the inverter and water pump. Only professional personnel trained in electrical equipment and with sufficient electrical knowledge can install, wire, maintain, inspect, or replace components of this product. The company is not responsible for any injury accidents or property losses due to non-compliant user operations.

1.1 Inverter Safety Precautions

	Before installation
 Warning	• If you find water ingress or water marks on the machine when unpacking, it means the inverter is damp or has water inside. Don't install it! • If you find machine parts are damaged or missing when unpacking, or if the packing label doesn't match the actual product, don't install it! • When transporting the machine, lift and place it gently. Otherwise, you may damage the machine! • Don't install this product in places with strong electric fields or strong electromagnetic wave interference! • If you're in an area with an altitude over 2000 meters, you must derate the use of the inverter.
 Danger	• Don't let foreign objects into the machine. Otherwise, it may damage the machine! • Install the machine in a place with little vibration, no splashing water, and away from direct sunlight.

	When wiring
 Warning	• Don't touch the machine's internal components with your hands. Otherwise, electrostatic damage to the machine may occur. • It's strictly forbidden to connect the input power supply to the equipment output terminal. This may cause equipment damage or even a fire. • When connecting the inverter to the motor, make sure the phase sequence of the inverter and motor terminals is exactly the same to prevent the motor from rotating in reverse. • The cables used for wiring must meet the corresponding requirements. If a shielded cable is used, ground the shielding layer reliably at one end. • After wiring, check that there are no dropped foreign objects or exposed cables inside the equipment, ensure proper sealing and protection of the cables at the interfaces.

 Danger	• Don't perform wiring operations when the power is on. There's a risk of electric shock. • Before wiring, cut off the power supply of all equipment. After power off, there's residual voltage in the equipment's internal capacitors. Wait at least 5 minutes before other operations. • Ensure the equipment is well grounded. Otherwise, there's a risk of electric shock. • Follow the steps in electrostatic prevention measures (ESD) and wear an electrostatic wrist strap during wiring operations to avoid damaging the equipment or internal circuits.
--	--

When powering on	
 Danger	• Before powering on, confirm that the equipment and product are installed correctly, the wiring is secure. Also, ensure the power supply meets the equipment requirements to prevent damage to the equipment. • When powering on, the equipment may move suddenly. Stay away from it. • After powering on, do not open the protective cover of the product, as there is a risk of electric shock. • It is strictly forbidden to touch the wiring terminals of the equipment or disassemble the equipment while it is energized. Otherwise, there is a risk of electric shock.

Runtime	
 Warning	• During operation, it is necessary to prevent foreign objects from falling into the equipment. Failure to do so may result in equipment damage. • Do not use the method of switching the contactor to control the start and stop of the equipment. Otherwise, equipment damage may occur. • The voltage output by the inverter is a PWM wave, which contains high-order harmonics. The temperature rise, noise, and vibration of the motor will increase slightly, which is a normal phenomenon.
 Danger	• It is strictly prohibited to touch any terminal of the equipment during operation, otherwise there is a risk of electric shock! • It is strictly prohibited to disassemble any device or component of the equipment and products during operation, otherwise there is a risk of electric shock! • It is strictly prohibited to touch the equipment enclosure, fan, resistor, etc. to test the temperature, otherwise burns may occur! • It is strictly prohibited for non-professional technicians to detect signals during operation, otherwise personal injury or equipment damage may occur!

During maintenance



Warning

- Regularly inspect and maintain the equipment as required and keep detailed maintenance records.
- Report equipment failures in line with the product warranty agreement. Do not use the damaged machine; otherwise, it will cause more severe damage.
- When the equipment malfunctions or is damaged, professional personnel should troubleshoot and repair it according to the maintenance guide and keep good repair records.
- Replace the vulnerable parts according to the replacement guide. After replacement, recheck the equipment wiring and set the parameters.



Danger

- Installation, wiring, maintenance, inspection of the equipment, or replacement of components by non-professionals are strictly prohibited!
- Equipment maintenance during power-on is strictly prohibited. Failure to comply may result in an electric shock hazard!
- After powering off all devices, wait at least 10 minutes before performing operations such as device maintenance.

During disposal



Warning

- The inverter is a power electronic component. Incineration may generate large amounts of toxic gases and could even result in an explosion. Please dispose of it in accordance with relevant national laws and regulations.

1.2 Pump Safety Precautions

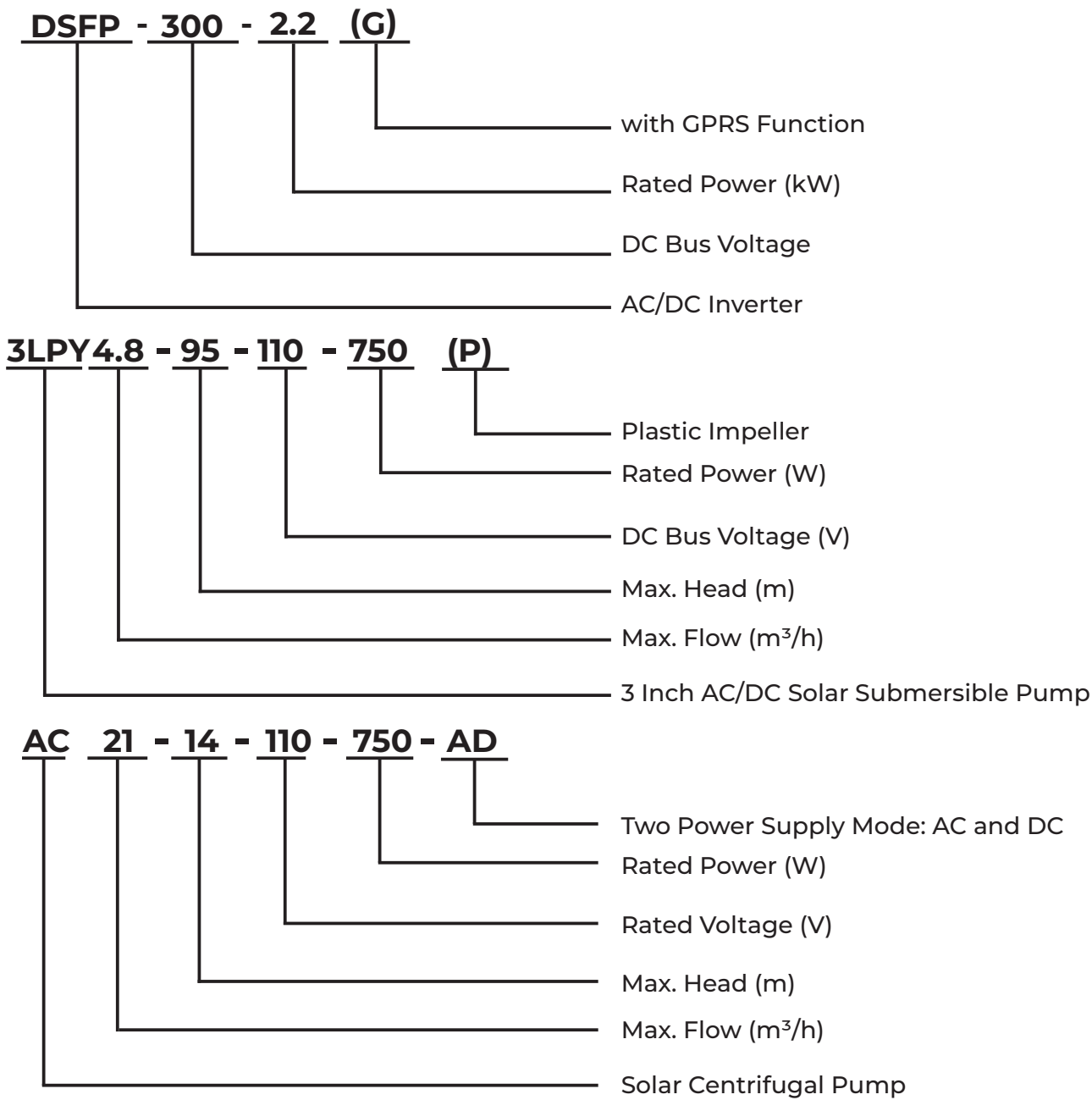
Before installation	
 Warning	• Ensure that the pump body, cables, pipes, and joints are free from damage, corrosion, or deformation. • Inspect the insulation performance of the motor and guarantee lightning protection grounding. • Confirm that the control cabinet, switches, and solar pump inverter function properly.
 Danger	• Do not use it during thunderstorms and disconnect the power supply.

Runtime	
 Warning	• Observe whether the current, voltage, and vibration are within the rated range. Stop the machine immediately in case of abnormality. • Do not touch the rotating parts or exposed cables during operation.

During maintenance	
 Warning	• Non-professionals are strictly prohibited from installing, wiring, maintaining, inspecting the equipment or replacing its parts! • It is strictly prohibited to maintain the equipment when it is powered on, otherwise there is a risk of electric shock! • After cutting off the power of all equipment, please wait at least 10 minutes before performing operations such as equipment maintenance. • Do not perform maintenance without wearing protective equipment such as insulating gloves and waterproof shoes.

2. Product Information

2.1 Model Description



2.2 Use Conditions

The electric pump should be able to work normally and continuously under the following conditions of use:

1. Submersible pump medium temperature: 1°C–35°C; XKP medium temperature range: 0°C~35°C, AC & AP medium temperature range: 0°C~60°C;
2. PH value: 6.5~8.5
3. Solid content: ≤0.01% (particle size ≤0.2mm)

2.3 Technical Data

ITEMS		DSFP/L- 110-0.75(G)	DSFP/L- 110-0.9(G)	DSFP/L- 150-1.1(G)	DSFP/L- 150-1.2(G)	DSFP/L- 200-1.5(G)
Input Parameters						
DC Input Voltage		80-430V DC				
MPPT Voltage Range		120-365V DC	120-365V DC	160-365V DC	160-365V DC	210-365V DC
AC Input Voltage		110~280V / 45~65Hz /1 Phase				
DC Input Voltage At Hybrid Mode		DC>AC*1.5				
Max. Current		15 A				
Peak current		17 A				
Output Parameters						
Max. Output Power	DC Mode	0.8 kW	1.2 kW	1.2 kW	1.2 kW	1.6 kW
	AC Mode	0.8 kW	1.2 kW	1.2 kW	1.2 kW	1.6 kW
	Hybrid Mode	0.8 kW	1.2 kW	1.2 kW	1.2 kW	1.6 kW
Rated Output Voltage		3~Phase, 90V~220V				
Max. Current		15 A				
Rated Current		10 A				
Speed Range		0-3600 rpm				
Other Parameters						
Enclosures Class		IP55				
Standby Power		< 5W				
Installation Method		Wall Mounted				
Package Info. (L*W*H)		365x275x180 mm				
Package Info. (GW)		3.7 kg				

ITEMS		DSFP- 110-0.75(G)	DSFP- 150-1.1(G)	DSFP- 150-1.3(G)	DSFP- 200-1.3(G)	DSFP- 200-1.5(G)	DSFP- 300-2.2(G)
Input Parameters							
DC Input Voltage		80-430V DC					
MPPT Voltage Range		120-365V DC	160-365V DC	160-365V DC	210-365V DC	210-365V DC	310-365V DC
AC Input Voltage		110~280V / 45-65Hz / 1 Phase					
DC Input Voltage At Hybrid Mode		DC>AC*1.5					
Max. Current		15 A					
Peak current		17 A					
Output Parameters							
Max. Output Power	DC Mode	1.1 kW	1.7 kW	1.7 kW	2.0 kW	2.0 kW	2.8 kW
	AC Mode	1.1 kW	1.7 kW	1.7 kW	2.0 kW	2.0 kW	2.8 kW
	Hybrid Mode	1.1 kW	1.7 kW	1.7 kW	2.0 kW	2.0 kW	2.8 kW
Rated Output Voltage		3-Phase, 90V~220V					
Max. Current		15 A					
Rated Current		10 A					
Speed Range		0~4000 rpm					
Other Parameters							
Enclosures Class		IP55					
Standby Power		< 5W					
Installation Method		Wall Mounted					
Package Info. (L*W*H)		365x275x180 mm					
Package Info. (GW)		3.7 kg					

ITEMS		DSFP-500-3	DSFP-500-4
Input Parameters			
DC Input Voltage		220-780V DC	
MPPT Voltage Range		450-625V DC	
AC Input Voltage		323~528V/45~65Hz /3 Phase	
Max. Current		15 A	
Peak current		17 A	
Output Parameters			
Max. Output Power	DC Mode	3 kW	4 kW
	AC Mode	3 kW	4 kW
	Hybrid Mode	3 kW	4 kW
Rated Output Voltage		3~Phase, 90-380V	
Max. Current		17 A	
Rated Current		12 A	
Speed Range		0~4000 rpm	
Other Parameters			
Enclosures Class		IP55	
Standby Power		< 5W	
Installation Method		Wall Mounted	
Package Info. (L*W*H)		365x275x180 mm	
Package Info. (GW)		4.0 kg	

Inverter Model	AC Power Switches to DC Power (switches above this voltage)	DC Power Switching to AC Power (switches above this power)	Waiting Time to Switch to DC Power
DSFP-110-0.75(G)	80 V	200 W	15 min
DSFP-150-1.1(G)	80 V	250 W	15 min
DSFP-150-1.3(G)	80 V	250 W	15 min
DSFP-200-1.3(G)	100 V	300 W	15 min
DSFP-200-1.5 (G)	100 V	300 W	15 min
DSFP-300-2.2(G)	120 V	400 W	15 min
DSFP-500-3(G)	250 V	500 W	15 min
DSFP-500-4(G)	350 V	750 W	15 min
DSFP/L-110-0.75(G)	80 V	200 W	15 min
DSFP/L-110-9(G)	80 V	250 W	15 min
DSFP/L-150-1.1(G)	80 V	250 W	15 min
DSFP/L-150-1.2(G)	80 V	250 W	15 min
DSFP/L-200-1.5(G)	100 V	300 W	15 min

Note:

Before powering on, be sure to use an instrument to detect the open circuit voltage of the solar panel, or calculate the open circuit voltage of the solar panel by connecting in series. The open circuit voltage of the solar panel must not exceed the maximum input voltage of the controller, otherwise it will cause irreversible damage.

2.4 Appearance and Dimension

2.4.1 Inverter Dimension

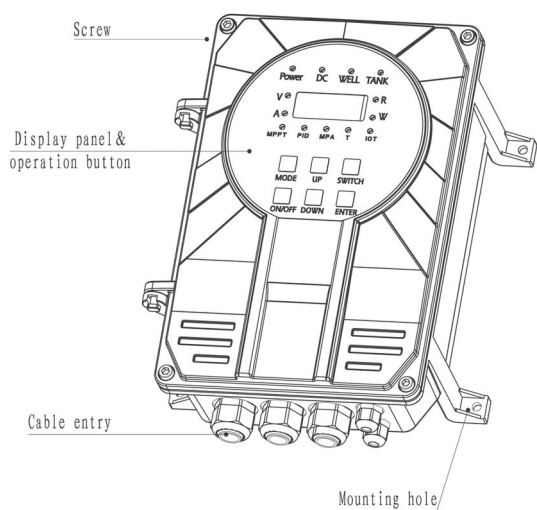


Figure 1

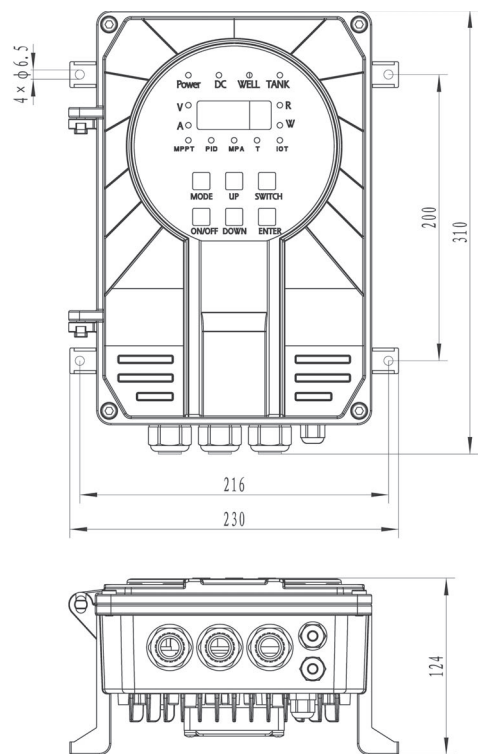


Figure 2

DSFP($\leq 2.2\text{kW}$) DSFP/L($\leq 2.2\text{kW}$)

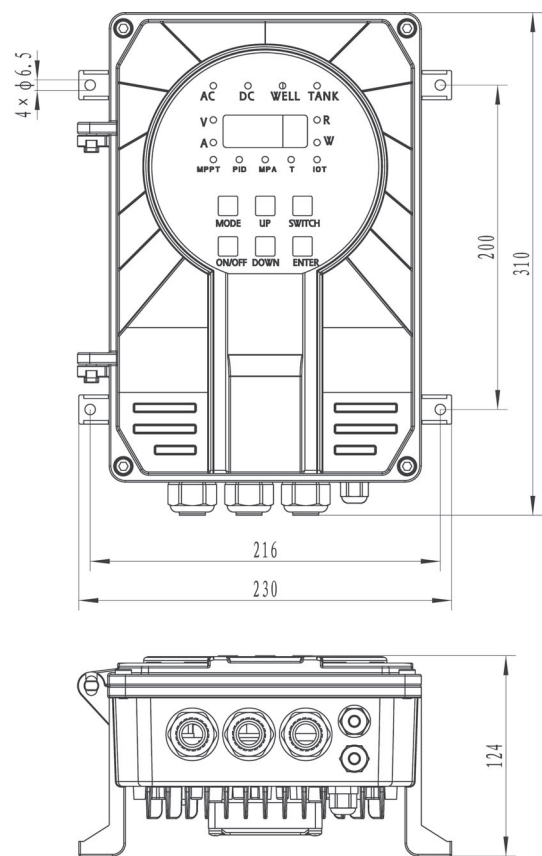
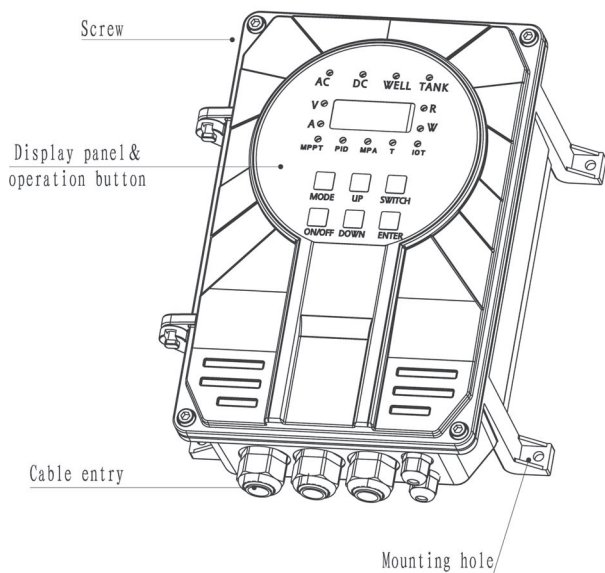


Figure 2

DSFP(3~4kW)

2.4.2 Installation of Inverter in Control Cabinet

NOTE:

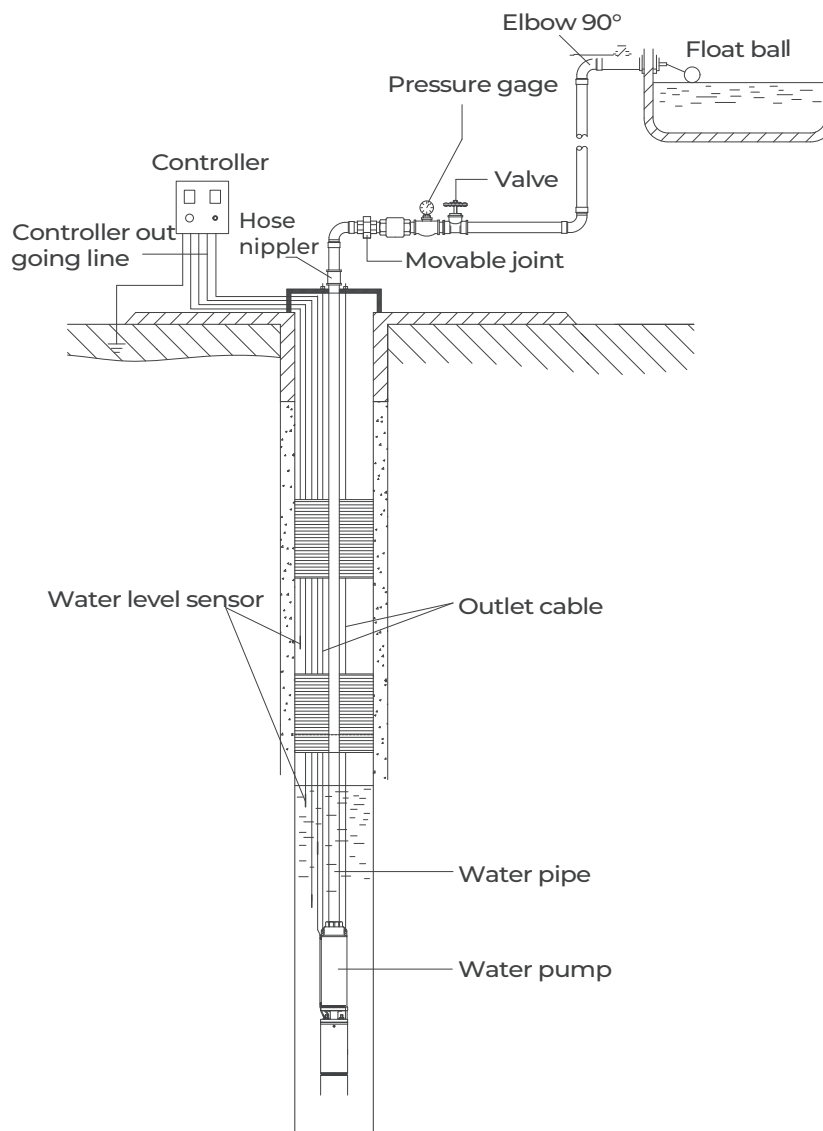
Cabinet Selection: Choose a control cabinet with good sealing performance, preferably rated IP54 or higher. Ensure the internal temperature remains within the inverter's operating range (-10°C to $+40^{\circ}\text{C}$). If necessary, install a cooling fan to maintain proper airflow.

Cable Routing and Grounding: Route power cables (high-voltage) and control cables (low-voltage) separately to minimize interference. Properly ground the inverter's grounding terminal. Use shielded cables for inverter connections, grounding the shield at one end—preferably near the inverter. It is recommended to install a disconnecter, circuit breaker, or fuse at the incoming power line.

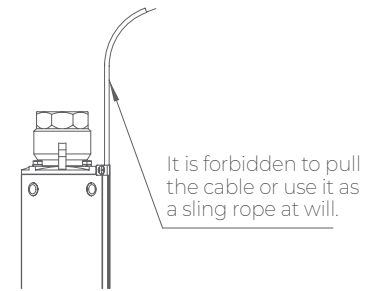
Installation and Clearance: Mount the inverter vertically and securely within the cabinet. Allow sufficient space for heat dissipation and maintenance — at least 150 mm above and 100 mm below the inverter.

3. Pump Installation

3.1 Submersible Pump Installation

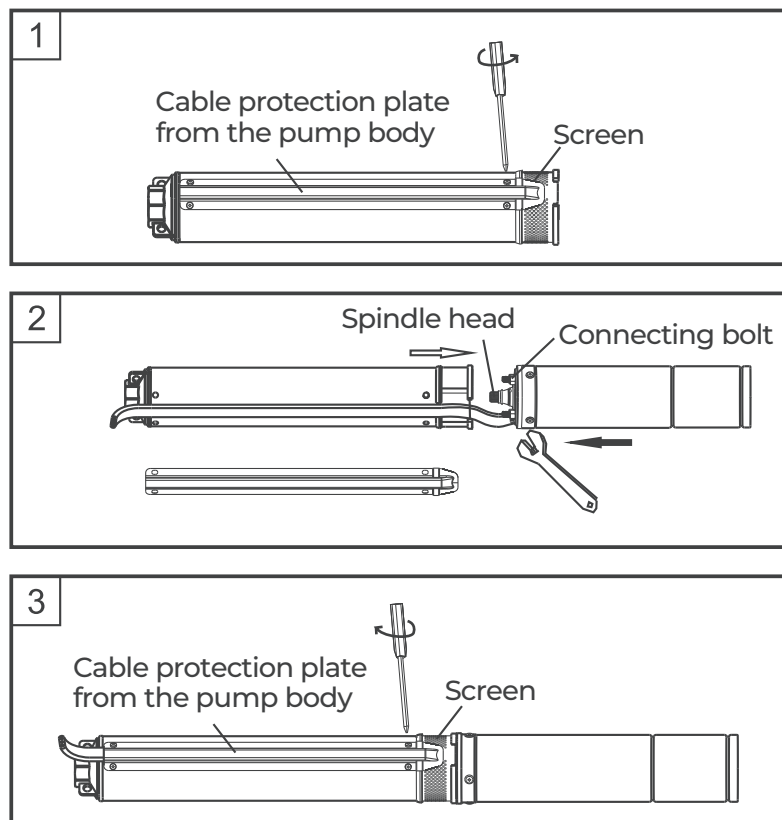


(1) It is strictly prohibited to hit and crush the cable, not to mention as a lifting rope, the electric pump in the process of operation, it is strictly prohibited pulling the cable, so as to avoid electric shock accidents due to damage to the cable. In the installation, the cable will be tied to the delivery pipe or take other appropriate measures to protect, so as to avoid stretching and deformation due to the excessive weight of the cable.



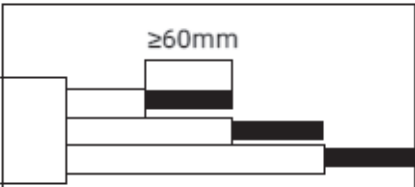
(2) When the electric pump is submerged in the water, its depth should not exceed 70m, and it should be more than 1~3m above the bottom of the water, and it should not be plunged into the mud, so as to prevent the water plants and debris from clogging the net or jamming the impeller, so that the electric pump can't work normally, and the pump should pay attention to checking the water level frequently in the process of work, and it must ensure that the electric pump has enough submerged depth.

(3) When the water pump reaches a certain length, the motor and the pump body need to be packed separately. In case of a separate packing, first remove the filter screen and cable protection plate from the pump body, then place the pump body on the motor to make the spindle head of the rotor smoothly slide into the coupling, manually rotate the coupling to check if it can run normally, then screw up the connecting bolt(-Figure 2), and finally install the filter screen and cable protection plate(-Figure 3).



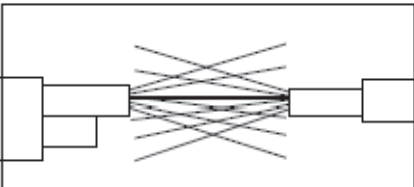
(4) Before use, thoroughly test the insulation resistance of the electronic pump's stator winding (including outgoing cable) to the pump casing with a 500V megohmmeter, and the cold insulation resistance should be not less than 100 MΩ.

(5) The wiring method of the water pump extension line is as follows:

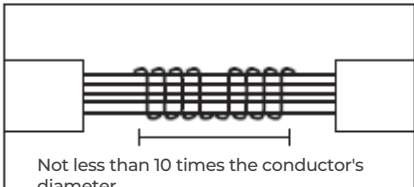


≥60mm

1. Remove the insulation layer without damaging the conductor.
2. Stagger the lengths of multiple wires
3. Ensure that there is no oil, water or other dirt on the joints.



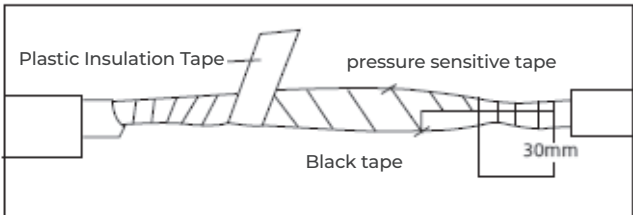
1. Divide the connector into several strands and tighten them (no less than 6 strands) evenly.
2. Cross two joints, with the crossing length aligned with the insulation layer at both ends.



Not less than 10 times the conductor's diameter

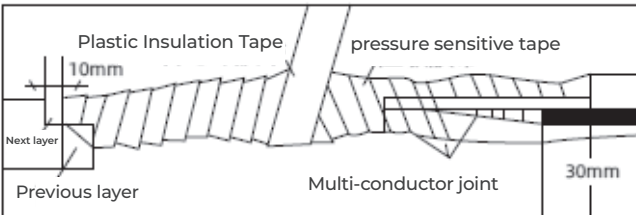
1. Twist all wire strands together. Select one strand to wrap around the others (including the core), then wrap the remaining strands one by one in sequence.
2. Repeat the same process on the opposite end.
3. Use pliers to tighten the joint and tin the joint for better effect

Note: For other wiring methods, please refer to Figures 1 & 2



Plastic Insulation Tape pressure sensitive tape Black tape 30mm

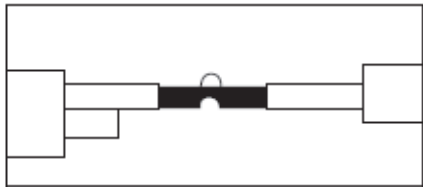
1. First, wrap the joint part tightly with black tape in two layers, and make sure that the copper wire head is not exposed (Figure 3)
2. Then wrap it with three layers of pressure-sensitive tape (self-adhesive tape), with the last layer extending about 10mm beyond the two ends of the previous layer. When wrapping, make sure to stretch the tape to twice its original length before wrapping it.
3. Finally, wrap it with one layer of plastic insulating tape (yellow and transparent).



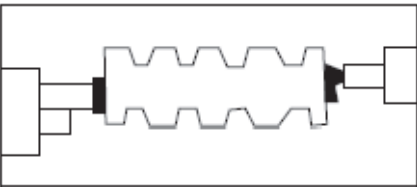
Plastic Insulation Tape pressure sensitive tape 10mm 30mm

Next layer Previous layer Multi-conductor joint

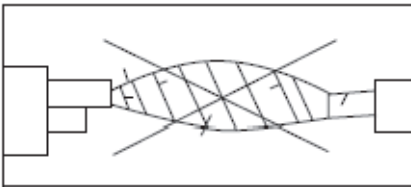
1. First organize the core wire joints, with pressure-sensitive tape wrapped 4 layers, the two ends should be wrapped around the cable sheath part of 30mm, after exceeding the first two ends.
The end to be wrapped around the cable sheath part of 30mm, after the two ends beyond the front 10mm or so.
2. Then use plastic insulation tape to wrap 3 layers, both ends over the first layer of 10mm or so.



Arc welding joint method



Casing cold press joint method



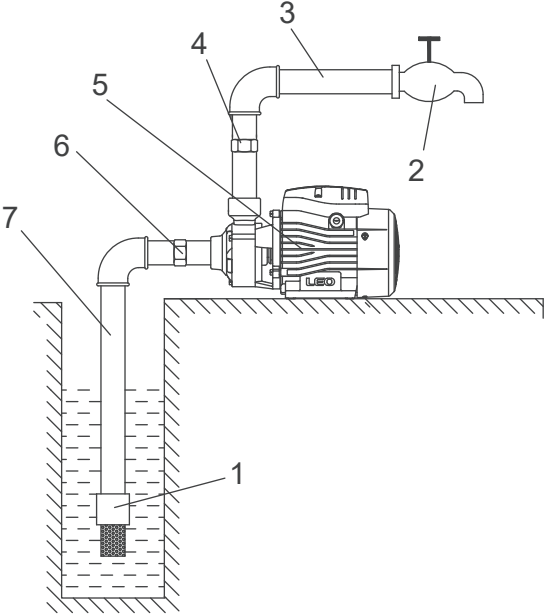
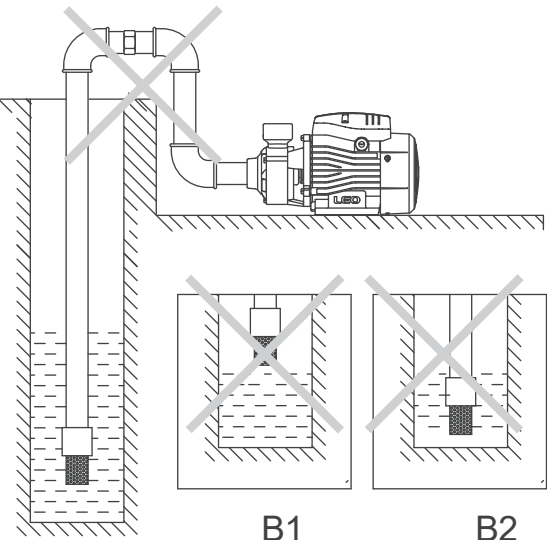
When wrapping the first layer of black tape, do not allow the copper wire to leak out or penetrate the tape

Finger 1

Finger 2

Finger 3

3.2 Centrifugal & Peripheral Pump Installation

 Correct Installation Diagram A	A: <table> <tr> <td>1. Foot valve</td><td>5. Electric pump</td></tr> <tr> <td>2. Water tap</td><td>6. Tie-in</td></tr> <tr> <td>3. Outlet pipe</td><td>7. Inlet pipe</td></tr> <tr> <td>4. Filling plug</td><td></td></tr> </table>	1. Foot valve	5. Electric pump	2. Water tap	6. Tie-in	3. Outlet pipe	7. Inlet pipe	4. Filling plug	
1. Foot valve	5. Electric pump								
2. Water tap	6. Tie-in								
3. Outlet pipe	7. Inlet pipe								
4. Filling plug									
Incorrect Installation Diagram B  B1 B2	B: Installation precautions for inlet pipelines (1). While installing the electric pump, do not use too soft rubber tube for the inlet pipeline, avoiding to be sucked flat. (2). The foot valve should be vertically placed and installed 30cm from water bottom to avoid sucking in sands and stones (B2); (3). Joints of the inlet pipelines should be sealed with the least elbows, no water can be sucked. (4). Diameter of the inlet pipe should be at least in accordance with that of the water inlet, so as to avoid too much water loss which will influence outlet performance. (5). Pay attention to drop of water level while using, the foot valve should not be above the water surface (B1). (6). In case the inlet pipe is longer than 10m or its lifting height exceeds 4m, the pipe diameter should exceed diameter of water inlet of the pump. (7). Ensure the pumped will not be affected by pipeline pressures while installing the pipelines. (8). Filter should be installed in inlet pipelines so as to avoid solid particles to enter into the electric pump. C: Installation Precautions of the outlet pipeline Pipe diameter of the outlet pipeline should be at least in accordance with that of the water outlet, so as to reduce its voltage drop, high flow rate and noise to the minimum.								

3.3 Swimming Pool Pump Installation

(1) You should make sure that the pump and terminals connections are protected from the monistruue and possible floods.

(2) The pumps are usually installed between the skimmer and the pool filter. they must be positioned as close as possible to the water level to minimize the suction distance and reduce head losses.

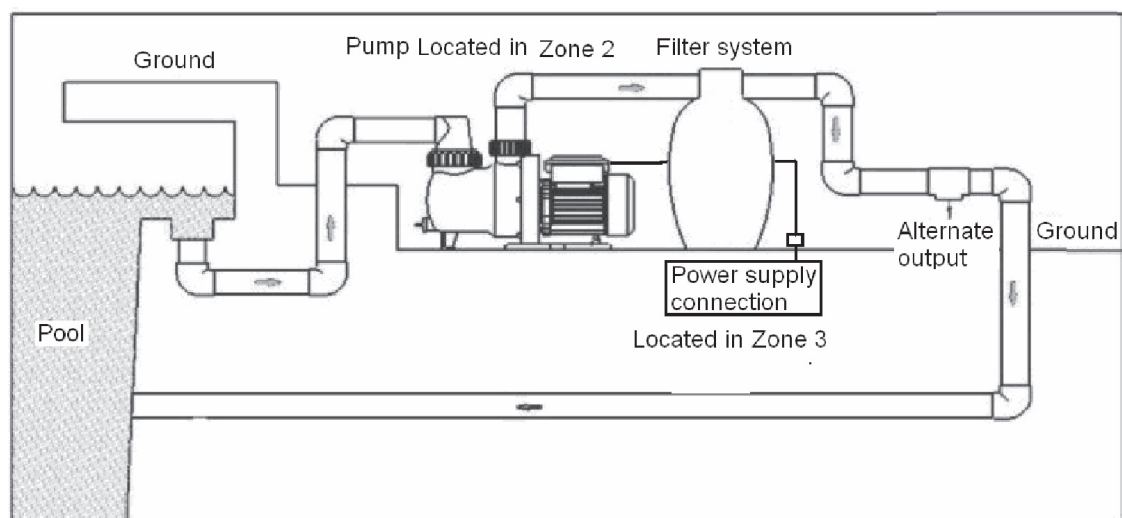
(3) It is recommended not to install the pump more than 3 meters above the water level. Independently of the height of the pump above the water and the capacity of the chosen model, priming can take several minutes, The pump must be mounted on a firm base, and can be bolted to the ground through the attaching holes in the base with the bolte. The pump must be installed with the shaft in the horizontal position and the pre-filter cover on the top. Make sure that the transparent cover is accessible so that it can be removed with the filtering basket for cleaning. Pumps must be installed in a dry, well ventilated place, and sheltered from rain.

(4) If plastic pipes are used, they must be sealed using TEFFLON tape. The diameter of the delivery and suction pipes must be greater than or equal to that of the pump inlet and outlet ports. Try to limit head losses by minimizing the length of the suction pipe and avoiding having bends and twisty pipe routings as possible. Unions must be new and perfectly clean to guarantee absolute tightness.

(5) The delivery and suction pipes must not under any circumstances induce mechanical loads on the pump. It is recommended to install suction and delivery valves in order to isolate the pump.

(6) The user shall inspect and make sure about the effectiveness of protective earthing of the building installation. In such case, an authorized qualified person shall inspect the building installation.

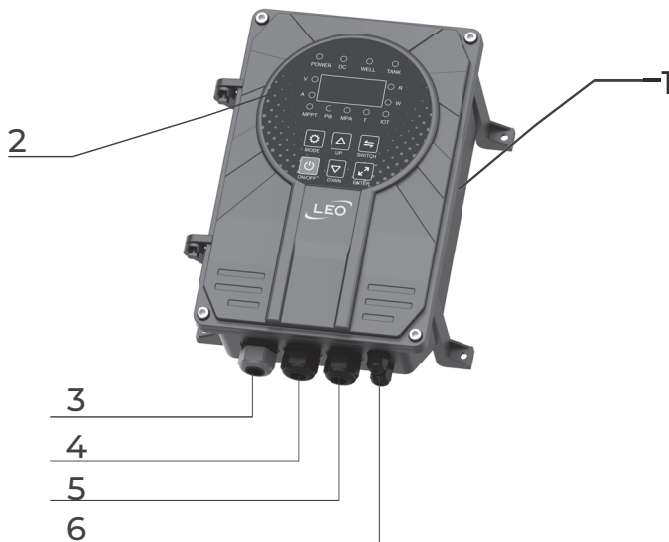
(7) It is obligatory for the pump electrical power supply to have residual current device (RCD) having a rated residual operating current not exceeding 30 m A.



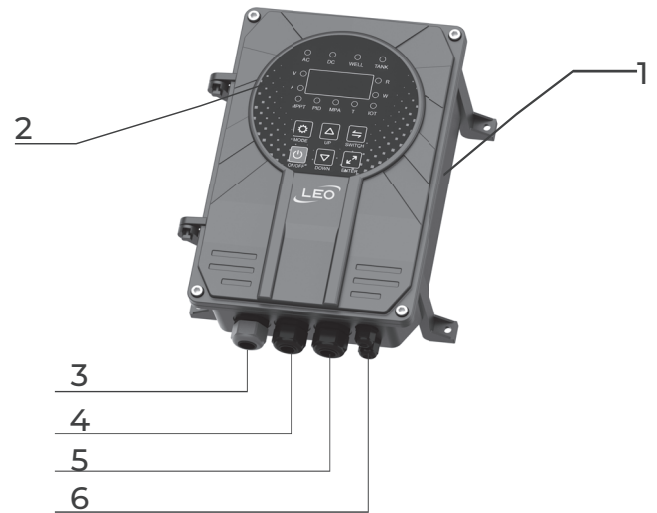
4. Inverter Operation Instructions

4.1 Wiring Instructions

4.1.1 External Wiring Instructions



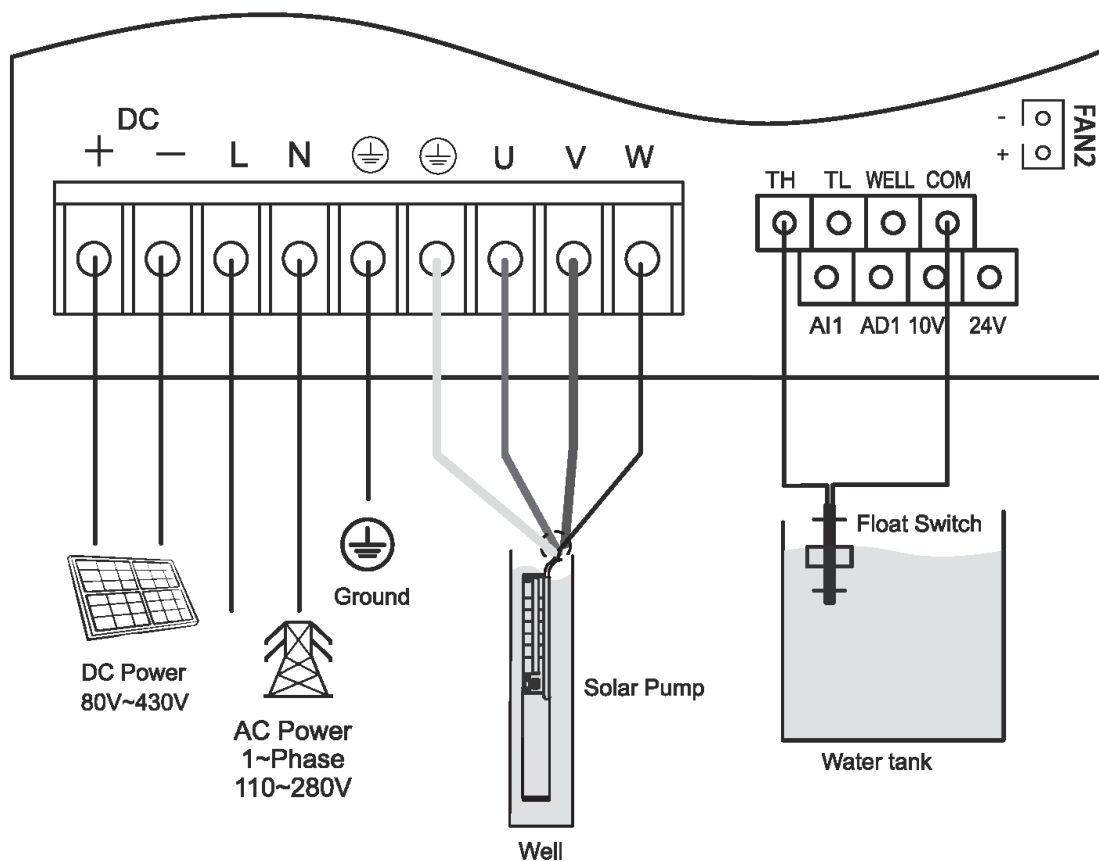
DSFP($\leq 2.2\text{kW}$) DSFP/L($\leq 2.2\text{kW}$)



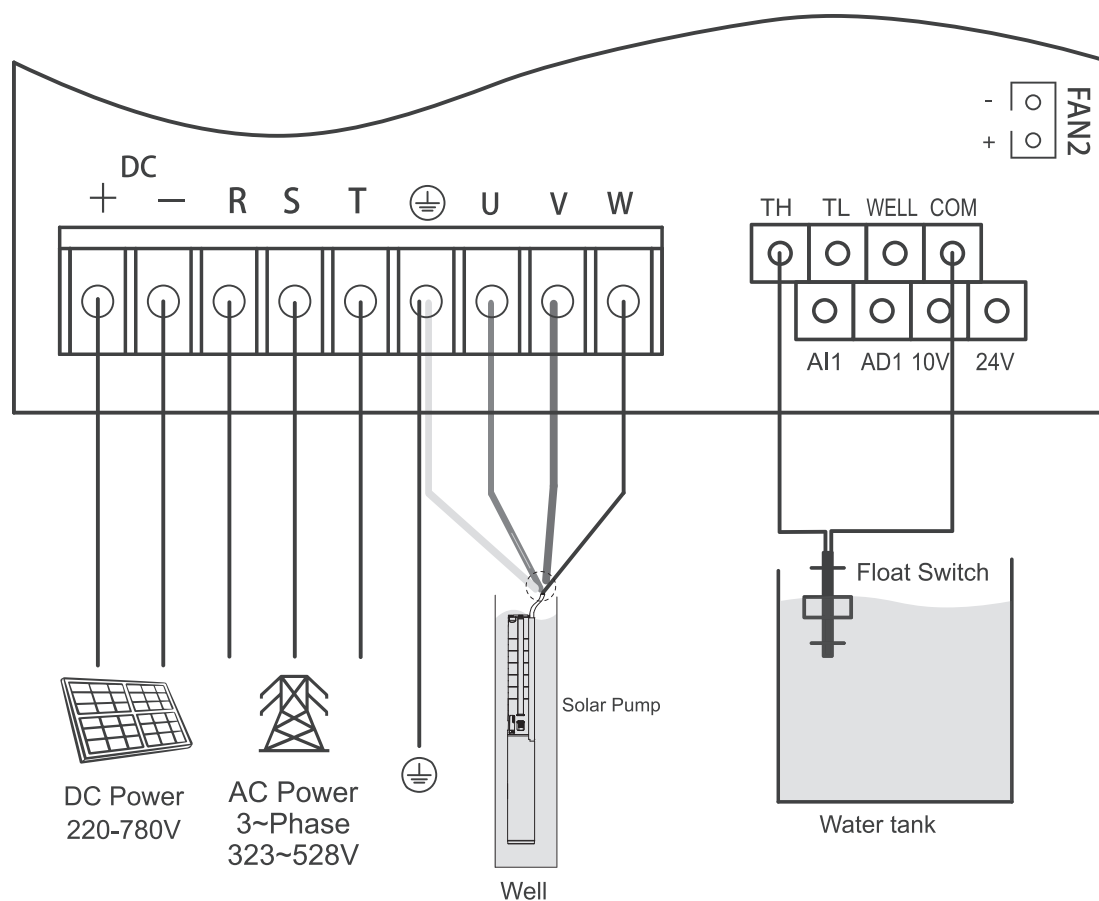
DSFP(3~4kW)

1. Nameplate and caution.
2. Operation panel
3. DC solar input cable entrance
4. AC input cable entrance
5. Pump electric cable entrance
6. Water level sensor cable entrance

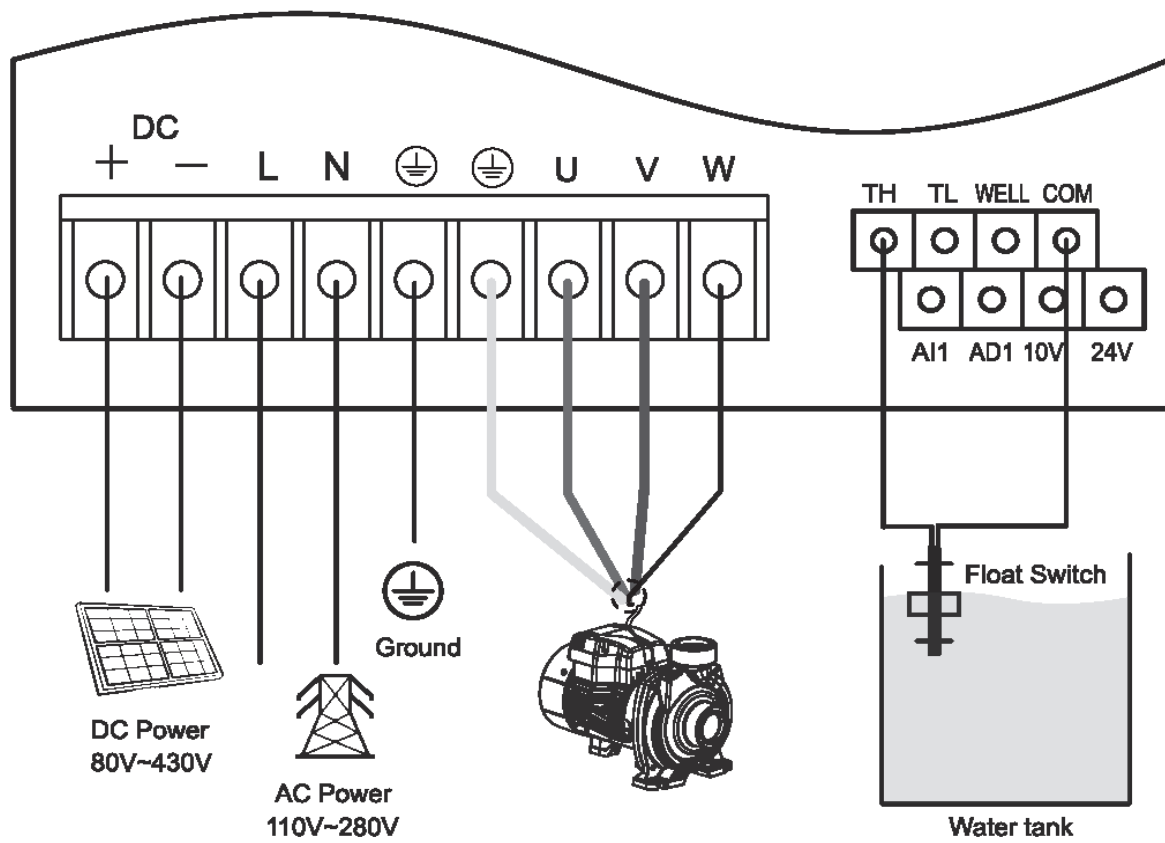
4.1.2 Internal Wiring Instructions



DSFP(≤2.2kW)



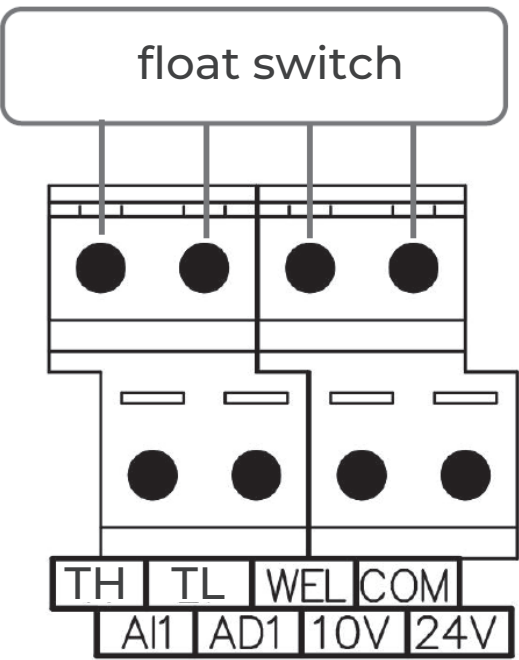
DSFP(3~4kW)



DSFP/L($\leq 2.2\text{kW}$)

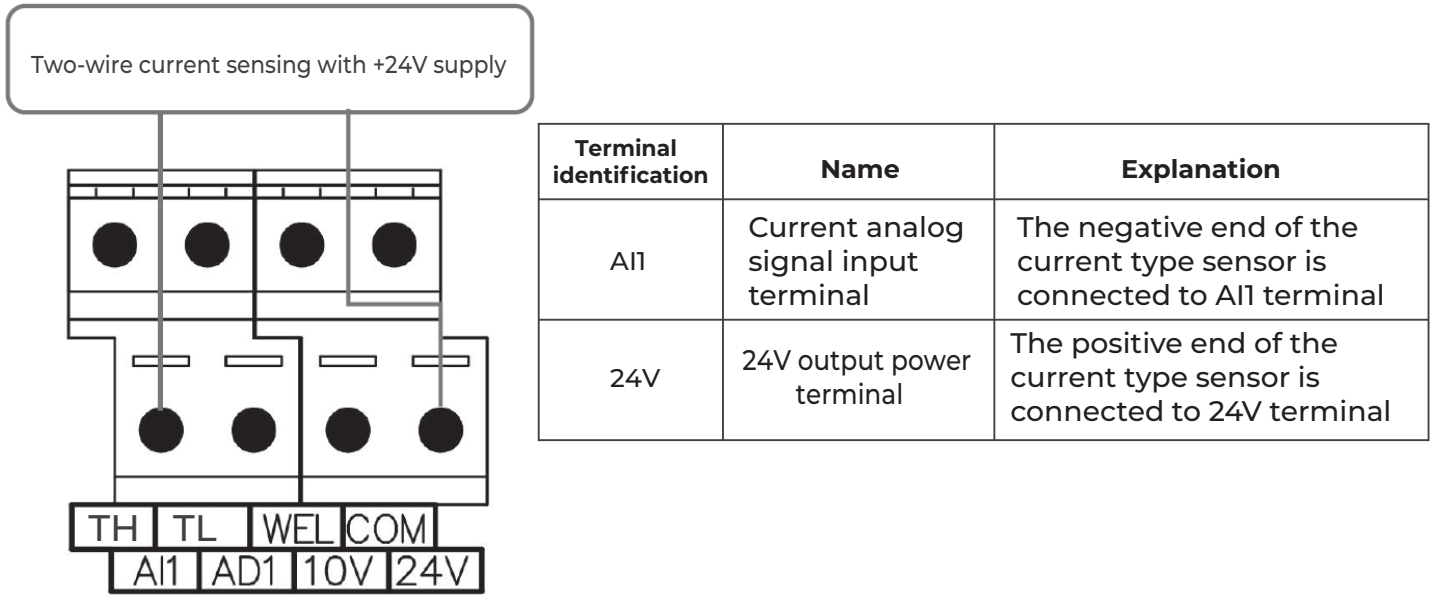
Type	Terminal	Name	Explanation
Input	DC+, DC-	DC bus terminals	Positive and negative terminals of the DC solar power input cable
	L, N	AC input terminal	AC220V power connection terminal Single-phase AC power input terminal
	R, S, T	AC input terminal	AC380V power connection terminal Three-phase AC power input terminal
Output	U, V, W	Inverter output terminal	Connect to three phase motor
Grounding		Grounding terminal	Connect the grounding wire.
Digital input	TL-COM	High-water float terminal(tank)	1. Input impedance: 2.4KΩ 2. Level input voltage range: 0V~10V
	TH-COM	Low-water float terminal(tank)	
	WEL-COM	Water shortage float terminal(well)	
Power supply	+10V-COM	10V power supply	Provide + 10V power supply to the outside, maximum output current: 10mA. Generally used as an external potentiometer working power supply, potentiometer resistance range: 1KΩ~5KΩ
	+24V-COM	24V power supply	Provide + 24V power supply to the outside, generally used as a working power supply for digital input and output terminals. And external sensor power supply,maximum output current: 200mA
Analog input	AI1	Current type pressure sensor signal input	Connect 4-20mA pressure sensor signal input
	AD1	Voltage type pressure sensor signal input	Connect 10V, 5V pressure sensor signal input

Float switch control wiring diagram

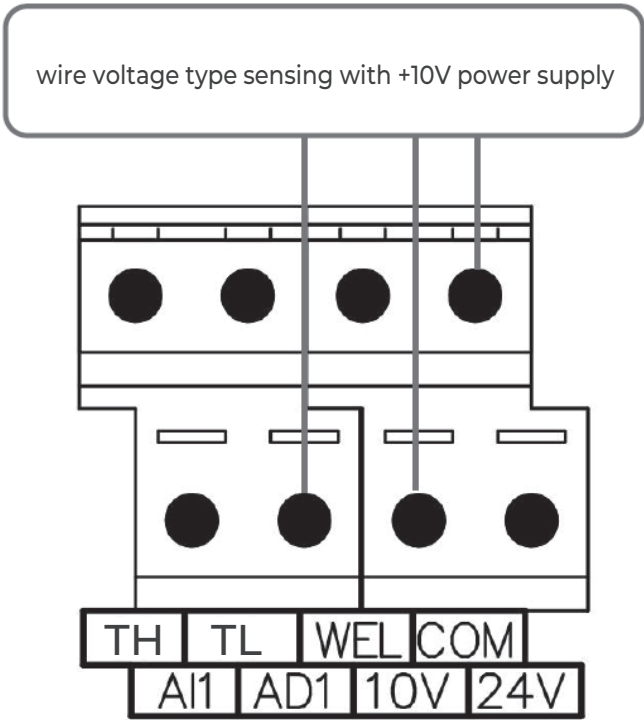


Terminal	Name	Explanation
TH	High-water float(tank)	TH is connected to one end of the float switch, and COM is connected to the other end of the float switch. When the float switch is closed, the motor stops and the system enters a high water level protection state. When the float switch is off, the high-water level status is eliminated.
TL	Low-water float(tank)	TL is connected to one end of the float switch, and COM is connected to the other end of the float switch. When the float switch is closed, the system will jump to low-water level status and immediately start the motor. When the float switch is off, the low-water level status is eliminated.
WEL	Water shortage float (well)	WEL is connected to one end of the float switch, and COM is connected to the other end of the float switch. When the switch is closed, the motor stops and the system enters the well water shortage protection status. When the switch is off, the water shortage state of the well is eliminated.

4~20mA current-type pressure sensor constant pressure control wiring diagram

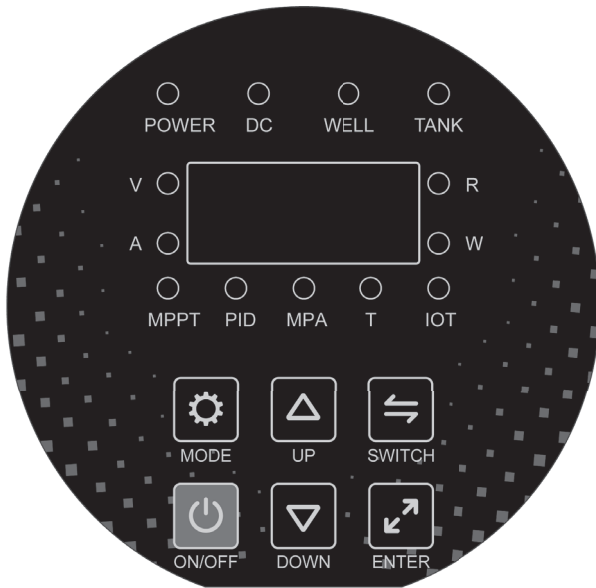


10V supply voltage-type pressure sensor constant pressure control wiring diagram

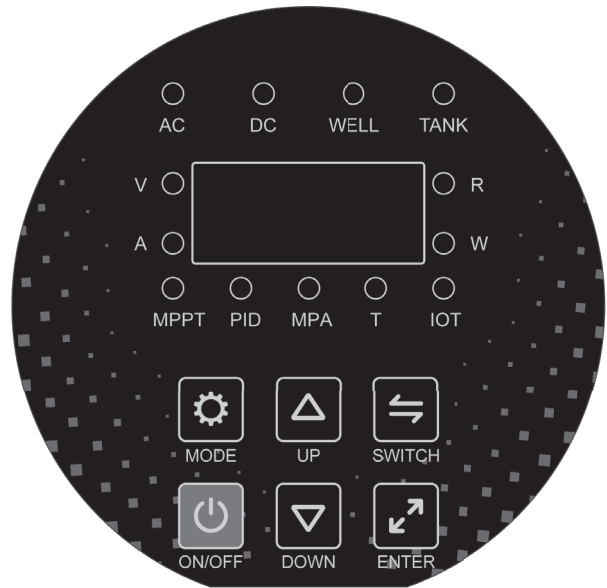


Terminal	Name	Explanation
AD1	Current analog signal input terminal	The voltage sensor output signal line is connected to the AD1 port
10V	10V output power terminal	The positive end of the voltage sensor is connected to the 10V terminal
COM	Weak signal GND port	Voltage type sensor GND terminal is connected to COM terminal

4.2 Interface Instructions



DSFP(≤2.2kW) DSFP/L(≤2.2kW)



DSFP(3~4kW)

The DSFP & DSFP/L series controllers support operations like modifying functional parameters, monitoring working status, and controlling startup and shutdown via the LED operation panel.

Markings	Key Name	Functional Description
 MODE	MODE	Press the button for 2 seconds to enter the menu (PX.X) settings. After the settings are completed, press the button for 2 seconds to exit the menu.
 ENTER	ENTER	In the menu settings, press the button to confirm and save the menu settings and return to the previous screen.
 UP	UP	Press the button to increase the value of the corresponding parameter.
 DOWN	DOWN	Press the button to decrease the value of the corresponding parameter.
 SWITCH	SWITH	Press the button to switch the display content. The content will be switched in the following order: Input voltage -> Input current -> Input power -> Motor speed
 ON/OFF	ON/OFF	Press the button to control the start and stop of the device. Press the button to reset the fault in the fault state.

Markings	Indicator Light Name	On	Flashing	Off
	Power	When power is connected	/	Power off
	AC	When AC power is connected	In AC working state	AC power supply is not connected
	DC	When DC power is connected	In DC working state	DC power supply is not connected
	Well	Well water shortage protection	/	Well status is normal
	Tank	Water tower full water protection	/	Tank status is normal
	Voltage	Display voltage value	/	/
	Rotation Speed	Display rotation speed value	/	/
	Current	Display current value	/	/
	Power	Display power value	/	/
	Maximum Power Point Tracking (MPPT)	Enter MPPT mode	/	MPPT function is not enabled
	PID	Constant pressure mode	/	/
	MPA	Intelligent pressure start and stop mode	/	/
	T	Timing mode	/	/
	Internet of Things(IOT)	IOT signal full	Flash quickly when the signal is full, and flash slowly when the signal is less than 3 bars	No signal

This series of inverters provides four control modes: **speed control mode, constant pressure control mode, pressure start and stop mode, and timing mode**. The control mode can be switched directly by pressing the [MODE + SWITCH] button at the same time;

The basic panel operations are as follows:

(1) Use the ON/OFF button to control the inverter to run and stop;

(2) Press the [MODE + UP] at the same time to switch to AC mode, DC mode, Auto mode, Hybrid mode(only DSFP($\leq 2.2\text{kW}$) & DSFP/L($\leq 2.2\text{kW}$) types have Hybrid mode); Press the [MODE + UP] at the same time to switch to AC mode, DC mode, Auto mode, Hybrid mode(only DSFP($\leq 2.2\text{kW}$) & DSFP/L($\leq 2.2\text{kW}$) types have Hybrid mode);

(3) Fault reset: When a fault occurs, press the ON/OFF button to reset the fault;

(4) When the inverter is running, the digital tube displays the operating status value of the current mode by default.

In the speed control mode, the current operating speed is displayed by default;

In the constant pressure control mode & pressure start and stop mode, the current pressure is displayed by default;

In the timing mode, the current timing time is displayed by default.;

Press the SWITCH key to switch to other operating status values (if it does not switch to a new status value for 10 seconds, it will automatically return to the default status value). The digital tube display values include the input voltage (unit: V), input current (unit: A), input power (unit: W), output speed (unit: r/min), outlet pressure (displayed in constant pressure and pressure start-stop mode, unit: Bar), timed operation/timed stop time (displayed in timing mode only, unit: hour)

4.2.1 Speed Control Mode

When the device starts

Key start: When the pump is in shutdown state, short press the ON/OFF key button to start the motor.

Fault self-recovery start: When the current inverter is in fault state, if the fault recovery time is reached, the inverter will clear the fault and restart the motor.

When the device stops

Key stop: When the inverter is running, short press the ON/OFF button to generate a shutdown command, and the motor will decelerate to stop.

Fault shutdown: When the current inverter is in operation, if the inverter detects a fault, the inverter will immediately shut down the device.

Speed setting

Target speed setting: When the inverter is in speed control mode, short press the UP & DOWN keys to quickly adjust the target speed.

Display parameter switching

Short press the SWITCH key to switch the display parameters, which will switch in the following order: input voltage -> input current -> input power -> running speed

4.2.2 Constant Pressure Control Mode (Valid only in AC Power Mode)

When the device starts

Constant pressure start: short press the ON/OFF key to put the water pump in standby state. When the pressure is detected to be lower than the starting pressure, the water pump starts automatically.

Fault self-recovery start: when the current inverter is in a fault state, if the fault recovery time is reached, the water pump is put in standby state. When the pressure is detected to be lower than the starting pressure

When the device stops

Button shutdown: when the inverter is running, short press the ON/OFF key to generate a shutdown command, and the motor will decelerate to stop.

Constant pressure shutdown: when the inverter is in constant pressure control mode and is currently in operation, if the return pressure reaches the shutdown pressure or the outlet valve is closed, the water pump will automatically stop.

Fault shutdown: when the current inverter is in operation, if the inverter detects a fault, the inverter will immediately shut down the device.

Constant pressure setting

Target pressure setting: when the inverter is in constant pressure control mode, short press UP & DOWN keys to quickly adjust the target pressure. (Unit: Bar)

Display parameter switching

Short press the SWITCH key to switch the display content, which will switch in the following order: current pressure (unit: Bar) -> input voltage -> input current -> input power -> operating speed

Constant Pressure Control Functional Codes			
Code	Description	Factory Value	Explanation
P2.0	Operating mode setting	0	0: Speed control mode; 1: Constant pressure control mode; 2: Cyclic timing mode ; 3: Pressure start/stop mode;
P2.1	Sensor model setting	4	0: 4–20mA/10Bar; 1: 0–10V/10Bar; 3: 4–20mA/16Bar; 4: 0–10V/16Bar; 6: 4–20mA/25Bar; 7: 0–10V/25Bar;
P2.9	Target pressure setting	3	Unit: Bar
P4.0	Sensor input lower limit	0	Current-type: mA; Voltage-type: V (Refer to sensor nameplate)
P4.1	Sensor input upper limit	10.00	Current-type: mA; Voltage-type: V (Refer to sensor nameplate)
P4.2	Pressure calibration coefficient (%)	100	Unit: %

Note: P2.0 and P2.1 are required settings. P2.0 must be set to 1; P2.1 must be set to the actual sensor model used;

Example:

Step 1: When the inverter is powered off, correctly connect the pressure sensor wires, check and then power on the inverter;

Step 2: Enter the function code parameter setting, first press the confirmation key to enter P0.0, set the parameter value to 12, obtain the modification permission, then set P2.0 to constant pressure control mode, and then check whether the parameters in the P2.1, P4.0, and P4.1 function codes are consistent with the pressure sensor nameplate information. If not, set according to the nameplate information;

Step 3: After the setting is completed, return to the monitoring interface, the digital tube displays the current pressure value, and compare the pressure displayed by the current digital tube with the pressure reading on the pressure gauge to see if they are consistent. If not, you can fine-tune P4.2 Parameters in the function code;

Step 4: Short press the UP & DOWN keys to set the target pressure value that needs constant pressure;

Step 5: Press the ON/OFF key to start the operation, wait for the pressure displayed on the digital tube to rise to the target pressure, and compare it with the pressure reading on the pressure gauge to see if it is consistent. If not, you can fine-tune the parameters in the P4.2 function code;

Step 6: After the setting is completed, in the running state, you can press the switch key to view other running status quantities;

Constant Pressure Sleep Function

In constant pressure control mode, after reaching the target pressure, it supports hibernation without water consumption, thus achieving energy saving when idle.

Constant Pressure Control Functional Codes			
P4.3	Constant pressure sleep enable	1	0: Disabled; 1: Enabled
P4.4	Sleep speed	2000	Unit: r/min
P4.5	Sleep detection cycle time	60	Unit: seconds
P4.6	Sleep deviation pressure (%)	2.0	Unit: %
P4.7	Wake-up deviation pressure (%)	10.0	Unit: %
P5.0	Low-speed holding time in sleep	30	Unit: seconds
P5.1	Pressure judgment in sleep (%)	5	Unit: %

Brief Description of Constant Pressure Sleep Process:

(1) Sleep shutdown

When the constant pressure sleep function (P4.3) is turned on, after detecting that the current operating speed is less than the set sleep speed (P4.4), wait for the sleep detection time (P4.5) n seconds to judge the sleep pressure. If the deviation between the current pressure and the set pressure is less than the sleep deviation percentage (P4.6), the system will enter the sleep process and the pump speed will drop to 1000 rpm; this state will be maintained at a low speed for n seconds (P5.0). If the current pressure value change percentage is less than the sleep judgment percentage (P5.1), the inverter will be completely sleep-stopped;

(2) Sleep start

In the sleep state, if the user starts to use water, the current pressure value drops by more than the wake-up deviation pressure percentage (P4.7), the inverter will exit the sleep shutdown state and restart;

Overpressure Protection Threshold Setting

Overpressure protection threshold Functional Codes			
Code	Description	Factory Value	Explanation
P4.8	Overpressure protection threshold	3.0	Unit: Bar

Brief Description of Overpressure Protection Process:

If the user does not install a pressure tank or the pressure tank capacity is small, the output pressure will overshoot when the valve is quickly closed at the water end;

When it is detected that the current pressure value exceeds the target pressure and the difference is greater than the overpressure protection threshold (P4.8), the inverter will immediately protect and shut down;

4.2.3 Pressure Start and Stop Mode (Valid only in AC Power Mode)

When the device starts

Loading pressure start: short press the ON/OFF key to put the pump in standby mode. When the current pressure is lower than the set loading pressure, the pump starts automatically.

Fault self-recovery start: when the current inverter is in fault state, if the fault recovery time is reached, the pump is put in standby state. When the current pressure is lower than the set loading pressure, the pump starts automatically.

When the device stops

Button shutdown: when the inverter is running, short press the ON/OFF key to generate a shutdown command, and the motor will decelerate to stop.

Unloading shutdown: when the inverter is in pressure switch mode, the pump automatically stops when the current pressure is greater than the set unloading pressure.

Fault shutdown: when the current inverter is in operation, if the inverter detects a fault, the inverter will immediately shut down the device.

Unloading pressure setting: when the inverter is in pressure switch mode, short press the UP & DOWN buttons to quickly adjust the unloading pressure. (Unit: Bar)

Display parameter switching

Short press the SWITCH key to switch the display content, which will switch in the following order: current pressure (unit: Bar) -> input voltage -> input current -> input power -> running speed

4.2.4 Timing Mode (Valid only in AC Power Mode)

The timing function mode of this machine is cyclic start and stop, which can realize automatic start and stop of the electric pump, with hours as the timing unit;

When the device starts

Timed start: short press the ON/OFF key to put the water pump in standby state. If the timed cycle downtime has ended and the running time of the current timing cycle is less than the set timed running time, the water pump will start automatically.

Fault self-recovery start: when the current inverter is in a fault state, if the fault recovery time is reached, the water pump will be in standby state. If the running time of the current timing cycle is less than the set timing running time, the water pump will start automatically.

When the device stops

Button shutdown: when the inverter is running, short press the ON/OFF key to generate a shutdown command, and the motor will decelerate to stop.

Timed shutdown: when the inverter is in the timing control mode and is currently in operation, if the running time of the current timing cycle is greater than the set timing running time, the water pump will automatically stop. And during the downtime of the timing cycle, the water pump will remain in the shutdown state.

Fault shutdown: when the current inverter is in operation, if the inverter detects a fault, the inverter will immediately shut down the device.

Timing Functional Code			
Code	Description	Factory Value	Explanation
P3.1	Timing cycle – run time	8	Unit: hours
P3.2	Timing cycle – stop time	0	Unit: hours

Example :

If P3.1 is set to 8 hours and P3.2 is set to 4 hours, the inverter will stop after running for 8 hours, and then run again for 8 hours after stopping for 4 hours, and repeat this process;

Display Parameter Switching

Short press the SWITCH key to switch the display content, which will switch in the following order: Remaining time of timing (unit: hour) -> Input voltage -> Input current -> Input power -> Operating speed

When the timing cycle running time is displayed, the power indicator light is always on; when the timing cycle stop time is displayed, the power indicator light flashes.

4.3 Parameter Tuning Guidance

4.3.1 Summary Table of Functional Codes

Codes	Description	Explanation
C0.0	Display the rotational speed	Unit: V
C0.1	Display the output current	Unit: A
C0.2	Display input AC voltage	Unit: V
C0.3	Display input DC voltage	Unit: V
C0.4	Display bus DC voltage	Unit: V
C0.5	Display input power	Unit: kW
C0.6	Display output pressure	Unit: V
C0.7	Displays estimated input current	Unit: A
C0.8	Display IPM temperature	Unit: °C
C0.9	Accumulated solar running time	Unit: h
C1.0	Accumulated mains power running time	Unit: h
C1.1	Accumulated solar power generation	Unit: KWH
C1.2	Accumulated solar power generation	Unit: MWH
C1.3	Accumulated fault query	You can use the "UP" and "DOWN" keys to query the last five fault codes. "NULL" means no fault has occurred. In this interface, long press "SWITCH" to clear the fault record.

Code	Description	Factory Value	Explanation
P0.0	User modification permission	0	12: Obtain modification permission; 21: Reset to factory default settings
P0.1	Software dry-run protection enable	1	0: Disabled; 1: Enabled
P0.2	Power supply mode	0	0: Auto detection; 2: Solar power; 3: AC power; 4: Hybrid mode
P0.3	Voltage protection hysteresis	AC220: 5 / AC380: 15	2-40V
P0.4	DC undervoltage protection value (Not supported for AC380)	80	Unit: V
P0.5	Dry-run power point 1	Model dependent	High-speed: 2400 rpm; Standard: 2000 rpm. Unit: W
P0.6	Dry-run power point 2	Model dependent	High-speed: 3600 rpm; Standard: 3000 rpm. Unit: W
P0.7	Dry-run power point 3	Model dependent	High-speed: 4800 rpm; Standard: 4000 rpm. Unit: W
P0.8	Dry-run power point 4	Model dependent	High-speed: 6000 rpm; Standard: 5000 rpm. Unit: W
P0.9	Synchronous motor set running speed	"Standard: 4000 rpm High-speed: 6000 rpm "	Unit: rpm
P1.0	Motor state after power-on	2	0: Default motor stop; 1: Default motor start; 2: Resume last command state
P1.1	Set maximum power	Model dependent	Unit: kW
P1.2	Motor rotation direction setting	0	0: Default; 1: Opposite to default
P1.3	DC switching voltage threshold	Model dependent	Unit: V
P1.4	DC-AC switching power threshold	Model dependent	AC220: W; AC380: kW
P1.5	AC to DC switching interval	15	Unit: minutes
P1.8	Max power in AC mode	Model dependent	AC220: W; AC380: kW
P1.9	Dry pumping (load shedding) protection fault recovery time	0.25	Unit: hours
P2.0	Operating mode setting	0	"0: Speed control mode; 1: Constant pressure control mode; 2: Cyclic timing mode;" 3: Pressure start/stop mode;

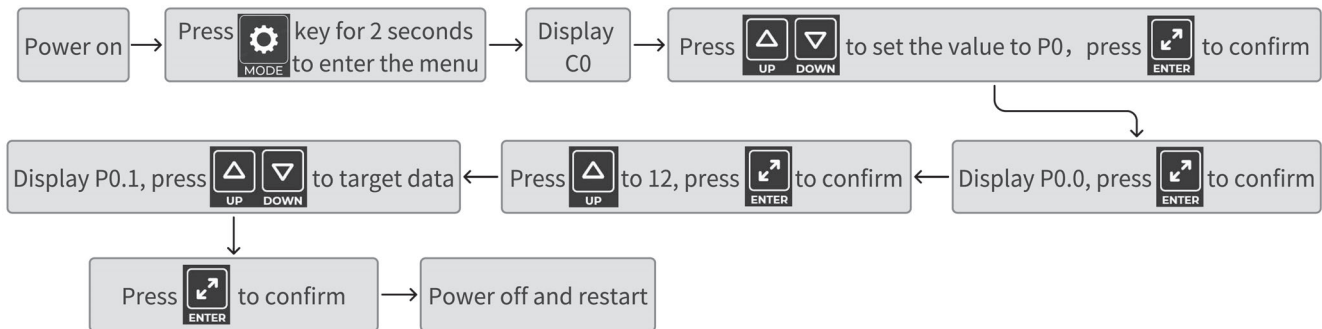
P2.1	Sensor model setting	4	"0: 4–20mA/10Bar; 1: 0–10V/10Bar; 3: 4–20mA/16Bar; 4: 0–10V/16Bar; 6: 4–20mA/25Bar; 7: 0–10V/25Bar;"
P2.9	Target pressure setting	3	Unit: Bar
P3.1	Timing cycle – run time	8	Unit: hours
P3.2	Timing cycle – stop time	0	Unit: hours
P3.3	Overcurrent fault auto-recovery times	0	Unit: times; Range: 0–5
P3.5	TH protection fault recovery time	0.25	Unit: hours
P3.6	Drive module temperature protection setting	80	Unit: °C
P3.7	Drive module temp protection enable	1	0: Disabled; 1: Enabled
P4.0	Sensor input lower limit	0	Current-type: mA; Voltage-type: V (Refer to sensor nameplate)
P4.1	Sensor input lower limit	10.00	Current-type: mA; Voltage-type: V (Refer to sensor nameplate)
P4.2	Pressure calibration coefficient (%)	100	Unit: %
P4.3	Constant pressure sleep enable	1	0: Disabled; 1: Enabled
P4.4	Sleep speed	Standard: 2000 rpm High-speed: 3000 rpm	Unit: r/min
P4.5	Sleep detection cycle time	60	Unit: seconds
P4.6	Sleep deviation pressure (%)	2.0	Unit: %
P4.7	Wake-up deviation pressure (%)	10.0	Unit: %
P4.8	Overpressure protection threshold	3.0	Unit: Bar
P4.9	Sensor disconnection protection enable	1	0: Disabled; 1: Enabled
P5.0	Low-speed holding time in sleep	30	Unit: seconds
P5.1	Pressure judgment in sleep (%)	5.0	Unit: %

P5.2	Acceleration time in constant pressure mode	5	Unit: seconds
P5.3	Deceleration time in constant pressure mode	20	Unit: seconds
P5.4	Constant pressure loop KP proportional gain	0.6	
P5.5	Constant pressure loop KP proportional gain	0.6	
P5.6	TH logic level	0	0: Default logic; 1: Inverted logic
P5.7	TH logic level	0	0: Default logic; 1: Inverted logic
P5.8	WEL logic level	0	0: Default logic; 1: Inverted logic
P5.9	Backflow protection enable	1	0: Disabled; 1: Enabled
P6.0	Minimum operating speed	1000	Unit: rpm
P6.1	Low light sleep speed	600	Unit: rpm [only for DSFP(≤ 2.2 kW) & DSFP/L(≤ 2.2 kW)]
P7.0	Motor type setting	0	0: Synchronous motor; 1: Asynchronous motor
P7.1	Synchronous motor model selection	Default	-
P7.2	Inverter carrier frequency	6.0	Unit: KHz
P7.3	Asynchronous motor rated power	Model dependent	Unit: kW
P7.4	Asynchronous motor rated voltage	220.0	Unit: V
P7.5	Asynchronous motor rated current	12.0	Unit: A
P7.6	Asynchronous motor rated frequency	50.0	Unit: Hz
P7.7	Asynchronous motor running frequency	50.0	Unit: Hz
P7.8	Synchronous motor max adjustable speed	Model dependent	Unit: rpm
P7.9	IOT communication selection	1	0: TTL4G (Domestic mini app); 1: 4854G (Overseas app)
P8.0	Max frequency for asynchronous motor	50	Unit: Hz
P8.1	Primary to secondary turns ratio	1.3	Ratio coefficient
P8.2	Asynchronous motor stall detection time	5	Unit: seconds

NOTE:

After all the following steps are completed, you need to **power off and restart** the inverter to complete the final adjustment of the parameters!

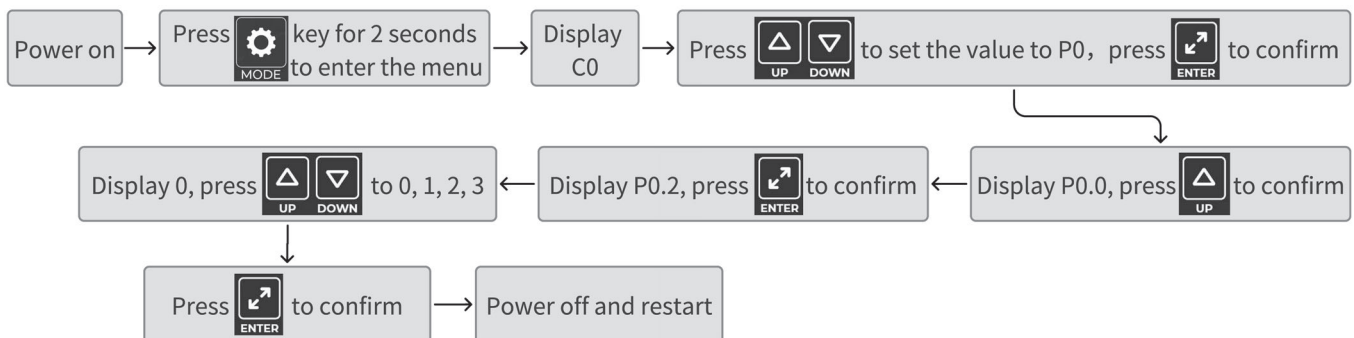
4.3.2 Unlock Parameter Modification Lock



Tips:

1. Before modifying the parameters, you have to unlock the settings menu. You can modify continuously while power on.
2. Parameter modification is prohibited during operation.
3. If P0.0=21, factory settings can be restored.

4.3.3 Power Supply Mode Selection



0 = Auto-identification (default)

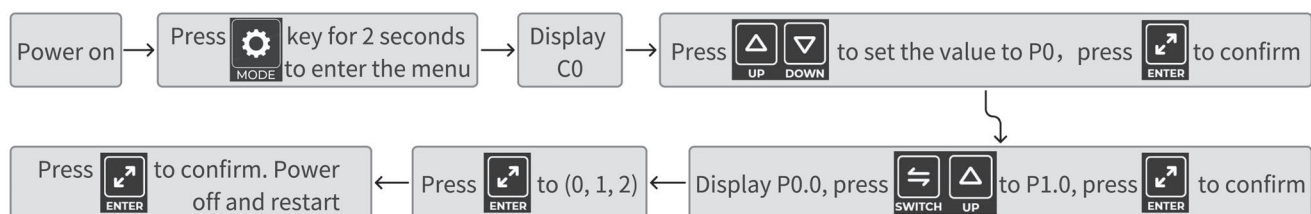
1 = AC Input

2 = DC Input

3 = Hybrid

Shortcut keys: MODE+UP

4.3.4 Selection of Running Mode after Power On



P1.0=0 Inverter not running(default)

P1.0=1 Inverter running(default)

P1.0=2 Follows the last command state

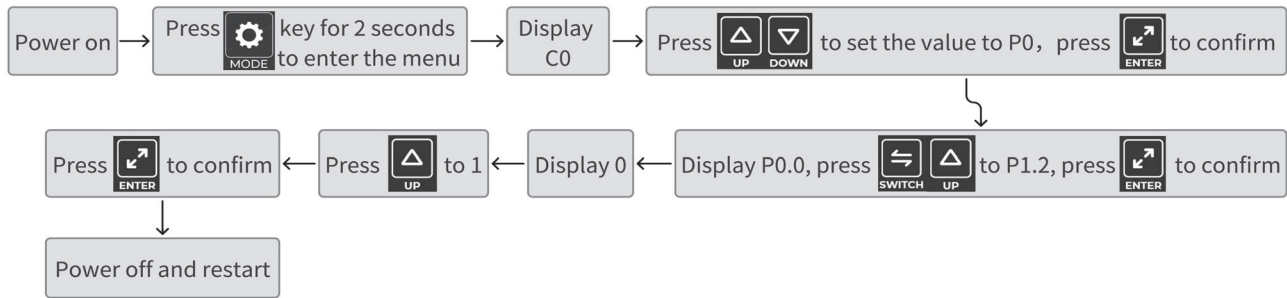
Tips:

0—Suitable for manual control scenario

1—Suitable for automatic start scenario

2—Applicable to scenarios with the same demand over a period of time

4.3.5 Quick Adjustment of Pump Rotation Direction



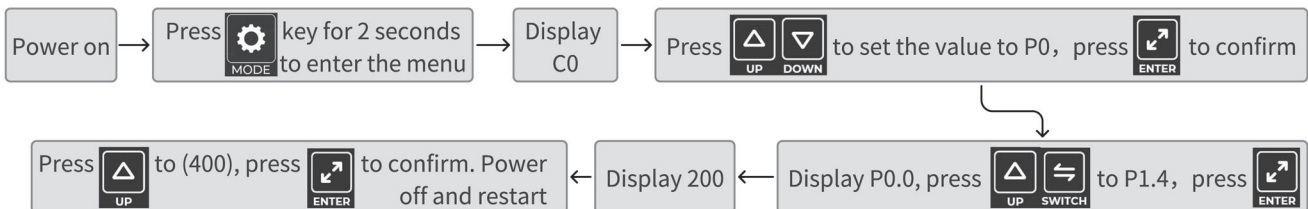
Tips:

- 1.Adjust pump rotation direction due to incorrect wiring (no need to rewire; adjust via parameters)
- 2.Used for temporary impeller cleaning

4.3.6 DC-to-AC Switching Settings

Example (1.1KW Pump-----DSFP-150-1.1G):

The default min. output power is 200W. According to actual demand, 400W is required to produce water. If it is lower than 400W, it will be invalid and needs to be switched to AC power supply mode. At this time, the min. output power value needs to be adjusted to 400.



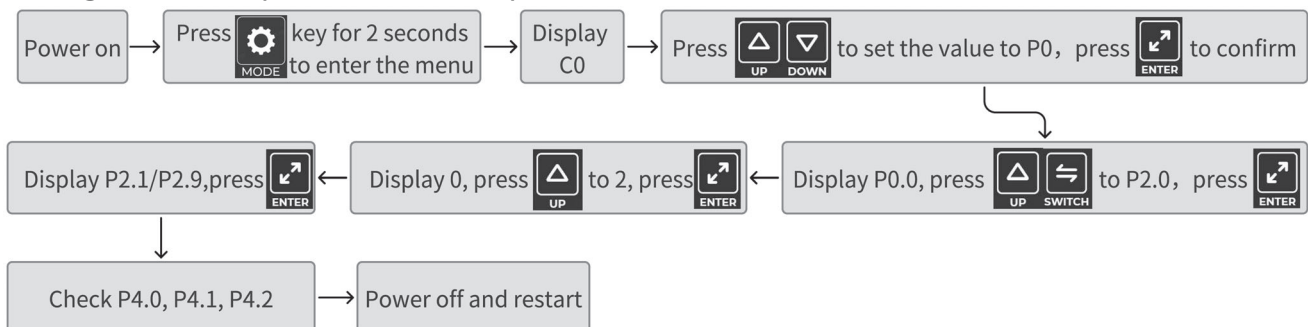
Tips:

- 1.Only applies to Auto mode.
- 2.Monitor minimum water output power during use.
- 3.When DC input voltage exceeds setting data of P1.3, via P1.5 delay setting to complete the switching of AC-DC.

4.3.7 Operation Mode Setting

Example:

Change to P2.0=2 pressure start-stop mode



- P2.0=0 PV Mode (MPPT indicator on)
- P2.0=1 Constant Pressure Mode (PID indicator on)
- P2.0=2 Pressure Start/Stop Mode (MPA indicator on)
- P2.0=3 Timer Mode (T indicator on)

Tips:

- 1.Modes 1,2,3 require stable DC/AC power.
- 2.For modes 1,2, select the correct pressure sensor type (P2.1) and set target pressure (P2.9).
- 3.Use MODE + SWITCH keys to switch modes (Common P64 fault occurs if modes are mismatched).

4.3.8 Constant Pressure Water Supply Setting

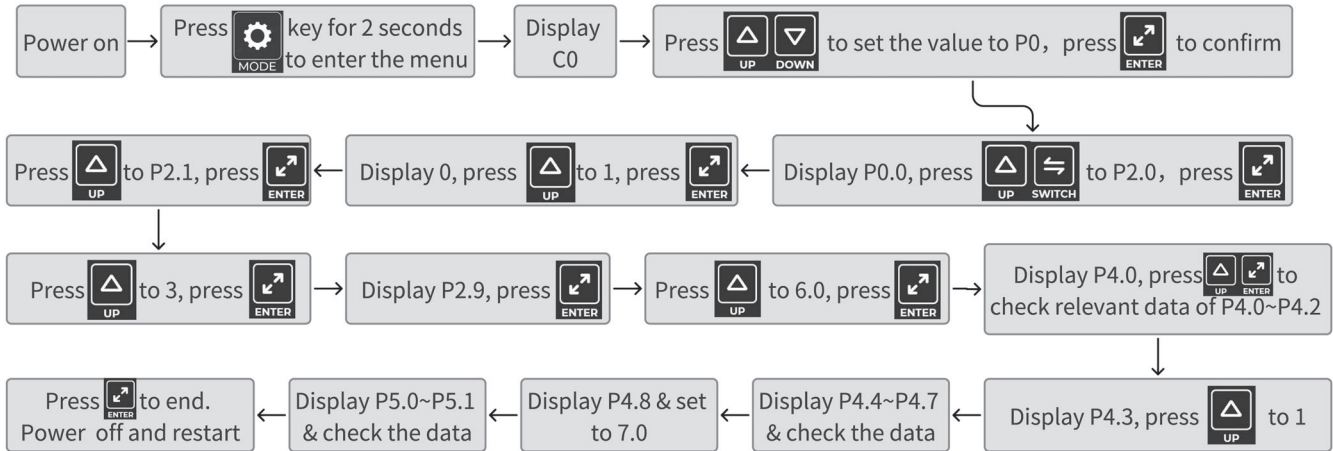
Example:

A community requires a deep-well constant pressure water supply system with:

Pressure: 6 bar

Sensor: 4–20mA, 1.6MPa

Now, we want to reach overpressure alarm: >7 bar and Hibernation speed: <2000 RPM



Tips:

1. Verify P4.0 and P4.1 against sensor nameplate; adjust data according to nameplate if inconsistent.
2. After setting P4.0 and 4.1, if the pressure gauge display is slightly different from the machine display, it can be corrected by P4.2.

Overview of Constant Voltage Hibernation Process:

(1) Hibernation Shutdown: When the constant pressure sleep function (P4.3) is activated, and the current operating speed is detected to be less than the set sleep speed (P4.4), the system waits for the sleep detection time (P4.5) n seconds to determine the sleep pressure. If the deviation of the current pressure from the set pressure is less than the sleep deviation percentage (P4.6), the system will initiate the sleep process, and the pump operating speed will decrease to 1000 rpm. After maintaining this low speed for a duration of (P5.0) n seconds, if the percentage change in the current pressure value is less than the sleep judgment percentage (P5.1), the controller will completely enter sleep mode and shut down.

(2) Hibernation Wake-up:

Resumes operation if pressure drops beyond P4.7 (wake-up tolerance).

5. Maintenance

- 1. Inverter Exterior:** Inspect for dust, stains, or insects on the inverter's surface. Clean as needed and ensure all ventilation openings are unobstructed.
- 2. Wiring Terminals:** Check for loose connections, overheating, discoloration, or signs of burning at the terminals. Use a torque screwdriver to ensure all terminals are securely tightened.
- 3. Cooling Fan:** Verify that the cooling fan operates normally and does not produce abnormal noise. Clean or replace the fan if it fails to rotate or emits unusual sounds.
- 4. Lightning Arrester:** Inspect the condition of the built-in or external lightning arrester. Replace any damaged surge protection modules promptly.
- 5. Pump Cable:** Examine the water pump cable for signs of aging, damage, or water-induced corrosion. Ensure the cable entry point into the well is properly sealed.
- 6. Valves and Pipelines:** Check the valve and pipeline system for leaks, looseness, aging, or corrosion. Tighten or replace any faulty components as needed.

6. Fault Codes and Troubleshooting

Fault Code	Fault Description	Fault Cause	Solutions	Recovery Process
P0 at Startup	Hardware overcurrent	1. Remove the motor UVW line and try again. If it still reports P0, the controller hardware is damaged. 2. If it reports P43, there is a short circuit in the controller output. 3. Start the rotating motor. 4. IPM module failure	1. Check the connection line from the inverter output to the motor to ensure there is no short circuit and the three-phase voltage is balanced 2. Check the cable and motor resistance and repair or replace them 3. Wait until the motor stops before restarting 4. Check the controller IPM module, connect the black probe of the multimeter to P+, and measure LN, UVW ; connect the red probe to P-, and measure LN, UVW. Normal range: 0.3-0.6V, if it is not within the normal range, replace the IPM module	AC380: Need to manually reset by pressing the button, or power off the device to clear AC220: Automatically clear after 30 seconds for the first 5 times, and try to start again after 30 minutes

P0 during Running	Overcurrent protection	1. Motor programming error 2. Poor cable or motor insulation 3. Motor failure causes imbalance	1. Check the motor program 2. Check the cable and motor resistance 3. Replace the new motor	
P1	Backwater protection	1. The motor pump body is in the process of water return reversal 2. If the pipeline is not in the water return state, or the water return time exceeds 10 minutes, the fault is still reported	1. Please wait for the water return to finish before restarting. 2. Please check whether there is leakage or short circuit between the motor output UVW and the ground.	For the first 5 times, the fault is displayed for 90 s and then automatically cleared and restarted. Then restart is attempted every 30 min.
P42	Input phase loss protection	Phase loss in 3-phase input	The inverter input and front-end power supply are abnormal. After eliminating the problem, power off and restart (only for high-power three-phase 380V models, single-phase input models do not have this code)	Automatic-ly clear after fault recovery
P43	Output phase loss protection	1. Motor fault 2. Inverter fault	1. The motor winding is open or short-circuited, or there is a grounding fault in the motor. 2. Internal components of the inverter such as the rectifier bridge or control board are damaged, resulting in abnormal or missing voltage in one phase, which causes a phase loss fault.	For the first 5 times, it will be automati-cally cleared after 30 s, and then try to start again after 30 min.
P44	Startup failure	Locked rotor or program mismatch	Check impeller, motor load, motor program	

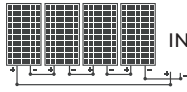
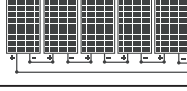
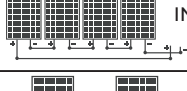
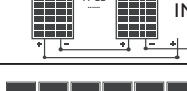
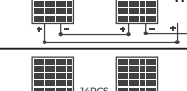
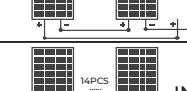
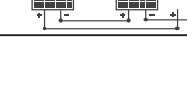
P45/ P47	out-of-step/ over-speed protection	1. When the motor is started with load or when the load fluctuates, the load suddenly increases, causing the motor speed to be too fast/drop too quickly. 2. The motor is stuck during operation, and the motor current increases 3. When the power supply voltage is too low, the motor current increases 4. The motor cannot decelerate quickly during deceleration 5. The pump cable is too long/too small	1. Adjust the load within the rated range. Adjust the stall protection parameters and overcurrent protection parameters according to the actual load conditions. 2. Check whether the impeller or bearing is stuck 3. Ensure that the power supply voltage is stable 4. Appropriately extend the acceleration and deceleration time 5. Configure the motor cable specifications according to the minimum allowable voltage drop; reduce the length of the water pump cable by extending the DC input cable	For the first 5 times, it will be automatically cleared after 30 s, and then try to start again after 30 min.
P46	stall protection	1. Motor model does not match 2. Pump extension cable is too long 3. Power supply is too low 4. Low speed protection	1. Select the correct motor model 2. Reduce the extension cord, or add an output reactor/filter 3. Increase the power supply 4. If the actual operating speed is less than the set minimum water outlet speed, P46 will be reported after a delay (delay logic: 30 seconds for the first 5 times, and 10 minutes each time thereafter)	For the first 5 times, it will be automatically cleared after 30 s, and then try to start again after 10 min.
P48	Dry-run/load -off protection	1. Air in the water pump has not been completely exhausted 2. Motor operating power is lower than the set dry-run protection power value	1. Cut off the power supply, and then turn it back on after 30 seconds to start the water pump to drain water. 2. Adjust P0.5 ~ P0.8 to set the power value	AC380: Determined by the time set by P1.9. After the time is reached, the fault is cleared and restarted. AC220: The first 3 times are automatically cleared after 60s, and then determined by the time set by P1.9.

P51	High voltage protection	Voltage input is too high Motor leakage	1. Check the recommended input voltage of the corresponding inverter 2. Check the actual input voltage and troubleshoot 3. Check the insulation resistance of the motor	Clear immediately after the voltage returns to normal
P59	Power supply mode error	Power supply mode setting error	When the controller selects the power supply mode set by P0.2, it cannot detect the corresponding power input and reports this fault code. Please confirm whether the power supply mode is consistent with the wiring.	Automatically clear after fault recovery
P60	Overtemperature protection	MCU temperature > 90°C	Improve cooling, avoid direct sunlight	Automatically clear after the temperature returns to normal
P63	Pressure sensing overpressure protection	1. The constant pressure setting pressure is abnormal 2. The pressure sensor line connection is abnormal	1. Check whether the constant pressure setting parameters are correct 2. Check whether the sensor feedback data is correct	After the pressure is restored, fault eliminate
P64	Pressure sensing short line protection	1. Wrong pressure sensor model selection 2. Abnormal pressure sensor line connection 3. Wrong operation mode selected	1. Check whether the constant pressure setting parameters are correct 2. Check whether the sensor feedback data is correct 3. Select the correct operation mode (for example, the PID mode is mistakenly pressed for solar energy)	After the pressure feedback returns to normal, fault eliminate
PL	Low voltage protection/inadequate power	Input voltage is too low Below the set minimum power for a certain period of time	1. Refer to the electrical characteristics of the corresponding model for normal power distribution 2. The solar panel selection is wrong, refer to the recommendation and select the correct one	For the first 5 times, it will be automatically cleared after 30 s, and then try to start again after 30 min.
E-17	Communication failure	Communication failure of main board & panel	Replace main board & panel	Automatically clear after fault recovery

No code display after power-on	Mainboard LED is on	1. The keyboard display panel is abnormal 2. The connection cable is loose or damaged	1. Replace the keyboard display panel 2. Tighten or replace the connection line between the keyboard and the PCB circuit board	Code display
	Mainboard LED is off	1. No power input 2. PBC circuit problems, such as fuse burnt out, rectifier bridge burnt out	1. Check if the input power is normal 2. Replace the circuit board (When testing the rectifier bridge using a multimeter in diode mode, follow these steps: a: Connect the red probe to pin 1 of the rectifier bridge and the black probe to pins 2 and 3 respectively for measurement. b: Then connect the black probe to pin 4 and the red probe to pins 2 and 3 respectively. c: Normal voltage: 0.3~0.6 V)	

7. Appendix

Appendix 1: Solar Panel Configuration Table

Rated Voltage	Inverter Model	Pump Power (W)	Solar Panel Configuration	Wiring Diagram
110 V	DSFP-110-0.75	750W	300W*4 Vmp=34.3	 INVERTER
110 V	DSFP/L-110-0.9	900 W	300W*4 Vmp=34.3	 INVERTER
150V	DSFP-150-1.1	1100W	300W*5 Vmp=34.3 410~430W*5 Vmp=32	 INVERTER
150V	DSFP/L-150-1.2	1200W	300W*6 Vmp=34.3	 INVERTER
150V	DSFP-150-1.3	1300W	560~585W*4 Vmp=42	 INVERTER
200V	DSFP-200-1.3	1300W	250~300W*7 Vmp=34.3	 INVERTER
200V	DSFP-200-1.5	1500W	450~460W*6 Vmp=35.72	 INVERTER
300V	DSFP-300-2.2	2200W	300~410W*10 Vmp=34.3	 INVERTER
500V	DSFP-500-3	3000W	300W*14 Vmp=34.3	 INVERTER
500V	DSFP-500-4	4000W	410~435W*14 Vmp=32	 INVERTER

Appendix 2: Pump Cable Size Recommendation Table

Cable Diameter Specification Recommendation Table												
Pump Voltage	Cable Length(m)											
	25 m	50 m	75 m	100 m	125 m	150 m	175 m	200 m	225 m	250 m	275 m	300 m
ACDC-110V	2.5 mm ²	2.5 mm ²	4 mm ²	6 mm ²	6 mm ²	6 mm ²	10 mm ²	10 mm ²	10 mm ²	10 mm ²	16 mm ²	16 mm ²
ACDC-150V	2.5 mm ²	2.5 mm ²	4 mm ²	4 mm ²	6 mm ²	6 mm ²	6 mm ²	10 mm ²	10 mm ²	10 mm ²	10 mm ²	16 mm ²
ACDC-200V	2.5 mm ²	2.5 mm ²	4 mm ²	4 mm ²	6 mm ²	6 mm ²	6 mm ²	6 mm ²	10 mm ²	10 mm ²	10 mm ²	10 mm ²
ACDC-300V	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	4 mm ²	4 mm ²	4 mm ²	6 mm ²	6 mm ²	6 mm ²	6 mm ²	6 mm ²
ACDC-500V	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	4 mm ²	4 mm ²	4 mm ²	4 mm ²

Appendix 3: Head Loss (m) Per 100m Steel Pipe

Flow		Inner diameter of pipe (mm)											
m ³ /h	L/S	25	32	38	50	65	75	80	100	125	150	200	
3	0.83	16.31	4.9	2.12	0.56	0.16							
4	1.11	27.76	8.35	3.61	0.95	0.26	0.13	0.1					
5	1.39	42	12.62	5.46	1.44	0.4	0.2	0.15					
6	1.67		17.68	7.66	2.01	0.56	0.28	0.2					
7	1.94		23.53	10.19	2.68	0.75	0.37	0.27					
8	2.22		30.13	13.05	3.43	0.95	0.48	0.35	0.12				
9	2.5		37.47	16.23	4.26	1.19	0.59	0.43	0.15				
10	2.78			19.72	5.18	1.44	0.72	0.52	0.18				
12	3.33			27.64	7.26	2.02	1.01	0.74	0.25				
14	3.89			36.78	9.66	2.69	1.34	0.98	0.33	0.11			
16	4.45				12.37	3.45	1.72	1.25	0.42	0.14			
18	5				15.39	4.29	2.14	1.56	0.53	0.18			
20	5.56				18.7	5.21	2.6	1.9	0.64	0.22	0.09		
25	6.94				28.27	7.83	3.92	2.87	0.97	0.33	0.13		
30	8.33					11.15	5.3	4.02	1.35	0.46	0.19		
35	9.72					14.89	7.32	5.34	1.8	0.61	0.25		
40	11.1					18.81	8.38	6.54	2.31	0.78	0.32		
45	12.5					23.39	11.65	8.51	2.87	1	0.4		
50	13.9						14.17	10.32	3.49	1.18	0.48	0.12	
60	16.7						19.86	14.5	4.89	1.65	0.68	0.17	
70	19.4							19.29	6.5	2.1	0.9	0.22	
80	22.2							24.7	8.33	2.81	1.16	0.28	
90	25								10.35	3.49	1.44	0.38	
100	27.8								12.59	4.25	1.75	0.43	

Example:

A pump with a rated flow of 6 m³/h is connected to a 300 m long steel pipe with an inner diameter of 50 mm. Based on tabular data, the head loss is calculated as:

$$2.01 \text{ m} \times (300 / 100) = 6.03 \text{ m}$$

When selecting the pump head, it is recommended to include a margin of at least 6m to account for pipe loss.

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