Preface

Thanks for using SP300 series Solar Pump Inverter.

This manual tells you how to use it correctly. Please read this manual carefully and fully, understanding the safety requirement and cautions before using (installation,operation, maintain, checking, and etc...).

Inside the manual includes all the : required parameter settings and program features of the SP300 solar pump inverter.

The main features for SP300 series solar pump inverters:

1- Hybrid function to accept AC and DC at same time

2- Wide input voltage range:

220V model: DC 150-450V (DC 80-450V for 110V motor)

380V model: DC 250-900VSP300

3- Easy drive for 220V single phase pump

4- Stable running and low frequency fluctuation

5- All-round protection and inverter no burn

6- Auto start and stop function

7- Adapt to various pumps,like AM,PMSM,submersible pump,surface pump etc

……

Content

SP300

Chapter 1.Before use

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

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

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

 WARNING: The connection of the drive 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 drive shell might lead to a shock.

 WARNING: Selection of PV module type, motor load and drive 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.

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

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

Chapter 2. Solar pumping system introduction

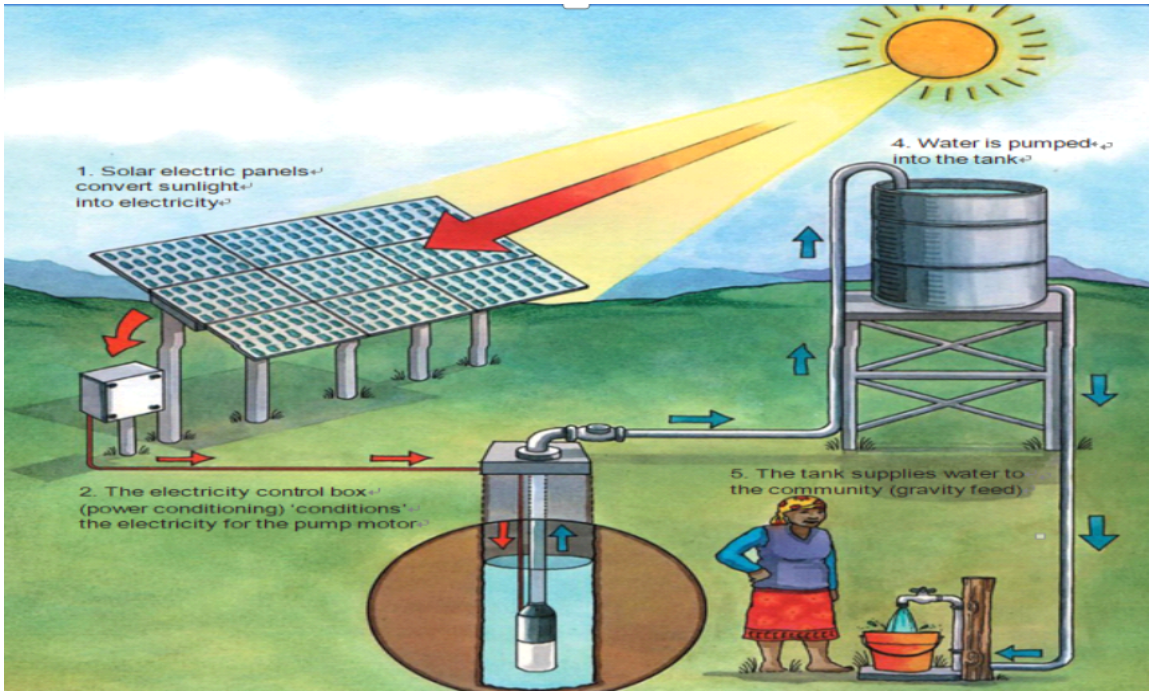
Solar pumping systems can be applied to all forms of daily use, water pumping for drinking water supply for remote villages and farms without connection to the water grid, for agricultural use such as livestock watering, agricultural irrigation, forestry irrigation, pond management, desert control, and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

The system is composed of a PV arrays, 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 drive 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).

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.

Solar pump system:It includes solar panels arrays +solar pump inverter +AC pumps.



System constitute diagram

Chapter 3. Solar pump inverter introduction

The SP300 series solar pump inverter is a low voltage AC drive from 0.4kw to 220KW above rating designed to operate with energy drawn from solar panel or photovoltaic cells (PV).

The inverter is customized to operate in dual supply mode, so the grid connected supply is used in the absence of energy from PV cells. This drive functions with the latest in technology maximum power point tracking (MPPT) algorithm to derive maximum power from the PV cells at any instant.

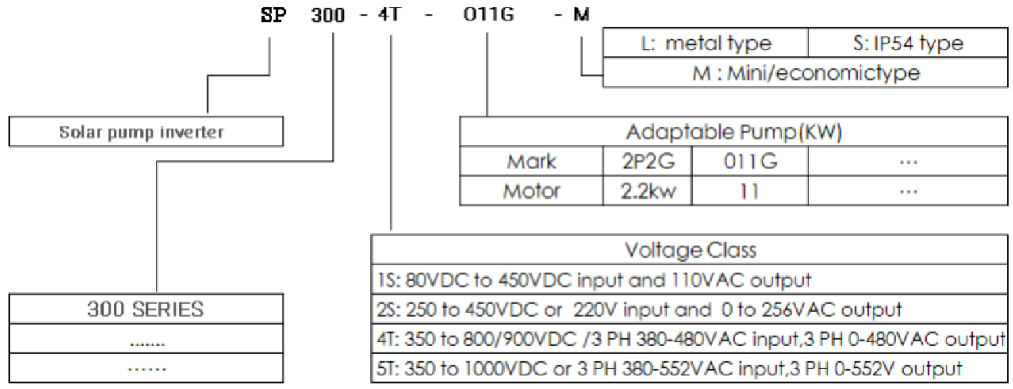
Solar Pump Inverter Features:

- ✓ Maximum power point tracking (MPPT) with fast response speed and stable operation efficiency> 99%
- ✓ Suits for most 3 phase AC pumps and AC PMSM high efficiency pumps
- ✓ The working voltage of solar panel can set by manual or MPPT automatically tracking
- ✓ Hybrid function and compatible with AC and DC power input at same time
- ✓ Built in automatic sleep-wake up function,
- ✓ Dry run (under load) protection
- ✓ Motor maximum current protection
- ✓ Low input power protection
- ✓ Lowest stop frequency protection
- ✓ The PQ (power/flow) performance curve enables calculating the flow output from the pump
- ✓ Digital control for fully automatic operation, data storage and protective functions
- ✓ Intelligent power module (IPM) for the main circuit
- ✓ LED display operating panel and support remote control
- ✓ Low water probe sensor, and water level control function
- ✓ Strong lightning protection
- ✓ Ambient temperature for using: -10 to +50˚C.
- ✓ Clock relay card for timing stop and stop control
- ✓ LCD keypad as optional
- ✓ Input VOC auto-detect function

SP300

3.1 SP300 series solar pump inverter

SP300 model description:



SP300 solar pump inverter voltage range

Model	Applicable for pumps	Input DC voltage	Over voltage point	Under voltage point	Suggest Vmp	Suggest Voc
SP300-2S	For 220V AC	150V – 450V	450V	100V	310VDC	380VDC
SP300-4T	For 380V/480V AC	350V – 900V	800V/900V	200V	520VDC	650VDC

3.2 Models and specification

SN	Model No.	Rate current	Output voltage (3PH AC)	Applicable for pumps	External of drive size(mm)H*W*D	MPPT voltage (VDC)	Weight (kg)
SP300-XX-M 2S series: Input 150-450V DC or 200 to 240V AC, VOC 350V DC							
1	SP300-2S-1P5G-M	7A	0-256VAC	1.5KW	151*100*127	260 to 375	1.4
2	SP300-2S-2P2G-M	10A	0-256VAC	2.2KW	151*100*127	260 to 375	1.4
SP300-XX-M 4T series: Input 350 to 800V/900V DC or 380 to 480V AC, VOC 620V DC							
1	SP300-4T-1P5G-M	3.7A	0-480VAC	1.5KW	151*100*127	486 to 750	1.4
2	SP300-4T-2P2G-M	5A	0-480VAC	2.2KW	151*100*127	486 to 750	1.4
SP300 2S series : Input 150 to 450V DC or 200 to 240V AC, VOC 350 VDC							
1	SP300-2S-1P5G	7A	0-256VAC	1.5KW	185*118*153.8	260 to 375	2
2	SP300-2S-2P2G	10A	0-256VAC	2.2KW	185*118*153.8	260 to 375	2.5
3	SP300-2S-004G	16A	0-256VAC	4.0KW	247*160*175	260 to 375	4.3
SP300 4T series : Input 350 to 800V/900V DC or 380 to 480V AC, VOC 620V DC							

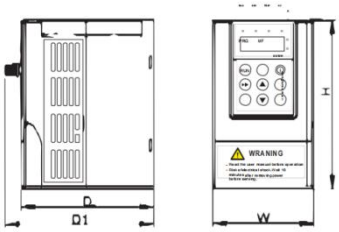
1	SP300-4T-2P2G	5A	0-480VAC	2.2KW	185*118*153.8	486 to 750	3
2	SP300-4T-004G	10A	0-480VAC	4KW	185*118*153.8	486 to 750	3
3	SP300-4T-5P5G	13A	0-480VAC	5.5KW	247*160*175	486 to 750	4.2
4	SP300-4T-7P5G	17A	0-480VAC	7.5KW	247*160*175	486 to 750	4.3
5	SP300-4T-011G	25A	0-480VAC	11KW	247*160*175	486 to 750	4.5
6	SP300-4T-015G	30A	0-480VAC	15KW	320*220*197.3	486 to 750	7.3
7	SP300-4T-018G	37A	0-480VAC	18KW	320*220*197.3	486 to 750	7.5
8	SP300-4T-022G	45A	0-480VAC	22KW	415*230*205	486 to 750	12
9	SP300-4T-030G	60A	0-480VAC	30KW	480*260*215	486 to 750	17
10	SP300-4T-037G	75A	0-480VAC	37KW	480*260*215	486 to 750	17.5
11	SP300-4T-045G	91A	0-480VAC	45KW	575*320*310	486 to 750	35
12	SP300-4T-055G	110A	0-480VAC	55KW	575*320*310	486 to 750	36
13	SP300-4T-075G	150A	0-480VAC	75KW	620*380*310	486 to 750	45
14	SP300-4T-090G	180A	0-480VAC	93KW	620*380*310	486 to 750	51
15	SP300-4T-110G	220A	0-480VAC	110KW	620*380*310	486 to 750	54
16	SP300-4T-132G	250A	0-480VAC	132KW	620*380*310	486 to 750	55
17	SP300-4T-160G	310A	0-480VAC	160KW	817*500*348	486 to 750	94
18	SP300-4T-185G	340A	0-480VAC	185KW	817*500*348	486 to 750	96
19	SP300-4T-200G	380A	0-480VAC	200KW	817*500*348	486 to 750	98
20	SP300-4T-220G	415A	0-480VAC	220KW	817*500*348	486 to 750	98
SP300-XX-L 2S series: Input 150-450V DC or 200 to 240V AC, VOC 350V DC							
1	SP300-2S-1P5G-L	7A	0-256VAC	1.5KW	298*165*201	260 to 375	3
2	SP300-2S-2P2G-L	10A	0-256VAC	2.2KW	298*165*201	260 to 375	3
3	SP300-2S-004G-L	16A	0-256VAC	4.0KW	310*205*225	260 to 375	4.5
SP300-XX-L SP3004T series : Input 350 to 800V/900V DC or 380 to 480V AC, VOC 620V DC							
1	SP300-4T-2P2G-L	5A	0-480VAC	2.2KW	298*165*201	486 to 750	3
2	SP300-4T-004G-L	10A	0-480VAC	4KW	298*165*201	486 to 750	3
3	SP300-4T-5P5G-L	13A	0-480VAC	5.5KW	310*205*225	486 to 750	4.5
4	SP300-4T-7P5G-L	17A	0-480VAC	7.5KW	310*205*225	486 to 750	4.5
SP300-XX-S 2S series: Input 150-450V DC or 200 to 240V AC, VOC 350V DCSP300							
1	SP300-2S-1P5G-S	7A	0-256VAC	1.5KW	245**160*180	260 to 375	5
2	SP300-2S-2P2G-S	10A	0-256VAC	2.2KW	245**160*180	260 to 375	5
3	SP300-2S-004G-S	16A	0-256VAC	4.0KW	320*215*190	260 to 375	7.5
SP300-XX-S 4T series : Input 350 to 800V/900V DC or 380 to 480V AC, VOC 620V DC							
1	SP300-4T-2P2G-S	5A	0-480VAC	2.2KW	245**160*180	486 to 750	5
2	SP300-4T-004G-S	10A	0-480VAC	4KW	245**160*180	486 to 750	5
3	SP300-4T-5P5G-S	13A	0-480VAC	5.5KW	320*215*190	486 to 750	7.5
4	SP300-4T-7P5G-S	17A	0-480VAC	7.5KW	320*215*190	486 to 750	7.5
5	SP300-4T-011G-S	25A	0-480VAC	11KW	320*215*190	486 to 750	7.5
6	SP300-4T-015G-S	30A	0-480VAC	15KW	410*275*200	486 to 750	13
7	SP300-4T-018G-S	37A	0-480VAC	18KW	410*275*200	486 to 750	13
8	SP300-4T-022G-S	45A	0-480VAC	22KW	410*275*200	486 to 750	13

3.3 SP300 series solar pump inverter technical specification

Solar pump inverter mode only when PE-00=1&2	
Recommended MPPT voltage range	Vmp 131 to 350 VDC for 1S model (80V to 450VDC input,110/220VAC output) Vmp 260 to 355VDC for 2S model (250V to 450VDC input,0-240VAC output) Vmp 486 to 650 VDC for 4T model (350V to 800VDC input, 0- 480VAC output)
Recommended input Voc and Vmpp voltage	Voc 180(VDC), Vmpp 155(VDC) for 1S model or 110V AC pumps Voc 380(VDC), Vmpp 310(VDC) for 2S model or 220V AC pumps Voc 650(VDC), Vmpp 520(VDC) for 4T model or 380V AC pumps
Motor type	Adapt for permanent magnet synchronous motor(PMSM) and asynchronous motor pumps,submersible and surface pumps etc
Rated output voltage	Output under rated condition: 3 phase, 0～input voltage, inaccuracy<5%
Output frequency	0~maximum frequency 600Hz
MPPT efficiency	99.7%
Overload capacity	150% rated current for 60S, 180% rated current for 2S
Solar pump control special performance	MPPT and CVT (constant voltage tracking), time control function,sand clean function, dry run protection, low frequency stop 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
Protection degree	IP20 for SP300-XX-M/L series,IP54 for SP300-XX-S series .All Air force cooling
Running mode	MPPT or CVT
Enhanced version of AC drive	Design based on vector control AC drive, more specification please refer to PH100 vector control drive operation manual
Certification	CE and IEC: (EN 61000-3-11:2000 EN 61000-3-12:2011) EN 62109-1/IEC 62109-1:2010 EN 61800-5-1:2007+A1:2017 EN IEC61800-3:2008(C3)/IEC 61800-3:2007(C2)
Storage temperature	-30 ～+60℃
Temperature humidity	-10 ～ + 50 ℃, derating above 40 ℃, maximum temperature 60 ℃ (no-load operation)5% to 95% RH (non-condensing)
Install place	altitude ≤ 1000m,above 1000m down the rated amount, each increase of 100m down the rated mount of 1%;no condensation, ice ,rain, snow, hail; solar radiation below 700W/㎡, air pressure 70-106 KPa
Standard functions	PID control, speed track, power off restart, jump frequency, upper/lower frequency limit control, program operation, multi- speed, RS485, analog output, frequency impulse output

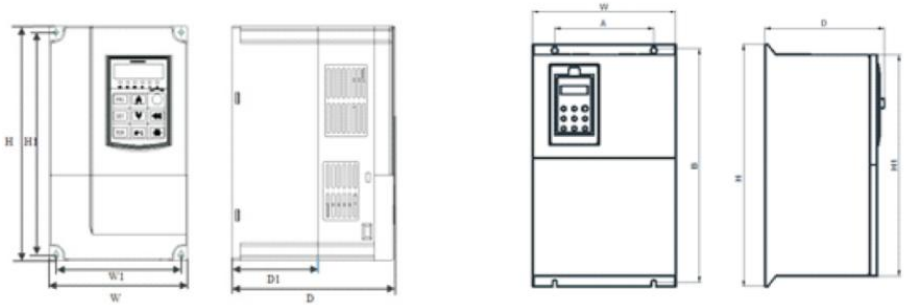
3.4 SP300 series solar pump inverter dimensions

3.4.1 SP300-XX- M mini model



Power	H	H1	W	W1	D	D1	Hole
1.5-2.2KW	151	142	100	88	127	130	4.5

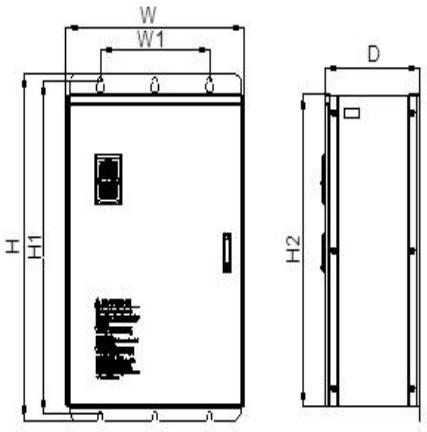
3.4.2 SP300 general model



Model	Hole location (mm)			Inverter dimension (mm)			Hole D (mm)	N.W
	W1	H1		H	W	D		(kg)
Single phase 220V input，50/60Hz								
SP300-2S-0P7G	106.5	175	/	185	118	153.8	4.5	2.1
SP300-2S-1P5G								
SP300-2S-2P2G								
SP300-2S-004G	148	235.5	/	247	160	175	5.5	4
3 phase 380V input，50/60Hz								
SP300-4T-0P7G	106.5	175	/	185	118	153.8	4.5	2.1
SP300-4T-1P5G								
SP300-4T-2P2G								
SP300-4T-004G								
SP300-4T-5P5G	148	235.5	/	247	160	175	5.5	4.5
SP300-4T-7P5G								
SP300-4T-011G								
SP300-4T-015G	205	305	/	320	220	197.3	6.5	7
SP300-4T-018G								
SP300-4T-022G								

SP300-4T-030G	200	465	/	480	260	215	8	17
SP300-4T-037G								
SP300-4T-045G	180	550	/	575	320	310	8	36
SP300-4T-055G								
SP300-4T-075G	240	595	/	620	380	310	10	51
SP300-4T-090G								
SP300-4T-110G								
SP300-4T-132G								
SP300-4T-160G	380	800	/	825	500	350	ф11	96
SP300-4T-185G								
SP300-4T-200G								
SP300-4T-220G								
SP300-4T-250G	520	850	/	875	718	360	ф14	138
SP300-4T-280G								
SP300-4T-315G								
SP300-4T-350G								

3.4.3 SP300-XX-S IP54 series



Models	W	H	D	H2	W1	H1	INSTALLATION Hole
SP300-2S-1P5G-S	160	245	180	224	120	229	ϕ6
SP300-2S-2P2G-S							
SP300-2S-004G-S	215	320	190	224	120	229	ϕ6
SP300-4T-2P2G-S	160	245	180	224	120	229	ϕ6
SP300-4T-004G-S							
SP300-4T-5P5G-S	215	320	190	296	160	302	ϕ8
SP300-4T-7P5G-S							
SP300-4T-011G-S							
SP300-4T-015G-S	275	410	200	384	200	392	ϕ8
SP300-4T-018G-S							
SP300-4T-022G-S							

Chapter4. Operation keypad description

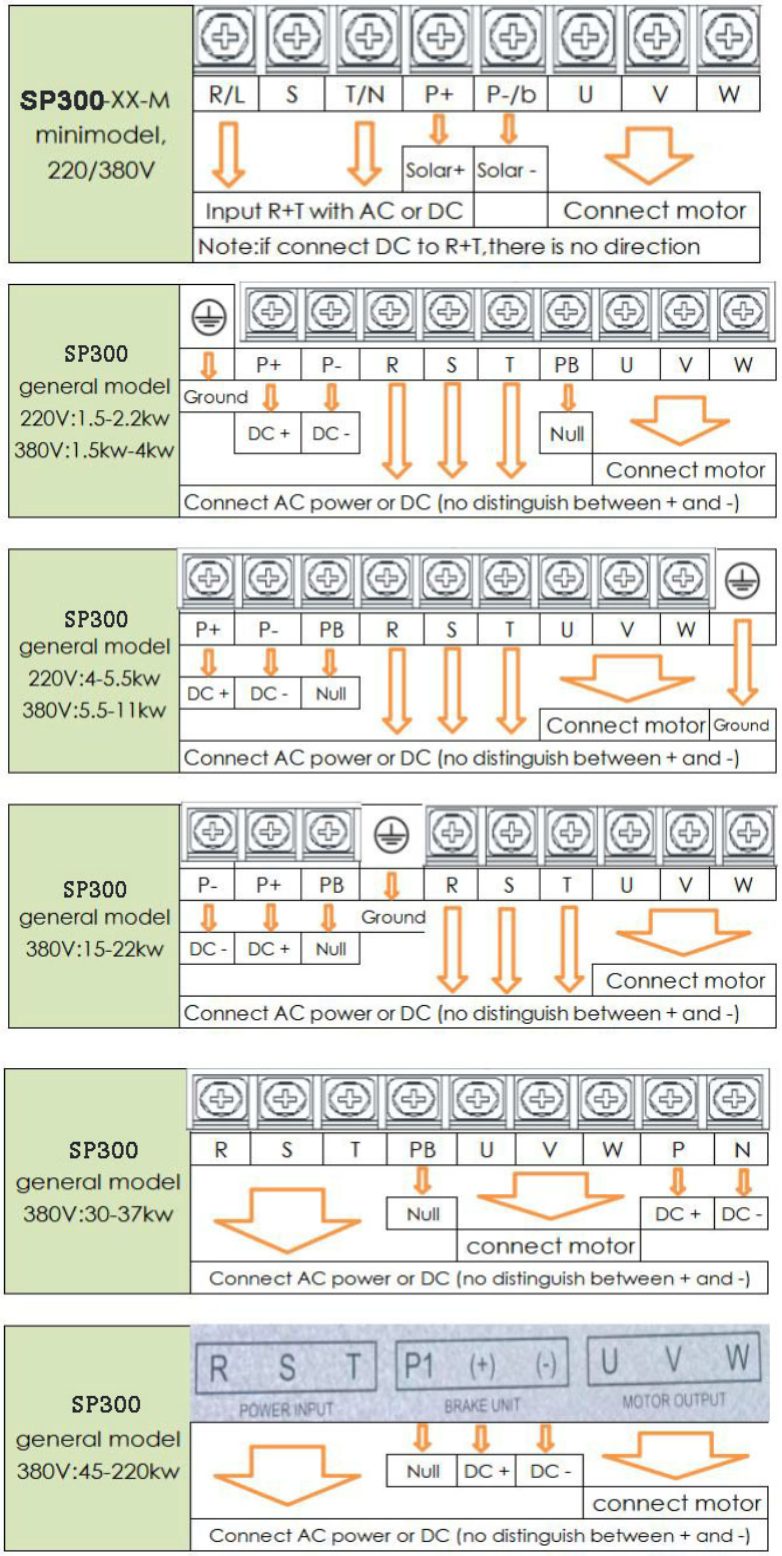
Key symbol	Name	Function description
PRG ESC	Menu key	Enter menu
ENTER SET	Confirm key	Enter into menu or confirm the setting value
▲	UP increase key	Data and function code increase
▼	Down decrease key	Data and function code reduce
SHIFT	SHIFT key	In the monitor status, press this key can select: output frequency/voltage/current,DC bus voltage
RUN	Running key	Use to run motor in keyboard control mode
M.F.K JOG	Multiple function key	The function of MF.K can be set P7.01 setting. Default setting is no function to program
STOP RESET	Stop and reset	In running status, this key can use to stop motor running (P0-02). Reset malfunction in alarm mode.
SPI	Solar Pump Inverter	No function for program

Symbol	When Indicator light on
Hz	Output running frequency
A	Output running current
V	First show input DC bus voltage then show output running voltage
RUN	Running mode
DIR	Inverter runs in keypad control mode with P0-02=0 setting
LOCAL	Inverter runs in terminal control mode,with P0-02=1 setting
TRIP	Fault indicator, inverter will be trip when any alarm happens

Chapter 5. SP300Terminals and wiring and operation

5.1 Terminals

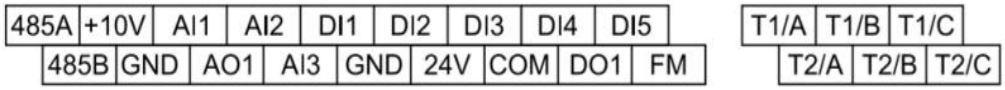
5.1.1 Power terminals



Noted: 1:Connect DC + and - to R-S-T,connect any 2 wire of it and no distinguish the direction

2: PB and P/P+ connect for braking resistor,P1 and P/P+ connect for DC reactor

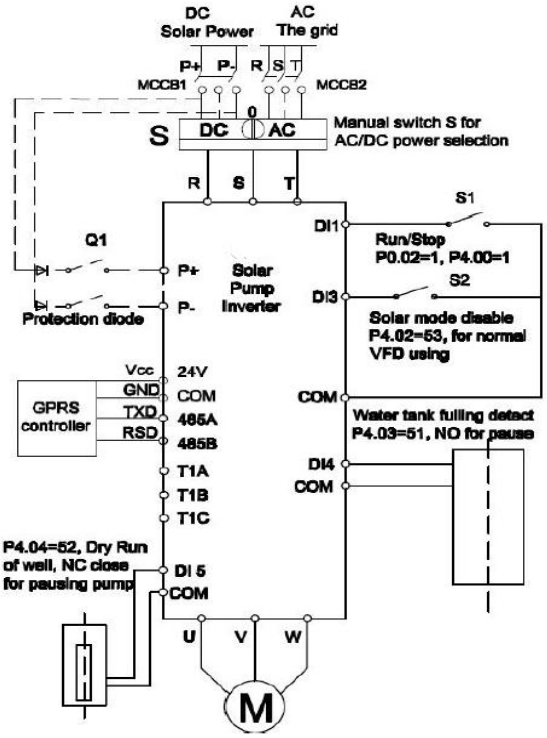
5.1.2 Control circuit terminals and explanation



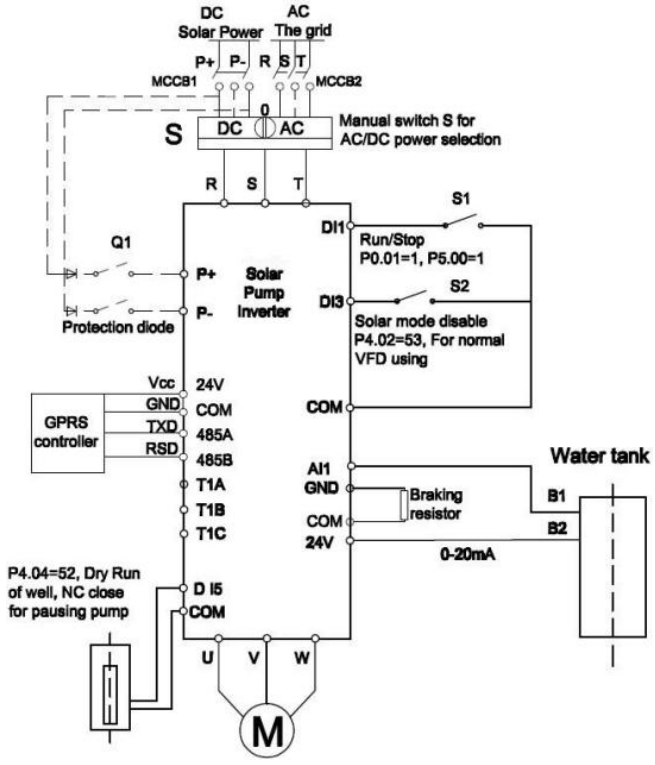
Noted:In SP300-XX-M mini model and use X to replace D,like X1=D1,X2=D2 etc

Type	Symbol	Name of terminals	Specification and explanation
Communication	485A	485+	RS485 communication port，compatible with Modbus
	485B	485-	
Digital input and output	DI1～DI4	Digital input	Sink or source input option set by jumper, input resistance is 2.5K,optocoupler isolation input, jumper J9
	DI5	Digital input or high speed pulse trains input terminals	General digital input terminal characteristics Pulse trains input maximum frequency: 100KHz
	DO1	Digital output 1	Open collector output Maximum drive capability is 50mA
	FM	Digital output 2	Open collector output, maximum drive capability is 50mA, Can be selected as a pulse train output, up to 100KHz
Analog input and output	AI1	Analog input 1	Input voltage range: 0V ~ 10V Input resistance: 22K
	AI2	Analog input 2	Input voltage range: 0 ~ 10V or 4 ~ 20mA Input resistance: 22K, jumper J8
	AO1	Analog output 1	Output range: 0 ~ 10V or 0 ~ 20mA,select by jumper J5
	AO2	Analog output 2	Output range: 0 ~ 10V or 0 ~ 20mA,select by jumperJ5
power supply Reference ground	10V	Analog power supply	Output current: 20mA; Accuracy: 2%
	GND	Analog Ground	Analog reference ground
	24V	User power supply	Accuracy：±15%
	COM	Digital ground	Digital reference ground
Status relay output	T1/A，T1/B，T1/C	Relay 1	TA/TB normal close、TA/TC normal open； Driving capability: 25VAc，3A，COSØ=0.4； 30Vdc，1A
	T2/A，T2/B，T2/C	Relay 2	TA/TB normal close、TA/TC normal open； Driving capability: 25VAc，3A，COSØ=0.4； 30Vdc，1A

5.2 Wiring diagram



solar pump wiring 1, digital switch for water tank fulling



Wiring 2 for water tank fulling for analog type water sensor

Wiring explanation for water and dry run sensor:

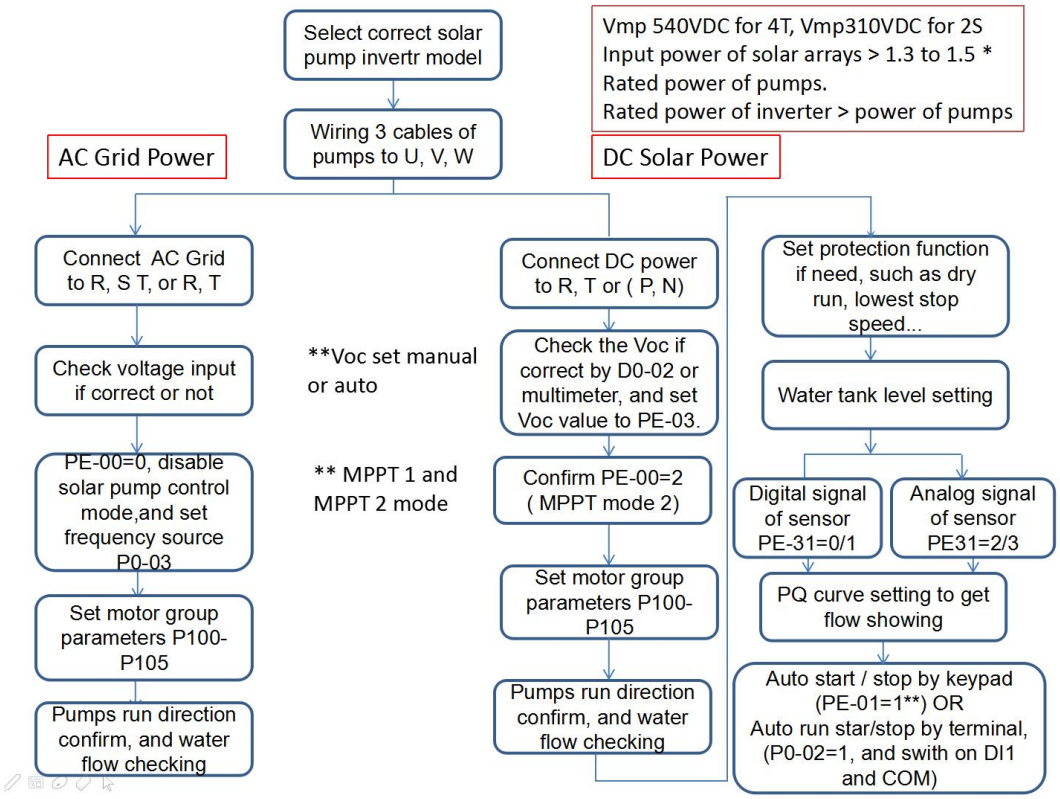
(1) Connect 2 wires of **float ball sensor** to DI4 and COM for water tank level fulling detecting, and set P4-03=51(float ball NO relay alarm). When water level reached to sensor detecting, the normal open (NO) relay point will be activated, invereter will stop pumping, and sent a A.FuL alarm.

(2) Connect 2 wires of sensor of **dry run sensor** of well to DI5 and GND, and set P4-04=52 (dry run NC relay alarm).It will sent alarm A.LLd and stop pumping when lack of water in well for dry run protection.

(3) It is also enable to connect analog (0-10VDC, or 0/4-20mA) water level sensor for water tank leveling detecting:

(4) Connecting 2 wires of 0/4-20mA analog sensor to AI1 and 24VDC terminals of inverter,and short connect COM and GND terminals for constructing a loop circuit.

5.3 Operation instructions and notes



SP300 solar pump inverter operation flow chat

Notes:

A. The total power of solar arrays input should be large than 1.3 to 1.5 times of rated of pumps.and the rated power of inverter must be large than rated power of pumps.

B. Set P1-00 to P1-05 motor group parameters for getting better pumps protection

C. Set dry run function with PE-22 to PE-24 parameters for pumps protection if not enough water in well.

D. Set lowest stop frequency function for pumps not allow to run in low speed protection with PE-19 to PE-21.

E. Set pumps over current protection with PE-25 and PE-26.

F. Set Min power input function to avoid solar pump system working in low power input. (PE-28 to PE-30).

G. Compatible with both digital and analog signal of transmitter for water tank full detection. (PE-31 to PE-35).

H. User can get flow, day flow, generating energy and day generating energy information from inverter with PQ curve setting(PE-38 to PE-39), and get monitor form U0-13 to U0-19.

I. It must to perform motor auto tuning for PMSM high speed and high efficiency pumps. Regarding for driving PMSM, the motor auto tuning is very important. The user can check parameters of P1-20, after auto tuning if has been modification, if these parameters is not correct for pumps, please modify it according to pumps specification.

Chapter 6. Simple parameter list

Table Symbol Description:

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

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

"●" - Indicates that the initial parameters related to the drives model.

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

"*" Factory setting, it is not allow to set by user.

Function code	Name	Setting range	Factory setting	Modification
P0 Basic function parameters				
P0-00	G/P model display	1: G type （ Heavy duty） 2: P type （pumps, fans load duty）	Per model	●
P0-01	The first motor control mode	0:VF control 1:Sensorless vector control without PG card feedback 2: Sensor vector control with PG card feedback 3: 2 wires output for 1 phase pump 4: 3 wires output for 1 phase pump (if remove starting capacitor and running capacitor, please select 4. If only remove starting capacitor or difficult to remove starting and running capacitors. Please select 3).	0	×
P0-02	Command mode	0: Keypad (LED OFF) 1:Terminal command (LED ON) 2: RS485 communication (LED flash)	0	√
P0-08	Preset frequency	0.00Hz～Maximum （P0-10）	50.00Hz	√
P0-09	Running direction	0: the same direction 1: the opposite direction	0	√
P0-10	Maximum frequency	400.00Hz	50.00Hz	×
P0-11	Upper limit frequency source	0： P0-12 1： AI1 2： AI2 3： Potentiometer of keypad 4： PULSE trains 5： Rs485 communication	0	×

P0-12	Upper limit frequency source	Lower limit frequency P0-14～Maximum frequency P0-10	50.00Hz	√
P0-13	Upper limit frequency offset	0.00Hz～Maximum frequency P0-10	0.00Hz	√
P0-14	Lower limit frequency	0.00Hz～Maximum frequency P0-12	0.00Hz	√
P0-15	Carrier frequency	0.5kHz～16.0kHz	Per model	√
P0-16	Carrier frequency auto adjusting with temperature	0: Not 1: Yes	0	√
P0-17	Acceleration time 1	0.00s～650.00s(P0-19=2) 0.0s～6500.0s(P0-19=1) 0s～65000s(P0-19=0)	Per model	√
P0-18	Deceleration time 1	0.00s～650.00s(P0-19=2) 0.0s～6500.0s(P0-19=1) 0s～65000s(P0-19=0)	Per model	√
P0-19	Unit of acceleration /deceleration time	0：1s 1：0.1s 2：0.01s	1	×
P0-20	The balance factory for 1 phase pump driving (3 phase output)	0.00 ～2.00	1.0	×
P0-21	The offset of auxiliary frequency source when perform superposition	0.00Hz～Maximum frequency F0-10	0.00Hz	√
P0-22	Frequency resolution	1：0.1Hz 2：0.01Hz	2	×
P0-24	Motor parameter group	0：Motor parameters group 1 1：Motor parameters group 2	0	×
P0-26	UP/DOWN of reference	0: Running frequency 1: Set frequency	0	×
P1 Motor parameter setting				
P1-00	Motor type	0:General asynchronous motor 1:Variable frequency asynchronous motor 2. Permanent magnet synchronous motor	0	×
P1-01	Rated power of motor	0.1KW～1000.0KW	Per model	×
P1-02	Rated voltage of motor	1V～2000V	Per model	×

P1-03	Rated current of motor	Inverter power <= 55KW: 0.01A～655.35A Inverter power > 55KW: 0.1A～6553.5A	Per model	×
P1-04	Rated frequency of motor	0.01Hz～Maximum frequency	Per model	×
P1-05	Rated speed of motor	1rpm～65535rpm	Per model	×
P1-06	Asyn. Motor Stator resistance	Inverter power <= 55KW: 0.001Ω～65.535Ω Inverter power > 55KW: 0.0001Ω～6.5535Ω	Auto tuning	×
P1-07	Asyn. motor rotor resistance	Inverter power <= 55KW: 0.001Ω～65.535Ω Inverter power > 55KW : 0.0001Ω～6.5535Ω	Auto tuning	×
P1-08	Asyn. motor leakage inductance	Inverter power <= 55KW: 0.01mH～655.35mH Inverter power > 55KW: 0.001mH～65.535mH	Auto tuning	×
P1-09	Asyn. motor mutual inductance	Inverter power <= 55KW: 0.1mH～6553.5mH Inverter power > 55KW: 0.01mH～655.35mH	Auto tuning	×
P1-10	Asyn. motor no-load current	Inverter power <= 55KW: 0.01A～F1-03 Inverter power > 55KW: 0.1A～F1-03	Auto tuning	×
P1-16	Synchronous motor stator resistance	Inverter power <= 55KW: 0.001Ω～65.535Ω Inverter power > 55KW: 0.0001Ω～6.5535Ω	Auto tuning	×
P1-17	Synchronous motor D-axis inductance	Inverter power <= 55KW0.01mH～655.35mH Inverter power > 55KW : 0.001mH～65.535mH	Auto tuning	×
P1-18	Synchronous motor Q axis inductance	Inverter power <= 55KW: 0.01mH～655.35mH Inverter power > 55KW : 0.001mH～65.535mH	Auto tuning	×
P1-20	Synchronous motor back electromotive force	0.1V～6553.5V	Auto tuning	×
P1-34	Number of pole pairs of rotary transformers	1～65535	1	×
P1-37	Auto tuning mode selection	0: no operation 1: Asynchronous motor still tunes 2: Asynchronous motor complete tuning 11: Synchronous motor tuning with load 12: Synchronous motor with no-load tuning	0	×
P4 group Input terminals				
P4-00	DI1 terminals function selection	0: no operation 1: Forward running or running command 2: Reverse running REV or forward/reverse	1	×
P4-01	DI2 terminals function		9	×

	selection	running direction selection (note: when set for 1 or 2 parameter, please reference to P4-11 function introduction) 3: 3 line control mode 4: Forward Jog（FJOG) 5: Reverse Jog（RJOG) 6: Terminal UP 7: Terminal DOWN 8: Free stop 9: Fault reset（RESET) 10: Run pause 11: External fault normal open input 16: Acceleration/ deceleration selection terminals 1 17: Acceleration/ deceleration selection terminals 2 18: Frequency source switch 19: UP/DOWN setting reset (terminals or keypad) 20: Running command terminals switch 21: Acceleration/deceleration forbidden 22: PID pause 35: Change PID direction 36: External parking terminal 1 37: Control command switchover terminal2 38: PID integral pause 41: Motor selection terminals 1 42: Motor selection terminals 2 43: PID parameter switchover 44: User define fault 1 45: User define fault 2 46: Speed control /Torque control switchover 47: Emergency stop 48: External parking terminal 2 49: DC braking in deceleration 50: current running time res 51: Water tank full detect 1/ single point detect 52: Water tank full detect 2/ single point detect 53: MPPT tracking stop/ solar control mode disable.		
P4-02	DI3 terminals function selection		53	×
P4-03	DI4 terminals function selection		51	×
P4-04	DI5 terminals function selection		52	×
P4-05	Reserve		0	×
P4-06	Reserve		0	×
P4-07	Reserve		0	×
P4-08	Reserve		0	×
P4-09	Reserve		0	×

P4-10	DI filter time	0.000s～1.000s	0.010s	√
P4-11	Terminals command mode	0: Two line control 1 1: Two line control 2 2: 3 line control 1 3: 3 line control 2	0	×
P4-12	Terminals UP/DOWN Change ratio	0.001Hz/s～65.535Hz/s	1.00Hz/s	√
P4-34	When AI input is less than minimum setting selection	Units' digit: AI 1 is less than minimum input Set selection 0: Corresponds to the minimum input setting 1:0.0% Ten's digit: A2 is less than minimum input Set selection, as above Hundred's digit: Potentiometer less than Min. Input selection, as above	000	√
P4-35	DI1 Relay time	0.0s～3600.0s	0.0s	×
P4-36	DI2 Relay time	0.0s～3600.0s	0.0s	×
P4-37	DI3 Relay time	0.0s～3600.0s	0.0s	×
P5 Group Output terminals				
P5-00	FM terminals output mode selection	0: High speed pulse output (FMP) 1: Digital output (FMR)	0	√
P5-01	FMR output function selection	0: No output 1: Frequency inverter running 2: Fault output (Free stop fault) 3: FDT1 Frequency level detect output 4:Frequency reach 5: Zero speed running (no output when stop) 6: Motor overload pre-alarm 7: Inverter overload pre-alarm 12: Cumulative run time arrives 17: Upper limit frequency arrives 18: Lower limit frequency arrives 19: Under voltage status output 38: Alarm output (all faults) 39: Motor over temperature warning 41: Fault output (for free stop failure and under voltage is not output)	0	√
P5-02	Relay 1 function selection		2	√
P5-03	Relay 2 function selection		0	√
P5-04	DO1 output function selection		1	√
P5-05	Extension card DO2 Output selection		4	√
P5-18	RELAY1 output relay time	0.0s～3600.0s	0.0s	√
P5-19	RELAY2 output relay time	0.0s～3600.0s	0.0s	√

P6 start and stop control				
P6-00	Starting mode	0: Directly start 1: start after speed tracking 2: Pre-excitation start (AC asynchronous machine)-	0	✓
P6-01	Speed tracking mode	00: starts from stop frequency 1: starts at zero speed 2: Starting from the maximum frequency	0	×
P6-02	The speed of speed tracking	1～100	20	✓
P6-03	Starting speed	0.00Hz～10.00Hz	0.00Hz	✓
P6-04	Starting speed keeping time	0.0s～100.0s	0.0s	×
P6-05	Start DC braking current / pre-excitation current	0%～100%	0%	×
P6-06	Start DC braking time / pre-excitation time	0.0s～100.0s	0.0s	×
P6-07	Acceleration and deceleration mode	0: Linear acceleration / deceleration 1: S curve acceleration / deceleration A 2: S curve acceleration and deceleration B	0	×
P6-10	Stop mode	0: Deceleration stop 1: free parking	0	✓
P7 keyboard and display				
P7-01	MF.K function button option	0: MF.K is invalid 1: Switchover between Operation panel command channel and remote command channel (terminal command channel or communication command channel) 2: Forward and reverse switching 3: Forward Jog 4: Reverse Jog	0	×
P7-02	STOP/RESET function	0: STOP/RES button enable only in operation panel control mode 1: STOP/RES button enable in any control mode	1	✓
P7-03	LED display parameters 1 in running mode	0000～FFFF Bit00: Running frequency 1(Hz) Bit01: Setting frequency (Hz) Bit02: DC bus voltage (V) Bit03: Output voltage (V)	H.001F	✓

		Bit04: Output current (A) Bit05: Output power (KW) Bit06: Output torque (%) Bit07: DI input status Bit08: DO output status Bit09: AI1 voltage (V) Bit10: AI2 voltage (V) Bit11: Voltage of potentiometer(V) Bit15: PID setting Bit16: Motor speed (RPM)		
P7-04	LED display parameters 2 in running mode	0000～FFFF Bit00: PID feedback Bit03: Running frequency 2 (Hz) Bit04: Rest running time Bit05: AI1 before correction voltage (V) Bit06: AI2 before correction voltage (V) Bit07: Operation panel potentiometer before correction voltage (V) Bit08: Line speed Bit09: Current power-on time (Hour) Bit10: Current running time (Min)	0	√
P7-05	LED display in stop mode	0000 ~ FFFF Bit00: Set frequency (Hz) Bit01: Bus voltage (V) Bit02: DI input status Bit03: DO output status Bit10: Load speed Bit11: PID setting	33	√
P7-06	Load speed display factor	0.0001～6.5000	1.0000	√
P7-07	IGBT temperature	0.0℃～100.0℃	-	●
P7-08	Rectifier temperature	0.0℃～100.0℃	-	●
P7-09	Cumulative run time	0h～65535h	-	●
P7-11	Software version No.	-	-	●
P7-12	The number of decimal places of load speed Displays	0: 0 decimal places 1: 1 decimal place 2: 2 decimal places 3: 3 decimal places	1	√
P7-13	Accumulated time since power on	0～65535 hour	-	●
P7-14	Cumulative power consumption	0～65535 KWh	-	●

P8 Auxiliary function				
P8-03	Acceleration time 2	0.0s～6500.0s	Per model	✓
P8-04	Deceleration time 2	0.0s～6500.0s	Per model	✓
P8-13	Reverse running enable	0: Allow 1: Forbidden	0	✓
P8-14	Running mode when setting frequency is less than the lower limit frequency	0: Run at lower limit frequency 1: stop 2: Zero speed running	0	✓
P8-18	Start protection selection	0: Disable 1: Enable	0	✓
P8-27	Terminal control prior	0 : Invalid 1: Valid	0	✓
P8-36	Output current over limit	0.0% (No detect) 0.1%～300.0% (Rated current)	200.0%	✓
P8-37	Output current over limit detect relay time	0.00s～600.00s	0.00s	✓
P8-42	Timing function selection	0: Invalid 1: Valid	0	✓
P8-43	Timing of run time selection	0: Set by P8-44 1: AI1 2: AI2 3: Potentiometer of operation panel The range of analog input corresponds to P8-44	0	✓
P8-44	Timing value setting of running time	0.0Min～6500.0Min	0.0Min	✓
P8-47	IGBT Module temperature arrives	0℃～100℃	75℃	✓
P8-48	Cooling fan control	0: Working in running 1: Working after power up 2:Working by temperature(45℃/40℃) 3:Solar Mode, working if Vpn > PE-16)	0	✓
P8-49	Wake up frequency	Sleep frequency (P8-51)～Maximum (P0-10)	0.00Hz	✓
P8-50	Wake up delay time	0.0s～6500.0s	0.0s	✓
P9 group Fault and protection				
P9-00	Motor overload protection selection	0: Prohibited 1: Allow	1	✓

P9-01	Motor overload protection gain	0.20～10.00	1.00	✓
P9-02	Motor overload pre-warning coefficient	50%～100%	80%	✓
P9-03	Overvoltage stall gain	0～100	0	✓
P9-07	Ground short circuit protection options when power on	0: Invalid 1: Valid	0	✓
P9-09	Automatic reset times	0～20(when set 20 means unlimited times)	20	✓
P9-10	DO (digital output) when fault alarm auto reset	Unit: 0: No action 1: Action Tens: 0: Reset immediately when under voltage fault 1: Reset time follow P9-11 when under voltage fault	H0.0	✓
P9-11	Fault auto reset interval time	0.1s～999.9s	5.0s	✓
P9-12	Input phase loss/ contactor pull protection selection	Bit: Input phase loss protection selection Ten: Contactor pull protection options 0: Prohibited 1: Allow	00	✓
P9-13	Output phase loss protection	0: Prohibited 1: Allow	0	✓
P9-14	First failure alarm type	0: No fault 2: Over current in acceleration 3: Over current in deceleration 4: Over current in constant speed during 5: Over voltage in acceleration 6: Over voltage in deceleration 7: Over voltage in constant speed during 8: Buffer resistance overload 9: Under voltage 10: Inverter overload 11: Motor overload 12: Input phase loss	–	●
P9-15	Second fault alarm type	13: Output phase loss 14: IGBT Module overheating 15: External fault 16: Communication error 17: Contactor is abnormal 18: Current detection is abnormal 19: Motor tuning abnormal 20: Encoder / PG card is abnormal	–	●

		21: Parameter read and write exception 22: Inverter hardware abnormality 23: Motor to ground short circuit		
P9-16	The third (latest one) type of failure	26: Running time arrives 29: Power-up time arrives 30: Under load 31: PID feedback is missing in running 40: Fast current limit timeout 41:Motor switch in running 42: The speed deviation is too big 43: Motor over speed 45: Motor over temperature	–	●
P9-17	Frequency at when the third (last) failure frequency	–	–	●
P9-18	Current at when the third (last) failure frequency	–	–	●
P9-19	DC bus voltage at when the third (last) failure frequency	–	–	●
P9-20	Input terminals status at when the third (last) failure frequency	–	–	●
P9-21	Output terminals status at when the third (last) failure frequency	–	–	●
P9-22	Inverter status when the third (last) failure frequency	–	–	●
P9-23	Power up time when the third (last) failure frequency	–	–	●
P9-24	Running time when the third (last) failure frequency	–	–	●
P9-27	Frequency at when the second failure	–	–	●
P9-28	Current at when the second failure	–	–	●
P9-29	DC bus voltage at when the second failure	–	–	●
P9-30	Input terminals status at when the second failure	–	–	●
P9-31	Output terminals status at when the second failure	–	–	●

P9-32	Inverter status at when the second failure	–	–	●
P9-33	Power up time when the second failure	–	–	●
P9-34	Running time when the second failure	–	–	●
P9-37	Frequency at when the third failure	–	–	●
P9-38	Current at when the third failure	–	–	●
P9-39	DC bus voltage at when the third failure	–	–	●
P9-40	Input terminals status at when the third failure	–	–	●
P9-41	Output terminals status at when the third failure	–	–	●
P9-42	Inverter status at when the third failure	–	–	●
P9-43	Power up time when the third failure	–	–	●
P9-44	Running time when the third failure	–	–	●
P9-50	Fault protection action selection 4	Bit: the speed deviation is too large (42) 0: Free stop 1: Stop by stop mode 2: Continue to run Ten: Motor over speed (43) Hundred places: initial position error (51)	00000	✓
P9-54	Running frequency of continue running when fault alarm	0: Run at the current operating frequency 1: Run at set frequency 2: Run at the upper limit frequency 3: Run at the lower limit frequency 4: Run at an abnormal standby frequency	0	✓
P9-55	An abnormal standby frequency	0.0%～100.0% (100.0% corresponds to the maximum frequency P0-10)	100.0%	✓
P9-56	Motor temperature sensor type	0: No temperature sensor 1： PT100 2： PT1000	0	✓
P9-57	Motor overheat protection threshold	0℃～200℃	110℃	✓

P9-58	Motor overheat pre-warning threshold	0℃～200℃	90℃	✓
P9-59	Working action of Instantaneous power fail selection	0: Invalid 1: Deceleration 2: Deceleration stop	0	✓
P9-60	Judgment voltage of instantaneous power fail pause	80.0%～100.0%	90.0%	✓
P9-61	Voltage recovery judgment time when instantaneous power fail	0.00s～100.00s	0.50s	✓
P9-62	Judgment voltage of instantaneous power failure action	60.0%～100.0%(Standard bus voltage)	80.0%	✓
P9-63	Load miss protection	0: Disable 1: Enable	0	✓
P9-64	Load miss detection level	0.0～100.0%	10.0%	✓
P9-65	Load miss detection time	0.0～60.0s	1.0s	✓
P9-67	Over speed detection	0.0%～50.0%(Max frequency)	20.0%	✓
P9-68	Over speed detection time	0.0s: No detect 0.1～60.0s	1.0s	✓
P9-69	Detection value of the speed deviation is too big	0.0%～50.0%(Max frequency)	20.0%	✓
P9-70	Detection time of speed deviation is too big.	0.0s: No detect 0.1～60.0s	5.0s	✓
PA Group PID function				
PA-00	PID reference source	0: PA-01 1: AI1 2: AI2 3: Keyboard potentiometer 4: PULSE train setting (DI5) 5: Communication reference 6: Multi-step instructions reference	0	✓
PA-01	PID value setting	0.0%～100.0%	50.0%	✓
PA-02	PID feedback source	0: AI1 1: AI2 2: Keyboard potentiometer 3: AI1-AI2 4: PULSE setting (DI5) 5: Communication reference 6: AI1 + AI2	0	✓

		7: MAX (| AI1 |, | AI2 |) 8: MIN (| AI1 |, | AI2 |)		
PA-03	PID working direction	0: Positive effect 1: Reverse effect	0	✓
PA-04	PID reference feedback range	0～65535	1000	✓
PA-05	Proportional gain Kp1	0.0～100.0	20.0	✓
PA-06	Integral time Ti1	0.01s～10.00s	2.00s	✓
PA-07	Differential time Td1	0.000s～10.000s	0.000s	✓
PA-08	PID reversal cutoff frequency	0.00～Maximum frequency	2.00Hz	✓
PA-09	PID deviation limit	0.0%～100.0%	0.0%	✓
PA-10	PID differential limiting	0.00%～100.00%	0.10%	✓
PA-11	PID reference given change time	0.00～650.00s	0.00s	✓
PA-12	PID feedback filter time	0.00～60.00s	0.00s	✓
PA-13	PID output filter time	0.00～60.00s	0.00s	✓
PA-14	Reserve	-	-	✓
PA-15	Proportional gain Kp2	0.0～100.0	20.0	✓
PA-16	Integral time Ti2	0.01s～10.00s	2.00s	✓
PA-17	Derivative time Td2	0.000s～10.000s	0.000s	✓
PA-18	PID parameter switching condition	0: Do not switch 1: Switch via DI terminal 2: Automatic switching according to the deviation	0	✓
PA-19	PID parameter switching deviation 1	0.0%～PA-20	20.0%	✓
PA-20	PID parameter switching deviation 2	FA-19～100.0%	80.0%	✓
PA-21	PID initial value	0.0%～100.0%	0.0%	✓
PA-22	PID initial value hold time	0.00～650.00s	0.00s	✓
PA-23	The maximum value of positive deviations for two output	0.00%～100.00%	1.00%	✓
PA-24	The maximum value of reverse deviations for two output	0.00%～100.00%	1.00%	✓
PA-25	PID integral property	Bit: Integral separation	00	✓

		0: Invalid 1: Valid Ten:Whether to stop the integral working after outputting to the limit 0: Continue integral working 1: Stop integral working		
PA-26	PID feedback loss detection value	0.0%:Do not judge feedback loss 0.1%～100.0%	0.0%	✓
PA-27	PID Feedback loss detection time	0.0s～20.0s	0.0s	✓
PA-28	PID calculating when stop	0：Don’t execute calculating when stop 1: Execute PID calculating when stop	0	✓
PD Group communication				
PD-00	Communication baud rate	bit：MODBUS 0：300BPS 1：600BPS 2：1200BPS 3：2400BPS 4：4800BPS 5：9600BPS 6：19200BPS 7：38400BPS 8：57600BPS 9：115200BPS Ten: Profibus-DP 0：115200BPs 1：208300BPs 2：256000BPs 3：512000Bps Hundred places: reserved	6005	✓
PD-01	MODBUS data format	0: No parity (8-N-2) 1: Even check (8-E-1) 2: Odd parity (8-O-1) 3: No parity (8-N-1) (MODBUS active)	0	✓
PD-02	Local address	0：Broadcast address 1～249 (MODBUS、Profibus-DP、CANlink enable)	1	✓
PD-03	MODBUS respond relay	0～20ms (MODBUS enable)	2	✓

PE Solar Pump inverter control parameters				
PE-00	Solar pump control mode	**0:Disable of solar pump control** **1: Enable (Algorithm-1, High efficiency)** **2: Enable (Algorithm-2, High stability)**	1	X
PE-01	Solar pump control mode option	**Units: Vmpp mode selecting** 0: Vmp set by PE-02 manually (CVT) 1: MPPT automatically **Tens: VOC detect mode** 0: Voc set by PE-03 manually 1: Voc detect automatically **Hundreds: Auto running by keypad** 0: Disable 1: Auto start after power-on(P0-02=0) **Thousands: AC detect active** 0: Disable 1: Auto detect (Above 5.5KW)	H.0.0.1.1	√
PE-02	CVT voltage set by manual	0 -100%	80%	√
PE-03	Voc (open loop voltage) set manually	0.0V-1000.0V	650V/ 380V	V
PE-04	DC bus voltage stability Proportional gain	0.0% - 999.9%	100.0%	√
PE-05	DC bus voltage stability Integral gain	0.0% - 999.9%	100.0%	√
PE-06	DC bus voltage stability differential gain	0.0% - 999.9%	0%	√
PE-07	Initial point of fast frequency drop	0.0 - 100.0%	5.0%	√
PE-08	Stop point of fast frequency drop	0.0 - 100.0%	50.0%	
PE-09	Weak magnetic limit multiples	0.0- 9.9	0.0	
PE-10	Mppt search upper limit voltage	0.0% - 100.0%	10%	√
PE-11	Mppt search lower limit voltage	0.0% - 100.0%	75%	√
PE-12	MPPT search gain	0% - 500%	100%	√
PE-13	MPPT search interval	0.0 - 10.0sec	0.5sec	√
PE-14	Stabilizer filtering time (solar	0-1000ms	50ms	

	pump control mode2)			
PE-15	Reserve	0	0	
PE-16	Sleep voltage threshold	0.0 - 1000.0V	300.0V/ 200.0V	√
PE-17	Wake up voltage threshold	0.0 - 1000.0V	350.0V/ 250.0V	√
PE-18	Awake waiting time	0 - 30000sec	60sec	√
PE-19	Stop frequency setting when low speed	0.00Hz ～300.00Hz	10.00Hz	√
PE-20	Detecting time of low frequency protection	0 - 30000sec	60sec	√
PE-21	Low speed protection auto reset delay time	0 - 30000sec	60sec	√
PE-22	Dry run protection detecting current	0.0 - 999.9A	0.0A	√
PE-23	Dry run protection detecting time	0 - 30000sec	10sec	√
PE-24	Dry run protection auto reset relay time	0 - 30000sec	60sec	√
PE-25	Detecting current of over current protection	0.0 - 999.9A	0.0A	√
PE-26	Detecting time of over current protection	0 - 30000sec	10sec	√
PE-27	Over current auto reset delay time	0 - 30000sec	60sec	√
PE-28	DC bus voltage drop	0.0% - 100.0%	90.0%	√
PE-29	Frequency detect when voltage drop	0.0% - 100.0%	15.0%	√
PE-30	Minimum power protection auto reset delay time	0 - 30000sec	300sec	√
PE-31	Water tank full level detecting method	Digit: Water full detect mode 0: Single point detect 1: 2 points detect 2: AI1 analog 3: AI2 analog Ten: Single point detect 51# function logic detection selecting Hundred: Single point detect 52# function logic detection selecting. 0: Normal Open, work when open, stop when switch on 1: Normal close, work when close, stop when open.	H0.0.0	√

PE-32	Water full level detecting threshold of analog	0 - 100.0%	25.0%	√
PE-33	Water full level reach protection detecting time	0 - 30000sec	10sec	√
PE-34	Water full level protection exit relay time	0 - 30000sec	10 sec	√
PE-35	Water level sensor probe damage threshold	0 - 100.0%	0.0%	√
PE-36	DC current correction factor	0.0 - 200.0%	100.00%	√
PE-37	DC current correction bias	-100.00A - 100.00A	0.00A	√
PE-38	Power point 0 of PQ Current	0.0kw - 999.9kw	0.5kw	√
PE-39	Power point 1 of PQ Current	0.0kw - 999.9kw	1.0kw	√
PE-40	Power point 2 of PQ Current	0.0kw - 999.9kw	1.5kw	√
PE-41	Power point 3 of PQ Current	0.0kw - 999.9kw	2.0kw	√
PE-42	Power point 4 of PQ Current	0.0kw - 999.9kw	2.5kw	√
PE-43	Flow point 0 of PQ curve	0.0 - 999.9m^3/h	0.0 m^3/h	√
PE-44	Flow point 1 of PQ curve	0.0 - 999.9m^3/h	5.0 m^3/h	√
PE-45	Flow point 2 of PQ curve	0.0 - 999.9m^3/h	10.0m^3/h	√
PE-46	Flow point 3 of PQ curve	0.0 - 999.9m^3/h	15.0m^3/h	√
PE-47	Flow point 4 of PQ curve	0.0 - 999.9m^3/h	20.0m^3/h	√
PE-48	Initiating frequency of dry run protection	0.00 - 320.00Hz	0.0Hr	√
PE-49	Sleep power setting	0.0% - 100.0%	0.0%	√
PE-50	Detecting time of sleep power	0 - 30000sec	60sec	√
PE-51	Sleep frequency	0.00Hz ～300.00Hz	10.00Hz	√
PP Factory function code management				
PP-00	User password	0～65535	0	√
PP-01	Parameter initialization	0: No operation 1: Reset parameters to factory default(not include motor parameters) 2: Clear record information	0	√
PP-05	Distributor unlock password	0 - 65535		
PF Distributor password setting				
PF-06	Distributor password setting	0 - 65535		
PF-07	Distributor allow total running time	0 - 65535Hr	Max. 7.4 Year	

Chapter 7. Explanation for special parameters

Some parameters description which may relative with solar pump control.

P0-01	Motor control mode		Factory setting	0
	Setting range	0	VF control	
		1	Open loop sensorless vector control	
		2	Close loop sensor vector control with PG card	
		3	2 wires output for single phase pump	
		4	3 wires output for single phase pump	

3: 2 wires output for single phase pumps when capacitors can’ t removed.

4: 3 wires output for single phase pumps when starting capacitors removed

P0-02	Running command source		Factory setting	0
	Setting	0	Keyboard/ keypad/ operation panel (LED turn off)	
		1	Terminals control (LED turn ON)	
		2	Communication (LED Flash)	

0: Keypad (operation panel); The running command is given by keypad.

1: External terminals; The running command controlled by multiple function terminals.

Refer to P4 parameters of input terminals command .

Example: When DI1 and COM is short circuit connection and P4-00 = 1, then you will get a auto-start in the morning and auto-stop when sundown function.

P0-15	Carrier frequency	Factory setting	Per model
	Setting range	0.5kHz～16.0kHz	

It uses to adjust the carrier frequency. By adjusting the carrier frequency can reduce the motor noise, to avoid the resonance point of the mechanical system, to reduce the line to ground leakage current and reduce the interference generated by the inverter

When the carrier frequency is low, the output current harmonic component increases, the motor loss increases, the motor temperature rise.

When the carrier frequency is high, the motor loss decreases, the motor temperature decreases, but the inverter loss increases, the inverter temperature increases, interference increases.

Adjusting the carrier frequency affects the following performance:

Carrier frequency	Low → High
Motor noise	Big → Small
Output current waveform	Low → Good
Motor temperature rise	High → Low
Inverter temperature rise	Low → High
Leakage current	Small → Big
External radiation interference	Small → Big

P1-00	Motor type		Factory setting	0
	Setting range	0	General asynchronous motor	
		1	Variable frequency asynchronous motor	
		2	Permanent magnet synchronous motor (PMSM)	
P1-01	Rated power		Factory setting	As per model
	Setting range		0.1KW～1000.0KW	
P1-02	Rated voltage		Factory setting	As per model
	Setting range		1V～2000V	
P1-03	Rated current		Factory setting	As per model
	Setting range		Power of inverter <= 55KW: 0.01A～655.35A Power of inverter > 55KW : 0.1A～6553.5A	
P1-04	Rated power		Factory setting	As per model
	Setting range		0.01Hz～Max power of inverter	
P1-05	Rated speed		Factory setting	As per model
	Setting range		1rpm～65535rpm	

Set above parameters for motor to protect and perform better!

P4 Group input terminals				
P4-00	DI1 digital input function	0: No function 1: Forward run FWD or run command 2: Reverse run REV or forward and reverse run direction 8: Free stop 9: Fault reset (RESET) 10: Run pause 51:Water tank full detect 1 52:Water tank full detect 2 53:MPPT tracking stop/ solar pump control disable	1	×
P4-01	DI2 digital input function		53	×
P4-02	DI3 digital input function		9	×
P4-03	DI4 digital input function		51	×
P4-04	DI5 digital input function		52	×

51 and 52 two digital input for water level full function activating.

Install a height place aside from water full leveling to form a water full detection hysteresis.

53: User can use to this function to disable solar pump control function by terminals.

When this function is activated, inverter will work AC mode and exit of solar control mode.

PE solar pump control parameters explanation:

PE-00	Solar pump control mode	0: Disable 1: Enable (Algorithm-1, High efficiency) 2: Enable (Algorithm-2, High stability)	1

When choose 1 for high efficiency ,its related parameters:PE-04,PE-05,PE-06 for MPPT gain.

When choose 2 for high stability ,its related parameters:PE-12,PE-13,PE-14 for MPPT gain.

PE-04	DC bus voltage stability gain	0.0% - 999.9%	100.0%
PE-05	DC bus voltage stability Integral gain	0.0% - 999.9%	100.0%
PE-06	DC bus voltage stability differential gain	0.0% - 999.9%	0.0%

PE-04 to PE-06 use to adjust MPPT tracking ratio, and keep DC bus voltage in stability.

PE-07	Initial point of fast frequency drop	0.0 - 100.0%	5.00%
PE-08	Stop point of fast frequency drop	0.0 - 100.0%	50.00%

In some cloudy case, the inverter can’ t get enough solar energy from PV arrays, so we program inverter drop frequency quickly, make pump in generating mode, feedback energy to inveter to maintain DC bus voltage.PE-07=0, frequency quick drop function is disable.

PE-09	Weak magnetic limit multiples	0.0- 9.9	1.2
PE-10	Mppt search upper limit voltage	0.0% - 100.0%	90%
PE-11	Mppt search lower limit voltage	0.0% - 100.0%	75%
PE-12	MPPT search gain	0% - 500%	100%
PE-13	MPPT search interval	0.0 - 10.0sec	2.0sec
PE-14	Stabilizer filtering time (sold pump control mode 2)	0-1000ms	50ms

PE-10/PE-11 use to set Vmpp range, and PE-12 is used to set MPPT searching gain, and PE-13 is used to set MPPT searching interval time. When the output frequency is fluctuating after activated MPPT searching,the performance can be improved by reducing PE-12 MPPT searching gain value and increase PE-13 the MPPT searching interval

PE-16	Sleep voltage threshold	0.0 - 1000.0V	250V/150V
PE-17	Wake up voltage threshold	0.0 - 1000.0V	350V/250V
PE-18	Awake waiting time	0 - 30000sec	60sec

PE-16 to FE-18 use to set solar pump inverter if go to sleep mode when input DC voltage is too low, and wake up automatically when DC bus voltage recovery again.
When the DC voltage is lower than FE-16 setting value for a system default time, it will go to sleep and sent out A.SLP alarm code. When DC bus voltage raises again and higher than PE-17 value for a FE-18 setting time, the inverter will be wake up to work again.

PE-19	Stop frequency setting when low speed	0.00Hz ～300.00Hz	10.00Hz
PE-20	Detecting time of low frequency protection	0 - 30000sec	20sec
PE-21	Low speed protection auto reset delay time	0 - 30000sec	60sec

If the output frequency is lower than PE-19 for a low speed detecting time PE-20,the solar pump inverter will stop to running and sent out A.LFr alarm.
Once the output frequency is greater than PE-19 for PE-21(automatic recover time), the inverter will restore to working.

PE-22	Dry run protection current threshold (under-load	0.0 - 999.9A	0.0A

	protection)		
PE-23	Dry run detect delay time	0 - 30000sec	10sec
PE-24	Automatic recover time in dry run protection mode	0 - 30000sec	60sec

If the output current is lower than PE-22 (Dry run current) for PE-23(dry run detect delay time), the inverter will go to dry run protection mode and sent out A.LLd alarm.

Once the current is bigger than PE-22 again for PE-24 (recover time of dry run), the inverter will restore to working.

PE-25	Motor over current protection threshold	0.0 - 999.9A	0.0A
PE-26	Over current detect delay time	0 - 30000sec	10sec
PE-27	Automatic recovery time in over current protection mode	0 - 30000sec	60sec

PE-25,PE-26, PE-27parameters are used to set motor over current protection.

If the over current is bigger than PE-25 for PE-26time, the drive will go to stop mode for providing motor protection and sent out A.OLd alarm.

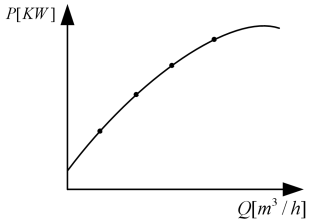
Once the current is lower than PE-25 for PE-27 recover time, inverter will recover to work again.

PE-31	Water tank full level detecting method	Digit: Water full detect mode 0: 1 point detect 1: 2 points detect 2: AI1 analog 3: AI2 analog Ten: Single point detect 51# function logic detection selecting Hundred: Single point detect 52# function logic detection selecting. 0: Normal Open, work when open, stop when switch on 1: Normal close, work when close, stop when open.	H0.00
PE-32	Water full level detecting threshold of analog	0 - 100.0%	25.0%
PE-33	Water full level reach protection detecting time	0 - 30000sec	10sec
PE-34	Water full level protection exit relay time	0 - 30000sec	60sec
PE-35	Water level sensor probe damage threshold	0 - 100.0%	0.0%

PE-31 parameter is used to set detecting method of water tank leveling.
The 1 point digital terminal water tank full detecting is default setting. There are normal open and normal close for selection.
For water well dry run detection, we can select normal close of digital function.
For water tank full detection, we can select normal open of digital function.
If select 2 points digital terminals full detect, please see below explanation:
Any 2 terminals (DI4 and DI5 are in default setting) can use to set for terminals digital detecting, the function code is 51/or 52. If both terminals are valid, it can able to activate water tank fulling protection, if both terminals are invalid, the water tank full is disable, only one terminals is valid, keep no changing of current working status.
PE-33/PE-34 are used to set water full detecting time and protection exit relay time.
PE-35 is used to set analog sensor damage detection threshold, when PE-31 is set for analog detecting, and feedback analog value larger than PE-35 setting threshold, and will judge the sensor is broken, submit A.Prb alarm as well, and inverter stop to working; The sensor probe detecting is disable when PE-31 set for 0.

PE-38	Power point 0 of PQ Current	0.0kw - 999.9kw	0.5kw
PE-39	Power point 1 of PQ Current	0.0kw - 999.9kw	1.0kw
PE-40	Power point 2 of PQ Current	0.0kw - 999.9kw	1.5kw
PE-41	Power point 3 of PQ Current	0.0kw - 999.9kw	2.0kw
PE-42	Power point 4 of PQ Current	0.0kw - 999.9kw	2.5kw
PE-43	Flow point 0 of PQ curve	0.0 - 999.9m^3/h	0.0 m^3/h
PE-44	Flow point 1 of PQ curve	0.0 - 999.9m^3/h	5.0 m^3/h
PE-45	Flow point 2 of PQ curve	0.0 - 999.9m^3/h	10.0m^3/h
PE-46	Flow point 3 of PQ curve	0.0 - 999.9m^3/h	15.0m^3/h
PE-47	Flow point 4 of PQ curve	0.0 - 999.9m^3/h	20.0m^3/h

The set of parameters calculates the output flow rate (U0-13) based on the output power (U0-05),user can program PE-38 ~ PE-47 according to P-Q curve of pumps, and U0-13 flow rated can be calculated by software.



PE-48	Initiating frequency of dry run protection	0.00 - 320.00Hz	0.0Hz	√
PE-49	Sleep power setting	0.0% - 100.0%	0.0%	√
PE-50	Detecting time of sleep power	0 - 30000sec	60sec	√
PE-51	Sleep frequency	0.00Hz ～300.00Hz	10.00Hz	√

PE-48 parameters use to select dry run function starting frequency. Only the output frequency is higher than this setting, the dry run is activated.

The inverter can able to detect sleep voltage and sleep power when enter to sleep mode

PE-49, PE-50 and PE-51 for power judge sleep mode.

When PE-49=0.0%, the inverter goes to sleep mode by judging sleep voltage PE-17.

When PE-49 is not =0.0%, the inverter goes to sleep mode by judging sleep power.

(If the power less than PE-49 and output frequency is lower than PE-51 for PE-50 relay time , inverter will go to sleep mode.)

Chapter 8. Monitoring parameters

Monitor parameters	Monitoring contents	Unit	Address
U0-00	Output frequency	0.01Hz	7000H
U0-01	Preset frequency	0.01Hz	7001H
U0-02	DC voltage of PV arrays	0.1V	7002H
U0-03	Output voltage	1V	7003H
U0-04	Output current	0.01A	7004H
U0-05	Power of PV arrays	0.1KW	7005H
U0-06	Current of PV arrays	0.01A	7006H
U0-07	DI input status	1	7007H
U0-08	DO output status	1	7008H
U0-09	AI1	0.01V	7009H
U0-10	AI2	0.01V	700AH
U0-11	Motor (pump) speed	1rpm	700BH
U0-12	PV open loop circuit voltage (Voc)	0.1V	700CH
U0-13	Flow rate of pump	0.1m^3/hr	700DH
U0-14	Day flow	0.1m^3	700EH
U0-15	Flow accumulation (low-order digit)	0.1m^3	700FH
U0-16	flow accumulation (low-order digit)	0.1Km^3	7010H
U0-17	Day generated power	0.1kwh	7011H
U0-18	Generated accumulation (low-order digit)	0.1kwh	7012H
U0-19	Generated accumulation (high-order digit)	0.1Mwh	7013H
U0-20	The rest running time	0.1Min	7014H
U0-24	Pump running speed	r/min	7018H
U0-25	Current power up time	1min	7019H
U0-26	Current running time	0.1min	701AH
U0-45	Fault information	1	702DH
U0-61	Inverter working status	1	703DH

Chapter 9. Trouble-shooting

SP300Alarm code	Alarm index code	Alarm description	Solutions
A.SLP	81	Sleep mode	1.Check total solar power input, the total power of solar arrays should be bigger 1.3 times of the pump. 2.Check if enough DC Vmp, 3. Increase the PE-04 and PE-05 value 4. Check PE-16 setting
A.LFr	82	Low frequency protection	If the output frequency is lower PE-19 setting,this alarm will be activated for pumps protection, please set PE-19 for low value if need.
A.LLd	83	Dry run/under load protection	Set PE-22 value to disable this alarm.
A.OLd	84	Over current/ over load protection	Set over current PE-25 for low or set for 0.
A.LPr	85	Minimum power	Waiting for recovery
A.FuL	86	Water tank fulling	To check if water is fulling
A.Prb	87	Analog sensor problem failure	To check if the sensor is broken or set PE-35 for lower
Err.98	98	Distributor running time reach	Contact with your distributor

Alarm code	Alarm description	Possible reason	Solutions
Err01	Inverter unit protection	1, The inverter output short circuit 2, The motor and inverter wiring is too long 3, The module overheating 4. The inverter wiring is loose 5, The circuit board abnormal 6, Inverter module exception	1, Excluding the external fault 2, Install the reactor or output filter 3, Check the air duct is blocked; 4, Plug all the cable 5, Seek technical support
Err02/ Er.oC1	Over current in acceleration	1, Motor to ground short circuit 2, Not perform auto tuning 3, The acceleration time is too short 4, Torque boost is not appropriate 5, The grid voltage is low 6, Loading suddenly in acceleration 7, The using Inverter power is small	1, Excluding the external fault 2, Perform motor ID auto tuning 3, Increase the acceleration time 4, Adjust the torque boost or V / F curve 5, Adjust voltage of power supply 6, Adjust the load 7, Select big power inverter

Err03/ Er.oC2	Over current in deceleration	1, Output short circuit or output to ground 2, No performance ID auto tuning for carrying vector control 3, The deceleration time is too short 4, The voltage is low 5, Loading suddenly when deceleration 6, No installing of brake unit and brake resistor	1, Excluding the external fault 2, Perform motor ID auto tuning 3, Increase the acceleration time 4, Adjust voltage of power supply to normal 5, Cancel the suddenly adding load 6, Install braking unit or braking resistor
Err04/ Er.oC3	Over current in constant speed running	1, The inverter output short circuit or phase to ground 2, No performance ID auto tuning for carrying vector control 3, The voltage of grid is low 4, Whether there is a sudden load in running 5, The using Inverter capacity (rated power is small	1, Excluding the external fault 2, Perform motor ID auto tuning 3, Cancel the sudden loading 4, Cancel the suddenly adding load 5. Select big power inverter instead
Err05/ Er.oU1	Over voltage in acceleration	1, The input voltage is high 2, The acceleration process there is an external drag motor running 3, The acceleration time is too short 4, No brake unit and brake resistor	1, Adjust voltage to the normal range Cancel the additional force or install braking resistor 3, Increase the acceleration time 4, Install the braking unit or braking resistor
Err06/ Er.oU2	Deceleration over voltage	1, The input voltage is high 2, The process of deceleration there is an external drag motor running 3, Deceleration time is too short 4, No brake unit and brake resistor	1, Adjust voltage to normal range 2, Cancel the additional force or install braking resistor 3, Increase acceleration time 4, Install the braking unit or braking resistor
Err07/ Er.oU3	Over voltage in constant speed	1, Input voltage is high 2. ,The process of deceleration there is an external drag motor running	1. Increase voltage go normal range 2. Cancel external force or install braking resistor
Err08/ Er.oHr	Snubber resistor failure	1. Input voltage is out of limit	Adjust voltage to normal range
Err09/ Er.LU1	Under voltage fault	1, Instantaneous power failure 2, Input voltage is out of limit DC bus voltage is abnormal 4, rectifier bridge and buffer resistance is not normal	1, Reset the fault 2, Adjust the voltage to the normal range 3, seek technical support

Err10 /Er.oL1	Inverter over load	1.. If load is too big, or motor is blocked or not 2. Using inverter capacity is too small	1. Reduce the load and check the motor and machine condition 2. Select bigger one capacity of motor
Err11 /Er.oL1	Motor overload	1, The motor protection parameter P9-01 set is appropriate 2, The load is too large or motor is blocked 3, Using the power of inverter too small	Set correct parameter Reduce load or check motor and driving machine Select bigger power inverter
Err12 /Er.iLF	Input phase loss	1, Three-phase input power is not normal 2, The driving board exception 3, Lightning board abnormalities 4, The main control board exception	1, Check and eliminate the problems in the external lines 2, Seek technical support
Err13 /Er.oLF	Output phase loss	1, The inverter wiring is damaged 2, 3 phase output is not balance of inverter when motor running 3, Driving board is abnormal 4, IGBT modulel is abnormal	1, Excluding the external fault 2, Check the motor three-phase winding is normal and troubleshooting 3, seek technical support
Err14 /Er.oH1	IGBT module is over heat	1, The ambient temperature is too high 2, Air duct blockage 3, The fan is damaged 4, IIGBT module thermistor is damage 5, The inverter module is damaged	1, Reduce the ambient temperature 2, Clean up the duct 3, Replace the fan 4, Replace the thermistor 5, Replace the inverter module
Err15 /Er.EEF	External device fault	1, Through the multi-function terminal DI input external fault signal 2, Through the virtual IO function input external fault signal	1, Reset to factory setting 2, Reset to factory setting
Err16 /Er.CE	Communication fail	1, The host computer is not working properly 2, The communication line is not normal 3, Communication parameters PD group settings are not correct	1, Check the host computer wiring 2, Check the communication cable 3, Set the communication parameters correctly
Err17	Contactor failure	1, The driving board and power supply is not normal 2, Contactor is not normal	1, Replace the drive board or power board 2, Replace the contactor
Err18 /Er.HAL	Current detection failure	1, Check the Hall device exception 2, The driving board exception	1, Replace the Hall device 2, Replace the driver board

Err19 /Er.TuN	Motor tuning fault	1, The motor parameters are not set by nameplate 2, Parameter identification process timeout	Set motor parameters according to motor nameplate
Err20 /Er.PG	Encoder fault	1, The encoder model does not match 2, The encoder connection error 3, The encoder is damaged 4, PG card exception	1, Check the encoder parameters 2, Excluding line wiring failure 3, Replace the encoder 4, Replace the PG card
Err21 /Er.EEP	EEPROM failures	1, EEPROM IC broken	1, Replace the control board
Err22	Inverter hardware failure	1, there is over voltage 2, there is over current	1, Troubleshooting as over voltage 2, Troubleshooting as over current
Err23 /Er.SGd	Short to ground	1, Motor to ground short circuit	1, Change motor cable or motor
Err26 /Er.ort	The cumulative run time arrives	1, The cumulative run time is over the set the value	1, Clear the record with parameters initialization
Err27	User Defined Fault 1	1, User define fault signal 1 with multi-function terminals. 2, User define fault signal 1 with virtual IO function	1, Reset factory setting 2, Reset factory setting
Err28	User Defined Fault 2	1 , User define fault signal 2 with multi-function terminals. 2, User define fault signal 2 with virtual IO function	1, Reset factory setting 2, Reset factory setting
Err26	The cumulative power up time arrives	1, The cumulative power up is over the set the value	1, Clear the record with parameters initialization
Err30	Load missing	1,The running current of inverter less than P9-64	Check the load condition
Err31	PID feedback loss	1, PID feedback value less than PA-26	Check the PID feedback signal or set PA-26 value correct
Err40	Wave by wave current limit fault	1, The load is too large 2, The inverter selection is too small	1, Check the load 2, Zoom in the inverter power level;
Err41	Motor switchover fault	1. Change the current motor selection through the terminal during the inverter operation	Switch motor in stop mode of inverter
Err42	The speed deviation is too large	1, The encoder parameter setting is not correct 2, No perform motor auto tuning 3, The speed deviation is too large , P9-69, P9-60 setting is unreasonable	1, Correct set encoder parameters 2, Motor auto tuning 3, Set correct value for P9-69, P9-60 per filed condition

SP300

Appendix 1 SP300Instructions for Driving 1 Phase 220V Pumps

Please select one more rated power class of inverter than the motor or pump.

SP300

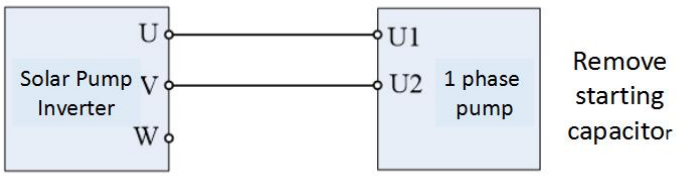
P0-01	1st motor control mode	0: VF control 1: Sensorless vector control (SVC) 2: PG sensor vector control (FVC) 3: 2 wires output for single phase pumps 4: 3 Wires output for single phase pumps	0
P0-20	Single - phase motor balance coefficient (Three-phase output)	0.0 - 2.0	1.0

It is request to set motor group parameters(P1 group) when driving 1 phase motor.

And also can adjust the output torque capacity with P3-01 parameters.

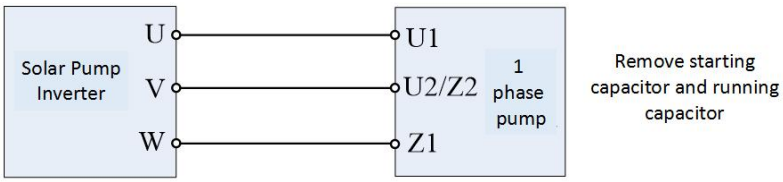
There are 2 driving modes for using inverter to drive 1 phase motor.

1) 2 wire output mode (P0-01 = 3): This mode wiring as below:



In this control mode, the start capacitor is removed. Connect 1 phase pump to any 2 wires from U-V-W. It can get large adjusting speed range due to starting capacitor have been remove. Through increase the value of P3-01 can increase the start torque and the starting capacity. It is not allow to change running direction in this control mode. Please change the cable wiring to change running direction if need.

2) 3 wires output mode (P0-01 = 4): This mode wiring as below:



In this mode, the starting and running capacitor **must** be remove. Adjusting the P0-20 value can able to change the UV/ WV voltage ratio (the bigger P0-20, the bigger WV, and smaller UV). Because the output voltage phase is difference 90°, so the output voltage can't reaches $Udc/\sqrt{2}$, only can reaches $Udc/2$ (P0-20=1.0).

The load driving capacity is not too strong compare to drive 3 phase AC pumps, and running current will be higher.

Appendix 2 InstructionsSP300 for PMSM pumps

The Procedure of operation for PMSM driving:

1. Set P0-01=1 and P1-00=2 parameters before PMSM running.

2. Set PMSM motor parameters.:P1-01 to P1-05, P1-16 to P1-20.(if the load is difficult to disconnect from motor, please set P1-20 BEF (Back Electromotive Force) accuracy from motor nameplate.

3. Set P1-37 for start auto-tuning.

If the performance is not good, please adjust some related parameter from P2-00 to P2-37.

SP300SP300 has two motor control algorithms for driving permanent magnet synchronous motor, which set by P1-00 and P0-01 both parameters.

	P0-01=0 (VF scalar control)	P0-01=1 (Sensorless vector control)
P1-00=0/1 (IM)	Asynchronous motor VF control	Asynchronous motor vector control
P1-00=2 (PMSM)	Permanent magnet motor scalar V/F control	Permanent Magnet Motor Vector Control

The vector control is superior to the scalar (V/f) control in terms of motor control performance such as low frequency torque, stability, current waveform and so on. However, the scalar control is not sensitive to the motor back EMF parameter (P1-20). The vector control requires accurate setting or identification of the motor back electromotive force; Both control algorithms need to obtain accurate stator resistance, inductance parameters (P1-16 ~ P1-18); It is recommended sensorless vector control for driving solar PMSM pumps.

SP300

Permanent magnet motor model parameters are as follows: (obtained by parameter identification of motor auto tuning)

P1-16	Stator resistance	0.001Ω～65.535Ω(Rated power of inverter<=55kW) 0.0001Ω～6.5535Ω(Rated power of inverter>55kW)
P1-17	D-axis inductance	0.01mH～655.35mH(Rated power of inverter<=55kW) 0.001mH～65.535mH(Rated power of inverter>55kW)
P1-18	Q-axis inductance	
P1-20	Back Electromotive Force	0.1V～6553.5V

Synchronous motor parameter identification: P1-16 ~ P1-20 motor model parameters can be obtained through parameter identification, the following steps:

If the control algorithm for the scalar control (P0-01 = 0), carry the static auto tuning is okay, do not need to remove the load; vector control need to obtain accurate back EMF parameters, if the application site is not easy to disconnect the load,user can set Back electromotive force by manual.

(Note: When the P1-37 set to 1,2 for the asynchronous motor auto tuning; parameters from the learning, especially dynamic self-learning need to stabilize the power supply, the best use of AC electricity supply. Means we can do motor auto tuning with AC power input first before using in solar system.)

Notes :

Vector control related parameters: it is no need to adjust vector control related parameters in generally. Please see the below list.

P2-00 ~ P2-05 for the speed loop PI parameters, vector control is effective; adjust the PI parameters can get better speed control effect;

P2-13 ~ P2-16 for the axis current loop PI parameters, vector effective; adjust the parameters of the group can improve the stability, current response;

P2-17 ~ P2-18 for the vector control observer (observer) parameters, adjust the observer gain can improve the stability;

P2-21: Start pull into the current size settings, vector / scalar algorithm is valid; increase the pull-in current can improve the low-frequency start torque;

P2-30 ~ P2-34 for the scalar control parameters: P2-30 oscillation suppression used to improve the stability; P2-32 excitation depth for the search to obtain the minimum current;

P2-00	Speed loop proportional gain 1	1～100	
P2-01	Speed loop integral time 1	0.01s～10.00s	
P2-02	Switching frequency 1	0.00～P2-05	
P2-03	Speed loop proportional gain 2	1～100	
P2-04	Speed loop integral time 2	0.01s～10.00s	
P2-05	Switching frequency 2	P2-02～Maximum frequency	
P2-06	Slip compensation coefficient	50%～200%	
P2-07	Speed loop filter time constant	0.000s～0.100s	
P2-08	Vector control over excitation gain	0～200	
P2-10	Current upper limit / torque upper limit	0.0%～200.0%	
P2-13	M-axis current loop	0～20000	

	proportional gain		
P2-14	M-axis current loop integral gain	0～20000	
P2-15	T-axis current loop proportional gain	0～20000	
P2-16	T-axis current loop integral gain	0～20000	
P2-17	Observer gain	0.1% - 999.9%	
P2-18	Observe the filter time	0.1 - 100.0ms	
P2-19	AM pre-excitation gain	0 - 9999ms	
P2-20	PM open loop start mode	0: direct start; 1: position detection start 2: DC pull-in start	
P2-21	Pull in current	0.0% - 200.0%	
P2-22	MTPA gain	0.0% - 999.9%	
P2-23	MTPA filter	1ms - 9999ms	
P2-24	PMSM weak current limit	0.1% - 200.0%	
P2-25	PMSM Weak Magnetic Feedforward Gain	0.1% - 999.9%	
P2-26	PMSM weakening ratio gain	0 - 9999	
P2-27	PMSM weak Magnetic Integral Gain	0 - 9999	
P2-30	Oscillation suppression gain	0.1% - 100.0%	
P2-31	Current loop gain	0.1 - 20.0	
P2-32	Excitation depth	0.1% - 500.0%	
P2-33	Excitation control proportional gain	0 - 5000	
P2-34	Excitation control integral gain	0 - 5000	
P2-35	DC pull time	0 - 9999	
P2-36	DC pull-in transition frequency	0.0 - 100.0%	
P2-37	DC pull-in cut-off frequency	0.0 - 100.0%	