Solar Pumping Inverter

User Manual

JNP75KH-V3
JNP90KH-V3
JNP110KH-V3
JNP132KH-V3

JNP132KH-V3-EN-V1.0

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Preface

Manual Instruction

This manual describes the transportation, installation, operation, maintenance and troubleshooting of the following JNP inverters:

- JNP75KH
- JNP90KH
- JNP110KH
- JNP132KH

In order to describe conveniently later, JNP75KH, JNP90KH, JNP110KH, JNP132KH will be short for JNPxH, solar pumping inverter will be short for inverter. The inverter type shall be pointed alone, when introduce the information about each type of inverter in details.

Target Reader

This manual applies to the professional engineering and technical person who is responsible for installing and operating of inverter and LCD panel.

Use the Manual

Please read this manual carefully before installing and operating inverter. Please keep this manual well for operation and maintenance in future.

The manual content would be constantly updated and revised, but it unavoidably has slightly discrepancies or errors with real inverter, please kind prevail if user purchases our inverter.

Symbol Used

The following safety symbols may be used in this manual, and the meanings are shown in below.

Safety Symbol	Meaning
Danger!	Means that it may lead to serious accident of injuries, if safety warning is ignored.
Warning!	Means that it may lead to serious accident of injuries, equipment serious damage or main business interruption, if safety warning is ignored.
Notice!	Means that it may lead to moderate accident of injuries, equipment moderate damage or part of the business interruption, if safety warning is ignored.
Note!	Means that the content is additional information.

Inverter related symbols:

Symbol	Meaning
	Direct current (DC)
	Alternating current (AC)
	Protective grounding
	Refer to relevant instructions
	Can not discard inverter together with domestic garbage
	Beware of dangerous high-voltage.

	Should wait for 5 minutes after inverter and PV panel are disconnected, then inverter only can be touched.
	Beware of hot surface The inverter temperature can exceed 60℃ during operation. Please don't touch the surface to avoid scald.
CE	CE certification marks. It means that inverter complies with the requirement of CE certification.

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1 Safety Instructions

For the electrical and electronics equipment, safety relates to the whole process of installation, commissioning, operation and maintenance. Therefore, incorrect use or operation would damage the life and personal security of operating person or the third party, and inverters.

In order to reduce casualties, damage of inverter and other equipments, user or operating person should strictly abide by all the safety information tips of danger, warning and note which are in the process of operating and maintaining.

Warning !

All the installation and operation of Solar pumping inverter must be completed by professional and technical person. Professional and technical person need:

- Receive special training
- Read this manual completely and master the operation related to safety matters. Any damage caused by improper installation or operation which do not according to the introduction in this manual will be beyond the warranty scope of our company.

Before installation

Notice !

User should check the inverter if there is any damage during transportation. Please contact Supplier or transportation company immediately if some problems of inverter are found.

Installing

Ensure inverter not have electrical connections and electricity before installing.

Danger!

The solar cell arrays should be covered with opaque materials when installing the photovoltaic arrays during the day, otherwise the solar cell arrays will generate high voltage, causing person casualties.

Warning!

If inverter damage caused by the following circumstances will be beyond the warranty scope of our company.

- Ensure that the max. short-circuit of DC side is in the inverter allowable range when configuring PV arrays, otherwise, inverter may be caused non-recoverable damage.
- Ensure that the open circuit voltage of JNPxH shall not exceed 880V when configuring PV arrays, otherwise, inverter may be caused non-recoverable damage。
- It would influence the machine features and may cause machine damage if the installation environment is selected improperly.
- Do not install the inverter in inflammable, explosive place or inflammable, explosive materials storage .
- Don't install the inverter in explosive dangerous place.
- Don't install the inverter in place where vulnerable to lightning strike.
- Don't install the inverter in place where have more salt fog.
- When running the inverter, please ensure good ventilation.
- Inverter should be installed erectly, and ensure the heat sink, fans etc. are without shelter.

Electrical connections

Danger!

Ensure that the solar cell array should be covered by light tight materials, before electrical connecting, otherwise, the solar cell array would produce high voltage under the sun to cause casualties.

Warning!

- All the operation and wiring work should be operated by professional electrical or machine engineer.
- Please do not close any breakers before all the equipments are not fully connected well.

Notice!

- All the electrical installation must meet the electrical installation standard of local and country.
- In order to ensure safe running, proper grounding, using appropriate conductor size and providing short circuit protection are required.
- Connection cable must select suitable specification, firm connection and good insulation.

Running

Danger!

- DC connect need to be turned off firstly, and ensure that it has really no voltage.
- Please don't plug any connectors under inverter charged state!
- Please don't open the cover plate under inverter charged state!

Notice!

Only LCD display screen and DC switches can be touched when the inverter is running, the heating devices (such as radiator, etc.) should not be touched to avoid scald.

Maintenance

Danger!

- Maintenance should be done by professional maintenance technical person.
- Please ensure that DC connect should be turned off before checking and maintaining, after waiting at least 5 minutes, should measure DC side and AC side voltage with a voltage meter, to ensure that operation under the circumstance of no voltage between DC side and AC side.

2 Production Introduction

2.1 Solar pumping System Introduction

Solar pumping system is different from traditional AC pump application system, Solar pumping system is using solar cells to directly convert solar energy into electrical energy, then Solar pumping inverter drive the AC motor to drive pump getting water from deep well, river, lake etc., finally transport to the destination to meet our demand for water.

Solar pumping system consists of four parts: PV array, Solar pumping inverter, three-phase AC pump and storage device.

PV array absorb sunshine radiation energy and convert it into electrical energy, supply power for whole system.

Solar pumping inverter is an important part of Solar pumping inverter system, which convert the output DC from PV array into AC for driving pump, and according to the changes of sunlight intensity in real time to adjust the output voltage and frequency to achieve max. power point tracking and max. the use of solar energy.

Warning!

Inverter should not be connected with the positive or negative ground of PV string.

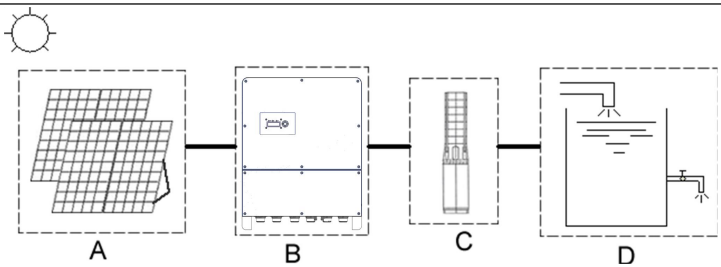


Figure2-1 Solar pumping application system

Table2-1 Solar pumping application system list

No.	Name	Description
A	PV array	Monocrystalline silicon, Polycrystalline silicon
B	Solar pumping inverter	Solar pumping inverter
C	AC pump	Three-phase AC pump.
D	Water storage device	Can be the reservoir, fields etc.

2.2 Production Introduction

2.2.1 Production Appearance

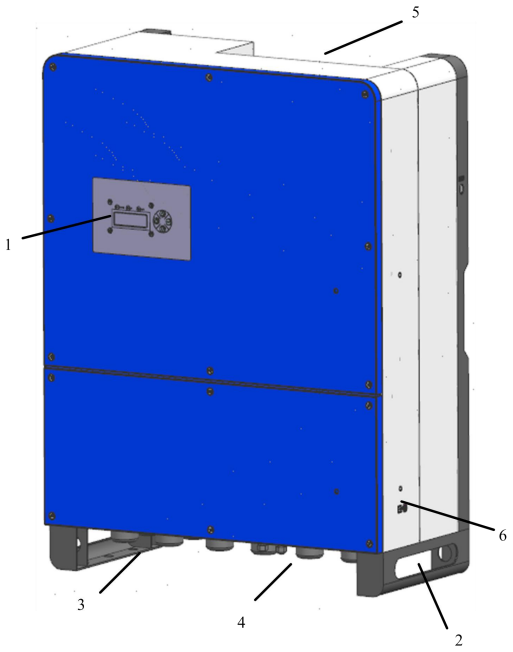


Figure2-2 Appearance of Solar pumping inverter

Table2-2 Inverter appearance information table

No.	Name	Introductions
1	LCD display screen	Man-machine interface, you can check the inverter operating information through LCD display screen, also can set some parameters of inverter.
2	Handle	Bottom handle

3	Input Wire casing	Including DC input terminals(PV+/PV-)
4	Output wire casing	The terminals include output terminals (U, V, V, and PE), water level sensor wiring terminals, and RS485 communication terminals.
5	Fan and Heatsinks	Help machine heat dissipation.
6	Nameplate	Listed inverter parameters

2.2.2 Production Dimensions

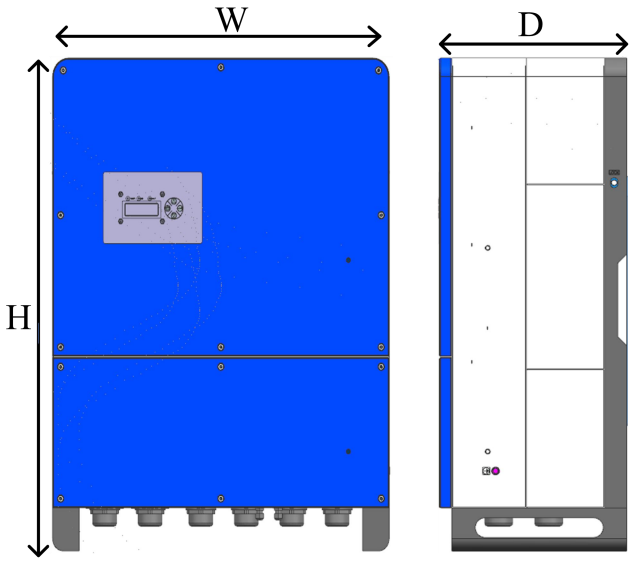


Figure2-3 Dimension drawing of Solar pumping inverter (unit : mm)

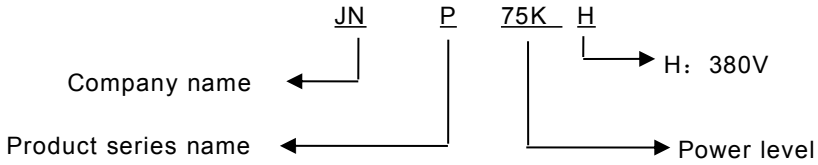
Table2-3 Inverter dimension table

Inverter type	Width(mm)	Height(mm)	Depth(mm)	Net weight（kg）
JNP75KH	600	800	600	68

JNP90KH	600	800	600	68
JNP110KH	600	800	600	68
JNP132KH	600	800	600	68

2.2.3 Product Name

The way of product naming, take JNP75KH for example:



2.3 Technical Feature

- Advanced IGBT power module;
- Use MPPT(Maximum power point tracking) technology, MPPT efficiency >99.9%;
- Automatic/ manual operation mode;
- Modular design, easy to install, operate, maintain;
- High conversion efficiency; low temperature rise; low noise; long lifespan;
- Advanced multi-languages LCD display and powerful communication interfaces;
- Wide MPPT input voltage range;
- Perfect system protection, high reliability.

3 Inverter Unpacking

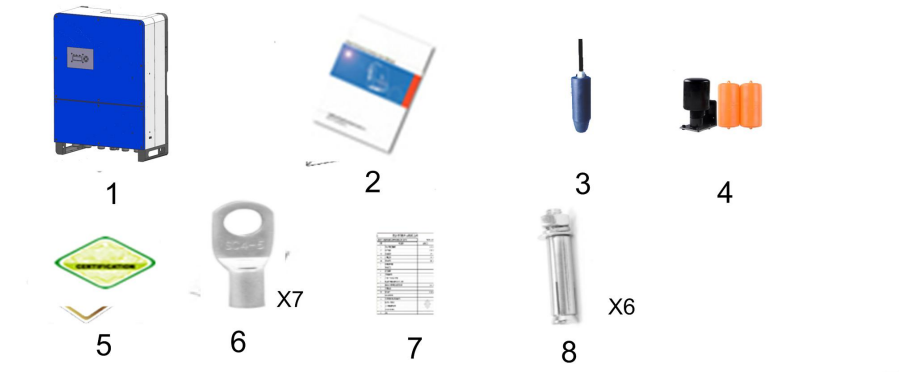
3.1 Unpacking Check

The product has been tested and checked carefully before transportation, but damage may be caused during transportation, therefore, the product should also be checked carefully before installation.

- Please check whether inverter outer packing is in good condition;
- After unpacking, please check whether the equipment is in good condition;
- According to the packing list to check whether all the parts is correct and in good condition.

If any damage is found, please contact Supplier. or the transportation company. Please keep well the photos taken at the damaged parts and we'll provide you with best and fastest services.

Supplier. supply the standard inverter and some commonly used accessories as below:



No.	Description	Status
1	PV pump inverter	Standard
2	User manual	Standard
3	Water level sensor B	Optional
4	Water level sensor A	Optional
5	Certificate of inspection	Standard
6	Cold pressed terminals	Standard
7	Packing List	Standard
8	expansion bolt	Standard

Figure3-1 Inverter and standard fittings

Note!

Photos are for reference only, please refer to actual products.

Table3-1 Inverter and fittings table

3.2 Identify Inverter

The nameplate in the side of inverter, and it shows the inverter model, main parameter and certificate mark.

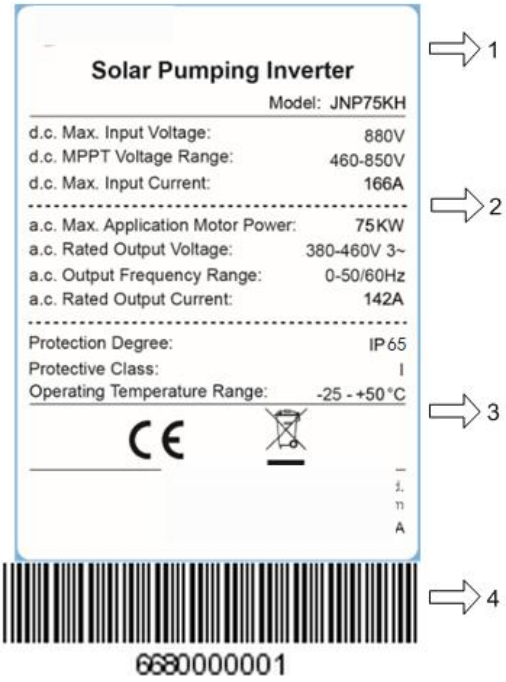


Figure3-2 Inverter nameplate

Table3-2 Nameplate information table

NO.	Description
1	Company Logo and name.
2	Inverter model and parameter information.
3	Certificate and safety signs, concrete meaning as “Preface”.
4	Company and address.
5	Inverter factory number.

Note !

Photos are for reference only, Please adhere to the original products!

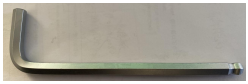
4 Installation Procedure

4.1 Prepare Installation Tools

Inverter installation and wire installation will need the following tools.

You also can choose the right tools according to your own experience

Table4-1 Installation tools list

Sketch map	Name	Recommend specification	Function
	Straight screwdriver	Φ3	Used for the AC wire installation.
	Cross screwdriver	Φ5	Used for disassembling inverter cover.
	Hydraulic Crimping pliers	Φ10	Crimp cable and terminals
	open spanner	Φ 13~15	Used to tighten expansion bolts and ground cable screws of the chassis
	socket spanner	Φ 17	Fastening screws for input and output cables
	socket head wrench	8#	Used for mounting support locking screw fastening

	electric drill	Φ 12	Drilling holes for fixing holes in the inverter mounting plate

4.2 Installation Steps

Follow these steps for installation.

Table4-2 Installation process

Installation steps	Installation instruction	Reference chapters
1	Before installation, check whether the inverter is in good condition or not;	
	Whether the product fittings are complete	3.1
	Whether the installation tools and spare parts are complete	4.1
	Whether the installation environment meets the requirements	1
2	Read the manual, especially the "Safety Instructions"	1
3	Choose the best installation location	5.1
	Installation	5.3
4	Electrical connection	6
	Select cables	6.3
	AC side wire connection	6.4
	DC side wire connection	6.5
	Sensor wire connection	6.6
	Communication wire connection	6.7
5	Commissioning	7
6	Configuration parameter	8
7	Debugging	9

5 Installation

5.1 Installation Site Required

Inverter installation site environment has very important influence to the safe operation, the performance and life of the inverter. Choose the right installation site before install the inverter.

Figure5-1 Installation Direction

- All installation must comply with local standards.
- Do not install the inverter at a flammable or explosive place or a place where the flammable or explosive materials are stored.
- Do not install the inverter in a place where there is a risk of explosion.
- Do not install the inverter in places where the inverter is vulnerable to lightning strike.
- Do not install the inverter in a higher salt spray environment
- Inverter installation site must be in good ventilation, do not install the

inverter in the closed case, otherwise the inverter will not work properly.

- Inverter protection level is IP65, can be installed outdoor, when the inverter is installed outdoor, should be installed as far as possible in the eaves or other have the shadow place, avoiding direct sunlight, rain and snow.
- Inverter is installed indoor, keep away from windows, avoiding lightning
- The installation place selected should be solid enough to support the inverter weight for a long period.
- The site for inverter installation must be clean and the ambient temperature must be maintained within -25 to +50 °C.
- Inverter installation site relative humidity should not be more than 95%, water vapor may corrode inverter, and damage the internal components
- The inverter must be installed in a place convenient for observation and maintenance
- Don't install the inverter in living area, the inverter will produce some noise when running, influence daily life.

5.2 Installation Direction

- The inverter should be installed vertically .
- Do not install inverter tilted forwards.
- Do not install inverters horizontally.
- The installation height of inverter should be convenient for operation and reading out of the LCD displayed information.
- Do not install the inverter in a place where children can touch.
- The inverter uses air cooling mode and the installation site selected should ensure the minimum installation spacing between the inverter and the fixed object and the nearby inverters to ensure good ventilation. And in front of the inverter need to keep enough space, is convenient to check the

LCD display information.

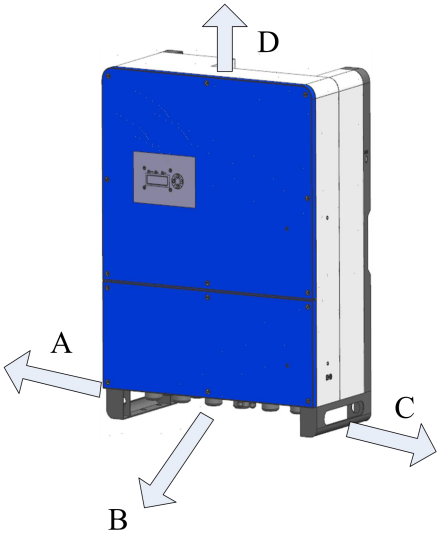


Figure5-2 Minimum spacing of adjacent installations

Table5-1 Minimum spacing dimension

Direction	Minimum spacing
A	100cm
B	100cm
C	100cm
D	100cm

6 Electrical Connection

The electrical connection can be carried out when the mechanical installation of inverter is completed. The following operation specification must be followed when making electrical connection.

Warning!

- All the electrical connection must meet local electrical connection standard.
- Only qualified electrical personnel can perform the wiring installation work.
- Incorrect wiring operation may cause operating casualties or equipment damage permanently.
- Ensure that there is no electricity in DC side before the electrical connection.
- Grounding correctly, using proper conductor and taking necessary Short-circuit protection to ensure the safe operation of inverter.
- Don't try to close any breaker before all the electrical connection is finished.

6.1 Schematic diagram of electrical connection

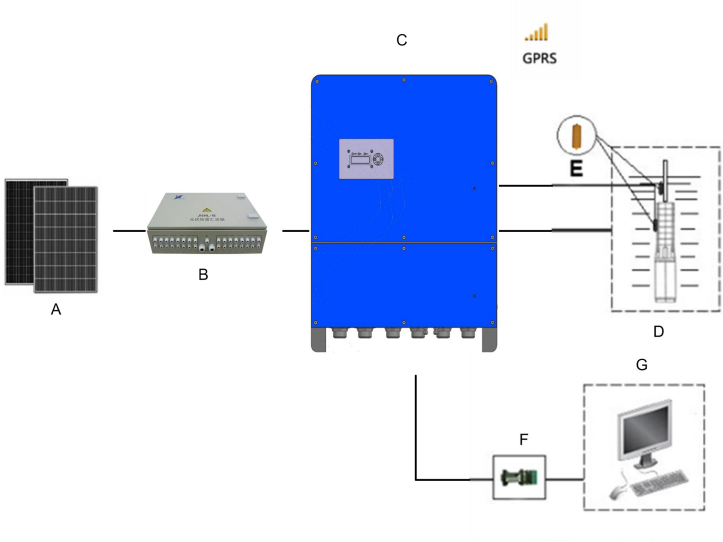


Figure6-1 External connection terminals of inverter

Table6-1 Terminals Description

No.	Items	Description
A	PV Array	Max. open voltage of each string is 880Vdc
B	PV combiner box	Non-standard accessory Can be ordered from SUPPLIER.
C	PV pump inverter	Main device of system
D	Pump	Three phase AC pump
F	RS485 communication conversion module	Non-standard accessory Can be ordered from SUPPLIER.
G	PC	Computer, monitor information of inverter, control on or off of inverter remotely.

		Modify system operation model remotely.

6.2 Inverter terminals

Input and Output terminals are at the bottom of inverter. As shown in following figure.

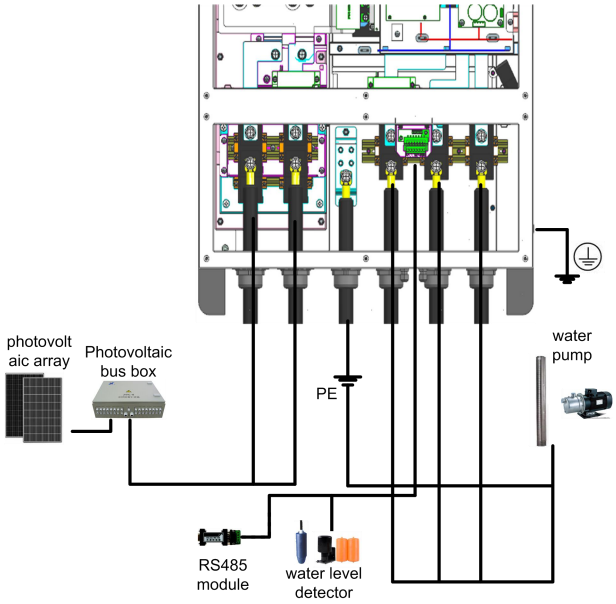


Figure6-1 Electrical connection terminal

Table6-1 Mark for connection terminals

Terminal	Description
PV1+/PV2+	PV positive input terminals
PV1-/PV2-	PV negative input terminals
U/V/W	AC output terminals, connect with AC pump
⏚	Grounding (Grounding screw on the right side of the chassis)。

PE	Output load grounding terminal。

6.3 Cable Selection for Electrical Connection

Please select cable according to the following table.

Table 6-3 Specification of Cables for Electrical Connection

Inverter model	Conduct cable recommendation（mm²）		
	DC side	AC side	
	PV+、PV-	U、V、W	PE
JNP75KH	70mm²	70mm²	35mm²
JNP90KH	95mm²	95mm²	35mm²
JNP110KH	120mm²	120mm²	50mm²
JNP132KH	120mm²	120mm²	50mm²

6.4 DC Side Connection

Danger！

Before connecting PV array and inverter, the PV array should be covered with opaque materials and the DC switch should be off, otherwise, the PV array may generate high voltage, and cause casualty. Non-professional person cannot operate.

Warning！

Before connecting PV array to the inverter, ensure the impedance between PV array with ground is not less than 1Mohm.

Note!

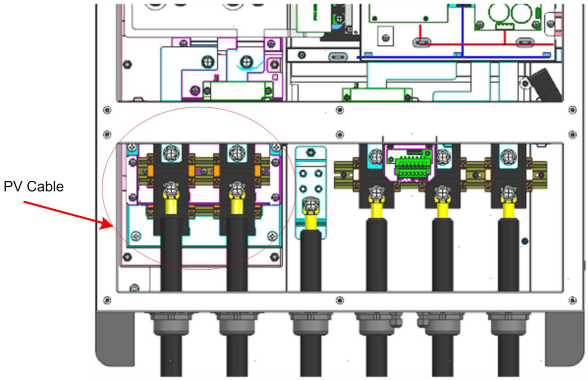
- make sure PV arrays are same, including the model of PV module, number, angle, azimuth, and connecting wires being with the same cross-sectional area.
- Inspect every system carefully before installation.

Step1: Please connect the wire of the DC connector according to the following

Step2: Ensure that the DC-side PV combine box are in off state.

Step3: Ensure that the positive and negative poles of PV array are connected rightly.

Step4: Plug the positive and negative connector into the corresponding terminals at the bottom of the inverter respectively.



Warning!

Make sure the Positive & Negative poles connection of PV array and Inverter are correct!

6.5 AC Side Electrical Connection

Notice!

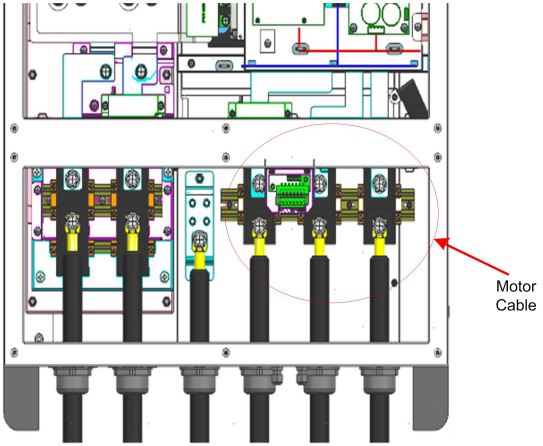
It's forbidden to connect several inverters in parallel to one set of pump!

Danger!

Ensure that all cables are not charged before electrical operation!

Step1: Wire connection of the connector:

Please connect the wire of AC connector according to the following figure:



Step2: AC cables connect with three phase terminals of pump, inverter earth wire connect with pump earth wire terminal.

6.6 Water Level Sensor Connection

Dry protection function: There have two kinds of detection models, automatic and manual. Automatic dry protection is achieved through inverter's software. And manual model need water level sensors to input signal through SENSOR inside Supplier Inverter.

Overflow Protection: water level sensors are requested to input signal through SENSOR inside Supplier Inverter.

Note!

- The water level sensors' location is designed according to your system situation.
- Water level sensor can be bound in corresponding position on the pipeline connected to the pump. Other method also can be used to ensure the water level sensor is in the right position.
- The installation of water level sensor must be reliable and effective.
- When use water level sensor to achieve function of overflow protection, set "**OF-F**" as "**On**", please refer to **"8.3.6.2 Key Parameters of the System Set"** for detail information.

6.6.1 Water level sensor interface define

Water level sensor connector pins in inverter panel port are defined are shown below:

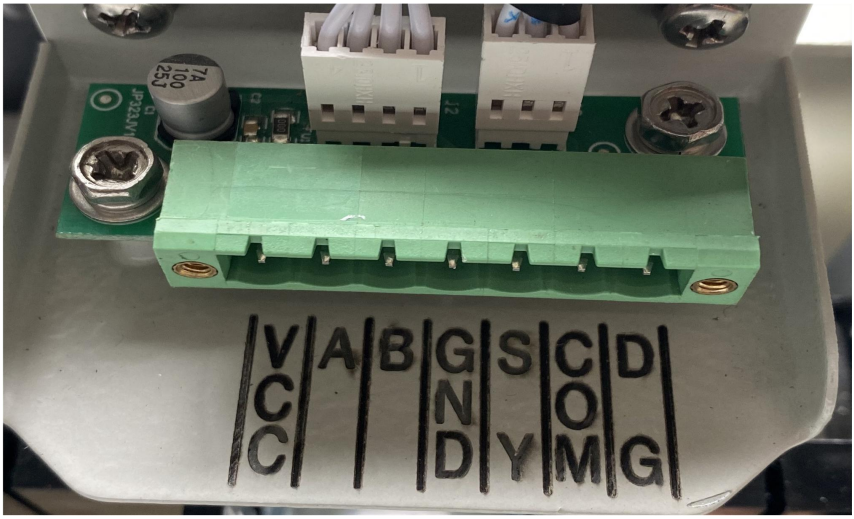


Figure 6-5 water level sensor connector terminals

Table6-4 the definition of pin of terminal block

Pin NO.	Description
A	RS485 communication terminal A
B	RS485 communication terminal B
VCC	Positive of VCC.
GND	Power supply VCC ground.
DG	Dry protection signal input terminal of sensor

SY	Overflow protection signal input terminal of sensor
COM	Common terminal of water level sensor

6.6.2 Water level sensor connection

Two kinds of water level sensor you can select are shown below:

Sensor A Sensor B

Figure6-6 Sensor

Notice!

If you select overflow protection water level sensor, you need to set the value of “OF-F”, the LCD menu ”Settings” → "Para Set" → "OF-F" to modify to “ON”. The setting method with reference to **“8.3.5 Key Parameters of the System Set”.**

If you selected water level sensor A, then water sensor installation method is shown below:

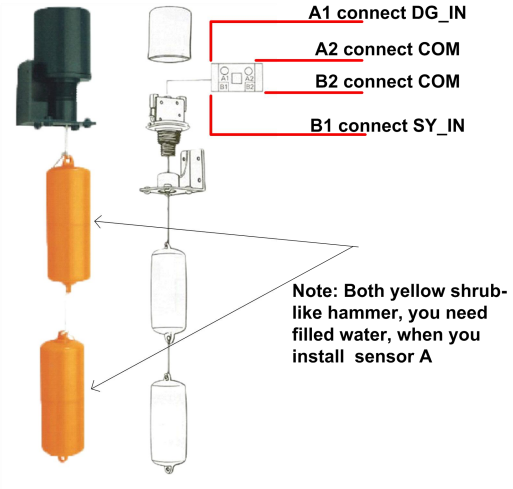


Figure6-7The detail figure of Sensor A

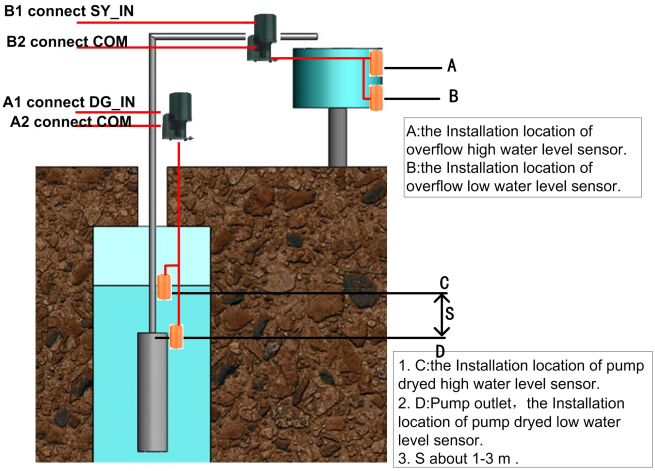
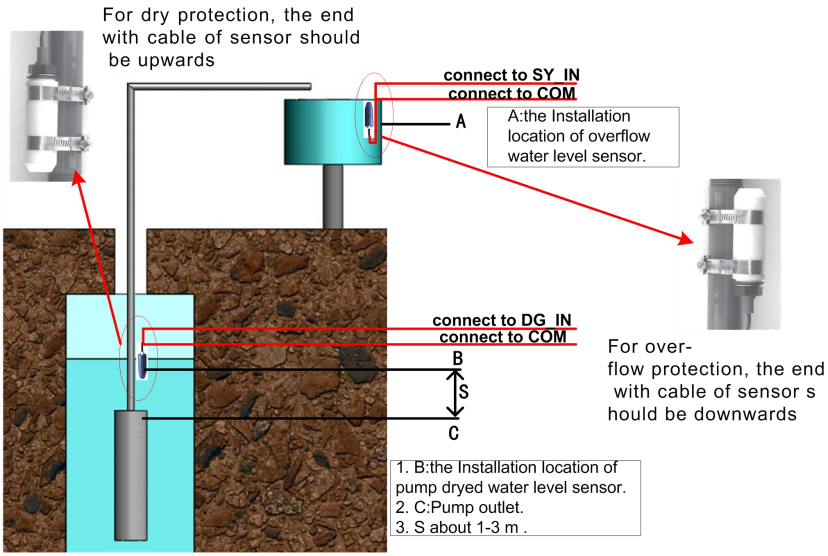


Figure6-8 The installation figure of Sensor A

If you selected water level sensor B, then water sensor installation method is shown below:



TheFigure6-9 The installation figure of Sensor B

Notice !

If you choose Water Level Sensor B, please note the following aspects when intall:

1. For dry protection, the end with cable of sensor should be upwards;

2. For over-flow protection, the end with cable of sensor should be downwards.

6.7 Communication Connection

6.7.1 RS485 Communication

When the inverter is for stand-alone communication, the communication connector can be used for communication connection between inverter and monitor equipment.

The COM terminal outside is for remote communication, output cable connect into monitoring PC. please refer to table 6-4 for COM terminals with inverter weak current signal connection terminals instruction.

The following diagram guides you to connect a single inverter to monitoring equipment.

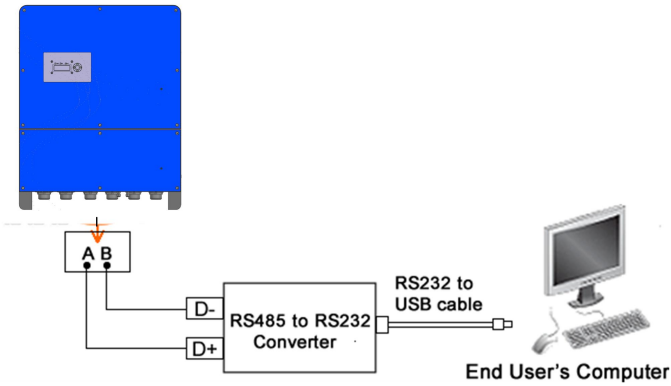


Figure6-10 Diagram of single communication wiring

The wiring diagram is schematic diagram, just take HEXIN converting module as an example. If the user choose other converter, need according to the converter‘s instructions, wiring the inverter’s A, B wires to the converter’s correct terminal.

Please refer to “**Inverter Management System User Manual**” for the corresponding monitoring software settings, after completing the wire connection.

6.7.2 GPRS Communication

Note：More information about the communication module, please refer to the **User**

and Installation Manual for GPRS.

7 Commissioning

7.1 Verify before Commissioning

PV Arrays

The PV array should be checked before operating the inverter, and to ensure that the positive and negative mustn't be misconnect, otherwise, the damage may be caused to the inverter. Make sure that the open-circuit voltage of photovoltaic array doesn't exceed the required voltage.

DC Input

Make sure that the DC terminals of the inverter are connected correctly and maintained consistent with the PV array.

AC Output

Make sure that the AC-side of inverter is connected correctly, and phases of AC-side are connected correctly.

Verify of the water pump motor parameters

Check the electrical parameters on water pump motor nameplate: the rated input voltage and input current frequency, to ensure inverter is matched with the pump.

7.2 Inverter being power on for the first time

Choose sunny day, and make sure the normal operation of your solar pumping system. Make sure that inverter work under high output power, high output frequency as much as possible. Please ensure the following condition before commissioning.

- Ensure that the inverter is connected correctly to the pump
- Ensure that the polarity of PV arrays are correct.

- Ensure that the AC and DC terminals are connected firmly.
- Check whether the system pipeline is unobstructed or not;
- Switch on the DC-side circuit breakers.

After finishing the above all, then begin initialization.

7.3 Modify motor parameters

After initialization, enter into critical parameters' setting, check inverter default with pump motor parameters, including : "U-Rated", "I-Rated", "P-Rated", "F-Rated", "RPM-Rated", "PF-Rated", and modify the inconsistent default of inverter.

Please refer to "**8.3.6.2.Key Parameters of the System Set** "for system critical parameters' setting.

The default motor parameters are shown as the below table 7-1.

table 7-1: The default motor parameters

Model	Rated volt.	Rated current	Power	Frequency	Rated rotate speed		Power factor
					Surface pump	Submersible pump	
JNP75KH	380V	142A	75KW	50Hz	1475	2875	0.86
	---	---		60Hz	1770	3450	
JNP90KH	380V	171A	90KW	50Hz	1475	2875	0.86
	---	---		60Hz	1770	3450	
JNP110KH	380V	209A	110KW	50Hz	1475	2875	0.86
	---	---		60Hz	1770	3450	
JNP132KH	380V	251A	132KW	50Hz	1475	2875	0.86
	---	---		60Hz	1770	3450	

7.4 Motor parameters' detection and commissioning

7.4.1 Motor parameters' detection

7.4.1.1 Motor parameters' detection

After finishing the modification, press "ENTER" & "DOWN" at the same time to return to the first screen, long-press "ON/OFF" for 4S, and inverter begin motor parameters' detection, if success, it will indicate "Test finish Start up? YES/NO"; If failed, it will indicate" R-Stat Test fail", then please refer to "**9.1 Trouble Shooting** ", figure 9-1 for reason.

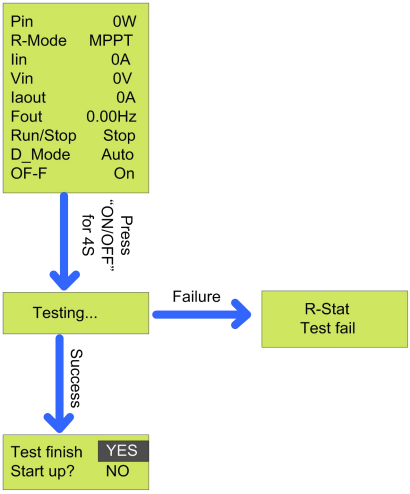


Figure 7-1 Motor Parameters' Detection Interface

Note!

In some special occasion, re-detection of motor parameters is required, such as change pump, the "DebugMode" should be changed to 6, then press "DOWN" and "ENTER" at the same time to return to the first screen, and begin detect.

7.4.1.2 Set motor parameters by manual

If the first commission failed caused by motor parameters' mismatching, and reset by manual is required. Please refer to the following steps:

1. Stop Inverter;
2. Refer to "**8.3.5.3 Key Parameters of the System Set** " to change "MP-Sel" to "manual";
3. Refer to "**8.3.5.3 Key Parameters of the System Set** " to revise the parameters of "R-Stat", "R-Rotr", "L-Mutu", "L-Leak" to the specified value. (Contact Supplier for the specified vale)
4. Return to the first screen (press "DOWN" and "ENTER" at the same time), and start inverter.

7.4.2 Commission

7.4.2.1 Self-detect motor parameter

After finishing motor parameters' detection, LCD screen will indicate" Test finish start up? YES/NO", select "YES", and inverter will start; select "NO", inverter will stay in motor detection model, and re-detect when start it again.

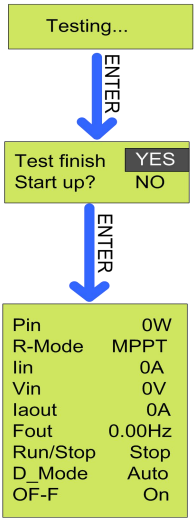


Figure 7-2 Inverter start to operation inverter

Note!

- If there is no water output , or flow rate is less than normal situation, even there has abnormal sound of pump, possible reasons are shown below:

a) Pump motor reversal caused by wrong phase sequence connection. Stop inverter, enter into “M-Mode” setting interface, please refer to“**8.3.6.2 Key Parameters of the System Set** ”;

b) Output power of PV array is not enough.

- If there occurs abnormal during the first commission, please refer to “**9.1 Troubleshooting**” for trouble shooting.
- If it occurs output frequency is very low, and output current is very big at the same time, please refer to “**7.4.2.2 Motor parameters’ setting by manual**”.

7.4.2.2 Motor parameters' setting by manual

If inverter alarm malfunction and cannot pump water caused by mismatching parameters during the first commissioning, setting motor parameters by manual is required.

First step: Stop inverter;

Second step: refer to "**8.3.6.2 Key Parameters of the System Set** " to change "MP-Sel" to "manual";

Third step: Press "ENTER" and "DOWN" at the same time to return to the first screen.

Note!

a) This four parameters of "R-Stat", "R-Rotr", "L-Mutu", "L-Leak" in the setting menu are default;

b) If start the inverter based on those default, but it occurs output current exceed motor rated current by 4%, and output power is less than 50%, and the output frequency is normal, that means "R-Stat" is bigger. Solution: Stop inverter, enter into setting menu to reduce "R-Stat" by 10%, and try again. If it still cannot work, reduce by 10% every time till system can run well (40% max.).

c) If it occurs output current is big, but output frequency is low, and no water output, which may caused by the mismatching of "R-Stat" and "L-Mutu". Solution: Stop inverter, enter into setting menu to reduce "R-Stat" and "L-Mutu" by 10% respectively, and try again. If it still cannot work, reduce both by 10% every time till system pump water (40% max.). If it occurs situation b) at this time, please refer to b) solution to solve it.

d) If it occurs abnormal during the first commissioning, please refer to "**9.1 Troubleshooting**" for reason.

7.5 Inverter Operation Mode Switch

There are two kinds of operation mode of Inverter, one is Vector Control as default, and the other one is VF Control. If you want to try VF, or the performance of Vector is not good, please refer to the following step:

First: Stop inverter, and ensure it's standby;

Second: Refer to "**8.3.6.2 Key Parameters of the System Set** " to set the "DebugMode" as "3";

Third: Refer to "**8.3.6.2 Key Parameters of the System Set** " to set the "Run-Mode" as "CVT";

Forth: Set the "UINST" as "0.85*"Vin""(standby);

Fifth: Return to main interface, long-press "ON/OFF" for 4S to start inverter.

7.6 Overload current setting

After the success of first commissioning, please refer to "**8.3.6.2 Key Parameters of the System Set** " to set the "Imotor" as 1.1 times of "I-Rated".

7.7 Stop Frequency Setting

Solar pumping system for the first time trial run is successful, need to set the system shutdown frequency, as follows.

Step 1: Ensure the system is running and there has water output. To enter "StopFreq" interface. Please refer to **"8.3.6.2 Key Parameters of the System Set".**

Step 2: To reduce the value of "StopFreq". Reduce 5 each time (every change need to press "ENTER" to confirm). Keep reducing till there just has no water output, and make a small change to just get small water come out, and the value is the very data of "StopFreq".

Step 3: Escape the "StopFreq" interface.

Finish the debugging.

Note!

The set of “StopFreq” can ensure inverter stop working when the output power of PV array is too weak to pump water, which can increase the pump’s lifespan.

8 LCD Panel Operating Instructions

8.1 Inverter LCD Display

There have three LED lights, four buttons on the LCD Display, shown in figure 8-1.

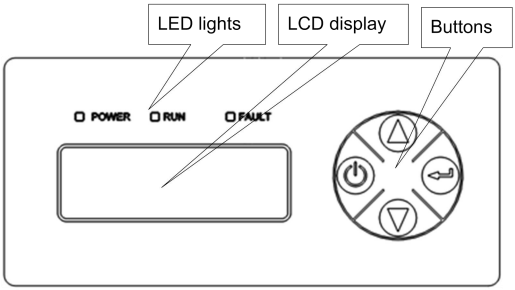


Figure8-1 LCD Display

8.1.1 LED Indicator Direction

Table8-1 LED Indicator Direction

LED Indicator	Name	Color	Instructions
POWER	Power light	Green	Light on When power on
RUN	Running light	Green	Light on under normal operation
FAULT	Faulty light	Red Yellow	Failure light (when there is a fault and the fault is not eliminated, the red light; When the status prompt appears, the yellow light is on.)

Detail Explanation of Indicator

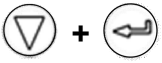
- When inverter is powered up, “POWER” indicator (green) will be lighted.
- Communication fault occurs, “FAULT” indicator flashes rapidly.
- Other outage or shutdown mode occurs, “FAULT” indicator will be lighted,

until fault or status are cleared.

- When invert is running normally, “RUN” indicator will be lighted.

8.1.2 Description of Buttons

Table8-2 Buttons Function Table

Buttons	Name	Functions
	“ON/OFF”	Press once to stop; long time press for 4s to get it started.
	“UP”	Page up and increase data.
	“DOWN”	Page down and decrease data.
	“ENTER”	To choose and confirm.
	“DOWN+ENTER”	Return to main interface.

Note!

When inverter is powered up, LCD display background is lighted, and after 30s normal running, the background light turns off.

8.1.3 LCD Display Interface Overview

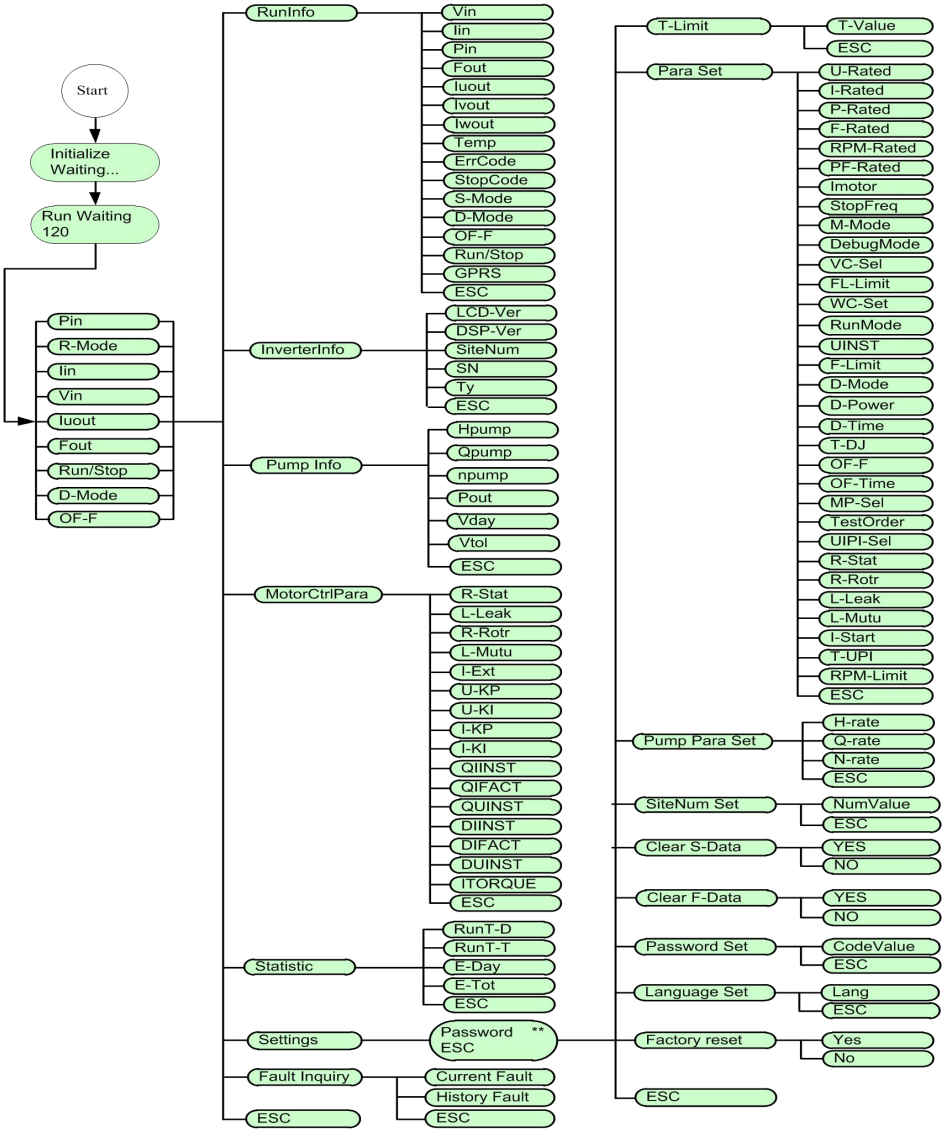


Figure8-2 LCD diagram

8.2 Initial Operational Interface

Once the inverter power on, the system start to initialize, display the initialization interface:

Figure8-3 System initialize

If the start-stop mode is auto., countdown interface will be display after initialization complete, and when countdown finished, LCD will enter the main interface, inverter will drive water pump. “RUN” indicator light.

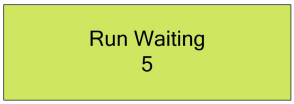


Figure8-4 Countdown interface

If the start-stop mode is manual mode (factory setting), the inverter is run to drive pump after long-time pressing "ON/OFF" key.

Note!

- The default mode of inverter is manual start-stop mode. When inverter power for the first time, it need key-press to start the inverter to drive pump.(Run after long-time press “ON/OFF"), at the same time, manual start-stop mode will change into automatic start-stop mode directly.
- Press “ON/OFF” stop the inverter and it will get started while long-time pressing “ON/OFF”, if not do like this, the system won’t start.

- LCD display two lines of characters.
- Time control of inverter running, saying after setting the running time, and inverter can stop auto. Please refer to "**8.3.5.2 Timing Shutdown Time Set**" for timing shutdown setting.

After inverter initializing, main interfaces will be displayed circularly:

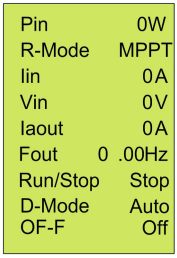


Figure8-5 Main interface

Main interface display basic running information. Main interface will turn page auto after 10s, or you can turn page through pressing "UP" and "DOWN" button.

Figure8-3 The meaning of main interface parameters

Parameters	Instructions
Pin	Inverter input power (W).
R-Mode	Operation mode, MPPT.
Iin	Inverter input current (A).
Vin	Inverter input voltage (V).
Iuout	Inverter A phase current (A).
Fout	Inverter output current frequency (Hz).
Run/Stop	Run or stop state.

	Run: Inverter running. Stop: Inverter stop and pump stop work.
D-Mode	Dry mode of PV pump system: "AUTOMATIC" doesn't need external water level sensor, "DETECTION" need external water level sensor.
OF-F	The optional function of overflow alarm in PV pump system.
	On: Inverter has over-flow protection function, If user's solar pump system include water storage device, this parameter should be set to "ON". Off: The inverter has no overflow alarm If the factory setting about inverter is "OFF". Note: To realize overflow alarm function, there need install external water level sensor, please refer to "6.6 water level sensors connect" for detail.

8.3 Main Menu

When the main interface is displayed, press "ENTER", then enter the main menu and set or query the detail data, or set the function.

Table8-4 Information list of main menu

Name	Explain
RunInfo	Display running data of inverter.
InverterInfo	Display basic information of inverter.
Pump Info	formation Displays basic pump information.
Statistic	Statistical information of running time data and power inverted.
MotorCtrlpara	Display internal control parameters for motor control.
Settings	Inverter's parameter setting.

FaultInquiry	Inquire current and historical fault.
ESC	Return to the previous menu.

8.3.1 Operation Information

RunInfo, display the running information of the inverter, please refer to the figure below.

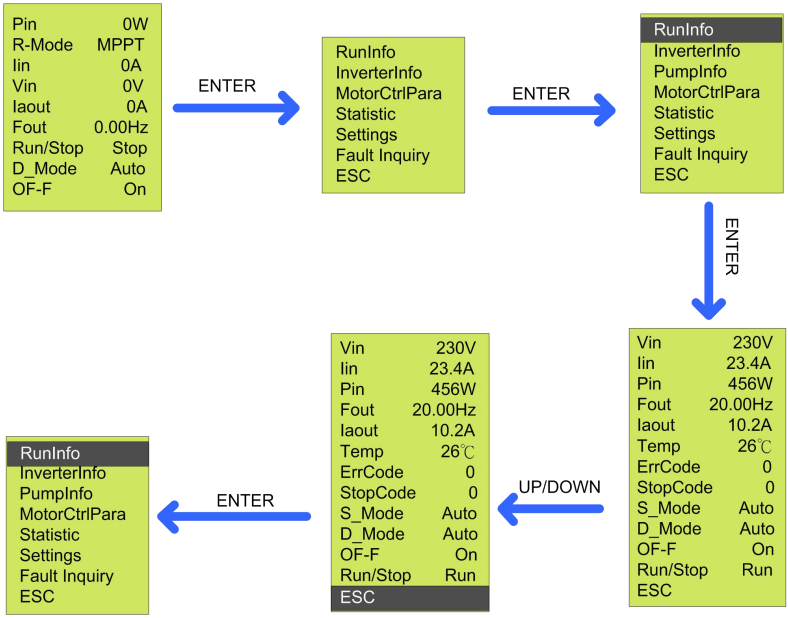


Figure8-6 Procedure of running data inquiry

Table8-5 RunInfo datas

RunInfo	Introduction
Vin	Inverter input voltage(V)
Iin	Inverter input current(A)

Pin	Inverter input power(W)
Fout	Inverter input current frequency(Hz)
Iuout	Inverter output U phase current (A).
Ivout	Inverter output V phase current (A).
Iwout	Inverter output W phase current (A).
Temp	Inverter radiator's temperature(℃)
ErrCode	The most recently error mode.
StopCode	Stop code, can check the reason of inverter shut down most recently.
S-Mode	Start and stop mode.
D-Mode	Protection mode against well dry out.
OF-F	Water overflow alarm function optional in PV pump system storage device.
Run/Stop	Run /stop status.
GPRS	GPRS connection status of the inverter
ESC	Return to the previous menu.

8.3.2 Basic Information

InverterInfo, shows basic information of inverter, please refer to the figure below.

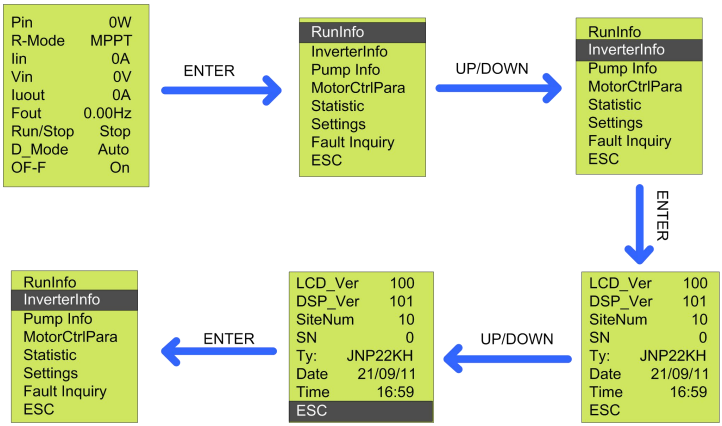


Figure8-7 Procedure of information inquiry

Table8-6 Detail information of inverter

InverterInfo	Explain
LCD-Ver	Version information of LCD program.
DSP-Ver	Version information of DSP program.
SiteNum	Site number of network node of inverter, when communicate with RS485. Default value is 10. If modifiable, please refer to“8.3.5.4Site Number Set”.
SN	Series number of inverter.
Ty	Type of inverter.
Date	Current day, from left to right shows day, month and year. This figure is modifiable, please refer to “8.3.5.1Display Time Set”.
Time	Current time, modifiable, please refer to “8.3.5 Display Time Set”.
ESC	Return to the previous menu

8.3.3 Pump Information

Pump information item show the basic information of pump.

Pump Info	Description	Remark
Hpump	Pump running lift head (m)	The rated head, rated flow and rated speed in the setting menu must be set first; otherwise, they all appear to be zero.
Qpump	Pump current water flow (m3/h)	
npump	Pump current running speed (r/m)	
Pout	Pump current power (W)	
Vday	Pump daily water output on that day (m3)	
Vtol	Pump total water output (m3)	
ESC	Return to the previous menu	

Figure 8-7 Pump information description

8.3.4 Motor control parameter interface

“Motor ctrl Para”, which is the displayed value after finishing motor detection, and relative parameters for motor control computed by. Please refer to the following diagram for motor control parameter query.

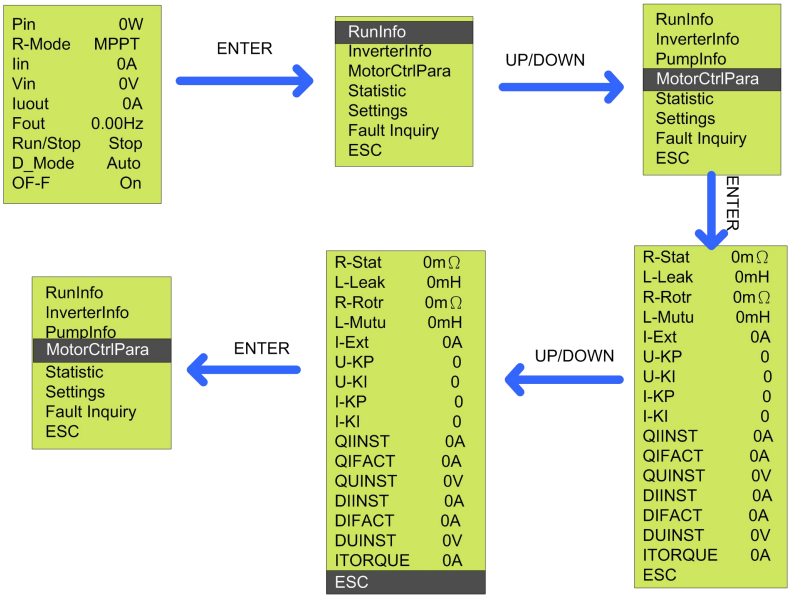


Figure8-8 Motor control parameter query step figure

Table 8-8 Motor control parameter list

Motor control parameter	**Instructions**
R-Stat	Detected motor stator resistance
L-Leak	Detected motor leakage
R-Rotr	Detected motor rotor resistance
L-Mutu	Detected motor mutual inductance
I-Ext	Excitation current
U-KP	Proportional coefficient of voltage loop
U-KI	Voltage loop Integral coefficient
I-KP	Proportional coefficient of current loop
I-KI	Current loop Integral coefficient

QIINST	Q axis instruction current
QIFACT	Q axis actual current
QUINST	Q axis instruction voltage
DIINST	D axis instruction current
DIFACT	D axis actual current
DUINST	D axis instruction voltage
ITORQUE	Max. torque current
ESC	Return to previous menu

Note!

The above parameters can only be read, cannot be revised.

8.3.5 Statistic Interface

Statistic, statistic of the totally running time and power generation of inverter. Please refer to figure below.

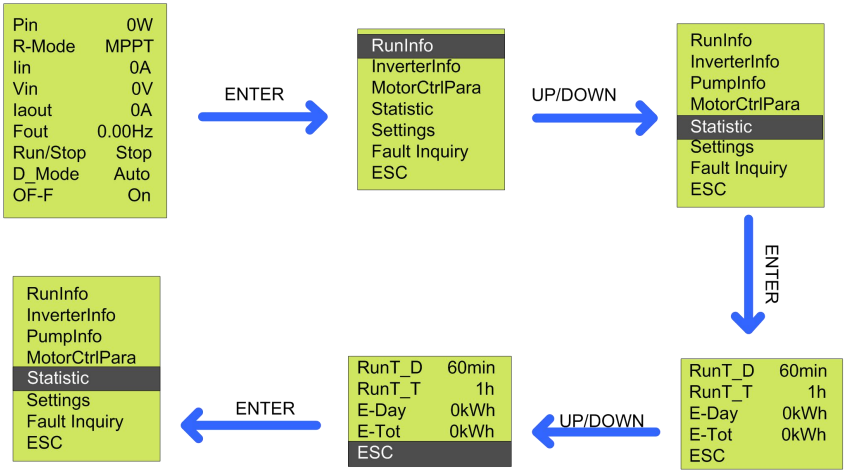


Figure8-9 Statistic data inquiry procedure

Table8-9 Detailed statistic data

Statistic	Explain
RunT-D	Inverter daily running duration. This figure will be reset when recharged.
RunT-T	Accumulative running duration. This figure can be reset manually. Please refer to **"8.3.3Statistical Data Clear"**.
E-Day	Daily power inverted. This figure will be reset when recharged.
E-Tot	Accumulative power inverted, can be reset manually. Please refer to **"8.3.3Statistical Data Clear"**.
ESC	Return to the previous menu

8.3.6 Parameter Setting

Settings, set the parameter, please refer to the figure below.

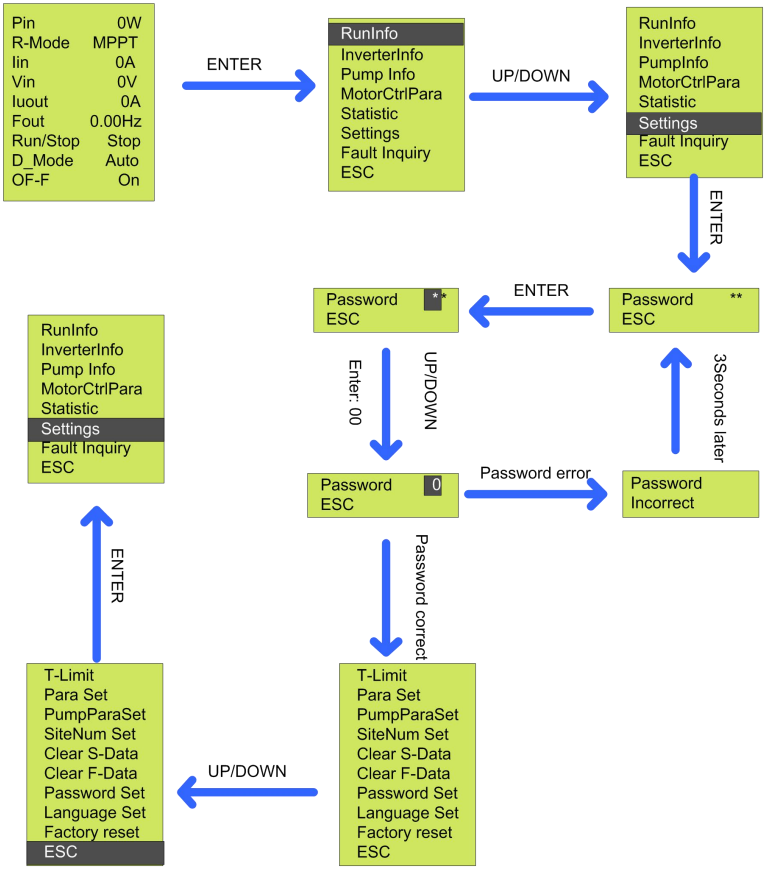


Figure8-10 Parameter setting

Note!

Default value of factory password is 00.

Table8-10 Inverter setting

Settings	Explain
T-Limit	To set the stopping time according to user requirement, inverter will stop running automatically as setting.
Para Set	For user to set the critical parameters of Solar pumping system.
PumpParaSet	Set pump parameters
SiteNum Set	Site number setting for remote communication.
Clear S-Data	To clear total running time and cumulative output power.
Clear F-Data	To clear historical faults' records.
Password Set	Password setting of entering setting menu.
Language Set	Language setting of entering setting menu.
Factory Reset	Used to restore factory default Settings
ESC	Return to the previous menu.

8.3.6.1 Timing Shutdown Time Set

T-Limit, to set timing shutdown time of the inverter. Please refer to the figure below.

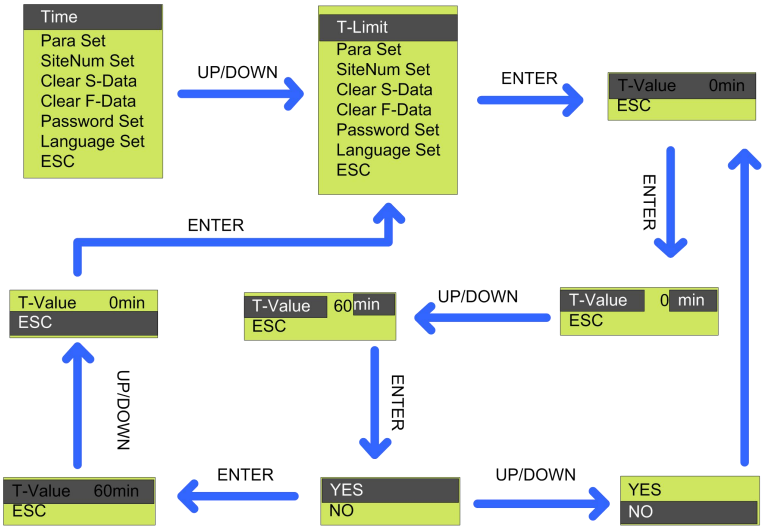


Figure8-12 Procedure of timing set

8.3.6.2 Key Parameters of the System Set

Para Set, to set the key parameters when your chosen pump is not matched to the rated power of Inverter. Please refer to the figure below.

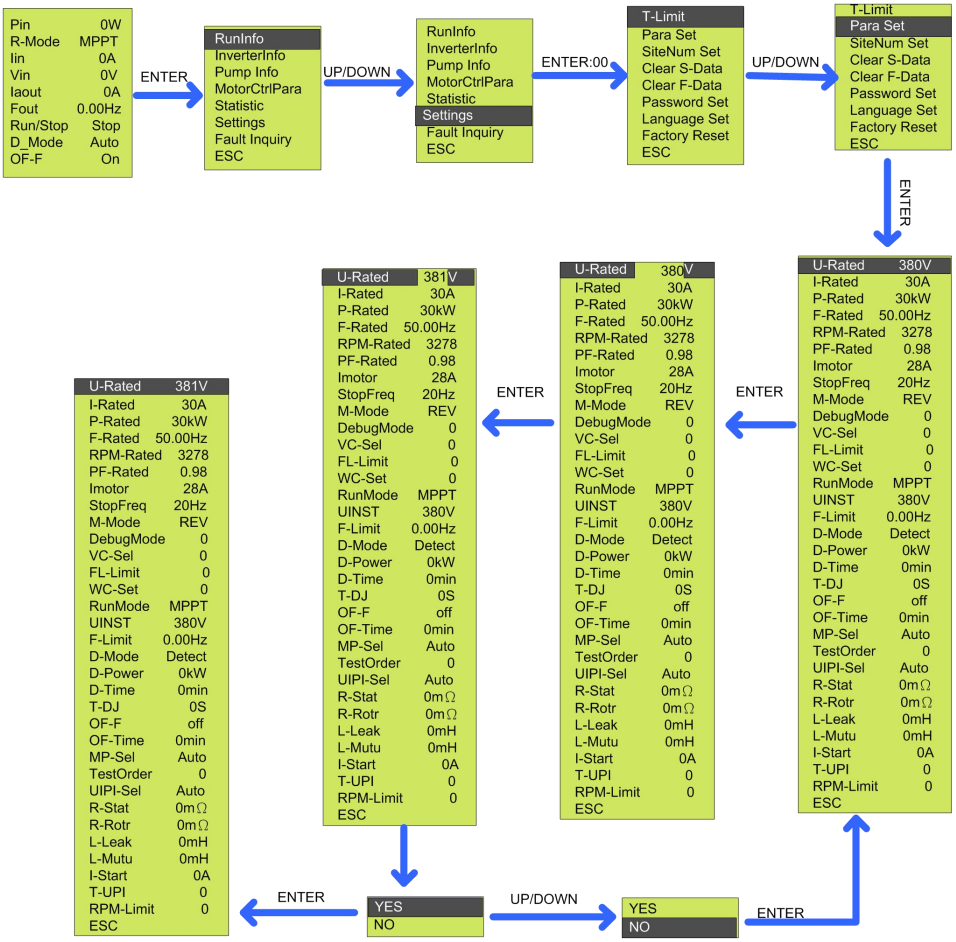


Figure8-13 Procedure of key parameters reset

Note!

Just take “U-Rated” set as an example, other setting is the same.

Table8-11 Loading matching set

Para Set	Explain
U-Rated	Motor rated voltage (V), which should be set according to pump nameplate.
I-Rated	Motor rated current (A), which should be set according to pump nameplate.
P-Rated	Motor rated power (w), which should be set according to pump nameplate.
F-Rated	Motor rated frequency (Hz), which should be set according to pump nameplate.
RPM-Rated	Motor rated rotate speed (rpm), which should be set according to pump nameplate.
PF-Rated	Motor rated rotate speed (rpm), which should be set according to pump nameplate.
Imotor	The pump motor over-load protection value when over-load, please refer to the rated current of motor to set this parameter, which should match motor over-load capacity, recommended to equal the rated current of motor.
StopFreq	Stop frequency (Hz). Setting principle is stop frequency when minimum flow is output.
M-Mode	If water output is abnormal, and caused by reversed motor phase sequence, you can try to reset this model from “REV” to “FWD”.Default is “FWD”.
DebugMode	This item indicate the running model of inverter: =0 Vector current control model; =1 Vector voltage control model;

	=3 VF control model; =5 Step by step motor parameter detection model; =6 Continuous motor parameter detection model; =8 Theoretical calculation PI parameter model.
VC-Sel	=0 full-order mathematic model; =1 voltage model; =2 improved voltage model; =3 improved full-order mathematic model.
FL-Limit	Flux linkage limit of motor.
WC-Set	Voltage WC.
Run-Mode	Run mode. Default is “CVT”.
UINST	Command voltage, you need to reduce this value to 0.85 times of Vin when inverter is stop.
F-Limit	Frequency limit, the maximum frequency that the inverter can output. the default value is "50Hz"or"60Hz"
D-Mode	For choose the dry out protection mode. When water sensor is applied, dry protection mode should be set to detect dry protection. Default is “DETECT”.
D-Power	Dry protection power, which shall be reset when the load power rating is lower than Solar pumping inverter. Recommended value is 40% of the rated output power of Inverter. For example, the D-Power of 55kW pump is 22000.
D-Time	Dry out recovery time, under auto dry out mode, after the warning of dry out and inverter shut down, the duration from shut down to restart. Default value is 30. Default duration is 30 minutes.
T-DJ	Dry checking time (Unit is S).
OF-F	For choose over flow warning function. Default is no overflow

	warning. If you want to use this function, please set to “on”. Default is “OFF”.
OF-Time	Over-flow alarming recovery time.
MP-Sel	=AUTO Motor parameter self-detection; =Manual Motor parameter input by manual.
TestOrder	=1 Detect stator resistance; =2 Detect leakage inductance; =3 Detect rotor resistance; =4 Detect static mutual inductance; =5 Detect dynamic mutual inductance; =6 Theoretical calculate mutual inductance.
UIPI-Sel	=AUTO Motor PI parameters’ self input; =Manual manual input motor PI parameters.
R-Stat	Stator resistance (mΩ), for motor control parameter.
R-Rotor	Rotor resistance (mΩ), for motor control parameter.
L-Leak	Motor leakage inductance (mH), for motor control parameter.
L-Mutu	Motor mutual inductance (mH), for motor control parameter.
I-Start	The max. current of soft-start (A), for motor control parameter.
T-UPI	PI accommodation time.
RPM-Limit	Estimated rotate speed limit.
ESC	Return to the previous menu.

Notice!

- Those parameters cannot be changed easily, only when you get Supplier New Energy engineer's recommendation.
- Supplier New Energy Inverter is not allowed to be used to drive the pump, which rated power is higher than its max. applicable motor output power.

8.3.6.3 Site Number Set

SiteNum Set, for remote RS485 communication use. Please refer to the figure below.

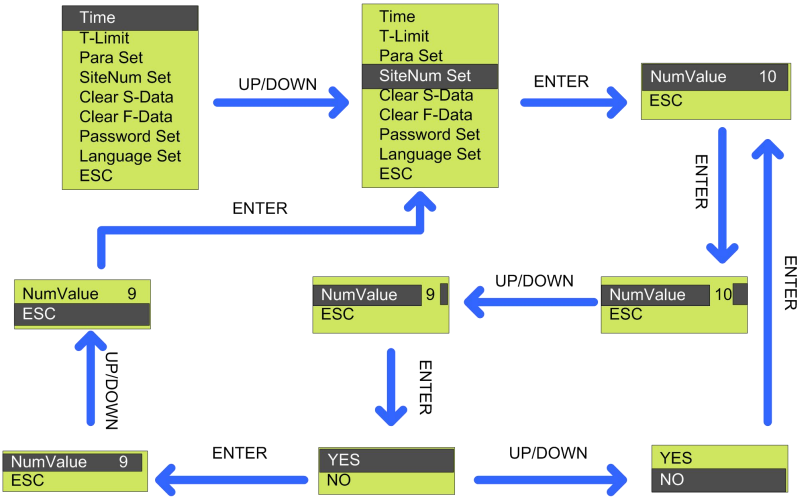


Figure8-14 Procedure of site number set

Note!

"SiteNum Set" maximum value is 64.

8.3.6.4 Statistical Data Clear

Clear S-Data, reset accumulated running duration and power inverted figure. Please refer to the figure below.

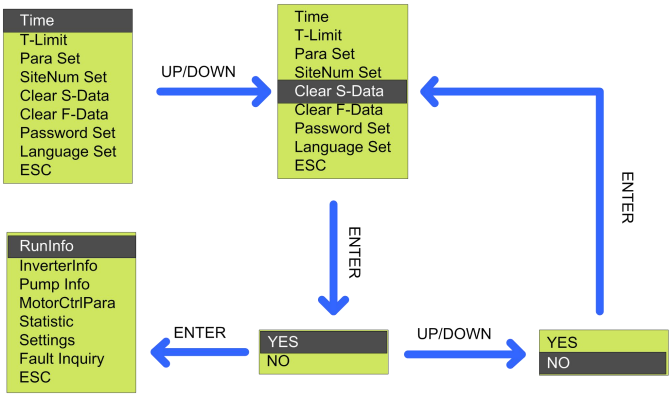


Figure8-15 Produce of statistic data clear

8.3.6.5 Historical Malfunction Clear

Clear F-Data, to clear historical malfunction record. Please refer to the figure below.

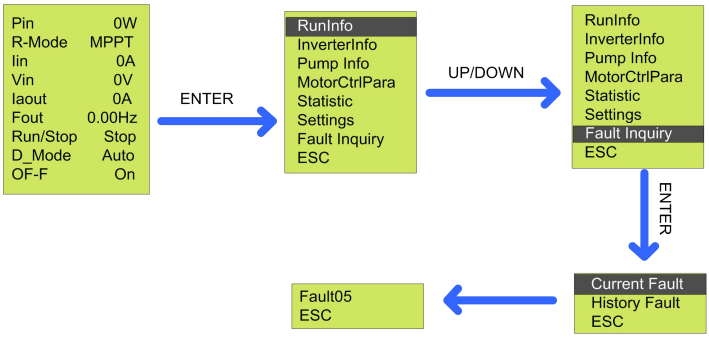


Figure8-16 Historical malfunction clear

8.3.6.6 Password Set

Password Set, to set the password to enter set menu, please refer to the figure below.

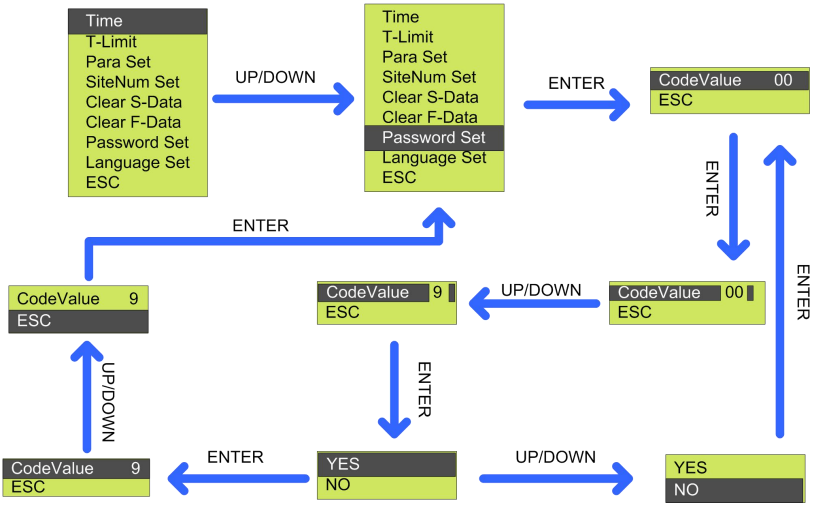


Figure8-17 Procedure of password set

8.3.6.7 Language Set

Language set, to set the man-machine interface language category, please refer to the following steps to operate.

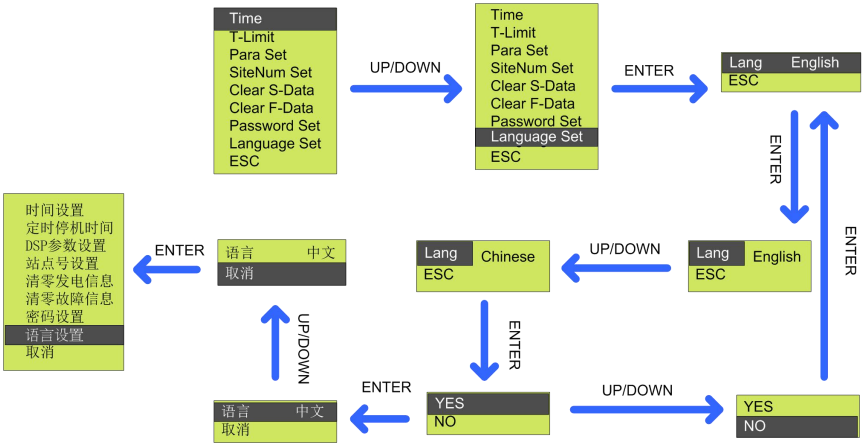


Figure8-18 Procedure of language set

8.3.7 Fault Inquiry

Fault Inquiry, to inquiry current and historic malfunction.

Table8-13 Fault inquiry

Fault Inquiry	Explain
Current Fault	Current fault inquiry.
History Fault	History fault inquiry.
ESC	Return to the previous menu.

Current Fault, to enquire current malfunction, please refer to the figure below.

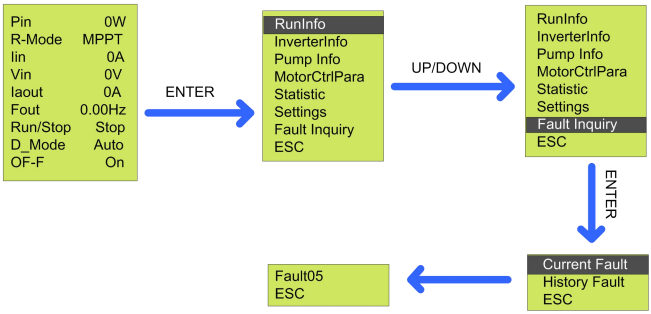


Figure8-19 Procedure of the current fault inquiry

8.3.8 Pump Information Setting

Used to set relevant parameters of water pump information.

Table 8-11 Description of water pump information setting (user sets according to water pump parameters)

Pump Information Setting	Description	Note
H_rate	Set pump rated lift head (m)	According to pump nameplate input Settings
Q_rate	Set pump rated water flow (m3/h)	
n_rate	Set pump rated speed (r/m)	

8.3.9 Malfunction Warning

If communication failure appears, the below interface will appear.

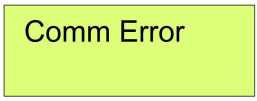


Figure8-20 Communication error screen

This interface will appear, and Fault red led flickers to show malfunction, this means internal communication malfunction is appear.

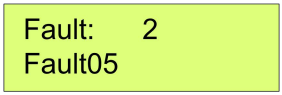


Figure8-21 Fault screen

Display show malfunction, fault LED lights up, shows inverter malfunction or stop. Press “UP” or “DOWN” to inquire current malfunction, choose “ESC”, press “ENTER” to quit. （When LCD screen show fault code, and fault LED lights up, which mean inverter fault or stop. Press “UP” or “DOWN” to inquire current fault, choose “ESC”, press “ENTER” to quit.）

Note!

Malfunction manual reset function: when the machine breakdown with malfunction, can long press "ON/OFF" button, the machine can automatically restart immediately. When the machine is displayed Fault12, no such reset function.

Fault code and the corresponding meaning are listed below

Table8-12 Malfunction and condition code

LCD showed code	Name of malfunction and condition
Fault100	Driving over-current.
State101	Array voltage low.
Fault104	Radiator overheating.
Fault105	Output over-load.
Fault106	Array over-voltage.
Fault107	Array over-current.
Fault108	AC over-current.
State109	Dry alarm.
State110	Weak sunshine.
Fault111	Temperature sensor fault.
Fault112	Short circuit fault.
Faul1t13	Initialization error from the machine.
State114	Overflow alarm.
Fault115	Output phase lose.

9 Malfunction and Troubleshooting

9.1 Troubleshooting

Once malfunction or stop condition appears, the malfunction LED will lighten up, LCD will display current malfunction or stop condition, current malfunction will be recorded by the system for later inquire. Please refer to the form below which covers the fault and troubleshooting.

Table 9-1 Solution for motor parameter detection failure

Item	Phenomena	Cause	Troubleshooting
R-Stat Test fail	Cannot start	1, The connection between motor and inverter is not in good condition; 2, Motor failure; 3, Inverter failure.	1, Check the connection between motor and inverter, whether there exist short-circuit, open circuit, and etc. 2. Check motor situation; 3. Contact Supplier
R-Rotr Test fail	Cannot start		
L-Leak Test fail	Cannot start		
L-Mutu Test fail	Cannot start		

Table9-2 Stop condition and trouble shooting

Condition code	Phenomena	Cause value	Troubleshooting

State101	Inverter shutdown when the fault appeared and will automatically restart after it disappear	Out put energy from array changes	Please check the input voltage from array and make sure this voltage inside inverter input voltage range. Note: In cloudy days, morning, or down, this situation is not malfunction.
State109	Inverter shut down until the water level recover or protection recover time is up, the machine will restart automatically.	Water level of source is lower than low-level water level sensor, even lower than inlet of pump.	1. Please check the water level, if the water level is ok, please check if there are air inside pump. 2. Please check the position of water level sensor.
State 110	Inverter shutdown. When malfunction disappear, inverter can restart automatic.	Array output low.	Usually appears in early morning, dusk and cloudy days. This situation is aim to protect the motor of pump and lengthen the lifetime.
State 114	Inverter shut down until the water level recover or protection recover time is up, the machine will restart automatically.	Water level in container higher than high-end level sensor.	If this situation appears more than once, please check onsite and set the water level sensor at a proper height.

Table9-3 Malfunction and troubleshooting

Condition code	Phenomena	Cause value	Troubleshooting
Fault100	Inverter shutdown and will restart automatically after the fault disappears	Short circuit in output wire	Please check if there is short circuit in output wires
Fault105	Inverter shutdown and will restart automatically after the fault disappears	Load higher than rated output power of inverter.	1. Please make sure the system is proper designed. The power of pump motor should not be larger than inverter output. 2. Make sure that the pump is working in the well range of head and flow. 3. Please refer to "**8.3.5.3 Key Parameters of the System Set"** to raise the figure of Imotor.
Fault106	Inverter shutdown and will restart automatically after malfunction disappears	DC input voltage higher than maximum input voltage of inverter	Please check maximum output voltage of array and make sure this voltage is below inverter maximum input voltage

Fault107	Inverter shutdown and will restart automatically after the fault disappears	Input current of inverter higher than rated maximum value	If this happen, please contact Supplier.
Fault108	Inverter shutdown and will restart automatically after the fault disappears	1. Power capacity of pump motor is higher than rated output. 2. Pump motor locked-rotor, or damaged. 3.Pipe system design is not reasonable	1. Please inspect whether pump motor is normal. 2. Please inspect whether pipeline system is in accordance with water pump or not. 3. Please refer to "**7.4.2.2 Motor parameters' setting by manual** " 4. If this happen frequently, please contact Supplier.
Fault111	Inverter shut down	Sensor not connect proper or damaged	If this happen frequently, please contact Supplier.
Fault112	Inverter shutdown, non-recover malfunction. No automatically restart, only if recharged	Output wire short circuit.	1. Please check if there is short circuit in output wires. 2.If this happen frequently, please contact Supplier.

Fault115	Inverter shutdown and will restart automatically after the fault disappears	Phase loss in inverter output	1. Please check if the output wires are proper connected and fixed. 2. If this happen frequently, please contact Supplier.

9.2 Maintenance

Please check and ensure the inverter is not charged with electricity before any maintenance.

A routine examination must be done every half year:

- Check the inverter for damaged or with deformation.
- Check whether there is abnormal noise when inverter is running.
- Check whether the parameters and time settings are correct.
- Clean and dredge the fan and air duct according to the site environment

Every half to one year, a routine examination should be done:

Warning!

Please check and make sure the inverter is not charged with electricity before any maintain work below.

- Check humidity and dust of inverter surrounding environment, if have too much dust, clean the inverter.
- Check the inverter cable connection is loose, if loose, tightening again according to the connection method of wire.
- Check whether the cable is damaged, especially the metal surface contact surface is cut marks or not.

9.3 Contact Customer Service

If you have any question about solar pumping inverter, please contact us,

In order to provide faster and better service, please provide us with information below:

- Model of Inverter
- Series number of inverter
- Malfunction name and time
- Malfunction description

10 Appendix A

Technical Data

Item \ Model	JNP75KH-V3	JNP90KH-V3	JNP110KH-V3	JNP132KH-V3
DC input				
Max. input DC voltage	880Vdc			
Recommended MPPT voltage	460-850Vdc			
Max. input DC current	166A	205A	251A	287A
MPPT efficiency	99%			
Number of string	2			
AC output				
Max. applicable motor output power	75kW	90kW	110kW	132kW
Rated output voltage	380-460Vac 3-phase			
Output frequency range	0～50/60Hz			
Rated output current	142A	171A	209A	251A
Mechanical data				
Dimensions(W/H/D)	630/800/300(mm)			
Weight	68kg			

System parameter	
Protective class	I
Protection degree	IP65
Operating temperature range	-25℃ to +50℃, above 50℃ need derate operating
Cooling method	Forced air cooling
Display	LCD
Communication interface	RS485/GPRS
Altitude	3000m; above 3000m need derate operating
Noise emission	＜70dB
Compliance	EN 50178; IEC/EN 62109-1; IEC 61800

11 Appendix B

11.1 Quality Assurance

The product malfunction in the warranty period, Supplier will be free repair or replacement products. The warranty period take the contract as a standard.

Evidence

During the warranty period, customers should provide the invoices for the purchase of products and date. And the trademarks of the products should be clearly visible. Otherwise we do have the right not to assume quality assurance.

Conditions

- The replaced products should be returned to Supplier.
- Supplier should be given reasonable time to repair the malfunctioning equipment.

Exemption from liability

The company has the right not to carry out quality assurance in the following:

- Transport damage
- Incorrect installation, modification and usage.
- Overall, components have been beyond the warranty period.
- Bad operating environment beyond the descriptions in this manual.
- Non company services, personnel to repair, replacement or demolition cause machine damage.
- Damage caused by abnormal natural environment.

If the product size and parameters have changed, the latest information given by the company shall prevail without notice.

11.2 Contact Us

If you have any question about Solar pumping inverter, please contact us, and we will be happy to give you answers. Please remember the following contact information.