MARSRIVA

USER MANUAL
Solar Pumping Inverter

RUN/TUNE FWD/REV LOCAL/REMOT TRIP

HZ   A   V

PRG
ESC

OPEN

DATA
ENT

QUICK
JOG

>>
SHIFT

RUN

STOP
RST

MARSRIVA

⚠ **Risk of electric shock**
Wait 5 miuntes power down before removing cover, Read the user manual and follow the safety instructions use.

Preface

This manual details the precautions, product features, structure, functions, installation, operation, maintenance, etc. of the Solar Pumping Inverter. Please read this manual carefully before use and use this product under safety instructions.

In order to facilitate the routine inspection and maintenance of the inverter, and understand the causes of abnormity and countermeasures in the future, please keep the manual properly.

If there are any problems or special requirements during use, please contact our distribution agent or ask our technical service center for support directly.

Contents in this manual are subject to change without prior notice.

Index

Safety Instructions

Safe operation of this product depends on proper transport, installation, operation and maintenance. Before beginning these works, please pay attention to the safety instructions and strictly follow the requirements in this chapter. There are three types of safety warning:

Danger: Incorrect use may cause fire, serious body injuries, or even death.

Warning: Incorrect use may cause mild or moderate body injuries and damage to devices.

Note: Useful information.

1.1 Purchase Inspection

Danger
➢ Please do **NOT** install the inverter if there is water or water stains inside.   ➢ Please do **NOT** install the inverter if it is damaged or with missing parts, otherwise it may cause fault expansion or body injuries.   ➢ Please do **NOT** touch the control terminals, PCB boards or other components inside the inverter directly with wet objects or body parts, otherwise it may cause electric shock.
Warning
➢ Please do **NOT** install the inverter if it is inconsistent with the packing list.   ➢ Please do **NOT** install the inverter if the specifications on the product nameplate are inconsistent with your order.

1.2 Transport and Installation

Danger
➢ The installation work must be performed by qualified electrical professionals, otherwise it may cause electric shock or fire.   ➢ The inverter must be installed on metal or other flame retardants and kept away from combustible materials, otherwise it may cause fire.

> ➢ Please assemble and tighten the fixing screws of the inverter according to the regulations, otherwise the inverter may accidently fall off and get damaged.
> ➢ It is **NOT** allowed to install the inverter in the environment containing explosive gas, otherwise it may cause explosion.
> ➢ It is **NOT** allowed to install the inverter in the place accessible to children and other public, otherwise it may cause electric shock.

⚠️ **Warning**

> ➢ Please handle the device gently to prevent accident fall off, which may hurt the feet and break the inverter.
> ➢ Please install the inverter in the place where there is only a little vibration, no water droplets and no direct sunlight.
> ➢ If the inverters are to be installed in the cabinet, especially two or more inverters in one cabinet, please pay attention to the installation position, ensure good ventilation and heat dissipation, otherwise it may cause device fault or damage.
> ➢ Please do **NOT** drop the wire end, screws or drilling residue into the inverter during the installation, otherwise it may damage the device.

1.3 Wiring

⚡ **Danger**

> ➢ The wiring work must be performed by qualified electrical professionals, otherwise it may cause electric shock or damage to devices.
> ➢ The wiring work must be carried out strictly according to this manual, otherwise it may cause electric shock or damage to devices.
> ➢ All power supplies connected to the inverter must be cut off and wait for not less than the time indicated on the inverter before wiring work, otherwise it may cause electric shock.
> ➢ The inverter must be grounded reliably, otherwise it may cause electric shock.

⚠️ **Warning**

> ➢ The terminal signal cable of the inverter should be put away from the power cable as far as possible. If the distance is not enough, they should be cross-distributed vertically, otherwise it will cause signal interference.
> ➢ Please make sure all terminal screws are tightened while wiring, otherwise it may damage the device.
> ➢ Shielded cables must be used for encoders, sensors and other susceptible components and reliably grounded.

> ➢ Cables, circuit breakers, contactors and other components must be selected as required by the manual.
> ➢ Please strictly follow the screen printing on the inverter during the wiring and do **NOT** connect the input and the output inversely, otherwise it can damage the device.
> ➢ Please do **NOT** install compensation capacitors or surge suppressors at the output of the inverter, otherwise it may cause overheat and damage the inverter.

1.4 Operation

⚡ **Danger**

> ➢ Please make sure all the wiring and connections are correct and the case cover is close before powering on.
> ➢ Please do **NOT** remove cover plate after powering on, otherwise it may cause electric shock.
> ➢ Please do **NOT** perform any operation other than the panel setting on the inverter during running, otherwise it may cause electric shock or damage the device.
> ➢ Please do **NOT** touch the fan or radiator base, otherwise it may cause mechanical injuries or burns.

⚠ **Warning**

> ➢ Please do **NOT** frequently turn on and turn off the inverter input power, otherwise it may damage the inverter.
> ➢ The inverter must be in no output state when the circuit breaker or contactor at the output of the inverter is switched on or off, otherwise it may damage the inverter.
> ➢ Please do **NOT** change the parameters of the inverter arbitrarily, otherwise it may damage the inverter.

1.5 Maintenance

⚡ **Danger**

> ➢ The maintenance work must be performed by qualified electrical professionals, otherwise it may cause electric shock or damage to devices.
> ➢ All power supplies connected to the inverter must be cut off and wait for not less than the time indicated on the inverter before wiring work, otherwise it may cause electric shock.

⚠ **Warning**

- ➢ Please take anti-static measures and prevent foreign matter from entering the inverter.
- ➢ Please do **NOT** conduct insulation and withstand voltage tests on the inverter, and do **NOT** use a megohm to test the control circuit of the inverter.
- ➢ Please tighten the screw with a suitable torque.
- ➢ Please keep the inverter and components away from inflammable materials.

1.6 Others

⚠ **Warning**

- ➢ Machine scrap should be treated as industrial waste and incineration is strictly prohibited, otherwise it may cause explosion.

Chapter 1 Product Introduction

Solar pumping system consists of a solar array, a solar pumping inverter and a pump (see Fig. 1-1). It can be widely applied in domestic water supply, agricultural irrigation, forestry watering, desert control, grassland animal husbandry, island water supply, wastewater treatment, etc. Based on the design philosophy that it is better to store water than electricity, there is no energy storage device such as battery in the system.

Solar pumping inverter is the core controller that controls and regulates the operation of solar pumping system. It drives the pump by converting DC power produced by solar array into AC power and adjusts the output frequency according to solar radiation in real time to implement maximum power point tracking (MPPT).
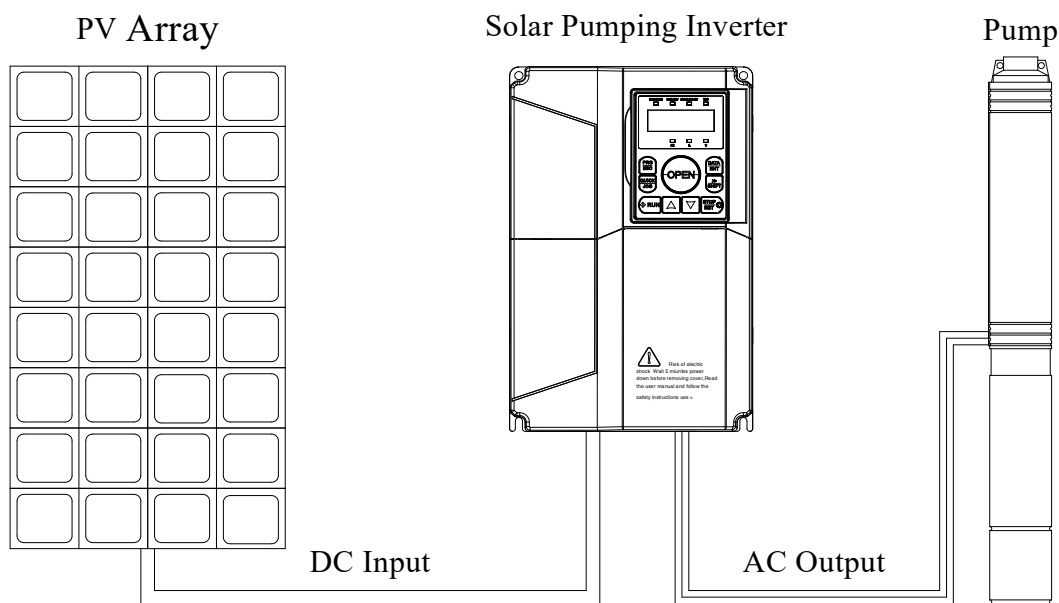
PV Array   Solar Pumping Inverter   Pump

DC Input   AC Output

Fig. 1-1 Solar Pumping System Structure

Product Features

➢ Compatible with submersible pumps, surface pumps, swimming pool pumps and other pumps using three-phase/single-phase asynchronous motors

➢ Leading MPPT algorithm, fast response, good stability and maximum 99% MPPT efficiency

➢ Fully automatic operation, the inverter drives the pump to work from sunrise to sunset, no need for manual intervention after installation

➢ Supporting soft start of pump, full motor protections, optional water level switch to prevent overflow and dry running

➢ Full protections including overvoltage protection, overcurrent protection and overheat automatic frequency reduction protection to extend product life effectively

➤ Equipped with AC and DC power supply interface to support grid/diesel generator backup power supply, satisfying all-weather 24 hours unattended water supply demand

➤ Optional DM-BR Data Monitors for all models, remotely monitoring system operation status with mobile APP or computer web page at anytime and anywhere

1.1 Product Model and Nameplate Description

1.1.1 Product Nameplate


```
MODEL: MR-VFD2.2K-L3P20

Rated Power:2.2kW                          CE
PV input:Vmpp 280-360V Vmax 440V
AC input:1PH 220V 23.0A
AC Output:3PH 220V 0-50/60Hz 10.0A

S/N: |||||||||||||||||||||||||||||||||
     SPR25010486
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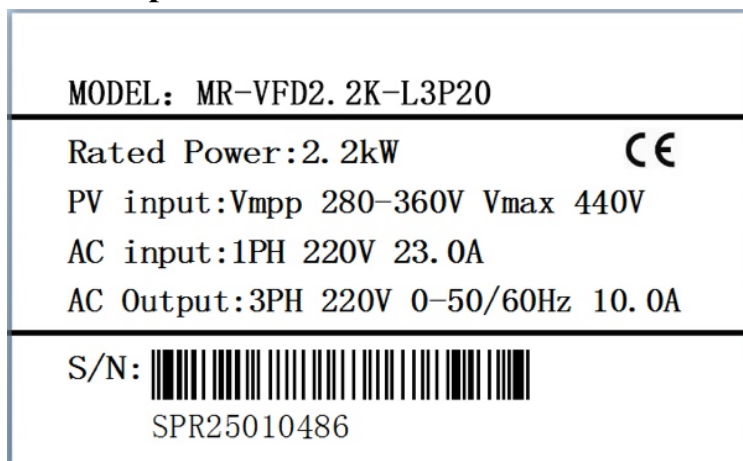
Fig. 1-2 Product Nameplate

1.1.2 Model Description

The letters and numbers on the product nameplate indicate the product series, adaptable power supply, rated power, adaptable load type, etc.
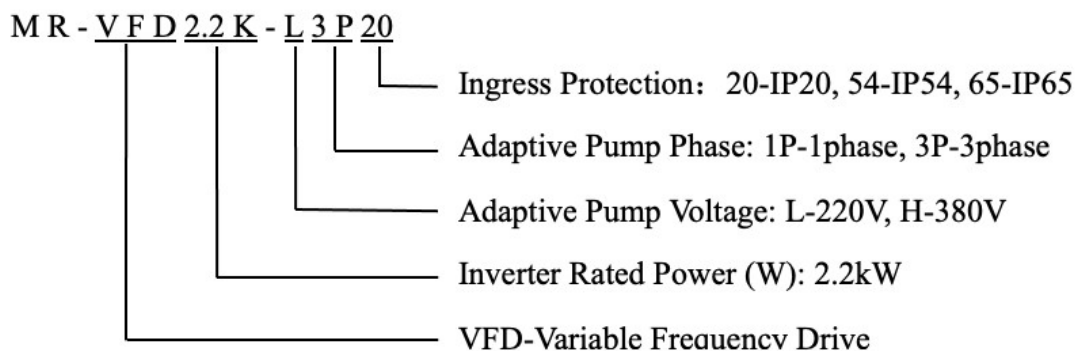

M R - V F D 2.2 K - L 3 P 20

Ingress Protection: 20-IP20, 54-IP54, 65-IP65

Adaptive Pump Phase: 1P-1phase, 3P-3phase

Adaptive Pump Voltage: L-220V, H-380V

Inverter Rated Power (W): 2.2kW

VFD-Variable Frequency Drive

Fig. 1-3 Product Model Description

1.2 Product Specifications and Technical Parameters

Tab. 1-1 Product Specifications

Model	Adaptable Pump Motor		Rated AC Input Current (A)	Rated AC Output Current (A)
	Rated Voltage	Rated Power (kW)		
1.1K-L1P20	1PH 220V~240V	≤1.1	11	7.5
1.5K-L1P20		1.5	17	10
2.2K-L1P20		2.2	23	16
1.1K-L3P20	3PH 220V~240V	≤1.1	11	7.5
1.5K-L3P20		1.5	17	10
2.2K-L3P20		2.2	23	16
4.0K-L3P20		3.0~4.0	25	20
1.5K-H3P20	3PH 380V~440V	≤1.5	5.0	4.2
2.2K-H3P20		2.2	5.8	5.5
4.0K-H3P20		3.0~4.0	12	9.5
5.5K-H3P20		5.5	17.5	14
7.5K-H3P20		7.5	22.5	18.5
11K-H3P20		11	30	25
15K-H3P20		15	39	32
18K-H3P20		18.5	45	38
22K-H3P20		22	54	45

Tab. 1-2 Product Technical Parameters

Parameter	L1P20 Series	L3P20 Series	H3P20 Series
Maximum DC Input Voltage (Vdc)	440	440	780/ 880(optional)
Start-up Voltage (Vdc)	180	180	270
Minimum Operating Voltage (Vdc)	150	150	240

Recommended MPP Voltage (Vdc)	280~360		500~620
AC Input Voltage (Vac)	1PH(≤2.2kW)/3PH (4.0kW) 220V (-15%) ~ 240V (+10%)		3PH 380V (-15%) ~ 440V (+10%)
AC Output Voltage (Vac)	1PH 0~220/240V	3PH 0~220/240V	3PH 0~380/440V
Default Output Frequency (Hz)	0~50/60Hz		
MPPT Efficiency	99%		
Rated Conversion Efficiency	>97%	>97%	>98%
Protection Grade	IP20		
Cooling Method	Forced Air Cooling		
Certification	CE		
Execution Standard	EN 61800-5-1:2007，EN 61800-3:2004+A1:2012		

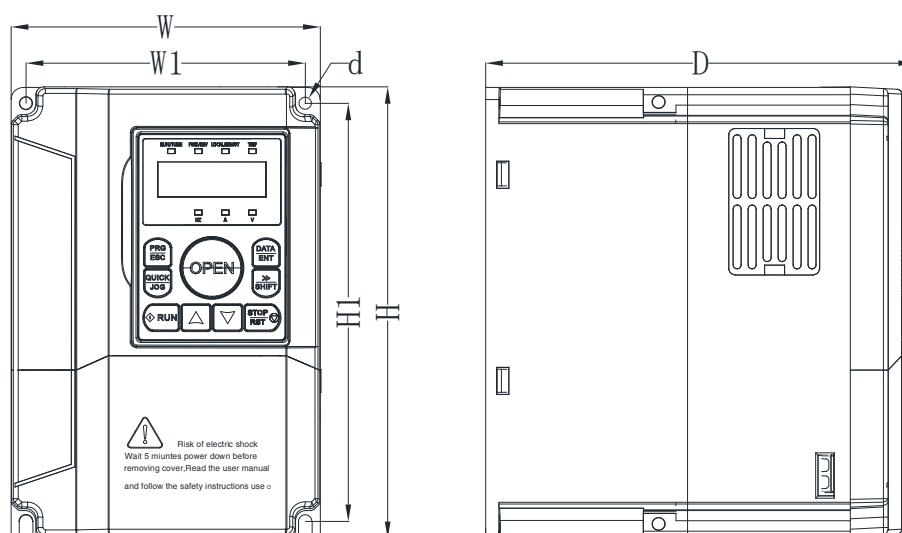## 1.3 Product Appearance, Dimension and Weight

Fig. 1-4 Product Appearance and Installation Dimension

Tab. 1-3 Product Appearance, Installation Dimension and Weight

Model	Appearance and Installation Dimension (mm)					Installation Aperture (mm)	Weight (kg)
	W	H	D	W1	H1		
1.1K-L1P20	126	187	175	114	174	5	1.8
1.5K-L1P20							
1.1K-L3P20							
1.5K-L3P20							
1.5K-H3P20							
2.2K-L1P20	160	249	191	148	236	5.5	3.4
2.2K-L3P20							
2.2K-H3P20							3.2
4.0K-H3P20							
5.5K-H3P20							3.4
7.5K-H3P20							
4.0K-L3P20	208	323	196	190	306	6.5	5.2
11K-H3P20							
15K-H3P20							
18K-H3P20							5.5
22K-H3P20							

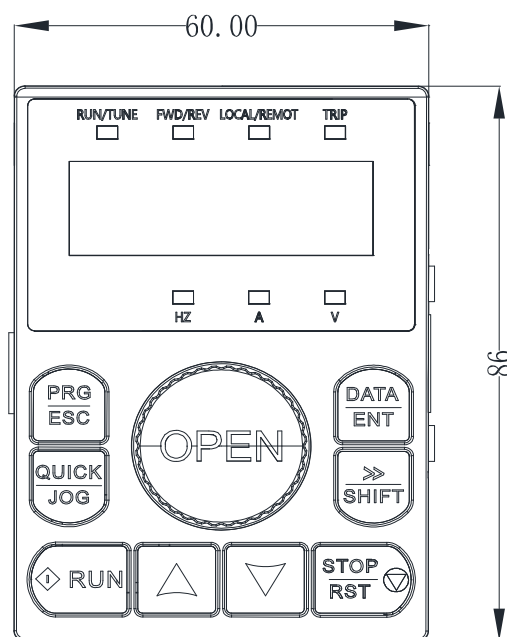## 1.4 Operation Panel Appearance and Dimension
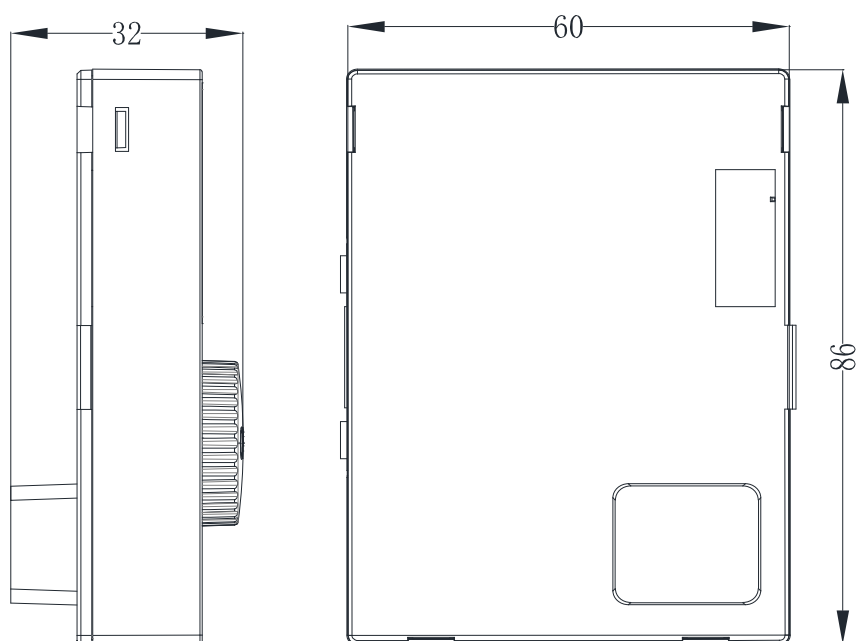

Fig. 1-5 Panel Appearance and Dimension (mm)

Fig. 1-6 Extension Operation Panel Bracket Appearance and Dimension (mm)

Note: When using extension operation panel, the extension cable should not exceed 20 m, otherwise the operation panel may not work properly.

Chapter 2 Installation and Wiring

2.1 Installation Instructions

2.1.1 Installation Environment Requirements

☞   **Note:** Install the inverter according to the installation environment requirements is the precondition for ensuring long-term normal and stable operation of the inverter.

Environmental Factor	Requirements
Ambient Humidity	5 ~ 90% (No dew condensation)
Ambient Temperature	-10°C ~ +50°C; The rated output current should be derated by 2% for every 1°C increase when temperature is over 40°C; When operating in a small enclosed space such as a cabinet, please strengthen the cooling to avoid the internal temperature exceeding the ambient temperature requirements
Storage Temperature	-40°C ~ +70°C
Vibration	Less than 0.5 g
Altitude	0 ~ 2000 m; The rated output current should be derated by 1% for every 100 m increase when altitude is over 1000 m
Installation Site	Indoor use, for outdoor use, protective measures must be taken; Install the inverter on the flame retardant with sufficient heat dissipation space and good ventilation; Keep away from electromagnetic radiation sources; No flammable, explosive, corrosive gases; no radioactive substances, no flammable substances; no dust, oil mist, steam; No direct sunlight

2.1.2 Installation Method

☞ **Note:** To ensure a good heat dissipation of the product, please install it vertically and do **NOT** install it horizontally or transversely.
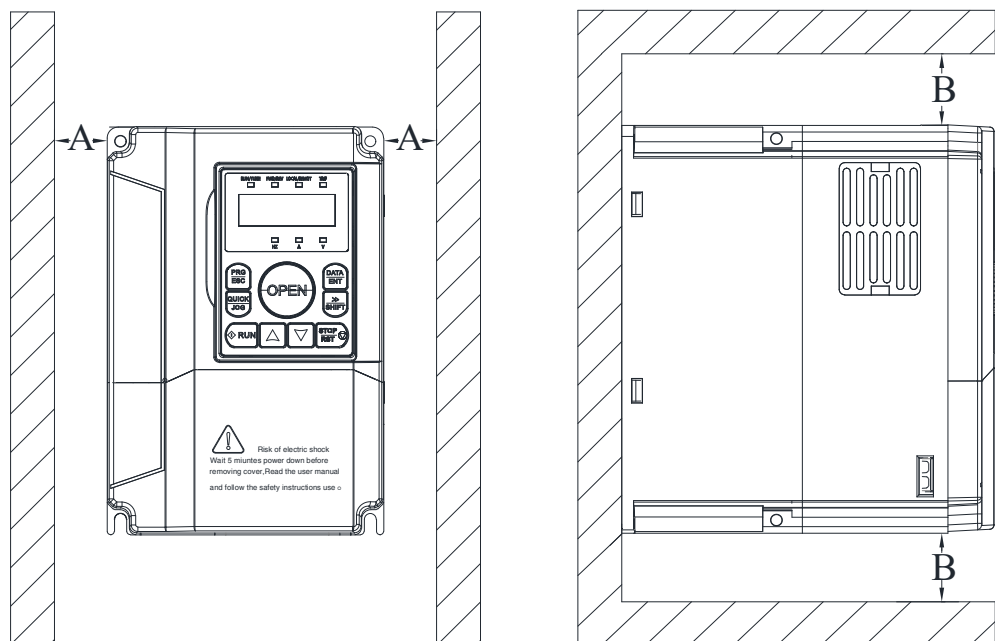

Fig. 2-1 Installation Direction and Space Requirements

Tab. 2-1 Installation Space Dimension

Rated Power	Installation Space Dimension (mm)	
	A	B
≤ 11 kW	≥50	≥200
＞11 kW	≥80	≥300

If multiple inverters are to be installed in the same cabinet, it is recommended to adopt transverse side-by-side installation. If two inverters are to be installed longitudinally, a guide plate should be added in the middle.

2.1.3 Installation Steps

1) Mark the mounting hole positions on the mounting wall according to the appearance and dimension diagrams.
2) Fix the screws (bolts) to the marked positions.
3) Hang the inverter to the screw (bolt).
4) Tighten the screws (bolts) and fix the inverter to complete the installation.

2.2 Wiring Instructions

2.2.1 Open Case Cover Illustration

Before wiring, please open the inverter top cover first as shown in Fig. 2-2.
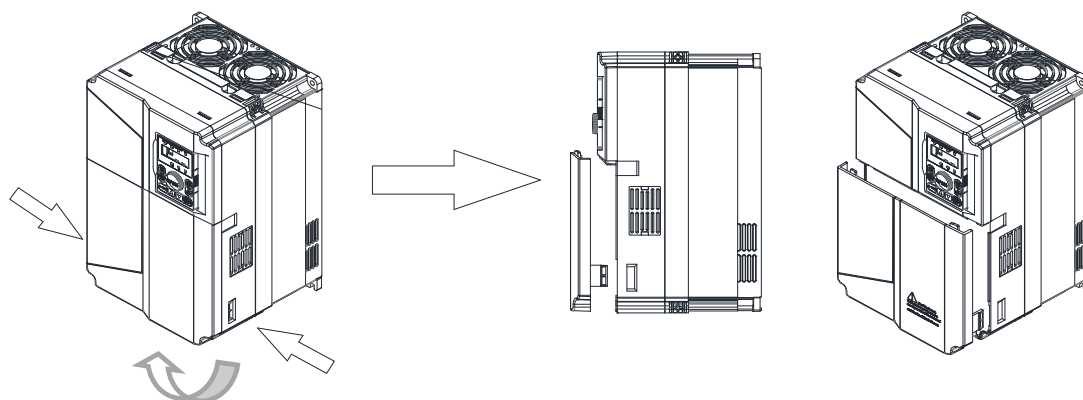
Fig. 2-2 Open Cover Diagram

2.2.2 System Wiring Illustration
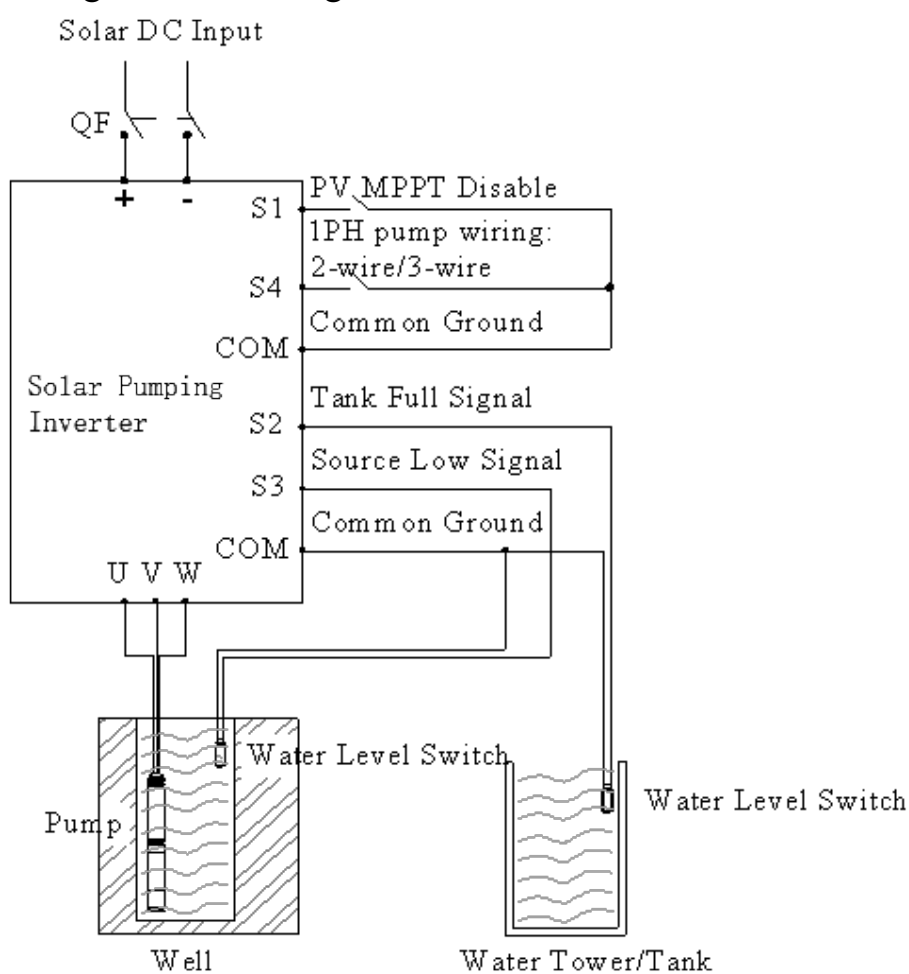
The basic wiring is shown in Fig. 2-3.

Fig. 2-3 Standard Wiring Diagram

2.2.3 Control Terminal Description

S1	S2	S3	S4	HDI	GND	AI2	AI3	+10V	RO1A	RO1B	RO1C
COM	+24V	PW	COM	AO1	AO2	GND	485+	485-	RO2A	RO2B	RO2C

Fig. 2-4 Control Terminal Diagram

Tab. 2-2 Control Board Terminal Function Description

Type	Terminal Label	Function Description	Technical Specifications
Switch Signal Input Terminal	+24 V	+24 V power supply	24 V±10%, isolated from GND internally Maximum output current: 200 mA
	PW	External power input terminal (power supply of switch signal input terminal)	Connected to +24 V terminal by default
	S1～S4	Switch signal input terminal 1 ~ 4	Input specification: 24 V, 5 mA S1: MPPT disable signal, disable MPPT function by connecting S1 to COM and set target frequency to rated frequency (disconnected by default) S2: Tank full signal, valid when connected to COM (disconnected by default) S3: Source low signal, valid when disconnected to COM (connected by default) S4: Single-phase pump wiring method. Using 2-wire connection method when disconnected to COM, using 3-wire connection method when connected to COM. (disconnected by default)
	COM	Common ground terminal of+24 V or external power supply	Isolated from GND internally
Analog Signal Input Terminal	+10 V	+10 V power supply	Output current: 0~50 mA (If a potentiometer is connected between +10 V and GND, the resistance should not be less than 5 kΩ)
	AI2	Analog signal input terminal	The input signal can be selected as voltage (0~10V) or current (0~20mA) by modifying the internal jumpers.

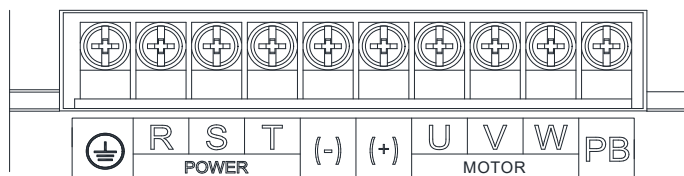| Type	Terminal Label	Function Description	Technical Specifications
	AI3		Input signal is voltage (-10V~10V)
	GND	Common ground terminal of analog signal	Isolated from COM internally
	AO1	Analog signal output terminal	The output signal can be selected as voltage (0~10V) or current (0~20mA) by modifying the internal jumpers.
	AO2		
Relay Output Terminal	RO1A RO1B RO1C	Relay output 1	RO1A-RO1C: normally open RO1B-RO1C: normally close Contact capacity: AC 250 V/3 A, DC 30 V/1 A
	RO2A RO2B RO2C	Relay output 2	RO2A-RO2C: normally open RO2B-RO2C: normally close Contact capacity: AC 250 V/3 A, DC 30 V/1 A
Communication Terminal	485+/485-	RS485 communication	RS485 communication interface, adopt Modbus protocol

☞ **Note:** The analog signal cables and digital signal cables should be separated and avoid entanglement.
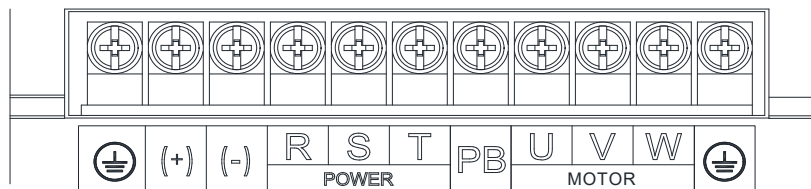
2.2.4 Main Circuit Terminal Description
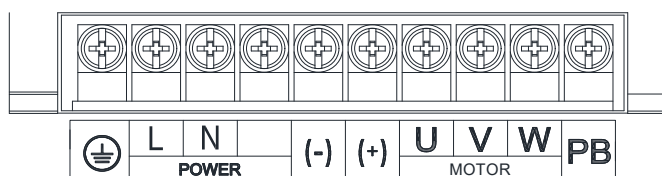
a)   L1P20/L3P20 series (≤ 1.5 kW)

b) H3P20 series(1.5kW~7.5kW)，2.2K-L3P20

c) H3P20 series(11kW~22kW)，4.0K-L3P20

Fig. 2-5 Main Circuit Terminal Diagram

Tab. 2-3 Main Circuit Terminal Function Description

Terminal Screen Printing Name	Function Description
R, S, T (L, N)	Three-phase (single-phase) power supply input terminal
(+), (-)	Positive and negative terminal of the solar array
U, V, W	Three-phase (single-phase) AC output terminal, connected to pump motor
⏚	Safety protection earth terminal (PE), please ensure reliable grounding
PB	Spare terminal, please do **NOT** connect it

2.2.5 Cable Lectotype Description

Tab. 2-4 Recommended Cable Size

Model	DC Cable (mm^2)	AC Cable (mm^2)		Earth Cable (mm^2)	Signal Cable (mm^2)
	(+) / (-)	L/N	R/S/T, U/V/W	PE	-
1.1K-L1P20 1.5K-L1P20	2.5	2.5	2.5	1.5	1.5
2.2K-L1P20	4	4	4	1.5	

1.1K-L3P20 1.5K-L3P20	2.5	2.5	2.5	1.5	
2.2K-L3P20	4	4	4	1.5	
4.0K-L3P20	6	-	6	2.5	
1.5K-H3P20	1.5	-	1.5	1.5	
2.2K-H3P20	1.5	-	1.5	1.5	
4.0K-H3P20	2.5	-	2.5	2.5	1.5
5.5K-H3P20	4	-	4	2.5	
7.5K-H3P20	4	-	4	2.5	
11K-H3P20	6	-	6	4	
15K-H3P20	10	-	10	6	
18K-H3P20	10	-	10	6	
22K-H3P20	10	-	10	10	

☞ **Note:** The recommended cable should be used under the conditions of ambient temperature (≤ 40°C), cable length (≤ 100 m) and working current (≤ rated current).

2.3 Other Notes

➢ A DC circuit breaker must be installed as protection switch for solar DC input.
➢ The inverter only has one pair of DC input terminals. If the solar modules are multi-paralleled, an additional solar combiner box is necessary.
➢ The inverter must be grounded reliably and the grounding cable should be as thick and short as possible. If possible, the inverter should be grounded separately.
➢ In areas with high incidence of lightning, please install an external surge suppressor at the power input of the inverter.
➢ If the inverter is far from the motor (＞200 m), it is recommended to install an output reactor.
➢ It is recommended to install input and output reactors, dedicated filters and magnetic rings at the input and output of the inverter, which can effectively reduce the noise and avoid disturbing other components.

Chapter 3 Operation Control

3.1 Panel Layout and Description

The inverter operation panel is composed of four parts as shown in the figure below: state indicator lights, unit indicator lights, 5-digit LED display and operation keys.
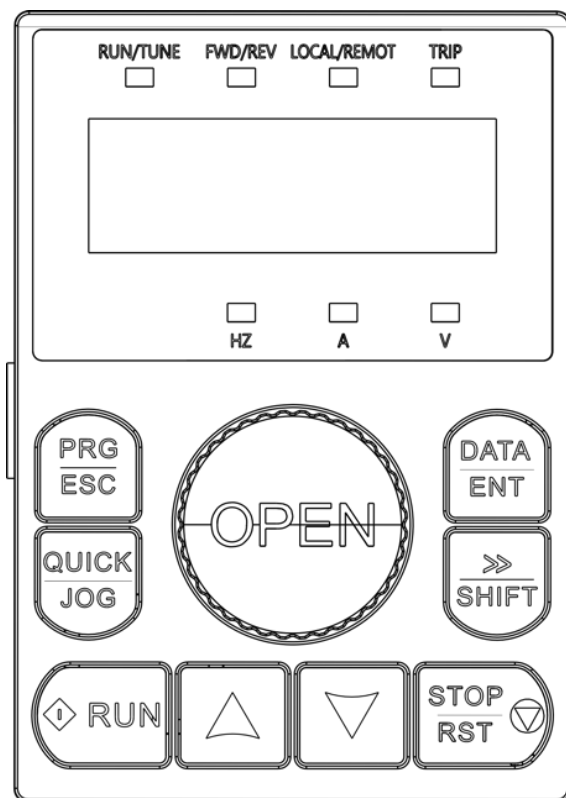

Fig. 3-1 Operation Panel Layout

3.1.1 Unit and State Indicator Lights Description

Tab. 3-1 Unit and State Indicator Lights Description

Panel Label		Name	Description
Unit Indicator Lights	Hz	Frequency Indicator Light	Unit of current display parameter is Hz
	V	Voltage Indicator Light	Unit of current display parameter is V
	A	Current Indicator Light	Unit of current display parameter is A
State Indicator Lights	RUN/TUNE	Operation State Indicator Light	Light on: Operating Light off: Stop
	FWD/REV	Forward and Reverse Indicator Light	Light on: Reverse rotation Light off: Forward rotation

Panel Label		Name	Description
	LOCAL/REMO T	Run/Stop Control Mode Indicator Light	Light on: Communication control mode Light off: Operation panel control mode Light blink: Terminal control mode
	TRIP	Alert Indicator Light	Light on: Fault alert Light off: No fault Light blink: Overload warning

3.1.2 5-digit LED Display

5-digit LED display can show various monitoring data such as setting frequency and output frequency, as well as function codes, parameter values and alert codes.

Tab. 3-2 Characters Description

Character	Description	Character	Description	Character	Description	Character	Description
0	0	1	1	2	2	3	3
4	4	5	5	6	6	7	7
8	8	9	9	A	A	b	b
c	c	d	d	E	E	F	F
H	H	I	I	L	L	N	N
o	o	O	O	P	P	t	t
T	T	U	U	V	V	.	.

3.1.3 Operation Panel Key Function

Tab. 3-3 Operation Panel Key Function Description

Key Appearance	Name	Function Description
PRG ESC	Programming Key	Enter or exit the first-level menu; Return to previous menu.
QUICK JOG	Multifunction Key	The key function is determined by parameter P07.02
◇ RUN	Run Key	In operation panel run/stop control mode, RUN key is used to start the inverter
DATA ENT	Enter Key	In parameter setting mode, enter the menu progressively or confirm parameters;

Key Appearance	Name	Function Description
		In password authentication mode, confirm the input password.
SHIFT	Shift Key (Right)	In variable display mode, right shift to circularly display different variables such as frequency, speed, voltage, current, etc. In parameter setting mode, right shift to select the bit to be modified; In password authentication mode, right shift to select the bit to be modified.
STOP RST	STOP/RESET Key	STOP/RESET key is used for inverter stop control according to the valid mode set in function parameter P07.04; When a fault occurs and the inverter has stopped, STOP/RESET key is used to reset the inverter and clear fault alert.
△	Increment Key	Progressively increase the parameters or data.
▽	Decrement Key	Progressively decrease the parameters or data.

3.2 Panel Operation Instructions

3.2.1 Parameter Modification

There is a three-level menu:

    1. Group number of parameters (first level)

    2. Serial number of parameters (second level)

    3. Setting value of parameters (third level)

☞**Note:** It will display "8.8.8.8.8" during power-on initialization and then display the setting frequency. To modify a parameter, please press $\boxed{\text{PRG/ESC}}$ to enter the first level menu, which displays P00. Then, press $\boxed{\triangle}$ or $\boxed{\triangledown}$ to select the group number of the parameter and enter the second level menu by pressing $\boxed{\text{DATA/ENT}}$. Next, press $\boxed{\triangle}$ or $\boxed{\triangledown}$ to find the target parameter P**.** and enter the third level menu by pressing $\boxed{\text{DATA/ENT}}$. Finally, press $\boxed{\triangle}$ or $\boxed{\triangledown}$ to modify the value and confirm it by pressing $\boxed{\text{DATA/ENT}}$. Press $\boxed{\text{PRG/ESC}}$ can return to previous menu.

In the third level menu, if the parameter does not blink, it indicates the parameter is unmodifiable. Possible reasons are:

    1) It is an unmodifiable parameter such as operation state parameters, fault record parameters, operation record parameters, etc.

2) It cannot be modified in operation state and can only be modified after the inverter is stopped

3.2.2 Fault Reset

The inverter will display relevant fault information if a fault occurs. Users can reset the fault through $\boxed{\substack{STOP \\ RST} \, \oslash}$ or defined fault reset terminal (group P05). Then the inverter will enter standby state. If users do not reset fault, the inverter will be in operation protection state and cannot operate.

3.2.3 Password Setting

In order to protect parameters more effectively, the inverter has password protection for function codes. When the parameter P07.00 is set to non-zero, its value is the user password. The password protection will take effect in 1 minute after pressing $\boxed{\substack{PRG \\ ESC}}$ to exit parameter modification state. To cancel the password protection function, set P07.00 to zero.

After setting the user password, the inverter will first enter the user password verification state and display "0.0.0.0.0." when users press $\boxed{\substack{PRG \\ ESC}}$ to enter the parameter modification state. The operator must enter the correct user password and confirm it before modifying parameters.

☞ **Note:** Restoring to default values (P00.18 set to 1) will clear the user password that has been set.   Please be cautious when using it.

3.3 Panel Display States

The display states of the inverter operation panel are divided into operation display state, stop display state, fault display state and parameter modification display state.

3.3.1 Operation Display State

The inverter operation panel will display seven operation state parameters in operation state by default: operation frequency, setting frequency, bus voltage, output current, output voltage, operation speed, output power. Press $\boxed{\substack{\gg \\ SHIFT}}$ can sequentially right shift to display operation state parameters. In operation state, RUN/TUNE indicator light is on, LOCAL/REMOT indicator light blinks and the corresponding unit indicator lights of current display state parameter will turn on.

3.3.2 Stop Display State

The inverter operation panel will display four stop state parameters in stop state by default: set frequency, bus voltage, input terminal state, output terminal state. Press $\boxed{\substack{\gg \\ SHIFT}}$ can sequentially right shift to display operation state parameters. In

stop state, RUN/TUNE indicator light is off, LOCAL/REMOT indicator light blinks and the corresponding unit indicator lights of current display state parameter will turn on.

3.3.3 Fault Display State

The inverter operation panel will display blinking fault code and TRIP indicator light turns on in fault state. Users can reset fault through [STOP/RST], control terminal or communication command. In fault state, users can still check state parameters through [SHIFT] as mentioned above.

For fault code details, please refer to Chapter 5 Fault Diagnosis and Solution.

3.3.4 Parameter Modification Display State

Press [PRG/ESC] can enter parameter modification display state in operation, stop and fault state. For details, please refer to section 3.2.1 Parameter Modification.

3.4 Initial Settings before First Operation

In order to ensure the efficient, reliable and stable operation of the solar pumping system, it is necessary to change wiring of control terminal or set some of the inverter function parameters according to the system configuration by professional electrical technicians.

Please follow the steps below to complete the initial settings.

Step	Initial Setting Content	Operation
1	Set water level detection function	The inverter enables normally closed water level switch to detect water level. Before installing the water level switch, please remove the jumper between S3 and COM.
2	Set rated parameters of the pump	If the rated parameters of the pump are inconsistent with the inverter default settings, please modify function parameters P02.01~P02.05 according to actual rated parameters of the pump
3	Set the maximum operation frequency of the pump	If the rated frequency of the pump is inconsistent with the inverter default setting, please modify function parameter P00.03
4	Confirm pump	Under strong and stable radiation:

	motor wiring	1. Observe water flow rate when the pump operates stably 2. Exchange any two cables of the pump motor 3. Observe water flow rate when the pump operates stably again 4. Compare and choose the wiring way with larger water flow rate (operation frequency should be roughly the same) to ensure forward rotation of the pump
5	Set low sunlight frequency	If no water comes out when the pump is operating at 10 Hz (the default value of function parameter P15.05), please increase the set value of P15.05 until water comes out to avoid ineffective operation when light is weak. The reasonable setting value should be the minimum operating frequency of the water pump that can discharge water.

Chapter 4 Function Parameters

The parameters of Solar Pumping Inverter are grouped by function. For example, "P07.08" represents the 8th parameter of group P07. The parameters related to solar pumping inverter are shown in Tab.4-1. The contents of parameter table include:

"Function code": Group number and serial number of the parameter;

"Name": Full name of the parameter;

"Description": Detailed description of the parameter function;

"Setting range": Setting range of the parameter (already pretreated in the inverter program to avoid wrong modification)

"Default value": Factory setting value of the parameter. The parameter will be refreshed to this value if factory settings are restored while operation state parameter value or record value will not be refreshed.

"Modifiability": Whether or not can the parameter be modified. There are three kinds of symbol:

○: The parameter can be modified in both stop and operation state

☆: The parameter cannot be modified in operation state

●: The parameter is operation state parameter or record parameter and cannot be modified (already pretreated in the inverter program to avoid wrong modification)

Tab.4-1 Function Parameter Description

Function Code	Name	Description	Setting Range	Default Value	Modifi-ability
P00: Basic Function Group					
P00.01	Run/Stop Control Mode	0: Operation panel Run/Stop control mode (LOCAL/REMOT indicator light off): Control the run and stop of the pump through [⬦RUN] and [STOP/RST▽] keys in operation panel. Press the above two keys at the same time can instantly cut off the inverter output in operation state; 1: Terminal Run/Stop control mode (LOCAL/REMOT indicator light blinks)	0~2	1	○

Function Code	Name	Description	Setting Range	Default Value	Modifi-ability
		Control the run and stop of the pump through multi-function DI input terminals 2: Communication Run/Stop control mode (LOCAL/REMOT indicator light on): Control the run/stop of the pump from host computer through communication			
P00.03	Maximum Output Frequency	Setting the maximum output frequency of the inverter It is the basis of VF curve setting and rate of acceleration/deceleration. Unit: Hz	P00.04~630.00	50.00	☆
P00.18	Restore Function Parameters	0: No action 1: Restore factory settings: Restore all function parameters to default values except Pump Parameters Group 2: Clear fault records: The parameter value will be restored to 0 after execution completed	0~2	0	☆
P01: Run/Stop Control Group					
P01.08	Stop Mode	0: Deceleration stop 1: Free stop	0~1	0	○
P01.15	Stop Frequency	After decelerating to this frequency, the inverter cuts off the output voltage Unit: Hz	0.00~100.00	0.50	☆
P01.18	Terminal Run/Stop Control Enable after	0: Disable terminal run/stop control 1: Enable terminal run/stop control	0~1	1	○

Function Code	Name	Description	Setting Range	Default Value	Modifi-ability
	Power-on	In the actual test, there is no difference between the Settings, all valid			
P01.23	Start-up Delay Time	Start-up delay time after power-on or fault reset Unit: s	0.0~60.0	0.0	○
P02: Pump Parameters Group					
P02.01	Pump Motor Rated Power	Unit: kW	0.1~3000.0	Determined by model	☆
P02.02	Pump Motor Rated Frequency	Unit: Hz	0.01~P00.03	50.00	☆
P02.03	Pump Motor Rated Rotation Speed	Unit: RPM	1~36000	Determined by model	☆
P02.04	Pump Motor Rated Voltage	Unit: V	0~1200	Determined by model	☆
P02.05	Pump Motor Rated Current	Unit: A	0.8~6000.0	Determined by model	☆
P04: V/F Control Group					
P04.00	V/F Curve Type	0: Straight line, suitable for constant torque loads 1: Multi-dots V/F curve, manually set V/F curve through P04.03~P04.08 2: 1.3th power torque reduction V/F curve 3: 1.7th power torque reduction V/F curve 4: 2.0nd power torque reduction V/F curve Curves 2~4 are suitable for	0~5	4	☆

Function Code	Name	Description	Setting Range	Default Value	Modifi-ability
		water pumps and users can choose them according to load characteristics for best performance. 5: Custom V/F curve			
P04.01	Torque Lifting Voltage	In order to increase the starting torque of the pump, increase this parameter to compensate for the low frequency output voltage; The setting value is the percentage of the motor rated voltage.	0.0~10.0	0.0%	○
P04.02	Torque Lifting Cut-off Frequency Point	The percentage of the motor rated frequency. After the frequency reaches this value, the torque lifting is cancelled.	0.0~50.0	20.0%	○
P04.03	V/F Frequency Point 1	0.00 Hz ~ P04.05	0.00~P04.05	0.00Hz	○
P04.04	V/F Voltage Point 1	0.0% ~ 110.0% of pump motor rated voltage	0.0~110.0	00.0%	○
P04.05	V/F Frequency Point 2	P04.03 ~ P04.07	P04.03~P04.07	00.00Hz	○
P04.06	V/F Voltage Point 2	0.0% ~ 110.0% of pump motor rated voltage	0.0~110.0	00.0%	○
P04.07	V/F Frequency Point 3	P04.05 ~ P02.02 (pump motor rated frequency)	P04.05~P02.02	00.00Hz	○
P04.08	V/F Voltage Point 3	0.0% ~ 110.0% of pump motor voltage	0.0~110.0	00.0%	○
P05: Input Terminal Group					

Function Code	Name	Description	Setting Range	Default Value	Modifi-ability
P05.01	Terminal S1 Function	0: No function 1: Forward rotation operation 2~5: Reserved 6: Free stop 7: Fault Reset 8~41: Reserved 42: Disable solar inverter, force the inverter to operate at power rated frequency 43: Tank full 44: Source low 45: Single-phase motor two/three wires connection method 46~63: Reserved	0~63	42	☆
P05.02	Terminal S2 Function		0~63	43	☆
P05.03	Terminal S3 Function		0~63	44	☆
P05.04	Terminal S4 Function		0~63	45	☆
P05.05	Terminal S5 Function		0~63	1	☆
P05.09	Terminal HDI Function		0~63	46	
P05.10	Terminal Function Enable Level	BIT8 BIT3 BIT2 BIT1 BIT0 HDI S4 S3 S2 S1	0x000~0x10F	0x000	○

P06: Output Terminal Group

Function Code	Name	Description	Setting Range	Default Value	Modifi-ability
P06.03	Relay RO1 Output Function	0: Invalid 1: In operation 2: In forward rotation operation 3: In reverse rotation operation 4: In jogging operation 5: Inverter fault 6~26: Reserved 27: Weak Light Protection 28~29: Reserved 30: PV MPPT Mode	0~30	30	○
P06.04	Relay RO2 Output Function		0~30	5	○
P06.05	Output Terminal Function Enable Level	BIT1 | BIT0 RO2 | RO1	0x0~0xF	0x0	○
P06.10	Relay RO1 Close Delay	Unit: second	0.000~50.000	10.000s	○

Function Code	Name	Description	Setting Range	Default Value	Modifi-ability
	Time				
P06.11	Relay RO1 Open Delay Time	Unit: second	0.000~50.000	10.000s	○
P06.12	Relay RO2 Close Delay Time	Unit: second	0.000~50.000	0.000s	○
P06.13	Relay RO2 Open Delay Time	Unit: second	0.000~50.000	0.000s	○
P07: Human-machine Interface					
P07.00	User Password	0 ~ 65535	0~65535	0	○
P07.04	[STOP/RST] Key Stop Function Valid Mode	0: Only valid in panel run/stop control mode 1: Valid in panel and terminal run/stop control modes 2: Valid in panel and communication run/stop control modes 3: Valid in all run/stop control modes	0~3	3	○
P07.05	Operation State Parameters Display Selection 1	BIT0: Operating frequency (light Hz on) BIT1: Setting frequency (light Hz blinks) BIT2: DC bus voltage (unit: 0.1 V, light V on) BIT3: Output voltage (unit: 1 V, light V on) BIT4: Output current (light A on) BIT5: Rotation speed (lights Hz and A on) BIT6: Output power (lights V and A on) BIT7~9: Reserved	0x0000~0xFFFF	0x003F	○

Function Code	Name	Description	Setting Range	Default Value	Modifi-ability
		BIT10: Input terminal state BIT11: Output terminal state BIT12~15: Reserved			
P07.07	Stop State Parameters Display Selection 1	BIT0: Setting frequency (light Hz on, frequency blinks slowly) BIT1: DC bus voltage (light V on) BIT2: Input terminal state BIT3: Output terminal state BIT4~15: Reserved	0x00~0x00FF	0x000F	○
P07.11	Rectifier Bridge Module Temperature	Unit: ℃	0~100.0	-	●
P07.12	IGBT Module Temperature	Unit: ℃	0~100.0	-	●
P07.13	Software Version		1.00~655.35	Current Version	●
P07.14	Accumulative Operation Time	Unit: hour	0~65535	-	●
P07.15	Inverter Power Consumption (high byte)	Display the total power consumption of the inverter; Total power consumption =P07.15*1000+P07.16 (kWh)	0~65535	-	●
P07.16	Inverter Power Consumption (low byte)		0.0~999.9	-	●
P07.18	Inverter Rated Power	Unit: kW	0.4~3000.0	Determined by model	●
P07.19	Inverter Rated Voltage	Unit: V	50~1200	Determined by model	●

Function Code	Name	Description	Setting Range	Default Value	Modifi-ability
P07.20	Inverter Rated Current	Unit: A	0.1~6000.0	Determined by model	●
P07.27	Current Fault Type	0: No fault 1: IGBT phase U fault (OUt1) 2: IGBT phase V fault (OUt2) 3: IGBT phase W fault (OUt3) 4: Overcurrent when accelerating (OC1) 5: Overcurrent when decelerating (OC2) 6: Overcurrent when operating in constant speed (OC3) 7: Overvoltage when accelerating (OU1)	-	-	●
P07.28	Latest Fault Type	8: Overvoltage when decelerating (OU2) 9: Overvoltage when operating in constant speed (OU3) 10: DC bus undervoltage (UV) 11: Pump overload (OL1) 12: Inverter overload (OL2) 13: Input phase loss (SPI) 14: Output phase loss (SPO) 15: Rectifier module overheat (OH1)	-	-	●
P07.29	Penultimate Time Fault Type	16: IGBT overheat (OH2) 17: Reserved 18: 485 communication fault (CE)	-	-	●
P07.30	Antepenulti-mate Time Fault Type	19: Current detection circuit fault (ItE) 20: Motor self-learning Fault (tE)	-	-	●
P07.31	Fourth Time from the End Fault Type	21: EEFROM r/w fault (EEP) 22: PID Feedback short-line	-	-	●

Function Code	Name	Description	Setting Range	Default Value	Modifi-ability
P07.32	Fifth Time from the End Fault Type	Fault (PIDE) 23: Breaking unit fault (bCE) 24: Operating time over (END) 25: Program defined overload alert (OL3) 26~31: Reserved 32: Grounding short circuit fault 1 (EtH1) 33: Grounding short circuit fault 2 (EtH2) 36: Load low alert (LL)	-	-	●
P08: Auxiliary Parameters Group					
P08.28	Fault Automatic Reset Times	If the same fault occurs repeatedly and reaches this number of times, it will not be reset again and manual intervention is required.	0~10	5	○
P08.29	Fault Automatic Reset Interval	Unit: second (Attention: After fault reset, the inverter will go through start-up delay time and then restart)	0.1~ 3600.0	5.0 s	○
P11: Protection Parameters Group					
P11.00	Phase Loss Protection	0x000 ~ 0x111 Ones digit of LED: 0: Disable input phase loss protection 1: Enable input phase loss protection Tens digit of LED: 0: Disable output phase loss protection 1: Enable output phase loss protection Hundreds digit of LED: Reserved	0x000~0 x111	0x010	○
P11.01	Instant Power	0: Disable	0~1	0	○

Function Code	Name	Description	Setting Range	Default Value	Modifi-ability
	Loss Frequency Reduction Function Selection	1: Enable			
P11.02	Instant Power Loss Frequency Drop Rate	If DC bus voltage drops to the frequency reduction point, the inverter will reduce the operating frequency by the instant power loss frequency reduction rate (P11.02), thus rapidly reduces the load power to maintain the normal operation of the solar pump. 	Model	L/S	H
Frequency Reduction Point	260V	460V		0.00~P00.03	0.00Hz/s	○
P15: Solar Pump Dedicated Function Group					
P15.00	Solar Pump Parameters Modifiability	0: Invalid Disable this function group and solar pump parameters cannot be modified 1: Valid Enable this function group and solar pump parameters can be modified	0~1	1	☆
P15.01	Vmpp Setting Mode	0: Manual set The target voltage is determined by the P15.02 value setting, which is a fixed value and is suitable for the system debugging stage. 1: Maximum power point tracking The target voltage determined by maximum power tracking voltage, which is	0~1	1	☆

Function Code	Name	Description	Setting Range	Default Value	Modifi-ability
		automatically adjusted in real time until it works at the maximum power point. Note: When S terminal function is set as 42 and active, this parameter setting is invalid.			
P15.02	Vmpp Manual Set Value	Unit: V Valid when P15.01 is set as 0; This setting value should be lower than the actual PV input voltage, otherwise the system will run at the lower frequency limit.	0.0~6553.5	L/S: 250.0V H: 350.0V	○
P15.03	PID Control Deviation Limit	The ratio of the deviation between actual DC bus voltage and reference voltage to the target voltage. The inverter will start PI control when the ratio is larger than this set value.	0.0~100.0	0.0%	○
P15.04	PID Control Maximum Output Frequency	The percentage of P00.03 maximum output frequency value. The target frequency obtained from PI control cannot be higher than this set value.	P15.05~100.0	100.0%	○
P15.05	PID Control Minimum Output Frequency	The percentage of P00.03 maximum output frequency value. The target frequency obtained from PI control cannot be lower than this set value.	0.0~P15.04	20.0%	○
P15.06	KP1	Ratio coefficients 1 of target frequency PI loop. The larger the value, the faster the adjustment.	0.00~100.00	5.00	○
P15.07	KI1	Integral coefficients 1 of	0.00~10	5.00	○

Function Code	Name	Description	Setting Range	Default Value	Modifi-ability
		target frequency PI loop. The larger the value, the faster the adjustment.	0.00		
P15.08	KP2	Ratio coefficients 2 of target frequency PI loop. The larger the value, the faster the adjustment.	0.00~100.00	35.00	○
P15.09	KI2	Integral coefficients 2 of target frequency PI loop. The larger the value, the faster the adjustment.	0.00~100.00	35.00	○
P15.10	PI Parameters Switch Point	When the deviation between actual DC bus voltage and reference voltage is larger than this set value, PI loop adopts coefficients 2, otherwise adopts coefficients 1.	0.0~6553.5	20.0V	○
P15.11	Source of Water Level Signal	0: Water level control switch input The water level signal is controlled by a switch input. Refer to the functions of S terminals 43 and 44 in P05 group for details; When the terminal input tank full signal is valid, the system will report a tank full alert (A-tF) after a delay time set by P15.14 and enter standby mode; In the tank full alert state, the tank-full signal is invalid. After a delay time set by P15.15, the system clears the tank full alert and resumes operation. When the terminal input source low signal is valid, the system reports a source low alert (A-tL) after a	0~1	0	☆

Function Code	Name	Description	Setting Range	Default Value	Modifi-ability
		delay time set by P15.16 and enter standby mode.; In the state of source low alert, the source low signal is invalid. After a delay time set by P15.17, the system clears the source low alert and enters the operating state again. 1: AI1 (Water level signal is input by analog AI1) 2: AI2 (water level signal is input by analog AI2) 3: AI3 (Water level signal is input by analog AI3) When this parameter is set as 1 to 3, indicates that the water level signal is controlled by the analog signal source. See parameters P15.12, P15.13 for details.			
P15.12	Tank Full Alert Threshold	Valid when P15.11 water level control is selected as analog input. When the detected analog signal for water level control is less than this set threshold and remains for a delay time set by P15.14, the system will report a tank full alert (A-tF) and enter standby mode. In non-continuous case, which is when the detected analog signal is greater than this threshold before the delay time is reached, the delay timer will automatically reset. Once the detected analog signal for water level control is less than this threshold again, the delay timer will restart. In the tank full alert	0.0% ~ 100.0%	25.0%	○

Function Code	Name	Description	Setting Range	Default Value	Modifi-ability
		state, when the detected analog signal for water level control is greater than this threshold, and remains for a time set by P15.15, the tank full alert will be cleared and the system reverts to the normal state. In non-continuous case, the delay timer will automatically reset.			○
P15.13	Source Low Alert Threshold	Valid when P15.11 water level control is selected as analog input. When the detected water level control analog signal is greater than this set threshold and remains for a delay time set by P15.16, the system will report source low alert (A-tL) and enter standby mode. In non-continuous case, which is when the detected analog signal is greater than this threshold before the delay time is reached, the delay timer will automatically reset. Once the detected water level control analog signal is less than this threshold again, the delay timer will restart. In the source low alert state, when the detected water level control analog signal is less than this threshold, and remains for a time set by P15.17, the source low alert will be cleared and the system returns to normal. In non-continuous case, the delay timer will automatically	0.0% ~ 100.0%	75.0%	○

Function Code	Name	Description	Setting Range	Default Value	Modifi-ability
		reset.			
P15.14	Tank Full Alert Delay Time	Tank full duration time before tank full alert. Unit: second	0.0 ~ 3600.0	10.0s	○
P15.15	Tank Full Reset Start-up Delay Time	Start-up delay time after water level returns to normal. Unit: second	0.0 ~ 3600.0	600.0s	○
P15.16	Source Low Alert Delay Time	Tank low duration time before tank full alert. Unit: second	0.0 ~ 3600.0	5.0s	
P15.17	Source Low Reset Start-up Delay Time	Start-up delay time after water level returns to normal. Unit: second	0~3600.0	600.0s	
P15.18	Level Sensor Damage Fault Threshold	Invalid when setting as 0.00%.. When non-0.0% is set, if the water level analog signal detected is greater than the P15.18 setting value, the inverter will report (tSF) fault and stop.	0.0% ~ 100.0%	0.0%	
P15.19	Load Low Operation Time	Set the under load operation time of the pump. Under the condition of continuous underload, a load low alert (A-LL) will be reported after the this set time reaches. Unit: seconds	0.0~1000.0	60.0s	
P15.20	Load Low Operation Current Threshold	Percentage of rated motor current (P02.05) When set to 0.0%, it is determined by the inverter's own underload. detection. Valid when non-0.0% is set. If the current is continuously less than this set value and the pump runs underload for a time set by P15.19, the load			

Function Code	Name	Description	Setting Range	Default Value	Modifi-ability
		low alert (A-LL) will be reported. In non-continuous case the delay timer will automatically reset.			
P15.23	Low Sunlight Fault Delay Time	When the output frequency is less than or equal to the lower limit of the PI output frequency, and remains running under weak light for this set time, the system will report low sunlight alert (A-LS) and enter standby mode. In non-continuous case, the delay timer will automatically reset. Note: When the bus voltage is lower than the undervoltage point (P15.37), the low sunlight is reported directly without delay. Unit: second	0.0~ 3600.0	100.0 s	○
P15.24	Low Sunlight Fault Reset Delay Time	Reset delay time after low sunlight alert. Unit: second	0.0~ 3600.0	300.0 s	○
P15.25	Given Reference Voltage	Unit: V	0.0~ 2000.0	0 V	●
P15.26	Minimum Reference Voltage of MPPT	The minimum reference voltage of MPPT. The reference value=open circuit voltage of PV panel * P15.26. The open circuit voltage of the PV panel is P15.25+P15.28. The MPPT tracking range will be within the range of the minimum voltage reference	0.00~ 1.00	0.7	○

Function Code	Name	Description	Setting Range	Default Value	Modifi-ability
		value ~ P15.27., P15.27 must be greater than the minimum voltage reference. The smaller the difference between them, the narrower the tracking range and the faster the tracking. However, it is necessary to ensure that the voltage point of the normal maximum power falls within this range. P15.26 and P15.27 must be adjusted appropriately according to the on-site situation.			
P15.27	Maximum Reference Voltage of MPPT	The maximum reference voltage of MPPT. Unit: V	0.0~ 6553.5	L/S: 400V H：750V	○
P15.28	Adjustment of initial reference voltage	MPPT begins to change from the reference voltage Initial reference voltage = PV voltage – P15.28	0.0~200.0	5.0V	○
P15.37	Bus Undervoltage Point	When the PV voltage is lower than the set voltage value, the system reports PV undervoltage fault. Unit: V	0.0~400.0	L/S: 150V H：260V	○
P17: State View Function Group					
P17.00	Setting Frequency	Unit: Hz	0.00~P0 0.03	0.00Hz	●
P17.01	Output Frequency	Unit: Hz	0.00~P0 0.03	0.00Hz	●
P17.02	Slope Given Frequency	Unit: Hz	0.00~P0 0.03	0.00Hz	●
P17.03	Output Voltage	Unit: V	0~1200	0V	●

Function Code	Name	Description	Setting Range	Default Value	Modifi-ability
P17.04	Output Current	Unit: A	0.0~500 0.0	0.0A	●
P17.05	Motor Rotation Speed	Unit: RPM	0~65535	0 RPM	●
P17.08	Pump Motor Power	Unit: the percentage of the pump motor rated power	-300.0~3 00.0	0.0%	●
P17.11	DC Bus Voltage	Unit: V	0.0~200 0.0	0.0V	●
P17.12	Switch Signal Input Terminal State	BIT4 ~ BIT0 S5 ~ S1	0x0000~ 0x01FFF	0	●
P17.13	Switch Signal Output Terminal State	BIT1 | BIT0 RO2 | RO1	0x0000~ 0x000F	0	●
P17.20	AI2 Input Voltage	AI2 Input Voltage Unit: V	0.00~10. 00	0.00V	●
P17.21	AI3 Input Voltage	AI3 Input Voltage Unit: V	0.00~10. 00	0.00V	
P17.25	Motor Power Factor	Motor operating power factor Unit: 0.01	-1.00~1. 00	0.0	●
P17.26	Current Operating Time	Current operating time of the inverter Unit: minute	0~65535	0m	●
P17.38	Main Winding Current	The main winding current of the motor when apply three-wire connection for single-phase motor control. Unit: A	0.00~10 0.00A	0.0A	●
P17.39	Secondary Winding Current	The secondary winding current of the motor when apply three-wire connection	0.00~10 0.00A	0.0A	

Function Code	Name	Description	Setting Range	Default Value	Modifi-ability
		for single-phase motor control Unit: A			

Chapter 5 Fault Diagnosis and Solution

Solar Pumping Inverters have complete protections. When a fault occurs, the inverter will take protection actions: the general protection is to instantly stop the output of the motor driving signal (shut down) and prohibit restarting for a period of time.

When the fault or protection occurs, the inverter will enter the fault display state, and the operation panel will display blinking fault code. After the fault or protection is cleared, the inverter will automatically carry out delayed restart. If the fault or protection occurs repeatedly for a certain number of times, the inverter will stay in the fault display state and not restart automatically anymore. Users can press ⬛ to reset after eliminating the fault. If the fault still exists after reset, please contact the manufacturer for help.

5.1 Common Faults and Solutions

The following faults may occur during the use of the inverter. Please refer to the solutions below for fault diagnosis and treatment.

5.1.1 No display after power-on

Check whether the inverter input power supply is normal and meet the inverter power requirements.

If there is no abnormality in the input power supply, the inverter internal circuit should be faulty. Please contact the manufacturer for help.

5.1.2 Tripping after power-on or during operation

Check whether there is grounding or short circuit between the input power supplies.

Check whether a leakage protector is installed at the input.

Check whether there is interphase short circuit between output modules. If so, please contact the manufacturer for help.

Check whether there is grounding or short circuit between motor leads.

If tripping occurs occasionally and the distance between the pump and the inverter is relatively long, please consider installing an output AC reactor.

5.1.3 The pump does not work while the inverter is operating

Check whether there is a balanced three-phase output between phase U, V and W. If so, the motor or its cables may be damaged, or the pump motor is locked-rotor due to mechanical reasons.

Check whether there is no voltage output. If so, the driving board or output module may be damaged. Please contact the manufacturer for help.

5.1.4 The inverter displays fault code and cannot operate

If a fault occurs during the use, please check the fault code in parameters P07.27~P07.32 and find solutions according to Table 5-1 Fault Code Description or contact the manufacturer directly for help.

5.2 Fault Code Description

Tab. 5-1 Fault Code Description

Fault Code	Fault Type	Possible Causes	Solutions
OC1	Overcurrent when Accelerating	1. Acceleration or deceleration is too fast 2. Input voltage is too low 3. Inverter rated power is too low 4. Pump load is abnormal 5. Cables are abnormal	1. Increase acceleration or deceleration time 2. Check the input power supply 3. Choose a power matching inverter 4. Check whether the pump motor is locked-rotor, whether the pump motor three-phase resistance is unbalanced, and whether the motor phase cables are not insulated from the ground 5. Check whether the output cables are correctly connected and well insulated
OC2	Overcurrent when Decelerating		
OC3	Overcurrent when Operating in Constant Speed		
OV1	Overvoltage when Accelerating	1. Input voltage is abnormal 2. Pump load is too heavy	1. Check the input power supply 2. Increase acceleration or deceleration time, or install proper braking resistance/unit
OV2	Overvoltage when Decelerating		
OV3	Overvoltage when Operating in Constant Speed		
UV	DC Bus Undervoltage	Input voltage is too low	Check the input power supply

OUt1	IGBT Phase U Fault	1. Acceleration is too fast 2. The IGBT of corresponding phase is damaged internally 3. Misoperation caused by interference 4. Bad connection of driving wires	1. Increase acceleration time 2. Contact the manufacturer for help 3. Check whether there are strong interference sources in the peripheral devices 4. Check the driving wires
OUt2	IGBT Phase V Fault		
OUt3	IGBT Phase W Fault		
OL1	Pump Overload	1. Input voltage is too low 2. Improper setting of pump motor rated current 3. Motor is locked-rotor 4. The power of inverter and pump do not match 5. Acceleration is too fast 6. Mismatched model selection	1. Check the input power supply 2. Set proper rated current of pump motor 3. Check the load and adjust the torque lifting capacity 4. Choose power matching motor and inverter 5. Increase acceleration time
OL2	Inverter Overload		
OL3	Program Defined Overload Alert	Improper parameter settings of overload alert	Check parameter settings of overload alert function
OH1	Rectifier Module Overheat	1. Air duct is blocked or cooling fan is damaged 2. Ambient temperature is too high 4. Connections or plug-ins in control board loosen 4. Rectifier module or IGBT is damaged	1. Clear air duct or replace cooling fan 2. Lower the ambient temperature 3. Check and reconnect 4. Contact the manufacturer for help
OH2	IGBT Overheat		
SPI	Input Phase Loss	Phase loss of input R, S, T	1. Check the input power supply 2. Check the installation wiring
SPO	Output Phase Loss	1. Phase loss of output U, V, W 2. Three-phase of pump is seriously unbalanced	1. Check the output wiring 2. Check the pump motor and cables
bCE	Braking Unit Fault	1. Braking circuit is faulty or braking pipeline is damaged 2. External braking resistance is too small	1. Check the braking unit and replace the braking pipeline 2. Increase braking resistance

CE	485 Communication Fault	1. Improper baud rate setting 2. Communication error in serial communication 3. Long interruption of communication	1. Set proper baud rate 2. Press [STOP/RST] to reset or contact the manufacturer for help 3. Check the wiring of communication interface
EEP	EEPROM R/W Fault	1. Error occurs when reading/writing control parameters 2. EEPROM is damaged	1. Press [STOP/RST] to reset or contact the manufacturer for help 2. Contact the manufacturer for help
END	Operating Time Over	User trial time is over	Contact the manufacturer for help
ItE	Current Detection Circuit Fault	1. Loose contact of the control board linker 2. Auxiliary power supply is damaged 3. Hall sensor is damaged 4. Amplifying circuit is abnormal	1. Check the linker and plug it again 2. Contact the manufacturer for help 3. Contact the manufacturer for help 4. Contact the manufacturer for help
ETH1	Grounding Short Circuit Fault 1	1. Inverter output cable is shorted to ground 2. Current detection circuit is faulty	1. Check the output wiring 2. Contact the manufacturer for help
ETH2	Grounding Short Circuit Fault 2		
A-LS	Low Sunlight Alert	1. Light is too weak 2. Solar panels are not sufficient	1. Wait for stronger sunlight 2. Check whether the solar panels are sufficient
A-tF	Tank Full Alert	1. The reservoir is full 2. Incorrect parameter setting or wiring	1. The inverter will stop automatically and restart after alert is cleared 2. Check the wiring and parameter setting of terminal S2

A-tL	Source Low Alert	1. Water level is too low 2. Incorrect parameter setting or wiring	1. The inverter will stop automatically and restart after alert is cleared 2. Check the wiring and parameter setting of terminal S3
A-LL	Load Low Alert	1. Water level is too low 2. Improper parameter setting	1. Check the water level 2. Adjust the dry running threshold

Tips: If the fault still cannot be eliminated according to the solutions above, please contact the manufacturer for help.

Warning: Please find out the fault cause and eliminate it before reset.

If the inverter cannot be reset or the fault occurs again, please do **NOT** reset again until finding out the cause, otherwise repeated reset will damage the inverter.

Chapter 6 Maintenance

6.1 Routine Inspection and Maintenance

Due to ambient temperature, humidity, dust, vibration and aging of the inverter internal components, some potential problems may arise during the operation. In order to ensure a long-term and stable operation of the inverter, routine and yearly inspection is necessary.

◆   **Inspection and Maintenance Requirements**

1.   The inspection must be performed by professional technicians and the power supply of the inverter should be cut off first if necessary.

2.   Before maintenance, the power supply of the inverter must be cut off, and please wait for not less than the time indicated on the inverter or the DC bus voltage is lower than 36 V.

3.   Please avoid leaving metal parts in the inverter, otherwise it may damage the device.

4.   If it is necessary to conduct insulation test on the inverter, all the input and output terminals must be reliably shorted. It is prohibited to conduct insulation test on a single terminal, and please use a 500 V megohm meter to conduct the test.

5.   Before conducting insulation test on the motor, the connections between motor and inverter must be removed.

◆   **Main Points of Inspection and Maintenance**

Tab. 6-1 Inspection and Maintenance Contents

Inspection Frequency		Inspection Item	Inspection Contents	Judging Criterion
Routine	**Regular**			
√		Operation Environment	1. Temperature, humidity 2. Dust, gas	1. Temperature < 50°C 2. Humidity < 90%, no dew condensation 3. No dust, no peculiar smell, no flammable or explosive gas
	√	Cooling System	1. Installation environment 2. Radiator 3. Fan	1. Good ventilation 2. No obstruction in radiator air duct 3. No abnormal noise or vibration, the accumulative operation time is less than 20,000 hours
√		Inverter	1. Vibration, temperature rise 2. Noise 3. Wires, terminals	1. Stable vibration, shell temperature rise is normal 2. No abnormal noise or peculiar smell 3. Fastening screws not loose

Inspection Frequency		Inspection Item	Inspection Contents	Judging Criterion
Routine	Regular			
√		Pump	1. Vibration, temperature rise 2. Noise	1. Steady operation, temperature rise is normal 2. No abnormal or non-uniform noise
√		Input and Output Parameters	1. Input voltage 2. Output current	1. Input voltage is in the specified range 2. Output current is under the rated value

6.2 Inspection and Replacement of the Damageable Parts

The fans and electrolytic capacitors in the inverter are damageable parts. In order to ensure a long-term, safe and trouble-free operation of the inverter, the damageable parts should be replaced regularly.

◆ Fans

The service life of the fan is about 20,000 hours. If the fan makes abnormal noise or vibration, please replace it immediately.

◆ Electrolytic capacitors

The service life of the electrolytic capacitor is related to the working conditions, especially the ambient temperature. It should be replaced after 40,000 hours use under normal conditions. If the electrolyte of the capacitor leaks, the safety valve pops out or the capacitor body expands, please replace it immediately.

6.3 Storage

The storage environment should meet the following requirements:

Tab. 6-3 Storage Environment Requirements

Item	Storage Environment
Temperature	-40℃ ~ 70℃
Humidity	5% ~ 95%, no dew condensation
Ambient Environment	No direct sunlight, no dust, no corrosive gas, no vibration (can use a plastic bag to seal and add desiccant inside)

☞ **Note:** Long-term storage will cause deterioration of the electrolytic capacitor. Thus it is necessary to power on the inverter every year. When the power is turned on, the voltage must be slowly increased to the rated voltage through a voltage regulator.

Warranty Agreement

Thank you very much for choosing our solar pumping inverters. The products are manufactured under strict production testing and material control. Once a fault occurs, we will serve you wholeheartedly.

1. Warranty

◆ The warranty of the inverter is 18 months from the factory delivery date.

◆ The replacement of components will not extend the warranty period.

◆ After the warranty expires, we still provide lifetime paid maintenance service.

2. Disclaimer (product damage caused by the following reasons is not within eighteen months free warranty)

◆ Operating against the manual or beyond the standard specification

◆ Repairing or modifying without permission

◆ Force majeure such as fires, salt corrosion, gas corrosion, earthquakes, storms, floods, lightning and voltage abnormal

◆ Improper storage

◆ Fall off damage or other external force intrusion due to improper transportation

3. Derivative liability

The manufacturer is not responsible for any special, indirect or secondary losses caused by the device. These include loss of profits, income, loss caused by using devices and related devices, cost of capital, cost of substitute devices, tool fees, service fees, cost of downtime, and loss caused by customers to their customers.

4. The situations that warranty is invalid

◆ The brand, trademark and nameplate on the product are damaged or unrecognizable.

◆ The user has not paid the purchase price according to the purchase and sales contract.

◆ The user deliberately conceals the poor use of the product during installation/wiring/operation/maintenance or other processes from after-sales service staff.

Warranty Card

Client Name		Contact	
Address		Telephone	
Product Model		Purchase Date	
Device Serial Number		Warranty Length (from the factory delivery date)	
Distributor (Seal)			

Packing List

1)   Inverter, 1 PC

2)   Operation manual (including warranty card), 1 PC

3)   Slotted screwdriver, 1 PC

4)   Water level switch, 1 PC (optional)

CE FC RoHS

Specifications are subject to change without notice, all product drawings are for reference only.