PV350/800/PSD350/PSD800 Series Solar Pumps Inverter

Operation manual

Shenzhen Kewo Electric Technology Co., Ltd

Preface

PV series Solar pump inverter overview

The PV350/800 series solar pump inverter (also can Solar Pump VFD) is a green energy products with new solar MPPT technology, which developed based on PV800 series motor frequency inverter, focusing on driving 3 phase AC pumps including AC induction pumps or high efficiency pumps with permanent magnet synchronous motor (PMSM) technology.

Compare to on grid of off grid solar inverter, it has soft starter, and multiple function of motor protection, and very competitive price.

An arrays of solar panels generates the power and voltage required for the PV800 Solar inverter to drive the AC pumps. The solar inverter converts the DC voltage input to a 3-phase AC output with variable voltage and frequency. The MPPT algorithm of solar inverter extracts maximum power available from the solar panels during the day and operates the motor at variable speed based on the power input to the inverter. The frequency range in which the inverter operates depends upon the motor speed, hydraulic system and the power available from the solar panel. As the sunshine varies during the day, power input to the inverter varies and the solar pump inverter generates variable V/F ratio thus controlling the speed of the motor, which in turn regulates the pump impeller speed. Water Level Sensor is used only when the water is pumped to overhead tank.

Product Features

Suitable for driving all 1/3 phase induction AC pumps, for PMSM high speed pumps is option.

✧ Multiple control modes, local control, auto start/stop, GPRS remote control.

✧ Maximum power point tracking (MPPT) with fast response speed and stable operation

✧ Dry run (under load) protection, Water fulling detecting, Maximum pumps current protection

✧ Low stop frequency protection, wake up when low voltage input function.

✧ Dual mode input, compatible with DC and AC power input, low and wide range voltage input.

✧ The PQ (power/flow) performance curve enables calculating the flow output from the pump

✧ Multiple pumps protection function, short circuit, phase missing, over current, over voltage...

✧ ambient temperature for using: -10 to +55˚C.

Please take more attention for bellow items:

1. Make sure disconnect power during wiring
2. Before indicator turn off of solar pump inverter after power fail, stands for there are high voltage inside and forbidden to touch any inside components.
3. Never try to modify or change inside components of inverter.
4. Please feel free to contact us if any question during using.

The instructions are subject to change, without notice, due to product upgrade, specification modification as well as efforts to increase the accuracy and convenience of the manual.

Product Checking

Upon unpacking, check:

• Whether the nameplate model and inverter ratings are consistent with your order.

The box contains the inverter, certificate of conformity, user manual and warranty card.

• Whether the inverter is damaged during transportation. If you find any omission or damage, contact manufacturer or your supplier immediately.

First-time Use

For the users who use this product for the first time, read the manual carefully.

If in doubt concerning some functions or performances, contact the technical support personnel of manufacturer to ensure correct use.

CE Mark

The CE mark on the PV series declares that the inverter complies with the European low voltage directive (LVD) and EMC directive.

About this manual

This manual provides an overview of the contents, purpose, compatibility, and the intended audience of this manual. The PV350/PV800 series solar pump inverter is an enhancement version of the PV800 AC motor frequency inverter firmware. This supplement manual intends to serve as a quick start guide for installing, commissioning and operating. 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 Safety and Caution

That all grounding connections are properly made and that the resistances do meet local codes or requirements

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 understands 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 responsibility to make sure that all maintenance, inspection and assembly work is performed exclusively by authorized and qualified experts sufficiently informed through careful perusal 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 the equipment may only be undertaken after consulting the manufacturer. Original spare parts and accessories authorized by the manufacturer guarantee operational safety. Using non-authorized parts may void any liability on 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 void 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 notes

 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 noes

 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 the first 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

Chapter2. Solar pumping system introduction

Chapter 1. Solar pumping system introduction

Solar pumping systems can be applied to all forms of daily use, water pumping for drinking water supply for remote villages and farms without connection to the water grid, for agricultural use such as livestock watering, agricultural irrigation, forestry irrigation, pond management, desert control, and industrial use such as waste water treatment etc.

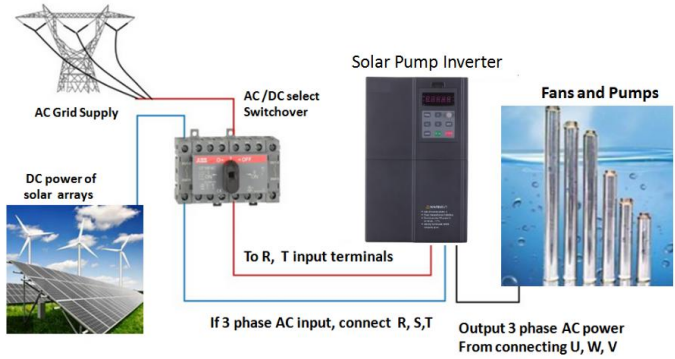
In recent years, with the promotion of the utilization of renewable energy resources, solar pumping systems are more and more used in municipal engineering, city center squares, parks, tourist sites, resorts and hotels, and fountain systems in residential areas.

The system is composed of a PV generator (solar panels), a pump and a solar pump inverter. Based on the design philosophy that it is more efficient to store water rather than electricity, there is no energy storing device such as storage battery in the system. The system is prepared to be combined with a elevated water storage, e.g. water tower or an uphill tank installation.

The PV generator, an aggregation of PV modules connected in series and in parallel, absorbs solar irradiation and converts it into electrical energy, providing power for the whole system. The pump inverter controls and adjusts the system operation and converts the DC produced by the PV module into AC to drive the pump, and adjusts the output frequency in real-time according to the variation of sunlight intensity to realize the maximum power point tracking (MPPT). The pump, driven by 3-phase AC motor, can draw water from deep wells, rivers and lakes and pour it into storage tanks or reservoirs, or be connected directly to the irrigation system, fountain system, etc. According to the actual system demand and installation condition, different types of pumps such as centrifugal pump, axial flow pump, mixed flow pump or deep well pump can be used.

1.1. Solar pump system constitution.

.Solar pump system include solar panels arrays, solar pump inverter and AC 1/3 phase pumps, and other accessories, such as combiner box, DC circuit breaker, AC/DC manual switchover, AC circuit breaker....



System wiring diagram including solar panels, solar pump inverter and pumps.

1.2. Solar pump inverter features

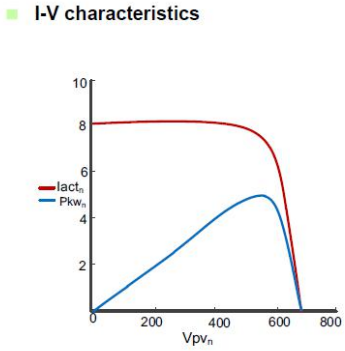
- ✧ High flow system for faster tank fill and significant water output with MPPT function.
- ✧ · Proven motor and pump technology for long-term reliability
- ✧ · Available free of cost at your doorstep, one times investment for more than 20 years free using
- ✧ ·Clean and pollution free energy, eco-friendly.
- ✧ ·Ideal for remote areas, where electricity is not available or availability is capital intensive.
- ✧ · Suitable for day time irrigation, continuous supply for 8-12 hours in a day.
- ✧ · Soft start feature prevents water hammer and increases system life easy to operate.
- ✧ · Simple installation and maintenance free.

1. 3. Solar pump inverter operation theory

The solar pump inverter uses 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.

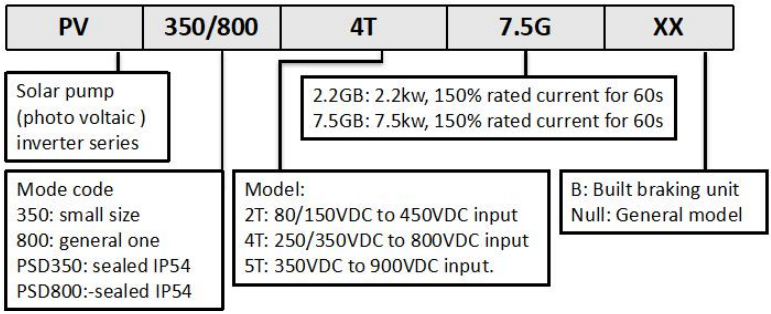
When the output voltage is zero, the PV cells create short circuit current. If the PV cells are not connected to any load, the output voltage is equal to the open circuit voltage. The maximum power point is obtained at the knee of the I-V curve. See the I-V characteristics shown below.



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

Chapter2. PV serial solar pump inverter selection

2.1 PV series solar pump inverter nameplate.



2T models:It uses for 220VAC pumps, 150VDC to 450VDC input, recommend 310Vmp.(Lowest 80VDC input is option)

4T models:It uses for 380VAC pumps, 350VDC to 800VDC input, recommend 540Vmp, (250VDC input is option)

5T models: it uses for 480VAC pumps, 350VDC to 900VDC, recommend 676vmp.

2.2. PV350/PV800 solar Pump inverter models list:

Model	Input voltage	Output for pumps	Power	Pictures
PV350-2T	150 to 450VDC, or 220VAC	3 PH 0-220VAC	0.4kw/0.75kw/1.5kw/2.2kw	
PV800-2T	150 to 450VDC, or 220VAC	3 PH 0-220VAC	0.75kw to 75kw	
PSD350-2T	150 to 450VDC, or 220VAC	3 PH 0-220VAC	0.4kw/0.75kw/1.5kw/2.2kw	
PSD800-2T	150 to 450VDC, or 220VAC	3 PH 0-220VAC	0.75kw-18.0kw	

PV350-4T	250 to 800VDC 380VAC/415VAC	3 PH 0-380/415VAC	0.75kw—3.7kw	
PV800-4T	250 to 800VDC 380VAC/415VAC	3 PH 0-380/415VAC	0.75kw—500kw	
PSD350-4T	250 to 800VDC 380VAC/415VAC	3 PH 0-380/415VAC	0.75kw—3.7kw	
PSD800-4T	250 to 800VDC 380VAC/415VAC	3 PH 0-380/415VAC	0.75kw—30kw	

2.3. PV350/800 serial solar pump inverter model list

SN	Models	Rate current	Output voltage (3PH VAC)	Applicable for pumps	Packing size	MPPT voltage (VDC)	GW Kgs
2T series : 150 to 450 VDC or 220VAC input, Vmp 310VDC, 372VDC							
1	PV350-2T0.75GB	4A	0 to 220	0.75KW	215*170*190	260 to 355	1.5
2	PV350-2T1.5GB	7A	0 to 220	1.5KW	215*170*190	260 to 355	1.5
3	PV350-2T2.2GB	10A	0 to 220	2.2kw	215*170*190	260 to 355	1.5
4	PV800-2T3.7G	16A	0 to 220	3.7kw	280*180*215	260 to 355	1.5
5	PV800-2TXXGB	**	0-220	<75kw	No-standard	260 to 355	**
4T series, 250/ 350 to 800 VDC or 380VAC, Vmp540VDC, Voc 648VDC							
4	PV350-4T0.75GB	2.5A	380V-440V	0.75KW	215*170*190	486 to 650	1.5
5	PV350-4T1.5GB	3.7A	380V-440V	1.5KW	215*170*190	486 to 650	1.5
6	PV350-4T2.2GB	5A	380V-440V	2.2KW	215*170*190	486 to 650	1.5
7	PV350-4T3.7GB	9.0A	220V/240V	3.7KW	215*170*190	486 to 650	1.5
8	PV800-4T1.5GB	3.7A	220V/240V	1.5KW	280*180*215	486 to 650	3
9	PV800-4T2.2GB	5A	220V/240V	2.2KW	280*180*215	486 to 650	3
10	PV800-4T3.7GB	9.0A	220V/240V	4.0KW	280*180*215	486 to 650	3
11	PV800-4T5.5GB	13A	380V-440V	5.5KW	320*215*250	486 to 650	4.3
12	PV800-4T7.5GB	17A	380V-440V	7.5KW	320*215*250	486 to 650	4.5
13	PV800-4T11GB	25A	380V-440V	11KW	390*275*285	486 to 650	6.5
14	PV800-4T15GB	32A	380V-440V	15KW	390*275*285	486 to 650	6.6
15	PV800-4T18.5GB	38A	380V-440V	18.5KW	445*205*315	486 to 650	12
16	PV800-4T22GB	45A	380V-440V	22KW	445*205*315	486 to 650	12
17	PV800-4T30G	60A	380V-440V	30KW	545*395*370	486 to 650	16
18	PV800-4T37G	75A	380V-440V	37KW	660*420*415	486 to 650	16
19	PV800-4T45G	90A	380V-440V	45KW	660*420*415	486 to 650	27
20	PV800-4T55G	110A	380V-440V	55KW	700*480*410	486 to 650	35
21	PV800-4T75G	150A	380V-440V	75KW	700*480*410	486 to 650	35
22	PV800-4T93G	170A	380V-440V	93KW	700*480*490	486 to 650	53
23	PV800-4T110G	210A	380V-440V	110KW	700*480*490	486 to 650	56
25	PV800-4T132G	260A	380V-440V	132KW	780*540*510	486 to 650	71

25	PV800-4T160G	300A	380V-440V	160KW	780*540*510	486 to 650	72
26	PV800-4T185G	340A	380V-440V	185KW	1130*580*570	486 to 650	149
27	PV800-4T200G	380A	380V-440V	200KW	1130*580*570	486 to 650	180
PSD350 IP54, 2T series, 150 to 450 VDC or 220VAC input, Vmp 310VDC, 372VDC							
1	PSD350-2T0.75GB	4A	220V/240V	0.75KW	265*180*210	260 to 355	2
2	PSD350-2T1.5GB	7A	220V/240V	1.5KW	265*180*210	260 to 355	2
3	PSD350-2T2.2GB	10A	220V/240V	2.2kw	265*180*210	260 to 375	2
4	PSD800-2T3.7GB	16A	220V/240V	3.7kw	335*225*245	260 to 355	3
PSD800 IP54, 4T series, 250 to 800 VDC or 380VAC, Vmp540VDC, Voc 648VDC							
4	PSD350-4T0.75GB	2.5A	380V-440V	0.75KW	265*180*210	486 to 650	2
5	PSD350-4T1.5GB	3.7A	380V-440V	1.5KW	265*180*210	486 to 650	2
6	PSD350-4T2.2GB	5A	380V-440V	2.2KW	265*180*210	486 to 650	2
7	PSD350-4T3.7GB	8.5A	220V/240V	3.7KW	265*180*210	486 to 650	2
8	PSD800-4T1.5GB	3.7A	220V/240V	1.5KW	335*225*245	486 to 650	3
9	PSD800-4T2.2GB	5A	220V/240V	11kw	335*225*245	486 to 650	3
10	PSD800-4T3.7GB	8.5A	220V/240V	4.0KW	335*225*245	486 to 650	3
11	PSD800-4T5.5GB	13A	380V-440V	5.5KW	400*270*290	486 to 650	4.3
12	PSD800-4T7.5GB	16A	380V-440V	7.5KW	400*270*290	486 to 650	4.5
13	PSD800-4T11GB	25A	380V-440V	11KW	440*330*310	486 to 650	6.5
14	PSD800-4T15GB	32A	380V-440V	15KW	440*330*310	486 to 650	7
15	PSD800-4T18.5G	38A	380V-440V	18.5KW	540*400*365	486 to 650	10
16	PSD800-4T22GB	45A	380V-440V	22KW	540*400*365	486 to 650	11
17	PSD800-4T30G	60A	380V-440V	30KW	540*400*365	486 to 650	14

Chapter3. PV series solar pump inverter specification

** Specification of Solar pump inverter specification,H9.00=1.	
Recommended MPPT voltage range	Vmp 260 to 355VDC for 2T (For driving 220VAC pumps) Vmp 486 to 650 VDC for 4T (For driving 380VAC pumps)
Recommended input Voc and Vmpp voltage	Voc 355(VDC), Vmpp 310(VDC) for 2T model or 220V AC pumps Voc 620(VDC), Vmpp 540(VDC) for 4T model or 380V AC pumps
Motor type	Control for permanent magnet synchronous motor (PMSM)and asynchronous motor pumps (all type 3 phase induction motor)
Rated output voltage	3-Phase,110V/160V/220V. 3-phase, 220V/380V/460V
Output frequency range	0~Maximum frequency 400Hz.
Efficiency	99.2 to 99.6%
Ambient temperature range	G-type for submersible pumps, 150% rated current for 60s, 180% rated current for 3s
Solar pump control special performance	MPPT (maximum power point 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, lightning protection, over heat protection.
Protection degree	IP20, Air force cooling
Running mode	MPPT or CVT
Altitude	Below 1000m; above 1000m, derated 1% for every additional 100m.
Standard AC input backup circuit	CE, Design based on AD800 series high performance inverter, more specification please refer to AD800 series vector control inverter operation manual

Specification of frequency inverter when H9.00=0 for motor VFD.

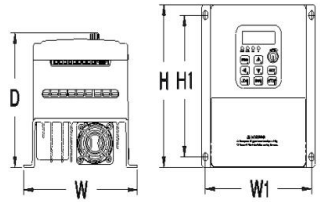
H9.00=1, it works as solar pump controller with MPPT, H9.00=0 it works as VFD when AC grid				
Control mode	Control mode	SVC in open loop	V/F control	Close loop vector control*
	Starting torque	0.5Hz 180%	0.5Hz 150%	0.00Hz 180%*
	Speed adjust range	1:100	1:100	1:1000*
	Speed stabilizing precision			±0.02%*
	Torque precision	NO	NO	±5%
	Motor type	General induction motor , Permanent magnet synchronous motor (PMSM)*		
Function design	Highest frequency	General vector control :400Hz V/f control:4000Hz		
	Frequency resolution	Digital setting: 0.01Hz analog setting:maximum×0.025%		
	Carrier frequency	0.5K ~ 16KHz, the carrier frequency can be adjusted by temperature automatically		
	Frequency reference setting method	Digital of Control panel, analog AI1, AI2, potentiometer of control panel, UP/DN control, communication, PLC pulse frequency		
	Acceleration./deceleration characteristic	Linear curve and S curve accel. /decel. mode, range of time: 0.0 to 65000S.		
	V/F curve	3 mode: linear, multiple points, N Power		
	V/F separation	2 times separation: totally separation, half separation		
	DC braking	DC braking frequency: 0.0 to 300Hz, DC braking current: 0.0% to 100%		
	Braking unit	Standard built in for up to 4T22GB(22kw), optional built it for 4T37G ~ 4T75G (18.5kw to 75kw), external built for above 4T93G (95kw).		
	Jog function	JOB frequency range: 0.0 to 50.0Hz, the acceleration and deceleration time of Jog		
	Configured PID function	Easy to perform pressure, flow, temperature close loop control.		
	PLC multiple speed	To achieve 16 segment speed running through built in PLC or terminal control		
	Common Dc bus	Multiple inverters use one DC bus for energy balance.		
	Auto voltage regulation (AVR)	Enable to keep output voltage constant when grid fluctuation		
	Over load tolerance capability	G type model: 150% rated current for 60s, 180% rated current for 3s, P type Model: 120% rated current for 60s, 150% rated current for 3s.		

H9.00=1, it works as solar pump controller with MPPT, H9.00=0 it works as VFD when AC grid		
	Stall protection control when over current, over voltage	Carry out limiting automation for running current, voltage to prevent over current, over voltage frequently
	Rapid current limit function	Minimize the IGBT module broken to protect the AC inverter, maximum reduce the over current fault.
	Torque limit and torque control	"Excavator" characteristics , torque limit automatically during motor running. Torque control is available in close loop vector control mode.
Features	Friendly interface	Display Hello when power on.
	Multiple function key JOG button	It can set for Forward Jog, reverse Jog, forward/reverse switch
	Timing control function	A total running time and total running time calculating
	2 group motor parameters	To achieve two motor switchover freely, control mode is selectable
	Motor over heat protection	Accepting motor temperature sensor signal input via AI1 terminals.
	Multiple kinds encoder *	Compatible collector PG, differential PG, and rotary transformer Encoder(resolver).
	Command source	Control panel, control terminals, series communication, switch freely.
	Frequency source	Digital setting, analog current/voltage, pulse setting, serial communication, main and auxiliary combination.
	Protection function	Short circuit detect when power on, input/output phase loss, over voltage, over current, under voltage, over heat, over load protection.
Environment	Application site	Indoor, free of exposure to sunlight, no dusty, no corrosive, no inflammable gas, no oil and water vapor, and water dipping
	Altitude	Lower 1000m
	environment temperature	-10℃ ~ +40℃, power derated for 40 ~ 50℃, rated current derated 1% for 1℃ increasing.
	humidity	Less than 95%, no water condense.

*:PV350 have no this function

Chapter 4. PV series solar pump inverter dimension and size

1. PV350 solar pump inverter dimensions



PV350 series model(0.75-3.7kw) (Fig1)

Inverter model	Installation hole site mm		Outline dimension mm			Mounting bolt (mm)	Fig / Dim.
	W1	H1	W	H	D		
PV350 series 220V and 380V							
PV350-2S0.4GB PV350-2S2.2GB	117	135	125	155	130	M4	Fig 1
PV350-4T0.75GB PV350-4T2.2GB							
PV350-4T3.7GB	117	135	125	155	155		

PV800 series solar pump inverter dimensions.

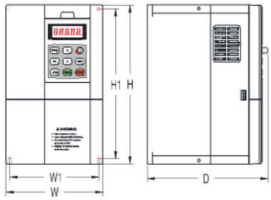


Fig2

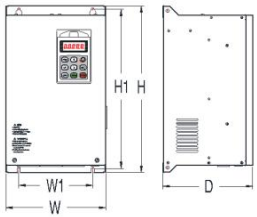


Fig3

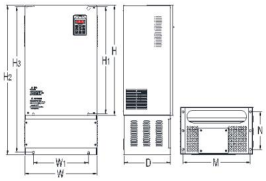


Fig4

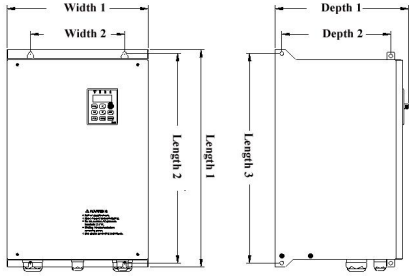
PV800 series model (0.75kw to 15kw, plastic shell), Fig2

PV800 series model (18.5kw -75kw, steel cover) (Fig.3)

PV800 series model (93kw -500kw, steel cover) (Fig.4)

PV800 series 3 phase 220V/240V							
PV800-2T0.75GB	117	135	125	155	130	M4	Fig 2
PV800-2T1.5GB							
PV800-2T2.2GB							
PV800-2T3.7GB	117	210	130	220	165	M4	Fig 2
PV800 Series 3 phase 380V/440V							
PV800-4T1.5GB PV800-4T2.2GB PV800-4T3.7GB	117	135	125	155	130	M4	Fig 2
PV800-4T5.5GB PV800-4T7.5GB	147	245	160	260	190	M5	Fig 2
PV800-4T11GB PV800-4T15GB	185	302	200	320	200	M6	Fig. 2
PV800-4T18.5GB PV800-4T22GB	170	365	230	380	210	M6	Fig. 3
PV800-4T30G	200	410	270	430	240	M6	Fig. 3
PV800-4T37G PV800-4T45G	220	500	350	580	275	M8	Fig. 3
PV800-4T55G PV800-4T75G	280	560	350	580	275	M8	Fig. 3
PV800-4T93G PV800-4T110G	300	600	400	620	300	M8	Fig. 4
PV800-4T132G PV800-4T160G	350	680	460	700	320	M8	Fig. 4
PV800-4T200 PV800-4T220	530	--	590	1270	390	M12	Fig. 4
PV800-4T250G PV800-4T280G PV800-4T315G	660	--	710	1450	410	M12	Fig. 4
PV800-4T355G PV800-4T400G	770	--	832	1850	410	M16	Fig. 4

PSD series sealed IP54 dimensions



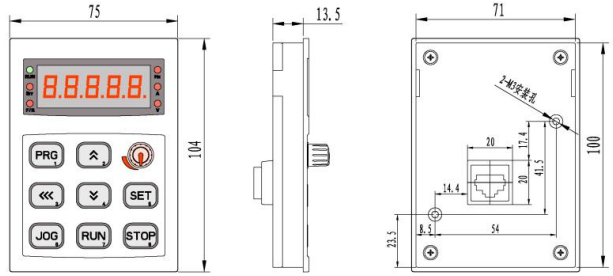
IP54 sealed solar pump inverter

Model	Power	L1	W1	D1	L2	W2	L3	D2	Hole
		External size			Installation size 1		Installation size 2		mm
PSD350-4T0.7/3.7GB PSD350-2T0.7/2.2GB	0.75-3.7kw,380V, 0.75kw-2.2,220V	230	130	177	215	90	215	140	M5
PSD800-4T(1.5-3.7GB)	0.75-3.7kw,380V	265	150	200	250	110	250	155	M5
PSD800-4T5.5/7.5GB	5.5-7.5KW,380V	320	180	210	305	120	305	170	M5
PSD800-4T11.0/15GB	11-15kw,380V	390	230	225	375	160	375	180	M6
SD800-18.5/22/30G	18.5-30kw, 380V	430	230	225	375	160	375	180	M6

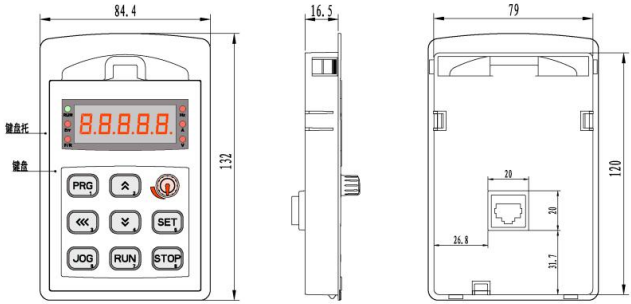
4.2. Dimension of standard built keypad and optional keypad (mm).

There are 3 models of PV series inverter keypad for selecting.

Note: PV350 series keypad is not dismantle, the user can connect external keypad from external connecting. When connecting external keypad, the built in keypad has no display. vice versa.



Standard built keypad model: XS-01



Standard built keypad model: XS-01T

Chapter 5 PV series solar pump inverter wiring.

5.1. Main loop circuit terminals description

Main loop circuit terminals description 1 (PV350 series)

P+	PB	R	S	T	U	V	W	⏚

Applicable to PV350-2S0.4G ~ 2S2.2G/PV350-4T0.75G ~ 4T3.7G

Main loop terminals description 2 (PV800 series)

⏚	P+	P-	R	S	T	U	V	W	PB

Applicable to PV800-2T0.4G ~ 2T7.5G/PV800-4T0.75G ~ 4T15G

R	S	T	P-	P+	P1	U	V	W	⏚

Applicable to PV800-2T11G ~ 2T75G/PV800-4T18.5G ~ 4T132G

R	S	T	P+	P-	U	V	W	⏚

Applicable to PV800-4T160 and above

5.2. Control loop circuit and connections

1. Single phase 220V input inverter main loop terminal description

Terminal mark	Name	Description
R T	Single phase power supply input terminal, or SOLAR DC power connection.	Connecting 220V AC grid power or DC power from solar panel. It is no polarity distinguish when PC power connecting
U V W	Inverter output terminal	Connecting 3 phase motor
P+ P-	DC bus positive/negative terminal for SOLAR DC power input connection	DC bus common input terminal,DC power input. Must be notice polarity connection, otherwise will cause inverter serious damage if wrong connection. P+ connect positive, and P- connect to negative.
P+ PB	Braking resistor connecting terminal	Connecting braking resistor if need. (No request for solar pump application)
PE (⏚)	Grounding terminal	inverter grounding terminal

5.3. Three phase inverter main loop terminal description

Terminal mark	Name	Description
R S T	3 phase power input terminal or SOLAR DC power supply connection with R, T input.	Connect 3 phase power supply of AC inverter, or connect DC power of solar arrays with R, T terminals. No need to polarity distinguish
U V W	Inverter output terminal	Connect 3 phase motor
P+ P1	Short circuit after factory leaving	Connect DC reactor dismantle
P+ P-	DC bus positive/negative terminal for DC power connection or command DC input.	Solar power connection, P+ connect to positive, P- connect to negative. Must be notice polarity connection, otherwise will cause inverter serious damage if wrong connection
P+ PB	Braking resistor connecting terminal	Connecting braking resistor, no need connection for solar pump application
PE (⏚)	Grounding terminal	inverter grounding terminal

5.4. Installation and wiring of PV series solar pump inverter.

The inverter accept both power supply source of DC solar power and AC grid input, but only allow one power supply input at the same time when no connecting protection diode before P+ an P-.

Because the protection diode can to preventing solar panels damaging due to DC current flow to solar arrays from inverter inside when connecting AC grid power supply.

In generally, suggest user to connect a AC/DC manual switchover (S) to select if solar DC power input or AC grid input by manual.

Wring steps

1. Recommend that connecting solar DC power supply to R, T terminals, (also can connect P+ and P-, but please pay great attention of polarity connecting, positive to P+, negative to P-).

2. Connect a S1 switch to start inverter for pumping in terminals command control mode, and set P0.01=1, P5.00=1

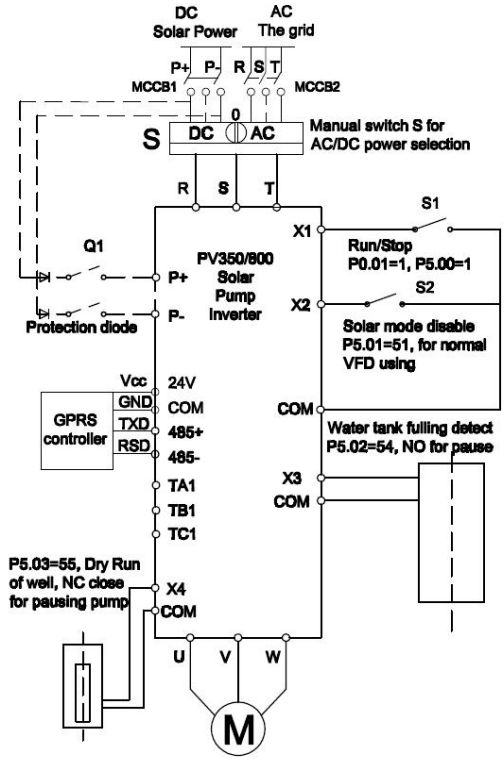
3. Connect S2 switch between X2 and COM when power supply is AC grid, when S2 is turn on, it will disable the solar pump control function, make inverter runs as a general purpose motor variable speed drive (VFD).

4. Connect float ball switch between X3 and COM for water tank fulling detecting, and sent P5.02=54. when water is fulling, it will activate float ball sensor normal open switch switch on, and stop inverter for pausing pumping. Inverter will start again once the water level lower again.

5.Connect a float ball sensor normal cose (NC) switch in the well for dry run protecting. P5.03=55.

If there are shortage of water in well, it will ask inverter stop for dry run protection.

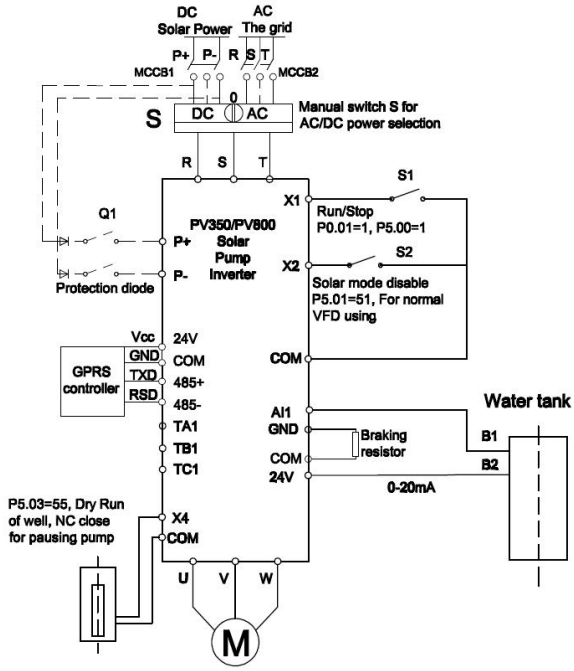
General wiring diagram



Inverter connection

(Dual mode manual switchover, start/stop switch, AC/DC run mode switchover, water tank float ball sensor switch, well dry run switch, and GPRS controller...)

6. If using a analog water level sensor for water tank fulling detecting. Please follow below circuit connection diagram.Connect 2 wires water level sensor to AI1 and 24VDC, and connect a resistor between GND and COM.
7. If request to connect GPRS module controller, connect Vcc to 24vdc power supply, GND to COM, Txd to Rs485+, Rsd to Rs485-. and set H9.11 to H9.15 parameters.



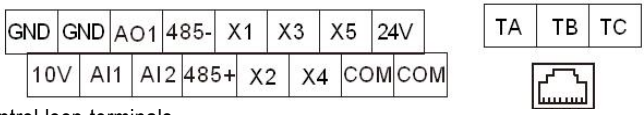
Note: 1. Input DC vmp and Voc voltage and total power should meet below requirement.

Input voltage, power solar arrays selection				
Pumps model	Inverte models	Vmp	Voc	Total Power of solar arrays
110VAC pumps	1S	110*1.41=130VDC	156VDC	≧ (1.3 to 2.0) rated power of pumps It is also depend on the quality of solar panels. The more power input, the better performance.
220VAC pumps	2S	220*1.41=310VDC	372VDC	
380VAC pumps	4T (Max 800VDC)	380*1.41=540VDC	648VDC	
480VAC pumps	4T (Max 900VDC)	480*1.41=677VDC	812VDC	

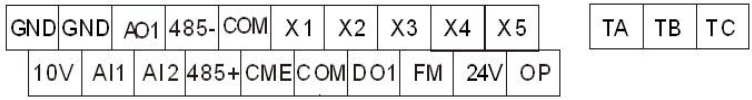
2. if connecting power supply to P+ and P-, please connect positive pole of power supply to P+, and negative pole of power supply to P-. it is very important, otherwise it will cause inverter damage.

5.5 Control loop terminals explanation:

PV350 /PSD350 control loop terminals.



PV800/PSD800control loop terminals.



Note: When connecting external potentiometer, the Jump P3 should place top position.

Terminal label	Terminal name	Function description
X1 COM	Multi-function input terminal 1	1. Input specification: 24VDC, 5mA 2. Frequency range: 0 ~ 200Hz 3. Voltage range: 10V ~ 30V
X2 COM	Multi-function input terminal 2	
X3 COM	Multi-function input terminal 3	
X4 COM	Multi-function input terminal 4	
X5 COM	Multi-function input terminal 5 High speed pulse train input terminal	Not only has the function as same as X1 to X4, but also can use for high speed pulse train receiving channel. Pulse frequency: 0 to 100KHz.
10V GND	Supply 10V power supply	Provides 10V power supply, maximum output current:10mA, Connect potentiometer, the resistor of potentiometer is 1-5KΩ.
24V COM	24 external power supply	Provide 24V power supply, maximum current is 200mA. Use for power on sensors or small relay
AI1 GND	analog input terminal 1	Input voltage range:DC 0—10V Input impedance:22KΩ
AO1 GND	Analog output 1	Output current or voltage signal selected by jumper P2 of controller board. Voltage signal range: 0-10V, current signal range:0-20mA
TA TB TC	Relay output	Multiple relay output: TA and TC is normal open, TA and TB is normal close. Specification: AC250V,3A/DC30V, 1A
485+ 485-	Rs485 communication interface	Built it RS485 communication interface

Chapter 6. Operation and display

6.1. Operation display introduction

User can modify the parameters, monitor the working status and start or stop the PV series inverter by operating the operation panel, as shown in the following

PRG 1	Programming key	Access to first level menu, or exit
2	Up key	Data and function code increase
3	Shift	To press this key to display parameters in stop or running status, also can select change bit during parameters modifying.
4	Down key	Data and function code decrease
SET 5	Confirm key	Enter to menu display step by step, confirm and save parameters
JOG 6	Multi-function key	This function code determined by P7.04.
RUN 7	Running key	Start inverter in keypad control mode
STOP 8	Stop/ Rest	Stop inverter in keypad operation mode, reset fault when fault occurs and trouble clearing.
	Potentiometer	When function code P0.03=4, the frequency adjust by potentiometer directly.

6.2. Press function description

Description of Indicators:

RUN:ON indicates that the inverter is in the running state, and OFF indicates that the inverter is in the stop state, flash slowly present inverter in sleep mode.

Err: Parameters identify/torque /fault indicator, ON indicates in torque control mode, flash slowly means in motor auto tuning state, flash fast present fault state.

F/R: Forward running indicator, ON indicates in reverse running state.

: Unit indictor, using to show currently data unit, it has several units as following show.

(○ stand for OFF ; ● stand for ON)

:Hz frequency indicator ;


:A current indicator ;


:voltage indicator ;


:RMP speed unit ;


:%

percentage ;

6.3. Monitor status list

Through the shit key "  " of keypad can display kinds of state parameters in stop or running mode. Selecting parameters display by function binary bit of code P7.06 (running parameters 1), P7.07 (running parameters 2. P7.08 (stop parameters)

In stop state, there are 11 stop state parameters can be selected to display, show as following respectively.

P7.08	LED Stop display parameter	Unit's digit: Bit0: frequency reference Bit1: DC bus voltage Bit2: AI1 voltage Bit3: AI2 voltage Ten's digit: Bit0: reserve	Bit1: counting value Bit2: length value Bit3: load speed Hundred's unit: Bit0:PID reference Bit1:X terminals status Bit2:D0 status	33	☆

In running state, 4 running status parameters running frequency, frequency reference, DC bus voltage and output current are displayed by default, and you can set whether other parameters are displayed by setting

P7.06	LED running display parameters 1	Unit's digit: Bit0: running reference Bit1: Output current Bit2: Output voltage Bit3: Machine speed Ten 's digit: Bit0: DC bus voltage Bit1: frequency reference Bit2: Count value Bit3: length value	Hundred' digit: Bit0:X input terminals state Bit1:DO output terminals state Bit2:AI1 voltage Bit3:AI2 voltage Thousand's digit: Bit0: Reserve Bit1:PID reference Bit2: Output current Bit3: Output torque	33	☆
P7.07	LED running display parameters 1	Unit's digit: Bit0:linear speed Bit1:PID feedback Bit2:PLC stage Bit3:PLUSE input frequency Ten's digit: Bit0:current power on time	Hundred's unit: Bit0:Auxiliary frequency Y Bit1: encoder feedback Bit2: actual feedback Bit3:before AI1 revise voltage Thousand 's unit:	0	☆

		Bit1:current running time Bit2:The rest running time Bit3:main frequency display	Bit0:before AI2 revise voltage Bit1: Torque reference Bit2:PLUSE input frequency Bit3:communication value		

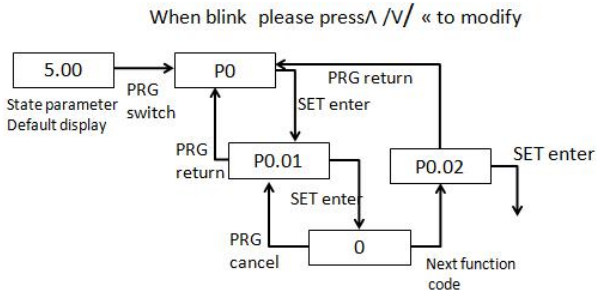
P7.06 and P7.07, as listed in the following table.

When the inverter is powered on again after power failure, the parameters that are selected before power failure are displayed.

Take P7.08 for example (stop display parameters), if you need to display frequency reference, DC bus voltage, machine speed, PID reference. Due to each parameter is independently, should be set unit's digit, then's digit, hundred's unit. Should set it with binary, and then translate into hexadecimal.

6.4. Function code review and modify method

PV series inverter keypad adopts 3 level menu design to operate parameters setting.



Note: During the third level menu operation, press PRG or SET key can return to second level menu. The difference is that, press SET key can save the set parameters and return to second menu, and automatically switch to next function code, and press PRG key means cancel the current parameters modifying and return to current function code of second menu directly.

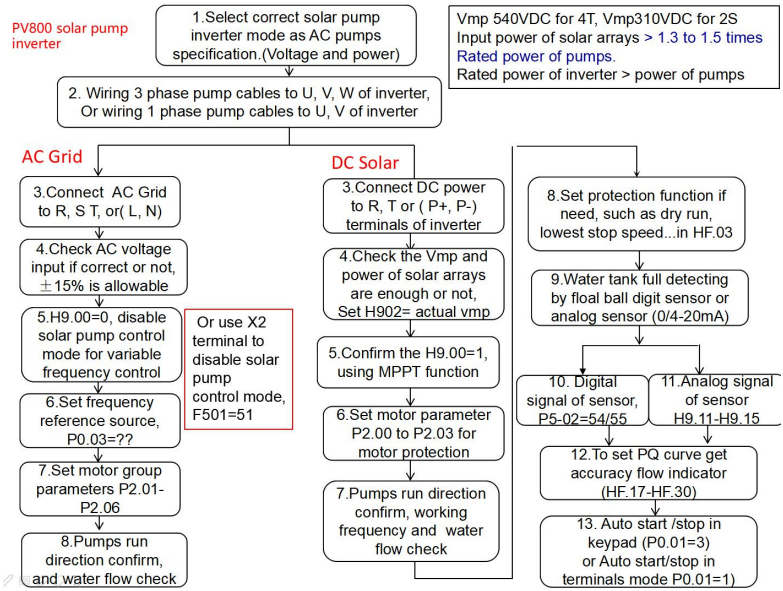
6.5 Password setting

PV series inverter provide user password protection. If the P7.00 is none 0 value, means it is user password. The password protection function is activated once exit function code edit mode. It will display "-----" if press the PRG key. Need input correct password to enter general menu. Otherwise it is forbidden enter.

If it need cancel the password, should enter to P7.00 with password first and then set it to 0.

Chapter 7. Quick installation guide and commissioning.

7.1. PV series solar pump inverter operation flow chat



7.2. PV series solar pump inverter commission steps when connect DC power connecting

1. Selecting correct inverter models according to the rated voltage, rated current of AC pumps.

Selecting to 2T series for 220VAC pump, the rated current of inverter should be bigger than pump's.

Selecting 4T series for 380VAC pumps;the rated current of inverter should be bigger than pump's.

Selecting 5T series for 480VAC pumps(Maximum DC voltage is 900VDC).

2. Check solar arrays input DC voltage and total input power if correct, check Voc open circuit voltage of solar arrays, and total input power of arrays.

Input voltage, power solar arrays selection				
Pumps model	Inverter models	Vmp	Voc	Total Power of solar arrays
110VAC pumps	1S	110*1.41=130VDC	156VDC	≧ (1.3 to 2.0) rated power of pumps It is also depend on the quality of solar panels. The more power input, the better performance.
220VAC pumps	2T	220*1.41=310VDC	372VDC	
380VAC pumps	4T (Max 800VDC)	380*1.41=540VDC	648VDC	
480VAC pumps	4T (Max 900VDC)	480*1.41=677VDC	812VDC	

* Vmp(Maximum power voltage), * Voc (open circuit voltage),

Recommend solar panels arrays selection as following table

The user need to calculate how many solar panels connecting in series to get enough Vmp first, and then calculate how many strings of solar panels to get enough total power input.

265w, 38Voc (Open circuit voltage), 31Vmp (Voltage at Pmax)				
Inverter models	Power of pump	Connection in series (PCS) (Vmp)	Connect in parallel (Strings) Power	Total (PCS)
1T (110VAC)	0.75kw to 1.0kw	5 PCS	1* strings	5*1=5
2T (220VAC)	0.75kw to 1.5kw	10PCS	1* strings	10*1=10
2T (220VAC)	2.2kw	11PCS	1* strings	11*1=11
4T(380VAC)	0.75kw to 2.2kw	18PCS	1* strings	18*1=18
4T(380VAC)	3.7kw	19PCS	1* strings	19*1=19
4T(380VAC)	5.5kw	18PCS	2* strings	18*2=36
4T(380VAC)	7.5kw	19pcs	2* strings	19*2=38
4T(380VAC)	11kw	18pcs	3* strings	18*3=54
4T(380VAC)	15kw	19pcs	4* strings	19*4=76

* For selecting 5T models for 480VAC pumps, the Vmp should be 480*1.41=677VDC, and around 811Voc.

3. Wiring as above inverter connection diagram, connect DC solar power supply to R, and T (P+, and P-), connect pumps input cables to U, V, W of inverter , start switch s1, water fulling float ball switch s2, well dry run function sensor switch S3.

4. Input H9.02 value with actual Vmp of on site solar arrays for quick jump into MPPT calculating.

5. Confirm the inverter if work in solar pump MPPT control mode in H9.00=0.

6. Set motor group parameters for pump protection from P2.00 to P2.03. If the selecting inverter power as same as rated current of motor. It is no need to set this group parameters.

7. Check the water delivery, water outcome if good or not, check the pumps running direction is correct or not, if the running direction is not correct, please change any 2 phase order of U, V. W wiring.

8. Set auxiliary protection function, such as pumps lowest running speed, dry run protection, maximum current of pumps, minimum input power of solar arrays, PQ curve setting for accuracy flow and today flow indicating in HF group.

9.If need, connect water tank fulling sensor. There are two types water level sensor, digital and analog 0-20mA, connect as diagram showed.

10. If system request to run automatically, inverter start at early morning when sunlight is sufficient automatically, and stop at sunset when no enough radiation automatically, please connect a start switch S1 between X1 and COM, set P0.01=1 (terminals control), and keep this switch in normal close status.

Note: H9 and HF both group parameters is desiged for solar pump control purpose only.
When H9.00=0,these 2 group parameters are disable.
For the MPPT gain function is defined by H9.06, H9.07, H9.08 and H9.09. If set these parameters are bigger, the MPPt calculating is stronger.

7.3. PV350/800 solar pump inverter commission steps when connecting AC grid.

1. Connect AC grid to R, S, T or (R, T for 1 phase input).
2. Check the input voltage if stable, if good, and switch on inverter.
3. Set H9.00=0 to disable solar pump inverter, take it for normal VFD using
4. Set the frequency source by P0.03 to select frequency reference.
5. Set P2.00 to P2.06 motor group parameters for motor pumps better protection.
6. Press the RUN button to start inverter, and then monitor output voltage to check if balance.

If output voltage is good in balance, press STOP button, connect motor to inveter U,V.W after power off inverter.

7. Set other parameters according onsite application requirement. Please refer more in detail on VFD operation manual.

7.4. Motor auto tuning for permanent magnet synchronous motor pumps (PMSM) procedure.

The PV series solar pump inverter also can use for driving PMSM high speed and high efficiency AC pumps.

Generally select open loop vector control mode for PMSM for better running performance. P0.00=1.

Before driving PMSM pumps, please perform PMSM motor auto tuning.

The steps of motor auto tuning.

1). Set P0.00=0 to select open loop sensorless vector control mode of PMSM.

2). Configure motor parameters as nameplate of PMSM pumps.

P2.01=2 (2: Permanent magnet synchronous motor)

P2.02=Motor rated current, P2.03=Motor rated frequency, P2.04=Motor rated speed,

P2.05=Motor rated voltage, P2.06=Mtor rated current.

3). Set P2.27 motor auto tuning mode.

If the pumps can remove from motor, please performance PMSM rotating tuning, P2.27=11,

If the pump can't remove from motor, please performance PMSM static auto tuning, P2.27=12

4. The motor will performance auto tuning once enter P2.27, and wait for times for finish tuning.

5. Please check the P2.16 back electromotive force value, if this value is too small or too big, please modify by manual, set 310vdc for 220vac motor, 540vdc for 380vac motor.

6. The user can start PMSM by press the RUN after PMSM motor auto tuning, if the running current is bigger, and cause over current trip, please do motor auto tuning again.

Note:1. User can set H9.00=1 first, take inveter for normal VFD using to performance motor auto tuning.

2.H9 and HF parameters groups special design for solar pump control with MPPT function, please refer to H9 And HF groups in detail.

3. Very easy for commissioning only with several parameters setting. H9.02, H9.06, H9.07, H9.08 and H9.09.

Chapter 8. Function parameters list

Code	Name	Setting range	Default set	P R
		P0 Basic function parameters		
P0.00	Control mode selection	0: Open loop sensor less vector control for PMSM 1: V/F control 2: Close loop sensor vector control	1	★
P0.01	Running command mode reference	0: Keypad (operation panel) 1:External terminal 2: RS485 communication 3: Inverter starting when power on in any running command mode. The default setting is 0, means the inverter will be start when you press the RUN button. Select 1 for external terminals control for auto running when switch on X1 and COM. If set for 3, the inverter can start to run pumps when power on. The STOP buttons is valid as well in this mode, but start inverter again need switch on again.	0	☆
P0.02	Memory of digital setting frequency upon power failure	0: Not memorize ； 1: memorize	1	☆
P0.03	Main frequency reference source X Selection	0: keypad digital frequency setting, not save after power failure 1: keypad digital frequency setting, memorized frequency after power failure. 2: Analog AI1 (-10v-10v) 3: Analog AI2 (0-10v/4-20mA) 4: Keypad potentiometer 5: PULSE trains frequency reference 6: Simple PLC 7: Multiple step command reference 8. Process-PID 9: RS485 communication Set H9.00=1 (solar pump control)	1	★
P0.04	Maximum frequency	50.00Hz ~ 4000.00Hz	50.00Hz	★
P0.05	Upper limit frequency	P0.06 ~ P0.04	50.00Hz	★
P0.06	Lower limit frequency	0.00Hz ~ P0.05	0.00Hz	☆
P0.07	Digital frequency reference	0.00Hz ~ P0.04	50.00Hz	☆
P0.08	Acceleration time 1	0.00s ~ 65000s	As power	☆

Code	Name	Setting range	Default set	PR
P0.09	Deceleration time 1	0.00s ~ 65000s	As power	☆
P0.10	Rotation direction	0 forward ; 1:reverse	0	☆
P0.11	Carrier frequency	0.5kHz ~ 16.0kHz	As power	☆
P0.12	Carrier frequency auto adjust select	0: Not auto adjust ; 1: Auto adjust	1	☆
P0.13	Parameters restore	0: No operation 1: Restore factory settings except motor parameters 2: Clear records	0	★
P0.14	Auxiliary frequency source Y selection	As same as P0.03 (main frequency source reference)	0	★
P0.15	Auxiliary frequency source selection Y when operation	0: Relative to maximum frequency (P0.04) 1: Relative to main frequency X (P0.03)	0	☆
P0.16	Range of auxiliary frequency source Y selection when operation	0% ~ 150%	100%	☆
P0.17	Frequency source operation (X, Y) selection	Unit's digit:frequency source selection 0: main frequency source 1: Arithmetic result of main and auxiliary operation (arithmetic relationship operation depends on ten's digit) 2: Switchover between main frequency X source and auxiliary source Y 3: Switchover between main source X and arithmetic operation between of main and auxiliary source. 4: Switchover between auxiliary source and arithmetic operation between of main X and auxiliary source Y Ten's digit : The arithmetic operation relationship between main and auxiliary. 0: main + auxiliary 1: main – auxiliary 2: Biggest one among two 3: Smallest one among two	00	☆
P0.18	Running terminals command mode	0: two lines 1 1: two lines 2 2: tree lines 1 3: threes lines 2	0	★

P1 Start/ stop control group				
P1.00	Startup mode	0: Start directly 1: DC brake first and start from starting frequency 2: Reserve	0	☆
P1.01	Starting frequency	0.00Hz ~ 10.00Hz	0.00Hz	☆
P1.02	Starting frequency holding time	0.0s ~ 100.0s	0.0s	★
P1.03	Startup DC braking current	0% ~ 100%	0%	★
P1.04	Startup DC braking time	0.0s ~ 100.0s	0.0s	★
P1.05	Stop mode	0 :deceleration ; 1:free stop	0	☆
P1.06	Initial frequency of stop DC braking	0.00Hz ~ maximum P0.04	0.00Hz	☆
P1.07	Waiting time of stop DC braking	0.0s ~ 100.0s	0.0s	☆
P1.08	Stop DC braking current	0% ~ 100%	0%	☆
P1.09	Stop DC braking time	0.0s ~ 100.0s	0.0s	☆
P1.10	Brake use ratio	0% ~ 100%	100%	☆
P1.11	Reverse running control	0: allow run in reverse, 1: reverse is forbidden	0	★
P1.12	Jog running frequency	0.00Hz ~ maximum frequency	5.00Hz	☆

P2 Motor parameters group				
P2.00	G/P type indicator	0:G type 1:P type	As power	●
P2.01	Motor type selection	0: General asynchronous motor 1: Frequency inverter motor 2: Permanent magnet synchronous motor 3: 1 phase motor	0	★
P2.02	Motor rated power	0.1kW ~ 1000.0kW	As power	★
P2.03	Motor rated frequency	0.00Hz ~ maximum frequency	50.00Hz	★
P2.04	Motor rated speed	0rpm ~ 65535rpm	1460rpm	★
P2.05	Motor rated voltage	0V ~ 2000V	As power	★
P2.06	Motor rated current	0.1A ~ 2000A	As power	★
P2.07	Motor Stator resistance	0.001Ω ~ 65.535Ω	As power	★
P2.08	Motor rotor resistance	0.001Ω ~ 65.535Ω	As power	★
P2.09	Motor Motor leakage inductance	0.01mH ~ 655.35mH	As power	★
P2.10	Motor mutual inductance	0.1mH ~ 6553.5mH	As power	★
P2.11	Motor no-load current	0.01A ~ P2.06	As power	★
P2.12	Synchronous motor D-axis inductance	0.01mH ~ 65.535mH	As power	★
P2.13	Q axis inductance of synchronous motor	0.01mH ~ 65.535mH	As power	★
P2.14	Reverse		As power	
P2.15	Synchronous motor stator inductance	0.01mH ~ 65.535mH	As power	★
P2.16	Back electromotive force of synchronous motor	0.1 ~ 6553.5V	As power	★
P2.17	Output Phase missing detection time of Synchronous Motor	0 ~ 60000	As power	★
P2.18	Encoder pulse number	1 ~ 65535	1024	★
P2.19	Encoder type	0: ABZ incremental encoder 1: Local inverter ABZ incremental encoder 2: ABZUVW encoder 3: Reserved 4: Resolver encoder	0	★
P2.20	Deceleration Ratio of Motor and Encoder	0 ~ 65.535	1.000	★
P2.21	ABZ encoder phase order/ main director	Bit0: Incremental encoder 0: Forward direction		★

		1: Reverse direction Bit1: Absolute encoder 0: Forward direction 1: Reverse direction		
P2.22	Magnetic pole initial angle	0.0 ~ 359.9°	0.0°	★
P2.23	Reserved			
P2.24	UVW signal zero position angle/	0.0 ~ 359.9°	0.0°	★
P2.25	Poles of resolver	1 ~ 65535	1	★
P2.26	Reversed			
P2.27	Motor auto tuning	0: No operation 1: Static auto tuning 2: Rotating tuning (complete tuning) 11: Static auto tuning fo PMSM 12: rotating running for PMSM	0	★

P3 Motor vector control group parameters				
P3.00	Speed loop proportional gain 1	1 ~ 100	30	☆
P3.01	Speed loop integral time 1	0.01s ~ 10.00s	0.50s	☆
P3.02	Switching frequency 1	0.00 ~ P3.05	5.00Hz	☆
P3.03	Speed loop proportional gain 2	1 ~ 100	20	☆
P3.04	Speed loop integral time 2	0.01s ~ 10.00s	1.00s	☆
P3.05	Switching frequency 2	P3.02 ~ P0.04	10.00Hz	☆
P3.06	Slip compensation coefficient	50% ~ 200%	100%	☆
P3.07	Speed loop filter time constant	0.000s ~ 0.100s	0.000s	☆
P3.08	Vector control over excitation gain	0 ~ 200	64	☆
P3.09	Upper limit of torque source selection in speed control mode	0:set by P3.10 function code 1:AI1 setting 2:AI2 setting 3:Potentiometer of keypad 4:PULSE train setting 5:communication	0	☆
P3.10	Upper limit of torque digital setting in speed control mode	0.0% ~ 200.0%	150.0%	☆

P4 V/F Control parameters				
P4.00	VF curve setting	0:Linear V / F curve 1:Multi-point V / F curve 2:Square V / F curve 3:VF separation mode 1 4:VF separation mode 2	0	★
P4.01	Torque boost	0.0%: (auto torque boost) 0.1% ~ 30.0%	0.3%	☆
P4.02	Torque boost cut-off frequency	0.00Hz ~ maximum	50.00Hz	★
P4.03	VF Slip compensation gain coefficient	0.0% ~ 200.0%	0.0%	☆
P4.04	VF over excitation gain	0 ~ 200	64	☆
P4.05	VF vertex point 1 output frequency	0.00Hz ~ P4.07	0.00Hz	★
P4.06	VF vertex point 1 output voltage proportional	0.0% ~ 100.0%	0.0%	★
P4.07	VF vertex point 2 output frequency	P4.05 ~ P4.09	0.00Hz	★
P4.08	VF vertex point 2 output voltage proportional	0.0% ~ 100.0%	0.0%	★
P4.09	VF vertex point 3 output frequency	P4.07 ~ motor rated frequency	0.00Hz	★
P4.10	VF vertex point 3 output voltage proportional	0.0% ~ 100.0%	0.0%	★
P4.11	The voltage source selection when VF isolated	0:digital reference (P4.13) 1:AI1 reference 2:AI2reference 3:keypad potentiometer reference 4:PULSE train reference (X5)	0	☆
P4.12	The voltage source setting when VF isolated	0V ~ motor rated voltage	0V	☆
P4.13	The voltage ramp up time when VF isolated	0.0s ~ 1000.0s	0.0s	☆

P5 Input/ Output terminals				
P5.00	X1 terminals function define	0: No operation 1: Forward running (FWD) 2: Reverse running (REV) 3: 3 lines control mode 4: Jog forward (FJOG) 5: Reverse forward (RJOG) 6: Free stop,use for detecting water level to stop inverter working. 7: Fault reset (RESET) 8: Normal open input of external fault 9: Terminal UP 10: Terminal DOWN 11: UP/DOWN reset (Terminal, keypad) 12: Multiple step terminals 1 13: Multiple step terminals 2 14: Multiple step terminals 3 15: Multiple step terminals 4 16: Acceleration/ deceleration selection terminals 1 17: Acceleration/ deceleration selection terminals 2 18: Normal close input of external fault 19: Stop by external terminals (only valid for running command by keypad) 20: Frequency reference source switch 21: X5 pulse trains input 22: Switch between main frequency and preset frequency reference 23: Switch between auxiliary frequency and preset frequency reference 24: Running command switch terminal 25: PID pause 26: PID action direction change for reverse 27: PID integral pause 28: PID parameters switch terminal. 29: Counter input 30: Counter reset 31:Length counting input 32::Length reset 33: Counter enable 34: Swing frequency pause 36: Accel/decel. forbidden	1	★
P5.01	X2 terminals function define		51	★
P5.02	X3 terminals function define		54	★
P5.03	X4 terminals function define		55	★
P5.04	X5 terminals function define		13	★
P5.05	X6 terminals function define (extension)		0	★
P5.06	X7 terminals function define (extension)		0	★
P5.07	X 8 terminals function define (extension)		0	★

		37: DC brake command 38: Run command switch terminal 2 39: Frequency reference activate terminal 40: Motor select terminal 1 41: Speed/torque control 42: Running pause 43: User fault define by terminal 1 44: User fault define by terminal 2 46: Torque control forbidden 47: Emergency stop 48: Stop by external terminal (by deceleration 4 reference) 49:DC braking in deceleration 50:Currently time reset 51: PV solar control is disable 52: PV solar voltage reference (CVT mode) 53: Monitoring content selecting by terminals, same function as shift button of keypad. 54: Float ball digit switch for water tank fulling detecting,(NO) normal open status. 55: Float ball digital switch for well water lacking detecting. (NC) Normal close status.		
P5.08	X 9 terminals function define (extension)		0	★
P5.09	X 10 terminals function define (extension)		0	★
P5.10	X terminal filter time	0.000s ~ 1.000s	0.010s	
P5.11	Line AI1 minimum setting	-10.00V ~ P5.13	0.20V	
P5.12	Corresponding value of line AI1 minimum setting	-100.0% ~ +100.0%	0.0%	
P5.13	Line AI1 maximum setting	P5.11 ~ +10.00V	10.00V	
P5.14	Corresponding value of line AI1 maximum setting	-100.0% ~ +100.0%	100.0%	
P5.15	AI1 filter time	0.00s ~ 10.00s	0.10s	
P5.16	Line AI2 minimum setting	0.00V ~ P5.18	0.20V	
P5.17	Corresponding value of line AI2 minimum setting	-100.0% ~ +100.0%	0.0%	
P5.18	Line AI2 maximum setting	P5.16 ~ +10.00V	10.00V	
P5.19	Corresponding value of	-100.0% ~ +100.0%	100.0%	

	line AI2 maximum setting		
P5.20	AI2 filter time	0.00s ~ 10.00s	0.10s
P5.21	Minimum value reference of potentiometer keypad	0.00V ~ P5.23	0.20V
P5.22	Corresponding value of minimum value reference of potentiometer keypad	-100.0% ~ +100.0%	0.0%
P5.23	Maximum value reference of potentiometer keypad	P5.21 ~ +10.00V	10.00V
P5.24	Corresponding value of maximum value reference of potentiometer keypad	-100.0% ~ +100.0%	100.0%
P5.25	Filter time of potentiometer	0.00s ~ 10.00s	0.10s
P5.26	PULSE minimum input	0.00kHz ~ P5.28	0.00kHz
P5.27	Corresponding value of PULSE minimum input	-100.0% ~ 100.0%	0.0%
P5.28	PULSE maximum input	P5.26 ~ 100.00kHz	50.00kHz
P5.29	P Corresponding value of PULSE maximum input	-100.0% ~ 100.0%	100.0%
P5.30	PULSE filter time	0.00s ~ 10.00s	0.10s
P5.32	AI less than minimum input setting selection	Unit's digit: AI1 less than minimum input setting selection 0: Corresponding setting for minimum input 1L 0.0% Ten's digit: AI2 less than minimum input setting selection, as same as above Hundred's digit: potentiometer of keypad less than minimum input selection, as above.	000
P5.33	X1 terminal response delay time	0.0s ~ 3600.0s	0.0s
P5.34	X2 terminal response delay time	0.0s ~ 3600.0s	0.0s
P5.35	X3 terminal response delay time	0.0s ~ 3600.0s	0.0s
P5.36	Input terminal	0: Positive logic	00000

	positive/negative logic setting 1	1: Negative logic Unit digit: X1 Ten digit: X2 Hundred ‘s digit:X3 Thousand digit:X4 Ten thousand digit:X5	

P6 Output terminals group			
P6.00	FM terminal output selection	0:Pulse train output 1:digital output	0
P6.01	FM terminal digital output selection	0: No output 1: Frequency running 2: frequency reach 3: Fault output (free stop fault) 4: Frequency level detect FDT 1 output 5: Frequency level detect FDT 2 output 6: 0 speed running (no output when free stop) 7: 0 speed running 2 (stop with output) 8:upper limit frequency reach 9:lower limit frequency reach 10: frequency reach 1 output 11: frequency reach 2 output 12: power on time reach 13: Running time reach 14: preset timing reach 15: setting counter arrive 16: Programmed counter arrive 17: Length arrive 18: under voltage status output 19: motor overload pre-alarm 20: frequency overload pre-alarm. 21: frequency under limit 22: torque under limit 23: standby for running 24: AI1>AI2 25: AI1 input out of upper and lower limit 26: lower frequency arrive (stop with output) 27: this running time arrive 28: warning output (for all faults) 29: Fault output (free stop fault and without output when under voltage) 30: current arrive 1 output 31: current arrive 2 output 32: load missing 34: module temperature reach 35: over current of software output 36: running direction 37: motor overheat pre-alarm 38: PLC circle running finish	0
P6.02	Local relay output		3
P6.03	Expansion relay output		0
P6.04	DO1 output selection		1
P6.05	Expansion output2		4

P6.06	FM pulse train output selection	0: running frequency 1: setting frequency 2: current output 3: torque output 4: power output 5: Output voltage 6: PULSE trains input (100.% corresponding to 100.0kHz) 7: AI1 8: AI2 9: Reverse	0	☆
P6.07	AO1 output selection	10: length 11: count value 12: communication setting 13: motor running speed	0	☆
P6.08	Expansion A02 output selection	14: output current (100.0% corresponding to 1000.0A) 15: Output voltage (100.0% corresponding to 1000.0V) 16: output torque (rated torque)	1	☆
P6.09	FM pulse trains output maximum frequency	0.01kHz ~ 100.00kHz	50.00kHz	☆
P6.10	AO1 zero offset	-100.0% ~ 100.0%	0.0%	☆
P6.11	AO1 gain	-10.00 ~ 10.00	1.00	☆
P6.12	Expansion A02 zero offset coefficient	-100.0% ~ 100.0%	0.0%	☆
P6.13	Expansion card A02 gain	-10.00 ~ 10.00	1.00	☆
P6.14	FM digital output ON delay time	0.0s ~ 3600.0s	0.0s	☆
P6.15	Local relay output ON delay time	0.0s ~ 3600.0s	0.0s	☆
P6.16	Expansion relay output ON relay time	0.0s ~ 3600.0s	0.0s	☆
P6.17	DO1 output ON delay time	0.0s ~ 3600.0s	0.0s	☆
P6.18	DO2 output ON delay time	0.0s ~ 3600.0s	0.0s	☆
P6.19	DO output terminal valid status selection	0: positive logic ; 1: negative logic unit digit:FM terminal Ten digit: local relay Hundred digit: expansion relay Thousand digit:DO1	00000	☆

		Ten thousand digit:DO2		
P6.20	FM digital output OFF delay time	0.0s ~ 3600.0s	0.0s	☆
P6.21	Local relay output OFF delay time	0.0s ~ 3600.0s	0.0s	☆
P6.22	Expansion relay output OFF relay time	0.0s ~ 3600.0s	0.0s	☆
P6.23	DO1 output OFF delay time	0.0s ~ 3600.0s	0.0s	☆
P6.24	DO2 output OFF delay time	0.0s ~ 3600.0s	0.0s	

P7 Keypad and monitor setting group				
P7.00	User password	0 ~ 65535	0	
P7.01	Function code group display selection	Digit: C group monitor display select 0: no display ; 1:display Ten digit: H function code display select 0:no display ; 1:display	01	
P7.03	Parameters write protection	0: parameters modify is allowable, 1: parameters modify forbidden	0	
P7.04	JOG key function selection	0: JOG key invalid 1: switching between of keypad and remote communication (between terminals and remote communication) 2: switch forward and reverse 3: forward jog 4: reverse jog	3	
P7.05	STOP key function	0: Stop key is valid only on keypad control mode 1 : Stop key is valid in any control mode	1	
P7.06	LED parameters display 1 on running	Unit Digit: Bit0:Running frequency Bit1:Output current Bit2:Output voltage Bit3:Machine speed Ten digit: Bit0:DC bus voltage Bit1:Frequency reference Bit2:Count value Bit3:Length Hundred digit: Bit0:X terminals input status Bit1:DO terminals output status Bit2:AI1 voltage Bit3:AI2 voltage Thousand digit: Bit0:Reserve Bit1:PID reference Bit2:Power output Bit3:Torque output	403B	
P7.07	LED parameters display 2 on running	Unit digit: Bit0:linear speed Bit1:PID feedback Bit2:PLC circle running	0	

		Bit3:PLUSE trains input (KHz) Ten digit: Bit0:current power on time Bit1:current running time Bit2:The remaining run time Bit3:main frequency Hundred digit: Bit0:auxiliary frequency Bit1: Encoder feedback speed Bit2: actual feedback speed Bit3:AI1 voltage before correction Hundred unit: Bit0:AI2 voltage before correction Bit1: torque reference value Bit2:PLUSE input frequency Bit3:communication reference		
P7.08	LED display parameters at stop	Unit digit: Bit0:frequency reference Bit1:DC bus voltage Bit2:AI1 voltage Bit3:AI2 voltage Ten digit: Bit0:Torque reference Bit1:Counter value Bit2:Length value Bit3:machine speed Hundred digit: Bit0:PID reference Bit1:X terminal status Bit2:DO status	3	
P7.09	Machine load display coefficient	0.0001 ~ 6.5000	0.6000	
P7.10	Heat sink of inverter temperature	0.0℃ ~ 100℃	-	
P7.12	Accumulative total running time	0h ~ 65535h	-	
P7.14	Soft version			
P7.15	Machine load speed display number of decimal point	0:0 decimal point 1:1 decimal point 2:2 decimal point 3:3 decimal point	0	
P7.16	Cumulative time of power on time	00000 ~ 65535 hour	-	

P8 Auxiliary parameters				
P8.00	The unit of acceleration/deceleration time	0:1s 1:0.1s 2:0.01s	1	
P8.01	Jog acceleration time	0.0s ~ 6500.0s	20.0s	
P8.02	Jog deceleration time	0.0s ~ 6500.0s	20.0s	
P8.03	Acceleration time 2	0.0s ~ 6500.0s	20.0s	
P8.04	Deceleration time 2 when fault alarm protection happens This function use to reduce the water hammer problem	0.0s ~ 6500.0s	5.0s	
P8.05	Acceleration time 3	0.0s ~ 6500.0s	20.0s	
P8.06	Deceleration time 3	0.0s ~ 6500.0s	20.0s	
P8.07	Acceleration time 4	0.0s ~ 6500.0s	20.0s	
P8.08	Deceleration time 4	0.0s ~ 6500.0s	20.0s	
P8.09	Reverse			
P8.10	Reference frequency of acceleration/deceleration time	0: Maximum frequency (P0.04) 1: Frequency reference 2: 100Hz	0	
P8.11	Jumping frequency 1	0.00Hz ~ maximum frequency	0.00Hz	
P8.12	Jumping frequency 2	0.00Hz ~ maximum frequency	0.00Hz	
P8.13	Jumping frequency range	0.00Hz ~ maximum frequency	0.01Hz	
P8.14	Frequency selecting is forbidden during acceleration/deceleration	0: invalid 1:valid	0	
P8.15	1/2 of acceleration time frequency switch point	0.00Hz ~ maximum frequency	0.00Hz	
P8.16	1/2 of deceleration time frequency switch point	0.00Hz ~ maximum frequency	0.00Hz	
P8.17	Terminal jog function priority selection	0:not priority ; 1:priority	0	
P8.18	Upper limit frequency source reference mode	0:P0.05 reference 1:AI1 reference 2:AI2 reference 3:potentiometer of keypad 4:PULSE trains setting 5:communication setting	0	
P8.19	Upper limit frequency offset	0.00Hz ~ maximum P0.04	0.00Hz	
P8.20	Auxiliary frequency source offset when superposition	0.00Hz ~ maximum P0.04	0.00Hz	

P8.21	Frequency standard of UP/DOWN during running	0:running frequency 1:frequency reference setting	0	
P8.22	Command source, combination of frequency source selection	Unit digit: with keypad control, combination of frequency source selection 0: no combination 1: digital setting 2: AI1 3: AI2 4: potentiometer of keypad 5: PULSE trains (X5) 6: multiple step speed 7: Simple PLC 8: PID 9: communication Ten digit: terminal command, combination frequency source selection Hundred digit: RS485 communication command, combination frequency source selection., Thousand digit: auto running, combination frequency source selection	0000	
P8.23	Terminals UP/DOWN charge rate	0.01Hz ~ 65.535Hz	1.00Hz	
P8.24	accelerate/ decelerate mode	0:accelerate/ decelerate with straight line ; 1:S curve accelerate/ decelerate A	0	
P8.25	S curve time scale of starting step	0.0% ~ (100.0%-P8.26)	30.0%	
P8.26	S curve time scale of close step	0.0% ~ (100.0%-P8.25)	30.0%	
P8.27	Forward/ reverse dead zoon time	0.0s ~ 3000.0s	0.0s	
P8.28	Frequency less than lower limit frequency stop delay time	0.0 ~ 600.0S	0.0S	
P8.29	Running mode selection when frequency less than lower limit frequency	0:running as lower limit frequency 1:stop 2:zero speed running	0	
P8.30	terminal start when power on protection select	0:not protection ; 1:protection	0	
P8.31	Drop control	0.00Hz ~ 10.00Hz	0.00Hz	
P8.32	FDT1 level	0.00Hz ~ maximum frequency	50.00Hz	
P8.33	FDT 1 lag value	0.0% ~ 100.0%	5.0%	

P8.34	Frequency arrival detecting range	0.0% ~ 100.0% (maximum)	0.0%	
P8.35	FDT2 level	0.00Hz ~ maximum frequency	50.00Hz	
P8.36	FDT2 lag value	0.0% ~ 100.0%	5.0%	
P8.37	Any arrival frequency detecting value 1	0.00Hz ~ maximum frequency	50.00Hz	
P8.38	Any frequency arrival detecting range 1	0.0% ~ 100.0% (maximum frequency)	0.0%	
P8.39	Any arrival frequency detecting value 2	0.00Hz ~ maximum frequency	50.00Hz	
P8.40	Any frequency arrival detecting range 2	0.0% ~ 100.0% (maximum frequency)	0.0%	
P8.41	Reverse			
P8.42	Time of timer setting method	0:P8.43 digital set 1:AI1 reference 2:AI2 reference 3:potentiometer of keypad Range of analog input corresponding to P8.43	0	
P8.43	Time value of timer	0.0min ~ 6500.0min	0.0min	
P8.44	Zero current detect level	0.0% ~ 300.0% ; (100.0% corresponding to motor rated current, stop without output)	5.0%	
P8.45	Zero current detect delay time	0.01s ~ 600.00s	0.10s	
P8.46	over current set point by software	0.0% (no detect) 0.1% ~ 300.0% (motor rated current)	200.0%	
P8.47	Over current detect delay time by software	0.00s ~ 600.00s	0.00s	
P8.48	Any current arrival 1	0.0% ~ 300.0%(motor rated current)	100.0%	
P8.49	Range of any current arrival 1	0.0% ~ 300.0%(motor rated current)	0.0%	
P8.50	Any current arrival 2	0.0% ~ 300.0%(motor rated current)	100.0%	
P8.51	Range of any current arrival 2	0.0% ~ 300.0%(motor rated current)	0.0%	
P8.52	AI1 input voltage lower limit protection	0.00V ~ P8.53	3.00V	
P8.53	AI1 input voltage upper limit protection	P8.52 ~ 11.00V	7.00V	
P8.54	Cooling fan control	0:Fans working on run 1: Fans working once power on	0	
P8.55	Module temperature arrival	0℃ ~ 100℃	75℃	
P8.56	Current running arrival time	0.0min ~ 6500.0min	0.0min	
P8.57	Motor selection	0: motor 1 ; 1: motor 2	0	

P9 PID function group				
P9.00	PID reference	0: digital set (P9.01) 1:AI1 2:AI2 3:potentiometer of keypad 4:PULSE trains (X5) 5:communication 6:multiple step speed	0	
P9.01	PID reference value set	0.0% ~ 100.0%	50.0%	
P9.02	PID feedback value	0:analog AI1 1:analog AI2 2:reserve 3:AI1-AI2 4:PULSE train (X5) 5:communication 6:AI1+AI2 7:MAX(|AI1|, |AI2|) 8:MIN(|AI1|, |AI2|)	0	
P9.03	PID adjust property	0:positive ; 1:negative	0	
P9.04	PID reference feedback range	0 ~ 65535	1000	
P9.05	proportional gain P1	0.0 ~ 100.0	20.0	
P9.06	integral time I1	0.01s ~ 10.00s	2.00s	
P9.07	derivative time D1	0.000s ~ 10.000s	0.000s	
P9.08	PID inversion cut of frequency for reverse	0.00 ~ maximum frequency	2.00HZ	
P9.09	PID limit deviation	0.0% ~ 100.0%	0.0%	
P9.10	PID differential amplitude limiting	0.00% ~ 100.00%	0.10%	
P9.11	PID reference change time	0.00 ~ 650.00s	0.00s	
P9.12	PID feedback filter time	0.00 ~ 60.00s	0.00s	
P9.13	PID output filter time	0.00 ~ 60.00s	0.00s	
P9.15	proportional gain P2	0.0 ~ 100.0	20.0	
P9.16	integral time I2	0.01s ~ 10.00s	2.00s	
P9.17	derivative time D2	0.000s ~ 10.000s	0.000s	
P9.18	PID parameters switchover condition	0:no switch 1:terminals 2:Switchover according to deviation	0	
P9.19	PID parameters switchover deviation 1	0.0% ~ PA.20	20.0%	
P9.20	PID parameters switchover	PA.19 ~ 100.0%	80.0%	

	deviation 2			
P9.21	PID starting value	0.0% ~ 100.0%	0.0%	
P9.22	PID starting value holding time	0.00 ~ 650.00s	0.00s	
P9.23	Positive maximum between twice deviation output	0.00% ~ 100.00%	1.00%	
P9.24	Negative maximum between twice deviation output	0.00% ~ 100.00%	1.00%	
P9.25	PID integral property	Unit digit: integral separation 0:invalid ; 1:valid Ten digit: if stop integral calculating when output reach to limit 0:continue ; 1:stop	00	
P9.26	PID feedback loss detect value	0.0%:no detect for loss 0.1% ~ 100.0%	0.0%	
P9.27	PID feedback loss detect time	0.0s ~ 20.0s	0.0s	
P9.28	PID stop calculating	0: stop without calculating, 1: stop and calculating	0	
P9.29	wake up frequency	Sleeping frequency (P9.31) ~ maximum (P0.10)	0.00Hz	
P9.30	Wake up delay time	0.0s ~ 6500.0s	0.0s	
P9.31	sleeping frequency	0.00Hz ~ wake frequency (P9.29)	0.00Hz	
P9.32	Sleeping delay time	0.0s ~ 6500.0s	0.0s	
P9.33	Wake up function define	0:as frequency (P9.29) 1:as percentage (P9.34)	0	
P9.34	Wake up value	0.0% ~ 100.0%	0.0%	

PA	Multiple step speed, PLC			
PA.00	Multi-step speed 1	-100.0% ~ 100.0% (100.0% corresponding to P0.04)	5.0%	
PA.01	Multi-step speed 2	-100.0% ~ 100.0%	10.0%	
PA.02	Multi-step speed 3	-100.0% ~ 100.0%	15.0%	
PA.03	Multi-step speed 4	-100.0% ~ 100.0%	20.0%	
PA.04	Multi-step speed 5	-100.0% ~ 100.0%	25.0%	
PA.05	Multi-step speed 6	-100.0% ~ 100.0%	30.0%	
PA.06	Multi-step speed 7	-100.0% ~ 100.0%	35.0%	
PA.07	Multi-step speed 8	-100.0% ~ 100.0%	40.0%	
PA.08	Multi-step speed 9	-100.0% ~ 100.0%	45.0%	
PA.09	Multi-step speed 10	-100.0% ~ 100.0%	50.0%	
PA.10	Multi-step speed 11	-100.0% ~ 100.0%	55.0%	
PA.11	Multi-step speed 12	-100.0% ~ 100.0%	60.0%	
PA.12	Multi-step speed 13	-100.0% ~ 100.0%	65.0%	
PA.13	Multi-step speed 14	-100.0% ~ 100.0%	70.0%	
PA.14	Multi-step speed 15	-100.0% ~ 100.0%	75.0%	
PA.15	Multi-step speed 16	-100.0% ~ 100.0%	80.0%	
PA.16	PLC running mode	0:Stop when single circle running finish 1:Keep final value when single circle running finish 2:continue circle running	0	
PA.17	PLC running Power-off memory select	Unit digit: 0:no memory when power off ; 1:power-off memory Ten digit: 0:no memory when stop ; 1: stop memory	00	
PA.18	PLC 1st step running time	0.0s(h) ~ 6500.0s(h)	0.0s(h)	
PA.19	PLC 1st acceleration/ deceleration time select	0 ~ 3	0	
PA.20	PLC 2nd step running time	0.0s(h) ~ 6500.0s(h)	0.0s(h)	
PA.21	PLC 2nd acceleration/ deceleration time select	0 ~ 3	0	
PA.22	PLC 3rd step running time	0.0s(h) ~ 6500.0s(h)	0.0s(h)	
PA.23	PLC 3rd acceleration/ deceleration time select	0 ~ 3	0	
PA.24	PLC 4th step running time	0.0s(h) ~ 6500.0s(h)	0.0s(h)	
PA.25	PLC 4th acceleration/ deceleration time select	0 ~ 3	0	
PA.26	PLC 5th step running time	0.0s(h) ~ 6553.5s(h)	0.0s(h)	
PA.27	PLC 5th acceleration/	0 ~ 3	0	

	deceleration time select			
PA.28	PLC 6th step running time	0.0s(h) ~ 6553.5s(h)	0.0s(h)	
PA.29	PLC 6th acceleration/ deceleration time select	0 ~ 3	0	
PA.30	PLC 7th step running time	0.0s(h) ~ 6553.5s(h)	0.0s(h)	
PA.31	PLC 7th acceleration/ deceleration time select	0 ~ 3	0	
PA.32	PLC 8th step running time	0.0s(h) ~ 6553.5s(h)	0.0s(h)	
PA.33	PLC 8th acceleration/ deceleration time select	0 ~ 3	0	
PA.34	PLC 9th step running time	0.0s(h) ~ 6553.5s(h)	0.0s(h)	
PA.35	PLC 9th acceleration/ deceleration time select	0 ~ 3	0	
PA.36	PLC 10th step running time	0.0s(h) ~ 6553.5s(h)	0.0s(h)	
PA.37	PLC 10th acceleration/ deceleration time select	0 ~ 3	0	
PA.38	PLC 11th step running time	0.0s(h) ~ 6553.5s(h)	0.0s(h)	
PA.39	PLC 11th acceleration/ deceleration time select	0 ~ 3	0	
PA.40	PLC 12th step running time	0.0s(h) ~ 6553.5s(h)	0.0s(h)	
PA.41	PLC 12th acceleration/ deceleration time select	0 ~ 3	0	
PA.42	PLC 13th step running time	0.0s(h) ~ 6553.5s(h)	0.0s(h)	
PA.43	PLC 13th acceleration/ deceleration time select	0 ~ 3	0	
PA.44	PLC 14th step running time	0.0s(h) ~ 6553.5s(h)	0.0s(h)	
PA.45	PLC 14th acceleration/ deceleration time select	0 ~ 3	0	
PA.46	PLC 15th step running time	0.0s(h) ~ 6553.5s(h)	0.0s(h)	
PA.47	PLC 15th acceleration/ deceleration time select	0 ~ 3	0	
PA.48	PLC 16th step running time	0.0s(h) ~ 6553.5s(h)	0.0s(h)	
PA.49	PLC 16th acceleration/ deceleration time select	0 ~ 3	0	
PA.50	PLC running time unit	0:s (second) ; 1:h (hour)	0	
PA.51	Multiple step command 1 frequency reference	0:function code PA.00 reference 1:AI1 2:AI2 3: potentiometer keypad 4:PULSE trains 5:PID reference 6:digit reference , UP/DOWN is changeable	0	

Pb Swing, fixed length and counting group				
Pb.00	Swing frequency setting mode	0:corresponding to center frequency 1:corresponding to maximum frequency	0	
Pb.01	Swing frequency range	0.0% ~ 100.0%	0.0%	
Pb.02	Suddenly jump frequency range	0.0% ~ 50.0%	0.0%	
Pb.03	Swing frequency period	0.1s ~ 3000.0s	10.0s	
Pb.04	Delta wave rise time of swing frequency	0.1% ~ 100.0%	50.0%	
Pb.05	length set	0m ~ 65535m	1000m	
Pb.06	Actual length	0m ~ 65535m	0m	
Pb.07	Pulse per meter, unit: 0.1	0.1 ~ 6553.5	100.0	
Pb.08	count value setting	1 ~ 65535	1000	
Pb.09	Assign of count value	1 ~ 65535	1000	
PC Fault and protection function				
PC.00	Motor overload protection	0:forbidden ; 1:allow	1	
PC.01	Motor overload protection gain	0.20 ~ 10.00	1.00	
PC.02	Motor overload pre-alarm coefficient	50% ~ 100%	80%	
PC.03	Over voltage gain	0 ~ 100	0	
PC.04	Overvoltage protection voltage	120% ~ 150%	130%	
PC.05	Over current stall gain	0 ~ 100	20	
PC.06	Over current stall protection current	100% ~ 200%	150%	
PC.08	Fault automatic reset times	0 ~ 20	20	
PC.09	Fault DO action selection when fault automatic reset period	0:on action 1:action	0	
PC.10	Interval time of fault automatic reset	0.1s ~ 100.0s	5.0s	
PC.11	Input power phase missing protection	0:disable 1: enable	1	
PC.12	Output power phase missing protection	0:disable 1: enable	1	

PC.13	The 1st fault type	0: no fault 1: over current on acceleration (E001) 2:over current on deceleration (E002) 3:over current on fixed speed (E003) 4:over voltage on acceleration (E004) 5 : over voltage on deceleration (E005) 6:over voltage on fixed speed (E006) 7:control power fault (E007) 8:under voltage fault (E008) 9:inverter unit fault (E009) 10:input power phase missing (E010) 11:output power phase missing (E011) 12: motor to ground short circuit fault (E012) 13:reserve 14:inverter overload E014) 15:motor overload (E015) 16:module overheat (E016) 17:parameters write/read abnormal (E017) 18:external fault (E018) 19:running time arrival E019) 20: power on time arrival (E020) 21:current detect fault (E021) 22:motor over temperature (E022) 23:contactor abnormal (E023) 24:communication fault (E024) 25:encoder /PG fault (E025) 26:motor auto tuning fault (E026) 27:initial position fault (E027) 28: hardware over current protection (E028) 29: motor over speed (E029) 30: speed deviation is big (E030) 31: reserve	-	
PC.14	The 2nd fault type		-	
PC.15	The 3rd (latest one) fault type		-	
PC.16	Running frequency on the 3rd fault	-	-	
PC.17	Current on the 3rd fault	-	-	
PC.18	DC bus voltage on 3rd fault	-	-	
PC.19	Input terminal status on 3rd fault	-	-	
PC.20	Output terminal status on 3rd fault	-	-	
PC.21	Frequency inverter status on 3rd fault	-	-	

PC.22	Time of the 3rd fault (Timing from current time)	-	-	
PC.23	Time of the 3rd fault (timing from start running)	-	-	
PC.24	Running frequency on the 2nd fault	-	-	
PC.25	Current on the 2nd fault	-	-	
PC.26	DC bus voltage on 2nd fault	-	-	
PC.27	Input terminal status on 2nd fault	-	-	
PC.28	Output terminal status on 2nd fault	-	-	
PC.29	Frequency inverter status on 2nd fault	-	-	
PC.30	Time of the 2nd fault (Timing from current time)	-	-	
PC.31	Time of the 2nd fault (timing from start running)	-	-	
PC.32	Running frequency on the 1st fault	-	-	
PC.33	Current on the 1st fault	-	-	
PC.34	DC bus voltage on 1st fault	-	-	
PC.35	Input terminal status on 1st fault	-	-	
PC.36	Output terminal status on 1st fault	-	-	
PC.37	Frequency inverter status on 1st fault	-	-	
PC.38	Time of the 1st fault (Timing from current time)	-	-	
PC.39	Time of the 1st fault (timing from start running)	-	-	
PC.40	Fault alarm protection action 1 selection	Hundred digit: E018 deceleration to stop		
PC.43	Fault alarm protection action 2 selection	Hundred digit: E060 Thousand digit: E056 thousand digit: E080 Note: It can't perform deceleration when E060		
PC.44	Fault alarm protection action 3 selection	Digit: E055 Ten digit: E070		
PC.45	Action selection at instantaneous power failure	0: Invalid 1: Decelerate		

		2: Decelerate to stop		
PC.46	Action pause judging voltage at instantaneous power failure	PC.48 ~ 100.0%		
PC.47	Voltage rise again judging time at instantaneous power failure	0.0 ~ 100.0S		
PC.48	Action judging voltage at instantaneous power failure	60.0% ~ 100.0%	80.0%	
PC.49	Protection of load loss	0:Disable 1: Enable	0	
PC.50	Detection level of load loss	0.0 ~ 100.0%	10.0%	
PC.51	Detection time of load Loss	0.0 ~ 60.0S	0.0	
PC.52	Over-speed detection value	0.0 ~ 50.0% (P0.04 value)	20.0%	
PC.53	Over-speed detection time	0.0 ~ 60.0S	5.0S	
PC.54	Detection value of too large speed deviation	0.0 ~ 50.0% (P0.04 value)	20.0%	
PC.55	Detection time of too large speed deviation	0.0 ~ 60.0S	0.0S	
PC.56	Reserve			
PC.57	Motor temperature sensor type	0:No temperature sensor 1:PT100 2:PT1000	0	
PC.58	Motor overheat protection value	0.0℃ ~ 200℃	110℃	
PC.59	Motor overheat pre-alarm value	0.0℃ ~ 200℃	90℃	
PC.60	Reserve			
PC.61	Quick current limit	0: Disable 1: Enable	1	
PC.62	Under voltage setting	60.0 ~ 140.0%	65%	
PC.63	Over voltage setting			

Pd Pd communication group				
Pd.01	Selection of communication Baud rate	1:600BPS 2:1200BPS 3:2400BPS 4:4800BPS 5:9600BPS 6:19200BPS 7:38400BPS 8:57600BPS 9:115200BPS	5	
Pd.02	Format of data	0: No parity (8.N-2) 1: Even parity (8.E-1) 2: Odd parity (8.O-1) 3: No parity (8.N-1)	0	
Pd.03	Local address	1 ~ 247 ; 0 take as for Broadcast address	1	
Pd.04	Response delay	0ms ~ 20ms	2	
Pd.05	Communication timeout	0.0 (invalid) ; 0.1s ~ 60.0s	0.0	
Pd.06	Data transfer format selection	0:non standard MODBUS Protocol 1:standard MODBUS Protocol	1	
PF Enhanced parameters group				
PF.14	Accumulative total power on time reach setting	0.0 ~ 65535h	0	
PF.15	Accumulative total running time reach setting	0.0 ~ 65535h	0	
PF.16	Speed tracking function selection	0:Disable 1: Enable	0	
PF.17	Speed tracking mode	0: Start tracking with stop frequency tracking, 1: Zero speed, 2: maximum frequency	0	
PF.18	Speed tracking speed ratio	1 ~ 100	20	
H0 Torque control mode				
H0.00	Torque control mode	0: disable 1:enable	0	
H0.01	Torque reference selection	0: digital of keypad reference (H0,03) The maximum range corresponding torque upper limit (H0.03) 1:analog AI1 reference 2:analog AI2 reference 3:potentiometer of keypad 4:PULSE trains reference 5:communication 6: minimum between of (AI1,AI2)	0	

		7:maximum between of (AI1,AI2)		
H0.03	torque reference by digital set	-200.0% ~ 200.0%	150.0%	
H0.05	Maximum frequency in forward under torque control	0.00Hz ~ maximum frequency	50.00Hz	
H0.06	Maximum frequency in reverse under torque control	0.00Hz ~ maximum frequency	50.00Hz	
H0.07	Acceleration time of torque control	0.00s ~ 65000s	0.00s	
H0.08	Deceleration time of torque control	0.00s ~ 65000s	0.00s	
H3 Multiple point AI curve parameters group				
H3.00	AI curve 4 minimum input	-10.00V ~ H3.02	0.00V	
H3.01	AI curve 4 minimum input corresponding value	-100.0% ~ +100.0%	0.0%	
H3.02	AI curve 4 break point 1 input	H3.00 ~ H3.04	3.00V	
H3.03	AI curve 4 break point 1 input corresponding value	-100.0% ~ +100.0%	30.00%	☆
H3.04	AI curve 4 break point 2 input	H3.02 ~ H3.06	6.00V	☆
H3.05	AI curve 4 break point 2 input corresponding value	-100.0% ~ +100.0%	60.00%	☆
H3.06	AI curve 4 maximum input	H3.04 ~ +10.00V	10.00V	☆
H3.07	AI curve 4 maximum input corresponding value	-100.0% ~ +100.0%	100.0%	☆
H3.08	AI curve 5 minimum input	-10.00V ~ H3.10	0.00V	☆
H3.09	AI curve 5 minimum input corresponding value	-100.0% ~ +100.0%	0.0%	☆
H3.10	AI curve 5 break point 1 input	H3.08 ~ H3.12	3.00V	☆
H3.11	AI curve 5 break point 1 input corresponding value	-100.0% ~ +100.0%	30.00%	☆
H3.12	AI curve 5 break point 2 input	H3.10 ~ H3.14	6.00V	☆
H3.13	AI curve 5break point 2 input corresponding value	-100.0% ~ +100.0%	60.00%	☆
H3.14	AI curve 5 maximum input	H3.12 ~ +10.00V	10.00V	
H3.15	AI curve 5 maximum input corresponding value	-100.0% ~ +100.0%	100.0%	

Code	Name	Parameters explanation in detail	Default	Property
H9 solar pump control special parameters				
H9.00	Solar pump control	0:Invalid 1:Enable When it set to 0, the solar pump control function is disable, it used for normal motor speed control VFD. When it set to 1, the solar pump control function is activate, H9 and HF group parameters is useful. DI#51 solar pump control disable set by terminal function is priority than this setting.	1	◎
H9.01	Vmpp voltage reference	0: Voltage reference (CVT) The reference voltage is set by H9.02, it is a constant value, the target frequency will increase tar wards to H9.04 upper limit frequency of PI when DC voltage is higher than H9.02, and target frequency will decrease tar wards to H9.05 lower limit frequency of PI when DC voltage is lower than H9.02. 1: Max. power point tracking (MPPT) When it set 1, adopt MPPT function, inverter always pursuing maximum power point. H9.02 value is chaning always due to MPPT function, C0.34 can monitor the MPPT voltage value(H9.02 value) Whatever control model has been selecting, the target frequency will change towards to upper limit of PI, when the DC bus voltage is lower than this setting, the target freqeuncy will change towards to lower limit of PI output frequency.	1	◎
H9.02	Vmpp set by keypad reference	0.0 ~ 1000Vdc When H9.01=0, the DC bus control voltage target setting. When H9.01=1, MPPT calculating entry point setting. If user set it for actual Vmp of solar arrays, or 80% of Voc value, the inverter can able to quick enter MPPT calculating for better performance.	310/530	○
H9.03	PI control deviation	0.00 ~ 100.0% (100.0% corresponding to H9.02) If the ratio percentage of deviation value between Bus voltage to reference voltage to to Reference voltage,which is ABS (DC bus voltage -Reference voltage)* 100.0%/Reference voltage, if the value exceeds	0.0%	○

Code	Name	Parameters explanation in detail	Default	Property
		the deviation limit of H99.03, PI adjustment will be perform, otherwise, this is no PI adjustment and the value is defaulted to be 0.0%. ABS: the absolute value		
H9.04	Upper output frequency of PI	H9.05 ~ 100.0%(100.0% corresponds to P0.05) H9.04,It is used to limit of maximum value of target frequency, 100% corresponds to P0.05 After the PI adjustment, the target frequency can not exceed the upper limit	100.0%	○
H9.05	Lower ou put frequency of PI	0.0% ~ H9.04 (100.0% correspond to P0.05) H9.05 is used to limit of the Min. Value of target frequency, 100% corresponds to P0.05) After PI adjustment, the target frequency cannot exceed the lower limit.	0.0%	○
H9.06	KP1 of target frequency acceleration	0.00 ~ 100.00 The proportion coefficient 1 of the target frequency increasing, the bigger the value is, the stronger the effect and faster adjustment is.	1.00	○
H9.07	KI1 of target frequency acceleration	0.00 ~ 100.00 The integral coefficient 1 of the target frequency increase. The bigger the value is, the stronger the effect and faster the adjustment is.	1.00	○
H9.08	KP2 of target frequency deceleration	0.00 ~ 100.00 The proportion coefficient 2 of the target frequency decrease, the bigger the value is, the stronger the effect and faster adjustment is.	4.00	○
H9.09	KI2 of target frequency deceleration	0.00 ~ 100.00 The integral coefficient 2 of the target frequency decrease. The bigger the value is, the stronger the effect and faster the adjustment is	4.00	○
Note: H9.06, H9.07, H9.08 and H9.09 parameters is useful for adjusting MPPT tracking function. H9.06, H9.07 for control target frequency going up, and H9.08 and H9.09 for control target frequency going down. When these value small, MPPT response is slow, and frequency fluctuating is small, when these values big, more MPPT response, and little bit frequency fluctuation, and can use to reduce under voltage alarm (E060) possibility happens times.				
H9.10	Reserve			

Code	Name	Parameters explanation in detail	Default	Property
H9.11	Water level detect control	0: Float ball switch input 1: AI1 2: AI2 3: AI3 The water tank level control is disable when it set for 0. The 1~3 options are used to set for analog input of water level reference. Only after this the analog signal setting, below H9.12 ， H9.13,H9.14,H9.15 codes function can be programmed.	0	◎
H9.12	Water level threshold	0.0 ~ 100.0% If the detecting signal value is less than the water level threshold and keep it in this state after the delay time of P15.13,it will submit water full alarm (E080), and dormant. If the time is not reached, the signal is bigger than the water level threshold, the time will be cleared automatically. When the signal time is shorter than water level threshold time, the time will be re-counted again. Note: when selected analog signal is AI1, we can check with C0.10 value.(eg. 1.5V, 1.5/10*100%=15%). If the C0.10 lesss than 15, and lasting for H9.13 relay time, the A80 water full alarm will be appear. When the signal large than 15, and lasting for H9.15 time, the alarm will be reset. If the selected signal is AI2, we can check with C0.11 value to see working status. When H9.11=0, DI digital 54 function is workable, and sent E080 alarm When H9.110, Digital 55 function is workable, and sent E075 alarm.	25.0%	○
H9.13	Full water delay	0 ~ 10000s Water tank fulling delay time setting	60s	○
H9.14	Empty water delay	0 ~ 10000s Water tank is lack of water delay time setting After full water level alarmed, if the detected valued greater than H9.12, and lasting more than H9.14 delay time, system restore to running state from sleep mode.	600s	○

Code	Name	Parameters explanation in detail	Default	Property
H9.15	Hydraulic detection probe damage threshold	0.0 ~ 100.0% 0.0% stands for disable If the detected water level signal large than H9.15, the solar pump inverter consider water probe is damaged and sent alarm（E0?) directly and go to sleep. Note: when AI1 is selected for water level analog signal, we can check C0.10 value to see working status.（8.0V，8/10*100%=80%). If the value large than 80, sending alarm（E054) and stop	0.0%	○
H9.16	Reserve			
H9.17	Min. Voltage reference of maximum power point tracking（MPPT)	Percentage of H9.02, range from (70 to 100%) Used to set MPPT mini working tracked voltage in MPPT mode.	85%	○
H9.18	Maximum Power Tracking Maximum Voltage Reference	Percentage of H9.02, range from (100 to 150%) It is valid at MPPT maximum power point tracking mode, used to set maximum voltage of MPPT.	110%	○
H9.19	Adjustment of initial reference voltage	0 ~ 200.0V MPPT begins to change from the reference voltage . Initial reference voltage=DC bus voltage -H9.19.	2.0V	○
H9.20	The auto adjusting time of Max and Min of MPPT voltage	After H9.20 interval time, the Max and Min voltage of Vmppt will be adjust automatically. If set for 0.0s, the auto adjust is disable.	10.0s	○
H9.21	Water tank fulling wake up delay time	The E080 alarm will be disappear and inverter wake up again after this setting delay time.	60.0S	
H9.22	Well lack of water wake up delay time	The E075 alarm will be disappear and inverter wake up again after this setting delay time.	60.0S	
H9.21 to H9.27	Reserve			○
H9.28	Total flow/ energy generated reset	0: No operation 1: Flow reset 2: Generated energy reset 3: Flow and generated energy reset	0	
H9.29	Reserve			
H9.30	Reserve			
H9.31	MPPT increase filter	For improve the frequency showing stability	0.0S	

Code	Name	Parameters explanation in detail	Default	Property
	time			
H9.32	Deceleration time 2 when lower than Min voltage	When the DC bus voltage is lower than HF.00 setting, the deceleration time as this setting	1.0S	
HF	Solar pump control protection function			
HF.00	Sleep voltage threshold	Setting range: Under voltage setting ~ H9.23, when the DC bus voltage lower than this setting value, it will appear E060 alarm(Low voltage alarm)	260/150 V	
HF.01	Wake up voltage threshold	Setting range:HF.00 ~ 1000 When the DC bus voltage higher than this value or equal to this value for HF.02 delay time, the E060 alarm will be disappeared in sleep mode	360/240 V	
HF.02	Awake waiting time	0.0 ~ 6500S	120s	
HF.03	Stop frequency when low speed (lowest frequency)	Setting range:0.0 ~ P0.04 When the output frequency is lower than this setting value for a HF.04 lasting time, it will appear E055 alarm . 0.0Hz means there are no lowest stop frequency protection. Once it is started, the timing will be activated. The timing will be reset once the output frequency higher than this value within set time. As long as the output frequency is lower than this value, re-timing again.	20.0Hz	
HF.04	Low frequency protection detection time	Setting range: 0.0 ~ 6500S	60.0s	
HF.05	Low stop frequency protection reset delay time	Setting range: 0.0 ~ 6500S Reset time, it will be timing when E055 protection is activated	120.0s	
HF.06	Dry run protection current threshold (under-load protection)	Setting: 0.0 ~ 100.0% (100.0% corresponding to P2.06 setting) When the output current is lower than this set value for a detecting time HF0.7, the dry run function will be activated, and submit E056 alarm. 0.0A means no operation Once it is started, the timing will be activated. The timing will be reset once the output frequency higher than this value within set time. As long as the output frequency is lower than this value, re-timing again.	0.0%	

Code	Name	Parameters explanation in detail	Default	Property
HF.07	Dry run protection detecting time	Setting range: 0.0 ~ 6500S	60s	
HF.08	Dry run reset relay time	Setting: 0.0 ~ 6500S Reset time, it will be timing when E056 protection is activated	120s	
HF.09	Over load of pumps protection setting	Range : 0.0 ~ 2 times * P2.06 If the output current is higher this setting for longer HF10 setting time, it will show E065 alarm.	140%	
HF.10	Over load detecting time	Range: 0.0 ~ 6500S	60	
HF.11	Over load restore time	Range:0~ 3000S Restore time calculte from E065 appears, and it will be reset after tis restore time.	120	
HF.12	Minimum power input protection threshold	Setting range: 0~ 100.0KW The minimum power input protection will be activated when output power is lower than this value for a detecting time HF.13, and show E070.	0.0	
HF.13	Minimum power input detect delay time	Setting range: 0.0 ~ 6500S	60	
HF.14	Automatic recovery time in minimum power input protection mode	Setting range:0.0 ~ 6500S Reset time,timing when E070 is be activated.	120.	
A description of timing problems for multiple fault conditions. If the conditions such as voltage dormancy, low stop frequency, dry run, overload and other conditions are met simultaneously, each will start the delay time, not associated. When a warning (alarm code)delay first arrived, this alarm code will be appear. The other several warning (alarm code)time delay will be cleared, until the early warning back to normal, if the other early warning conditions are still met, will be re-timing. If an alarm condition is not met during status, then the warning delay time will be cleared. A group alarm code are able to reset automatically, whether it is control by terminals or keypad.				
HF.15	The adjustment time of reference voltage		0.2	
HF.16	The adjustment range of reference voltage		10	
HF.17	Power curve 0		0.50	
HF.18	Power curve1		1.00	
HF.19	Power curve2		1.50	
HF.20	Power curve3		2.00	
HF.21	Power curve4		2.50	
HF.22	Flow curve 0		0.0	

Code	Name	Parameters explanation in detail	Default	Property
HF.23	Flow curve1		5.0	
HF.24	Flow curve2		10.0	
HF.25	Flow curve3		15.0	
HF.26	Flow curve4		20.0	
HF.27	Today flow /Today generated energy setting time (reset time)	0.0 ~ 24.0h Setting time period, used for how much of total per day calculating	8 . 0h	
HF.28				
HF.29	Flow bias	0—1000.0m3/h	0.0	
HF.30 HF31	Flow gain Starting frequency of dry run protection	0.0—100.0% 0.00 to 400hz	100% 20Hz	

Note 1. The user can monitor inverter running status in C0.33,

0: stop mode,

1: Sun weak sleep function

2: Dry run function

3. Water fulling function

4. Lowest speed protection

5. Over current protection

6. Minimum power input

7. Running status

8. Lack of water in well

Note 2: Auto restore alarm of solar pump control function.

E060: Low voltage of weak sunlight, it can recover when sunlight radiation is retosre gain.

E55: Lowest stop frequency alarm

E056: Dry run function alarm

E065: Solar pump over load protection alarm

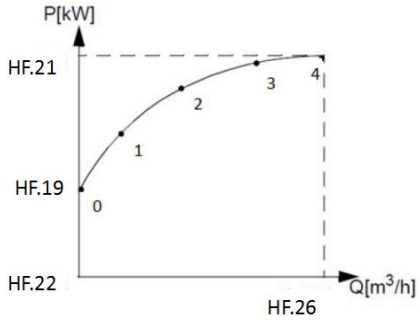
E070:Mini power input protection

E080: Full water of tank alarm

E081: Lack of water in well alarm

Note 3.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 drive 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 drive parameters.



The solar pump inverter records and stores the flow rate on each day and provides the required data for current day and current year.

Note:

• Do not use the flow calculation function outside the normal operating range of the pump.

• Do not use the flow calculation function for invoicing purposes.

• Ensure that power and flow points are in incremental order with non-zero values.

HF.17 to HF.21use to define input power of pump at points 1...5 on the PQ performance curve.

HF.22 to HF.26 use to define flow rate at points 1...5 on the PQ curve respectively.]

Chapter 9. Monitor parameters group

Function code	Name	Min. unit	Communication address
C0 Monitor parameters group			
C0.00	Running frequency (Hz)	0.01Hz	5000H
C0.01	Output current (A)	0.01A	5001H
C0.02	Output voltage(V)	1V	5002H
C0.03	Machine speed display	1	5003H
C0.04	DC bus voltage	0.1V	5004H
C0.05	Frequency reference (Hz)	0.01Hz	5005H
C0.06	Counting value	1	5006H
C0.07	Length value	1	5007H
C0.08	X terminals state	1	5008H
C0.09	DO output state	1	5009H
C0.10	AI1 voltage (V)	0.01V	500AH
C0.11	AI2 voltage (V)	0.01V	500BH
C0.12	Potentiometer voltage (V)	0.01V	500CH
C0.13	PID reference	1	500DH
C0.14	Output power (kW)	0.1kW	500EH
C0.15	Output torque (%)	0.1%	500FH
C0.16	Linear speed	1m/Min	5010H
C0.17	PID feedback	1	5011H
C0.18	PLC step	1	5012H
C0.19	PULSE input frequency (Hz)	0.01kHz	5013H
C0.20	Current power on time	1Min	5014H
C0.21	Current running time	0.1Min	5015H
C0.22	Remain running time	0.1Min	5016H
C0.23	Main frequency X display	0.01Hz	5017H
C0.24	Auxiliary frequency Y display	0.01Hz	5018H
C0.25	Feedback speed (unit 0.1Hz)	0.1Hz	5019H
C0.26	Encoder feedback speed	0.01Hz	501AH
C0.27	Before AI1 revise voltage	0.001V	501BH
C0.28	Before AI2 revise voltage	0.001V	501CH
C0.29	Torque reference	0.01%	501DH
C0.30	PULSE input frequency	1Hz	501EH

Function code	Name	Min. unit	Communication address
C0.33	Solar pump working status	0:Stop mode 1:sleep mode in weak of sunlight 2:Dry run protection 3:Full water tank 4:Lowest stop frequency mode 5:Over current protection 6:Mini input power protection, 7:Normal working status 8:Lack of water in well	5021H
C0.34	MPPT reference voltage	V	5022H
C0.38	MPPT working status	0.0 Not in MPPT 0.2: MPPT 0.3: deceleration	
C0.51	Today flow	Cub meter	5033H
C0.52	Low bit of total flow	Cub meter	5034H
C0.53	High bit of total flow	Cub meter	5035H
C0.54	Today generated energy	kwh	5036H
C0.55	Low bit of total generated energy	kwh	5037H
C0.56	High bit of total generated energy	kwh	5038H
C0.57	DC bus current	A	
C0.58	Flow rate		

Chapter 10. Fault diagnosis and trouble shooting

PV series inverter provides a total of 24 pieces of fault information and protective functions. After a fault occurs, the inverter implements the protection function, and displays the fault code on the operation panel (if the operation panel is available).

Before contacting manufacturer for technical support, you can first determine the fault type through P2.13 ~ PC.39 , analyze the causes, and perform troubleshooting according to the following tables.

10.1. Fault code description and solution

SN	Fault code	Fault name	Possible Causes	Solutions
Solar pump control mode alarm				
1	E55	Lowest stop frequency alarm	The output frequency is lower than HF.03 for HF.04	If the sun raddiation is not good, the output frequency will be reduced to low, especiall in cloudy, at morning and sunset. Set Hf.03 value small.
2	E056	Dry run protection	If the output current smaller than HF.06 setting for H7.00 time when high speed.(over than HF.31 setting) There are no water in well.	Check if enough water in well
3	E060	Under voltage when weak sunight	The input power is not enough when cloudy, or MPPT calculating is too weak	check if working on MPPT mode H9.00=1, and set H06, H07, acceletaion gain of MPPT value to bigger, H9.08 H9.09 deceleration gain of MPPT value to bigger
4	E065	Over load protection alarm	If the output current is bigger than HF.09, this alarm will be appears for pumps protection	Please select bigger inverter, or set Hf.09 value bigger, or limit output frequency by P0.05
5	E070	Mini power input protection alarm	If the inpt power of solar arrays is lower than HF.12 setting	Please add more solar panels
6	E080	Water fulling of tank detect	The water is fulling	Please check the sensor if good or not.
7	E081	Lack of water in well alarm	There are no enough of water in well	Add more water into well
Other alarmr of inverter				
1	E001	Over current during acceleration	1:The output circuit is grounded or short circuited. 2: Motor auto-tuning is not performed. 3: The acceleration time is too	1: Eliminate external faults. 2: Perform the motor auto tuning. 3: Increase the acceleration time. 4: Adjust the manual torque

			short. 4: Manual torque boost or V/F curve is not appropriate. 5: The voltage is too low. 6: The startup operation is performed on the rotating motor. 7: A sudden load is added during acceleration. 8: The inverter model is of too small power class.	boost or V/F curve. 5: Adjust the voltage to normal range. 6: Select rotational speed tracking restart or start the motor after it stops. 7: Remove the added load. 8: Select an inverter of higher power class.
2	E002	Over current During deceleration	1: The output circuit is grounded or short circuited. 2: Motor auto-tuning is not performed. 3: The acceleration time is too short. 4: Manual torque boost or V/F curve is not appropriate. 5: The voltage is too low. 6: The startup operation is performed on the rotating motor. 7: A sudden load is added during acceleration. 8: The inverter model is of too small power class.	1: Eliminate external faults. 2: Perform the motor autotuning. 3: Increase the acceleration time. 4: Adjust the manual torque boost or V/F curve. 5: Adjust the voltage to normal range. 6: Select rotational speed tracking restart or start the motor after it stops. 7: Remove the added load. 8: Select an inverter of higher power class.
3	E003	over current at constant speed	1: The output circuit is grounded or short circuited. 2: Motor auto-tuning is not performed. 3: The voltage is too low. 4: A sudden load is added during operation. 5: The inverter model is of too small power class	1: Eliminate external faults. 2: Perform the motor autotuning. 3: Adjust the voltage to normal range. 4: Remove the added load. 5: Select an inverter of higher power class.
4	E004	Overvoltage during acceleration	1: The input voltage is too high. 2: An external force inverters the motor during acceleration. 3: The acceleration time is too short. 4: The braking unit and braking resistor are not installed.	1: Adjust the voltage to normal range. 2: Cancel the external force or install a braking resistor. 3: Increase the acceleration time. 4: Install the braking unit and braking resistor.
5	E005	Overvoltage	1: The input voltage is too high.	1: Adjust the voltage to

		during deceleration	2: An external force inverters the motor during deceleration. 3: The deceleration time is too short. 4: The braking unit and braking resistor are not installed.	normal range. 2: Cancel the external force or install the braking resistor. 3: Increase the deceleration time. 4: Install the braking unit and braking resistor.
6	E006	Over voltage at constant speed	1: The input voltage is too high. 2: An external force inverters the motor during deceleration	1: Adjust the voltage to normal range. 2: Cancel the external force or install the brakingresistor.
7	E007	Control power supply fault	The input voltage is not within the allowable range.	Adjust the input voltage to the allowable range.
8	E008	Under voltage	1: Instantaneous power failure occurs on the input power supply. 2: The inverter's input voltage is not within the allowable range. 3: The bus voltage is abnormal. 4: The rectifier bridge and buffer resistor are faulty. 5: The inverter board is faulty. 6: The main control board is faulty.	1: Reset the fault. 2: Adjust the voltage to normal range. 3: Contact the agent or manufacturer
9	E009	inverter parts fault	1.inverter output short circuit 2. cable from inverter to motor too long 3. IGBT module over heat 4. IGBT module damaged 5. driving abnormal	1.Too check the cable insulation, to check with disconnect motor cable 2. add AC reactor 3. to contact manufacturer
10	E010	Input phase missing	1: The three-phase power input isabnormal. 2: The inverter board is faulty. 3: The lightening board is faulty. 4: The main control board is faulty	1: Eliminate external faults. 2: Contact the agent or manufacturer
11	E011	Power output phase missing	1: The cable connecting the inverter and the motor is faulty. 2: The inverter's three-phase outputs are unbalanced when the motor is running. 3: The inverter board is faulty. 4: The module is faulty.	1: Eliminate external faults. 2: Check whether the motor three-phase winding is normal. 3: Contact the agent or manufacturer

12	E012	Short circuit to ground	The motor is short circuited to the ground.	Replace the cable or motor.
13	Reserve			
14	E014	inverter overload	1. Boost torque is too big under VF control 2. accel. and decel. time is too short 3.motor parameters setting is improperly 4.Restart motor which in counter rotate 5. The grid voltage is too lower 6. load is too big or motor block load 7. inverter selected is too load	1.Reduce boost torque 2. increase the accel./decel. time 3.reset motor parameters 4.Recue current limit and adopt speed tracking 5. Too check grid voltage 6.Too check load 7.change bigger power inverter
15	E015	Motor load	Motor have wrong parameters setting Input voltage of grid is too low Load is too big or motor is blocked	1, Reset the motor parameters 2, check the input source of grid 3, Check the motor load if in good condition
16	E016	Module overheat	1: The ambient temperature is too high. 2: The air filter is blocked. 3: The fan is damaged. 4: The thermally sensitive resistor of the module is damaged. 5: The inverter module is damaged.	1: Lower the ambient temperature. 2: Clean the air filter. 3: Replace the damaged fan. 4: Replace the damaged thermally sensitive resistor. 5: Replace the inverter module.
17	E017	EEPROM read/ write fault	The EEPROM chip is damaged.	Replace the main control board.
18	E018	External equipment fault	Through multiple terminals X input external fault signal 2.Terminals error operation	1.runing reset 2.Contact manufacturer
19	E019	Accumulative running time reached	The accumulative running time reaches the setting value.	Clear the record through the parameter initialization function
20	E020	Accumulative power-on time reached	The accumulative power-on time reaches the setting value	Clear the record through the parameter initialization function
21	E021	Current detect fault	1. Current hall detectc damaged 2.Driving board fault	1. check the hall and plug if loose 2. contact to manufacturer
22	E022	Overheat fault of	1.Motor temperature	1.motor heat dissipation is not good

		motor	2. motor temperature sensor fault	2.checkthe connecting of halls and sensor
23	E023	Contactor fault	1.Contactor is abnormal 2.driving board and power supply is not good	1.change the contactor 2.contact manufacturer
24	E024	Communication fault	1.Upper control abnormal 2.communication cable is not good 3.communicaiton parameters setting is correct	1. Check the connection of upper controller 2. Check communication cable 3.To set correct parameters
25	E025	Encoder fault	1.Encoder type is not matching 2.wrong wiring of encoder 3.encoder is damaged 4.PG card abnormal	1.Set encoder parameters correct 2. Check wiring 3.To check encoder 4. Check PG card
26	E026	Motor auto-tuning fault	1: The motor parameters are not set according to the nameplate. 2: The motor auto-tuning times out.	1: Set the motor parameters according to the nameplate properly. 2: Check the cable connecting the inverter and the motor.
27	E027	Initial position fault	The motor parameters are not set based on the actual situation	Check that the motor parameters are set correctly and whether the setting of rated current is too small
28	E028	Hard ware current protection	1.the load is too big or load blocked 2. motor auto tuning is not good 3.inverter power is too small	1.Check motor and load 2.Try to run with VF control 3.Change bigger power inverter
29	E029	Motor over-speed	1: The encoder parameters are set incorrectly. 2: The motor auto-tuning is not performed. 3: motor over speed setting is not correct	1.reset encoder parameters 2.motor parameters indentify 3.to set parameters properly.
30	E030	Too large speed deviation	1: The encoder parameters are set incorrectly. 2: The motor auto-tuning is not performed. 3: Motor setting is not correct	1: Set the encoder parameters properly. 2: Perform the motor auto tuning. 3: Set motor parameters correctly based on the actual situation.

If the user can't solved the problem, please contact local distributor or contact manufacturer directly.

10.2. Table below Troubleshooting to common faults of the inverter

SN	Fault	Possible Causes	Solutions
1	There is no display at power-on.	1: There is no power supply to the inverter or the power input to the inverter is too low. 2: The power supply of the switch on the inverter board of the inverter is faulty. 3: The rectifier bridge is damaged. 4: The control board or the operation panel is faulty. 5: The cable connecting the control board and the inverter board and the operation panel breaks.	1: Check the power supply. 2: Check the bus voltage. 3: Re-connect the keypad connector 4: Contact the agent or manufacturerfor technical support.
2	“E012” is displayed at power-on	1: The motor or the motor output cable is short-circuited to the ground. 2: The inverter is damaged.	1: Measure the insulation of the motor and the output cable with a megger. 2: Contact the agent or manufacturerfor technical support
3	The inverter display is normal upon power on. But “HELLO” is displayed after running and stops immediately.	1:The cooling fan is damaged or locked-rotor occurs. 2: The external control terminal cable is short circuited	1: Replace the damaged fan. 2: Eliminate external fault.
4	E016 (module overheat) fault is reported frequently.	1: The setting of carrier frequency is too high. 2: The cooling fan is damaged, or the air filter is blocked. 3: Components inside the inverter are damaged (thermal coupler or others).	1: Reduce the carrier frequency (P0.11). 2: Replace the fan and clean the air filter. 3: Contact the agent or manufacturerfor technical support.
5	The motor does not rotate after the inverter runs.	1: Check the motor and the motor cables. 2: The inverter parameters are set improperly (motor parameters). 3: The cable between the inverter board and the control board is in poor contact. 4: The inverter board is faulty.	1: Ensure the cable between the inverter and the motor is normal. 2: Replace the motor or clear mechanical faults. 3: Check and re-set motor parameters.
6	The XI terminals are disabled.	1: The parameters are set incorrectly.	1: Check and reset the parameters in group P5.

		2: The external signal is incorrect. 3: The jumper bar across OP and +24 V becomes loose. 4: The control board is faulty.	2: Re-connect the external signal cables. 3: Re-confirm the jumper bar across OP and +24 V P9 connector
7	The motor speed is always low in CLVC mode.	1: The encoder is faulty. 2: The encoder cable is connected incorrectly or in poor contact. 3: The PG card is faulty. 4: The inverter board is faulty	1: Replace the encoder and ensure the cabling is proper. 2: Replace the PG card. 3: Contact the agent or manufacturerfor technical support
8	The inverter reports overcurrent and overvoltage frequently.	1: The motor parameters are set improperly. 2: The acceleration/deceleration time is improper. 3: The load fluctuates	1: Re-set motor parameters or re-perform the motor auto tuning. 2: Set proper acceleration/ deceleration time. 3: Contact the agent or manufacturerfor technical support.
9	E023 is reported upon power-on or running.	The soft startup contactor is not picked up.	1: Check whether the contactor cable is loose. 2: Check whether the contactor is faulty. 3: Check whether 24 V power supply of the contactor is faulty. 4: Contact the agent or manufacturerfor technical support
10	“ 8888 “ is displayed upon power-on.	Related component on the control board is damaged.	Replace the control board.

Chapter 11. Maintenance and Troubleshooting

The influence of the ambient temperature, humidity, dust and vibration will cause the aging of the devices in the inverter, which may cause potential faults or reduce the service life of the inverter. Therefore, it is necessary to carry out routine and periodic maintenance.

11.1 Routine Maintenance

Routine maintenance involves checking:

Whether the motor sounds abnormally during running

Whether the motor vibrates excessively during running

Whether the installation environment of the inverter changes.

Whether the inverter's cooling fan works normally

Whether the inverter overheats

11.2. Routine cleaning involves

Keep the inverter clean all the time.

Remove the dust, especially metal powder on the surface of the inverter, to prevent the dust from entering the inverter.

Clear the oil stain on the cooling fan of the inverter.

11.3. Periodic Inspection

Perform periodic inspection in places where inspection is difficult.

Periodic inspection involves:

Check and clean the air duct periodically.

Check whether the screws become loose.

Check whether the inverter is corroded.

Check whether the wiring terminals show signs of arcing;

Before measuring the insulating resistance with megameter (500 VDCmegameter recommended), disconnect the main circuit from the inverter.

Do not use the insulating resistance meter to test the insulation of the control circuit. The high voltage test need not be performed again because it has been completed before delivery.

11.4. Main circuit insulation test

Replacement of Vulnerable Components

The vulnerable components of the inverter are cooling fan and filter electrolytic capacitor.

Their service life is related to the operating environment and maintenance status. Generally, the service life is shown as follows:

Component	Service Life	Possible Damage Reason	Judging Criteria
Fan	2 to 3 years	Bearing worn •Blade aging	Whether there is crack on the blade • Whether there is abnormal vibration noise upon startup
Electrolytic capacitor	4 to 5 years	Input power supply in poor quality • High ambient temperature • Frequent load jumping • Electrolytic aging	Whether there is liquid leakage. • Whether the safe valve has projected. • Measure the static capacitance. • Measure the insulating resistance.

11.5. Storage of the inverter

For storage of the inverter, pay attention to the following two aspects:

1) Pack the inverter with the original packing box provided by manufacturer

2) Long-term storage degrades the electrolytic capacitor. Thus, the inverter must be energized once every 2 years, each time lasting at least 5 hours. The input voltage must be increased slowly to the rated value with the regulator.

11.6. Warranty Agreement

1) Free warranty only applies to the inverter itself.

2) manufacturerwill provide 18-month warranty (starting from the leave-factory date as indicated on the barcode) for the failure or damage under normal use conditions. If the equipment has been used for over 18 months, reasonable repair expenses will be charged.

3) Reasonable repair expenses will be charged for the damages due to the following causes:

• Improper operation without following the instructions

• Fire, flood or abnormal voltage.

• Using the inverter for non-recommended function

4) The maintenance fee is charged according to manufacturer's uniform standard. If there is an agreement, the agreement prevails.

Appendix B. Communication protocol description

Overview of communication agreement

Standard RS485 communication interface is collocated for the inverter; ModBus communication agreement is adopted according to the international standard for active/passive communication. The user is able to make use of PC/PLC, upper computer and main station inverter for centralized control (set up the revision status of control command, operation frequency and related functional code parameters of frequency converter; execute surveillance to the working status and fault information of frequency converter) and thus adapt to specific application requirements.

2.1. Protocol format

MOBUS RTU format

Large than 3.5 bytes of transmission time	Slave address	Function code	Data	CRC check	Large than 3.5 bytes of transmission time
Frame starting		PDU			Frame end

2.2 Slave machine address

2.2.1 （0 for broadcast address，the slave address can be set for 1～247）

2.3 PDU parts

2.3.1 Function code 03: (read data)

Read multiple inverter function code parameters, running status, monitor parameters and fault information, can read at most 6 continuous address of inverter parameters.

Host machine data send

PDU part	03	Register starting address high bit	Resistor starting address low bit	High address of number of register	Low address of number of register
Date length （Byte）	1	1	1	1	1

Slave machine response:

PDU part	03	Read number of bytes(2* number of register)	Read content
Date length （Byte）	1	1	2* number of register

2.3.2 Function 06 (Write EEPROM)

Write operation command, running frequency, function code parameter for single Ac dive

Host machine send.

PDU part	06	Register starting address high bit	Register starting address low bit	High address of number of register	Low address of number of register

Date length (Byte)	1	1	1	1	1

Slave machine response:

PDU par	06	Register starting address high bit	Register starting address low bit	High address of number of register	Low address of number of register
Date length (Byte	1	1	1	1	1

2.3.3 Function code 10 (write RAM) :

Write operation command, running frequency, function code parameter for single Ac dive

If there are some mistake happens, the salve machine send objection response.

Objection response.:

PDU parts	0x80+ function code	Objection response. code
Date length (Byte)	1	1

Objection response mistake code types.

Objection response code	Corresponding mistake
01	Password is wrong
02	Command code is wrong
03	CRC check wrong
04	Invalid address
05	Invalid parameters
06	Parameter change is invalid
07	System is locked
08	Performing EEPROM operation

2.4 CRC checking

CRC check	CRC low address	CRC high address
Data length (Byte)	1	1

CRC hecking function as following

```
unsigned int crc _chk_value(unsigned char*data_value, unsigned char length)
{
unsigned int crc_value=0xFFFF;
inti;
while(length--)
{ crc_value^=*data_value++;
```

```
for(i=0;i<8;i++)
{ if(crc_value&0x0001)
crc_value=( crc_value>>1)^0xA001;
else
crc_value=crc_value>>1;
}
}
return(crc_value);
}
```

2.5 communication parameter definition

inverter parameter address CRC calculation

Register definition	Register address space
Function parameters	Named P group for initial letter of function code, only change P letter for 0 is communication address. For example: the function code P8.14 communication address is 0x080E
Operation command	0x2000
inverter current status	0x3000
Fault information	0x3100
Frequency reference	0x4000

Note:

2.5.1 it will cause the service life of EEPROM reducing if performance write function frequently. Only write the value of RAM OK in some parameters communication mode which no need storage.

2.5.2 Operation command code corresponding to running control code

Operation command code	running control code
0x0001	Forward running
0x0002	Reverse running
0x0003	Forward Jog
0x0004	Reverse Jog
0x0005	Coast to stop (free stop)
0x0006	deceleration to stop
0x0007	Fault reset

2.5. 3, inverter status code corresponding indicator meaning:

inverter status code	indicator meaning
0x0001	Forward running
0x0002	Forward running
0x0003	Stop

2.5.4 The high address of fault information code is 0, the low address corresponding to suffix E0. of inverter fault code, for example, the fault information code 0x000C, stand for inverter fault code E012.

2.5.5 Monitor parameters and its communication address. (P7.02 set for 01)

SN	Monitor content	Communication W/R address
0	Running frequency (Hz)	5000H
1	Output current (A)	5001H
2	Output voltage (V)	5002H
3	Machine speed display	5003H
4	DC bus voltage (V)	5004H
5	Frequency reference (Hz)	5005H
6	Count value	5006H
7	Length value	5007H
8	X input status	5008H
9	DO output status	5009H
10	AI1 voltage (V)	500AH
11	AI2 voltage (V)	500BH
12	Voltage of potentiometer	500CH
13	PID reference	500DH
14	Output power (Kw)	500EH
15	Output torque(%)	500FH
16	Linear speed	5010H
17	PID feedback	5011H
18	PLC step	5012H
19	Input PULSE trains (Hz)	5013H
20	Current power on time	5014H
21	Current running time	5015H
22	The rest running time	5016H
23	Main frequency source	5017H
24	Auxiliary frequency source	5018H
25	Feedback speed (unit0.1Hz)	5019H
26	Encoder feedback speed	501AH
27	Before AI1 revise voltage	501BH
28	Before AI2 revise voltage	501CH
29	Torque reference	501DH

30	PULSE input frequency	501EH
31	Communication setting	501FH

2.6 Take examples

2.6.1 Start 1# inverter forward running

Host machine request:

Slave address	Function code	Register starting address high bit	Resistor starting address low bit	register data high address	register data low address	CRC check low address	CRC check low address
01	06	20	00	00	01	43	CA

Slave machine response: inverter forward running, feedback the same host machine request date.

2.6.2 Set inverter running frequency is 50Hz

Host machine request:

Slave address	Function code	Register starting address high bit	register starting address low bit	register data high address	register data low address	CRC check low address	CRC check low address
01	06	40	00	27	10	86	36

Slave machine response: Inverter runs with 50Hz, feedback the same host machine request date.

2.6.3 Write inverter current output voltage, frequency response: output frequency 227V.

Host machine request:

Slave address	Function code	Register starting address high bit	Register starting address low bit	Register data high address	register data low address	CRC check low address	CRC check low addres s
01	03	50	02	00	01	34	CA

Slave machine response:

Slave address	Function code	Read high address of date	Read low address of date	1st high address of register	1st low address of register	CRC check low address	CRC check low address
01	03	00	02	00	E3	A5	83

Appendix 2. Selection of Peripheral Electrical Devices

1. Selection of peripheral electrical devices

Inverer Model	MCCB	Contactor	Cable of Input Side Main Circuit	Cable of Output Side Main Circuit	Cable of Control Circuit
	(A)	(A)	(mm2)	(mm2)	(mm2)
Single-phase 220 V					
PV350-2S-0.7GB	10	12	0.75	0.75	0.5
PV350--2S-1.5GB	16	18	1.5	1.5	0.5
PV350-0-2S-2.2GB	25	25	2.5	2.5	0.5
PV800-2S-4.0GB	32	32	4	4	0.75
Three-phase 380 V					
PV350--4T-0.7GB	4	9	0.75	0.75	0.5
PV350--4T-1.5GB	6	9	0.75	0.75	0.5
PV350--4T-2.2GB	10	12	0.75	0.75	0.5
PV800-4T-4.0GB/5.5PB	16	18	1.5	1.5	0.5
PV800-4T-5.5GB/7.5PB	20	25	2.5	2.5	0.75
PV800-4T-7.5GB/11PB	25	25	4	4	0.75
PV800-4T-11GB/15PB	32	32	6	6	0.75
PV800-4T-15GB/18.5PB	40	40	6	6	0.75
PV800-4T-18.5G/22P	50	50	10	10	1
PV800-4T-22G/30P	50	50	10	10	1
PV800-4T-30G/37P	63	63	10	10	1
PV800-4T-37G/45P	80	80	25	25	1
PV800-4T-45G/55P	100	115	35	35	1
PV800-4T-55G/75P	125	125	50	50	1
PV800-4T-75G/90P	160	185	70	70	1
PV800-4T-90G/110P	200	225	95	95	1
PV800-4T-110G/132P	225	225	120	120	1
PV800-4T-132G/160P	315	330	120	120	1
PV800-4T-160G/185P	350	400	150	150	1
PV800-4T-185G/200P	350	400	150	150	1
PV800-4T-200G/220P	400	400	185	185	1
PV800-4T-220G/250P	500	500	240	240	1

2. Out put reactor (OCR)

This 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, suggest installed output rector to compensate recharge current of line capacitive.

Product application

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 filter and motor.
5. If the distance from pump to inverter over than 150M, less than 300M, suggest install output reactor.

3. DV/dT fi lters with VFDs Introduction

A dV/dT filter is a device that controls the voltage spikes generated by variable frequency drives (VFDs) and long motor lead lengths. This voltage spike event is generally known as the reflected wave phenomenon . This resulting reflected wave can cause very high voltages on the motor leads, which can lead to damage and premature failure of the motor winding insulation (even with inverter duty rated motors), particularly within the first few turns.

Taking these factors into account will assist in the performance of the dV/dT filter in the application and the protection of the motor from dangerous reflected wave voltages up to 1000 feet from the VFD. (VFD means inveter)

4. Sine Wave Filter (SFR)

Sine Wave Filter are designed to provide a Sine Wave output voltage when driven from Variable Frequency Drives or other types of PWM inverters with switching frequencies from 2kHz to 8kHz.

For Variable Frequency Drive (VFD) applications, Sine Wave Filters eliminate the problem of motor/cable insulation failures, heating, and audible noise. Sine Wave Filters also reduce electromagnetic interference (EMI) by eliminating the high dV/dt associated with inverter output waveforms. Bearing currents are also reduced, especially in larger motors above 50 kW.

The perfect solution for:

- Applications with older motors
- Aggressive environments
- Applications with frequent braking
- 690 V above applications with general purpose motors
- Motor cable length between 350 and 3000 meters

Above reactor and filter can improve the inveter performance especial long distance from pump to inveter. If need more detail please contact us.

Appendix 3. DC input voltage booster

It is use to booster low voltage input to high voltage to meet solar pumps system application which need high voltage using for investment cost saving.
For example, For 1/3 phase 220VAC pumps, it should be request Vmp (working voltage) is 310VDC, Voc (open loop voltage) is 370VDC.
For 3 phase 380VAC pumps, it should be request Vmp 540VDC, and Voc 648VDC.
To order to get high voltage output from solar panels, we always connect solar panels in serial.
for 37voc solar panels, we need do 10 pcs solar panels connection in serial to get 370VDC, and need do 17 pcs solar panels connection in serial to get 629VDC.
And it will cause big investment for small power solar pumps system, and also make it difficult to promote this very good green energy solar pump system solution for people who need more water but less of grid power.
We design and develop DC voltage booster device for increase low voltage to high voltage for save solar panels using,for money save.
There are 3 models DC voltage booster can help us reduce solar panels investment.
LV40-70 design for "L" (3phase 220Vac) inverter, input voltage range :40 to 70Vdc,Output will be 240V to 420VDC.
LV60-90 design for"L" (3phase 220Vac) inverter, input voltage range :60 to 90Vdc, Output will be 300VDC to 450VDC.
LV60-90 design for"H" (3phase 380Vac) inverter, input voltage range :60 to 90Vdc, Output will be 480VDC to 720VDC.
Low voltage booster device is specially for small power solar pump inverter with low current and high voltage, especial for 0.75kw, 1.5kw 220V pumps, and 0.75kw, 1.5kw 380V pumps. Input voltage is DC60-90V or DC40-70 can work normally, output voltage is 5~7 times of input voltage. Output voltage changes according to input voltage so that solar pump inverter can track the maximum power of PV arrays.

Solar DC voltage booster model pictures