SPC SERIES

SOLAR PUMP INVERTER

PRODUCTS MANUAL

Energy Saving | Protection Motor | MPPT | Convenient To Use

M-SPC--EN-B

Contents

Safety Precautions

Please read this manual carefully and follow all safety precautions before moving, installing, operating and servicing the inverter. If ignored, physical injury or death may occur, or damage may occur to the devices.

If any physical injury or death or damage to the devices occurs for ignoring to the safety precautions in the manual, our company will not be responsible for any damages and we are not legally bound in any manner.

Safety Definition

Danger	Serious physical injury or even death may occur if not follow relevant requirements
Warning	Physical injury or damage to the devices may occur if not follow relevant requirements
Note	Physical hurt may occur if not follow relevant requirements
Qualified Electricians	People working on the device should take part in professional electrical and safety training, receive the certification and be familiar with all steps and requirements of installing, commissioning, operating and maintaining the device to avoid any emergency.

Safety Guidelines

	Only qualified electricians are allowed to operate on the inverter. Do not carry out any wiring and inspection or changing components when the power supply is applied. Ensure all input power supply is disconnected before wiring and checking and always wait for at least the time designated on the inverter or until the DC bus voltage is less than 36V.
	Do not refit the inverter unauthorized; otherwise fire, electric shock or other injury may occur.
	The base of the radiator may become hot during running. Do not touch to avoid hurt.
	The electrical parts and components inside the inverter are electrostatic. Take measurements to avoid electrostatic discharge during relevant operation.

Delivery And Installation

	Please install the inverter on fire-retardant material and keep the inverter away from combustible materials. Do not operate on the inverter if there is any damage or components loss to the inverter. Do not touch the inverter with wet items or body, otherwise electric shock may occur.

- ★ Select appropriate moving and installing tools to ensure a safe and normal running of the inverter and avoid physical injury or death. For physical safety, the erector should take some mechanical protective measurements, such as wearing safety shoes and working uniforms.
- ★ Do not carry the inverter by its cover. The cover may fall off.
- ★ Ensure to avoid physical shock or vibration during delivery and installation.
- ★ Install away from children and other public places.
- ★ The inverter cannot meet the requirements of low voltage protection in IEC61800-5-1 if the altitude of installation site is above 2000m.

Commissioning And Running

	Disconnect all power supplies applied to the inverter before the terminal wiring and wait for at least the designated time after disconnecting the power supply. High voltage is present inside the inverter during running. Do not carry out any operation except for the Panel setting. The inverter cannot be used as “Emergency-stop device”.If the inverter is used to break the motor suddenly, a mechanical braking device should be provided.

Note:

- ★ Do not switch on or off the input power supply of the inverter frequently.
- ★ For inverters that have been stored for a long time, check and fix the capacitance and try to run it again before utilization.
- ★ Cover the front board before running, otherwise electric shock may occur.

1. Product Overview

1.1. Unpacking Inspection

Check as follows after receiving products:

- Check that there are no damage and humidification to the package.
- Check the information on the type designation label on the outside of the package to verify that the drive is of the correct type.
- Check that there are no signs of water in the package and no signs of damage or breach to the inverter.
- Check the information on the type designation label on the outside of the package to verify that the name plate is of the correct type.
- Check to ensure the accessories (including user's manual and Inverter Panel) inside the device is

1.2. Type Designation Key

The type designation contains information on the inverter. The user can find the type designation on the type designation label attached to the inverter or the simple name plate.

SPC - 2K2 - L33
① ② ③

Sign	Description
①	Solar Pump Inverter
②	2.2KW
③	L:220/230/240V ; H:380/400V ; 11:Single phase input, single phase output 13:Single phase input, three phase output ; 33:Three-phase input, three-phase output

1.3. Product Specifications

Model	L11	L13	L33	H33
AC input voltage (V)	220(-15%)~240(+10%) (1PH)		220(-15%)~240 (+10%) (3PH)	380(-15%)~440 (+10%) (3PH)
Max. DC voltage (V)	440	440	440	800
Start-up voltage (V)	200	200	200	300
Lowest working voltage (V)	150	150	150	250
Recommended DC input voltage range (V)	200~400	200~400	200~400	300~750
Recommended MPP voltage (V)	330	330	330	550

1.4. Rated Specifications

Series	Model	Rated Output Power (Kw)	Rated Input Current (A)	Rated Output Current (A)
L11(0.4-2.2 Kw)	SPC-0K4-L11	0.4	6.5	4.2
	SPC-0K7-L11	0.75	9.3	7.2
	SPC-1K5-L11	1.5	15.7	10.2
	SPC-2K2-L11	2.2	24	14
L13(0.4-2.2 Kw)	SPC-0K4-L13	0.4	6.5	2.5
	SPC-0K7-L13	0.75	9.3	4.2
	SPC-1K5-L13	1.5	15.7	7.5
	SPC-2K2-L13	2.2	24	10
L33(4-7.5 Kw)	SPC-004-L33	4	17	16
	SPC-5K5-L33	5.5	25	20
	SPC-7K5-L33	7.5	33	30
H33(0.7-37 Kw)	SPC-0K7-H33	0.75	3.4	2.5
	SPC-1K5-H33	1.5	5.0	4.2
	SPC-2K2-H33	2.2	5.8	5.5
	SPC-004-H33	4.0	13.5	9.5
	SPC-5K5-H33	5.5	19.5	14
	SPC-7K5-H33	7.5	25	18.5
	SPC-011-H33	11	32	25
	SPC-015-H33	15	40	32
	SPC-018-H33	18.5	47	38
	SPC-022-H33	22	51	45
	SPC-030-H33	30	70	60
	SPC-037-H33	37	80	75

SPC Solar Pumping Inverter

2. Installation Guidelines

The chapter describes the mechanical installation and electric installation.

- Only qualified electricians are allowed to carry out what described in this chapter. Please operate as the instructions in Safety precautions. Ignoring these may cause physical injury or death or damage to the devices.
- Ensure the power supply of the inverter is disconnected during the operation. Wait for at least the time designated after the disconnection if the power supply is applied.
- The installation and design of the inverter should be complied with the requirement of the local laws and regulations in the installation site. If the installation infringes the requirement, our company will exempt from any responsibility. Additionally, if users do not comply with the suggestion, some damage beyond the assured maintenance range may occur.

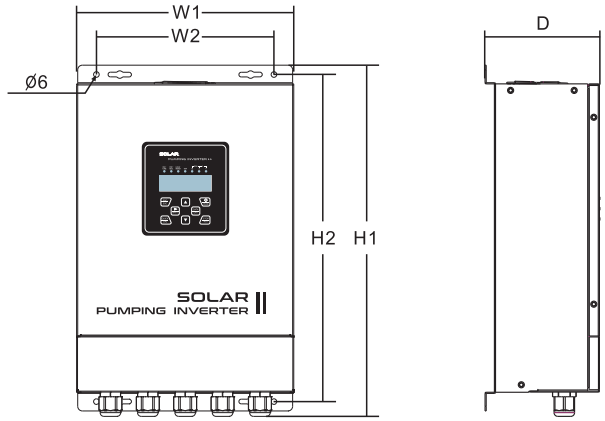
2.1. Mechanical Installation

2.1.1. Installation Environment

The installation environment is the safeguard for a full performance and long-term stable functions of the inverter. Check the installation environment as follows:

Environment	Conditions
Installation site	Indoor
Environment Temperature	The ambient temperature of inverter is -10°C~50°C while air temperature change should be less than 0.5°C per minute. The inverter will be derated once ambient temperature exceeds 40°C. It is not recommended to use the inverter if ambient temperature is above 50°C. To ensure reliability, do not use the inverter if the ambient temperature changes frequently. Provide cooling fan or air conditioner to Inverter the internal ambient temperature below the required one if the inverter is used in a close space such as in the Inverter cabinet. When the temperature is too low, if the inverter needs to restart to run after a long stop, it is necessary to provide an external heating device to increase the internal temperature, otherwise damage to the devices may occur.
Installation Site	Rh≤90%. No condensation is allowed.
Storage Temperature	-40°C~+70°C. The temperature change rate is less than 1°C/minute.
Running Environment Condition	The installation site of the inverter should: Keep away from the electromagnetic radiation source; Keep away from contaminative air, such as corrosive gas, oil mist and flammable gas; Ensure foreign objects, such as metal power, dust, oil, water cannot enter into the inverter(do not install the inverter on the flammable materials such as wood); Keep away from direct sunlight, oil mist, steam and vibration environment.
Altitude	Below 1000m. If the altitude is above 1000m, please derate 1% for every additional 100m.
Vibration	≤5.8m/s2(0.6g)
Installation Direction	The inverter should be installed on an upright position to ensure sufficient cooling effect.

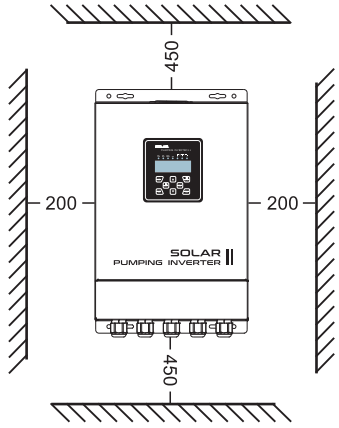
2.1.2. Dimensional Chart



Model	Height H1 (mm)	Width W1 (mm)	Depth D (mm)	Height H2 (mm)	Width W2 (mm)	Installation hole
0.4~2.2K	376	232	122	350	190	6
4-7K	428	282	152	400	240	6
7-11K	493	302	152	465	260	6

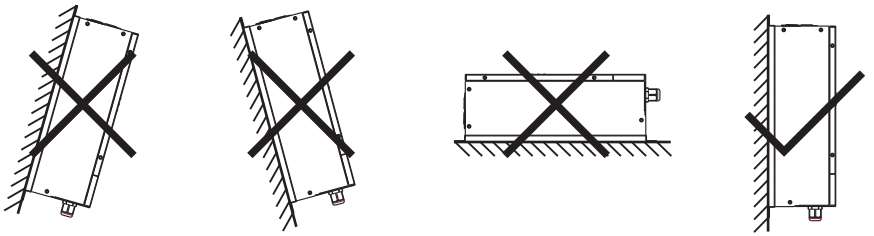
2.1.3. Installation Method

Select the installation site based on the following requirements:



Installation Distance(mm)

The mounting surface should be perpendicular to the horizontal line, as shown in the figure below.

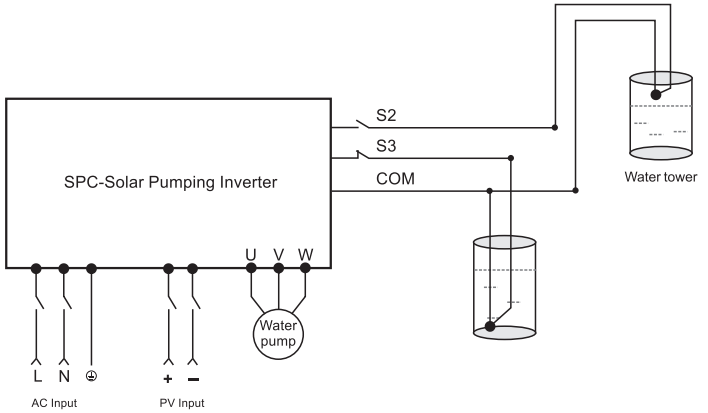


Installation location

2.2. Standard Wiring

2.2.1. Terminals Of Main Circuit

The figure below shows the standard wiring of inverter.



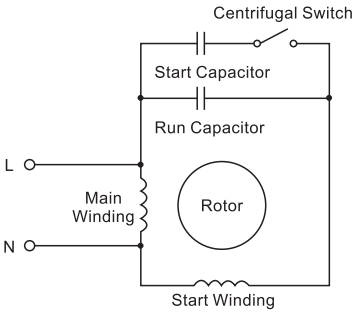
Description for -L11 single-phase output models

1) Generally, the output terminals L and N of the inverter connect to the phase cables of the single-phase motor.

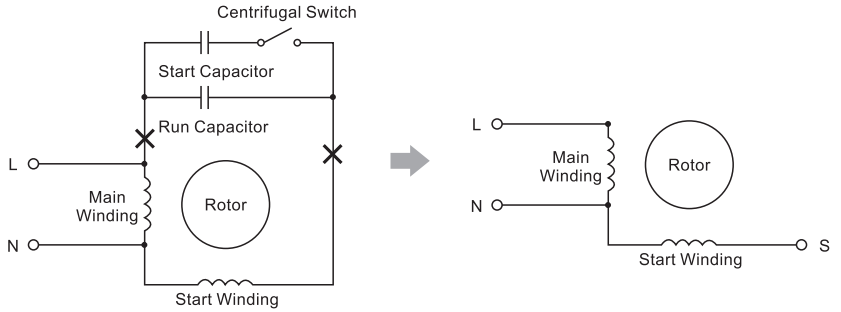
Warning: This type of wiring cannot be used with a two-value capacitor motor or a centrifugal switch to control the motor of the start capacitor. The motor or controller may be damaged.

2) If the single-phase pump cannot be started or used in a two-value capacitor motor or a centrifugal switch to control the starter capacitor motor, use a two-phase control method to remove the motor's starting capacitor and operating capacitor (if there is a running capacitor).

3) The internal wiring diagram of the ordinary single-phase motor is as follows. When the motor speed exceeds 75% of the rated speed, the starting capacitor is disconnected by the centrifugal switch.



Internal wiring of the single-phase motor winding after removing the starting and running capacitor:



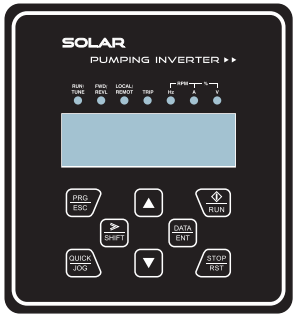
U1 and V1 are the common terminals of the windings. Connect them to the output terminal N of the solar Pumping Inverter. Connect U2 to the output terminal L of the inverter. Connect V2 to the output terminal V of the inverter. (Note: Use the screws equipped with the inverter.) Connect S4 of the inverter to COM in short circuited manner.

3. Panel Operation Procedure

3.1. Panel Introduction

Panel are used to Inverter SPC Solar Pumping Inverter series inverter, read the state data and adjust parameters.

SPC Solar Pumping Inverter



Name	Description	
State LED	RUN/TUNE	LED off means that the inverter is in the stopping state; LED blinking means the inverter is in the parameter autotune state;LED on means the inverter is in the running state.
	FWD/REV	FED/REV LED LED off means the inverter is in the forward rotation state; LED on means the inverter is in the reverse rotation state.
	LOCAL/REMOT	LED for Panel operation, terminals operation and remote communication Inverter. LED off means that the inverter is in the Panel operation state; LED blinking means the inverter is in the terminals operation state; LED on means the inverter is in the remote communication Inverter state.
	TRIP	LED for faults LED on when the inverter is in the fault state; LED off in normal state; LED blinking means the inverter is in the pre-alarm state.
Unit LED	Mean the unit displayed currently.	
	Hz	Frequency unit
	RPM	Rotating speed unit
	A	Current unit
	%	Percentage
	V	Voltage unit
Display zone	5-figure LED display displays various monitoring data and alarm code such as set frequency and output frequency.	

Name	Description							
Display zone	Display	Mean	Display	Mean	Display	Mean	Display	Mean
	0	0	1	1	2	2	3	3
	4	4	5	5	6	6	7	7
	8	8	9	9	A	A	b	B
	C	C	d	D	e	E	F	F
	H	H	I	I	L	L	N	N
	n	n	o	o	P	P	r	r
	S	S	t	t	u	U	v	v
	.	.	-	-				
Buttons	PRG/ESC	Programming key	Enter or escape from the first level menu and remove the parameter quickly.					
	QUICK/JOG	Quick key	The function of this key is confirmed by function code F07.02.					
	▲	UP key	Increase data or function code progressively.					
	▼	DOWN key	Decrease data or function code progressively					
	SHIFT	Right-shift key	Move right to select the displaying parameter circularly in stopping and running mode. Select the parameter modifying digit during the parameter modification.					
	DATA/ENT	Enter key	Enter the menu step-by-step. Confirm parameters.					
	RUN	Run key	This key is used to operate on the inverter in key operation mode.					
	STOP/RST	Stop/ Reset key	This key is used to stop in running state and it is limited by function code F07.04. This key is used to reset all Inverter modes in the fault alarm state.					
Panel port	External Panel port. When Panels are valid, both the local and external Panel LEDs are on.							

3.2. Keypad Displaying

The Panel displaying state of SPC Solar Pumping Inverter series inverter is divided into stopping state parameter, running state parameter, function code parameter editing state and fault alarm state and so on.

3.2.1. Displayed State Of Stopping Parameters

When the inverter is in the stopping state, the Panel will display stopping parameters.

In the stopping state, various kinds of parameters can be displayed. Select the parameters to be displayed or not by F07.07. See the instructions of F07.07 for the detailed definition of each bit.

In the stopping state, there are 4 parameters that can be displayed. They are: set frequency, bus voltage, input terminals state, and output terminals state.

≫/SHIFT can shift the parameters from left to right. QUICK/JOG (F07.02=2) can shift the parameters from right to left.

3.2.2. Displayed State Of Running Parameters

After the inverter receives valid running commands, the inverter will enter into the running state and the Panel will display the running parameters. RUN/TUNE LED on the Panel is on, while the FWD/REV is determined by the current running direction.

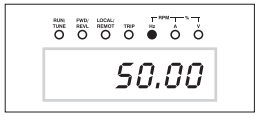
In the running state, there are 6 parameters that can be displayed. They are: running frequency, set frequency, bus voltage, output voltage, output current, and rotating speed. ≫/SHIFT can shift the parameters from left to right. QUICK/JOG (F07.02=2) can shift the parameters from right to left.

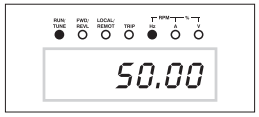
3.2.3. Displayed State Of Faults

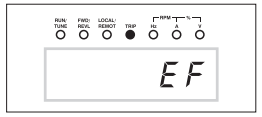
If the inverter detects the fault signal, it will enter into the fault pre-alarm displaying state. The Panel will display the fault code by flicking. The TRIP LED on the Panel is on, and the fault reset can be operated by the STOP/RST on the Panel, Inverter terminals or communication commands.

3.2.4. Displayed State Of Function Codes Editing

In the state of stopping, running or fault, press PRG/ESC to enter into the editing state (if there is a password, see F07.00). The editing state is displayed on two classes of menu, and the order is: function code group/function code number ⟶ function code parameter, press DATA/ENT into the displayed state of function parameter. On this state, press DATA/ENT to save the parameters or press PRG/ESC to escape.







3.3. Keypad Operation

Operate the inverter via operation panel. See the detailed structure description of function codes in the brief diagram of function codes.

3.3.1. How To Modify The Function Codes Of The Inverter

The inverter has three levels menu, which are:

1. Group number of function code (first-level menu)

2. Tab of function code (second-level menu)

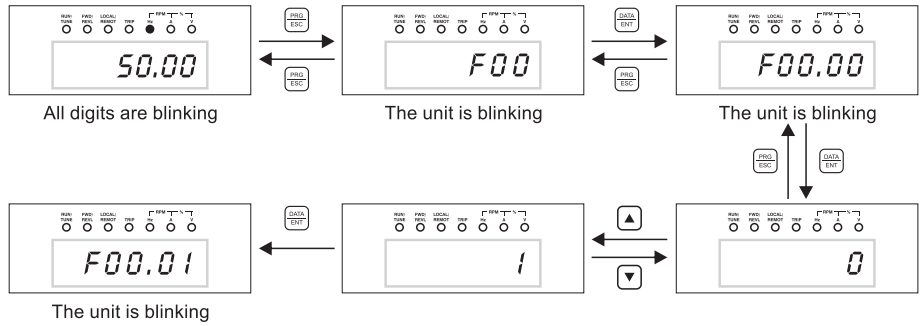
3. Set value of function code (third-level menu)

★ Remarks: Press both the PRG/ESC and the DATA/ENT can return to the second-level menu from the third-level menu. The difference is: pressing DATA/ENT will save the set parameters into the Inverter panel, and then return to the second-level menu with shifting to the next function code automatically; while pressing PRG/ESC will directly return to the second-level menu without saving the parameters, and keep staying at the current function code.

Under the third-level menu, if the parameter has no flickering bit, it means the function code cannot be modified. The possible reasons could be:

1) This function code is not modifiable parameter, such as actual detected parameter, operation records and so on;

2) This function code is not modifiable in running state, but modifiable in stop state. Example: Set function code F00.01 from 0 to 1.

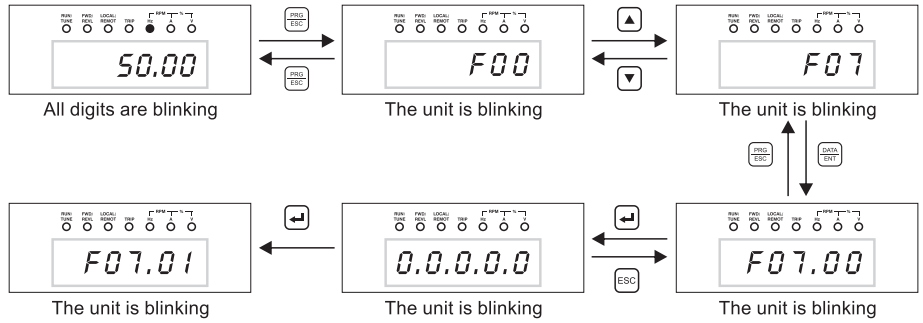


Note: When setting, ≫/SHIFT and ▲ + ▼ can be used for shifting and adjustment.

3.3.2. How To Set The Password Of The Inverter

SPC Solar Pumping Inverter series inverter provide password protection function to users. Set F07.00 to gain the password and the password protection becomes valid instantly after quitting from the function code editing state. Press PRG/ESC again to the function code editing state,“0.0.0.0.0” will be displayed. Unless using the correct password, the operators cannot enter it. Set F07.00 to 0 to cancel password protection function.

The password protection becomes effective instantly after retreating from the function code editing state. Press PRG/ESC again to the function code editing state, “0.0.0.0.0” will be displayed. Unless using the correct password, the operators cannot enter it.



Note: When setting, ≫/SHIFT and ▲ + ▼ can be used for shifting and adjustment.

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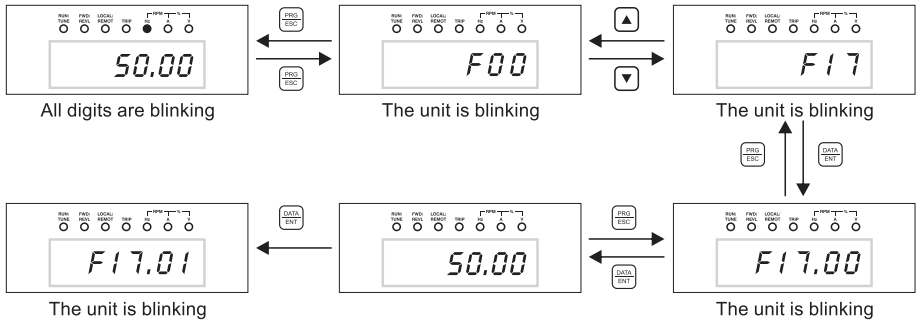
3.3.3. How To Watch The Inverter State Through Function Codes

SPC Solar Pumping Inverter series inverters provide group F17 as the state inspection group. Users can enter into F17 directly to watch the state.



4. Commissioning Guidelines

- Disconnect all power supplies applied to the inverter before the terminal wiring and wait for at least the designated time after disconnecting the power supply.
- High voltage is present inside the inverter during running. Do not carry out any operation except for the Panel setting.
- The inverter automatically runs once power on. If parameters need to be set, follow the guidelines in this chapter.

4.1. Inspection Before Operation

Before powering on the inverter, ensure that:

- The inverter is grounded reliably.
- The wiring is correct and reliable.
- The AC/DC breaker is selected correctly.
- The PV input voltage is in the allowed range of the inverter.
- The type, voltage, and power of the motor match those of the inverter.

4.2. Trial Run

Close the DC breaker. The inverter automatically runs with a delay of 10 seconds. Check the water yield of the pump. If the water yield is normal, the trial run is successful. If the water yield is under the normal value, exchange any two motor cables, connect the cables, and perform trial run again.

4.3. Parameter Settings

The inverter automatically runs by default once being powered on. If you want to set parameters, press QUICK/JOG within 10 seconds since the inverter power-on to switch to the Panel Inverter mode (LOCAL/REMOT is off) and then set parameters. If the running indicator is already on after the inverter is powered on, press STOP/RST to enter the parameter setting mode. After parameter setting, turn off and then turn on the power switch. The inverter runs again.

4.4. Advanced Settings

Note: The default settings of the inverter for the water pump can apply to most conditions and the advanced settings are not required in most cases.

4.4.1. FI Adjustment To The Water Yield

If the user requires large or low water yield, it is necessary to adjust FI (F15.06~F15.10) properly. The bigger FI parameters, the stronger the effect is, but the frequency fluctuation of the motor is bigger. In reserve, the lower the water yield is, the more stable the motor frequency is.

4.4.2. Special Settings For Single Phase Motors

a) When the single phase motor is in bad running performance, the user can adjust F04 VF curve settings: set F04.00=1 and set F04.03~F04.08 to appropriate values according to commissioning conditions; increase the voltage if the motor cannot start and decrease the voltage if the current is high.

b) When the light is normal and the system starts slowly, increase F15.28 initial voltage differential value appropriately.

c) For single phase motors with two-phase Inverter (capacitor-removing):

① The maximum voltage needs to be less than 1/1.6 of the bus voltage. It is recommended to set the rated voltage F02.04 less than 200V, or limit the maximum voltage output by multi-dot V/F curve.

② Observe the currents of the windings through F17.38 and F17.39, the switched current is the combination current of the two windings. The impedances of the windings are different, so the currents are different at the same voltage output.

③ F04.35 can be used to change the output currents of the main and secondary windings. It is recommended that qualified engineers perform adjustment since the voltage adjustment is associated with motor design parameters. Otherwise, the motor performance may be impacted.

5. Function Parameters

☆: means the set value of the parameter can be modified on stop and running state;

★: means the set value of the parameter cannot be modified on the running state;

●: means the value of the parameter is the real detection value which cannot be modified;

Note: The inverter implements auto checking and restriction on the parameter modification property. This prevents users from modifying parameters by misoperation.

5.1. Common Function Parameters For Solar Pumping Inverter

Function code	Name	Detailed illustration of parameters	Default	Modify
F00 Group Basic function group				
F00.00	Speed Inverter mode	0: SVC 0 No need to install encoders. Suitable in applications which need low frequency, big torque for high accuracy of rotating speed and torque Inverter. Relative to mode 1, it is more suitable for the applications which need small power. 1: SVC 1	2	★

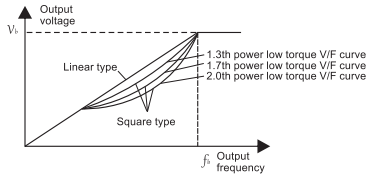
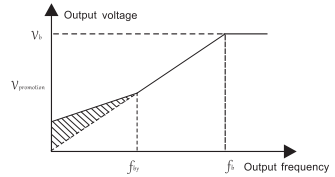
Function code	Name	Detailed illustration of parameters	Default	Modify
		1 is suitable in high performance cases with the advantage of high accuracy of rotating speed and torque. It does not need to install pulse encoder. 2: SVPWM Inverter 2 is suitable in applications which do not need high Inverter accuracy, such as the load of fan and pump, and suitable when one inverter drives multiple motors. Note: In vector Inverter, the inverter must autotune motor parameters first.		
F00.01	Run command hannel	Select the run command channel of the inverter. The Inverter command of the inverter includes: start, stop, forward/reverse rotating, jogging and fault reset. 0: Keypad running command channel ("LOCAL/REMOT" light off) Carry out the command Inverter by RUN, STOP on the Panel. Set the multi-function key QUICK to FWD/REV shifting function (F07.02=3) to change the running direction; press RUN and STOP simultaneously in running state to make the inverter coast to stop. 1: Terminal running command channel ("LOCAL/REMOT " flickering)Carry out the running command Inverter by the forward rotation, reverse rotation and forward jogging and reverse jogging of the multi-function terminals. 2: Communication running commandchannel (" LOCAL/REMOT " on);The running command is Inverter by the upper monitor via communication.	1	☆
F00.03	Max. output frequency	This parameter is used to set the maximum output frequency of the inverter. Users need to pay attention to this parameter because it is the foundation of the frequency setting and the speed of acceleration and deceleration. Setting range: F00.04~400.00Hz	50.00Hz	★
F00.04	Upper limit of the running frequency	The upper limit of the running frequency is the upper limit of the output frequency of the inverter which is lower than or equal to the maximum frequency. Setting range: F00.05~F00.03 (Max.output frequency)	50.00Hz	★

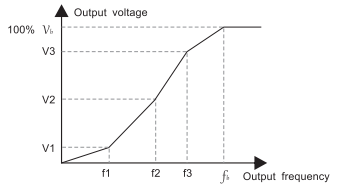
Function code	Name	Detailed illustration of parameters	Default	Modify
F00.05	Lower limit of the running frequency	The lower limit of the running frequency is that of the output frequency of the inverter. The inverter runs at the lower limit frequency if the set frequency is lower than the lower limit. **Note:** Max. output frequency ⩾ Upper limit frequency ⩾ Lower limit frequency. Setting range: 0.00Hz~F00.04 (Upper limit of the running frequency)	0.00Hz	★
F00.11	ACC time 1	ACC time means the time needed if the inverter speeds up from 0Hz to the Max. output frequency (F00.03). DEC time means the time needed if the inverter speeds down from the Max. Output frequency to 0Hz (F00.03). SPC series inverters have four groups of ACC/DEC time which can be selected by F05. The factory default ACC/DEC time of the inverter is the first group. Setting range of F00.11 and F00.12: 0.0~3600.0s	Depend on mode	☆
F00.12	DEC time 1		Depend on mode	☆
F00.13	Running direction selection	0: Runs at the default direction. The inverter runs in the forward direction. FWD/REV indicator is off. 1: Runs at the opposite direction. The inverter runs in the reverse direction. FWD/REV indicator is on. Modify the function code to shift the rotation direction of the motor. This effect equals to the shifting the rotation direction by adjusting either two of the motor lines (U, V and W). The motor rotation direction can be changed by QUICK on the Panel. Refer to parameter F07.02. **Note:** When the function parameter comes back to the default value, the motor's running direction will come back to the factory default state, too. In pump application scenarios, the inverter cannot run in the reverse direction. This function code cannot be modified. 2: Forbid to run in reverse direction: It can be used in some special cases if the reverse running is disabled.	0	☆
F00.15	Motor parameter autotuning	0: No operation 1: Rotation autotuning Comprehensive motor parameter autotune. It is recommended to use rotation autotuning when high Inverter accuracy is needed. 2: Static autotuning It is suitable in the cases when the motor cannot	0	★

Function code	Name	Detailed illustration of parameters		Default	Modify
		de-couple form the load. The antotuning for the motor parameter will impact the Inverter accuracy. 3: Static autotuning 2 (No autotuning for non-load current and mutual inductance)			
F00.18	Function restore parameter	0: No operation 1: Restore the default value 2: Clear fault records **Note:** The function code will restore to 0 after finishing the operation of the selected function code. Restoring to the default value will cancel the user password. Use this function with caution.		0	★
F01 Group Start-up and stop Inverter					
F01.08	Stop mode	0: Decelerate to stop. After the stop command becomes valid, the inverter decelerates to reduce the output frequency during the set time. When the frequency decreases to 0Hz, the inverter stops. 1: Coast to stop. After the stop command becomes valid, the inverter ceases the output immediately. And the load coasts to stop at the mechanical inertia.		0	☆
F01.18	Operation protection	0: The terminal running command is invalid when powering on. 1: The terminal running command is valid when powering on.		1	☆
F01.21	Restart after power off	0: Disabled 1: Enabled		1	☆
F02 Group Motor 1 parameters					
F02.00	Motor type	0: Asynchronous motor 1: Reserved		0	★
F02.01	Rated power of asynchronous motor	0.1~3000.0kW	Set the parameter of the asynchronous motor. In order to ensure the Inverterling performance, set the F02.01~F02.05 according to the name plate of the asynchronous motor. SPC series inverters provide the function of parameter autotuning. Correct	Depend on model	★
F02.02	Rated frequency of asynchronous motor	0.01Hz~F00.03		50.00Hz	★
F02.03	Rated rotating speed of asynchronous motor	1~36000rpm		Depend on model	★

Function code	Name	Detailed illustration of parameters		Default	Modify
F02.04	Rated voltage of asynchronous motor	0~1200V	parameter autotuning comes from the correct setting of the motor name plate. In order to ensure the Inverterling performance, please configure the motor according to the standard principles, if the gap between the motor and the standard one is huge, the features of the inverter will decrease. **Note:** Resetting the rated power (F02.01) of the motor can initialize the motor parameters F02.02~F02.10.	Depend on model	★
F02.05	Rated current of asynchronous motor	0.8~6000.0A		Depend on model	★
F02.06	Stator resistor of asynchronous motor	0.001~65.535Ω	After the motor parameter autotuning finishes, the set values of F02.06~F02.10 will be updated automatically. These parameters are basic parameters Inverterled by vectors which directly impact the features. **Note:** Users cannot modify the parameters freely.	Depend on model	☆
F02.07	Rotor resistor of asynchronous motor	0.001~65.535Ω		Depend on model	☆
F02.08	Leakage inductance of asynchronous motor	0.1~6553.5mH		Depend on model	☆
F02.09	Mutual inductance of asynchronous motor	0.1~6553.5mH		Depend on model	☆
F02.10	Non-load current of asynchronous motor	0.1~6553.5A		Depend on model	☆
F04 Group SVPWM Inverter					
F04.00	V/F curve setting	These function codes define the V/F curve of SPC series motor 1 to meet the need of different loads. 0: Straight line V/F curve; applying to the constant torque load 1: Multi-dots V/F curve 2: 1.3th power low torque V/F curve 3: 1.7th power low torque V/F curve 4: 2.0th power low torque V/F curve Curves 2~4 apply to the torque loads such as fans and water pumps. Users can adjust according to the features of the loads to get the best performance.		4	★

SPC Solar Pumping Inverter

Function code	Name	Detailed illustration of parameters	Default	Modify
		5: Customized V/F(V/F separation); in this mode, V can be separated from f and f can be adjusted through the frequency given channel set by F00.06 or the voltage given channel set by F04.27 to change the feature of the curve. 		
F04.01	Torque boost	Torque boost to the output voltage for the features of low frequency torque. F04.01 is for the Max. output voltage Vb. F04.02 defines the percentage of closing frequency of manual torque to fb. Torque boost should be selected according to the load. The bigger the load is, the bigger the torque is. Too big torque boost is inappropriate because the motor will run with over magnetic, and the current of the inverter will increase to add the temperature of the inverter and decrease the efficiency. When the torque boost is set to 0.0%, the inverter is automatic torque boost. Torque boost threshold: below this frequency point, the torque boost is valid, but over this frequency point, the torque boost is invalid.  Setting range of F04.01: 0.0%: (automatic) 0.1%~10.0% Setting range of F04.02: 0.0%~50.0%	0.0%	☆
F04.02	Torque boost close		20.0%	☆
F04.03	V/F frequency point 1 of motor 1	If F04.00 =1, the user can set V//F curve by F04.03~F04.08. V/F is set to the motor load. Note: V1＜V2＜V3; f1＜f2＜f3. If the low-frequency voltage is high, overtemperature and burning may occur and the overcurrent stall and protection may occur to the inverter.	0.00Hz	☆
F04.04	V/F voltage point 1 of motor 1		00.0%	☆
F04.05	V/F frequency point 2 of motor 1		00.00Hz	☆

Function code	Name	Detailed illustration of parameters	Default	Modify
F04.06	V/F voltage point 2 of motor 1	 Setting range of F04.03: 0.00Hz~F04.05 Setting range of F04.04: 0.0%~110.0% (rated voltage of motor1) Setting range of F04.05: F04.03~F04.07 Setting range of F04.06:0.0%~110.0%(rated voltage of motor1) Setting range of F04.07: F04.05~F02.02(rated frequency of motor1) or F04.05~F02.16(rated frequency of motor1) Setting range of F04.08: 0.0%~110.0%(rated voltage of motor1)	00.0%	☆
F04.07	V/F frequency point 3 of motor 1		00.00Hz	☆
F04.08	V/F voltage point 3 of motor 1		00.0%	☆
F04.09	V/F slip compensation gain	This function code is used to compensate the change of the rotation speed caused by load during compensation SVPWM Inverter to improve the rigidity of the motor. It can be set to the rated slip frequency of the motor which is counted as below: △f=fb-n*p/60 Of which, fb is the rated frequency of the motor, its function code is F02.01; n is the rated rotating speed of the motor and its function code is F02.02; p is the pole pair of the motor. 100.0% corresponds to the rated slip frequency△f. Setting range: 0.0~200.0%	0.0%	☆
F04.34	Single-phase drive mode	Ones: Single-phase motor Inverter mode 0: Disabled; 1: Enabled (The function is reserved. The Inverter mode of the single-phase motor is specified by the external terminal command.) Tens: Voltage of the secondary winding (V phase) reverse 0: Not reversed; 1: Reversed Setting range: 0~0x11	0x00	★
F04.35	Voltage ratio of V and U	0.00~2.00	1.40	☆
F05 Group Input terminals				
F05.00	HDI input type	0: High-speed pulse input. See F05.49~F05.54. 1: HDI switch input	1	★

Function code	Name	Detailed illustration of parameters	Default	Modify
F05.01	S1 terminals function selection	0: No function 1: Forward rotation operation 2: Reverse rotation operation 3: 3-wire Inverter operation 4: Forward jogging 5: Reverse jogging 6: Coast to stop 7: Fault reset 8: Operation pause 9: External fault input 10: Increasing frequency setting(UP) 11: Decreasing frequency setting(DOWN) 12: Cancel the frequency change setting 13: Shift between A setting and B setting 14: Shift between combination setting and A setting 15: Shift between combination setting and B setting 16: Multi-step speed terminal 1 17: Multi-step speed terminal 2 18: Multi-step speed terminal 3 19: Multi-step speed terminal 4 20: Multi-step speed pause 21: ACC/DEC time 1 22: ACC/DEC time 2 23: Simple PLC stop reset 24: Simple PLC pause 25: PID Inverter pause 26: Traverse pause (stop at the current frequency) 27: Traverse reset (return to the center frequency) 28: Counter reset 29: Torque Inverter prohibition 30: ACC/DEC prohibition 31: Counter trigger 32: Reserved 33: Cancel the frequency change setting 34: DC brake 35: Reserved 36: Shift the command to the Panel 37: Shift the command to terminals 38: Shift the command to communication 39: Pre-magnetized command 40: Clear the power 41: Keep the power 42: Forced switch to power frequency input (Switching-on indicates switching to power frequency input; switching-off indicates the input mode is Inverterled by the Panel.) 43: Full water signal 44: Non-water signal 45: Two-phase Inverter mode of the single-phase motor 46: PV voltage digital input when no boost module is applied (in auto switching mode) 47~63: Reserved	42	★
F05.02	S2 terminals function selection		43	★
F05.03	S3 terminals function selection		44	★
F05.04	S4 terminals function selection		45	★
F05.05	S5 terminals function selection		1	
F05.09	HDI terminals function selection		46	★

Function code	Name	Detailed illustration of parameters	Default	Modify
F05.10	Polarity selection of the input terminals	0x000~0x10F BIT8 BIT3 BIT2 BIT1 BIT0 HDI S4 S3 S2 S1	0x000	★
F06 Group Output terminals				
F06.03	Relay RO1 output selection	0: Invalid 1: In operation 2: Forward rotation operation 3: Reverse rotation operation 4: Jogging operation 5: Inverter fault 6: Frequency degree test FDT1 7: Frequency degree test FDT2 8: Frequency arrival 9: Zero speed running 10: Upper limit frequency arrival 11: Lower limit frequency arrival 12: Ready for operation 13: Pre-magnetizing 14: Overload alarm 15: Underload alarm 16: Completion of simple PLC stage 17: Completion of simple PLC cycle 18: Setting count value arrival 19: Defined count value arrival 20: External fault valid 21: Reserved 22: Running time arrival 23: MODBUS communication virtual terminals output 24~26: Reserved 27: Weak light 28~29: Reserved 30: Shift to PV mode (If the system works in PV mode, relay output is high.)	30	☆
F06.04	Relay RO2 output selection		5	☆
F06.05	Polarity selection of output terminals	The function code is used to set the pole of the output terminal. When the current bit is set to 0, output terminal is positive. When the current bit is set to 1, output terminal is negative. BIT1 BIT0 RO2 Ro2 Setting range: 0~F	0	☆
F06.10	Switch on delay of Ro1	0.000~50.000s	10.000s	☆

Function code	Name	Detailed illustration of parameters	Default	Modify
F06.11	Switch off delay of Ro1	0.000~50.000s	10.000s	☆
F06.12	Switch on delay of Ro2	0.000~50.000s	0.000s	☆
F06.13	Switch off delay of Ro2	0.000~50.000s	0.000s	☆
F07 Group Human-Machine Interface				
F07.02	**QUICK** function selection	0: No function 1: Jogging running. Press QUICK to begin the jogging running. 2: Shift the display state by the shifting key. Press QUICK to shift the displayed function code from right to left. 3: Shift between forward rotations and reverse rotations. Press QUICK to shift the direction of the frequency commands. This function is only valid in the Panel commands channels. 4: Clear UP/DOWN settings. Press QUICK to clear the set value of UP/DOWN. 5: Coast to stop. Press QUICK to coast to stop. 6: Shift the running commands source. Press QUICK to shift the running commands source. 7: Quick commissioning mode (based on non-factory parameters) **Note:** Press QUICK to shift between forward rotation and reverse rotation, the inverter does not record the state after shifting during powering off. The inverter will run according to parameter F00.13 during next powering on.	6	★
F07.03	**QUICK** the shifting sequence of running command	When F07.02=6, set the shifting sequence of running command channels. 0: Keypad Inverter→terminal Inverter→ communication Inverter 1: Panel Inverter←→terminals Inverter 2: Panel Inverter←→communication Inverter 3: Terminals Inverter←→communication Inverter	1	☆
F07.04	**STOP** stop function	Select the stop function by STOP. STOP is effective in any state for the Panel reset. 0: Only valid for the Panel Inverter 1: Both valid for Panel and terminals Inverter	1	☆

Function code	Name	Detailed illustration of parameters	Default	Modify
		2: Both valid for Panel and communication Inverter 3: Valid for all Inverter modes		
F07.11	Boost module temperature	When the inverter is configured with the boost module, this function code displays the temperature of this module. This function code is valid only in the AC mode. This function code is invalid in the PV mode. −20.0~120.0°		●
F07.12	Inverter module temperature	−20.0~120.0°		●
F07.15	MSB of inverter power consumption	Display the power used by the inverter. Inverter power consumption=F07.15*1000+F07.16 Setting range of F07.15: 0~65535(*1000) Setting range of F07.16: 0.0~999.9 Unit: kWh		●
F07.16	LSB of inverter power consumption			●
F07.27	Current fault type	0:No fault 1:IGBT U phase protection(OUt1) 2:IGBT V phase protection(OUt2) 3:IGBT W phase protection(OUt3) 4:OC1 5:OC2 6:OC3 7:OV1 8:OV2 9:OV3 10:UV 11:Motor overload(OL1) 12:The inverter overload(OL2) 13:Input side phase loss(SPI) 14:Output side phase loss(SPO) 15: Overheat of the boost module (Oh1) 16: Overheat fault of the inverter module(OH2) 17: External fault(EF) 18: 485 communication fault(CE) 19:Current detection fault(ItE) 20:Motor antotune fault(tE) 21: EEPROM operation fault(EEP) 22: PID response offline fault(PIDE) 23: Braking unit fault(bCE) 24: Running time arrival(END) 25: Electrical overload(OL3) 26~31:Reserved 32: Grounding short circuit fault 1(ETH1) 33: Grounding short circuit fault 2(ETH2) 34: Speed deviation fault(dEu)		●
F07.28	Previous fault type			●
F07.29	Previous 2 fault type			●
F07.30	Previous 3 fault type			●
F07.31	Previous 4 fault type			●
F07.32	Previous 5 fault type			●
F07.57	Previous 6 fault type			●
F07.58	Previous 7 fault type			●
F07.59	Previous 8 fault type			●
F07.60	Previous 9 fault type			●
F07.61	Previous 10 fault type			●

Function code	Name	Detailed illustration of parameters	Default	Modify
F07.62	Previous 11 fault type	35: Maladjustment(STo) 36:Underload fault(LL) 37: Hydraulic probe damage(tSF) 38: PV reverse connection fault(PINV) 39: PV overcurrent(PVOC) 40: PV overvoltage(PVOV) 41:PV undervoltage(PVLV) 42: Fault on communication with the boost module (E-422) 43: Bus overvoltage detected on the boost module (OV) **Note:** Faults 38~40 can be detected in boost. The boost module stops working once after detecting a fault. The boost module sends back the fault information to the inverter module in the next data sendback. Alarms: Weak light alarm (A-LS) Underload alarm (A-LL) Full water alarm (A-tF) Water-empty alarm (A-tL)		●
F07.63	Previous 12 fault type			●
F07.64	Previous 13 fault type			●
F07.65	Previous 14 fault type			●
F07.66	Previous 15 fault type			●
F07.67	Previous 16 fault type			●
F07.68	Previous 17 fault type			●
F07.69	Previous 18 fault type			●
F07.70	Previous 19 fault type			●
F07.71	Previous 20 fault type			●
F08 Group Enhanced functions				
F08.28	Times of fault reset	0~10	5	☆
F08.29	Interval time of automatic fault reset	0.1~3600.0s	10.0s	☆

5.2. Parameters Of Special Functions

Function code	Name	Detailed illustration of parameters	Default	Modify
F11 Group Protective parameters				
F11.01	Frequency decrease at sudden power loss	0: Disable 1: Enable	0	☆

Function code	Name	Detailed illustration of parameters	Default	Modify
F11.02	Frequency decrease ratio at sudden power loss	Setting range: 0.00Hz~F00.03/s After the power loss of the grid, the bus voltage drops to the sudden frequency decrease point, the inverter begin to decrease the running frequency at F11.02, to make the inverter generate power again. The returning power can maintain the bus voltage to ensure a rated running of the inverter until the recovery of power. Voltage degree: 220V / 400V Frequency decrease point: 260V / 460V	0.00Hz/s	☆
F15 Group Special Functions For PV Inverters				
F15.00	PV inverter selection	0: Invalid 1: Enable 0 means the function is invalid and the group of parameters cannot be used 1 means the function is enabled, and F15 parameters can be adjusted	1	★
F15.01	Vmpp voltage reference	0: Voltage reference 1: Max. power tracking 0 means to apply voltage reference mode. The reference is a fixed value and given by F15.02. 1 means to apply the reference voltage of Max. power tracking. The voltage is changing until the system is stable. Note: If terminal 43 is valid, the function is invalid.	1	★
F15.02	Vmpp voltage Panel reference	0.0~6553.5Vdc If F15.01 is 0, the reference voltage is given by F15.02. (During test, reference voltage should be lower than PV input voltage; otherwise, the system will run at lower limit of frequency).	250.0V	☆
F15.03	PI Inverter deviation	0.0~100.0% (100.0% corresponds to F15.02) If the ratio percentage of real voltage to reference voltage, which is abs(bus voltage-reference	0.0%	☆

Function code	Name	Detailed illustration of parameters	Default	Modify
		voltage)*100.0%/ reference voltage, exceeds the deviation limit of F15.03, PI adjustment is available; otherwise, there is no PI adjustment and the value is defaulted to be 0.0%. abs: absolute value		
F15.04	Upper frequency of PI output	F15.05~100.0% (100.0% corresponds to F00.03) F15.04 is used to limit the Max. value of target frequency, and 100.0% corresponds to F00.03. After PI adjustment, the target frequency cannot exceed the upper limit.	100.0%	☆
F15.05	Lower frequency of PI output	0.0%~F15.04 (100.0% corresponds to F00.03) F15.05 is used to limit the Min. value of target frequency, and 100.0% corresponds to F00.03. After PI adjustment, the target frequency cannot be less than the lower limit.	20.0%	☆
F15.06	KF1	0.00~100.00 Proportion coefficient 1 of the target frequency The bigger the value is, the stronger the effect and faster the adjustment is.	5.00	☆
F15.07	KI1	0.00~100.00 Integral coefficient 1 of the target frequency The bigger the value is, the stronger the effect and faster the adjustment is.	5.00	☆
F15.08	KP2	0.00~100.00 Proportion coefficient 2 of the target frequency The bigger the value is, the stronger the effect and faster the adjustment is.	35.00	☆
F15.09	KI2	0.00~100.00 Integral coefficient 2 of the target frequency The bigger the value is, the stronger the effect and faster the adjustment is.	35.00	☆
F15.10	PI switching point	0.0~6553.5Vdc If the absolute value of bus voltage minus the reference value is bigger than F15.10, it will switch to F15.08 and F15.09; otherwise it is F15.06 and F15.07.	20.0V	★
F15.11	Water level Inverter	0: Digital input of the water-level Inverter 1: AI1(the water-level signal is input through AI1, not supported currently)	0	★

Function code	Name	Detailed illustration of parameters	Default	Modify
		2: AI2 (the water-level signal is input through Ai2) 3: AI3 (the water-level signal is input through Ai3) If the function code is 0, the water-level signal is Inverterled by the digital input. See 43 and 44 functions of S terminals in group F05 for detailed information. If the full-water signal is valid, the system will report the alarm (A-tF) and sleep after the time of F15.14. During the alarm, the full-water signal is invalid and the system will clear the alarm after the time of F15.15. If the empty-water signal is valid, the system will report the alarm (A-tL) and sleep after the time of F15.16. During the alarm, the empty -water signal is invalid and the system will clear the alarm after the time of F15.17. If the function code is 1~3, it is the reference of water-level Inverter analog signal. For details, see F15.12 and F12.13.		
F15.12	Full-water level threshold	0.0~100.0% This code is valid when F15.11 water level Inverter is based on analog input. If the detected water level Inverter analog signal is less than the water level threshold F15.12 and keeps in the state after the delay time F15.14, the system reports A-tF and sleeps. If the delay time is not reached, the signal is bigger than the water level threshold, the time will be cleared automatically. When the measured water level Inverter analog signal is less than the water level threshold, the delay time will be counted again. 0 is full water and 1 is no water. During the full-water alarm, if the detected water level signal is higher than the threshold of F15.12 and the delay counts, the alarm is cleared after the time set by F15.15 is reached in this continuous state continues. During the non-continuous application, the delay timing will clear automatically.	25.0%	☆
F15.13	Empty-water level threshold	0.0~100.0% This code is valid when F15.11 water level Inverter is based on analog input. If the detected water level Inverter analog signal is greater than the water level threshold F15.13 and keeps in the state after the delay time F15.16, the system reports A- tL and sleeps. If the delay time is not reached (that means non-continuous), the delay time is automatically cleared. When the detected water level Inverter analog signal is less than the water level threshold, the delay counts.	75.0%	☆

Function code	Name	Detailed illustration of parameters	Default	Modify
		During the empty-water alarm, if the detected water level Inverter analog signal is less than the water level threshold F15.13 and delay counts, the empty-water alarm is cleared after the delay time set by F15.17 in this continous state. In the non-continuous state, the delay time is automatically cleared. abs: absolute value		
F15.14	Full water delay	0~10000s Time setting of full water delay (This function code is still valid when the digital indicates the full-water signal.)	5s	☆
F15.15	Wake-up delay in full water state	0~10000s Time setting of wake-up delay in full-water state (This function code is still valid when the digital indicates the full-water signal.)	20s	☆
F15.16	Empty-water delay	0~10000s Time setting of empty-water delay (This function code is still valid when the digital indicates the empty-water signal.)	5s	☆
F15.17	Wake-up delay in empty-water state	0~10000s Time setting of wake-up delay in empty-water state (This function code is still valid when the digital indicates the empty-water signal.)	20s	☆
F15.18	Hydraulic probe damage	0.0~100.0% 0.0%: Invalid. If it is not 0.0%, when the signal is longer than F15.18, it will report tSF fault directly and stop.	0.0%	★
F15.23	Delay time of weak light	0.0~3600.0s Delay time of weak light If the output frequency is less than or equal to the lower limit of PI output frequency and the state lasts for the set value, it will report A-LS and sleep. If the state is not continuous, the delay counting will be cleared automatically. **Note:** If the bus voltage is lower than the undervoltage point or the PV voltage is lower than 70V, it will report the weak light alarm without any delay time.	100.0s	☆
F15.24	Delay time of wake-up at weak light	0.0~3600.0s Delay time of wake-up at weak light If the weak light alarm is reported, after the delay	300.0s	☆

Function code	Name	Detailed illustration of parameters	Default	Modify
		time of wake-up, the alarm will be cleared and it will run again. When F15.32=0, if the PV voltage is higher than F15.34, after the delay time,it will switch to PV input mode.		
F15.25	Initial reference voltage display	0.0~2000.0V	0	●
F15.26	Min. voltage reference during max. power tracking	0.00~1.00 This function code is used to set the minimum voltage reference during maximum power tracking. Min. voltage reference during max. power tracking = Solar cell panel open-circuit voltage * F15.26. Solar cell panel open-circuit voltage = F15.25+ F15.28 Track the maximum power in the range of Min. voltage reference~F15.27. F15.27 must be greater than Min. voltage reference. The less the difference, the faster the tracking is. The maximum voltage needs to be in the range. F15.26 and F15.27 can be adjusted according to site operation.	0.70	☆
F15.27	Max. voltage reference during max. power tracking	Min. voltage reference during max. power tracking~F15.31 Valid in MPPT Max. tracking voltage, the tracked max. voltage The default value depends on model.	400.0V	☆
F15.28	Adjustment of initial reference voltage	0.0~200.0V MPPT begins to change from the reference voltage Initial reference voltage =PV voltage-F15.28	5.0V	☆
F15.29	Adjustment of upper and lower imit time of Vmppt	0.0~10.0s When F15.29 is set to 0.0, the automatic adjustment is invalid. If it is not 0.0, the upper and lower limits of Vmppt will be adjusted automatically at the inveral set by	1.0s	☆

Model	Max. voltage reference	Max. Vmppt
L11	400	400
L13	400	400
L33	400	400
H33	750	750

Function code	Name	Detailed illustration of parameters	Default	Modify
		F15.29. The medium value is the current PV voltage and the limit is F15.30: Maximum/Minimum reference voltage=Current PV voltge±F15.30 and it will update to F15.26 and F15.27 at the same time.		
F15.30	Adjustment of upper and lower limits of Vmppt	5.0~100.0V Adjustment of the upper and lower limits	30.0V	☆
F15.31	Max. value of Vmppt	F15.27~6553.5V The upper limit cannot exceed the F15.28 when Vmppt is the maximum value. During the maximum power tracking, the upper limit of the solar cell panel reference voltage will not exceed the value set by F15.31. The factory value depends on the model. By default, the value for the H33 models is 750V and the value for other models is 400V.	400.0V	☆
F15.32	PV input and power frequency input selection	0: Automatic shift 1: Power frequency input 2: PV input If the value is 0, the system will switch between PV input and power frequency input according to the detected PV voltage and threshold; If the value is 1, the system will force to switch to power frequency input; If the value is 2, the system will force to switch to PV input. **Note:** When the terminal input 42 is valid, the function code will be invalid.	2	★
F15.33	Threshold to switch to power frequency input	0.0V~F15.34 If PV voltage is lower than the threshold or the light is weak, it can switch to power frequency input through the relay output. If the value is 0, it is invalid. For inverters without the boost module, the switching point voltage is determined by the external voltage detection circuit. For inverters with the boost module, the switching point voltage is 70V.	70.0V	☆
F15.34	Threshold to switch to PV input	F15.33~400.0V If PV voltage is greater than the threshold, it can switch to PV input through the relay output after the time set by F15.24. To prevent frequent switching, this threshold must be greater than F15.33.If the value is 0.0, it is invalid.The default value depends on model.	100.0V	☆

Function code	Name	Detailed illustration of parameters	Default	Modify
F15.35	Rated pump flow	The pump flow is QN if the pump runs at the rated pump frequency and rated lift. Unit: cubic meter/hour.	0.0	☆
F15.36	Rated pump lift	The pump lift is H N if the pump runs at the rated frequency and rated current. Unit: meter	0.0	☆
F15.37	Voltage setting at PV undervoltage point	When the PV voltage is less than the preset voltage, the system reports the PV undervoltage (UV) fault. The default value depends on the model Model / PV UV point: L11 140V; L13 140V; L33 240V; Any model with the boost module 70V Setting range: 0.0~400.0	70.0	☆
F17 Group	**State viewing**			
F17.38	Current of the Current of the	It is the current of the main winding when applying capacitance-removing to Inverter the single phase motor. 0.00~100.00A	0.0A	●
F17.39	Current of the secondary winding	It is the current of the secondary winding when applying capacitance-removing to Inverter the single phase motor. 0.00~100.00A	0.0A	●

Function code	Name	Detailed illustration of parameters	Default	Modify
F18 Group State viewing special for solar inverter				
F18.00	PV reference voltage	MPPT is implemented at the inverter side. This value is determined at the inverter side.		●
F18.01	Current PV voltage	It is transferred from the boost module or equal to the bus voltage.		●
F18.02	Display of MPPT min. reference voltage	The value displays the minimum voltage reference during maximum power tracking. It equals the solar cell panel open-circuit voltage multiplied F15.26.		●
F18.04	Current inductive current	It is transferred from the boost module. This function code is valid only in AC mode and invalid in PV mode.		●
F18.07	PV input power	Reserved. Unit: kW		●
F18.08	Previous PV input power	Reserved		●
F18.09	Previous PV voltage	Reserved		●
F18.10	Device configuration display	0x00~0x11 Ones on LED 0: PV power supply 1: AC grid power supply Tens on LED 0: Detection indicates the system contains the boost module. 1: Detection indicates the system does		●
F18.11	Current pump flow	Unit: cubic meter/hour	0.0	●
F18.12	Current pump lift	Unit: meter	0.0	●
F18.13	MSBs in total pump flow	This function code displays the 16 most significant bits (MSBs) in the total pump flow. Unit: cubic meter	0	●
F18.14	LSBs in total pump flow	This function code displays the 16 least significant bits (LSBs) in the total pump flow. Unit: cubic meter. Total pump flow =F18.13*65535+ F18.14 If F15.32=0, the system will switch to the power frequency input when the light is weak.	0.0	●
F18.15	Total pump flow resetting	Setting this value to 1 can reset the total pump flow. F18.13 and F18.14 will accumulate the flow after resetting. After the resetting succeeds, F18.15 is automatically set to 0.	0	★
F19 Group Voltage boost (inverter module communicates with boost module through 485)				
F19.00	Boost voltage loop KP	0.000~65.535	0.500	☆
F19.01	Boost voltage loop KI	0.000~65.535	0.080	☆
F19.02	Boost current loop KP	0.000~65.535	0.010	☆
F19.03	Boost current loop KI	0.000~65.535	0.010	☆
F19.04	Upper limit of the output current of boost voltage loop PI	Upper limit output of mppt voltage loop PI, upper limit of the boost current loop reference current F19.05~15.0A	12.0A	☆
F19.06	Bus reference voltage	This function code is set to the bus reference voltage at PV input when the system contains the boost module. By default, this function code is set to 350V for models of 220V and 570V for models of 380V. Setting range: 300.0V~600.0V	350.0V	★
F19.07	Boost voltage loop KF1	If the difference between the bus reference voltage and actual bus voltage is greater than 20V, the boost voltage loop uses this group PI parameter. Otherwise, the boost voltage loop uses the first group PI parameter. Setting range: 0.000~65.535	0.500	☆
F19.08	Boost voltage loop Ki1	If the difference between the bus reference voltage and actual bus voltage is greater than 20V, the boost voltage loop uses the PI parameters of this group. Otherwise, the boost voltage loop uses the PI parameters of the first group. Setting range: 0.000~65.535	0.080	☆
F19.10	Boost software version	Once being powered, the boost module sends its version information to the inverter module.	0.00	●

Note:

- The time when the pump inverter operated to the lower limit of PI output frequency after inverter start-up is determined by the ACC time.
- Delay time counting follows the rules if multiple fault conditions are met simutaneously: For example, if all fault conditions of weak light, full water, and underload are met at the same time, the inverter will count the delay time for each fault independently. If the delay time of a fault is reached, the fault is reported. The delay time counting of the other two faults keeps. If the reported fault is resolved but the conditions of the other two faults persist, the delay time counting of the other two faults continues. If a fault condition is not met during counting, the delay time of this fault is cleared.

6. Fault Diagnosis And Solution

Do as follows after the inverter encounters a fault:

1. Check to ensure there is nothing wrong with the Panel.
2. If there is nothing wrong, please check F07 and ensure the corresponding recorded fault parameters to confirm the real state when the current fault occurs by all parameters.
3. See the following table for detailed solution and check the corresponding abnormal state.
4. Eliminate the fault and ask for relative help.
5. Check to eliminate the fault and carry out fault reset to run the inverter.

Fault code	Fault type	Possible cause	Solutions
OUT1	IGBT U	1. The acceleration is too fast. 2. This phase IGBT is damaged internally. 3. Interference causes misoperation. 4. The drive wire is connected improperly. 5. The load transients or is abnormal. 6. The grounding is short circuited.	1. Increase the acceleration time. 2. Change the power unit. 3. Check the drive wire. 4. Check whether the peripheral equipment has strong interference sources.
OUT2	IGBT V		
OUT3	IGBT W		
OV1	Overvoltage when acceleration	1. The input voltage is abnormal. 2. There is large energy feedback. 3. No braking components. 4. Braking energy is not open.	1. Check the input power. 2. Check if the DEC time of the load is too short or the inverter starts during the rotation of the motor or it needs to increase the energy consumption components. 3. Install the braking components. 4. Check the setting of relative function codes.
OV2	Overvoltage when deceleration		
OV3	Overvoltage when constant speed running		
OC1	Overcurrent when acceleration	1. The acceleration or deceleration is too fast. 2. The voltage of the grid is too low. 3. The power of the inverter is too low. 4. The load transients or is abnormal. 5. The grounding is short circuited or the output is phase loss. 6. There is strong external interference. 7. The overvoltage stall protection is not open.	1. Increase the ACC time. 2. Check the input power. 3. Select the inverter with a larger power. 4. Check if the load is short circuited (the grounding short circuited or the wire short circuited) or the rotation is not smooth. 5. Check the output configuration. 6. Check if there is strong interference. 7. Check the setting of relative function codes.
OC2	Overcurrent when deceleration		
OC3	Overcurrent when constant speed running		

Fault code	Fault type	Possible cause	Solutions
UV	Bus undervoltage	1. The voltage of the power supply is too low. 2. The overvoltage stall protection is not open.	1. Check the input power of the supply line. 2. Check the setting of relative function codes.
OL1	Motor overload	1. The voltage of the power supply is too low. 2. The motor setting rated current is incorrect. 3. The motor stall or load transients is too strong.	1. Check the power of the supply line. 2. Reset the rated current of the motor. 3. Check the load and adjust the torque lift.
OL2	Inverter overload	1. The acceleration is too fast. 2. The rotating motor is reset. 3. The voltage of the power supply is too low. 4. The load is too heavy. 5. The motor power is too small.	1. Increase the ACC time. 2. Avoid the restarting after stopping. 3. Check the power of the supply line. 4. Select an inverter with bigger power. 5. Select a proper motor.
SPI	Input phase loss	Phase loss or fluctuation of input R,S,T	1. Check input power. 2. Check installation distribution.
SPO	Output phase loss	U,V,W phase loss output (or serious asymmetrical three phase of the load)	1. Check the output distribution. 2. Check the motor and cable.
OH1	Rectifier overheat	1. Air duct jam or fan damage 2. Ambient temperature is too high. 3. The time of overload running is too long.	1. Dredge the wind channel or change the fan. 2. Decrease the environment temperature.
OH2	IGBT overheat		
EF	External fault	SI external fault input terminals action	Check the external device input.
CE	Communication error	1. The baud rate setting is incorrect. 2. Fault occurs to the communication wiring. 3. The communication address is wrong. 4. There is strong interference to the communication.	1. Set proper baud rate. 2. Check the communication connection distribution 3. Set proper communication address. 4. Change or replace the connection distribution or improve the anti-interference capability.
ItE	Current detection fault	1. The connection of the Inverter board is not good. 2. Assistant power is bad	1. Check the connector and repatch. 2. Change the Hall.

Fault code	Fault type	Possible cause	Solutions
		3. Hall components is broken 4. The magnifying circuit is abnormal.	3. Change the main Inverter panel.
tE	Autotuning fault	1. The motor capacity does not comply with the inverter capability. 2. The rated parameter of the motor is not set correctly. 3. The offset between the parameters from autotune and the standard parameter is huge 4. Autotune overtime	1. Change the inverter mode. 2. Set the rated parameter according to the motor name plate. 3. Empty the motor load. 4. Check the motor connection and set the parameter. 5. Check if the upper limit frequency is above 2/3 of the rated frequency.
EEP	EEPROM fault	1. Error of Inverter the write and read of the parameters 2. Damage to EEPROM	1. Press STOP/RST to reset. 2. Change the main Inverter panel.
PIDE	PID feedback fault	1. PID feedback is offline. 2. The PID feedback source disappears.	1. Check the PID feedback signal 2. Check the PID feedback source.
END	Time arrival of factory setting	The actual running time of the inverter is above the internal setting running time.	Ask for the supplier and adjust the setting running time.
OL3	Electrical overload	The inverter will report overload pre-alarm according to the set value.	Check the load and the overload pre-alarm point.
ETH1	Grounding short circuit fault 1	The grounding of the inverter output terminal is short circuited. The current detection circuit is faulty. The actual motor power sharply differs from the inverter power.	Check whether the motor wiring is proper. Change the Hall. Change the main Inverter panel. Set motor parameters correctly.
ETH2	Grounding short circuit fault 2		
dEu	Velocity deviation fault	The load is too heavy or stalled.	1. Check the load and ensure it is normal. Increase the detection time. 2. Check whether the Inverter parameters are normal.
Sto	Maladjustment fault	1. The Inverter parameters of the synchronous motors not set properly. 2. The autotuning parameter is not correct. 3. The inverter is not connected to the motor.	1. Check the load and ensure it is normal. 2. Check whether the Inverter parameter is set properly or not. 3. Increase the maladjustment detection time.

Fault code	Fault type	Possible cause	Solutions
LL	Electronic underload fault	The inverter will report the underload pre-alarm according to the set value.	Check the load and the underload pre-alarm point.
tSF	Hydraulic probe damage	Hydraulic probe damage	Change the damaged hydraulic probe.
PINV	PV reverse connection fault	Incorrect PV wiring	Change the wiring direction of the positive and negative terminals and connect the cables again.
PVOC	PV overcurrent	1. The acceleration or deceleration is too fast. 2. The inverter power is too low. 3. The load transients or is abnormal. 4. The grounding is short circuited.	1. Increase the ACC or DCC time. 2. Select the inverter with a larger power. 3. Check if the load is short circuited (the grounding short circuited or the wire short circuited) or the rotation is not smooth.
PVOV	PV overvoltage	1. The solar cell panel input voltage is too high. 2. Model H33 is set as another model.	1. Reduce the number of solar cell panels that are wired in series. 2. Check and reset the model.
PVLV	PV undervoltage	1. The power of the solar cell panel series is too low or it is cloudy and rainy weather. 2. The motor start-up current is too high.	1. Increase the number of solar cell panels or perform the test in the normal sun light. 2. Change the motor.
E-422	Fault on communication with boost module 422	Improper contact with the communication cables	Check the four communication cables of 422 and ensure that they are connected properly.
OV	Bus overvoltage detected at the boost module side	The sun light changes suddenly.	Adjust the boost PI parameters. Enlarge the values of F19.07 and F19.08.
A-LS	Weak light alarm	The sun light is weak or the solar cell panel configuration is insufficient.	The equipment automatically runs when the light becomes strong. Check whether the solar cell panel configuration is proper.
A-LL	Underload alarm	The reservoir is empty.	Check the reservoir.

Fault code	Fault type	Possible cause	Solutions
A-tF	Full-water alarm	The reservoir is full.	If the user has set the full-water alarm function, the equipment automatically stops when the full-water alarm time reaches the specified time. In this situation, the user does not need to perform any operation. Otherwise, check whether terminals are wired incorrectly.
A-tL	Empty-water alarm	The reservoir is empty.	If the user has set the empty-water alarm function, the equipment automatically stops when the empty-water alarm time reaches the specified time. In this situation, the user does not need to perform any operation. Otherwise, check whether terminals are wired incorrectly.

7. Recommended Solar Modules

7.1. Recommended Configuration For Solar Pumping Inverter

Solar pumping Inverter model	Open-circuit voltage degree of solar module			
	37±1V		45±1V	
	Module power ±5Wp	Modules per string * strings	Module power ±5Wp	Modules per string * strings
SPC-0K4-L11	250	11*1	300	9*1
SPC-0K7-L11	250	11*1	300	9*1
SPC-1K5-L11	250	11*1	300	9*1
SPC-2K2-L11	250	11*1	300	9*1
SPC-0K4-L13	250	11*1	300	9*1
SPC-0K7-L13	250	11*1	300	9*1
SPC-1K5-L13	250	11*1	300	9*1
SPC-2K2-L13	250	11*1	300	9*1
SPC-004-L33	250	11*2	300	9*2
SPC-5K5-L33	250	11*3	300	9*3
SPC-7K5-L33	250	11*4	300	9*4
SPC-0K7-H33	250	18*1	300	15*1
SPC-1K5-H33	250	18*1	300	15*1
SPC-2K2-H33	250	18*1	300	15*1
SPC-004-H33	250	20*1	300	16*1
SPC-5K5-H33	250	18*2	300	15*2
SPC-7K5-H33	250	18*2	300	15*2
SPC-011-H33	250	18*3	300	15*3
SPC-015-H33	250	18*4	300	15*4
SPC-018-H33	250	18*5	300	15*5
SPC-022-H33	250	18*6	300	15*6
SPC-030-H33	250	18*8	300	15*8
SPC-037-H33	250	18*9	300	15*9

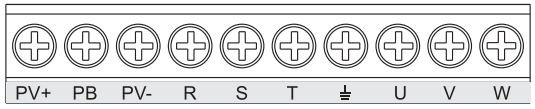
8. Cables

8.1. Recommended power cables for standard inverter models

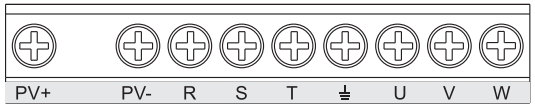
Model	Recommended cable size (mm^2)		Terminal screw	Tightening torque (Nm)
	(+) / (−), R/S/T, U/V/W	PE		
SPC-0K4-L11	1.5	1.5	M4	0.8
SPC-0K4-L13	1.5	1.5	M4	0.8
SPC-0K7-L13	1.5	1.5	M4	0.8
SPC-0K7-H33	1.5	1.5	M4	0.8
SPC-1K5-H33	1.5	1.5	M4	0.8
SPC-2K2-H33	1.5	1.5	M4	0.8
SPC-0K7-L11	2.5	2.5	M4	0.8
SPC-1K5-L11	2.5	2.5	M4	0.8
SPC-2K2-L11	2.5	2.5	M4	0.8
SPC-1K5-L13	2.5	2.5	M4	0.8
SPC-2K2-L13	2.5	2.5	M4	0.8
SPC-004-H33	2.5	2.5	M4	1.2~1.5
SPC-5K5-H33	2.5	2.5	M4	1.2~1.5
SPC-004-L33	4	4	M5	2~2.5
SPC-7K5-H33	4	4	M5	2~2.5
SPC-5K5-L33	6	6	M5	2~2.5
SPC-011-H33	6	6	M5	2~2.5
SPC-7K5-L33	10	10	M5	2~2.5
SPC-015-H33	10	10	M5	2~2.5
SPC-018-H33	16	16	M5	2~2.5
SPC-022-H33	25	16	M5	2~2.5
SPC-030-H33	25	16	M6	4~6
SPC-037-H33	35	16	M6	4~6

9. Wiring terminals

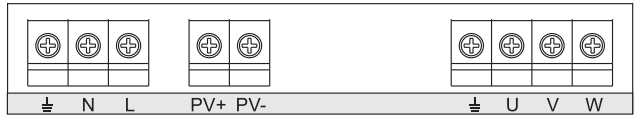
9.1. The following figure shows the different types of terminals for the pump inverter



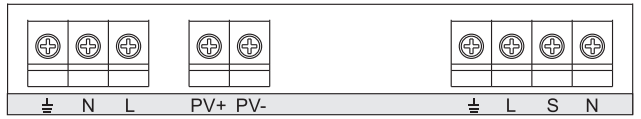
L33/H33 terminals



L33/H33



L13/H13



L11

9.2. Wiring terminal functions

Terminal	Name	Function
R,S,T	AC input	3PH 380/220V AC input terminals,connected to the grid
N		Neutral wire.For 4-37KW models,use 3PH 4-wire distribution system and connect the neutral wire to terminal N.
L,N	AC input	1PH 220V AC input terminals,connected to the grid
(+) , (−)	PV input	Solar cell panel input terminals
U,V,W	3PH inverter output	3PH inverter output terminal, connected to three-phase water pump
L,S,N	1PH inverter output	1PH inverter output terminal, L, N connected to the motor, S terminal is connected to the start coil when using the 2-phase algorithm.
⏚	Safety grounding	Safety grounding terminal.Each inverter must be grounded properly. Note:It is at the bottom of the chassis.

➢ Above parameter revision change without notication.