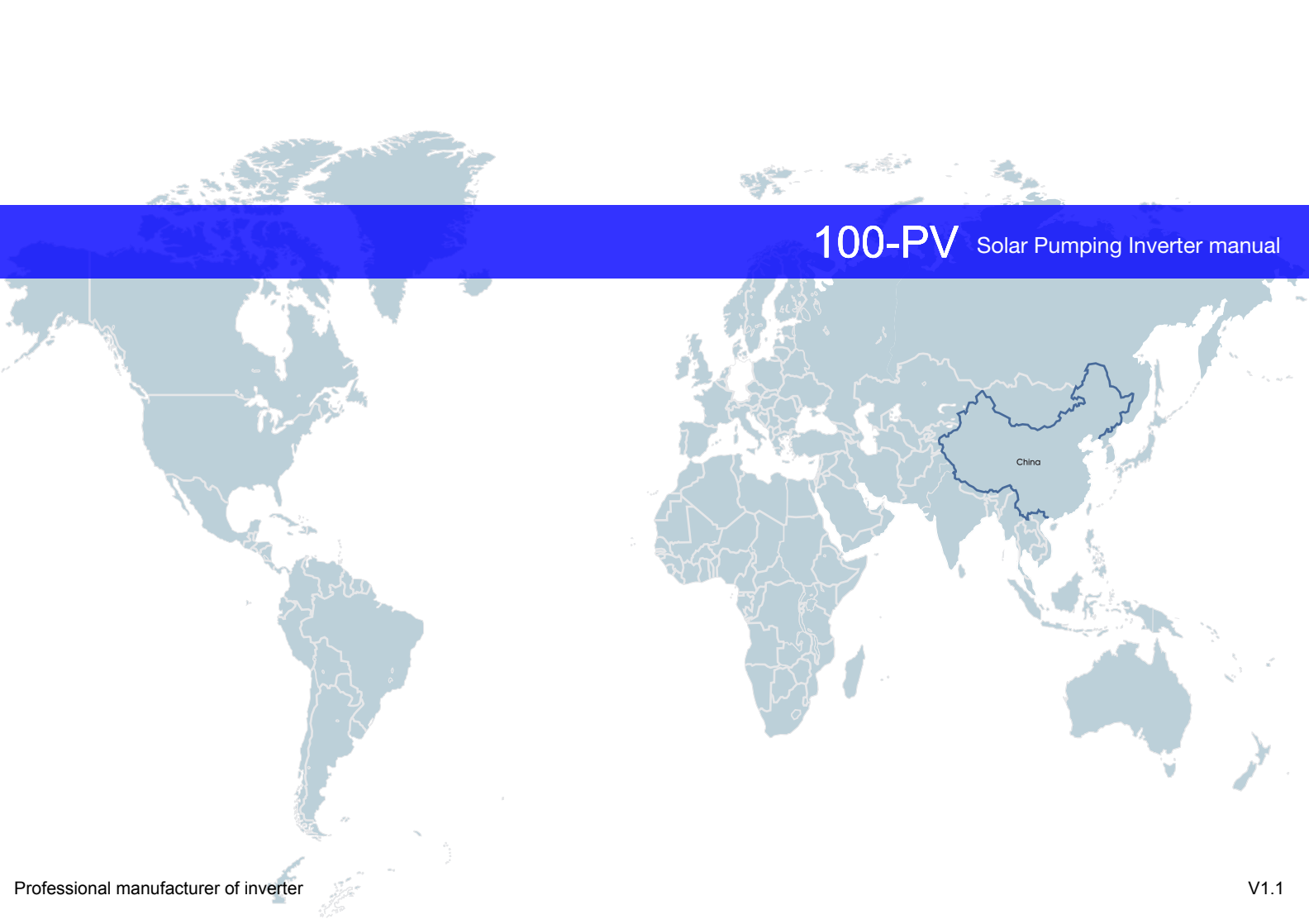


A light blue world map is centered on the page. The country of China is outlined with a dark blue border and labeled with the word "China" in black text. A solid blue horizontal band runs across the upper portion of the map, containing the title text.

100-PV Solar Pumping Inverter manual

Contents

Contents	1
1 Safety precautions	2
1.1 Safety definition	2
1.2 Warning symbols	2
1.3 Safety guidelines	3
2 Product overview.....	5
2.1 Unpacking inspection	5
3 Installation guidelines.....	6
3.1 Mechanical installation	6
3.2 Standard wiring.....	6
4 Commissioning guidelines.....	7
4.1 Inspection before operation.....	7
4.2 Trial run.....	7
4.3 Parameter settings	7
4.4 Advanced settings	7
5 Function parameters	9
6 Fault diagnosis and solution.....	26

1 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.

1.1 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.

1.2 Warning symbols

Warnings caution you about conditions which can result in serious injury or death and/or damage to the equipment, and advice on how to avoid the danger. Following warning symbols are used in this manual:

Symbols	Name	Instruction	Abbreviation
 Danger	Danger	Serious physical injury or even death may occur if not follow the relative requirements	
 Warning	Warning	Physical injury or damage to the devices may occur if not follow the relative requirements	
 Do not	Electrostatic discharge	Damage to the PCBA board may occur if not follow the relative requirements	
 Hot sides	Hot sides	Sides of the device may become hot. Do not touch.	
Note	Note	Physical hurt may occur if not follow the relative requirements	Note

1.3 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. Below is the table of the waiting time: <table><tr><th colspan="2">Inverter model</th><th>Minimum waiting time</th></tr><tr><td>1PH 220V</td><td>0.4kW-2.2kW</td><td>5 minutes</td></tr><tr><td>3PH 220V</td><td>4kW-7.5kW</td><td>5 minutes</td></tr><tr><td>3PH 380V</td><td>0.75kW-37kW</td><td>5 minutes</td></tr></table>	Inverter model		Minimum waiting time	1PH 220V	0.4kW-2.2kW	5 minutes	3PH 220V	4kW-7.5kW	5 minutes	3PH 380V	0.75kW-37kW	5 minutes
Inverter model		Minimum waiting time											
1PH 220V	0.4kW-2.2kW	5 minutes											
3PH 220V	4kW-7.5kW	5 minutes											
3PH 380V	0.75kW-37kW	5 minutes											
	❖ 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.												

1.3.1 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.
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Note:

- 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 leakage current of the inverter may be above 3.5mA during operation. Ground with proper techniques and ensure the grounding resistor is less than 10Ω. The conductivity of PE grounding conductor is the same as that of the phase conductor (with the same cross sectional area).

1.3.2 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 keypad 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.
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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.

1.3.3 Maintenance and replacement of components

	✧ Only qualified electricians are allowed to perform the maintenance, inspection, and components replacement of the inverter. ✧ Disconnect all power supplies to the inverter before the terminal wiring. Wait for at least the time designated on the inverter after disconnection. ✧ Take measures to avoid screws, cables and other conductive materials to fall into the inverter during maintenance and component replacement.
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Note:

- ✧ Please select proper torque to tighten screws.
- ✧ Keep the inverter, parts and components away from combustible materials during maintenance and component replacement.
- ✧ Do not carry out any isolation voltage-endurance test on the inverter and do not measure the control circuit of the inverter by megameter.

1.3.4 Scrap treatment

	✧ There are heavy metals in the inverter. Deal with it as industrial effluent.
	✧ When the life cycle ends, the product should enter the recycling system. Dispose of it separately at an appropriate collection point instead of placing it in the normal waste stream.

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

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.
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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	The ambient temperature of inverter is -10℃~50℃ while air temperature change should be less than 0.5℃ per minute. The inverter will be derated once ambient temperature exceeds 40℃. It is not recommended to use the inverter if 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.

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 keypad 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:

- 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.

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 keypad control 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. 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.

4.4.2 Special settings for single phase motors

a) When the single phase motor is in bad running performance, the user can adjust P04 VF 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 Observe the currents of the windings through P17.38 and P17.39, 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 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.

5 Function parameters

Common function parameters for solar pumping inverter control

Function code	Name	Detailed illustration of parameters	Default	Modify
P00 Group Basic function group				
P00.00	Speed control mode	0: SVC 0 1: SVC 1 2: SVPWM control (V/F)	2	⊙
P00.01	Run command channel	0: Keypad running command 1: Terminal running command channel 2: Communication running command The running command is controlled by the upper monitor via communication	1	○
P00.03	Max. output frequency	Setting range: P00.04~400.00Hz	50.00Hz	⊙
P00.04	Upper limit of the running frequency	Setting range: P00.05~P00.03 Max. output frequency	50.00Hz	⊙
P00.05	Lower limit of the running frequency	Setting range: 0.00Hz~P00.04 (Upper limit of the running frequency)	0.00Hz	⊙
P00.11	ACC time 1	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. 1: Runs at the opposite direction 2: Forbid to run in reverse direction:	0	⊙

Function code	Name	Detailed illustration of parameters	Default	Modify
P00.18	Function restore parameter	0: No operation 1: Restore the default value 2: Clear fault records	0	⊙
P01 Group Start-up and stop control				
P01.08	Stop mode	0: Decelerate to stop. 1: Coast to stop.	1	○
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	○
P02 Group Motor 1 parameters				
P02.00	Motor type	0: Asynchronous motor	0	⊙
P02.01	Rated power of asynchronous motor	0.1~3000.0kW	Depend on model	⊙
P02.02	Rated frequency of asynchronous motor	0.01Hz~P00.03	50.00 Hz	⊙
P02.03	Rated rotating speed of asynchronous motor	1~36000rpm	Depend on 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	⊙

Function code	Name	Detailed illustration of parameters	Default	Modify
P05 Group 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	42	⊙
P05.02	S2 terminals function selection	2: Reverse rotation operation 6: Coast to stop 7: Fault reset	43	⊙
P05.03	S3 terminals function selection	9: External fault input 36: Shift the command to the keypad	44	⊙
P05.04	S4 terminals function selection	37: Shift the command to terminals 38: Shift the command to communication 39: Pre-magnetized command	45	⊙
P05.05	S5 terminals function selection	40: Clear the power 41: Keep the power	1	
P05.09	HDI terminals function selection	42: Forced switch to power frequency input (Switching-on indicates switching to power frequency 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 PV voltage digital input when no boost module is applied (in auto switching mode)	46	⊙

Function code	Name	Detailed illustration of parameters	Default	Modify
P06 Group Output terminals				
P06.03	Relay RO1 output selection	0: Invalid 1: In operation 2: Forward rotation operation	30	○
P06.04	Relay RO2 output selection	3: Reverse rotation operation 5: Inverter fault 27: Weak light 30: Shift to PV mode (If the system works in PV mode, relay output is high.)	5	○
P07 Group Human Machine Interface				
P07.12	Converter module temperature	-20.0~120.0°		●
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)		●
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			●

Function code	Name	Detailed illustration of parameters	Default	Modify
P07.59	Previous 8 fault type	14: Output side phase loss(SPO) 15: Overheat of the boost module (OH1)		●
P07.60	Previous 9 fault type	16: Overheat fault of the inverter module(OH2) 17: External fault(EF)		●
P07.61	Previous 10 fault type	18: 485 communication fault(CE) 19: Current detection fault(Ite) 37: Hydraulic probe damage(tSF)		●
P07.62	Previous 11 fault type	38: PV reverse connection fault(PINV) 39: PV overcurrent(PVOC)		●
P07.63	Previous 12 fault type	40: PV overvoltage(PVOV) 41: PV undervoltage(PVLV)		●
P07.64	Previous 13 fault type	42: Fault on communication with the boost module (E-422) 43: Bus overvoltage detected on the boost module (OV)		●
P07.65	Previous 14 fault type	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.		●
P07.66	Previous 15 fault type	Alarms:		●
P07.67	Previous 16 fault type	Weak light alarm (A-LS) Underload alarm (A-LL)		●
P07.68	Previous 17 fault type	Full water alarm (A-tF) Water-empty alarm (A-tL)		●
P07.69	Previous 18 fault type			●
P07.70	Previous 19 fault type			●
P07.71	Previous 20 fault type			●

Function code	Name	Detailed illustration of parameters	Default	Modify
P15 Group 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	○

Function code	Name	Detailed illustration of parameters	Default	Modify
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 $\text{abs}(\text{bus voltage} - \text{reference voltage}) * 100.0\% / \text{reference voltage}$, 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	○

Function code	Name	Detailed illustration of parameters	Default	Modify
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	○
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	◎

Function code	Name	Detailed illustration of parameters	Default	Modify
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	⊙

Function code	Name	Detailed illustration of parameters	Default	Modify
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	Name	Detailed illustration of parameters	Default	Modify
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	○

Function code	Name	Detailed illustration of parameters	Default	Modify
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%	◎
P15.23	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.	100.0s	○

Function code	Name	Detailed illustration of parameters	Default	Modify
		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. If P15.32=0, the system will switch to the power frequency input when the light is weak.		
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	●
P15.26	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 * P15.26. Solar cell panel open-circuit voltage = P15.25+ P15.28 Track the maximum power in the range of Min. voltage reference~P15.27. P15.27 must be greater than Min. voltage reference. The less the	0.70	○

Function code	Name	Detailed illustration of parameters	Default	Modify															
		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.																	
P15.27	Max. voltage reference during max. power tracking	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><td>Model</td><td>Max. voltage reference</td><td>Max. Vmppt</td></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>	Model	Max. voltage reference	Max. Vmppt	-SS2	400	400	-S2	400	400	-2	400	400	-4	750	750	400.0V	○
Model	Max. voltage reference	Max. Vmppt																	
-SS2	400	400																	
-S2	400	400																	
-2	400	400																	
-4	750	750																	
P15.28	Adjustment of initial reference voltage	0.0~200.0V MPPT begins to change from the reference voltage Initial reference voltage =PV voltage-P15.28	5.0V	○															
P15.29	Adjustment of upper and lower limit time of Vmppt	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 interval set by P15.29. The medium value is the current PV voltage and the limit is P15.30: Maximum/Minimum reference	1.0s	○															

Function code	Name	Detailed illustration of parameters	Default	Modify
		voltage=Current PV voltage±P15.30 and it will update to P15.26 and P15.27 at the same time.		
P15.30	Adjustment of upper and lower limits of Vmppt	5.0~100.0V Adjustment of the upper and lower limits	30.0V	○
P15.31	Max. value of Vmppt	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.	400.0V	○
P15.32	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	2	◎

Function code	Name	Detailed illustration of parameters	Default	Modify
		valid, the function code will be invalid.		
P15.33	Threshold to switch to power frequency input	0.0V~P15.34 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	○
P15.34	Threshold to switch to PV input	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.	100.0V	○
P15.35	Rated pump flow	The pump flow is Q_N if the pump runs at the rated pump frequency and rated lift. Unit: cubic meter/hour.	0.0	○
P15.36	Rated pump lift	The pump lift is H_N if the pump runs at the rated frequency and rated current. Unit: meter	0.0	○
P15.37	Voltage setting at	When the PV voltage is less than the	70.0	○

Function code	Name	Detailed illustration of parameters	Default	Modify												
	PV undervoltage point	preset voltage, the system reports the PV undervoltage (UV) fault. The default value depends on the model <table><tr><td>Model</td><td>PV UV point</td></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	Model	PV UV point	-SS2	140V	-S2	140V	-2	140V	-4	240V	Any model with the boost module	70V		
Model	PV UV point															
-SS2	140V															
-S2	140V															
-2	140V															
-4	240V															
Any model with the boost module	70V															
P15.39	Model	to change models. For example, if the user wants to use model -4 (default after This function code is provided for users factory delivery) as model -2, P15.39 must be set to 2. 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	⊙												

Note:

- 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.

6 Fault diagnosis and solution

1. 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.
2. 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	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
OC2	Overcurrent when deceleration		

Fault code	Fault type	Possible cause	Solutions
OC3	Overcurrent when constant speed running	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.	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.
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	1. Dredge the wind channel or

Fault code	Fault type	Possible cause	Solutions
OH2	IGBT overheat	2. Ambient temperature is too high. 3. The time of overload running is too long.	change the fan. 2. Decrease the environment temperature.
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. Hall components is broken 4. The magnifying circuit is abnormal.	1. Check the connector and repatch. 2. Change the Hall. 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 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 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.	1. Check the PID feedback signal

Fault code	Fault type	Possible cause	Solutions
		2. The PID feedback source disappears.	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 control 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 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 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.

Fault code	Fault type	Possible cause	Solutions
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 -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 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 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 cell

Fault code	Fault type	Possible cause	Solutions
			panel configuration is proper.
A-LL	Underload 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.