USFULL®

User's Manual

FU9000SI Series
Auto Solar Pump Drive

V0.4 www.usfull.net

Contents

1 Safety Information and Precautions

In this manual, the notices are graded based on the degree of danger:

•DANGER indicates that failure to comply with the notice will result in severe personal injury or even death.

•WARNING indicates that failure to comply with the notice will result in personal injury or property damage.

Read this manual carefully so that you have a thorough understanding. Installation, commissioning or maintenance may be performed in conjunction with this chapter. FULLWILL will assume no liability or responsibility for any injury or loss caused by improper operation.

1.1 Safety Information and Precautions

Use Stage	Safety Grade	Precautions
Before installation	DANGER	• Do not install the equipment if you find water seepage, component missing or damage upon unpacking. Do not install the equipment if the packing list does not conform to the product you received.
	WARNING	• Handle the equipment with care during transportation to prevent installation damage to the equipment. • Do not use the equipment with damaged or missing components. Failure to comply will result in personal injury. • Do not touch the components with your hands. Failure to comply will result in static electricity damage.
During installation	DANGER	• Install the equipment on incombustible objects such as metal, and keep it away from combustible materials. Failure to comply may result in a fire. • Do not loosen the fixed screws of the components, especially during the screws with red mark.
	WARNING	• Do not drop wire end or screw into the inverter. Failure to comply will result in damage to the inverter. • Install the inverter in places free of vibration and direct sunlight. Arrange the installation positions properly when two inverters are laid in the same cabinet to ensure the cooling effect.
At wiring	DANGER	• Wiring must be performed only by qualified personnel under instructions described in this manual. Failure to comply may result in unexpected accidents. • A circuit breaker must be used to isolate the power supply and the inverter. Failure to comply may result in a fire. • Ensure that the power supply is cut off before wiring. Failure to comply may result in electric shock. • Tie the inverter to ground properly by standard. Failure to comply may result in electric shock.
	WARNING	• Never connect the power cables to the output terminals (U, V, W) of

		the inverter. Pay attention to the marks of the wiring terminals and ensure correct wiring. Failure to comply will result in damage to the inverter. • Never connect the braking resistor between the DC bus terminals (+) and (-). Failure to comply may result in a fire. • Use wire sizes recommended in the manual. Failure to comply may result in accidents. • Use a shielded cable for the encoder, and ensure that the shielding layer is reliably grounded.
Before power-on	DANGER	• Check that the following requirements are met: –The voltage class of the power supply is consistent with the rated voltage class of the inverter. –(+) and (-) are DC power supply input terminals. R, S and T (L,N) are AC power supply input terminals and output terminals (U, V, W) are properly connected. –No short-circuit exists in the peripheral circuit before the wiring is secured. Failure to comply will result in damage to the inverter power-on. • Do not perform the voltage resistance test on any part of the inverter because such test has been done in the factory. Failure to comply will result in accidents.
	WARNING	• Cover the inverter properly before power-on to prevent electric shock. • All peripheral devices must be connected properly under the instructions described in this manual. Failure to comply will result in accidents
After power-on	DANGER	• Do not open the inverter's cover after power-on. Failure to comply may result in electric shock. • Do not touch any I/O terminal of the inverter. Failure to comply may result in electric shock.
	WARNING	• Do not touch the running. Failure to comply will result in accidents. • Do not change the default settings of the inverter. Failure to comply will result in damage to the inverter.
During operation	DANGER	• Do not touch the fan or the discharging resistor to check the temperature. Failure to comply will result in personal burnt. • Signal detection must be performed only by qualified personnel during during operation. Failure to comply will result in personal injury or damage to the inverter.
	WARNING	• Avoid objects falling into the inverter when it is running. Failure to comply will result in damage to the inverter. • Do not start/stop the inverter by turning the contactor ON/OFF. Failure to comply will result in damage to the inverter.
During maintenance	DANGER	• Repair or maintenance of the inverter may be performed only by qualified personnel. Failure to comply will result in personal injury or

		damage to the inverter. • Do not repair or maintain the inverter at power-on. Failure to comply will result in electric shock. • Repair or maintain the inverter only ten minutes after the inverter is powered off. This allows for the residual voltage in the capacitor to discharge to a safe value. Failure to comply will result in personal injury. • Ensure that the inverter is disconnected from all power supplies before starting repair or maintenance on the inverter. • Set and check the parameters again after the inverter is replaced. • All the pluggable components must be plugged or removed only after power-off. • The rotating motor generally feeds back power to the inverter. As a result, the inverter is still charged even if the motor stops, and the power supply is cut off. Thus ensure that the inverter is disconnected from the motor before starting repair or maintenance on the inverter.

2 Product overview

2.1 Unpacking inspection

Check as follows after receiving products:

1. Check that there are no damage and humidification to the package. If not, please contact with local agents or FULLWILL offices.

2. Check the information on the type designation label on the outside of the package to verify that the drive is of the correct type. If not, please contact with local dealers or FULLWILL offices.

3. Check that there are no signs of water in the package and no signs of damage or breach to the AC drive. If not, please contact with local dealers or FULLWILL offices.

4. Check the information on the type designation label on the outside of the package to verify that the nameplate is of the correct type. If not, please contact with local dealers or FULLWILL offices.

5. Check to ensure the accessories (including user's manual and control keypad) inside the device is complete. If not, please contact with local dealers or FULLWILL offices.

2.2 Nameplate

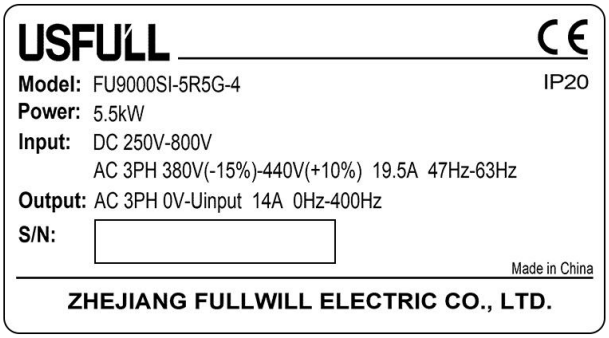


Figure 2-1 Nameplate

Note: This is the example of FU9000SI standard products are marked according to the reality.

2.3 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 nameplate.

FU9000SI – 5R5G – 4

① ② ③

Key	Sign	Description	Remarks
Model	①	Series inverter	FU9000SI
Rated power	②	Power range + Load type	5R5G—5.5kW G—General type
Voltage degree	③	Voltage degree	4: AC 3PH 380V(-15%)~440(+10%) S2: AC 1PH input 220V(-15%)~ 240(+10%) AC 3PH 0-Uinput SS2: AC 1PH input/output 220V(-15%)~ 240(+10%)

2.4 Product specifications

Model	-SS2	-S2	-4
AC input voltage (V)	220(-15%)~240(+10%) (1PH)		380(-15%)~440 (+10%) (3PH)
AC output voltage (V)	220(-15%)~240(+10%) (1PH/3PH)		380(-15%)~440 (+10%) (3PH)
Max DC voltage (V)	400	400	800
Start-up voltage (V)	200	200	300
Lowest working voltage (V)	150	150	250
Recommended DC input voltage range (V)	200~400	200~400	300~750
Recommended MPP voltage (V)	330	330	550

2.5 Rated specifications

Series	Model	Rated output power (Kw)	Rated input current (A)	Rated output current (A)
-SS2(0.75KW-4KW)	FU9000SI-0R7G-SS2	0.75	9.3	7.2
	FU9000SI-1R5G-SS2	1.5	15.7	10.2
	FU9000SI-2R2G-SS2	2.2	24	14
	FU9000SI-004G-SS2	4	32	25
-4(0.75KW-110KW)	FU9000SI-0R7G-4	0.75	3.4	2.5
	FU9000SI-1R5G-4	1.5	5	4.2
	FU9000SI-2R2G-4	2.2	5.8	5.5
	FU9000SI-004G-4	4	13.5	9.5
	FU9000SI-5R5G-4	5.5	19.5	14
	FU9000SI-7R5G-4	7.5	25	18.5
	FU9000SI-011G-4	11	32	25
	FU9000SI-015G-4	15	40	32
	FU9000SI-018G-4	18.5	47	38
	FU9000SI-022G-4	22	51	45
	FU9000SI-030G-4	30	70	60
	FU9000SI-037G-4	37	80	75
	FU9000SI-045G-4	45	94	92
	FU9000SI-055G-4	55	128	115
	FU9000SI-075G-4	75	160	150
	FU9000SI-090G-4	90	190	180
	FU9000SI-110G-4	110	225	215
	FU9000SI-132G-4	132	265	260
	FU9000SI-160G-4	160	310	305
	FU9000SI-185G-4	185	345	340
	FU9000SI-200G-4	200	385	380
	FU9000SI-220G-4	220	430	426
	FU9000SI-250G-4	250	468	465
	FU9000SI-280G-4	280	525	520
	FU9000SI-315G-4	315	590	585

3 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.

3.1 Mechanical installation

3.1.1 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	-10℃~+50℃. The temperature change rate is less than 0.5℃/minute. If the ambient temperature of the inverter is above 40℃, derate 2% for every additional 1℃. It is not recommended to use the inverter if the ambient temperature is above 50℃. To ensure reliability, do not use the inverter if the ambient temperature changes frequently. Provide cooling fan or air conditioner to control the internal ambient temperature below the required one if the inverter is used in a close space such as in the control 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.
Humidity	RH≤90%. No condensation is allowed.
Storage temperature	-40℃~+70℃. The temperature change rate is less than 1℃/minute.

Environment	Conditions
Altitude	Below 1000m If the sea level 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.

Note:

FU9000SI series inverters should be installed in a clean and ventilated environment according to enclosure classification.

Cooling air must be clean, free from corrosive materials and electrically conductive dust.

3.1.2 Installation direction

The inverter may be installed on the wall or in a cabinet.

The inverter needs be installed in the vertical position. Check the installation site according to the requirements below. See Appendix D Dimension drawings for frame details.

3.1.3 Installation Clearance Requirements

The clearance that needs to be reserved varies with the power class of the FU9000SI, as shown in the following figure.

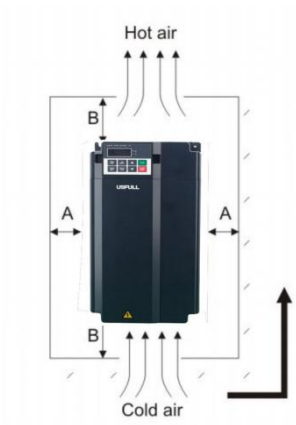


Figure 3-1 Clearance around the FU9000SI for installation

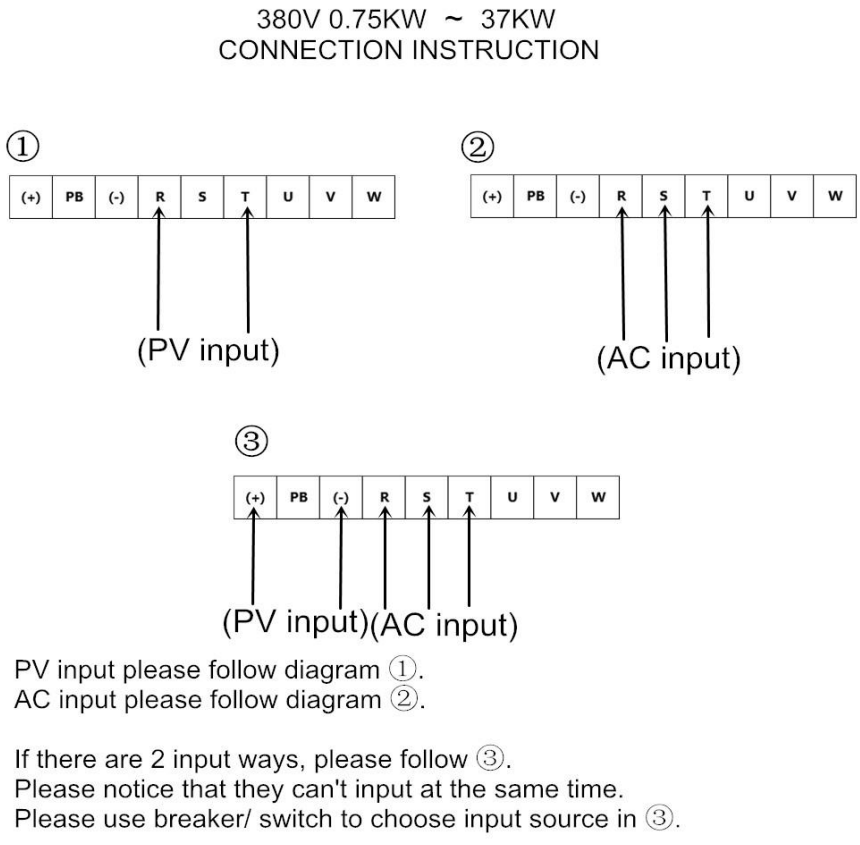
Installation clearance requirements on the FU9000SI series inverters of different power classes:

Power Class	Clearance Requirements	
0.4−15 kW	A ≥ 10 mm	B ≥ 100 mm
18.5−22 kW	A ≥ 10 mm	B ≥ 200 mm
22−37 kW	A ≥ 50 mm	B ≥ 200 mm
37−110 kW	A ≥ 50 mm	B ≥ 300 mm

3.2 Standard wiring

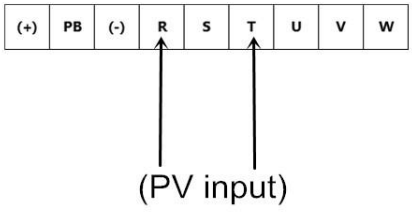
3.2.1 Terminals of main circuit

⚠	The DC breaker Q1 must be installed as the protection switch for PV input. In parallel connection, the combination box special for PV must be used. When the distance between the PV input component and inverter exceeds 10 meters, type-II surge protection devices must be configured at the DC side. When the distance between the pump and inverter exceeds 50 meters, it is recommended to configure output reactors for the output reactor model selection. The inverter automatically runs after being powered on. If parameters need to be set, follow the parameter setting instructions in Group P15. Before connecting the braking resistor cable, remove the yellow labels of PB, (+), and (-) from the terminal blocks. Otherwise, poor connection may occur.



220V
CONNECTION INSTRUCTION

①



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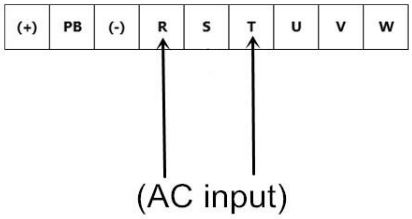
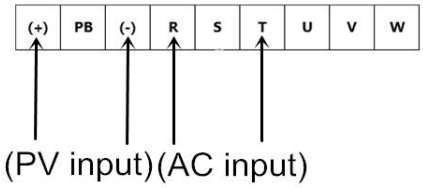


③

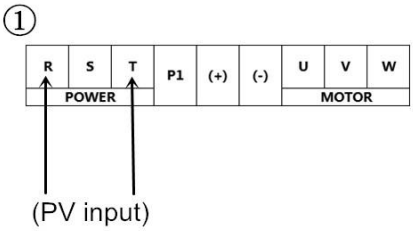


PV input please follow diagram ①.
AC input please follow diagram ②.

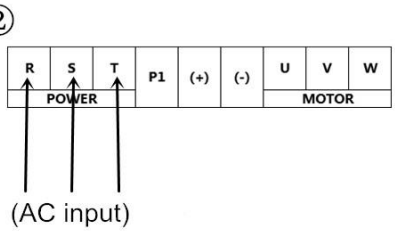
If there are 2 input ways, please follow ③.
Please notice that they can't input at the same time.
Please use breaker/ switch to choose input source in ③.

380V ≥45KW
CONNECTION INSTRUCTION

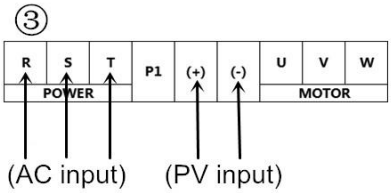
①



②



③



PV input please follow diagram ①.
AC input please follow diagram ②.

If there are 2 input ways, please follow ③.
Please notice that they can't input at the same time.
Please use breaker/ switch to choose input source in ③.

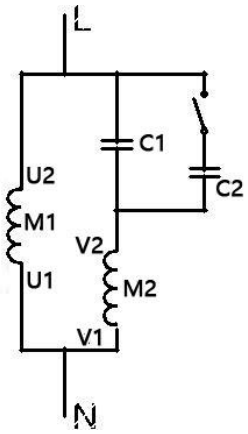
Terminals of main circuit

Terminal	Name	Function
R, S, T	AC input	3PH (1PH) AC input terminals, connected to the grid **Note:** Use the screws equipped with the inverter for wiring.
(+), (-)	PV input	Solar cell panel input terminals
U, V, W	Inverter output	3PH/1PH AC output terminals, connected to the pump motor **Note**: 1PH motors must connect to terminals U and W.
⏚	Safety grounding	Safety protection grounding terminal. Each inverter must be grounded

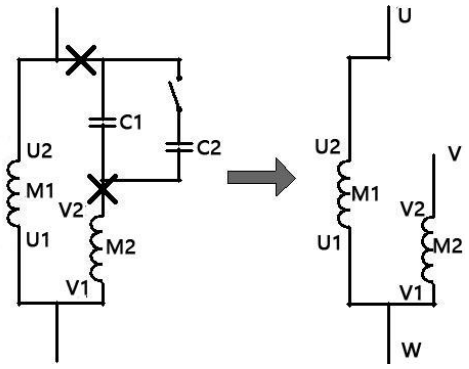
Description for -SS2 single-phase output models

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

2)If the single-phase pump cannot be started, the two-phase control method must be used, and the start-up and running capacitors (if any) of the motor must be removed. The figure below shows the internal wiring of the common single-phase motor. In the figure, L1, L2, C1, and C2 indicate the running winding, start-up winding, running capacitor, and start-up capacitor. When the motor speed exceeds 75% of the rated speed, the start-up capacitor is switched off.



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 W of the inverter. Connect U2 to the output terminal U of the inverter. Connect V2 to the output terminal V of the inverter. (Note: Use the screws equipped with the inverter.)

3.2.2 Terminals of control circuit

Functions of control terminals

Type	Terminal	Name	Function Description
Supply power	+24V	24V power supply	It provides the power of 24V±10% and maximum current of 200mA. It functions as the working power supply of digital input and output or externally connects to the sensor power supply.
	COM	Common terminal	
Input digital	S1- COM	Forced switch to mains	Terminal feature parameters: 1. Internal impedance: 3.3kΩ 2. Acceptable voltage input:12~24V 3. Maximum input frequency:1kHz S1: Forcible switch to mains (Switching-on indicates switching to mains, and switching-off indicates input controlled by the keypad.) S2: It connects to the high-water switch of the normally open contact by default. S3: It connects to the low-water switch of the normally closed contact. S4: A high electrical level corresponds to the single-phase algorithm. A low electrical level corresponds to the two-phase algorithm.
	S2- COM	Full-water alarm	
	S3- COM	Empty-water alarm	
	S4- COM	Single/two phase algorithm switching	
Communication	RS485+	485 communication	485 communication terminals, using the ModBus protocol
	RS485-		
Output digital	422TX+ 422TX- 422RX+ 422RX-	422 communication	Communication terminals special for the boost module.
Output relay	R01A (ROA)	Normally open contact of relay 1	1. Contact capacity: 3A/AC250V,1A/DC30V 2. They cannot be used for high frequency switch output. During the application of auto mains & PV switching, the AC input contactor coil is controlled by the normally closed contact of the relay.
	RO1B (ROB)	Normally closed contact of relay 1	
	RO1C (ROC)	Common terminal of relay 1	

3.2.3 Standard wiring

The figure below shows the standard wiring of inverter.

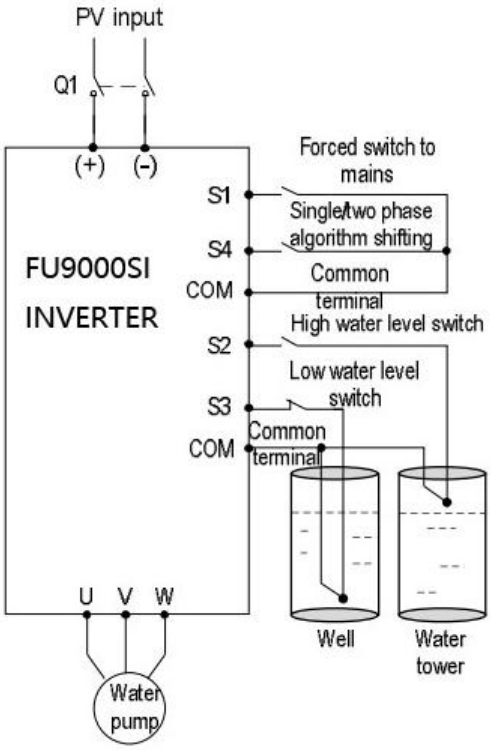


Figure 3-3 Standard wiring diagram

4 Keypad operation procedure

4.1 Operation Panel

You can modify the parameters, monitor the working status and start or stop the FU9000SI by operating the operation panel, as shown in the following

Figure 4-1 Diagram of the operation panel

Note: The keypads of inverters can be used as external keypads.

No.	Name	Description		
1	State LED	RUN/TUNE	LED off means that the inverter is in the stopping state; LED blinking means the inverter is in the parameter auto tune state; LED on means the inverter is in the running state.	
		FWD/REV	FWD/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 keypad operation, terminals operation control LED off means that the inverter is in the keypad operation state; LED blinking means the inverter is in the terminals operation state; LED on means the inverter is in the remote communication control 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.	
2	Unit LED	Mean the unit displayed currently		
		Hz	Frequency unit	
		RPM	Rotating speed unit	
		A	Current unit	
		%	Percentage	
		V	Voltage unit	
3	Display zone	5-figure LED display displays various monitoring data and alarm code such as set frequency and output frequency.		
4	Buttons	PRG ESC	Programming key	Enter or escape from the first level menu and remove the parameter quickly.
		DATA ENT	Entry key	Enter the menu step-by-step. Confirm parameters.
		▲	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.
		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 P07.02. This key is used to reset all control modes in the fault alarm state.
		QUICK JOG	Quick key	The function of this key function code P07.01.

4.2 Keypad displaying

The keypad displaying state of FU9000SI series inverters is divided into stopping state parameter, running state parameter, function code parameter editing state and fault alarm state and so on.

4.2.1 Displayed state of stopping parameters

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

In the stopping state, various kinds of parameters can be displayed. Select the parameters to be displayed or not by P07.07.

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(P07.02=2) can shift the parameters from right to left.

4.2.2 Displayed state of running parameters

After the inverter receives valid running commands, the inverter will enter into the running state and the keypad will display the running parameters. RUN/TUNE LED on the keypad 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(P07.02=2) can shift the parameters from right to left.

4.2.3 Displayed state of faults

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

4.2.4 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 P07.00). 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.

4.3 Keypad operation

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

4.3.1 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 control 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 P0-00 from 0 to 1.

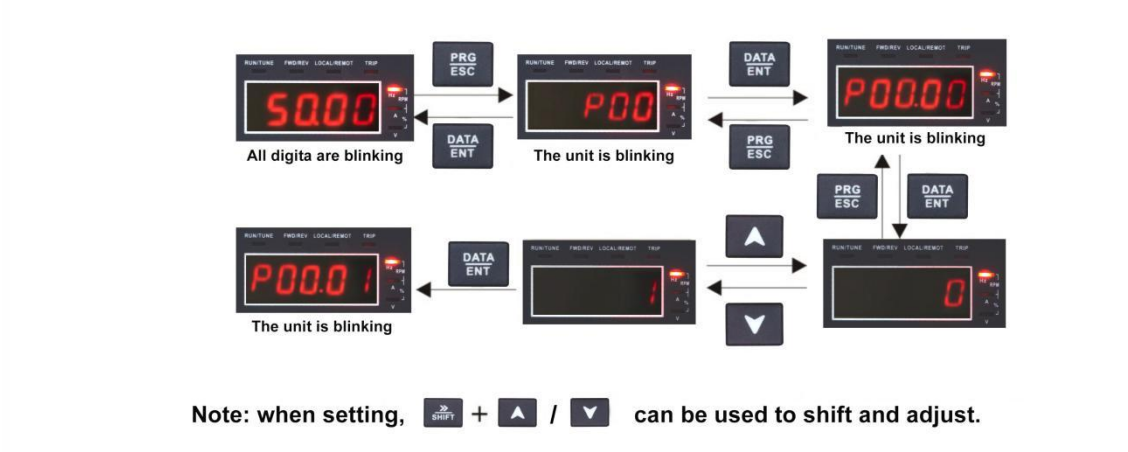


Figure 4-2 Sketch map of modifying parameters

4.3.2 How to set the password of the inverter

FU9000SI series inverters provide password protection function to users. Set P07.00 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 P07.00 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.

4.3.3 How to watch the inverter state through function codes

FU9000SI series inverters provide group P17 as the state inspection group. Users can enter into P17 directly to watch the state.

5 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 keypad setting. * The inverter automatically runs once power on. If parameters need to be set, follow the guidelines in this chapter.

5.1 Inspection before operation

Before powering on the inverter, ensure that:

a)The inverter is grounded reliably.

b)The wiring is correct and reliable.

c)The AC/DC breaker is selected correctly.

d)The PV input voltage is in the allowed range of the inverter.

e)The type, voltage, and power of the motor match those of the inverter.

5.2 Trial run

Close the DC breaker. The inverter automatically runs with a delay of 5 seconds. Check the water yield of the pump. If the water yield is normal, the trial run is successful. If the water yield is below the normal value, exchange any two motor cables, connect the cables, and perform trial run again.

5.3 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.

5.3.1 PI adjustment to the water yield

If the user requires large or low water yield, it is necessary to adjust PI (P15.06~P15.10)

properly. The bigger PI 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.

5.3.2 Special settings for single phase motors

a) When the single phase motor is in bad running performance, the user can adjust P04 V/F curve settings: set P04.00=1 and set P04.03~P04.08 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 P15.28 initial voltage differential value appropriately.

c) For single phase motors with two-phase control (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 P02.04 less than 200V, or limit the maximum voltage output by multi-dot V/F curve.

② P04.35 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.

6 Function parameters

The symbols in the function code table are described as follows:

"☆": The parameter can be modified when the inverter is in either stop or running state.

"★": The parameter cannot be modified when the inverter is in the running state.

"●": The parameter is the actually measured value and cannot be modified.

"*": The parameter is factory parameter and can be set only by the manufacturer.

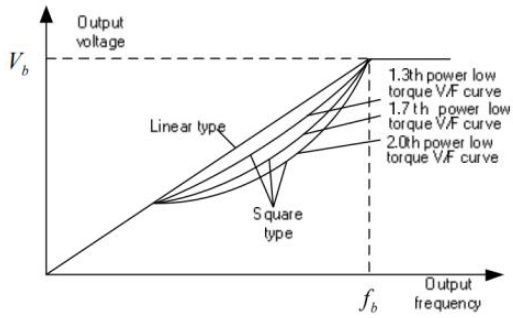
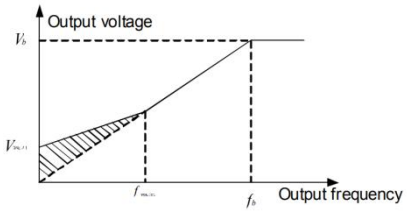
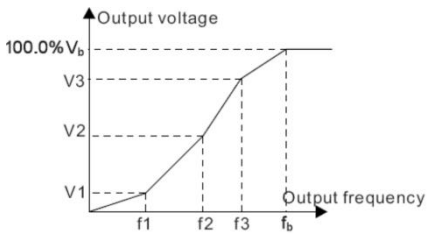
6.1 Standard Function Parameters

Function Code	Parameter Name	Detailed Illustration of Parameters	Default	Change
Group P0: Standard Function Parameters				
P00.00	Speed control 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 control. Relative to mode 1, it is more suitable for the applications which need small power. 1: SVC 1 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 control 2 is suitable in applications which do not need high control accuracy, such as the load of fan and pump, and suitable when one inverter drives multiple motors.	2	★
P00.01	Run command channel	Select the run command channel of the inverter. The control 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 control by **RUN**,**STOP/RST** on the keypad. Set the multi-function key **QUICK/JOG** to **FWD/REV** shifting function (P07.02=3) to change the running direction; press **RUN** and **STOP/RST** simultaneously in running state to make the inverter coast to stop. 1: Terminal running command channel ("**LOCAL/REMOT**" flickering) Carry out the running command control by the forward rotation, reverse rotation and forward jogging and reverse jogging of the multi-function terminals. 2: Communication running command channel ("**LOCAL/REMOT**"on); The running command is controlled by the upper monitor via communication.	1	★

Function Code	Parameter Name	Detailed Illustration of Parameters	Default	Change
P00.03	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: P00.04~400.00Hz	50.00 Hz	★
P00.04	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: P00.05~P00.03 (max output frequency)	50.00 Hz	★
P00.05	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~P00.04 (Upper limit of the running frequency)	0.00 Hz	★
P00.11	ACC time 1	ACC time means the time needed if the inverter speeds up from 0Hz to the max output frequency (P00.03). DEC time means the time needed if the inverter speeds down from the max output frequency to 0Hz (P00.03). FU9000SI series inverters have four groups of ACC/DEC time which can be selected by P05. The factory default ACC/DEC time of the inverter is the first group. Setting range of P00.11 and P00.12: 0.0~3600.0s	Depend on mode	☆
P00.12	DEC time 1		Depend on mode	☆
P00.13	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/JOG** on the keypad. Refer to parameter P07.02. **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	☆

Function Code	Parameter Name	Detailed Illustration of Parameters		Default	Change
P00.15	Motor parameter Auto tuning	0: No operation 1: Rotation auto tuning Comprehensive motor parameter auto tune. It is recommended to use rotation auto tuning when high control accuracy is needed. 2: Static auto tuning It is suitable in the cases when the motor cannot de-couple form the load. The auto tuning for the motor parameter will impact the control accuracy. 3: Static auto tuning 2 (No auto tuning for non-load current and mutual inductance)		0	☆
P00.18	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	☆
Group P1: Start and stop control					
P01.08	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	★
P01.18	Operation protection	0: The terminal running command is invalid when powering on. 1: The terminal running command is valid when powering on.		1	★
P01.21	Restart after power off	0: Disabled 1: Enabled		1	★
Group P2: Motor 1 parameters					
P02.00	Motor type	0: Asynchronous motor 1: Reserved		0	★
P02.01	Rated power of asynchronous motor	0.1~3000.0kW	Set the parameter of the asynchronous motor. In order to ensure the controlling performance, set the P02.01~P02.05 according to the name plate of the asynchronous motor. FU9000SI series inverters provide the function of parameter auto tuning. Correct parameter auto tuning comes from the correct setting of the motor name plate.	Depend on model	★
P02.02	Rated frequency of asynchronous motor	0.01Hz~P00.03		50.00 Hz	★
P02.03	Rated rotating speed of	1~36000rpm		Depend on	★

	asynchronous motor		In order to ensure the controlling 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 (P02.01) of the motor can initialize the motor parameters P02.02~P02.10.	model	
P02.04	Rated voltage of asynchronous motor	0~1200V		Depend on model	★
P02.05	Rated current of asynchronous motor	0.8~6000.0A		Depend on model	★
P02.06	Static resistor of Asynchronous motor	0.001~65.535Ω	After the motor parameter auto tuning finishes, the set values of P02.06~P02.10 will be updated automatically. These parameters are basic parameters controlled by vectors which directly impact the features. **Note**: Users cannot modify the parameters freely.	Depend on model	★
P02.07	Rotor resistor of asynchronous motor	0.001~65.535Ω		Depend on model	★
P02.08	Leakage inductance of asynchronous motor	0.1~6553.5mH		Depend on model	★
P02.09	Mutual inductance of asynchronous motor	0.1~6553.5mH		Depend on model	★
P02.10	Non-load current of asynchronous motor	0.1~6553.5A		Depend on model	★
Group P4: V/F Control Parameters					
P04.00	V/F curve setting	These function codes define the V/F curve of FU9000SI 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. 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 P00.06 or the voltage given channel set by P04.27 to change the feature of the curve. Note: V_b in the below picture is the motor rated voltage and f_b is the motor rated frequency.	4	★

				
P04.01	Torque boost	Torque boost to the output voltage for the features of low frequency torque. P04.01 is for the max output voltage V_b.	0.0%	☆
P04.02	Torque boost close	P04.02 defines the percentage of closing frequency of manual torque to f_b. 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 P04.01: 0.0%: (automatic) 0.1%~10.0% Setting range of P04.02: 0.0%~50.0%	20.0%	☆
P04.03	V/F frequency point 1 of motor 1	If P04.00=1, the user can set V//F curve by P04.03~P04.08. V/F is set to the motor load. **Note**: V1＜V2＜V3; f1＜f2＜f3. If the low-frequency voltage is high, over temperature and burning may occur and the overcurrent stall and protection may occur to the inverter.  Setting range of P04.03: 0.00Hz~P04.05 Setting range of P04.04: 0.0%~110.0% (rated voltage of motor1)	0.00 Hz	☆
P04.04	V/F voltage point 1 of motor 1		00.0%	☆
P04.05	V/F frequency point 2 of motor 1		0.00 Hz	☆
P04.06	V/F voltage point 2 of motor 1		00.0%	☆
P04.07	V/F frequency point 3 of motor 1		0.00 Hz	☆
P04.08	V/F voltage point 3 of motor 1		00.0%	☆

		Setting range of P04.05: P04.03~P04.07 Setting range of P04.06: 0.0%~110.0%(rated voltage of motor1) Setting range of P04.07: P04.05~P02.02(rated frequency of motor1) or P04.05~P02.16(rated frequency of motor1) Setting range of P04.08: 0.0%~110.0% (rated voltage of motor1)		
P04.09	V/F slip compensation gain	This function code is used to compensate the change of the rotation speed caused by load during compensation SVPWM control to improve the rigidity of the motor. It can be set to the rated slip frequency of the motor which is counted as below: $\triangle f=f_b-n*p/60$ Of which, f_b is the rated frequency of the motor, its function code is P02.01; n is the rated rotating speed of the motor and its function code is P02.02; p is the pole pair of the motor. 100.0% corresponds to the rated slip frequency$\triangle f$. Setting range: 0.0~200.0%	00.0%	☆
P04.34	Single-phase drive mode	Ones: Single-phase motor control mode 0: Disabled; 1: Enabled (The function is reserved. The control 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	★
P04.35	Voltage ratio of V and U	0.00~2.00	1.40	☆
Group P5: Input Terminals				
P05.00	HDI input type	0: High-speed pulse input. See P05.49~P05.54. 1: HDI switch input	1	★
P05.01	S1 terminals function selection	0: No function 1: Forward rotation operation 2: Reverse rotation operation 3: 3-wire control 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)	42	★
P05.02	S2 terminals function selection		43	★
P05.03	S3 terminals function selection		44	★
P05.04	S4 terminals function selection		45	★
P05.05	S5 terminals function selection		1	★
P05.09	HDI terminals function selection		46	★

<table>
<tr><td></td><td></td><td>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 control pause
26: Traverse pause (stop at the current frequency)
27: Traverse reset (return to the center frequency)
28: Counter reset
29: Torque control 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 keypad
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 mains input (Switching-on indicates switching to mains input; switching-off indicates the input mode is controlled by the keypad.)
43: Full water signal
44: Non-water signal
45: Two-phase control mode of the single-phase motor
46: Boost module-free PV digital input (for auto switching)
47~63: Reserved</td><td></td><td></td></tr>
<tr><td rowspan="3">P05.10</td><td rowspan="3">Polarity selection of the input terminals</td><td colspan="5">0x000~0x10F</td><td rowspan="3">0x000</td><td rowspan="3">☆</td></tr>
<tr><td>BIT8</td><td>BIT3</td><td>BIT2</td><td>BIT1</td><td>BT0</td></tr>
<tr><td>HD1</td><td>S4</td><td>S3</td><td>S2</td><td>S1</td></tr>
</table>

<table>
<tr><th>Function Code</th><th>Parameter Name</th><th>Detailed Illustration of Parameters</th><th>Default</th><th>Change</th></tr>
<tr><td colspan="5">Group P6: Output Terminals</td></tr>
<tr><td>P06.03</td><td>Relay RO1 output selection</td><td>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.)</td><td>30</td><td>★</td></tr>
<tr><td>P06.04</td><td>Relay RO2 output selection</td><td></td><td>5</td><td>☆</td></tr>
<tr><td rowspan="4">P06.05</td><td rowspan="4">Polarity selection of output terminals</td><td>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.</td><td rowspan="3">0</td><td rowspan="3">☆</td></tr>
<tr><td>BIT1 | BIT0</td></tr>
<tr><td>RO2 | RO1</td></tr>
<tr><td>Setting range: 0~F</td><td></td><td></td></tr>
<tr><td>P06.10</td><td>Switch on delay of RO1</td><td>0.000~50.000s</td><td>10.000s</td><td>☆</td></tr>
<tr><td>P06.11</td><td>Switch off delay of RO1</td><td>0.000~50.000s</td><td>10.000s</td><td>☆</td></tr>
<tr><td>P06.12</td><td>Switch on delay of RO2</td><td>0.000~50.000s</td><td>0.000s</td><td>☆</td></tr>
<tr><td>P06.13</td><td>Switch off delay of RO2</td><td>0.000~50.000s</td><td>0.000s</td><td>☆</td></tr>
</table>

Function Code	Parameter Name	Detailed Illustration of Parameters	Default	Change
Group P7: Human-Machine Interface				
P07.02	**QUICK/JOG** function election	0: No function 1: Jogging running. Press **QUICK/JOG** to begin the jogging running. 2: Shift the display state by the shifting key. Press QUICK/JOG to shift the displayed function code from right to left. 3: Shift between forward rotations and reverse rotations. Press **QUICK/JOG** to shift the direction of the frequency commands. This function is only valid in the keypad commands channels. 4: Clear **UP/DOWN** settings. Press **QUICK/JOG** to clear the set value of UP/DOWN. 5: Coast to stop. Press **QUICK/JOG** to coast to stop. 6: Shift the running commands source. Press **QUICK/JOG** to shift the running commands source. 7: Quick commissioning mode (based on non-factory parameters) Note: Press **QUICK/JOG** 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 P00.13 during next powering on.	6	☆
P07.03	**QUICK/JOG** The shifting sequence of running command	When P07.02=6, set the shifting sequence of running command channels. 0: Keypad control→terminal control→communication control 1: Keypad control←→terminals control 2: Keypad control←→communication control 3: Terminals control←→communication control	1	☆
P07.04	**STOP/RST** stop function	Select the stop function by **STOP/RST**. **STOP/RST** is effective in any state for the keypad reset. 0: Only valid for the keypad control 1: Both valid for keypad and terminals control 2: Both valid for keypad and communication control 3: Valid for all control modes	1	☆
P07.05	Parameter choice for running status	0*0000~0*FFFF BIT0: Running frequency (HZ light) BIT1: Reference frequency (HZ flicker) BIT2: DC bus voltage (V light) BIT3: Output voltage (A light) BIT4: Output current (RPM light) BIT5: Rotation speed (% light) BIT6: Output power (% light) BIT7: Output torque (% flicker) BIT8: PID preset (%light) BIT9: PID feedback BIT10: Input terminal status BIT11: Output terminal status BIT12: Torque setting value BIT13: Count value BIT14: Retain Bl15: Step No. of PLC or multi step	0x03FF	☆

Function Code	Parameter Name	Detailed Illustration of Parameters	Default	Change
P07.11	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℃		●
P07.12	Converter module temperature	-20.0~120.0℃		●
P07.15	MSB of inverter power consumption	Display the power used by the inverter. Inverter power consumption=P07.15*1000+P07.16		☆
P07.16	LSB of inverter power consumption	Setting range of P07.15: 0~65535(*1000) Setting range of P07.16: 0.0~999.9 Unit: kWh		☆
P07.27	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) 35: Maladjustment(STo) 36: Underload fault(LL) 37: Hydraulic probe damage(tSF) 38: PV reverse connection fault(PINV)		●
P07.28	Previous fault type			●
P07.29	Previous 2 fault type			●
P07.30	Previous 3 fault type			●
P07.31	Previous 4 fault type			●
P07.32	Previous 5 fault type			●
P07.57	Previous 6 fault type			●
P07.58	Previous 7 fault type			●
P07.59	Previous 8 fault type			●
P07.60	Previous 9 fault type			●
P07.61	Previous 10 fault type			●
P07.62	Previous 11 fault type			●
P07.63	Previous 12 fault type			●
P07.64	Previous 13 fault type			●
P07.65	Previous 14 fault type			●
P07.66	Previous 15 fault type			●
P07.67	Previous 16 fault type			●
P07.68	Previous 17 fault type			●
P07.69	Previous 18 fault type			●
P07.70	Previous 19 fault type			●

<table>
<tr><td>P07.71</td><td>Previous 20 fault type</td><td>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)</td><td></td><td>●</td></tr>
<tr><td colspan="5">Group P8: Enhanced functions</td></tr>
<tr><td>P08.28</td><td>Times of fault reset</td><td>0~10</td><td>5</td><td>★</td></tr>
<tr><td>P08.29</td><td>Interval time of automatic fault reset</td><td>0.1~3600.0s</td><td>10.0s</td><td>☆</td></tr>
<tr><td colspan="5">Group P11: Protective parameters</td></tr>
<tr><td>P11.00</td><td>Phase loss protection</td><td>0x000~0x011
LED ones:
0: Input phase loss software protection disabled
1: Input phase loss software protection enabled
LED tens:
0: Input phase loss software protection disabled
1: Input phase loss software protection enabled
LED hundreds: Reserved
000~111</td><td>Depend on model</td><td>☆</td></tr>
<tr><td>P11.01</td><td>Frequency decrease at sudden power loss</td><td>0: Disable
1: Enable</td><td>0</td><td>☆</td></tr>
<tr><td>P11.02</td><td>Frequency decrease ratio at sudden power loss</td><td>Setting range: 0.00Hz-P00.03/s
After the power lass of the grid, the bus voltage drops to the sudden frequency decrease point, the inverter begin to decrease the running frequency at P11.02, 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.
<table><tr><td>Voltage degree</td><td>220V</td><td>400V</td></tr><tr><td>Frequency decrease point</td><td>260V</td><td>460V</td></tr></table></td><td>0.00Hz/s</td><td>☆</td></tr>
</table>

Function Code	Parameter Name	Detailed Illustration of Parameters	Default	Change
Group P15: Special functions for PV inverters				
P15.00	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 P15 parameters can be adjusted	1	☆
P15.01	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 P15.02. 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	☆
P15.02	Vmpp voltage keypad reference	0.0~6553.5Vdc If P15.01 is 0, the reference voltage is given by P15.02. (During test, reference voltage should be lower than PV input voltage; otherwise, the system will run at lower limit of frequency).	250.0V	☆
P15.03	PI control deviation	0.0~100.0% (100.0% corresponds to P15.02) If the ratio percentage of real voltage to reference voltage, which is abs(bus voltage-reference voltage)*100.0%/reference voltage, exceeds the deviation limit of P15.03, PI adjustment is available; otherwise, there is no PI adjustment and the value is defaulted to be 0.0%. abs: absolute value	0.0%	☆
P15.04	Upper frequency of PI output	P15.05~100.0% (100.0% corresponds to P00.03) P15.04 is used to limit the max value of target frequency, and 100.0% corresponds to P00.03. After PI adjustment, the target frequency cannot exceed the upper limit.	100.0%	☆
P15.05	Lower frequency of PI output	0.0%~P15.04 (100.0% corresponds to P00.03) P15.05 is used to limit the min value of target frequency, and 100.0% corresponds to P00.03. After PI adjustment, the target frequency cannot be less than the lower limit.	20.0%	☆
P15.06	KP1	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	☆
P15.07	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	☆
P15.08	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	☆

Function Code	Parameter Name	Detailed Illustration of Parameters	Default	Change
P15.09	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	★
P15.10	PI switching point	0.0~6553.5Vdc If the absolute value of bus voltage minus the reference value is bigger than P15.10, it will switch to P15.08 and P15.09; otherwise it is P15.06 and P15.07.	20.0V	★
P15.11	Water level control	0: Digital input of the water-level control 1: AI1(the water-level signal is input through AI1, not supported currently) 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 controlled by the digital input. See 43 and 44 functions of S terminals in group P05 for detailed information. If the full-water signal is valid, the system will report the alarm (A-tF) and sleep after the time of P15.14. During the alarm, the full-water signal is invalid and the system will clear the alarm after the time of P15.15. If the empty-water signal is valid, the system will report the alarm (A-tL) and sleep after the time of P15.16. During the alarm, the empty -water signal is invalid and the system will clear the alarm after the time of P15.17. If the function code is 1~3, it is the reference of water-level control analog signal. For details, see P15.12 and P12.13.	0	★
P15.12	Full-water level threshold	0.0~100.0% This code is valid when P15.11 water level control is based on analog input. If the detected water level control analog signal is less than the water level threshold P15.12 and keeps in the state after the delay time P15.14, 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 control 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 P15.12 and the delay counts, the alarm is cleared after the time set by P15.15 is reached in this continuous state continues. During the non-continuous application, the delay timing will clear automatically.	25.0%	★

Function Code	Parameter Name	Detailed Illustration of Parameters	Default	Change
P15.13	Empty-water level threshold	0.0~100.0% This code is valid when P15.11 water level control is based on analog input. If the detected water level control analog signal is greater than the water level threshold P15.13 and keeps in the state after the delay time P15.16, 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 control analog signal is less than the water level threshold, the delay counts. During the empty-water alarm, if the detected water level control analog signal is less than the water level threshold P15.13 and delay counts, the empty-water alarm is cleared after the delay time set by P15.17 in this continuous state. In the non-continuous state, the delay time is automatically cleared.	75.0%	★
P15.14	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	★
P15.15	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	★
P15.16	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	★
P15.17	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	★
P15.18	Hydraulic probe damage	0.0~100.0% 0.0%: Invalid. If it is not 0.0%, when the signal is longer than P15.18, it will report tSF fault directly and stop.	0.0%	★
P15.19	Operation time of water pump underload	0.0-1000.0s This parameter is used to set the operation time of water pump underload. Under the continuous underload operation, underload pre-alarm(A-LL) will be reported if the operation time is reached.	60.0s	★

Function Code	Parameter Name	Detailed Illustration of Parameters	Default	Change
P15.20	Current detection value of underload operation	0.0%: Automatic underload detection 0.1-100.0% If it is 0.0%, it is determined by the underload detection of the water pump inverter. If it is not 0.0%, it tis determined by P15.20. 100.0% corresponds to the rated current of the motor. If the target frequency and the absolute value of the ramp frequency is less than or equal to P15.22, and the current is less than P15.20, after the time set by P15.19, underload fault is reported. Otherwise, it will be operated normally. If the state is not continuous, the delay counting will be cleared automatically.	00.00%	★
P15.21	Underload reset delay	0.0-1000.0s This parameter is used to set the underload reset delay. The operation time and reset time are counted at the same time during underload, and it is generally bigger than P15.19 so as to ensure underload pre-alarm is reported after underload delay operation time is reached. After the time set by P15.21-P15.19, it is reset. If the value is the same as P15.19, it is automatically reset when underload pre-alarm is reported.	120.0s	★
P15.22	Lag frequency threshold	0.00-200.00Hz P15.22 is the lag frequency threshold for the analysis of the underload operation. If the target frequency and the absolute value of the ramp frequency is less than or equal to P15.22, the current will be compared.	0.30Hz	★
P15.23	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 under voltage point or the PV voltage is lower than 70V, it will report the weak light alarm without any delay time. If P15.32=0, the system will switch to the mains input when the light is weak.	100.0s	★
P15.24	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 time of wake-up, the alarm will be cleared and it will run again. When P15.32=0, if the PV voltage is higher than P15.34, after the delay time, it will switch to PV input mode.	300.0s	★
P15.25	Initial reference voltage display	0.0~2000.0V	0	●

<table>
<tr><th>Function Code</th><th>Parameter Name</th><th>Detailed Illustration of Parameters</th><th>Default</th><th>Change</th></tr>
<tr><td>P15.26</td><td>Min. voltage reference during max power tracking</td><td>0.00~1.00
This function code is used to set the minimum voltage reference during maximum power tracking. Minimum Voltage reference during maximum power tracking = Solar panel open-circuit voltage *P15.26. Solar panel open-circuit voltage = P15.25+ P15.28
Track the maximum power in the range of minimum voltage reference~P15.27.
P15.27 must be greater than minimum voltage reference. The less the difference, the faster the tracking is. The maximum voltage needs to be in the range. P15.26 and P15.27 can be adjusted according to site operation.</td><td>0.70</td><td>●</td></tr>
<tr><td>P15.27</td><td>DI status upon 2nd fault</td><td>Min. voltage reference during max power tracking~P15.31
Valid in MPPT max tracking voltage, the tracked max voltage. The default value depends on model.
<table>
<tr><th>Model</th><th>Max voltage reference</th><th>Max Vmppt</th></tr>
<tr><td>-SS2</td><td>400</td><td>400</td></tr>
<tr><td>-S2</td><td>400</td><td>400</td></tr>
<tr><td>-2</td><td>400</td><td>400</td></tr>
<tr><td>-4</td><td>750</td><td>750</td></tr>
</table></td><td>400.0v</td><td>●</td></tr>
<tr><td>P15.28</td><td>Adjustment of initial reference voltage</td><td>0.0~200.0V
MPPT begins to change from the reference voltage
Initial reference voltage =PV voltage-P15.28</td><td>5.0v</td><td>●</td></tr>
<tr><td>P15.29</td><td>Adjustment of upper and lower limit time of Vmppt</td><td>0.0~10.0s
When P15.29 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 internal set by P15.29. The medium value is the current PV voltage and the limit is P15.30: Maximum/Minimum reference voltage=Current PV voltage±P15.30 and it will update to P15.26 and P15.27 at the same time.</td><td>1.0s</td><td>●</td></tr>
<tr><td>P15.30</td><td>Adjustment of upper and lower limits of Vmppt</td><td>5.0~100.0V
Adjustment of the upper and lower limits</td><td>30.0V</td><td>●</td></tr>
<tr><td>P15.31</td><td>Max value of Vmppt</td><td>P15.27~6553.5V
The upper limit cannot exceed the P15.28 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 P15.31. The factory value depends on the model. By default, the value for the -4 models is 750V and the value for other models is 400V.</td><td>400.0V</td><td>●</td></tr>
</table>

<table>
<tr><th>Function Code</th><th>Parameter Name</th><th>Detailed Illustration of Parameters</th><th>Default</th><th>Change</th></tr>
<tr><td>P15.32</td><td>PV input and mains input selection</td><td>0: Automatic shift
1: Mains input
2: PV input
If the value is 0, the system will switch between PV input and mains input according to the detected PV voltage and threshold;
If the value is 1, the system will force to switch to mains 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.</td><td>2</td><td>●</td></tr>
<tr><td>P15.33</td><td>Threshold to switch to mains input</td><td>0.0V~P15.34
If PV voltage is lower than the threshold or the light is weak, it can switch to mains 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.</td><td>70.0V</td><td>●</td></tr>
<tr><td>P15.34</td><td>Threshold to switch to PV input</td><td>P15.33~400.0V
If PV voltage is greater than the threshold, it can switch to PV input through the relay output after the time set by P15.24. To prevent frequent switching, this threshold must be greater than P15.33.
If the value is 0.0, it is invalid.
The default value depends on model.</td><td>100.0V</td><td>●</td></tr>
<tr><td>P15.35</td><td>Rated pump flow</td><td>The pump flow is Q_N if the pump runs at the rated pump frequency and rated lift. Unit: cubic meter/hour.</td><td>0.0</td><td>●</td></tr>
<tr><td>P15.36</td><td>Rated pump lift</td><td>The pump lift is H_N if the pump runs at the rated frequency and rated current.
Unit: meter</td><td>0.0</td><td>●</td></tr>
<tr><td>P15.37</td><td>Voltage setting at PV under voltage point</td><td>When the PV voltage is less than the preset voltage, the system reports the PV under voltage (UV) fault.
The default value depends on the model.
<table>
<tr><th>Model</th><th>PV UV point</th></tr>
<tr><td>-SS2</td><td>140V</td></tr>
<tr><td>-S2</td><td>140V</td></tr>
<tr><td>-2</td><td>140V</td></tr>
<tr><td>-4</td><td>240V</td></tr>
<tr><td>Any model with the boost module</td><td>70V</td></tr>
</table>
Setting range: 0.0~400.0</td><td>70.0</td><td>●</td></tr>
</table>

Function Code	Parameter Name	Detailed Illustration of Parameters	Default	Change
P15.39	Model	This function code is provided for users to change models. For example, if the user wants to use model -4 (default after factory delivery) as model -2, P15.39 must be set to 2. 0: -SS2 220V; single-phase input;single-phase output 1: -S2 220V; single-phase input;three-phase output 2: -2 220V; three-phase input;three-phase output 3: -4 380V; three-phase input;three-phase output Setting range: 0~3	0	●
Group P17: PV State viewing				
P17.38	Current of the main winding	It is the current of the main winding when applying capacitance-removing to control the single phase motor. 0.00~100.00A	0.0A	●
P17.39	Current of the secondary winding	It is the current of the secondary winding when applying capacitance-removing to control the single phase motor. 0.00~100.00A	0.0A	●
Group P18: PV State viewing special for solar converters				
P18.00	PV reference voltage	MPPT is implemented at the converter side. This value is determined at the converter side.		●
P18.01	Current PV voltage	It is transferred from the boost module or equal to the bus voltage.		●
P18.02	Display of MPPT min. reference voltage	The value displays the minimum voltage reference during maximum power tracking. It equals the solar panel open-circuit voltage multiplied P15.26.		●
P18.04	Current inductive current	It is transferred from the boost module. This function code is valid only in AC mode and invalid in PV mode.		●
P18.07	PV input power	Reserved. Unit: kW		●
P18.08	Previous PV input power	Reserved		●
P18.09	Previous PV voltage	Reserved		●
P18.10	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 not contain the boost module.		●
P18.11	Current pump flow	Unit: cubic meter/hour	0.0	●
P18.12	Current pump lift	Unit: meter	0.0	●

Function Code	Parameter Name	Detailed Illustration of Parameters	Default	Change
P18.13	MSBs in total pump flow	This function code displays the 16 most significant bits (MSBs) in the total pump flow. Unit: cubic meter	0	●
P18.14	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 = P18.13*65535+ P18.14	0.0	●
P18.15	Total pump flow resetting	Setting this value to 1 can reset the total pump flow. P18.13 and P18.14 will accumulate the flow after resetting. After the resetting succeeds, P18.15 is automatically set to 0.	0	●
Group P19: Voltage boost (converter module communicates with boost module through 485)				
P19.00	Boost voltage loop KP	0.000~65.535	0.500	○
P19.01	Boost voltage loop KI	0.000~65.535	0.080	○
P19.02	Boost current loop KP	0.000~65.535	0.010	○
P19.03	Boost current loop KI	0.000~65.535	0.010	○
P19.04	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 P19.05~15.0A	12.0A	○
P19.06	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	○
P19.07	Boost voltage loop KP1	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	○
P19.08	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 this group PI parameter. Otherwise, the boost voltage loop uses the first group PI parameter. Setting range: 0.000~65.535	0.080	○
P19.10	Boost software version	Once being powered, the boost module sends its version information to the converter module.	0.00	●

Note:

- The time when the 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 simultaneously: 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.

7 Fault diagnosis and solution

Do as follows after the inverter encounters a fault:

1.Check to ensure there is nothing wrong with the keypad. If not, please contact with the local FULLWILL office.

2.If there is nothing wrong, please check P07 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.

<table>
<tr><th>Fault code</th><th>Fault type</th><th>Possible cause</th><th>Solutions</th></tr>
<tr><td>OUt1</td><td>IGBT U</td><td rowspan="3">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.</td><td rowspan="3">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.</td></tr>
<tr><td>OUt2</td><td>IGBT V</td></tr>
<tr><td>OUt3</td><td>IGBT W</td></tr>
<tr><td>OV1</td><td>Over voltage when acceleration</td><td rowspan="3">1. The input voltage is abnormal.
2. There is large energy feedback.
3. No braking components.
4. Braking energy is not open.</td><td rowspan="3">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.</td></tr>
<tr><td>OV2</td><td>Over voltage when deceleration</td></tr>
<tr><td>OV3</td><td>Over voltage when constant speed running</td></tr>
</table>

Fault code	Fault type	Possible cause	Solutions
OC1	Over current 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 is abnormal. 5.The grounding is short circuited or the output is phase loss. 6. There is strong external interference. 7. The over voltage 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.
0C2	Over current when deceleration		
OC3	Over current when constant speed running		
UV	Bus under voltage	1. The voltage of the power supply is too low. 2. The over voltage 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.

Fault code	Fault type	Possible cause	Solutions
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 control board is not good. 2. Assistant power is bad 3. Hoare components is broken 4. The magnifying circuit is abnormal.	1. Check the connector and repatch. 2. Change the Hoare. 3. Change the main control 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 auto tune and the standard parameter is huge 4. Auto tune overtime	1. Change the inverter mode. 2. Set the rated parameter according to the motor name plate. 2.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 controlling the write and read of the parameters 2. Damage to EEPROM	1. Press STOP/RST to reset. 2. Change the main control 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.

Fault code	Fault type	Possible cause	Solutions
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	1. The grounding of the inverter output terminal is short circuited. 2. The current detection circuit is faulty. 3. The actual motor power sharply differs from the inverter power.	1. Check whether the motor wiring is proper. 2. Change the Hoare. 3. Change the main control panel. 4. 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 control parameters are normal.
STo	Maladjustment fault	1. The control 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 control parameter is set properly or not. 3. Increase the maladjustment detection time.
LL	Electronic Under load fault	The inverter will report the under load pre-alarm according to the set value.	Check the load and the under load 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 over current	1. The acceleration or deceleration is too fast. 2. The inverter power is too low. 3. The load transients / is abnormal. 4. The grounding is short circuited.	1. Increase the ACC or DEC 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.

Fault code	Fault type	Possible cause	Solutions
PVOV	PV over voltage	1. The solar cell panel input voltage is too high. 2. Model -4 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 under voltage	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 over voltage detected at the boost module side	The sun light changes suddenly.	Adjust the boost PI parameters. Enlarge the values of P19.07 and P19.08.
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 panel configuration is proper.
A-LL	Under load alarm	The reservoir is empty.	Check the reservoir.
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.

Appendix A GPRS and cable guidance

A.1 GPRS module and monitoring software

The pumping inverters support the installation of the GPRS module to implement remote monitoring. The GPRS module connects to the inverters through 485 communication. The inverter operation state can be monitored on the APP in the mobile phone or web page in real time.

Method for connecting the GPRS to the inverter:

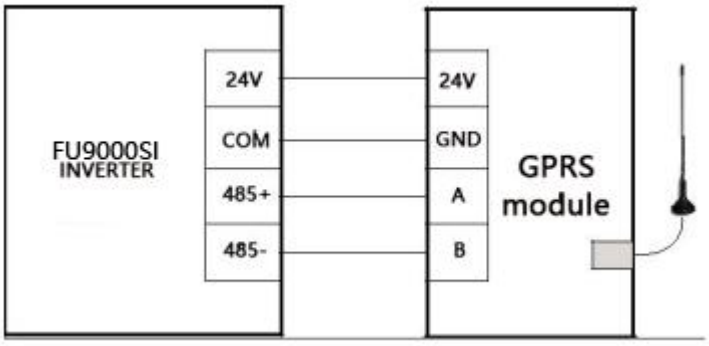


Figure A-1 Connecting the GPRS module to the inverter

For more information, see the GPRS/GPS adaptor operation guide matching the GPRS module or contact the local FULLWILL office. When consulting, provide the product models and serial numbers.

A.2 Cables

A.2.1 Power cables

Dimension the input power and motor cables according to local regulations.

Note: A separate PE conductor is required if the conductivity of the cable shield is not sufficient for the purpose.

A.2.2 Control cables

The relay cable needs the cable type with braided metallic screen.

Keypads need to be connected with network cables. The network cables must be shielded in complicated electromagnetic environments.

Communication cables must be shielded twisted pairs.

Note:

Run analog and digital signals in separate cables.

Check the insulation of the input power cable according to local regulations before connecting to the drive.

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		
FU9000SI-0R7G-S2	1.5	1.5	M4	0.8
FU9000SI-0R4G-SS2	1.5	1.5	M4	0.8
FU9000SI-0R7G-4	1.5	1.5	M4	0.8
FU9000SI-1R5G-4	1.5	1.5	M4	0.8
FU9000SI-2R2G-4	1.5	1.5	M4	0.8
FU9000SI-1R5G-S2	2.5	2.5	M4	0.8
FU9000SI-2R2G-S2	2.5	2.5	M4	0.8
FU9000SI-0R7G-SS2	2.5	2.5	M4	0.8
FU9000SI-1R5G-SS2	2.5	2.5	M4	0.8
FU9000SI-2R2G-SS2	2.5	2.5	M4	0.8
FU9000SI-004G-4	2.5	2.5	M4	1.2~1.5
FU9000SI-5R5G-4	2.5	2.5	M4	1.2~1.5
FU9000SI-7R5G-4	4	4	M4	2~2.5
FU9000SI-004G-2	4	4	M5	2~2.5
FU9000SI-011G-4	6	6	M5	2~2.5
FU9000SI-015G-4	10	10	M5	2~2.5
FU9000SI-018G-4	16	16	M5	2~2.5
FU9000SI-022G-4	25	16	M5	2~2.5
FU9000SI-030G-4	25	16	M5	2~2.5
FU9000SI-037G-4	35	16	M5	2~2.5

Note:

For the cable selection for model IP65, see the cables applicable to the models with the same power as model IP20 in this table.

It is appropriate to use the recommended cable size under 40℃ and rated current. The wiring distance should be no more than 100m.

If the control cable and power cable must cross, the angle between them must be 90°.

Appendix B Recommended solar modules

B.1 Recommended configuration for 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
FU9000SI-0R4G-SS2	250	11*1	300	9*1
FU9000SI-0R7G-SS2	250	11*1	300	9*1
FU9000SI-1R5G-SS2	250	11*1	300	9*1
FU9000SI-2R2G-SS2	250	11*1	300	9*1
FU9000SI-0R4G-S2	250	11*1	300	9*1
FU9000SI-0R7G-S2	250	11*1	300	9*1
FU9000SI-1R5G-S2	250	11*1	300	9*1
FU9000SI-2R2G-S2	250	11*1	300	9*1
FU9000SI-0R7G-4	250	18*1	300	15*1
FU9000SI-1R5G-4	250	18*1	300	15*1
FU9000SI-2R2G-4	250	18*1	300	15*1
FU9000SI-004G-4	250	20*1	300	16*1
FU9000SI-5R5G-4	250	18*2	300	15*2
FU9000SI-7R5G-4	250	18*2	300	15*2
FU9000SI-011G-4	250	18*3	300	15*3
FU9000SI-015G-4	250	18*4	300	15*4
FU9000SI-018G-4	250	18*5	300	15*5
FU9000SI-022G-4	250	18*6	300	15*6
FU9000SI-030G-4	250	18*8	300	15*8
FU9000SI-037G-4	250	18*9	300	15*9

Appendix C Dimension drawings

C.1 External keypad structure

If the keypad is externally installed on an optional bracket, it can be 20 meters away from the inverter at most.

C.2 Dimensions

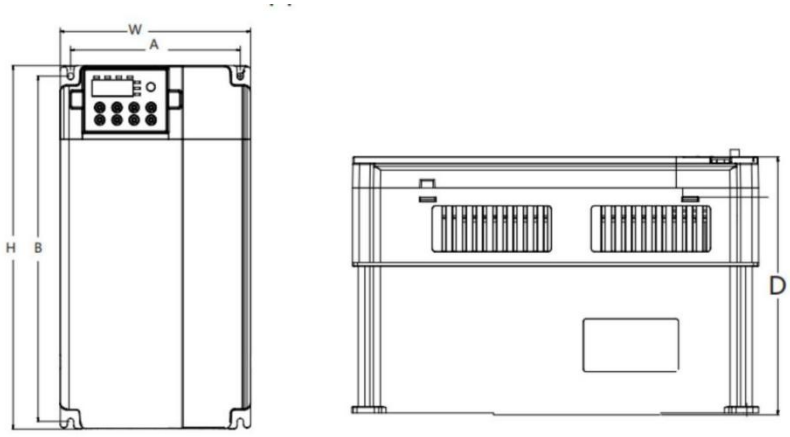


Figure 6-1 plastic structure

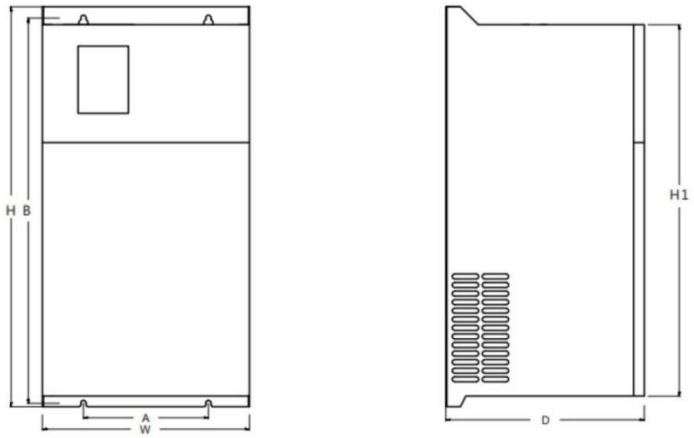


Figure 6-2 iron structure

Power	Installation hole MM		Outside dimension MM				Installation hole
	A Width	B	H	H1	W	D	size MM
1PH 220V input & 1PH/3PH 220V output							
FU9000SI- 0R7G-SS2	115	175	186		126	160.5	5
FU9000SI-1R5G-SS2	115	175	186		126	160.5	5
FU9000SI-2R2G-SS2	115	175	186		126	160.5	5
FU9000SI-004G-SS2	152.1	305	321		170.6	200.6	5.5
380V input & 380V output							
FU9000SI-0R7G-4	115	175	186		126	160.5	5
FU9000SI-1R5G-4	115	175	186		126	160.5	5
FU9000SI-2R2G-4	115	175	186		126	160.5	5
FU9000SI-004G-4	115	175	186		126	160.5	5
FU9000SI-5R5G-4	130.5	243	255.7		146.1	172.2	5
FU9000SI-7R5G-4	130.5	243	255.7		146.1	172.2	5
FU9000SI-011G-4	152.1	305	321		170.6	200.6	5.5
FU9000SI-015G-4	152.1	305	321		170.6	200.6	5.5
FU9000SI-018G-4	152.1	305	321		170.6	200.6	5.5
FU9000SI-022G-4	236.8	383.54	400		255	230.5	6.8
FU9000SI-030G-4	236.8	383.54	400		255	230.5	6.8
FU9000SI-037G-4	236.8	383.54	400		255	230.5	6.8
FU9000SI-045G-4	175	540		560	290	278	8
FU9000SI-055G-4	175	540		560	290	278	8
FU9000SI-075G-4	175	540		560	290	278	8
FU9000SI-090G-4	300	630		650	380	278	8
FU9000SI-110G-4	300	630		650	380	278	8
FU9000SI-132G-4	260	720		750	400	330	8
FU9000SI-160G-4	260	720		750	400	330	8
FU9000SI-185G-4	300	830		870	440	350	10
FU9000SI-200G-4	420	1075		1100	650	380	12
FU9000SI-220G-4	420	1075		1100	650	380	12
FU9000SI-250G-4	420	1075		1100	650	380	12
FU9000SI-285G-4	420	1075		1100	650	380	12
FU9000SI-315G-4	420	1075		1100	650	380	12

Appendix D Further information

D.1 Product and service inquiries

Address any inquiries about the product to your local FULLWILL offices, quoting the type designation and serial number of the unit in question. A listing of FULLWILL sales, support and service contacts can be found by navigating to www.usfull.com.

D.2 Feedback of FULLWILL inverters manuals

Your comments on our manuals are welcomed. Go to www.usfull.net and select online feedback of Contact Us.