VEICHI

Manual

SI23 Solar Pump VFD

Contents

Chapter 1 Safety Requirement and Cautions

To ensure safety of your health, equipment and property, please read this chapter carefully before using the frequency VFD and act in compliance with the instructions when installing,ebugging, running and overhauling the frequency VFD.

1.1 Safety Definition

Danger: it will cause danger of serious injuries and even death while operating against the rules.

Caution: it will cause danger of light injuries or equipment destruction while operating against the rules.

Note: some information is useful while operating and use frequency VFD.

1.2 Safety Requirements and Cautions

● Before Installation

Danger
Only qualified personnel can operate the equipment. Before operating, be sure to carefully read the manual about safety, installation, operation and maintenance. The safe operation depends on the proper processes of choosing models, carrying, installation, operation and maintenance.

Danger
Don’t use the damaged or incomplete frequency VFDs; Otherwise, there is risk of injury.

● Installation

Danger
1. Please install the frequency VFD on metal or other nonflammable material, and keep it away from the combustible material. Otherwise there is danger of fire. 2. No unauthorized modification to the frequency VFD; Otherwise there is danger of damaged. 3. Normal frequency VFD, which is not explosion-proof, can not be installed where with explosive gas or dust; Otherwise there is danger of explosion.

Attention
1. When two frequency VFDs are installed in the same control cabinet, pleas pay attention to the installing place to guarantee the effective heat dissipation. 2. When carrying the frequency VFD, ease support its bottom.

● Wiring

Danger
1. Wire is connected only when the main circuit is cut off, otherwise there is a danger of shock. 2. Wire is connected by professional person only. Otherwise there is a danger of shock. 3. Earth must be reliable. Otherwise there is a danger of shock. 4. AC power supply should not be connected with output ports U, V, W, otherwise there is a danger of damage to frequency VFD. 5. No drop of bolt, spacer, metal stick, conducting wire or other things into the inner of frequency VFD; Otherwise there is a danger of fire or damage to frequency VFD.

Attention
1. If the damage to frequency VFD or other equipment is caused by improper wiring and utilization or unauthorized alteration, the user should shoulder all responsibilities. 2. Please make sure all wirings meet EMC requirement and satisfy safety standard in the local area; Please refer to recommendations in this manual or national standards of wire diameter to avoid accidents. 3. Static electricity on human body would seriously damage internal MOS transistor, etc. No touch the printed circuit boards, IGBT or other internal devices without anti-static measure, otherwise it will cause the malfunction of frequency VFD. 4. Please don't connect phase shifter capacitance or LC/RC noise filter to the output circuit of frequency VFD; Otherwise it will damage the frequency VFD. 5. Please don't connect the magnetic switch or magnetic contactor to the output circuit of frequency VFD; When frequency VFD is in the operation with load, magnetic switch or magnetic contactor can make VFD over-current protection function act. It will damage frequency VFD seriously. 6. Please don't disassemble the panel cover, it only needs to disassemble the terminal cover when wiring. 7. It is forbidden to do any pressure test on frequency VFD, otherwise it will damage the frequency VFD.

● Before Electrification

Danger
1. Please make sure that voltage grade of power supply is consistent with frequency VFD's voltage and then check whether the wiring is correct and firm, and whether there is short circuit in peripheral equipment's circuit. Otherwise it will damage frequency VFD and other equipment. 2. Before the frequency VFD is connected to the input power supply, make sure that the cover has been well fixed. Otherwise it will cause electric shock. 3. For the frequency VFDs whose storage time is over 1 year, when electrification, the voltage should be raised by booster from low to high. Otherwise it will damage the frequency VFD.

Attention
Check if all periphery fittings are wired properly according to the handbook; Otherwise it will cause accidents.

● After Electrification

Danger
1. After electrified, it is forbidden to open the cover, make wiring, and check up; Otherwise, it will cause the danger of electric shock. 2. After electrified, it is forbidden to contact internal wiring board and its parts. Otherwise it will cause the danger of electric shock. 3. Do not operate or touch frequency VFD with wet hand. Otherwise there is danger of damage to frequency VFD and electric shock.

Attention
Please set the parameter of frequency VFD cautiously; Otherwise it will damage equipment.

● Operation

Danger
1. Before running, please check and confirm the application range of the machine and equipment once more; Otherwise it will cause accidents. 2. Please don't touch the cooling fan and braking resistance to check the temperature; Otherwise there is a danger of getting burn. 3. Unprofessional workers are banned to check the signals in the running stage; Otherwise it will cause injuries and damage the equipment.

Attention
1. Please don't turn off the equipment by switching off power; Please cut off the power supply after the electric machine stops running; Otherwise it will damage the frequency VFD. 2. Please avoid anything dropping into the equipment when the frequency VFD is running; Otherwise it will cause electric shock.

● Maintenance

Danger
1. Please don't maintain and repair the equipment with electric; Otherwise it will cause electric shock. 2. Before maintaining and repairing the frequency VFD, please make sure the indicator lights of power supply have completely turned off; Otherwise it may cause electric shock and damage the frequency VFD. 3. Persons who have not passed specialized train are not allowed to conduct the frequency VFD maintenance; Otherwise it may cause electric shock and damage the frequency VFD.

1.3 Cautions in Using

1. In application of this series frequency VFD, you have to confirm all machine insulation to prevent damage to the equipment. Moreover, when the motor working in tough environment, please periodic inspect the electrical insulation to ensure the safety of the system work.
2. If the motor adapter is not consistent with frequency VFD's rating current (The rating current of the motor is far smaller than that of frequency VFD), please adjust the protective value to ensure safe running.
3. In occasions such as load raises, usually there is negative torque and frequency VFD breaks off for over-current or over-voltage. In this case, you should consider choosing the matching brake unit.
4. Frequency VFD, in a certain output frequency range, can meet the mechanical resonance of the load equipment. To avoid it, you can set up jumping frequency.
5. As output voltage of the VFD is pulse-wave type, if there is capacity which can improve power factor or pressure-sensitive resistance which used for thunder-proof in the voltage output side, the frequency VFD will break off or its parts will be damaged, so it is necessary to dismantle them. Moreover, it is proposed not install switch parts like air switch and contactor (if it is necessary to install switch on output side, please make sure the output electricity of frequency VFD is zero when the switch is working).
6. At over 1,000 meters altitude, the VFD’s heat dissipation function worsened due to the thin air, it is necessary to use less.
7. The VFD output voltage is pulse wave type. If using digital multi-meter measurement, deviation of the reading will be great. And the deviation is different by using different type of digital multi-meter. Under normal circumstances, while RMS 380V, digital multi-meter reading is around 450V.
8. Solar panel can be connected in the series or parallel. For rated voltage 380V controller, we suggest working voltage between 480V and 560V while MPPT. What means the solar panel open circuit voltage should be between 600V and 700V.

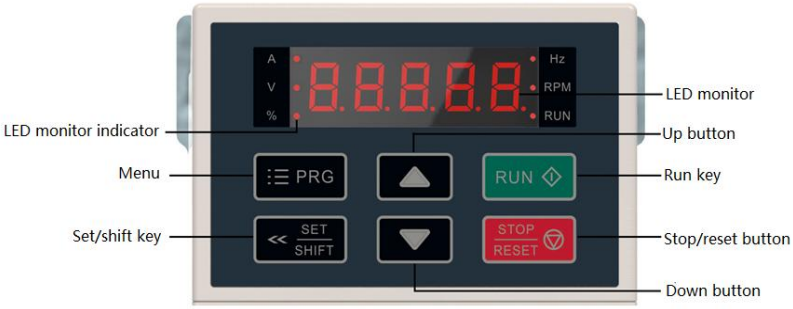
1.4 Cautions in Disposal

When you dispose frequency VFD, please pay attention to:

1. Electrolytic capacitor: the electrolytic capacitor of main circuit or the printing plate may explode when they are burned.
2. Plastic: plastic incineration may generate toxic gases.
3. Dispose method: please dispose as industrial waste.

Chapter 2 Keyboard layout and functions specification

- **Keyboard operator appearance**



- **Key function**

Symbol	Defination	Function Description
	Menu	Enter the function menu interface during standby or running; press this button to exit the modification when the parameter is modified; press the button (1 second) during standby or running to enter the status interface directly.
	Set/shift	Set function: After modifying the value, press this key to confirm the modified value. Shift function: long press this button (1 second) to move the operation bit, long press is not loose, then cyclic shift.
	Up/Down	The up key increases the operation value and the down key decreases the operation value.
	Run	When the run/stop is controlled by the keyboard, press this button to turn the VFD forward. The status indicator is always on during forward run, and the status indicator is flashing during reverse run.
	Stop/Reset	When the command given channel is keyboard control, press this key to stop the VFD; the parameter [F04.08] can be used to define whether other command channels are valid; the VFD resets when pressing the key in fault status.

- **Indicator Defination**

Name		Status	Defination
Unit indicator	Hz	Flash/Light on	Indicates the frequency unit
	A	Light on	Represents current unit
	V	Light on	Represents voltage unit
	RPM	Light on	Express unit of speed
	%	Flash/Light on	Indicates the percentage unit
Status Indicator	RUN	Light on	The VFD is running forward
	RUN	Flash	The VFD is running reverse
	RUN	Light off	VFD is shutdown

Chapter 3 Fault Diagnosis and Solution

This chapter describes the VFD fault, alerts, and operation of the failure on the VFD, the display information on VFD and countermeasures.

Keypad display	Fault code	Fault type	Possibility reason	Troubleshooting
E.LU2	E. LU2	Under voltage at runs	●Power voltage too low ●DC main contactor don't close	●Check input power to solve ●Ask support
E.oU1	E. oU1	Over voltage at acceleration	●Power voltage fluctuation over limit ●Too start rotating motor	●Check power grid ●Restart until motor is stop completely, or set [F1.00] set for 1 or 2
E.oU2	E. oU2	Over voltage during deceleration	●Deceleration time too small ●The driving load too heavy ●Power voltage fluctuation over limit	●Prolong deceleration time ●Reduce the load, or select bigger capacitor drive, or connect braking unit ●Check input power
E.oU3	E. oU3	Overvoltage at constant speed	●The input voltage is too high ●An external force drives the motor during deceleration	●Adjust the voltage to normal range ●Cancel the external force or install the braking resistor
E.oU4	E. oU4	Over voltage at stop	●Voltage fluctuate above limit	●Check the input voltage
E.oC1	E. oC1	Over current during acceleration	●Acceleration time is too short ●To start rotating motor ●V/F setting not correct or torque boost setting too big ●Solar drive capacitor is too small	●Prolong acceleration time ●Restart motor when it on still, or set F1.00 for 1 or 2 ●Reset V/f curve or torque boost setting

	E. oC2	Over current during deceleration	●The output circuit is grounded or short circuited ●Motor auto-tuning is not performed ●The acceleration time is too short ●Manual torque boost or V/F curve is not appropriate ●The voltage is too low ●The startup operation is performed on the rotating motor ●A sudden load is added during acceleration ●The AC drive model is of too small power class	●Eliminate external faults ●Perform the motor auto tuning ●Increase the acceleration time ●Adjust the manual torque boost or V/F curve ●Adjust the voltage to normal range ●Select rotational speed tracking restart or start the motor after it stops ●Remove the added load ●Select an AC drive of higher power class
	E. oC3	Over current at constant speed	●The output circuit is grounded or short circuited ●Motor auto-tuning is not performed ●The voltage is too low ●A sudden load is added during operation ●The AC drive model is of too small power class	●Eliminate external faults ●Perform the motor auto tuning ●Adjust the voltage to normal range ●Remove the added load ●Select an AC drive of higher power class

	E. oL 1	Motor overload	●Boost torque is too big under VF control ●ACC. and DEC. time is too short ●Motor parameters setting is improperly ●Restart motor which in counter rotate ●The grid voltage is too lower ●Load is too big or motor block load ●AC drive selected is too load	●Reduce boost torque ●Increase the ACC./DEC.time ●Reset motor parameters ●Reduce current limit and adopt speed tracking ●Check grid voltage ●Check load condition ●Change bigger power AC drive
	E. oL2	AC drive overload	●Boost torque is too big under VF control ●ACC. and DEC. time is too short ●Motor parameters setting is improperly ●Restart motor which in counter rotate ●The grid voltage is too lower ●Load is too big or motor block load ●AC drive selected is too load	●Reduce boost torque ●increase the ACC./DEC.time ●reset motor parameters ●Reduce current limit and adopt speed tracking ●Too check grid voltage ●Too check load ●change bigger power AC drive
	E. SC	System abnormal	●Deceleration is too short ●Short circuit of solar drive output or phase output short circuit to ground ● Module damage ● EMC interface	●Prolong acceleration time ●To check peripheral equipment ●Ask to support ●Check the wiring layout, cable ground
	E. oH 1	VFD over-heat	●Temperature is too high ●Air channel is blocked ●Fan connection parts is loose ●Fan is damaged ●Temperature detection circuit fault	●Make the environment meet the requirement ●Clear the air channel ●Check and reconnect the wire ●Change the same new fan ●Seek support from factory

	E. rE1	Motor static detection fault	●Detection overtime ●Start static detection while motor is running ●Capacitance difference is too big between motor and VFD ●Motor parameter setting mistake	●Check motor connection wire ●Detect after motor stopping totally ●Change VFD model ●Reset parameter according to nameplate
	E. rE2	Motor rotation detection fault	●Detect while motor is running ●Detect with load ●Detection overtime ●Capacitance difference is too big between motor and VFD ●Motor parameter setting mistake	●Detect after motor stop totally ●Re-detect without load ●Check motor connection wire ●Change VFD model ●Reset parameter according to nameplate
	E. EEP	Memory fault	●Electromagnetic disturb in memory period ●EEPROM damage	●Resume load and save ●Seek support from factory
	L. FE	Reserved	-	-
	E. iLF	Input phase loss	●3-phase input power open phase	●Check 3-phase power supply and the phase ●Check 3-phase power supply wiring
	E. oLF	Output phase loss	●3-phase output power open phase	●Check 3-phase output voltage and current ●Check wiring
	E. Gnd	Output earth terminal short circuit	●Check wiring and insulation	●Output earth
	E. HAL	Current detection fault	●Detect circuit fault ●Phase imbalance	●Seek support from factory ●Check motor and wiring

	Rs485 communication fault	●Unsuitable baud rate setting ● wire breaks	●Set suitable baud rate setting ●Check communication wire ●Make sure right communication format	●RS485communication fault
Photovoltaic-specific faults				
		●Sleeping voltage warning	Bus voltage below the value of the set dormant voltage	Check out F21.11 - F21.13 F21.11 Set to 0 to turn off Sleep
		●Low frequency warning	Operating frequency below the low frequency setting	Check out F21.14 - F21.16 F21.14 Set to 0 to turn off low frequency protection
		●Dry protection warning	Operating output current below the dry setting current	Confirm motor operation Check out F21.17 - F21.19 F21.17 Set to 0 to switch off the hit and dry protection
		●Overcurrent warning	Operating output current exceeding the set overcurrent value	Confirm motor operation Check out F21.20 - F21.22 F21.20 set to 0 to switch off overcurrent protection
		●Minimum power warning	Output power below minimum power	Checking the current and voltage detection of the inverter Check out F21.23 - F21.25 F21.23 Set to 0 to switch off minimum power protection
		●Full water protection warning	Stops operation when water full detection is reached Warning displayed	Detects if the defined terminal is on or off

Chapter 4 Parameters List

This chapter just provides function parameter table. Specifications refer to AC10 technical manual.

● **Environment setting**

Parameter (address)	Function Description	Range of settings and definition	Factory default (setting range)	Notes
F00.03 (0x0003)	Initialization	V/F SVC Set the VFD initialization method. 0: Not initialized 11: Select the set value according to the purpose to carry out the parameters (excluding the motor parameters) 22: All parameters are initialized 33: Clear the fault record	0 (0~33)	-
F00.04 (0x0004)	Keyboard parameter copy	V/F SVC 0: No function 11: Upload parameters to the keyboard 22: Download parameters to the VFD	0 (0~9999)	-
F00.05 (0x0005)	User password	V/F SVC Used to set the user password.	0 (0~65355)	-

● **Basic parameters**

Parameter (address)	Function Description	Range of settings and definition	Factory default (setting range)	Notes
F01.00 (0x0100)	Motor 1 control mode	V/F SVC The way the motor is controlled. 0: AM-VF; VF control 1: AM-SVC; Open loop vector control, current closed loop control	0 (0~1)	S/T2 models only support VF control
F01.01 (0x0101)	Run command channel	V/F SVC Used to select the channel that the drive accepts the run and stop commands and the direction of travel. 0: Keyboard control (external keyboard priority) 1: Terminal control 2: RS485 communication control 3: Reserved	0 (0~3)	-

F01.02 (0x0102)	Frequency reference source channel A	V/F SVC The frequency converter sets the given source of the frequency. 0: Keyboard digital given frequency 1: Keyboard analog potentiometer given 2: Current/voltage analog AI given 3: Reserved 4: Reserved 5: Terminal pulse PUL given 6: RS485 communication given 7: Terminal UP/DW control 8: PID control given 9: Program Control (PLC) given 10: Option card 11: Multi-speed speed given	0 (0~11)	-
F01.09 (0x0109)	Keyboard digital given frequency	V/F SVC Used to set and modify the keyboard digital setting frequency.	50.00Hz (0.00Hz~ upper limit frequency setting)	-
F01.10 (0x010A)	Maximum frequency	V/F SVC The maximum frequency that the frequency converter can set.	50.00Hz (upper limit frequency~ 599.00Hz)	-
F01.12 (0x010C)	Upper limit frequency digital setting	V/F SVC The upper line frequency is given when F01.11 is set to 0.	0.00Hz (0.00Hz~ upper limit frequency digital setting)	-
F01.13 (0x010D)	Lower limit frequency	V/F SVC Given a lower frequency limit, the given frequency is limited.	0.00Hz (0.00Hz~ upper limit frequency digital setting)	-
F01.22 (0x0116)	Acceleration time 1	V/F SVC The time required for the output frequency to accelerate from 0.00 Hz to the time reference frequency. 1s~65000s(F01.21 = 0) 0.1s~6500.0s(F01.21 = 1) 0.01s~650.00s(F01.21 = 2)	Model setting (0.01s~ 650.00s)	-

F01.23(0x0117)	Deceleration time 1	V/F SVC The time it takes for the output frequency to decelerate from the time reference frequency to 0.00 Hz.	Model setting (0.01s~ 650.00s)	-
F01.40 (0x0128)	Carrier frequency	V/F SVC Used to set the switching frequency of the VFD IGBT.	4.0kHz (1.0kHz~ 16.0kHz)	-

● Motor Parameters

Parameter (address)	Function Description	Range of settings and definition	Factory default (setting range)	Notes
F02.00 (0x0200)	Motor type	V/F SVC Set the type of motor. 0: Asynchronous motor (AM) 1: Reserved	0 (0~1)	-
F02.01 (0x0201)	Pole number	V/F SVC Set the number of motor stages.	4 (2~98)	-
F02.02 (0x0202)	Motor rated power	V/F SVC Set the rated power of the motor.	Model setting (0.1kW~ 1000.0kW)	-
F02.03 (0x0203)	Motor rated frequency	V/F SVC Set the rated frequency of the motor.	Model setting (0.01Hz~ Maximum frequency)	-
F02.04 (0x0204)	Motor rated speed	V/F SVC Set the rated speed of the motor.	Model setting (0rpm~ 65000rpm)	-
F02.05 (0x0205)	Motor rated voltage	V/F SVC Set the rated voltage of the motor.	Model setting (0V~1500V)	-
F02.06 (0x0206)	Motor rated current	V/F SVC Set the rated current of the motor.	Model setting (0.1A~ 3000.0A)	-
F02.07 (0x0207)	Motor parameter auto-tuning selection	V/F SVC After the parameter auto-tuning is completed, the set value of [F02.07] will be automatically set to "0". 0: No operation 1: Rotary self-tuning 2: Static self-tuning 3: Stator resistance self-tuning	0 (0~3)	S/T2 models do not support parameter auto-tuning

F02.50 (0x0232)	Motor online learning function selection	V/F SVC 0: Invalid 1: Power-on self-learning 2: Run the initial segment self-learning 3: Self-learning in operation	0 (0~3)	S/T2 models do not support motor online learning
F02.69 (0x0245)	Winding connection methods	0: U phase to secondary winding, V phase to public end, W phase to main winding; 1: W phase to secondary winding, V phase to public end, U phase to main winding; 2: V phase to secondary winding, U phase to public end, W phase to main winding; 3: W phase to secondary winding, U phase to public end, V phase to main winding; 4: U-phase to secondary winding, W-phase to public end, V-phase to main winding; 5: V-phase to secondary winding, W-phase to public end, U-phase to main winding. Translated with DeepL.com (free version)	0 (0~5)	

● **V/F Control**

Parameter (address) adjustable attribute	**Function Description**	**Range of settings and definition**	**Factory default (setting range)**	**Notes**
F04.00 (0x0400)	Linear VF curve selection	V/F Used to select the type of V/F curve to meet different load features. 0: Straight line VF curve 1-9: Respectively, a power VF curve of 1.1-1.9 10: Square VF curve 11: Custom VF curve	0 (0~11)	-
F04.01 (0x0401)	Torque boost	V/F 0.0%: automatic torque boost 0.1%~30.0%: manual torque boost	0.0% (0.0%~30.0%)	-

● **I/O Terminals**

Parameter (address)	Function Description	Range of settings and definition	Factory default (setting range)	Notes
F05.00 (0x0500)	Terminal X1 function selection	V/F SVC See the function of terminal X for details.	1 (0~63)	-
F05.01 (0x0501)	Terminal X2 function selection	V/F SVC See the function of terminal X for details.	2 (0~63)	-
F05.02 (0x0502)	Terminal X3 function selection	V/F SVC See the function of terminal X for details.	4 (0~63)	-
F05.03 (0x0503)	Terminal X4 function selection	V/F SVC See the function of terminal X for details.	8 (0~63)	-
F05.50 (0x0532)	AI lower limit	V/F SVC Define the signal received by the terminal. The voltage signal below this value is processed by the limit value.	0.0% (0.0%~ 100.0%)	-
F05.51 (0x0533)	AI lower limit corresponding setting	V/F SVC Set the percentage of the corresponding set value.	0.0% (-100.0%~ 100.0%)	-
F05.52 (0x0534)	AI upper limit	V/F SVC Define the signal received by the terminal. The voltage signal above this value is processed according to the upper limit value.	100.00% (0.00%~ 100.00%)	-
F05.53 (0x0535)	AI upper limit corresponding setting	V/F SVC Set the percentage of the corresponding set value.	100.00% (0.00%~ 100.00%)	-
F06.00 (0x0600)	AO output mode selection	V/F SVC 0: 0V~10V 1: 4.00mA~20.00mA 2: 0.00mA~20.00mA 3: Reserved 4: Reserved	0 (0~4)	-

F06.01 (0x0601)	AO output selection	V/F SVC 0: Given frequency 1: Output frequency 2: Output current 3: Input voltage 4: Output voltage 5: Mechanical speed 6: Given torque 7: Output torque 8: PID given 9: PID feedback amount 10: Output power 11: Bus voltage 12: VS input value 13: AI input value 14: AS input value 15: PUL input value 16: Module temperature 1 17: Module temperature 2 18: 485 communication given 19: Virtual terminal vY1	0 (0~19)	-
F06.20 (0x0614)	Output terminal polarity selection	V/F SVC 0: Positive polarity 1: Negative polarity LED "0" digit: Y terminal LED "00" digit: Relay output terminal 1 LED "000" digit: Reserved LED "0000" digit: Reserved	0000 (0000~1111)	-
F06.21 (0x0615)	Output terminal Y	V/F SVC See terminal Y function.	1 (0~63)	-
F06.22 (0x0616)	Relay 1 output (TA-TB-TC)	V/F SVC See terminal Y function.	4 (0~63)	-

● Start/Stop Control

Parameter (address)	Function Description	Range of settings and definition	Factory default (setting range)	Notes
F07.05 (0x0705)	Direction of rotation	V/F SVC LED "0" digit: Reverse the running direction. 0: The direction is unchanged 1: Direction reversal LED "00" digit: No direction of operation 0: Allow forward and reverse commands 1: Only forward commands are allowed 2: Only reverse command is allowed LED "000" digit: Frequency Control Command Direction. 0: The frequency control direction is invalid. 1: Frequency control direction is valid LED "0000" digit: Reserved	0000 (0000~1111)	-
F07.06 (0x0706)	Power failure restart action selection	V/F SVC 0: Invalid 1: Valid	0 (0~1)	-
F07.10 (0x070A)	Stop mode	V/F SVC 0: Deceleration stop 1: Free stop	0 (0~1)	-

● Protection Parameters

Parameter (address)	Function Description	Range of settings and definition	Factory default (setting range)	Notes
F10.00 (0x0A00)	Overcurrent suppression	V/F SVC The automatic limiting output current does not exceed the set overcurrent suppression point to prevent overcurrent faults from being triggered by excessive current. 0: Inhibition is always valid 1: Acceleration/deceleration is valid, constant speed is invalid	0 (0~1)	-
F10.01 (0x0A01)	Overcurrent suppression point	V/F SVC Set the load current limit level, 100% corresponds to the rated motor current.	160.0% (0.0%~300.0%)	-

F10.12 (0x0A0C)	Bus overvoltage suppression point	V/F SVC Set bus voltage value for trigger overvoltage suppression function.	T3: 780 S2: 370 (T3: 650~760 S2: 340~380) Also subject to overvoltage limit	T3 overvoltage point: 820V (750~840) S2 overvoltage point: 400V (360~410)
F10.16 (0x0A10)	Bus undervoltage suppression	V/F SVC When the bus voltage is lower than the undervoltage suppression point, the operating frequency is automatically adjusted to suppress the bus voltage from decreasing, preventing the undervoltage fault. 0: Off 1: On	0 (0~1)	-
F10.17 (0x0A11)	Bus undervoltage suppression point	V/F SVC Set bus voltage value for trigger undervoltage suppression function.	T3: 430 S2: 240 (T3: 350~450 S2: 180~260) Also subject to overvoltage limit	T3 overvoltage epoint: 820V (750~840) S2 overvoltage epoint 400V (360~410)
F10.18 (0x0A12)	Bus undervoltage suppression gain	V/F SVC Set the response effect of undervoltage suppression.	100.0% (0.0%~500.0%)	-

F10.19 (0x0A13)	Bus undervoltage protection point	V/F SVC The lower limit voltage allowed by the set bus voltage. Below this value, the VFD reports an undervoltage fault.	T3: 320 S2: 190 (T3: 300~400 S2: 160~240) Also subject to overvoltage limit	T3 overvoltagepoint: 820V (750~840) S2 overvoltagepoint 400V (360~410)
F10.20 (0x0A14)	Input and output phase loss protection options	V/F SVC Set whether the input and output phase loss protection functions are enabled. LED "0" digit: Output phase loss protection 0: Off 1: On LED "00" digit: Input phase loss protection 0: Off 1: On, detected the input missing phase report warning A.ILF, continue to run 2: Turn on, detect input missing phase report fault E.ILF, free stop	021 (000~121)	-
F10.22 (0x0A16)	Ground short circuit protection option	V/F SVC Set whether the VFD output and the VFD cooling fan ground short circuit protection function are enabled. LED "0" digit: Output short circuit protection 0: Off 1: On LED "00" digit: Fan to ground short circuit protection 0: Off 1: On	11 (00~12)	-
F10.23 (0x0A17)	Fan ON/OFF control selection	Set the VFD cooling fan operation mode. 0: The fan runs after the VFD is powered on 1: After the shutdown, the fan operation is related to temperature, and the operation is running 2: After the shutdown, the fan stops after F10.24, and the operation is related to temperature	1 (0~2)	-

F10.50 (0x0A32)	Failure self-recovery	V/F SVC Set the number of fault self-recovery that is allowed to be performed. Note: A value of 0 indicates that the fault self-recovery function is turned off; otherwise it indicates that the function is enabled.	0 (0~15)	-
F10.51 (0x0A33)	Failure self-recovery interval	V/F SVC Set the waiting time before the VFD resets to the time before each reset.	1.0s (0.1s~600.0s)	-
F10.52 (0x0A34)	Numbers of failures recovered	V/F SVC Indicates the number of self-recovery faults that have been performed. This parameter is a read-only parameter.	0	-

● Operation Parameters

Parameter (address)	Function Description	Range of settings and definition	Factory default (setting range)	Notes
F11.00 (0x0B00)	Key lock selection	V/F SVC 0: Not locked 1: Keyboard function parameter modification lock 2: Function parameters and non-start stop button lock 3: Function parameters and button full lock	0 (0~3)	-
F11.01 (0x0B01)	Key lock password	V/F SVC	0 (0~65535)	-
F11.11 (0x0B0B)	Parameter 1 showed up on first line of the keyboard	V/F SVC LED "0" and "00" digit: Setting yy setting in monitoring parameter number Cxx.yy 00~63 LED "000" and "0000" digit: Monitoring parameter number Cxx.yy xx setting 00~07	0000 (0000~0763)	-
F11.12 (0x0B0C)	Parameter 2 showed up on first line of the keyboard	V/F SVC LED "0" and "00" digit: Setting yy setting in monitoring parameter number Cxx.yy 00~63 LED "000" and "0000" digit: Monitoring parameter number Cxx.yy xx setting 00~07	0001 (0000~0763)	-

F11.13 (0x0B0D)	Parameter 3 showed up on first line of the keyboard	V/F SVC LED "0" and "00" digit: Setting yy setting in monitoring parameter number Cxx.yy 00~63 LED "000" and "0000" digit: Monitoring parameter number Cxx.yy xx setting 00~07	0002 (0000~0763)	-
F11.14 (0x0B0E)	Parameter 4 showed up on first line of the keyboard	V / F SVC LED "0" and "00" digit: Monitor parameter number Cxx.yy YY setting 00~63 LED "000" and "0000" digit: Monitoring parameter number Cxx.yy XX setting 00~07	0011 (0000~0763)	-
F11.20 (0x0B14)	Keyboard display item settings	V/F SVC LED "0" digit: Output frequency display selection 0: Target frequency 1: Operating frequency LED "00" digit: Reserved 0: Invalid 1: Active power to remove stator resistance loss LED "000" digit: Power Display Dimensions 0: Power display percentage (%) 1: Power display kilowatt (kW) LED "0000" digit: Reserved	0000 (0000~1111)	-

- **Communication Parameters**

Parameter (address)	Function Description	Range of settings and definition	Factory default (setting range)	Notes
F12.00 (0x0C00)	Master-slave choice	V/F SVC 0: Slave 1: Host	0 (0~1)	-
F12.01 (0x0C01)	Modbus communication address	V/F SVC	1 (1~247)	-
F12.03 (0x0C03)	Modbus data format	V/F SVC 0: (N, 8, 1) no parity, Data bits: 8, Stop position: 1 1: (E, 8, 1) even parity,	0 (0~5)	-

		Data bits: 8, Stop position: 1 2: (O, 8, 1) odd parity, Data bits: 8, Stop position: 1 3: (N, 8, 2) no parity, Data bits: 8, Stop position: 2 4: (E, 8, 2) even parity, Data bits: 8, Stop position: 2 5: (O, 8, 2) odd parity, Data bits: 8, Stop position: 2		

● Solar Pump Special Parameters

Parameter (address)	Function Description	Range of settings and definition	Factory default	Notes
F21.00 (0x5500)	Solar pump drive control mode	LED0 Mode selection. 0: Variable frequency control mode 1: CVT mode for solar 2: MPPT mode for solar LED00 Operation selection 0: Continuous Operation 1: Inermittent Operation 2: Pump Clean LED000 Reserved LED0000 Motor selection 0: Three-phase Motor 1: Single-phase motor single-phase control 2: Single-phase motor two-phase control	0002	-
F21.01 (0x5501)	Running control mode	0: Stop 1: Running 2: Sleep 3: Low speed protection 4: Dry run protection 5: Over current protection 6: Minimum power protection 7: Water fulfilled protection	Read Only	-
F21.02 (0x5502)	VOC voltage (display)	0.0V~999.9V	Read only	-
F21.03 (0x5503)	CVT target voltage	70.0%~95.0%	81.0%	-

F21.04 (0x5504)	MPPT upper limit voltage	20.0%~200.0%	100.0%	-
F21.05 (0x5505)	MPPT lower limit voltage	20.0%~200.0%	50.0%	-
F21.06 (0x5506)	Frequency adjusting gain	0.1%~500.0%	10.0%(AM) 40.0% (PMSM)	-
F21.07 (0x5507)	MPPT search interval	0.1s~30.0s	1.0s	-
F21.08 (0x5508)	MPPT regulating gain	0~9999	100	-
F21.09 (0x5509)	Quick-drop frequency gain	0~20	2	-
F21.10 (0x550A)	Frequency adjusting filter time	0.001s~2.000s	0.020s	-
F21.11 (0x550B)	Go to sleep mode voltage	0V~1000V	0V	-
F21.12 (0x550C)	Wake up restore voltage	0V~1000V	400V	-
F21.13 (0x550D)	Sleeping stop restore waiting time	0.0s~3000.0s	10.0s	-
F21.14 (0x550E)	Low speed protection detect frequency	0.00Hz~300.00Hz	0.00Hz	-
F21.15 (0x550F)	Low speed protection detect time	0.0s~3000.0s	10.0s	-
F21.16 (0x5510)	Low speed protection restore working time	2.0s~3000.0s	10.0s	-
F21.17 (0x5511)	Dry run protection detect current	0.0A~999.9A	0.0A	-
F21.18 (0x5512)	Dry run protection detect time	2.0s~3000.0s	10.0s	-

F21.19 (0x5513)	Dry run auto restore working time	2.0s~3000.0s	10.0s	-
F21.20 (0x5514)	Over current point setting	0.0A~999.9A	0.0A	-
F21.21 (0x5515)	Over current protection detect time	0.0s~3000.0s	10.0s	-
F21.22 (0x5516)	Over current protection auto restore working time	2.0s~3000.0s	10.0s	-
F21.23 (0x5517)	Input minimum power protection power point setting	0.00kW~650.00kW	0.00kW	-
F21.24 (0x5518)	Minimum power protection detect time	0.0s~3000.0s	10.0s	-
F21.25 (0x5519)	Minimum power protection auto restore working time	0.0s~3000.0s	10.0s	-
F21.26 (0x551A)	Fault alarm restore mode	0: Auto reset 1: Reset by manual LED0: Low speed protection LED1: Dry run LED2: Over current protection LED3: Minimum power protection	0000	-
F21.27 (0x551B)	Water fulfilled detect time	0.0s~3000.0s	10.0s	-
F21.28 (0x551C)	Water fulfilled restore time	0.0s~3000.0s	10.0s	-

F21.29 (0x551D)	Auxiliary Function 1	0: Invalid, 1: Valid LED0: Upper frequency limit 0: upper limit is limited by the given frequency 1: upper limit frequency is limited by the rated frequency of the motor LED1:Lower frequency limit 0: Lower limit minimized to 0 1: Lower limit frequency minimized to 1/4 of motor rated frequency LED2: reserved LED3: Play dry protection selection 0: Protection without sensor (current judgment) 1: with sensor protection 2: Automatic recognition protection	0110	-
F21.30 (0x551E)	DC current revise offset	0.00A~99.99A	0.00A	-
F21.31 (0x551F)	DC current revise proportion gain	0.0%~999.9%	100.0%	-
F21.32 (0x5520)	Power curve point 0	0.00kW~99.99kW	0.50kW	-
F21.3 3(0x5521)	Power curve point 1	0.00kW~99.99kW	1.00kW	-
F21.34 (0x5522)	Power curve point 2	0.00kW~99.99kW	1.50kW	-
F21.35 (0x5523)	Power curve point 3	0.00kW~99.99kW	2.00kW	-
F21.36 (0x5524)	Power curve point 4	0.00kW~99.99kW	2.50kW	-
F21.37 (0x5525)	Flow curve point 0	0.0m³/h~999.9m³/h	0.0m³/h	-
F21.38 (0x5526)	Flow curve point 1	0.0m³/h~999.9m³/h	5.0m³/h	-
F21.39 (0x5527)	Flow curve point 2	0.0m³/h~999.9m³/h	10.0m³/h	-
F21.40 (0x5528)	Flow curve point 3	0.0m³/h~999.9m³/h	15.0m³/h	-
F21.41 (0x5529)	Flow curve point 4	0.0m³/h~999.9m³/h	20.0m³/h	-

F21.42 (0x552A)	Flow calculating revise offset	0.0m³~999.9m³	0.0m³	-
F21.43 (0x552B)	Flow calculating revise gain	0.1%~500.0%	100.0%	-
F21.44 (0x552C)	Power per day/ generated power per day reset period	0.0h~24.0h	7.0h	-
F21.45 (0x552D)	Reserved	-	-	-
F21.46 (0x552E)	Photovoltaic pump function selection 1	0: Invalid 1: Valid LED0 :Constant torque frequency limit selection LED1 :Reserved LED2 :Voltage rising update Voc voltage LED3 : Fast frequency falling function	1100H	-
F21.47 (0x552F)	Fast frequency falling threshold	3.0%~15.0%	5.0%	-
F21.48 (0x5530)	Constant torque frequency limit coefficient	80.0%~150.0%	100.0%	-
F21.49 (0x5531)	Sudden voltage increase threshold	0.0%~20.0%	5.0%	-

F21.50 (0x5532)	Reserved	-	-	-
F21.51 (0x5533)	Reserved	-	-	-
F21.52 (0x5534)	Reserved	-	-	-
F21.53 (0x5535)	Functional selection	LED0: Inermittent Operation Storage 0: None 1: Storaged LED00:Stop Mode When Alarm 0: Slow down 1: Free stop LED000:Reserved LED0000:Reserved	0000	-
F21.54 (0x5536)	Times of Inermittent Operation	0~1000	0	-
F21.55 (0x5537)	Start time of Inermittent Operation	0min~3000min	0min	-
F21.56 (0x5538)	Stop time of Inermittent Operation	0min~3000min	0min	-
F21.57 (0x5539)	Pump Clean Frequency	0.00Hz~300.00Hz	25.00Hz	-
F21.58 (0x553A)	FWD Running Time	0s~3000s	30s	-
F21.59 (0x553B)	REV Running Time	0s~3000s	30s	-
F21.60 (0x553C)	Cycle Times	0~60	5	-
F21.61 (0x553D)	Power Limitation	0.0~1000.0	0.0	-
F21.62 (0x553E)	Power Limitation Kp	0.0~100.0	1.0	-
F21.63 (0x553F)	Power Limitation Ki	0.0~100.0	1.0	-
F21.64 (0x5540)	Secondary/main winding voltage ratio	0.00~2.00	1.10	-
F21.65 (0x5541)	AC/DC switching mode	0: invalid 1: terminal control 2: Voltage detection automatic control	0	-
F21.66 (0x5542)	AC power cut-out threshold	0.0~2000.0	600V	-

F21.67 (0x5543)	AC power cut-in delay	0.0min~2000.0min	5min	-
F21.68 (0x5544)	Macro Definition Batch Parameter Change	0000~001F	0000	-
F21.69 (0x5545)	Terminal input and output delay amplification	1~10000	1	-
F21.70 (0x5546)	Dry run protection detection frequency	0.00Hz~599.00Hz	50.00Hz	-
F21.71 (0x5547)	Deep protection mode selection	0: Invalid 1: Valid	0	-
F21.72 (0x5548)	Deep protection fault recovery times	0~10000	5	-
F21.73 (0x5549)	Battery board power insufficiency detection period	0~60000	15min	-
F21.74 (0x554A)	Device protection interval time	0~60000	30min	-
F21.75 (0x554B)	Undervoltage protection times threshold	0~60000	5	-
F21.76 (0x554C)	AC power access duration	0~60000	60min	-

● **Monitoring parameters**

Parameter code (address)	Function Description	Content	Signal level of multi-function analog output	Notes
C00.00 (0x2100)	Given frequency	V/F SVC	10V corresponds to the maximum	-
C00.01 (0x2101)	Output frequency	V/F SVC	10V corresponds to the maximum frequency	-
C00.02(0x2102)	Output current	V/F SVC	10V corresponds to the rated current of the double motor (5A)	-
C00.03 (0x2103)	Input voltage	V/F SVC	10V corresponds to 380V	-

C00.04 (0x2104)	The output voltage	V/F SVC	10V corresponds to the rated voltage of the motor 360V	-
C00.05 (0x2105)	Mechanical speed	V/F SVC	10V corresponds to the maximum frequency of mechanical speed	-
C00.08 (0x2108)	PID given	V/F SVC	10V corresponds to 100%	-
C00.09 (0x2109)	PID feedback	V/F SVC	10V corresponds to 100%	-
C00.10 (0x210A)	Output Power	V/F SVC	-	-
C00.11 (0x210B)	Bus voltage	V/F SVC	5V corresponding rated bus voltage	-
C00.12 (0x210C)	Module temperature 1	V/F SVC	10V corresponds to 100℃	-
C00.14 (0x210E)	Input terminal X is on	V/F SVC	-	-
C00.15 (0x210F)	Output terminal Y is	V/F SVC	-	-
C00.16(0x2110)	Analog AI input value	V/F SVC	10V corresponds to 10V	-
C00.20 (0x2114)	Analog output AO	V/F SVC	-	-
C00.23 (0x2117)	Power-on running	V/F SVC	-	-
C00.24 (0x2118)	Accumulated running time of the machine	V/F SVC	-	-
C00.25 (0x2119)	VFD power level	V/F SVC	-	-
C00.26 (0x211A)	VFD rated voltage	V/F SVC	-	-
C00.27 (0x211B)	VFD rated current	V/F SVC	-	-
C00.28 (0x211C)	Software version	V/F SVC	-	-

● **Fault Monitor**

Parameter code (address)	Function Description	Content	Signal level of multi-function analog output	Notes
C01.00 (0x2200)	Fault type diagnostic	V/F SVC	-	-
C01.01 (0x2201)	Troubleshooting information	V/F SVC	-	-
C01.02 (0x2202)	Fault operating frequency	V/F SVC	-	-
C01.03 (0x2203)	Fault output voltage	V/F SVC	-	-
C01.04 (0x2204)	Fault output current	V/F SVC	-	-
C01.05 (0x2205)	Fault bus voltage	V/F SVC	-	-
C01.06 (0x2206)	Faulty module temperature	V/F SVC	-	-
C01.07 (0x2207)	Faulty VFD status	V/F SVC	-	-
C01.08 (0x2208)	Fault input terminal status	V/F SVC	-	-
C01.09 (0x2209)	Fault output terminal status	V/F SVC	-	-

● **I/O Terminals Function Table**

X	Functional interpretation	X	Functional interpretation	X	Functional interpretation
0	No function	21	PID control pause	42	Counter clock input
1	Forward running	22	PID characteristic switching	43	Counter clear terminal
2	Reverse run	23	PID parameter switching	44	DC brake command
3	Three-wire operation control (Xi)	24	PID given switch 1	45	Pre-excitation command terminal
4	Forward turn	25	PID given switch 2	46	Reserved
5	Reverse jog	26	PID given switch 3	47	Reserved
6	Free parking	27	PID feedback switching 1	48	Command channel switch to keyboard
7	Emergency pull over	28	PID feedback switching 2	49	Command channel switch to terminal
8	Fault reset	29	PID feedback switching 3	50	Command channel switch to communication
9	External fault input	30	Program run (PLC) pause	51	Command channel switch to expansion card
10	Frequency increment	31	Program run (PLC) restart	52	Run prohibition
11	Frequency decrement (DW)	32	Acceleration/deceleration time selection terminal 1	53	Forward prohibition
12	Frequency increment decrement clear (UP/DW clear)	33	Acceleration/deceleration time selection terminal 2	54	Reverse prohibition
13	Channel A switches to channel B	34	Suspension acceleration	55	Reserved
14	Switch the frequency channel combination to A	35	Swing frequency input	57	Zero servo command
15	Switch the frequency channel combination to B	36	Swing frequency pause	58	Run output blocking command
16	Multi-speed terminal 1	37	Swing frequency reset	80	Water fulfilled detection
17	Multi-speed terminal 2	38	Keyboard button and display self-test selection	81	Water fulfilled detection reset
18	Multi-speed terminal 3	39	X4 frequency measurement	82	Hybrid input
19	Multi-speed terminal 4	40	Timer trigger terminal	83	Dry run protection input
20	PID control canceled	41	Timer clear terminal	84	AC power connection

Y	Functional	Y	Functional interpretation	Y	Functional interpretation
0	No output	14	Lower limit frequency is	28	Underload pre-alarm
1	The VFD is running	15	Program run cycle is	29	VFD is warning
2	VFD running in reverse	16	The running phase of the program is completed.	30	Communication address 0x3018 control output
3	The VFD is running in forward rotation	17	PID feedback exceeds the upper limit	31	VFD overheat warning
4	Fault trip alarm 2 (no alarm during fault self-recovery)	18	PID feedback is below the lower limit	32	Motor overheat alarm output
5	Fault trip alarm 2 (no alarm during fault	19	PID feedback sensor disconnection	33	Frequency (speed) is consistent 1
6	External downtime	20	Meter length arrives	34	Any frequency (speed) is consistent 1
7	VFD is under-voltage	21	Timer time is up	35	Frequency detection 1
8	The VFD is ready for operation	22	Counter reaches maximum	36	Frequency detection 2
9	Output frequency level	23	Counter reaches the set value	37	Frequency (speed) is
10	Output frequency level	24	Energy consumption braking	38	Any frequency (speed) is
11	Arrived at a given	25	PG feedback disconnection	39	Solar pump alarm output
12	Zero speed operation	26	Emergency stop	40	AC power supply access control output
13	Upper limit frequency is	27	Overload pre-alarm output 1	41	Reserved

● Photovoltaic Pump Special Parameters

Parameter (address)	Function Description	Range of settings and definition	Factory default	Notes
F21.00(0x5500)	Solar pump drive control mode	LED0 Mode selection 0: Variable frequency control mode 1: CVT mode for solar 2: MPPT mode for solar LED00 Operation selection 0: Continuous Operation 1: Inermittent Operation 2: Pump Clear LED000 Reserved LED0000 Motor selection 0: Three-phase Motor 1: Single-phase pump with	0002	-

		single-phase control 2: Single-phase pump with two-phase control		
Variable frequency control mode：if normal normal mode operation is required, set to inverter speed regulation mode. Turn PV pump mode off, at this point the inverter can only perform a single inverter voltage regulation, it can control the machine for start/stop and speed changes but cannot apply PV function parameters. **CVT mode for solar**：CVT , which means constant voltage tracking, stabilises the bus voltage at a given operating point by adjusting the output frequency; the frequency command generated by the CVT module is sent to the inverter circuit to achieve speed control of the motor. **MPPT mode for solar:** MPPT, Maximum Power Point Tracking, searches for the maximum power point based on the bus voltage Vpn, the operating frequency and outputs the target value of the bus voltage at the maximum power point,Vpn. **Continuous operation:** The inverter is always in operation and always carries out a comparison between the PV voltage and the bus voltage to operate the pump. **Intermittent operation:** This function is used to control watering by intermittent operation on sites where the farmland does not need to be watered all the time. **Cleaning the pump**: Pump plugging (pump cleaning) function, function defined as the need to remove debris from the pump after it has entered the pump. **Motor Selection:** Choose according to the motor you are using. Functional code parameter distinctions for different control modes between three-phase and single-phase motors: a. For three-phase pump control, if the F21.00 thousand's digit is 0, then: Function code F04.00 = 0; F10.20 = 0021; F21.14 = 0; F21.16 = 10; b. For single-phase pump control with F21.00 (thousands place) set to 1, function codes are: F04.00 = 5; F10.20 = 0020; F21.14 = 30; F21.16 = 300; c. If a single-phase pump is controlled by two phases and the thousand's digit of F21.00 is 2, then function code F04.00 = 0; F10.20 = 0021; F21.14 = 30; F21.16 = 300;			
F21.01(0x5501)	Running control mode	0: Stop 1: Running 2: Sleep 3: Low speed protection 4: Dry run protection 5: Over current protection 6: Minimum power protection 7: Water fulfilled protection	Read Only	-
Used to read the inverter operating status to determine if there is a fault problem with motor operation (read only).				
F21.02(0x5502)	VOC voltage display	0.0V~999.9V	Read only	-

F21.03(0x5503)	CVT target voltage	70.0%~95.0%	81.0%	-
Voc, the open circuit voltage, is used for reading parameters when the Voc size is equal to the bus voltage at shutdown.				
F21.04(0x5504)	MPPT upper limit voltage	20.0%~200.0%	100.0%	-
F21.05(0x5505)	MPPT lower limit voltage	20.0%~200.0%	50.0%	-
MPPT mode voltage upper and lower limits, the customer can select the upper and lower limit values according to the requirements, the inverter will run the frequency to search for the maximum power point according to the range and output the target value of the bus voltage at the maximum power point.				
F21.06(0x5506)	Frequency adjusting gain	0.1%~500.0%	10.0% (AM) 40.0% (PMSM)	-
F21.07(0x5507)	MPPT search interval	0.1s~100.0s	1.0s	-
F21.08(0x5508)	MPPT regulating gain	0~9999	100	-
F21.09(0x5509)	Quick-drop frequency gain	0~20	2	-
F21.10(0x550A)	Frequency adjusting filter time	0.001s~2.000s	0.001s	-
When the voltage is stable and there are fluctuations in frequency the filtering time can be increased appropriately.				
F21.11(0x550B)	Go to sleep mode voltage	0V~1000V	0V	-
F21.12(0x550C)	Wake up restore voltage	0V~1000V	400V	-
F21.13(0x550D)	Sleeping stop restore waiting time	0.0s~3000.0s	10.0s	-
When the inverter is in operation and the bus voltage is less than the F21.11 sleep voltage threshold, the A.LPn warning is immediately reported. F21.11 Set to 0 to turn off sleep.				
F21.14(0x550E)	Low speed protection detect frequency	0.00Hz~300.00Hz	10.00Hz	-
F21.15(0x550F)	Low speed protection detect time	0.0s~3000.0s	10.0s	-

F21.16(0x5510)	Low speed protection restore working time	0.0s~3000.0s	10.0s	-
When the inverter is in MPPT regulation and the output frequency is less than the F21.14 low frequency protection detection frequency, the A.LFr warning is reported after the F21.15 low frequency protection detection time. If the F21.14 low frequency protection detection frequency is set to 0, the low voltage protection is switched off.				
F21.17(0x5511)	Dry run protection detect current	0.0A~999.9A	0.0A	-
F21.18(0x5512)	Dry run protection detect time	0.0s~3000.0s	10.0s	-
F21.19(0x5513)	Dry run auto restore working time	0.0s~3000.0s	10.0s	-
Dry run protection: To protect the pump, the current is constantly very low and can seriously affect the motor. When the inverter is in operation, F21.29 thousand bits is 0 without sensor and the output current is less than F21.17 hit dry protection detection point, after F21.18 hit dry detection time, A.LuT alarm is reported. F21.17 Disable hit-and-dry protection when set to 0.				
F21.20(0x5514)	Over current point setting	0.0A~999.9A	0.0A	-
F21.21(0x5515)	Over current protection detect time	0.0s~3000.0s	10.0s	-
F21.22(0x5516)	Over current protection auto restore working time	0.0s~3000.0s	10.0s	-
When the inverter is in operation and the output current is greater than the F21.20 overcurrent protection detection point, an A.Old alarm is reported after the F21.21 overcurrent detection protection time.				
F21.23(0x5517)	Input minimum power protection power point setting	0.00kW~650.00kW	0.00kW	-
F21.24(0x5518)	Minimum power protection detect time	0.0s~3000.0s	10.0s	-
F21.25(0x5519)	Minimum power protection auto restore working time	0.0s~3000.0s	10.0s	-
Minimum power protection: also to protect the pump, when the operating current is small, the power is calculated to be smaller. In terms of different dimensions. When the inverter is in operation and the output power is less than the F21.23 minimum power protection				

detection point, the A.LPr is reported after the F21.24 minimum power protection detection time.				
F21.26(0x551A)	Fault alarm restore mode	0:Auto reset;1:Reset by manual LED0:Low speed protection LED1:Dry run LED2:Over current protection LED3: Minimum power protection	0000	-
When the protection alarm is triggered, automatic recovery and manual recovery can be selected according to this parameter. The manual recovery corresponds to the invalidation of the protection automatic recovery time, and the automatic recovery will be used normally again according to the time.				
F21.27(0x551B)	Water fulfilled detect time	0.0s~3000.0s	10.0s	-
F21.28(0x551C)	Water fulfilled restore time	0.0s~3000.0s	10.0s	-
Full water protection: applied to pools to determine the water level by pumping. In field use, there are two water full detection points, i.e. upper and lower limit levels, when the water exceeds the upper limit level, the water full protection is triggered. When the water volume drops below the lower limit level, exit the water full protection stage, so as to play a hysteresis loop effect. Therefore, in the X terminal function code, 80: photovoltaic water full detection alarm that is the upper limit, 81: photovoltaic water full detection alarm reset that is the lower limit. Because the amount of water reaches the upper limit, will certainly trigger the lower limit; exit the lower limit, will certainly exit the upper limit. So need two terminals at the same time, when valid, into the water full protection alarm. When invalid at the same time, exit the water full protection alarm. When the inverter is in operation and the two terminals are valid at the same time, the A.FuL alarm is reported after F21.27 water full detection time, and after the warning is reported, the inverter is slowed down or stopped freely according to the setting of F21.53 ten bits.				
F21.29(0x551D)	reserve	-	-	-
F21.30(0x551E)	DC current revise offset	0.00A~99.99A	0.01A	-
F21.31(0x551F)	DC current revise proportion gain	0.0%~999.9%	100.0%	-
F21.32(0x5520)	Power curve point 0	0.00kW~99.99kW	0.50kW	-
F21.33(0x5521)	Power curve point 1	0.00kW~99.99kW	1.00kW	-
F21.34(0x5522)	Power curve point 2	0.00kW~99.99kW	1.50kW	-
F21.35(0x5523)	Power curve point 3	0.00kW~99.99kW	2.00kW	-
F21.36(0x5524)	Power curve point 4	0.00kW~99.99kW	2.50kW	-
F21.37(0x5525)	Flow curve point 0	0.0m³/h~999.9m³/h	0.0m³/h	-

F21.38(0x5526)	Flow curve point 1	0.0m³/h~999.9m³/h	5.0m³/h	-
F21.39(0x5527)	Flow curve point 2	0.0m³/h~999.9m³/h	10.0m³/h	-
F21.40(0x5528)	Flow curve point 3	0.0m³/h~999.9m³/h	15.0m³/h	-
F21.41(0x5529)	Flow curve point 4	0.0m³/h~999.9m³/h	20.0m³/h	-
F21.42(0x552A)	Flow calculating revise offset	0.0m³~999.9m³	0.0m³	-
F21.43(0x552B)	Flow calculating revise gain	0.0%~999.9%	100.0%	-
F21.44(0x552C)	Power per day/ generated power per day reset period	0.0h~24.0h	7.0h	-
F21.45(0x552D)	Reserved	-	-	-
F21.46(0x552E)	Photovoltaic pump function selection 1	0:Invalid 1:Valid LED0:Constant torque frequency limit selection LED1:Reserved LED2:Voltage rising update Voc voltage LED3: Fast frequency falling function	1100H	-
Constant torque frequency limiting selection: applied to the use of the site where the torque is always constant, when the torque is constant and the load is small, the frequency will always increase and we need to set a limit to it to do the limiting, then this value can be designed. Voltage surge update Voc voltage: Voc is the open circuit voltage, when shutdown Voc size and bus voltage are equal, when running according to the current bus voltage to Voc voltage projection and continuous slow update, when the bus voltage suddenly rises, in order to ensure the normal operation of the PV system, need to immediately update the Voc voltage significantly. Fast frequency reduction function: When the PV suddenly encounters a dark cloud shading during normal operation, the power of the panel will be significantly reduced and the bus voltage will drop rapidly. To prevent the sudden bus voltage change from pulling the inverter crotch, use this function to adjust the output frequency to drop rapidly.				
F21.47(0x552F)	Fast frequency falling threshold	3.0%~15.0%	5.0%	-
F21.48(0x5530)	Constant torque frequency limit coefficient	80.0%~150.0%	100.0%	-
F21.49(0x5531)	Sudden voltage increase threshold	0.0%~20.0%	5.0%	-
F21.50(0x5532)	Reserved	-	-	-

F21.51(0x5533)	Reserved	-	-	-
F21.52(0x5534)	Reserved	-	-	-
F21.53(0x5535)	Functional selection	LED0: Inermittent Operation Storage 0: None 1: Storaged LED00:Stop Mode When Alarm 0: Slow down 1: Free stop LED000:Reserved LED0000:Reserved	0000	-
F21.54(0x5536)	Times of Inermittent Operation	0~1000	0	-
F21.55(0x5537)	Start time of Inermittent Operation	0min~3000min	0min	-
F21.56(0x5538)	Stop time of Inermittent Operation	0min~3000min	0min	-
F21.57(0x5539)	Pump Clear Frequency	0.00Hz~300.00Hz	25.00Hz	-
F21.58(0x553A)	FWD Running Time	0s~3000s	30s	-
F21.59(0x553B)	REV Running Time	0s~3000s	30s	-
F21.60(0x553C)	Cycle Times	0~60	5	-
The above parameters are mainly selected according to the F21.00 function, the function is switched on and then the parameters are debugged here, please see the F21.00 guidance notes for details of the operation.				
F21.61(0x553D)	Power Limitation	0.0~1000.0	0.0	-
F21.62(0x553E)	Power Limitation Kp	0.0~100.0	1.0	-
F21.63(0x553F)	Power Limitation Ki	0.0~100.0	1.0	-
F21.64(0x5540)	Secondary winding voltage: Primary winding voltage	0.00~2.00	1.10	-
F21.65(0x5541)	AC/DC switching mode	0~3	0	-
F21.66(0x5542)	AC power disconnection threshold	0.0~2000.0	600V	-
F21.67(0x5543)	AC power reconnection delay	0.0~2000.0	5min	-

F21.68(0x5544)	Macro definition batch parameter modification	0x0000 ~ 0x001F	0X0000	-
F21.69(0x5545)	Terminal input/output delay amplification factor	1~10000	1	-
F21.70(0x5546)	Dry-run protection detection frequency	0.00~600.00Hz	50.00Hz	-
F21.71(0x5547)	Deep protection mode selection	0~1	0	-
F21.72(0x5548)	Deep protection fault recovery count	0~10000	5	-
F21.73(0x5549)	Solar panel power deficiency detection cycle	0~60000	15min	-
F21.74(0x554A)	Device protection interval time	0~60000	30min	-
F21.75(0x554B)	Undervoltage protection threshold count	0~60000	5	-
F21.76(0x554C)	AC power connection duration	0~60000	60min	-

● **Photovoltaic Pump Special Monitor Parameters**

Function code	Function name	Setting range and definition	Default setting
C04.00(0x2500)	Frequency reference	0.01Hz	Read only
C04.01(0x2501)	Output frequency	0.01Hz	Read only
C04.02(0x2502)	Output current	0.1A	Read only
C04.03(0x2503)	Intermittent Run Cycle Count	-	Read only
C04.04(0x2504)	Pump Purge Cycle Count	-	Read only
C04.05(0x2505)	Reserved	-	Read only
C04.06(0x2506)	Operation Time	1min	Read only
C04.07(0x2507)	Stop Time	1min	Read only
C04.08(0x2508)	Reserved	-	Read only
C04.09(0x2509)	Reserved	-	Read only
C04.10(0x250A)	Output power	0.01kW	Read only
C04.11(0x250B)	DC bus voltage	0.1V	Read only
C04.12(0x250C)	Filtered Bus Voltage	0.1V	Read only
C04.13(0x250D)	Status of MPPT	-	Read only
C04.14(0x250E)	Solar Panel Operation Point	0.1%	Read only

C04.15(0x250F)	Solar Panel Voc	0.1V	Read only
C04.16(0x2510)	Frequency Searching Period	-	Read only
C04.17(0x2511)	Solar Target Frequency	0.10Hz	Read only
C04.30(0x251E)	DC current	0.01A	Read only
C04.31(0x251F)	Flow speed	0.1m³/h	Read only
C04.32(0x2520)	Voc voltage	0.1V	Read only
C04.33(0x2521)	Flow per day	0.1m³	Read only
C04.34(0x2522)	Cumulative total flow(low position)	0.1m³	Read only
C04.35(0x2523)	Cumulative total flow(high position)	0.1km³	Read only
C04.36(0x2524)	Generated power per day	0.01kWh	Read only
C04.37(0x2525)	Cumulative total generated power (low position)	0.01kWh	Read only
C04.38(0x2526)	Cumulative total generated power (high position)	0.1MWh	Read only
C02.40(0x2329)	Effective value of secondary winding current	0.1A	Read only
C02.41(0x232A)	Effective value of common terminal current	0.1A	Read only
C02.42(0x232B)	Effective value of main winding current	0.1A	Read only

Chapter 5 Operation Guidance

5.1 Asynchronous Motor Pump Drive Operation Guidance

1) Wiring

a. Confirmed the solar pump drive if matching with motor.

b. Correctly connecting “+”“-” of solar panel to R, T wiring terminals. Otherwise it will cause VFD damage.

c. Connect motor wire and ground wire to corresponding U, V, W, E terminals.

2) Parameters setting and trial run

a. Set F01.00 to 0, F01.02 for 0, and F01.22, F01.23 parameters setting according to application site.

b. Set motor(pump) parameters according to nameplate of pump.

c. Set solar pump MPPT mode F21.00 for 1 or 2.

d. Press FWD button for trail running, and confirm the motor running direction.

3) Common problems

a. Q:Well-lit conditions, the pump is running, but the water is very small.

A:Check if the pump motor direction is reversed.

b. Q:Well-lit conditions, the drive is in standby mode 0.00Hz.

A:Check F21.01,observe what protection status is the drive in currently, check whether the parameters set is reasonable.

c. Q:DC current is incorrectly displayed.

A:Adjust F21.30,F21.31 for calibration.

d. Q:Well-lit conditions, frequency severe beating during operation.

A:Reasonably adjust F21.06 value, the adjustment is recommended to be in the vicinity of the default, too big or too small will cause frequency oscillation.

5.2 Synchronous Motor Pump Drive Operation Guidance

1) Wiring

a. Confirm if the solar pump drive matches with the motor.

b. Connecting “+”“-” of solar panel to R, T wiring terminals. Otherwise it will cause VFD damage.

c. Connect motor wire and ground wire to corresponding U, V, W, E terminals.

2) Parameters setting and trial run

a. Set F01.00 to 0, F01.02 for 0, and F01.22, F01.23 can be set according to demand.

b. Set motor (pump) parameters according to nameplate of pump. Then Set F02.07 for 1, the keypad will show T-00, press START to start motor auto tuning. This process takes about three minutes.

Note: 1. If you can disconnect the motor and load, self-learning would be better.

2. The self-learning need to be done with enough sunshine and when the solar panels can provide enough energy.

c. Set solar pump MPPT mode F21.00 for 1 or 2.

d. Press FWD button for trail running, and confirm the motor running direction.

3) Common problems and solutions

a. Q:Well-lit conditions, the pump is running, but the water is very small.

A:Check if the pump motor direction is reversed.

b. Q:Well-lit conditions, the drive is in standby mode 0.00Hz.

A:Check F21.01, observe what protection status is the drive in currently, check whether the parameters set is reasonable.

c. Q:DC current is incorrectly displayed.

A:Adjust F21.30, F21.31 for calibration.

d. Q:Well-lit conditions, frequency severe beating during operation.

A:Reasonably adjust F21.06 value, the adjustment is recommended to be in the vicinity of the default, too big or too small will cause frequency oscillation.

5.3 PV Water Pump Features

1) Sleep Function

During the photovoltaic pump operation, the VFD will go into sleep state when the DC voltage provided by solar panels is lower than F21.11 (sleep voltage threshold) due to objective factors, while the keyboard warning "LPn"; when DC voltage provided by solar panels rises back to F21.12 (sleep recovery voltage) point, start timing and after F21.13 (sleep shutdown waiting time), the drive starts running.

2) Low-frequency Protection Function

During the operation of the photovoltaic pump, for some reason, the output frequency is lower than F21.14 (low frequency detection frequency), and after F21.15 (under frequency detection time) time, enters into the standby protection state, while the keyboard warning "LFr"; after entering into the standby protection state and after F21.16 (frequency protection automatic recovery) time, automatically resume to running state.

3) Dry Run Protection

During the operation of the photovoltaic pump, for some reason, the output current is less than F21.17 (dry protection current detection), and after F21.18 (dry protection detection time) time, enters into standby protection state, while the keyboard warning "Lowf"; after entering into the standby protection state and after F21.19 (dry protection automatic recovery)time,automatically resume to running state.

4) Over-current Protection

During the operation of the photovoltaic pump, for some reason, the output current is greater than F21.20(over current point setting), and after F21.21 (over current protection detect) time, enters into standby protection state, while the keyboard warning "oLd"; after entering into the standby protection state and after F21.22 (over current protection auto restore working)time, automatically resume to running state.

5) Minimum Power Protection

During the operation of the photovoltaic pump, for some reason, the output power is less than F21.23(minimum power protection value), and after F21.24 (minimum power protection detection time) time, enters into standby protection state, while the keyboard warning "LPr"; after entering into the standby protection state and after F21.25 (minimum power automatic recovery)time, automatically resume to running state.

6) Full Water Protection

Detect the water full alarm and low water level through two X terminals, realizing automatic level control. Wherein F21.27 is the water overfill protection detection time and F21.28 is full water protection exit time, and X 3 terminal is defined as full solar water detection alarm, and X4 terminal is defined as full solar water detection alarm reset, the warning signal is shown as “ FUL ”.

7) Alarm Recovery Mode: 0: automatic recovery; 1: manual recovery

This option is for low frequency protection, dry protection, over-current protection, minimum power function; you can select the alarm restoration by F21.26. When you select 0 for automatic recovery, during fault warning displaying, you can also press the “RESET” button to stop operation; during fault warning displaying, you can press the “RESET” button to manually clear, you can also press “RESET” button to achieve stop operation.

8) PQ Curve Function

This model provides a self-defined PQ curve for users to set up five groups of PQ corresponding points according to the pump cases, to achieve real-time traffic speed, daily flow, cumulative flow, generating capacity, cumulative electricity consumption; of which by default, daily flow and generating capacity are calculated based on 7h in a day.

9) Status Check

When the photovoltaic pump is running, you can check F21.01 to confirm the current operating status.

Version Change Record

Date	Modified version	Change content
2024.07	V1.0	First edition release
2025.11	V1.1	1.Modify the upper frequency limit of F01.10 and F21.70 to 599Hz 2.Add F02.69 function code

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