Chapter 1. About this manual

This chapter provides an overview of the contents, purpose, compatibility, and the intended audience of this manual. The PL series solar pump inverter is an enhancement of the PL inverter firmware. This supplement manual intends to serve as a quick start guide for installing, commissioning and operating the PL solar pump inverter. This manual includes all the required parameter settings and program features specific to the solar pump inverter.

READ AND FOLLOW ALL INSTRUCTIONS!

When installing and using this electrical equipment, basic safety precautions should always be followed, including the following:

 WARNING – To reduce the risk of injury, do not permit children to use this product unless they are closely supervised at all times.

 WARNING – To reduce the risk of electric shock, replace damaged cord immediately.

 WARNING – It must be assured that all grounding connections are properly made and that the resistances do meet local codes or requirements

Safety and causations

1.1 General Warnings

The manual contains basic instructions which must be observed during installation, operation and maintenance. The manual should be carefully read before installation and start-up by the person in charge of the installation. The manual should also be read by all other technical personnel/ operators and should be available at the installation site at all times.

Personnel Qualification and Training – All personnel for the operation, maintenance, inspection and installation must be fully qualified to perform that type of job. Responsibility, competence and the supervision of such personnel must be strictly regulated by the user.

Should the available personnel be lacking the necessary qualification, they must be trained and instructed accordingly. If necessary, the operator may require the manufacturer/supplier to provide such training.

Furthermore the operator/user must make sure that the personnel fully understand the contents of the manual.

Dangers of Ignoring the Safety Symbols – Ignoring the safety directions and symbols may pose a danger to humans as well as to the environment and the equipment itself. Non-observance may void any warranties.

Non-observance of safety directions and symbols may for example entail the following: Failure of important functions of the equipment/plant; failure of prescribed methods for maintenance and repair; endangerment of persons through electrical, mechanical and chemical effects; danger to the environment because of leakage of hazardous material; danger of damage to equipment and buildings.

Safety-oriented Operation – The safety directions contained in the manual, existing

national regulations for the prevention of accidents as well as internal guidelines and safety-regulations for the operator and user must be observed at all times.

General Safety Directions for the Operator/User– If hot or cold equipment parts pose a danger then they must be protected by the operator/user against contact with people. Protective covers for moving parts (e.g. couplings) must not be removed when the equipment is running. Leaks (e.g. at the shaft seal) of
hazardous pumping media (e.g. explosive, toxic, hot liquids) must be disposed of in such a way that any danger to personnel and the environment is removed. All government and local regulations must be observed at all times. Any danger to persons from electrical energy
must be excluded by using good installation practices and working to local regulations.

Safety Directions for Maintenance, Inspection and Assembly Work– It is the user's responsibilityto make sure that all maintenance, inspection and assemblywork is performed exclusively by authorized andqualified experts sufficiently informed through carefulperusal of the Operating Instructions.The accident prevention regulations must be observed. All work on the equipment should be done when it is not operational and ideally electrically isolated. The sequence for shutting the equipment down is described in the manual and must be strictly observed. Pumps or pump units handling hazardous liquids must be decontaminated. Immediately upon completion of the work, all safety and protective equipment must be restored and activated.

Before restarting the equipment, all points contained in chapter "Initial Start-up" must be observed.

Unauthorized Changes and Manufacturing of Spare Parts– Any conversion or changes of theequipment may only be undertaken after consultingthe manufacturer. Original spare parts and accessoriesauthorized by the manufacturer guarantee operationalsafety. Using non-authorized parts may void any liabilityon the part of the manufacturer.

Unauthorized Operation– The operational safety of the equipment delivered is only guaranteed if the equipment is used in accordance with the directions contained in this manual. Limits stated in the data sheets may not be exceeded under any circumstances.

Transportation and Intermediate Storage– Prolonged intermediate storage in an environment of high humidity and fluctuating temperatures must be avoided. Moisture and condensation may damage windings and metal parts. Non-compliance will avoid any warranty.

1.2 Purchase Inspection

 CAUTION: Properly check the delivery before installation. Never install the inverter when you find it damaged or lack a component. Incomplete or defective installation might cause accidents.

 CAUTION: The submersible motor is a water filled AC machine. Always observe the instructions delivered together with the motor according to its water filling. These instructions can be found in the motor manual or on the motor body itself. Ignoring these instructions will shorten the product lifetime and damage the motor permanently.

1.3 Installation

 CAUTION: To ensure effective cooling, the inverter must be installed vertically with at least 10 cm space above and below the casing.

 CAUTION: When installed in an indoor location sufficient ventilation must be ensured by a vent or ventilator or similar device. Do not install in a place which is exposed to direct sunlight.

 CAUTION: Do not let the drilling chips fall into the inverter fin or fan during installation. This might affect the heat dissipation

1.4 Connection

 WARNING: The connection of the inverter must be carried out by qualified personnel only. Unqualified handling might lead to shock, burn, or death.

 WARNING: Please double-check that input power has been disconnected before connecting the device, otherwise electrocution or fire can be caused.

 WARNING: The earth terminal must be reliably grounded, otherwise touching the inverter shell might lead to a shock.

 WARNING: Selection of PV module type, motor load and inverter must be adequate, or the equipment might get damaged.

 WARNING: Grounding of this electrical equipment is mandatory. Never run the pump system when the ground wire is not connected to proper ground. Ignoring this instruction can lead to electrocution.

1.5 Operation

 WARNING: The inverter should only connected to power after correct wiring, or the inverter might get damaged.

 WARNING: Do not modify the connection while the system is connected to power, or touching any part of it might cause electrocution

 CAUTION: Adjust partial control parameters according to the steps indicated by the manual before thefirst operation. Do not change the control parameters of the inverter by random, or it might damage the equipment.

 CAUTION: The heat sink gets hot during operation. Do not touch it until it has cooled down again, or you might get burned.

 CAUTION: At altitudes of more than 1,000 m above sea level, the inverter should be

derated for use. Output current should be derated by 10% for every 1,500 m increment of altitude

⚠CAUTION: Never run the pump when it is not fully submerged in water. When the pump is installed the correct running direction can be determined by measuring the flow rates.

Chapter2. Solar pumping system introduction

2.1. Solar Pumping System overview

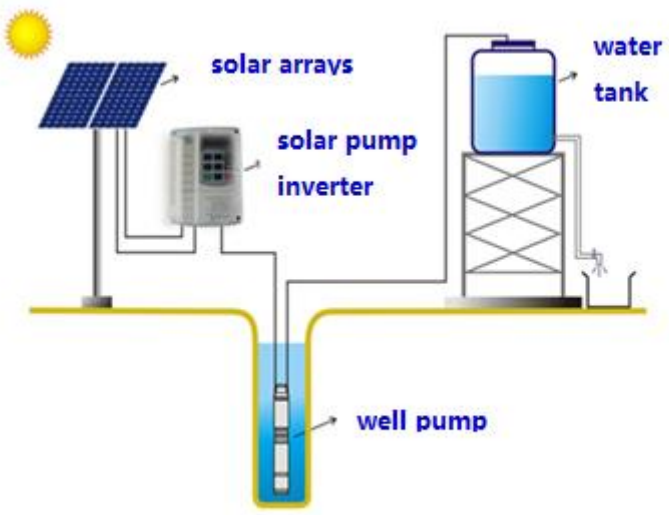
Solar pumping systems can be applied to allforms of daily use, water pumping for drinking water supplyfor remote villages and farms without connection to thewater grid, for agricultural use such as livestock watering,agricultural irrigation, forestry irrigation, pond management,desert control, and industrial use such as wastewatertreatment etc.

In recent years, with the promotion of theutilization of renewable energy resources, solar pumpingsystems are more and more used in municipal engineering,city centre squares, parks, tourist sites, resorts and hotels,and fountain systems in residential areas.

The system is composed of a PV generator, a pump and asolar pump inverter. Based on the design philosophy thatit is more efficient to store water rather than electricity,there is no energy storing device such as storage battery inthe system. The system is prepared to be combined with aelevated water storage, e.g. water tower or an uphill tankinstallation.

The PV generator, an aggregation of PV modules connectedin series and in parallel, absorbs solar irradiation andconverts it into electrical energy, providing power for thewhole system. The pump inverter controls and adjusts thesystem operation and converts the DC produced by the PVmodule into AC to inverter the pump, and adjusts the outputfrequency in real-time according to the variation of sunlightintensity to realize the maximum power point tracking(MPPT). The pump, invertern by 3-phase AC motor, can drawwater from deep wells, rivers and lakes and pour it intostorage tanks or reservoirs, or be connected directly to theirrigation system, fountain system, etc. According to theactual system demand and installation condition, differenttypes of pumps such as centrifugal pump, axial flow pump,mixed flow pump or deep well pump can be used.

Solar pump system constitution.



System wiring diagram

2.2. Solar pump inverter features:

Save in energy costs and maximize productivity

Solar pump inverters ensure reliable power supply throughout the day with on and off-grid compatibility.

Save environment

Harnessing the power of sun provides an environmentally friendly pumping without producing any CO2 emissions

Easy install, operation and little parameters configuring. End user, who never used inverter before, can Install and operation it very well.

Reduce maintenance costs

The inverters can be equipped with remote monitoring options, reducing maintenance trips to the site.

Reduce operational risk

Embedded pump-specific features such as dry run detection, minimum power input protection, maximum current protection, stop frequency running protection.

Chapter 3. Solar pump inverter overview

The PL series solar pump inverter is a low voltage AC inverter of 0.75 to 400KW above rating designed to operate with energy drawn from solar panel or photovoltaic cells (PV). The inverteris customized to operate in dual supply mode, so the grid connected supply is used in the absence of energy from PV cells. This inverterfunctions with the latest in technology maximum power point tracking (MPPT) algorithm to derive maximum power from the PV cells at any instant

The inverter is specifically designed to meet the requirements of pump manufacturers and the original equipment manufacturers (OEM).

3.1 Product Features

Control modes

The solar pump inverteroperates in local control mode and in remote control modeidentical to the ordinary PL AC inverter.

- Local control—interfaces through the operation panel (keypad)
- Remote control—interfaces through external terminals control.

Note: Ensure that the inverteris in local control before starting or stopping the inverterusing the control panel.

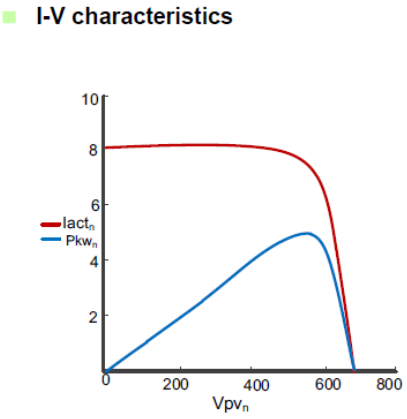
- ✓ Maximum power point tracking (MPPT) with fast response speed and stable operation
- ✓ Dry run (under load) protection
- ✓ Motor maximum current protection
- ✓ Input power protection
- ✓ Low stop frequency protection
- ✓ The PQ (power/flow) performance curve enables calculating the flow output from the pump
- ✓ Digital control for fully automatic operation, data storage and protective functions
- ✓ Intelligent power module (IPM and PIM) for the main circuit
- ✓ LED display operating panel and support remote control
- ✓ Dual mode AC and DC power supply input is available
- ✓ Low water probe sensor, and water level control function
- ✓ Ambient temperature for using: -10 to +50˚C.

3.2. Solar pump inverter operation theory

The solar pump inverteruses the maximum power point tracking (MPPT) control program to improve the efficiency of solar energy systems. The output of the photovoltaic (PV) cell is proportional to its area and intensity, while the output voltage is limited by p-n junction from 0.6 to 0.7 V. Therefore when the output voltage is constant, output power is proportional to intensity and surface area. The current and voltage at which the PV cell generates maximum power is known as the maximum power point.

The MPPT controller follows different strategies to derive the maximum power from the PV array. The internal MPPT algorithm is used to derive maximum power from the PV cell at any instant. This is achieved by modifying the operating voltage or current in the PV cell until the maximum power is obtained.

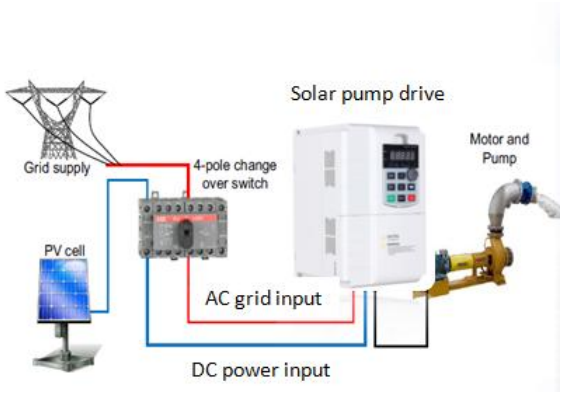
When the output voltage is zero, the PV cells create short circuit current. If the PV cells are not connected to any load, the output voltage is equal to the open circuit voltage. The maximum power point is obtained at the knee of the I-V curve. See the I-V characteristics shown below.



The I-V curve is not constant since intensity and temperature changes during day time. Under constant temperature, current changes linearly with intensity and voltage changes logarithmically with intensity. Since the voltage variation is small with respect to intensity changes, maximum power varies proportionally with intensity

3.3. PL series solar pump inverter compatible with dual supply mode

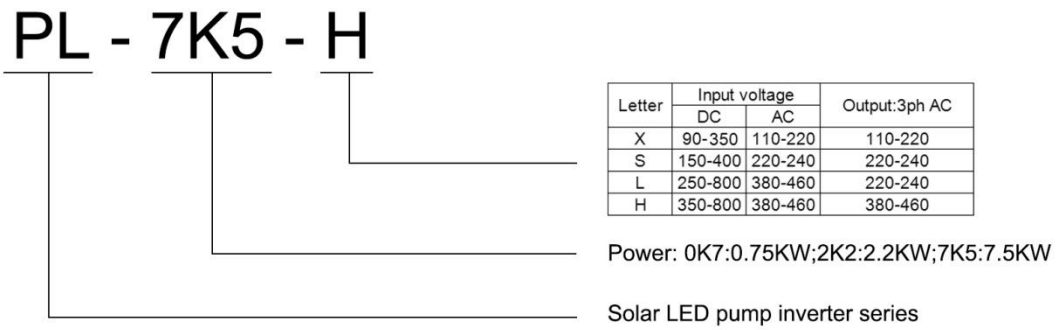
The solar pump inverter operates in dual supply mode either with a three phase input supply from the grid or with DC input supply from PV cells. A four-pole changeover switch enables switching between the two supply modes. At a given time only one supply (PV cell or grid) will be connected to the inverter.



Note: Use two poles of the changeover switch in series to ensure that the voltage applied across each pole is half of the full DC voltage

3.4. PL series solar pump inverter model description

The user can learn the specification from the nameplate.



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Series No.	Description	Mark	Contents
1	Products model	①	PL for solar pump inverter
2	Power and load	②	0.75K stand for 0.75kw 2K2 stands for 2.2kw 7K5stands for 7.5kw
3	Voltage specification	③	X: = 90 to 400 V DC or 110 to 220VAC, Output 3PH AC110-220V S:= 150 to 350 V DC or 200 to 240V AC, Output 3PH AC 220-240V L: = 250 to 800 V DC or 380 to 460V AC, Output 3PH AC 380-460V H: = 350 to 800 V DC or 380 to 460V AC, Output 3PH AC 380-460V

3.5.Specification of rating power, rated current.

Model	Input voltage	Output for pumps	Power	Picture
PL-X	90 to 350 V DC or 110 to 220VAC	3PH AC 110 to 220V	0.75/1.5KW, 4A, 7.5A	
PL-S	150 to 400V DC or 220 to 240V AC	3PH AC 220 to 240V	0.75-1.5KW, 4A, 7.5A	
PL-L	250 to 800 V DC or 380 to 460V AC	3PH AC 220 to 240V	0.75-1.5KW, 4-7.5A	

	250 to 800 V DC or 380 to 460V AC	3PH AC 220 to 240V	2.2-4KW, 10-16A	
PL-H	350 to 800 V DC or 380 to 460V AC	3PH AC 380 to 460V	1.5-15KW	
	350 to 800 V DC or 380 to 460V AC	3PH AC 380 to 460V	18-400KW (Steel cover)	

3.6.PL series solar pump inverter technical specification

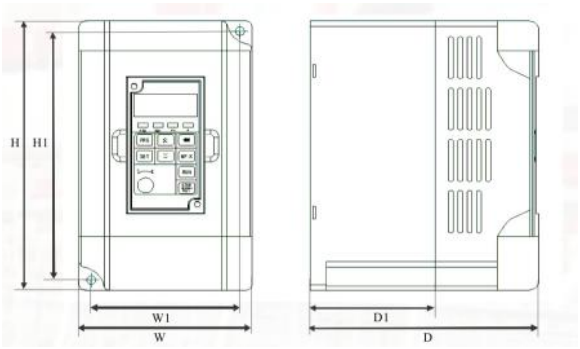
Recommended MPPT voltage range	90 ~350V DC input for 110V/160V/220V pumps, 0.75kw to 1.5kw 200~400VDC for 220VAC/240V pumps with 0.75 Kw to 4kw. 250~800VDC, for 380VAC pumps with1.5kw to 75kw
Recommended input voltage	170 Vmp DC for 110V AC pumps. 260Vmp DC for 160V AC pumps. 350Vmp DC for 220V AC pumps, 620Vmp DC for 380V AC pumps
Motor type	Control for permanent magnet synchronous motor and asynchronous motor pumps.
Maximum DC power input	1. 400VDC for 220AC output 2. 800VDC for 380V AC output
Rated output voltage	3-phase , 110V/160V/220V. 3-phase, 220V/380V/480V
Output frequency range	0~50/60Hz
MPPT efficiency	97%,
Ambient temperature range	G-type inverterwith submersible pumps, and P type for general pumps.
Solar pump control special performance	MPPT (maximum power point tracking), CVT (constant voltage tracking), auto/manual operation, dry run protection, low stop frequency protection, minimum power input, motor maximum current protection, flow calculating, energy generated calculating and water tank level detected
Protection function	Phase loss protection, phase short circuit protection, ground to phase circuit protection , input and output short circuit protection. Stall protection
Protection degree	IP20, Air force cooling
Running mode	MPPT or CVT
Altitude	Below 1000m; above 1000m, derated 1% for every additional 100m.
Standard	CE, Design based on vector control inverter PL series, more

AC input backup circuit	specification please refer to PL vector control inverter operation manual

3.7. Models and specification

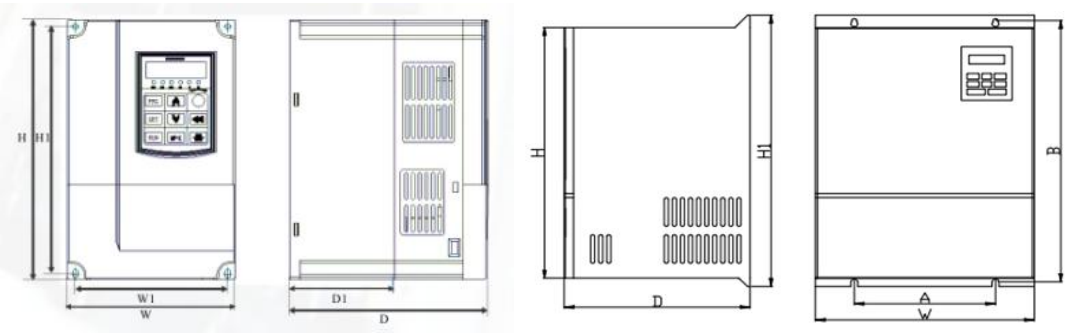
SN	Models	Rate current	DC input range (VDC)	Output voltage	Applicable for pumps	Installation size (mm)	IKT module	Fig
PL-X type: 90 to 350 VDC or 110 to 220VAC								
1	PL-0.75K-X	7.5A	90 to 350	110V/220V	0.75KW	143*86*114	IPM	Fig 1
2	PL-1K5-X	10A	90 to 350	110V/220V	1.5KW	143*86*114	IPM	Fig 1
PL-S type: 150 to 400 VDC or 200 to 240VAC								
1	PL-0K75-S	4A	150 to 400	220V/240V	0.75KW	143*86*114	IPM	Fig 1
2	PL-1K5-S	7.5A	150 to 400	220V/240V	1.5KW	143*86*114	IPM	Fig 1
PL-L type: 250 to 400 V DC or 200 to 240 V AC								
3	PL-0K7-L	4A	250 to 400	220V/240V	0.75KW	143*86*114	PIM	Fig 1
4	PL-1K5-L	7.5A	250 to 400	220V/240V	1.5KW	143*86*114	PIM	Fig1
5	PL-2K2-L	10A	250 to 400	220V/240V	2.2KW	185*118*157	PIM	Fig 2
6	PL-4K0-L	16A	250 to 400	220V/240V	4.0KW	185*118*157	PIM	Fig 2
PL-H type: 350 to 800 VDC or 380 to 460VAC								
7	PL-1K5-H	4A	350 to 800	380V-460V	1.5KW	185*118*157	PIM	Fig 2
8	PL-2K2-H	5A	350 to 800	380V-460V	2.2KW	185*118*157	PIM	Fig 2
9	PL-4K0-H	10A	350 to 800	380V-460V	4.0KW	185*118*157	PIM	Fig 2
10	PL-5K5-H	13A	350 to 800	380V-460V	5.5KW	247*160*178	PIM	Fig 2
11	PL-7K5-H	17A	350 to 800	380V-460V	7.5KW	247*160*178	PIM	Fig 2
12	PL-11K-H	25A	350 to 800	380V-460V	11KW	247*160*178	PIM	Fig 2
13	PL-15K-H	33A	350 to 800	380V-460V	15KW	247*160*178	PIM	Fig 2
14	PL-18K5-H	38A	350 to 800	380V-460V	18.5KW	335*217*190	PIM	Fig 2
15	PL-22K-H	45A	350 to 800	380V-460V	22KW	360*230*225	PIM	Fig 2
16	PL-30K-H	60A	350 to 800	380V-460V	30KW	463*285*225	PIM	Fig 2
17	PL-37K-H	75A	350 to 800	380V-460V	37KW	463*285*225	PIM	Fig 2
18	PL-45K-H	91A	350 to 800	380V-460V	45KW	600*385*270	PIM	Fig 2
19	PL-55K-H	110A	350 to 800	380V-460V	55KW	600*385*270	PIM	Fig 2
20	PL-75K-H	150A	350 to 800	380V-460V	75KW	600*385*270	PIM	Fig 2
21	PL-90K-H	180A	350 to 800	380V-460V	90KW	700*473*307	PIM	Fig 2
22	PL-110K-H	210A	350 to 800	380V-460V	110KW	700*473*307	PIM	Fig 2
23	PL-132K-H	250A	350 to 800	380V-460V	132KW	930*579*375	PIM	Fig 2
24	PL-160K-H	310A	350 to 800	380V-460V	160KW	930*579*375	PIM	Fig 2
25	PH-**-K-H	***	350 to 800	380V-460V	200-400KW	***	*	*

3.8. PL series solar pump inverter dimensions



Mini type Fig 1

Power	H	H1	W	W1	D	D1	Hole
0.4~1.5KW	143	132	86	74	114	62.5	Ø4.5



General type Fig 2

Power (3 phase 380V output)	H	H1	W	W1 or A	D	D1 or B	hole
1.5~4KW	185	173	118	115	157	79	Ø5
5 -15KW	247	232	160	136	178	93	Ø5
18KW	335	305	217	140	190	323	Ø5
22KW	360	331	230	217	225	348	Ø6
30-37KW	463	432	285	235	225	447	Ø8
45-75KW	600	550	385	260	270	580	Ø10
90-110KW	700	660	473	343	307	678	Ø10
132-160KW	930	880	579	449	375	905	Ø10
185-280KW	1060	983	650	420	377	1030	Ø12
315-400KW	1358	1203	800	520	400	1300	Ø14
We reserve the right to change dimensions without note.							

Chapter 4. Operation control panel description

4.1 Press function key description

Key symbol	Name	Function description
PRG	Menu key	Enter menu or exit
SET	Confirm key	Enter to menu step by step and confirm the setting value
▬	UP increase key	Data and function code increase
▬	DW reduce key	Data and function code reduce
	Shift	In the monitor status, press this key can select display monitoring parameter in circulation.
RUN	Running key	Us to start inverter in keypad control mode
MF.K	Multiple function key	Programmed by F4-31 setting. Default is reverse running
STOP RESET	Stop and reset	In running status, this key can use to stop operation (F0-02). Reset malfunction in alarm mode.

4.2. Indicator description

Symbol	Indicator description
Hz	Unit of frequency（Hz）
A	Unit of current (Amp)
V	Unit of voltage（V）
FWD	Forward run indicator
REV	Reverse run indicator FWD，REV both flash in stand for DC braking
ALM	Fault indicator (alarm for over current, over voltage but that don't reach the level of fault limit)

4.3. Digital display area

5 digit LED display, it can use to display frequency reference, output frequency and kinds of monitoring data and fault alarm code.

4.4. Function code operation

There are 3 level menu in respectively.

1. Function code parameters（First level menu）
2. Function code name（The second level menu）
3. Setting value of function code (the third level menu ）

Note: If in the third level menu, you can press PRG or SET key to return second menu.

The difference is that press SET key will keep set parameter in controller board and then return to second menu, press PRG key an return second menu directly without parameters storing.

Example: Change 0.00Hz of F1-01 for 5.00Hz. see below fig.

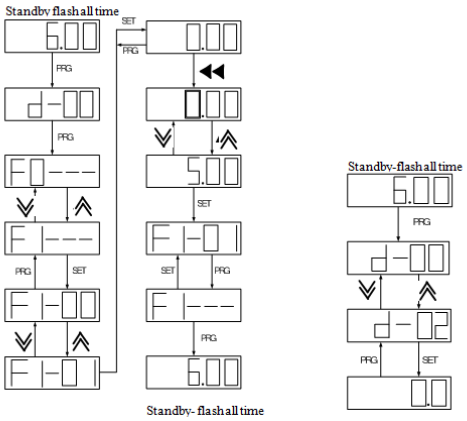
4.5. Monitor parameters inquiry.

There two ways to inquiry monitoring parameters.

1. Press " "to inquiry 6 solar pump control common parameters (It is set by fF4-26,F4-27 , F4-28)(Output frequency, output current, output voltage, DC voltage, Dc current and input power)

2.User also can go to d parameters to inquiry relative parameters.

Example: Inquiry d-02 (output current value of inverter), see below fig.



4,6. Common parameters display

Press shift button of keypad can display output current, output frequency, output voltage, DC bus voltage, DC bus current and input power 6 parameters in circulation in monitor status.

4.7. Fault reset

Solar pump inverter will display relative fault information if there are any alarm occurs.

User can reset it by "STOP/RESET" or external terminals (F5 group setting). Once reset, inverter place on standby status.

If inverter place in fault reset and without any reset, it located in protection status and can't working.

Note: Solar pump inverter perform itself initialize when power on.

The system of inverter will initialization by himself when power on. The LED of keypad display -SGd- when DC bus of dive from low to high.

When DC bus reach start point, LED will display the frequency reference and flash all the time, means inverter place on standby status.

Chapter 5. PL series solar pump inverter installation

5.1 About this chapter

This chapter includes the basic information about the mechanical and electrical installation of solar pump inverterand also provides steps to quickly operate the inverter.

For general instructions on installation and maintenance of PL Inverters, see *PL User's manual.*

Safety instructions

WARNING! All electrical installation and maintenance work on the invertermustbe carried out by qualified electricians only. Follow the safety instructions listedbelow.

- **Never work on the inverter, the braking chopper circuit, the motor cable or the motorwhen input power is applied to the inverter.**
- **After disconnecting the input power, always wait for 5 minutes to let the intermediatecircuit capacitors discharge. Always ensure by measuring that no voltage is actuallypresent.**
- **A rotating permanent magnet motor generates a dangerous voltage. Always ensure to lockthe motor shaft mechanically before connecting a permanent magnet motor to the inverter,and before doing any work on an invertersystem connected to a permanent magnet motor.**

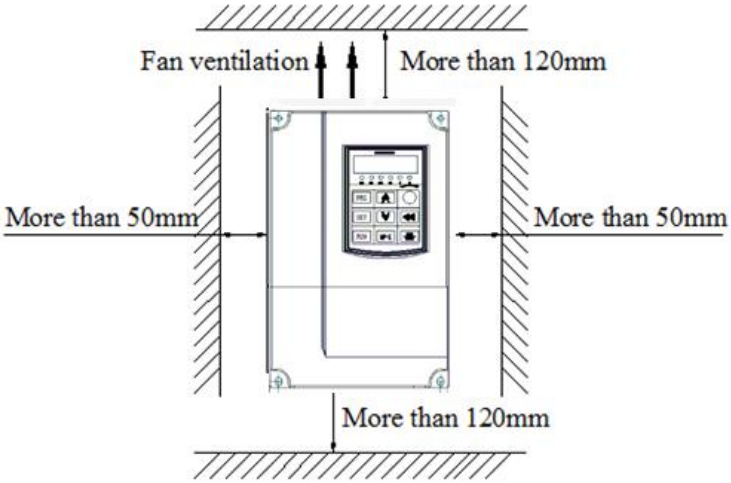
5.2 Mechanical installation

In back mounting, fasten the inverterto the wall with screws using four mounting holes.

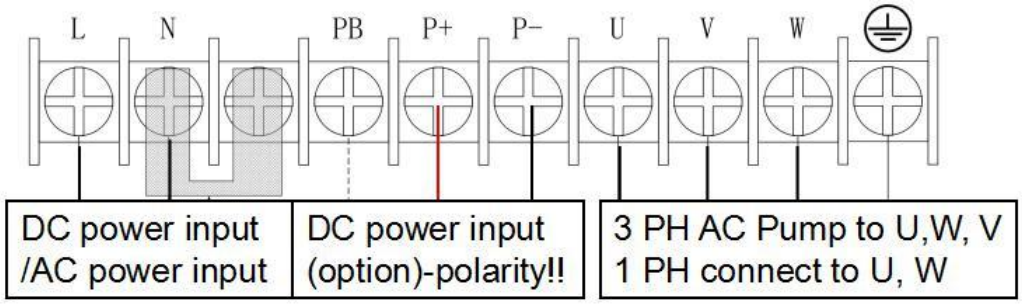
Note: Installation Environment Requirements

1. Ambient temperature, the surrounding environment temperature take great effect for service life span of solar pump inverter, don't allow surrounding temperature over than allowable temperature above (-10°C to +50°C)
2. Heat dissipation, Install the solar inverter on the surface of an incombustible object, and ensure that there is sufficient space around for heat dissipation. Install the solar pump inverter vertically on the support using screws.
3. vibration, it should be less than 0.6G, far away from the punching machine or the like.
4.Free from direct sunlight, high humidity and condensation

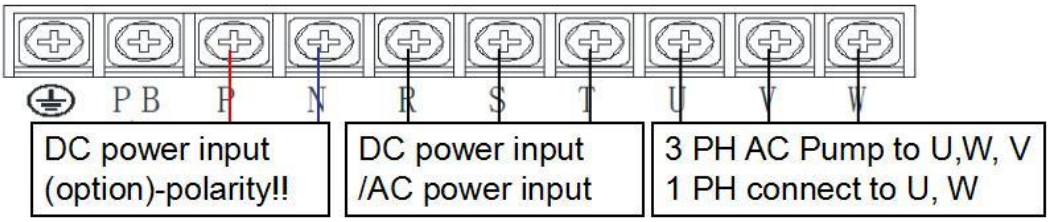
5.Free from corrosive, explosive and combustible gas
6.Free from oil dirt, dust and metal powder



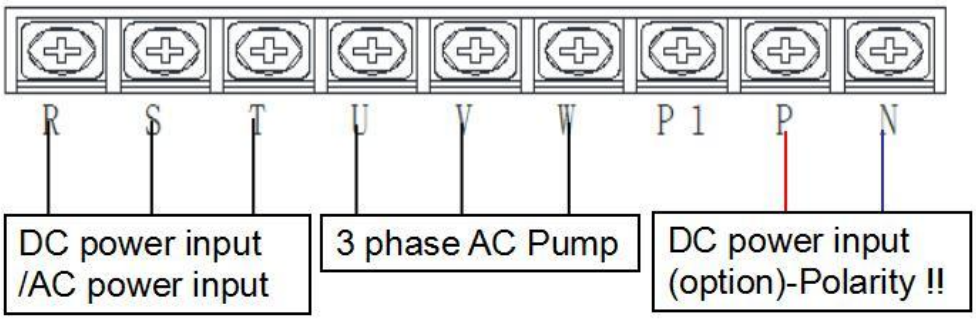
5.3. Installation and wiring



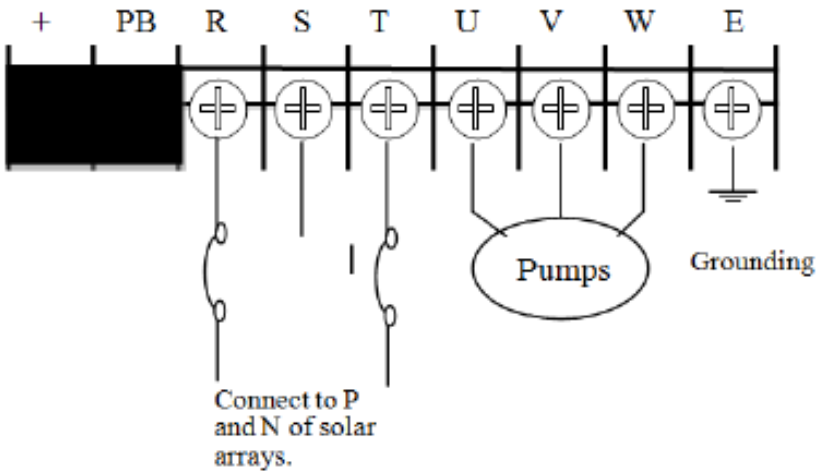
PL-X/S input and output connection

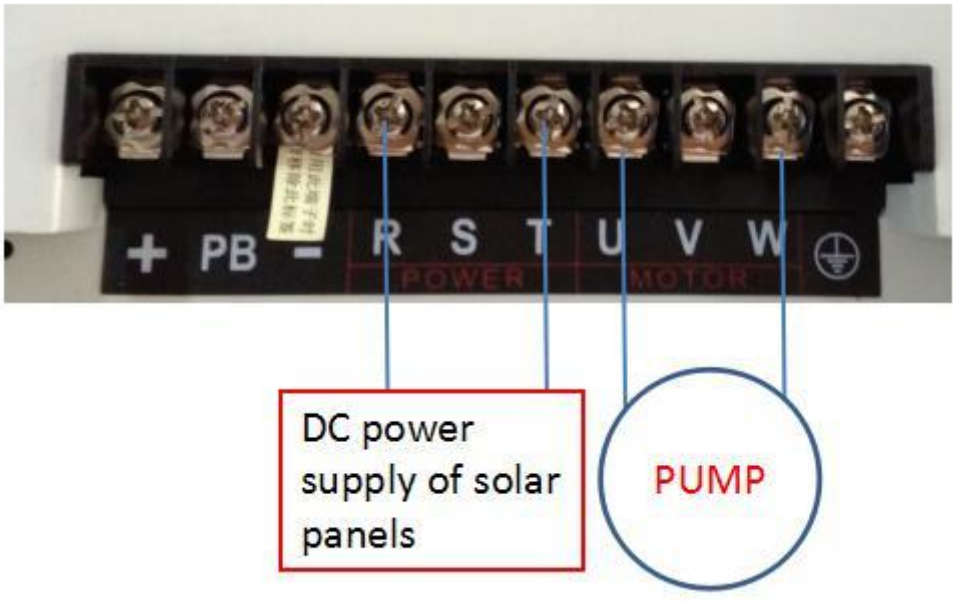


PL-L input and output connection (1.5-15KW)



PL-L input and output connection (Above 18KW)





R, T terminals of inverter received solar DC power from PV.

Note:

- Do not use an asymmetrically constructed motor cable.
- Route the motor cable, input power cable and control cables separately.
- Make sure that the maximum cable lengths are not exceeded. For detailedinformation, see the user's manual.

5.4Main circuit terminals description

Terminals symbol	Function description
+	Positive terminals of DC bus voltage
PB	P, PB connect braking resistor
R, S, T	AC input connecting or DC input connect
U, V, W	Connect to motor
E	Grounding terminals

5.5.Connection procedure

1. Strip the input power cable. Ground the bare shield of the cable (if any) 360 degrees under the grounding clamp. Fasten the grounding conductor (E) of the input power cable under the screw of the grounding clamp. Connect the phase conductors to the R,T terminals from PV solar panel.

2. Strip the motor cable. Ground the bare shield of the cable 360 degrees under thegrounding clamp. Twist the shield to form as short a pigtail as possible and fasten itunder the screw of the grounding clamp. Connect the phase conductors to the U, Vand W terminals.

4. Secure the cables outside the inverter mechanically.

5.6 .Control circuit terminals

5.6.1 Control circuit terminals diagram

5.6.2. Control circuit terminals function description

Type	Terminals symbol	Terminals function	Remark
Power supply output	12V	12V/10mA power supply	
	GND	Frequency reference voltage signal common point (12, GND), analog current signal input negative point	
	24V	Output 24V/50mA power supply (24V, GND)	
Analog input	AI1	Analog voltage signal input terminals 1	0～10V
	AI2	Analog voltage signal input terminals 2	0～10V
Digital input terminals	PM	Terminal active level selection	If PM connect with power supply point, the multi-function terminals and GND ON is active, if PM connect with GND, the multi-function terminals and power supply points is active. The function defined by parameter （F5-16～F5-21）
	X1	Multi-function input terminals 1	
	X2	Multi-function input terminals 2	
	X3	Multi-function input terminals 3	
	X4	Multi-function input terminals 4	
	X5	Multi-function input terminals 5	
	X6	Multi-function input terminals 6, also can used for high speed pulse trains input terminals	
Analog output	AO1	Programmable voltage and current signal output terminal (Defined by F5-34 ~ F5-36 parameters)	Output voltage 0～10V, current 0～20mA
	AO2	Programmable frequency, voltage output (defined by F5-39 ~ F5-43 parameter).	Maximum output high frequency is 50Hz, 10V.
Transistor Output	Y	Programmable open collector output, set by parameter F5-27	The maximum load current 50mA, maximum withstand voltage of 24V
Programmable relay output	TA-TB-TC1 TA-TB-TC2	Programmable relay output, set by parameter F5-28 F5-29	Contact capacity: AC250V 1A, Resistive load
RS485	485A	RS485 communication	

communicat ion	485B		

5.6.3,Jumper Description

CN1 DIP switch (DIP means slide switch)

DIP switch on 0 ~ 10V, AO1 output 0 ~ 10V.

DIP switch on the 4 ~ 20mA, AO1 output 0 ~ 20mA.

CN3 DIP switch

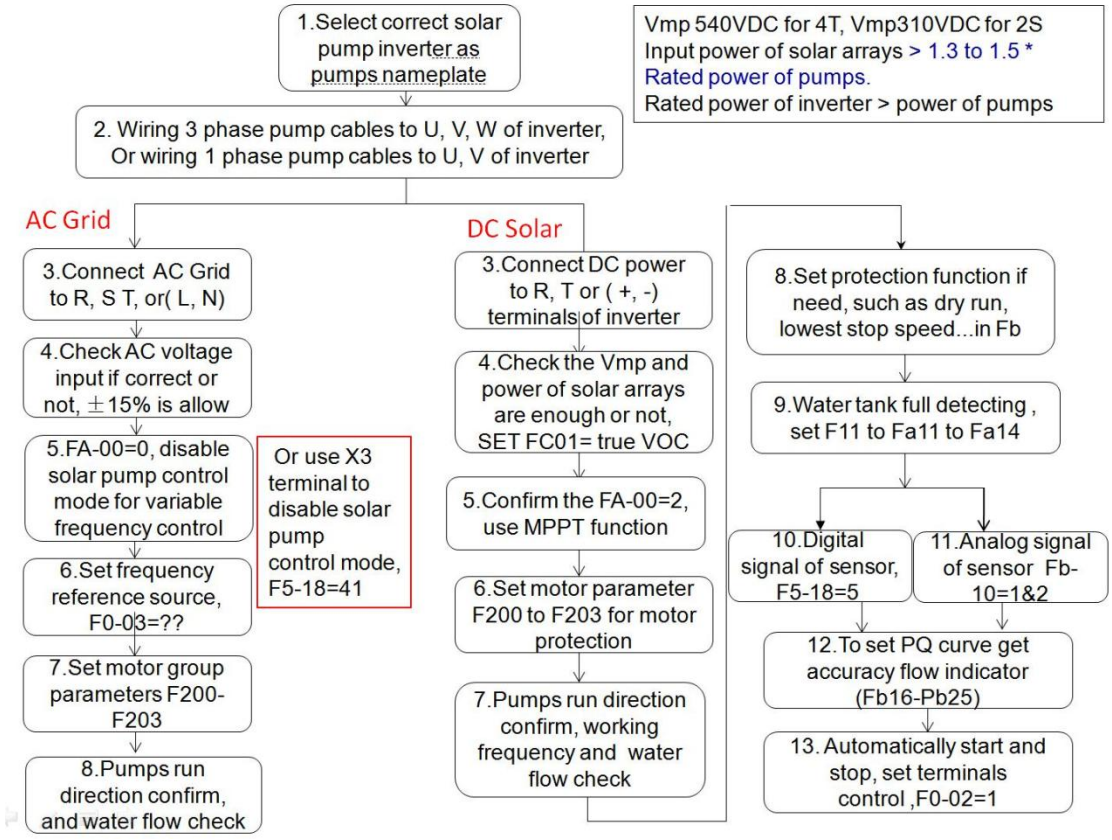
DIP switch in the 0 ~ 10V, while setting [F5-39] = 0, AO2 output 0 ~ 10V.

DIP switch on the PWM, while setting [F5-39] = 1, AO2 output pulse signal.

Chapter 6. Solar pump inverter commissioning guide

6.1 Wiring and commission steps

Flow chart of solar pump inverter



6.1.1 Commissioning steps

1. Select correct mode of solar pump inverter(voltage , power and current) as pumps name plate and field condition.

a. for 1phase 220VAC pumps, selecting PL-S or L type inverter, the input Voc(Open loop circuit voltage) is need large than 360VDC, Vmp (Working MPPT voltage) is bigger than 310VDC, inverter rated current must be large than rated current of pump, total of solar panel arrays should be large then 1.3-1.5 times of rated of pumps.

Note: Because the working current of single phase AC pump is much bigger than 3phase

220VAC pumps, so should select one big power range inverter for driving 1 phase pumps. For example, user should select 2.2KW (PL-2.2K-S) inverter to drive 1 phase 1.5KW AC pumps.
b. for 3 phase 220VAC pumps, selecting PL-S or L type inverter, the input Voc(Open loop circuit voltage) is need large than 360VDC, Vmp (Working MPPT voltage) is bigger than 310VDC, inverter rated current must be large than rated current of pump, total of solar panel arrays should be large then 1.3-1.5 times of rated of pumps.
2. Wiring according to the diagram and check the wiring if correct or not.
When sunlight condition is good, switch Q1 to power up DC solar power, connect to R,T terminals or to (P+),(P1), please distinguish to polarity connection when connect to P+ and P-. Otherwise it will cause inverter damage.
When there are poor sunlight redition, please switch Q2 to AC grid power if needs. Connect R,S,T to AC grid for 3 phase 380V input, connect R,T or (L,N) to AC grid for single phase 220V AC input.
If user want to adjust output frequeny when connecting AC power code, please disable solar pump control mode first. Set Fa00=0 or using terminals to disable switch on ×3 and GND, and set F5-18=41 (solar pump control mode is disable)
3. Wiring 3 cables of AC pumps to U,V,W. Or connect 2 cables of 1 phase AC pumps to any phase 0f U,V,W terminals of inverter.
For 1 phase pumps driving, we suggest to remove start capacity of pumps ad then connect 3 cables to U,V,Wterminals of inverter. Because the output PWM wave of solar pump inverter is not for capacitor.
Set Fc05=0, Fa00=1 (CVT mode), Fd04=00 parameters for 1 phase AC pumps which starting capacitors didn't removed.
Set Fc05=1, Fa00=1 (CVT mode), Fd04=00 parameters for 1 phase which has removed starting capacitors.
4. Please check input voltage (Voc and Vmp) if enough or not when switch S1 power on solar DC power. Because this solar pump inverter MPPT working is much related with Voc(open loop circuit voltage of solar power) detected or setting. Please set Fc01 with accuracy input Voc, and to check D25 value of inverter showing. D25 value should be same as input actual Voc.
For PL-L model of inverter, the Fc01 factory setting is 360VDC(Fc01=360), if the input Voc is much less than this value, the output frequency will be 0 or (0.5Hz starting frequency), and have A.L Fr alarm. Please set Fc01 with correct input Voc first.
For PL-H model of inverter, the Fc01 factory setting is 660VDC(Fc01=660), if the input Voc is much less than this value, the output frequency will be 0 or (0.5Hz starting frequency), and have A.L Fr alarm. Please set Fc01 with correct input Voc first.
And recommend Voc is 360VDC for L models, 220V AC output inverter, Voc is 620V DC for PL-H model, 380V AC output inverter, Voc is 710V DC for PL-H model, 440V AC output inverter.
Note: PL series solar pump inverter also can able to detect Voc automatically as soon as power on when Fc00 is set to 0. Please power oninverter again when user set Fc00-0.
5. Confirm MPPT working mode. The Fc00=1 is factory setting of solar pump inverter model. Before press RUN button to start pumping to confirm Fa00=2. (MPPT working)
For driving 1 phase AC pump, it should set Fa00=1 to make it work on CT(constant voltage

tracking) mode.

6. For providing pumps better protection, please set motor of pumps parameter from Fa01 to Fa04. If the rated power of inverter is bigger than rated power pumps, the rated current(F2-03) of driving pumps setting is very import.

For use to drive PMSM pumps, set parameter F2-00=1,F0-01=2.

If the performance of PMSM pump is not good, please perform motor ID auto tuning.

Note. How to perform auto tuning for driving PMSM?

(1) Set sensorless vector control mode for driving PMSM, F0-01=2

(2) Set PMSM motor parameter, F2-00=1, F2-11(Rated frequency of PMSM), f2-12(rated voltage of PMSM), F2-13 (Rated current of PMSM), F2-14 (rated back EMF or PMSM), f2-15(stator resistance of PMSM). The frequency, current and voltage is important parameters, it need to set.

(3) Set F2-10=1 or 2 to perform PMSM ID auto tuning. If the motor is easy to remove from pump, please set F2-10=1, if the motor is difficult to remove from pump, please set F2-10=2.

7. Press the RUN button to perform motor trial running and observe the running frequency and the water yield. If the sunlight radiation is good, and frequency goes up, but water flow is very small. Might the direction of pumps running is not correct, please to change any two phase motor wiring.

Note:

7.1 If the output frequency is fluctuation, please set Fa-05(frequency adjust gain) value smaller, and Fa-07 (MPPT control period) value bigger.

7.2 If the A. LUO (under voltage) is occur often, user can set Fa05 value bigger, (Fa05=100), set Fa-07=1, and F0-12(acceleration time bigger,) F0-13 (deceleration time smaller, close to 0.8s).

7.3 If over current and over load alarm occurs, please kindly to check if pump has been blocked by foreign material, and select bigger power inverter. If the distance from pump to inverter over than 150 meter, please consider select bigger power inverter, and install AC reactor after inverter output.

7.4 The function of AC output reactor---is used for suppress the capacitive charging current of connection cable between inverter and motor, and passivating the voltage rising rated of PWM as well. It is mounted at the output side of frequency inverter. When the distance of cable between inverter and motor over a value (100 meter and more), suggest installed output rector to compensate recharge current of line capacitive.

(1) Limit DV/DT to 500V/us

(2) Limit the overvoltage of motor.

(3) Reduce the leakage current of motor.

(4) Reduce the interference generated by contacter which mount between folter and motor.

7.5 If the distance of inveter to pumps over than 500 meter, please consider to connect sine wave filter. Sine wave filters eliminate the problem of motor/cable insulation failures, heating, eliminating the high DV/DT associated with inverter output waveforms. Bearing currents are also reduced, especially in larger motors above 1KW.

8. Set the lowest stop frequency protection, low voltage sleep protection, dry run(under-load) protection, maximum current of pump protection and minimum power input protection Fb

parameter group.

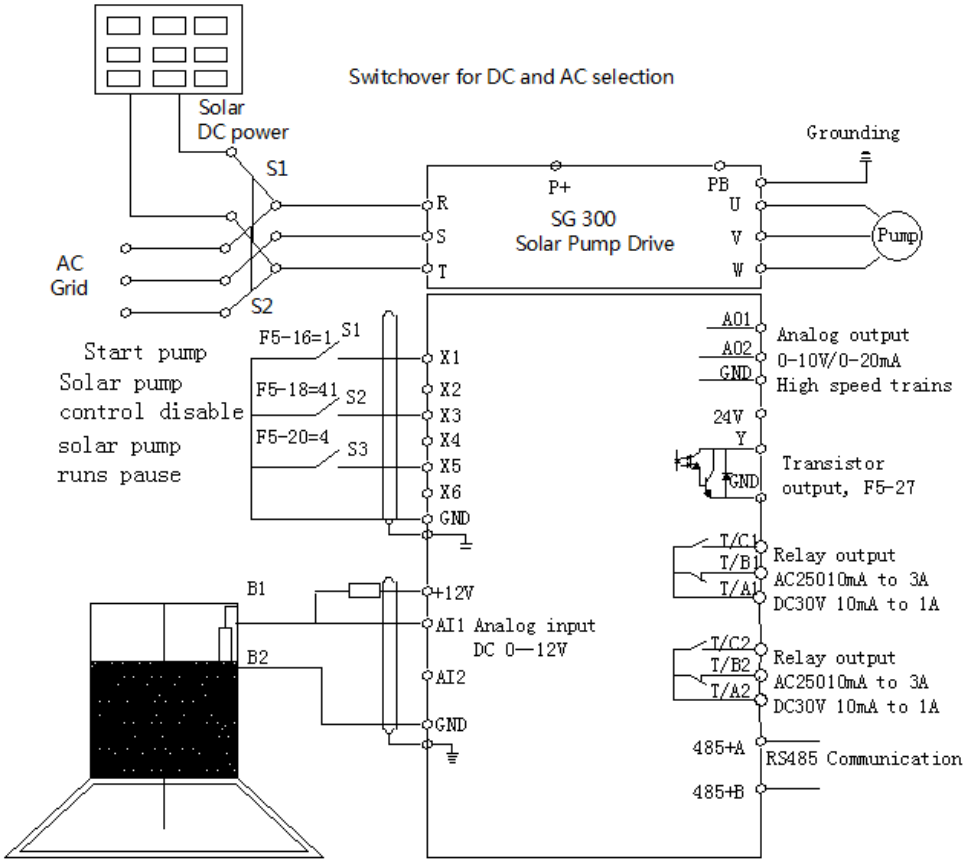
9. Set water tank fulling water level detects fuction. User can use digital signal of sensor to detect if water level reach to setting point. Connect a switch between ×5 and GND, and set F5-20=5 (Solar pump pause). If the water level of tank over than setting point, it will activate ×5 and GND terminal and stop pumping. User also can use analog signal to detect water tank fulling. Set Fa-10 to Fa-14.

10. Set Fa-16 to Fa 25 parameters as PQ curve of pumps to get more accuracy flow showing with

D28 to d31.

11. If solar pump inverters runs well, and system working is stable, the commissioning is finished. Set FA-01 to 1 for terminals automatically running control. Switch on S1(×1 and GND short circuit connect), the solar pump system can work with MPPT function according to sunlight radiation automatically.

Solar pump inverter wiring with dual mode AC grid and solar DC power input.



Note:

1. Use a switch over to select solar power DC input or AC grid input.

Only allow one power input at the same time.

2. Switch on S1, and F5-16 set for 1, it will use to start pumps.

3. Switch on L to disable solar pump control when AC grid input.

4. If external fault or water is enough, user can switch S3 to make system pause.

5.AI and GND analog input ports can receive water level detect analog signal to control water level.

Note.2.

Note: The required input solar panel voltage is 1.15 times of solar inverter DC bus voltage.

For example: In H series, recommend 540V*1.15=621V;

in L series, recommend 311*1.15=357V.

The required power of solar arrays is 1.3 times of rated power of inverters, shouldn't less than 1.2 times of rated power of inverter.

For example, 7R5G, the required power is 7500*1.3=9750w.

Chapter 7. Simple parameter list

Table Symbol Description:

☆ - indicates that the parameter can be changed in the process of stopping and running.

× - indicates that the parameter can be changed in stop mode, can not be changed during running;

* - Indicates that the initial parameters related to the inverters model

Below list all parameters for AC inverters, not only for solar pump control but also for motor speed and torque control. Blue and bold words stands for parameters which may relative to solar pump control function.

1.F0. parameters for basic running control

Code	Name	Description	Unit	Default setting	Property
F0-00	**Model selection**	**0：General purpose 1：P type (variable torque load)**	**1**	**0**	**×**
F0-01	**Control mode**	**0: VF control 1: Vectorized VF control 2：Open loop vector control 1 3: High performance open loop vector control 2**	**1**	**0**	**×**
F0-02	**Running command channel selection**	**0: Operation panel (keypad) 1: External terminals 2: RS485terminals**	**1**	**1**	**☆**
F0-03	Main frequency reference source A	0：Potentiometer of keypad 1: UP, DOWN of keypad. 2: AI1 (0-10V) 3: AI2 (0-10V/0-20mA) 5: PID close loop reference 6: Multi-segment speed control 7: Simple PLC 8: UP/DW of terminals 9: Communication 11: High speed pulse trains	1	0	☆
F0-04	Auxiliary frequency reference source B	0: Potentiometer of keypad 1：AI1 (0- 10V) 2：AI2（0-10V） 3：F0-07 4: High speed pulse trains reference 5: Multi-segment speed	1	1	☆
F0-05	The reference source selection of auxiliary frequency source B	0：Upper limit frequency 1：Main frequency source A	1	0	☆

F0-06	The operation of frequency source A and B combination setting	0: Main frequency source A 1: Auxiliary frequency source B 2：A+B 3：MAX（A，B） 4：MIN（A，B） 5：A-B	1	0	☆
F0-07	UP and Down key of keypad setting	0~Upper limit frequency	0.01	50.00	☆
F0-08	**Upper limit frequency**	**5.00~650.00 Hz**	**0.01**	**50.00**	**×**
F0-09	**Lower limit frequency**	**0.00Hz ~ F0-08**	**0.01**	**0.50**	**×**
F0-10	**Running mode under low limit frequency**	**0: Running with lower limit frequency** **1: Stop** **2: Sleep mode in stand by**	**1**	**0**	**×**
F0-11	Wake up time in sleep mode	0.0~6000.0 S	0.1	0.0	×
F0-12	**Acceleration mode 1**	**0.1~6000.0 s**	**0.1**	*****	**☆**
F0-13	**Deceleration mode 1**	**0.1~6000.0s**	**0.1**	*****	**☆**
F0-14	Carrier frequency	1 ~ 10KHz	1	*	☆
F0-15	Ac inverter running direction	0: Runs as forward direction 1: Runs as reverse direction 2: Reverse direction is forbidden	1	0	☆
F0-16	**Parameters display in standby mode**	**0~39 （corresponding with d parameters）**	**1**	**3**	**☆**
F0-17	**Factory restore to factory setting**	**0: No operation** **11: Parameters initialization** **22: Clear fault record**	**1**	**0**	**×**
F0-18	**Parameters modify protection**	**0: No protection** **1: Disable modify**	**1**	**0**	**×**
F0-19	**STOP operation range**	**0: Enable on keypad operation mode** **1: Enable on all command mode**	**1**	**0**	**×**

2.F1 parameters for start and stop parameters

Code	Name	Description	Unit	Default setting	Property
F1-00	Start up mode	0: Start up with starting frequency 1: Start up after DC braking 2: Start up with speed tracking	1	0	×
F1-01	**Starting frequency**	**0.00~10.00Hz**	**0.01**	**0.50**	**×**
F1-02	Starting frequency holding time	0.0~20.0s	0.1	0.0	×
F1-03	DC braking current when starting	0~150.0%	1	50.0	×
F1-04	DC braking time when starting	0.0~30.0s	0.1	0.0	×

F1-05	**Stop mode**	**0: Deceleration to stop 1: Free stop**	**1**	**1**	☆
F1-06	Dc braking start frequency when stop	0.00~50.00Hz	0.01	3.00	×
F1-07	Dc braking current when stop	0~150.0%	1	50.0	×
F1-08	DC braking holding time when stop	0.0~60.0s	0.1	0.0	×
F1-09	Speed tacking arithmeticSelection	0: Minimum current arithmetic 1: Voltage/frequency arithmetic.	1	0	×
F1-10	Waiting time of speed tacking	0.0 ~ 10.0s	0.1	1.0	×
F1-11	Speed tacking search time	3.0 ～ 100.0s	0.1	6.0	×
F1-12	Current setting of speed tacking finished	1.00～50.00%	0.01	15.00	×
F1-13	Starting voltage when braking	105.0~140.0%	0.1	123.0	☆
F1-14	Final voltage when braking	105.0~150.0%	0.1	128.0	☆
F1-15	Terminals running command detect when power on	0: Running command is disable when power on 1: Running command enable when power on	1	0	×
F1-16	Stop speed	0.00~100.00%	0.01	1.00	☆
F1-17	Stop speed detect mode	0: Detect as speed reference 1: Detect as actual speed (for vector control)	1	1	☆

3. F2 motor parameters group

Code	Name	Description	Unit	Default setting	Property
F2-00	**Motor type**	**0: Asynchronous motor 1: Permanent magnet synchronous motor**	**1**	**0**	**×**
F2-01	**Motor rated voltage**	**1~700V**	**1**	*****	**×**
F2-02	**Motor rated frequency**	**5.00~600.00Hz**	**0.01**	**50.00**	**×**
F2-03	**Motor rated current**	**0.1~3000.0A**	**0.1**	*****	**×**
F2-04	**Rated slip frequency**	**0.00~5.00Hz**	**0.01**	*****	**×**
F2-05	**Poles pair**	**1~50**	**1**	**2**	**×**
F2-06	**No load current**	**10.0~ 80.0%**	**0.1**	*****	**×**
F2-07	**Stator resistor**	**0.00~50.00%**	**0.01**	*****	**×**
F2-08	**Rotor resistance**	**0.00~50.00%**	**0.01**	*****	**×**
F2-09	**Leakage inductance**	**0.00~50.00%**	**0.01**	*****	**×**
F2-10	**Motor parameter auto-tuning**	**0: No operation 1: static auto tuning**	**1**	**0**	**×**

		2: Completely auto tuning			
F2-11	**Rated frequency of PMSM**	**5.00~600.00Hz**	**0.01**	**50.00**	**×**
F2-12	**Rated voltage of PMSM**	**1~700V**	**1**	*****	**×**
F2-13	**Rated current of PMSM**	**0.1~3000.0A**	**0.1**	*****	**×**
F2-14	**Rated back EMF of PMSM**	**1~700V**	**1**	*****	**×**
F2-15	**Stator resistance of PMSM**	**0.00~50.00%**	**0.01**	*****	**×**
F2-16	**Active damping detection time**	**2~100**	**1**	**10**	**×**
F2-17	**Active damping 1**	**0~1000**	**1**	**100**	**×**
F2-18	**Active damping 2**	**0~1000**	**1**	**100**	**×**
F2-19	**Active damping switching frequency**	**0.00~100.00Hz**	**0.01**	**100.00**	**×**
F2-20	**Active damping limiter**	**0.00~3.00Hz**	**0.01**	**1.00**	**×**

PMSM stands for Permanent magnet synchronous motor

4.F3 group parameters for Vector control and V/f control

Code	Name	Description	Unit	Default setting	Property
F3-00	ASR low speed proportional coefficient	0.01 ~ 30.00	0.01	0.60	☆
F3-01	Low ASR integral coefficient	0.01 ~ 10.00	0.01	1.00	☆
F3-02	ASR switching frequency 1	1.00~7.50Hz	0.01	5.00	☆
F3-03	ASR high speed proportional coefficient	0.01 ~ 30.00	0.01	0.60	☆
F3-04	High ASR integral coefficient	0.01 ~ 10.00	0.01	1.00	☆
F3-05	ASR switching frequency 2	8.00~50.00Hz	0.01	10.00	☆
F3-06	Current loop proportional coefficient	0.01~10.00	0.01	0.20	×
F3-07	Current loop integral coefficient	1~100	1	10	×
F3-08	Slip compensation coefficient	50~200%	1	100	×
F3-09	Speed feedback filter time constant	1~100millisecond	1	6	×
F3-10	Torque limit	0~200%	1	150	×
F3-11	Cross compensation coefficient	0.00 ~ 0.50	0.01	0.20	×
F3-12	Closed-loop voltage proportional coefficient	0~ 1.00	0.01	0.20	×
F3-13	Voltage closed-loop integral coefficient	0~ 1.00	0.01	0.20	×
F3-14	Magnetic field control proportional coefficient	10~1000	1	50	×
F3-15	Magnetic field control integral coefficient	1~500	1	50	×

F3-16	Current reference filter time constant	1~100millisecond	1	10	×
F3-17	Whether torque control	0: Torque control disable 1: Torque control enable	1	0	☆
F3-18	Torque reference	0: Torque reference set by F3-19 1: AI1 2: AI2 3: Multi-segment speed 4：RS485 5：HDI	1	0	☆
F3-19	Torque reference by keypad setting	0.0～200.0%	0.1	50.0	☆
F3-20	Torque reference direction	0: Forward direction 1: Reverse direction	1	0	☆
F3-21	**Upper limit frequency reference source set selection**	**0: Upper limit frequency 1: AI1 2: AI2 3: Multi-segment speed 4: RS485 5: HDI 6: Potentiometer of keypad**	**1**	**0**	☆
F3-22	V/F curve selection	0: Standard V/F curve，V/F=constant 1: Square V/f curve 2: User defined V/f curve	1	0	×
F3-23	Custom curve F1	0.0 ～100.0%	0.1	0.0	×
F3-24	Custom curve V1	0.0 ～100.0%	0.1	0.0	×
F3-25	Custom curve F2	0.0 ～100.0%	0.1	0.0	×
F3-26	Custom curve V2	0.0 ～100.0%	0.1	0.0	×
F3-27	Custom curve F3	0.0 ～100.0%	0.1	0.0	×
F3-28	Custom curve V3	0.0 ～100.0%	0.1	0.0	×
F3-29	**Torque boost**	**0.0~20.0%**	**0.1**	**2.0**	**×**
F3-30	Low frequency oscillation suppression strength	0~1000	1	100	×
F3-31	High frequency oscillation suppression strength	0~1000	1	0	×
F3-32	High and low frequency turning point	5.00～50.00 Hz	0.01	20.00	×
F3-33	V / F control slip compensation coefficient	0~200%	1	0	×

5.F4 group parameters for auxiliary running control

Code	Name	Description	Unit	Default setting	Property

F4-00	Forward /reverse dead time	0.0~5.0s	0.1	0.1	☆
F4-01	Skip frequency 1	0.00 ~Upper limit frequency	0.01	0.00	☆
F4-02	Skip frequency 1 range	0.00 ~5.00Hz	0.01	0.00	☆
F4-03	Skip frequency 2	0.00 ~ Upper limit frequency	0.01	0.00	☆
F4-04	Skip frequency 2 range	0.00 ~5.00Hz	0.01	0.00	☆
F4-05	Skip frequency 3	0.00 ~ Upper limit frequency	0.01	0.00	☆
F4-06	Skip frequency 3 range	0.00 ~5.00Hz	0.01	0.00	☆
F4-07	Jog frequency	0.00~ Upper limit frequency	0.01	5.00	☆
F4-08	Jog acceleration time	0.1~6000.0s	0.1	10.0	☆
F4-09	Jog deceleration time	0.1~6000.0s	0.1	10.0	☆
F4-10	Acceleration time 2	0.1~ 6000.0S	0.1	*	☆
F4-11	Deceleration time 2	0.1~ 6000.0S	0.1	*	☆
F4-12	Acceleration time 3	0.1~ 6000.0S	0.1	*	☆
F4-13	Deceleration time 3	0.1~ 6000.0S	0.1	*	☆
F4-14	Acceleration time 4	0.1~ 6000.0S	0.1	*	☆
F4-15	Deceleration time 4	0.1~ 6000.0S	0.1	*	☆
F4-16	Acceleration /deceleration mode	0: Linear, 1: S curve	1	0	×
F4-17	Terminal UP/DW rate	0.01~100.00Hz/s	0.01	1.00	☆
F4-18	FDT 1（frequency detect level ）setting	0.00~upper limit frequency	0.01	50.00	☆
F4-19	FDT 1 lag detection value	0.0~100.0%	0.1	5.0	☆
F4-20	FDT 2（frequency detect level ）setting	0.00~upper limit frequency	0.01	50.00	☆
F4-21	FDT 2 lag detection value	0.0~100.0%	0.1	5.0	☆
F4-22	Frequency arrival detection range	0 0.00~20.00Hz	0.01	1.00	☆
F4-23	PWM modulation	Unit ‘s digit: if over modulation 0: Not modulation 1: Modulation Ten’s digit: Modulation mode 0: 3 phase modulation at low speed, 2 phase modulation at high speed Hundred’s digit: Low speed deal with 0: when the low carrier frequency large than 3Khz, runs with within 3Khz. 1: Carrier frequency runs with previous setting	1	0	×
F4-24	**AVR (auto voltage**	**0: no operation**	**1**	**0**	**×**

	regulation)	**1: Enable 2: Disable in deceleration**			
F4-25	Drop control	0.0~10.00Hz	0.01	0.0	×
F4-26	**Operation monitoring items selection**	**0～3939: Low bit and high bit each stands for one d parameters. 3 parameters can determined 6 monitor parameters, press Shift key to circulation display in running.**	**1**	**0100**	☆
F4-27	**Operation monitoring items selection 2**		**1**	**0502**	☆
F4-28	**Operation monitoring items selection 3**		**1**	**3226**	☆
F4-29	**Speed display coefficient**	**0.1~999.9%**	**0.1**	**100.0**	☆
F4-301	**Linear speed display coefficient**	**0.01~99.99**	**0.01**	**1.00**	☆
F4-31	**Multifunction key MF.K set**	**0: REV 1: Jog forward 2: Jog Reverse 3: Running command switchover**	1	**0**	×

6.F5 group parameters for external terminals input and output

Code	Name	Description	Unit	Default setting	Property
F5-00	AI1minimum input	0.00~10.00V	0.01	0.00	☆
F5-01	AI1 minimum input corresponding value	-100.00~100.0%	0.1	0.0	☆
F5-02	AI1 maximum input	0.00~10.00V	0.01	10.00	☆
F5-03	AI1 maximum input corresponding value	-100.00~100.0%	0.1	100.0	☆
F5-04	AI1filter time constant value	0.01~50.00s	0.01	0.10	☆
F5-05	AI2 minimum input	0.00~10.00V	0.01	0.00	☆
F5-06	AI2 minimum input corresponding value	-100.00~100.0%	0.1	0.0	☆
F5-07	AI2 maximum input	0.00~10.00V	0.01	10.00	☆
F5-08	AI1 maximum input corresponding value	-100.00~100.0%	0.1	100.0	☆
F5-09	AI2 filter time constant value	0.01~50.00s	0.01	0.10	☆
F5-10	PLUSE minimum input	0.00~50.00KHz	0.01	0.00	☆
F5-11	PLUSE minimum input corresponding value	-100.00~100.0%	0.1	0.0	☆
F5-12	PLUSE maximum value	0.00~50.00KHz	0.01	50.00	☆
F5-13	PLUSE Maximum value corresponding value	-100.00~100.0%	0.1	100.0	☆
F5-14	PULSE filter time constant value	0.01~50.00s	0.01	0.10	☆

F5-15	**External terminal command control mode**	**0: Two lines control mode 1 1: Two lines control mode 2 2: Three lines control mode 1 3: Threes lines control mode 2**	**1**	**1**	**×**
F5-16	**X1terminals function selection（0~39）**	0: No function **1: FWD Forward command** 2: REV Reverse command 3: External fault input (normally open) 4: DC braking **5: Emergency stop input (solar pump pause)** 6: Fault reset input 7: Multi-speed input 1 8: Multi-speed input 2 9: multispeed input 3 10: Multi-speed input 4 11: three-line control 12: Terminal UP 13: Terminal DOWN 14: Terminal reset 15: Acceleration and deceleration selection terminal 1 16: Acceleration and deceleration selection terminal 2 17: PLC Pause running 18: PLC state reset (modes 1, 2) 19: Forward jog 20: reverse jog 21: Traverse suspend operation 22: Traverse reset 23: PID suspend operation 24: Interior timer enable 25: The internal timer is cleared 26: Counter trigger input 27: Counter Reset (reset to 0) 28: Frequency reference given A and B switchover 29: Frequency reference given A and A + B switchover 30: Frequency reference given B and A + B switchover 31: deceleration to stop 32: Torque control prohibition 33: Length counter input		1	×
F5-17	X2 terminals function selection（0~50）			2	×
F5-18	X3 terminals function selection（0~50）			7	×
F5-19	X4 terminals function selection（0~50）			8	×
F5-20	**X5 terminals function selection（0~50）**			1	×
F5-21	X6 terminals function selection（0~50）			10	×

		34: The length of the counter is cleared 35: Command given source is forcibly set by keypad 36: Command given source is forcibly set by terminal 37: Command given source is forcibly set by the communication. 38: PID parameters 39: External fault normally closed input 40: Pulse input (only valid for X6) **41: Solar control prohibition**			
F5-27	Y transistor output selection	0: No function 1: Run state 2: Fault output 3: Frequency arrival 4: detection frequency FDT1 arrival 5: detection frequency FDT2 arrival 6: Zero speed running 7: Lower limit frequency arrival 8: Upper limit frequency arrival 9: Counter reaches the specified value (greater than the specified value, output ON) 10: Counter reach final value (equal to the final value, output a ON clock cycle counter signal) 11: Internal timer reaches (Output a ON timer unit signal) 12: Running time is reached (greater than the set time Output ON) 13: PLC a segment operation is completed (Output a 0.5s ON signal) 14: PLC run cycle is complete (Output a 0.5s ON signal) 15: Over-torque warning 16: Inverter standby 17: Length arrive 18: Place in sleep mode 19: AI1 input over limit 20: Module temperature	1	1	☆
F5-28	Relay 1 output selection		1	1	☆
F5-29	Relay 2 output selection		1	1	☆

		reaches			
F5-34	AO1 output selection	0: Frequency reference 1: Run Frequency 2: Output current 3: DC bus voltage 4: Output voltage 5: output power (100% corresponds to 200% of rated power) 6: Torque current 7: AI1 8: AI2 9: Reserved 10: High-speed pulse input 11: RS485 set 12: Length 13: count value 14 to 20 Reserved	1	0	☆
F5-35	AO1 analog output corresponding to 0%	0.0~100.0%, output 0~10V, 100.00% corresponding to 10V, output 0~20mA, 100.00% corresponding to 20mA.	0.1	0.0	☆
F5-36	AO1 analog output corresponding to 100.00%	0.0~100.0%	0.1	100.0	☆
F5-39	AO2 output type selection	0: Analog 1：HDO pulse trains output	1	0	☆
F5-40	HDO pulse train upper limit	0.10~50.00KHz	0.01	50.00	☆
F5-41	AO2 output selection	As same as AO1 selection	1	1	☆
F5-42	AO2 analog output corresponding to 0%	0.0~100.0%，when output 0~10V，100.0% corresponding to 10V；when output is high speed pulse train ，100.0% correspond to 50.00KHz	0.1	0.0	☆
F5-43	AO2 analog output corresponding to 100.00%	0.0~100.0%	0.1	100.0	☆

7.F6 group parameters for PID control

Code	Name	Description	Unit	Default setting	Property
F6-00	Select PID reference command source	0: Potentiometer of keypad 1：Fb.0 reference 2：F6.01 reference 3：AI1 4：AI2 5：RS485 6：PLUSE trains	1	0	☆

		7：multi-speed			
F6-01	PID reference	0~100.0%	0.1	50.0	☆
F6-02	PID feedback channel selection	0：AI1 1：AI2 2：HDI 3：RS485	1	0	☆
F6-03	Regulation characteristics	0: Positive 1: Negative	1	0	☆
F6-04	Proportional gain	0.0~50.0	0.1	5.0	☆
F6-05	Integration time constant	0.1~100.0s	0.1	10.0	☆
F6-06	Differential Gain	0.0~5.0	0.1	0.0	☆
F6-08	Preset frequency	0.0～100.0% upper limit frequency	0.1	50.0	☆
F6-09	Preset frequency holding time	0.0 ~ 3000.0S	0.1	0.0	☆
F6-10	Feedback disconnection detection threshold	0.0～100.0%	0.1	5.0	☆
F6-11	Feedback disconnection judgment time	0.0~3000.0s，0.0 means not perform disconnect judge.	0.1	0.0	☆
F6-12	PID limited negative output	0~100.0%	0.1	0.0	☆
F6-13	Twice the maximum output deviation	0.00~100.00%	0.01	1.00	☆

8.F7 group parameters for multi-speed and simple PLC control

Code	Name	Description	Unit	Default setting	Property
F7-00	Programmable multi segment speed running setting	Unit' digit: 0: Single segment running finished stop 1: Single segment running finished and keep the finial setting 2: cycle running continue Ten' s digit 0: Running time unit is second 1: Running time unit is minute Hundred's digit: Reserve Thousand's digit: restart selection 0: Every restart from 0 segment point 1: Every restart from break off point frequency.	1	2	×
F7-01	Multi-speed frequency 0	0.0 ~ 100.0%	0.1	10.0	☆
F7-02	Multi-speed frequency 1	0.0 ~ 100.0%	0.1	20.0	☆
F7-03	Multi-speed frequency 2	0.0 ~ 100.0%	0.1	30.0	☆
F7-04	Multi-speed frequency 3	0.0 ~ 100.0%	0.1	40.0	☆

F7-05	Multi-speed frequency 4	0.0 ~ 100.0%	0.1	50.0	☆
F7-06	Multi-speed frequency 5	0.0 ~ 100.0%	0.1	70.0	☆
F7-07	Multi-speed frequency 6	0.0 ~ 100.0%	0.1	80.0	☆
F7-08	Multi-speed frequency 7	0.0 ~ 100.0%	0.1	100.0	☆
F7-09	Multi-speed frequency 8	0.0 ~ 100.0%	0.1	10.0	☆
F7-10	Multi-speed frequency 9	0.0 ~ 100.0%	0.1	20.0	☆
F7-11	Multi-speed frequency 10	0.0 ~ 100.0%	0.1	30.0	☆
F7-12	Multi-speed frequency 11	0.0 ~ 100.0%	0.1	40.0	☆
F7-13	Multi-speed frequency 12	0.0 ~ 100.0%	0.1	50.0	☆
F7-14	Multi-speed frequency 13	0.0 ~ 100.0%	0.1	70.0	☆
F7-15	Multi-speed frequency 14	0.0 ~ 100.0%	0.1	80.0	☆
F7-16	Multi-speed frequency 15	0.0 ~ 100.0%	0.1	100.0	☆
F7-17	Speed 0 running time	0.0~3000.0	0.1	10.0	☆
F7-18	Speed 0 running direction and acceleration/deceleration	Unit's digit：0：Forward 1: Reverse Ten' s digit： 0: Acceleration/deceleration 1 1: Acceleration/deceleration 2 2: Acceleration/deceleration 3 3: Acceleration/deceleration 4	1	0	☆
F7-19	Speed 1 running time	0.0~3000.0	0.1	10.0	☆
F7-20	Speed 1 running direction and acceleration/deceleration	As same as speed 1 description	1	0	☆
F7-21	Speed 2 running time	0.0~3000.0	0.1	10.0	☆
F7-22	Speed 2 running direction and acceleration/deceleration	As same as speed 1 description	1	0	☆
F7-23	Speed 3 running time	0.0~3000.0	0.1	10.0	☆
F7-24	Speed 3 running direction and acceleration/deceleration	As same as speed 1 description	1	0	☆
F7-25	Speed 4 running time	0.0~3000.0	0.1	10.0	☆
F7-26	Speed 4 running direction and acceleration/deceleration	As same as speed 1 description	1	0	☆
F7-27	Speed 5 running time	0.0~3000.0	0.1	10.0	☆
F7-28	Speed 5 running direction and acceleration/deceleration	As same as speed 1 description	1	0	☆
F7-29	Speed 6 running time	0.0~3000.0	0.1	10.0	☆
F7-30	Speed 6 running direction and	As same as speed 1 description	1	0	☆

	acceleration/deceleration				
F7-31	Speed 7 running time	0.0~3000.0	0.1	10.0	☆
F7-32	Speed 7 running direction and acceleration/deceleration	As same as speed 1 description	1	0	☆
F7-33	Speed 8 running time	0.0~3000.0	0.1	10.0	☆
F7-34	Speed 8 running direction and acceleration/deceleration	As same as speed 1 description	1	0	☆
F7-35	Speed 9 running time	0.0~3000.0	0.1	10.0	☆
F7-36	Speed 9 running direction and acceleration/deceleration	As same as speed 1 description	1	0	☆
F7-37	Speed 10 running time	0.0~3000.0	0.1	10.0	☆
F7-38	Speed 10 running direction and acceleration/deceleration	As same as speed 1 description	1	0	☆
F7-39	Speed 11 running time	0.0~3000.0	0.1	10.0	☆
F7-40	Speed 11 running direction and acceleration/deceleration	As same as speed 1 description	1	0	☆
F7-41	Speed 12 running time	0.0~3000.0	0.1	10.0	☆
F7-42	Speed 12 running direction and acceleration/deceleration	As same as speed 1 description	1	0	☆
F7-43	Speed 13 running time	0.0~3000.0	0.1	10.0	☆
F7-44	Speed 13 running direction and acceleration/deceleration	As same as speed 1 description	1	0	☆
F7-45、	Speed 14 running time	0.0~3000.0	0.1	10.0	☆
F7-46	Speed 14 running direction and acceleration/deceleration	As same as speed 1 description	1	0	☆
F7-47	Speed 15 running time	0.0~3000.0	0.1	10.0	☆
F7-48	Speed 15 running direction and acceleration/deceleration	As same as speed 1 description	1	0	☆

9.F8 group parameters for communication

Code	Name	Description	Unit	Default setting	Property
F8-00	Baud selection	0：300bps 1：600bps 2：1200bps 3：2400bps 4：4800bps 5：9600bps 6：19200bps 7：38400bps	1	5	☆
F8-01	Data format	0: No parity 1: Odd 2: Even parity	1	0	☆

F8-02	Address	0~247 0: Broadcast address does not return data	1	1	☆
F8-03	The machine response delay	0~100ms	1	5	☆
F8-04	Timeout judgment time	0.0~100.0s；0.0 means time out	0.1	0.0	☆
F8-05	Master-Slave Select	0: Slave port 1: Master port	1	0	☆
F8-06	RS485 frequency reference scale factor	0~999.9%	0.1	100.0	☆
F8-07	Writing operation if return data	0: Return 1: No reture	1	0	☆

10. Advanced F9 group parameters

Code	Name	Description	Unit	Default setting	Property
F9-00	Swing frequency amplitude	0.0~100.0%	0.1	0.0	☆
F9-01	Kick frequency amplitude	0.0~50.0%	0.1	0.0	☆
F9-02	Triangular wave rise time	0.1~3600.0s	0.1	5.0	☆
F9-03	Triangular wave fall time	0.1~3600.0s	0.1	5.0	☆
F9-04	Specify the value of the counter	0~65535	1	1000	☆
F9-05	Counter final value	0~65535	1	2000	☆
F9-06	Setting length	0~65535meter	1	1000	☆
F9-07	The number of pulses per meter	0.1~6553.5	0.1	100.0	☆
F9-08	Internal timer timer unit	0.01~99.99s	0.01	1.00	☆
F9-09	internal timer cycle period	1~65535	1	10	☆
F9-10	Setting the running time	0~65535hour	1	65535	☆
F9-101	**X1 switch-on delay time**	**0.0~3600.0S**	**0.1**	**0.0**	**☆**
F9-12	**X1 off delay time**	**0.0~3600.0S**	**0.1**	**0.0**	**☆**
F9-13	X2 switch-on delay time	0.0~3600.0S	0.1	0.0	☆
F9-14	X2 off delay time	0.0~3600.0S	0.1	0.0	☆
F9-15	**X3 switch-on delay time**	**0.0~3600.0S**	**0.1**	**0.0**	**☆**
F9-16	**X3 off delay time**	**0.0~3600.0S**	**0.1**	**0.0**	**☆**
F9-17	Y1 output delay time	0.0~3600.0S	0.1	0.0	☆
F9-18	Relay 1 output delay time	0.0~3600.0S	0.1	0.0	☆
F9-19	Relay 2 output delay time	Relay 1 output delay time	0.1	0.0	☆

11. FA group parameters for solar pump control

Code	Name	Description	Unit	Default setting	Property
FA-00	Select solar pump control mode	0: Variable frequency inverter control (AC grid input) 1:CVT (constant voltage tracking) 2: MPPT (maximum power point tracking)	1	2	×
FA-01	Auto/ manual switch over	0: Manual by keypad control 1: Automatically running with terminals control 2: RS485 communication	1	0	☆
FA-02	CVT object voltage	0.0~100.0% of Voc	0.1	80.0	☆

FA-03	MPPT upper limit voltage	0.0~100.0% of Voc	0.1	90.0	☆
FA-04	MPPT lower limit voltage	0.0~100.0% of Voc	0.1	75.0	☆
FA-05	Frequency adjust gain	1~1000	1	40	☆
FA-06	Frequency adjusting allowable deviation	1~5	1	3	☆
FA-07	MPPT Control period	0.01~10.00S	0.01	0.30	×
FA-08	Dc current correction offset	0.00~50.00A	0.01	0.00	☆
FA-09	Dc current correction gain	0.0~100.0%	0.1	100.0	☆
FA-10	Water level detect control	0: Disable 1: AI1 takes as water level detect signal 2: AI2 takes as water level detect signal Only FA-10 not 0 set, the FA-11 to FA-14 is enable	1	0	☆
FA-11	Water level threshold	0.0~100.0%	0.1	25.0	☆
FA-12	Full water delay	0.0~3000.0S If the detected water level less than FA-11, and lasting for FA-12 delay time. it will give out water full alarm and display A.Ful, and go to sleep. If the time is not reached, the signal is bigger than water level threshold, the time will be reset automatically.	0.1	60.0	☆
FA-13	Empty water delay	0.0~3000.0S After full water level alarmed, if the detected valued greater than FA-11, and lasting more than FA-13 delay time, system restore to running state from sleep mode.	0.1	600.0	☆
FA-14	Hydraulic detection probe damage threshold	0.0~100.0% 0.0: No detected If the detected water level signal large than FA-14, the solar pump inverter consider water probe is damaged and sent alarm directly and go to sleep.	0.1	0.0	☆

12. Fb group parameters for solar pump protection and monitoring

Code	Name	Description	Unit	Default setting	Property
Fb-00	Sleep voltage threshold	0~1000V	1	*	☆
Fb-01	Restore running state voltage threshold	0~1000V	1	*	☆
Fb-02	Awake waiting time	0.0~3000.0S	0.1	120.0	☆
Fb-03	Stop frequency when low speed	0.00~300.00Hz	0.01	20.00	☆

Fb-04	stop delay time when reachstop frequency	0.0~3000.0S	0.1	30.0	☆
Fb-05	Automatic recovery time in stop frequency protection mode	0.0~3000.0S	0.1	120.0	☆
Fb-06	Dry run protection current threshold (under-load protection)	0.0~100.0A	0.1	1.0	☆
Fb-07	Dry run detect delay time	0.0~3000.0S	0.1	60.0	☆
Fb-08	Automatic recover time in dry run protection mode	0.0~3000.0S	0.1	120.0	☆
Fb-09	Motor over current protection threshold	0~3000.0A	0.1	*	☆
Fb-10	Over current detect delay time	0.0~3000.0S	0.1	30.0	☆
Fb-11	Automatic recovery time in over current protection mode	0.0~3000.0S	0.1	30.0	☆
Fb-12	Minimum power input protection threshold	0.00~100.00KW	0.01	0.00	☆
Fb-13	Minimum power input detect delay time	0.0~3000.0S	0.1	10.0	☆
Fb-14	Automatic recovery time in minimum power input protection mode	0.0~3000.0S	0.1	10.0	☆
Fb-15	Alarm action mode	0: Sending alarm and automatically rest 1: Reset by manual Unit's digit: Low stop frequency Ten's digit: Dry run (under load) Hundred's digit: Motor over current protection Thousand's digit: Minimum power input protection	1	0000	☆
Fb-16	PQ CURVE P0 (Input power of pump at point 0)	0.00~100.00KW	0.01	0.50	☆
Fb-17	PQ CURVE P1 (Input power of pump at point 1)	0.00~100.00KW	0.01	1.00	☆
Fb-18	PQ CURVE P2 (Input power of pump at point 2)	0.00~100.00KW	0.01	1.50	☆
Fb-19	PQ CURVE P3 (Input power of pump at point 3)	0.00~100.00KW	0.01	2.00	☆
Fb-20	PQ CURVE P4 (Input power of pump at point 4)	0.00~100.00KW	0.01	2.50	☆
Fb-21	PQ CURVE Q 0 (Flow rate at point 0)	0.0~1000.0m^3/h	0.1	0.0	☆

Fb-22	PQ CURVE Q 1 (Flow rate at point 1)	0.0~1000.0m³/h	0.1	5.0	☆
Fb-23	PQ CURVE Q 2 (Flow rate at points 2)	0.0~1000.0m³/h	0.1	10.0	☆
Fb-24	PQ CURVE Q 3 (Flow rate at point 3)	0.0~1000.0m³/h	0.1	15.0	☆
Fb-25	PQ CURVE Q 4 (Flow rate at point 4)	0.0~1000.0m³/h	0.1	20.0	☆
Fb-26	Today flow / generated energy day reset period	0.0~24.0hour	0.1	8.0	☆
Fb-27	Flow measured offset	0.00~1000.0m³/h	0.1	0.0	☆
Fb-28	Flow measured gain	0.0~100.0%	0.1	100.0	☆
Fb-29	Cumulative flow/ generated energy reset setting	0: No operation 1: Flow reset 2: Generated energy reset 3: Both flow and generated energy reset	0	0	×

13. Fd group parameters for protection

Code	Name	Description	Unit	Default setting	Property
Fd-00	Current limit value	100.0~200.0%	0.1	*	☆
Fd-01	Frequency drop time when over current	1.0~200.0s	0.1	5.0	☆
Fd-02	Over voltage limit	110.0~145.0%	1	130.0	☆
Fd-03	Overvoltage suppression gain	0~10	1	2	☆
Fd-04	**Phase loss protection**	**Unit's digit: Input phase limit 0: No protection 1: Protection Ten's digit: Output phase limit 0: No protection 1: Protection**	**1**	**11**	**☆**
Fd-05	**Motor overload protection**	**20.0~100.0%**	**0.1**	**100.0%**	**☆**
Fd-06	Pre-alarm value of over torque	20.0~200.0%	0.1	*	☆
Fd-07	Over torque detect delay time	0.0~60.0s	0.1	0.1	☆
Fd-08	**Fault auto reset times**	**0~5**	**1**	**0**	☆
Fd-09	**Failure self-reset interval time**	**0.1~600.0s**	**0.1**	**1.0**	☆
Fd-10	**Fault relay output during reset**	**0: No output 1: Output**	**1**	**0**	☆
Fd-11	AI1 input voltage low limit	0.00~10.00V	0.01	2.00	☆
Fd-12	AI1input voltage upper limit	0.00~11.00V	0.01	8.00	☆
Fd-13	Module temperature reaches	25.0~90.0℃	0.1	70.0	☆
Fd-14	Previous two faults	0~30	1	0	×
Fd-15	Previous faults	0~30	1	0	×

Fd-16	Current fault	0~30	1	0	×
Fd-17	Output frequency at current fault	0 ~Upper limit frequency	0.01	0.00	×
Fd-18	Output current at current fault	0 ~ 3000.0A	0.1	0.0	×
Fd-19	DC bus voltage at current fault	0 ~ 800V	1	0	×

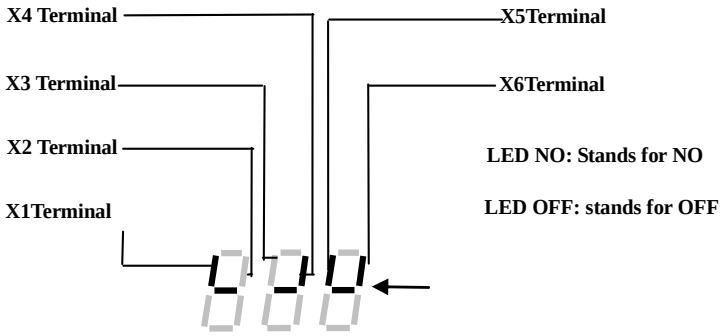
D Group parameters for working status monitor

Note：Press shift button of keypad can display output current, output frequency, output voltage, DC bus voltage, DC bus current and input power 6 parameters in circulation in monitor status.

Monitor code	Contents	Mini. Unit
d-00	**Current output frequency**	**0.01Hz**
d-01	**Current output voltage**	**1V**
d-02	**Current output current**	**0.1A**
d-03	Current frequency reference	0.01Hz
d-04	Current output frequency 2	0.01Hz
d-05	**DC bus voltage value**	**1V**
d-06	Module temperature	0.1℃
d-07	PID reference value	0.1%
d-08	PID feedback	0.1%
d-09	**Speed**	**rmp**
d-10	Running liner frequency	0.01*
d-11	External pulse train input	0.01KHz
d-12	RS485 reference	
d-13	Reserve	
d-14	AI1	0.1V
d-15	AI2	0.1V
d-16	DI terminals status	
d-17	DO terminals status	
d-18	Single continuous run time	1H
d-19	Total running time	1H
d-20	External pulse count value	
d-21	Internal timer count	
d-22	Actual length	m
d-23	Pressure reference	MPa
d-24	Actual pressure	MPa
d-25	**Open circuit voltage**	**1V**
d-26	**DC bus current**	**0.01A**
d-27	**MPPT tracking voltage**	**0.1%**
d-28	**Calculate flow rate**	**0.1m3/h**
d-29	**Today flow**	**0.1m3**
d-30	**Cumulative flow 1**	**0.1m3**
d-31	**Cumulative flow 2**	**1Km3**
d-32	**Input power**	**0.01KW**
d-33	**Today generated energy**	**0.1KWH**
d-34	**Cumulative generated energy 1**	**0.1KWH**

d-35	**Cumulative generated energy 2**	**1MWH**
d-36	**Working status**	**1**
d-37	**Rated voltage of Inverter**	**1V**
d-38	**Rated current of Inverter**	**0.1A**
d-39	**Software version**	

XI input terminals status description: The last three to five digital display digital input status



2）DO Terminals status：Th e lowest bit stands for Y, the second bit stands for relay output 1, the high bit stands for relay output 2.

Y is the lowest position, the output relay 1 followed by 2 relay outputs as a binary number consisting of the highest level, is converted into a decimal display.

3）d-36 working status display introduction:

0：Stop mode

1: Running

2: **A.LUo** means on low voltage sleep mode ,

3: **A.LFr** means on low stop frequency sleep mode,

4:**A.LCr** means on dry run protection

5: **A.OCr** means on motor over current mode,

6: **A.Lpr** means on minimum power input mode,

7: **A.FuL** water full sleep mode.

Chapter 8. Parameters description in detail

Some parameters description which may relative with solar pump control.

F0-00	Model selection	0：General purpose 1：P type (variable torque load)	1	0	×

0: Suitable for driving general purpose constant torque heavy load w

For solar submersible pump need select G type models because large torque in deep well.

1: suitable fr driving fans pumps, etc variable torque light load

The power of P type mode for fans, pumps light load lower than G constant torque model one range.

Note: This value can't change after factory leaving.

For some fans pumps application, such as boost fans, deep well pump, which load is heavy. Select the AC Inverter should according to the actual current.

The tolerance capacitors of G type: 150% rated current for 1 minutes, 180% rated current for 2 seconds.

The tolerance capacitors of Ptype: 120% rated current for 1 minutes, 150% rated current for

2 seconds.

F0-01	Control mode	0: VF control 1: Vectorized VF control 2： Open loop vector control 1 3: High performance open loop vector control 2	1	0	×

0: V/F control

No need install encoder, good compatibility and stable running. Suits for the applications, which no high request for loads, and one inverter for more than one motors, and motor auto-tuning cannot be performed or the motor's parameters can be acquired through other methods, such as fans, pumps load.

Always select VF control for solar pump control application for asynchronous motor.

1: Vectorized VF control,

Do vectorized for V/F control to enhanced control accuracy, stability of control and improved the torque output at low speed. Not sensitive to motor parameters.

2: Open loop sensorless vector control 1:

Unique method vector control, vector control versatility relatively strong, has steadyperformance, but the dynamic indicators worse than the high performance open loop vector control 2, insensitive to motor parameters.

3: High performance sensorless vector control 2

It uses a rotor field oriented vector control, with high static and dynamic performance control, sensitive to motor parameters. This control mode suits for high performance general purpose application without encoder, such as machine, centrifugal machine, drawbench, injection mold machine, etc. one inverter only allow to control one motor.

Please configure motor group parameters carefully, and performance ID auto tuning when apply this control mode.

F0-02	Running command channel selection	0: Operation panel (keypad) 1: External terminals 2: RS485terminals	1	1	☆

Selects AC Inverter running command input channel,

The AC Inverter control command includes starting, stop, forward, reverse, jog function.

0: Keypad (operation panel); The running command is controlled by RUN, STOP, JOG(through F4-13) by keypad.

1: External terminals The running command controlled by multiple function terminals. It can achieved to forward, reverse, Jog, reverse running with two lines or three lines control, see P0.18, F5-16～F5-21 function code in detail.

2: communication command

The running command is given by communication, see the communication protocol F8 group description.

F0-03	Main frequency reference source A	0：Potentiometer of keypad 1: UP, DOWN of keypad. 2: AI1 (0-10V) 3: AI2 (0-10V/0-20mA) 5: PID close loop reference 6: Multi-speed control 7: Simple PLC 8: UP/DW of terminals 9: Communication 11: High speed pulse trains	1	0	☆
F0-04	Auxiliary frequency reference source B	0: Potentiometer of keypad 1: AI1 (0- 10V) 2: AI2（0-10V） 3: F0-07 (UP and Down of keypad reference setting) 4: High speed pulse trains reference 5: Multi-segment speed	1	1	☆
F0-05	The reference source selection of auxiliary frequency source B	0：Upper limit frequency 1：Main frequency source A	1	0	☆
F0-06	The operation of frequency source A and B combination setting	0: Main frequency source A 1: Auxiliary frequency source B 2: A+B 3: MAX（A，B） 4: MIN（A，B） 5: A-B	1	0	☆

There are two frequency reference source of main and auxiliary reference (A and B). The user can select frequency reference according actual application request.

These parameters is disable in solar pump control mode, because the output frequency is controlled by inner MPPT algorithm.

F0-08	Upper limit frequency	5.00~650.00 Hz	0.01	50.00	×
F0-09	Lower limit frequency	0.00Hz ~ F0-08	0.01	0.50	×
F0-10	Running mode under low limit frequency	0: Running with lower limit frequency 1: Stop 2: Sleep mode in stand by	1	0	×
F3-21	Upper limit frequency reference source set selection	0: Upper limit frequency 1: AI1 2: AI2 3: Multi-segment speed 4: RS485 5: HDI 6: Potentiometer of keypad	1	0	☆

The upper limit frequency is upper limit value of output frequency of AC Inverter.

When frequency reference is set by the external analog reference, multiple speed and simple PLC, the given value is percent %, their reference value is upper limit frequency.

Uses F3-21 to set the value of upper limit frequency source.

In solar pump control, if sunlight radiation is good, output is 50Hz. The user can limit frequency output according application request with this F0-08 and F3-21 parameters configuration.
F0-09, lower limit frequency used to defined lower limit output frequency of AC inverter.
F0-10 running mode selection used to select stop, running and go to sleep mode when output frequency is lower than F0-09.

Note: If F0-10 set for 1, Ac inverter stop when output frequency lower than F0-09. It request confirm STOP command again to start Ac inverter when control by terminals or RS485 mode, when starting command is open.
If control by keypad or pulse terminals control, it need trigger starting signal again to start AC inverter. In terminals control mode, only terminals signal is disable, and enable again to make AC inverter start again.

F0-12	Acceleration mode 1	0.1~6000.0 s	0.1	*	☆
F0-13	Deceleration mode 1	0.1~6000.0s	0.1	*	☆

Acceleration time is the output frequency from 0Hz to rated frequency ramp up time.
Deceleration time is the output frequency reduce from rated frequency to 0Hz ramp down time.

F0-14	Carrier frequency	1 ~ 10KHz	1	*	☆

Carrier frequency mainly affects the operation of the audio noise and thermal effects.
When the ambient temperature is high, the motor load is heavy, it should be appropriate to reduce the carrier frequency in order to improve the thermal characteristics of the Ac inverter.

F0-15	Ac inverter running direction	0: Runs as forward direction 1: Runs as reverse direction 2: Reverse direction is forbidden	1	0	☆

This parameters used to changed the AC inverter output phase, thereby to check the motor running direction as well.
0: Running direction as same as setting
1: Running direction is reverse as setting.
2: Reverse running direction is forbidden.
If the output frequency is big, but output water yield is low in good sunlight condition, please used this parameters to change pump running direction or change motor wiring phase.

F0-17	Factory restore to factory setting	0: No operation 11: Parameters initialization 22: Clear fault record	1	0	×

To modify the parameters of the AC inverter to factory default.
0: No operation
11: Parameters initialization, restore all parameters setting back to default setting.
22: Clear fault records
Note: Set F0-00 (AC inverter modes G/P type selection properly) according to the actual situation before initialization. This parameters can't be restore.

F0-18	Parameters modify protection	0: No protection 1: Disable modify	1	0	×

0: No protection

1: All parameters under protection, can't modify. But F0-07 in monitor status can changed by UP and DOWN button of keypad.

F1-00	Start up mode	0: Start up with starting frequency 1: Start up after DC braking 2: Start up with speed tracking	1	0	×

0: Start up with starting frequency F1-01 setting.
1: Performance DC braking first, and then start from starting frequency for application which need starting from still.
2: Start up with speed tracking for fans application.

F1-15	Terminals running command detect when power on	0: Running command is disable when power on	1	0	×

0: Start running command is disable when power on.
If the running command selection source is terminal control when AC inverter power on. even if terminals command is enable, the AC inverter will not response to start, to avoid bring damaged when AC inverter staring suddenly. If need start system, user have to disable terminals first and then start it.
1: Starting running command is enable.
Ac inverter starts immediately when power on if terminals command is enable.

F2-00	Motor type	0: Asynchronous motor 1: Permanent magnet synchronous motor	1	0	×
F2-01	Motor rated voltage	1~700V	1	*	×
F2-02	Motor rated frequency	5.00~600.00Hz	0.01	50.00	×
F2-03	Motor rated current	0.1~3000.0A	0.1	*	×
F2-04	Rated slip frequency	0.00~5.00Hz	0.01	*	×
F2-05	Poles pair	1~50	1	2	×
F2-06	No load current	10.0~ 80.0%	0.1	*	×

When the asynchronous motor is first time using, the user need to configuration these motor parameters according to nameplate of motor.
Performance sensorless vector control with selecting F0-01 for 2 or3. It must performance motor auto tuning first.
If driving solar PMSM (permanent magnet synchronous motor) pumps, it must perform motor ID auto tuning first. Select F2-10 for 1 or 2 to performance auto tuning.
Before performance auto tuning need configuring F2-11 to F2-15 PMSM parameters.

F2-10	Motor parameter auto-tuning	0: No operation 1: Static auto tuning 2: Completely auto tuning	1	0	×
F2-11	Rated frequency of PMSM	5.00~600.00Hz	0.01	50.00	×
F2-12	Rated voltage of PMSM	1~700V	1	*	×
F2-13	Rated current of PMSM	0.1~3000.0A	0.1	*	×
F2-14	Rated back EMF of PMSM	1~700V	1	*	×
F2-15	Stator resistance of PMSM	0.00~50.00%	0.01	*	×

F2.07～F2.09 these parameters in generally can't find in nameplate of motor. Please perform motor auto tuning to get these parameters. only get f2.07～f2.09 from static auto-tuning.
If the load can easy disconnect from motor, please to performance completely auto tuning to get accuracy motor parameters.
If the load can't disconnect from motor, set F2-10 for 1 to performance auto tuning.

F3-29	Torque boost	0.0~20.0%	0.1	2.0	×

To compensate the low frequency torque characteristics of V/F control, you can boost the output voltage of AC inverter at low frequency by modifying F3-29. If the torque boost is set to too large, the motor may overheat, and the AC inverter may suffer over current.
If set it for 0, it will performance auto torque boost.

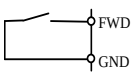
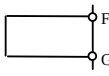
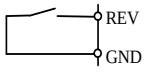
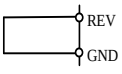
F4-29	Speed display coefficient	0.1~999.9%	0.1	100.0	☆
F4-30 1	Linear speed display coefficient	0.01~99.99	0.01	1.00	☆
F4-31	Multifunction key MF.K set	0: REV 1: Jog forward 2: Jog Reverse 3: Running command switchover	1	0	×

F4-29 Speed display coefficient that used for correct the speed display.
F4-31 used to define the function of multiple function key on keypad.

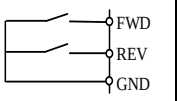
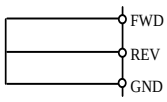
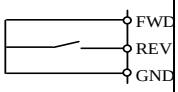
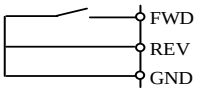
F5-15	External terminal command control mode	0: Two lines control mode 1 1: Two lines control mode 2 2: Three lines control mode 1 3: Threes lines control mode 2	1	1	×
F5-16 To F5-21	X1 to X6 terminals function selection（0~39）	1: FWD Forward command 5: Emergency stop input (solar pump pause) 41: Solar control prohibition			

The F5-15 parameter used to select terminals control mode, there are 4 control modes in inverters.
FWD stands for running in forward direction control by external terminal, and marks for FWD.
REV stands for running in reverse direction control by external terminal, and marks for REV.

0：Two line control mode 1

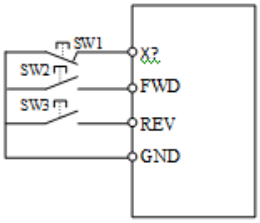
Construction	Stop	Running	Forward	Reverse
Terminals status				

1：Two lines control mode 2

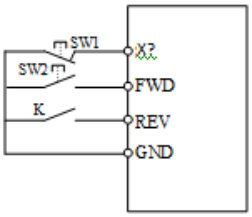
Construction	Stop command		Forward	Reverse
Terminals status				

2：Three lines control mode 1

It is must defined one input terminal for 3 lines control mode (one of terminals of F5-16～F5-21 set for 11). Refer to the 3 lines control mode as following wiring.



a) 3 lines control mode 1



b) 3 lines control mode 2

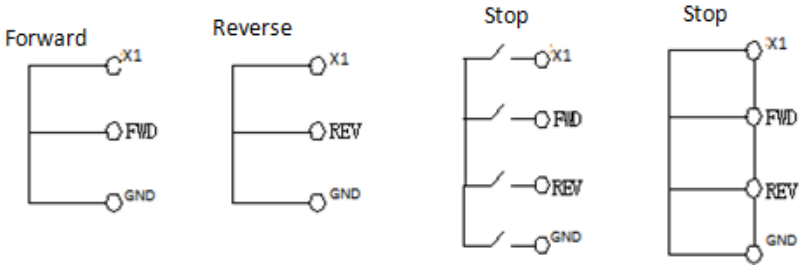
3 lines control mode wiring

X? is programmed for 3 line control, we can take one terminals of X1～X6 (F5-16～F5-21) set for 11. Sw1 is inverter stop trigger switch. SW2 is forward trigger switch, and SW3 is reverse trigger switch.

3: 3 lines control mode 2.

X? is programmed for 3 line control, we can take one terminals of X1～X6 (F5-16～F5-21) set for 11. SW1 is stop trigger switch, SW2 is forward trigger switch, K is reverse selection switch.

If selection X1 for 3 lines control mode, see below wiring diagram.



3 lines control mode description

There are X1 to X6 programmable digital input terminals in this inverter, used F5-16 to F5-21 parameters to express it. Each terminal can be define 41 functions.

In solar pump control mode, 1: FWD Forward command, 5: Emergency stop input (solar pump pause) and 41: Solar control prohibition are popular in using.

When one of X1 to X6 is set for 41 (solar control prohibition), the solar pump control function is disable, and AC inverter variable frequency mode is activated, as same as FA.00 set for 0.

FA group parameters for solar pump control

FA-00	Select solar pump control mode	0: variable frequency inverter control (AC grid input) 1:CVT (constant voltage tracking) 2: MPPT (maximum power point tracking)	1	2	×
FA-01	Auto/ manual selection	0: Manual by keypad control 1: Automatically running with terminals control 2: RS485 communication	1	0	☆
FA-02	CVT object voltage	0.0~100.0% of Voc	0.1	80.0	☆

FA-00 parameter uses to select AC inverter variable frequency control mode or solar pump control. There are two solar pump control modes, which are constant voltage tracking (CVT) and maximum power point tracking (MPPT). MPPT solar pump control mode is default setting.

In very good sunlight radiation area, user can select CVT mode for better frequency stable output, because the DC bus voltage is control target in this mode. FA-02 (CVT object voltage) is used to set target control voltage of DC bus. The suggest value setting is 75% to 90%.

FA-01 Auto/manual switchover selection is use to set control by manual or by auto terminals control. In the first time using after installation, suggesting select FA-01 for 0, inverter control by manual with keypad. Once the commissioning is finished and tested well, we can switchover for auto terminal control.

In the auto terminal control mode, one programmable digital terminal from X1 to X6 should set for 1 (forward running control).

Compare to F0-02 parameter setting, this parameter has priority level, and make F5-16 and F5-20 set for 1 (FWD running control) as the same time.

Once X1 short circuit to GND (X1 and GND is ON) or X5 short circuit GND (X5 and GND is ON), the inverter system will be work automatically.

FA-03	MPPT control upper limit voltage	0.0~100.0% open loop circuit voltage	0.1	90.0	×
FA-04	MPPT control lower limit voltage	0.0~100.0% open loop circuit voltage	0.1	75.0	×
FA-05	Frequency adjusting gain	1~5000	1	40	×
FA-06	Frequency adjusting allowable deviation	1~5	1	3	×
FA-07	MPPT Control period	0.01~10.00S	0.01	0.30	×

Uses FA-03 and FA-04 to define MPPT upper limit and lower limit voltage. in generally, the default setting 75% to 90% is OK. For 3 phase 380V output control, the MPPT voltage Vmp is 540V, for 3 phase 220V output control, the MPPT voltage Vmp is 310V. the Vmp should be stay during with FA04 to FA03.

FA-05 (Frequency adjusting gain) parameter uses to reflect MPPT performance is quick or slow during operation. If this value is big, the MPPT performance is quickly, and might cause LU fault in bad sunlight condition, if this value set too small, the output frequency might seems a little fluctuation. User can set this value bigger, but not large than 100% in good sunlight condition area. In generally, the default 40% setting is OK.

FA-06 (Frequency adjusting allowable deviation), change this parameters will effect output frequency stability with MPPT function. if change it bigger, the output frequency might seems a little fluctuation. In generally, no need change this parameters.

We suggest user modify FA-05 parameter first, and don't changed FA-06 setting in generally

case.

FA-07 parameter uses to limit MPPT searching period. No need to modify in generally case.

FA-08	Dc current correction offset	0.00~50.00A	0.01	0.00	☆
FA-09	Dc current correction gain	0.0~100.0%	0.1	100.0	☆

FA-08 and FA-09 both parameters uses to correct DC output current display.

Because the output DC current is calculating by software, it need parameters to correct it when it not correct.

FA-10 to FA-14 parameters use to set water tank level detecting, it compatible analog signal input.

Fb group parameters for solar pump protection and monitoring

Fb-00	Sleep voltage threshold	0~1000V	1	*	☆
Fb-01	Restore running state voltage threshold	0~1000V	1	*	☆
Fb-02	Awake waiting time	0.0~3000.0S	0.1	120.0	☆

Fb-00~Fb-02 uses to programmed solar pump inverter go to dormant state when input DC voltageis low, and wake up automatically when DC bus voltage is raise again.
When the DC voltage lower than Fb-00 set value for a system default time, it will go to stop sleep mode and sent out an alarm with A.Lvo code display in keypad.
When DC bus voltage raises again and higher than Fb-01 value for a Fb-02 setting time, the inverter will recover to running state.

Fb-03	Stop frequency when low speed	0.00~300.00Hz	0.01	20.00	☆
Fb-04	stop delay time when reachstop frequency	0.0~3000.0S	0.1	30.0	☆
Fb-05	Automatic recovery time in stop frequency protection mode	0.0~3000.0S	0.1	120.0	☆

If the output frequency is lower than Fb-03 (stop frequency when low speed) for Fb-04 (stop frequency delay time), the solar pump inverter will go into stop mode to protection pumps.

Once the output frequency is greater than Fb-03 (stop frequency) for Fb-05(automatic recover time), the inverter will recover to running status again If Fb-15 (Alarm action mode) unit's digit is 0 in default setting. If Fb-15 unit's digit is set for 1, need to reset it by press STOP/RESET button by manual.

Fb-06	Dry run protection current threshold (under-load protection)	0.0~100.0A	0.1	1.0	☆
Fb-07	Dry run detect delay time	0.0~3000.0S	0.1	60.0	☆
Fb-08	Automatic recover time in dry run protection mode	0.0~3000.0S	0.1	120.0	☆

If the output current is lower than Fb-05 (Dry run current) for Fb-07 (dry run detect delay time), the inverter will go to dry run protection mode.
Once the current is bigger than Fb-07 again for Fb-08 (recover time of dry run), the inverter will
restore to running status if Fb-15 (Alarm action mode) ten's digit is 0 in default setting.
If Fb-15 ten's digit is set for 1, need to reset it by press STOP/RESET button by manual.

Fb-09	Motor over current protection threshold	0~3000.0A	0.1	*	☆
Fb-10	Over current detect delay time	0.0~3000.0S	0.1	30.0	☆
Fb-11	Automatic recovery time in over current protection mode	0.0~3000.0S	0.1	30.0	☆

Fb-09 to Fb-11 parameters used to set motor over current protection.
If the over current is bigger than Fb-09 for Fb-10 time, the inverter will go to stop mode for providing motor protection.
Once the current is lower than Fb-09 for Fb-11 recover time, the inverter will recover to work again if the hundred's digit of Fb-15 set for 0 in default.
If Fb-15 hundred 's digit is set for 1, need to reset it by press STOP/RESET button by manual.

Fb-12	Minimum power input protection threshold	0.00~100.00KW	0.01	0.00	☆
Fb-13	Minimum power input detect delay time	0.0~3000.0S	0.1	10.0	☆
Fb-14	Automatic recovery time in minimum power input protection mode	0.0~3000.0S	0.1	10.0	☆

Fb-12 to Fb-15 parameters used to set minimum power input power protection.
When the input power from solar panel is lower than Fb-13 (minimum power input) for Fb-13 time, the inverter will be stop.
Once the input power larger than Fb-12 for Fb-14 time, the inverter will start working again if thousand's digit of Fb-15 set for 0 in default.
If Fb-15 thousand's digit is set for 1, need to reset it by press STOP/RESET button by manual.

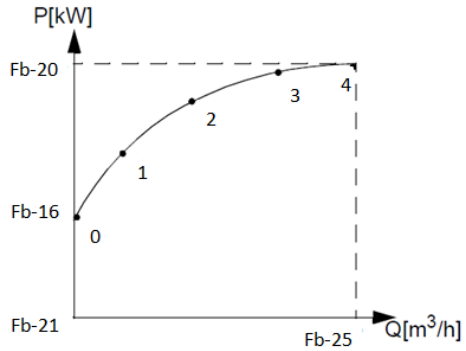
Fb-15	Alarm action mode	0: Sending alarm and automatically rest 1: Reset by manual Unit's digit: Low frequency stop mode Ten's digit: Dry run (under load) Hundred's digit: Motor over current protection Thousand's digit: Minimum power input protection	1	0000

Fb-15 uses to set low frequency stop mode, dry run mode, motor over current and minimum input power protection, etc 4 kinds protection mode if set by automatically or manual.
Fb-16 to Fb-29 parameters provide flow calculation from PQ curve programming.

Flow calculation

The flow calculation function provides a reasonably accurate calculation of the flow without the installation of a separate flow meter. The function defines the flow estimate using the pump performance curve and inverter actual load. The PQ (power/flow) performance curve enables calculating the flow output from the pump. The performance curve is provided by the pump manufacturer. The user saves five operating points (P,Q) of the performance curve to inverter parameters.

PQ curve



The solar pump inverter records and stores the flow rate on each day and provides

therequired data for current day and current year.

Note:

- Do not use the flow calculation function outside the normal operating range of thepump.
- Do not use the flow calculation function for invoicing purposes.
- Ensure that power and flow points are in incremental order with non-zero values.

Fb-16 to Fb-20 use to define input power of pump at points 1...5 on the PQperformance curve.

Fb-21 to Fb-25 use to define flow rate at points 1...5 on the PQ curverespectively.

Fb-27	Flow measured offset	0.00~1000.0m³/h	0.1	0.0	☆
Fb-28	Flow measured gain	0.0~100.0%	0.1	100.0	☆
Fb-29	Cumulative flow/ generated energy reset setting	0: No operation 1: Flow reset 2: Generated energy reset 3: Both flow and generated energy reset	0	0	×

Fb-27 and Fb-28 use to correct flow calculating for difference pumps.

Fb-29 used to cumulative low and generated energy reset.

d-00	Current output frequency	0.01Hz
d-01	Current output voltage	1V
d-02	Current output current	0.1A
d-05	DC bus voltage value	1V
d-26	DC bus current	0.01A
d-32	Input power	0.01KW

Note. Press the Shift button of keypad can display d-00, d-01,d-02, d-05, d-26, d-32, etc 6 common monitoring parameters in circulation.

d-25	Open circuit voltage	1V
d-27	MPPT tracking voltage	0.1%
d-28	Calculate flow rate	0.1m3/h
d-29	Today flow	0.1m3
d-30	Cumulative flow 1	0.1m3
d-31	Cumulative flow 2	1Km3
d-32	Input power	0.01KW
d-33	Today generated energy	0.1KWH
d-34	Cumulative generated energy 1	0.1KWH
d-35	Cumulative generated energy 2	1MWH
d-36	Working status	1
d-37	Rated voltage of Inverter	1V
d-38	Rated current of Inverter	0.1A
d-39	Software version	

User also can learn solar inverter working status from above list. See the flow calculating from d-28 to d31 parameters, see the generated energy from d33 to d35.

User also can check the solar inverter working status from D-36. 0：Stop mode

1: Running

2: **A.LUo** means on low voltage sleep mode ,

3: **A.LFr** means on low stop frequency sleep mode,

4:**A.LCr** means on dry run protection

5: **A.OCr** means on motor over current mode,
6: **A.Lpr** means on minimum power input mode,
7: **A.FuL** water full sleep mode.

Chapter9. Troubleshooting and Countermeasures

The below table listed PL sereis solar pump inverter all types of faults possibly occurs. Before contacting manufacturer for technical support, you can first determine the fault type through following table description and records your done treating process and phenomena. if the fault can not be resolved, please seek for the manufacturer service support.

Troubleshooting table

Fault code	Fault description	Possible reason	Countermeasures	Address
E. SC	Output short circuit	1:Output short circuit or grounding short circuit 2: The load too heavy	1.Check the output connection 2. seek for service support	01H
E. OC1	Over current in acceleration	1. Acceleration time is too short 2. too high torque boost or VF curve setting is not correct	1. Extend the acceleration time 2. low the torque boost voltage, and adjust the V/F curve.	02H
E. OC2	Over current in deceleration	The deceleration time is too short	Extend the deceleration time	03H
E.OC3	Over current in running	The load changed suddenly or fluctuation is too big	Reduce the load fluctuation	04H
E.OC4	Soft ware over current	As same as E.OC1，E.OC2，E.OC3 description	As same as E.OC1，E.OC2，E.OC3	05H
E.232.	Inner communication fault	Hardware problem	Seek for manufacturer support	06H
E.Gnd	Grounding fault	1: Output grounding of motor or inverter, 2: Input and output connection of inverter	1. Check the connection 2. check the motor if aging or insulation is not good	07H
E.OU1	Over voltage in acceleration	1.Input voltage is too high 2. Power supply open and close frequently	Check the Dc input voltage or AC grid condition	08H
E. OU2	Over voltage in deceleration	1.Deceleration time is too short 2. Input voltage is abnormal	1.Extend deceleration time 2. Check the input voltage 3. Install braking unit or resistor	09H
E.OU3	Over voltage in running	1. Power supply is abnormal 2. load feedback energy	1. Check the voltage of power supply 2. Install braking unit or resistor	0AH
E. UL	Under voltage	1. Output connection is loss 2. Load suddenly missing	1. Check the output wiring 2. Check the inverter load	0EH
E.OL1	Over load of inverter	1. Load is too big 2. Acceleration is too short 3.Torque boost voltage is high, and VF curve is not properly 4.Input voltage is too low	1. reduce the load or change bigger power inverter for instead 2. Extend the acceleration time 3. Low the torque boost voltage, and adjust the	0FH

			V/F curve. 4. Check the grid voltage	
E.OL2	Motor overload	1. The load is too big 2. Acceleration time is too short 3. Protection coefficient setting is is too small 4. Torque boost voltage is high, and VF curve is not properly	1. reduce the load 2. Extend the acceleration time 3. Low the torque boost voltage, and adjust the V/F curve. 4.set the motor protection coefficient bigger	10H
E.CUr	Current detect is correct	1. Current detect parts or circuit is problem 2. Auxiliary power supply has problem	Seek for manufacturer support	11H
E. LU	Under voltage	1. Power supply voltage is abnormal 2. power supply is fluctuation	1. check the power supply 2. separate power supply 3. added the solar panel to increase Dc voltage input.	12H
E.EF1	External equipment normal open terminal fault	External fault input terminal of the inverter signal input	Check the signal source and related equipment	13H
E.EF2	External equipment normal close terminal fault	External fault input terminal of the inverter signal input	Check the signal source and related equipment	14H
E.OH	Inverter over heat	1. duct obstruction 2. The ambient temperature is too high 3. Fan damage	1. Clean the duct or improved ventilation 2. Reduce the carrier frequency 3. Replace the fan	15H
E.SP1	Input phase loss	1. Input voltage phase loss 2. Input voltage is too low	1. Check the connection 2. Check power supply of phase loss	16H
E.SP0	Output phase loss	The connection between inverter and motor is broken	Check the wiring	17H
E.EEP	Memory fault	Hard ware problem	See for support	18H
E.End	Running time is reached	The allowable running time setting is reach	Contact vendor	19H
E. PID	PID feedback fault	1. PID feedback single is broken 2. sensor has problem 3. feedback signal parameters setting is not correct	1. Check the feedback channel 2. Check whether the fault sensor 3. Verify the feedback signal meets the set requirements	1AH
E.485	RS485 communication fault	Send and receive data error occurs in serial communication	1. Check the connection 2. Seek for support	1BH
E.doG	EMC interference	Since the ambient electromagnetic interference caused by malfunction	Install the absorb circuit	1CH

E.232	Inner upper communication fault	Hardware problem	Seek for support from vendor	1DH

Note:

The series inverter records the latest three times fault occurs code and output parameters of inverter when latest fault occurs. Query information to help find the cause of the fault.

Appendix. Solar arrays selecting list.

Selecting solar arrays matching selecting

Sun great solar pumps inverter model	Maximum Input DC current	Solar arrays open circuit voltage specification: Open circuit voltage range 21V±2V Power±3 WP	Short circuit current	Serial, parallel No.	Open circuit voltage range 31V±2V Power±3 WP	Short circuit current	Serial, parallel No.	Open circuit voltage range 43V±2V Power±3WP	Short circuit current	Serial, parallel No.	Inverter rated current
General type: 250 to 800 VDC or 380 to 480VAC											
S300-0K7GB-T4	4.6A	30WP	2.75A	30*1							2.3A
S300-1K5GB-T4	7A	60WP	3.48A	30*1							3.7A
S300-2K2GB-T4	10A	90WP	5.5A	30*1							5A
S300-4K0GB-T4	17A	85WP	4.7A	28*2							8.5A
S300-5K5GB-T4	23A				180WP	7.33A	19*2				13A
S300-7K5GB-T4	32A				240WP	8.81A	20*2	200WP	7.32A	15*3	17A
S320-011GB-T4	48A				180WP	7.33A	20*4	240WP	7.32A	15*4	25A
S320-015GB-T4	64A				240WP	8.81A	20*4	240WP	7.32A	15*5	32A
S320-018GB-T4	76A				240WP	8.81A	20*5	240WP	7.32A	15*6	38A
S320-022GB-T4	80A				240WP	8.81A	20*6	270WP	7.32A	15*7	45A
S320-030GB-T4	90A				240WP	8.81A	20*8	240WP	7.32A	15*10	60A
General type: 150 to 400 V DC or 200 to 240 V AC											
S300-0K7GB-S2	7A	30WP	2.75A	17*2							4A
S300-1K5GB-S2	14A	60WP	3.48A	17*2							7A
S300-2K2GB-S2	20A	90WP	5.5A	17*2							10A
S300-4K0GB-S2	32A	90WP	5.5A	17*3							16A

Note: The required input solar panel voltage is 1.15 times of solar drive DC bus voltage.

For example: In T4 series, recommend 540V*1.15=621V; in S2 series, recommend 311*1.15=357V.

The required power of solar arrays is 1.3 times of rated power of drives, shouldn't less than 1.2 times of rated power of inverter.

For example, 7R5G, the required power is 7500*1.3=9750w.

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