Photovoltaic Water-Pumping-Special Inverter

EV520-PV Series

User Manual

Nanjing Oulu Electric Corp.,Ltd.

Foreword

First of all, thank you for purchasing EV520-PV series photovoltaic water special frequency converter!

EV520-PV series photovoltaic water lifting special frequency converter is a special frequency converter, which is mainly used to control and adjust the speed and torque of three-phase AC asynchronous motor and three-phase permanent magnet synchronous motor. It supports a variety of PG cards, industrial bus expansion cards, input and output expansion cards, etc. It has powerful functions and can be equipped with LCD LCD keyboard to enrich the display content. At the same time, it also supports the debugging tools of our upper computer to realize fast debugging, parameter copy and restore, etc. It can be used for life water supply, urban water supply, farmland irrigation, grassland animal husbandry, forestry irrigation, desert management and other photovoltaic water supply application scenarios.

The EV520-PV series photovoltaic water pumping frequency converter only needs to connect the photovoltaic panel to the frequency converter, and the photovoltaic water pump can be automatically started after power is turned on, and the sunlight tracking efficiency can reach 99%. The inverter has multiple protection functions such as PV overvoltage, dry pumping and water shortage, which can effectively prolong the product life. Can support the optional 4G module to realize remote control; Support IP54 grade cabinet solution, the whole series can realize automatic switching between photovoltaic input and grid input, no care work for 24 hours.

This manual introduces the functional characteristics and usage methods of EV520-PV series photovoltaic water-lifting special frequency converter, including product selection, parameter setting, operation and debugging, maintenance and inspection, etc. Please read this manual carefully before use.

Precautions
◆The illustrations in this user manual are for illustration only and may differ from the product you ordered.
◆The company is committed to the continuous improvement of products, product features will continue to upgrade, the information provided is subject to change without notice.
◆If you have any problems in use, please contact our regional agents or contact our customer service center directly.

When you get the product, please confirm the following items:

Confirm Item	Confirmation method
Is it consistent with the type and model of the goods ordered?	Please confirm the nameplate on the side of the product
Are there any parts damaged or damaged	Check the overall appearance and check whether it is damaged during transportation
Whether the fastening parts such as screws are loose	If necessary, check with a screwdriver
Manual, warranty card and other accessories	Product manual and corresponding accessories

Directory

Chapter 1 Safety Information and Precautions

Safety Definition: In this manual, safety precautions are divided into the following two categories:

Danger: situations that may result in serious injury or even death due to the danger caused by not operating as required;

CAUTION: Danger due to failure to operate as required may result in moderate or minor injuries and equipment damage.

Please read this chapter carefully when installing, debugging and repairing the system, and be sure to operate in accordance with the safety precautions required by this chapter. Any injury and loss caused by illegal operation has nothing to do with the company.

1.1 Safety Matters

Use phase	Security Grade	Precautions
Before Installation	Danger	● Do not install the control system when it is found that water enters, parts are missing or parts are damaged during unpacking! ● When the packing list does not match the physical name, please do not install!
	Attention	● When handling, it should be lifted gently, otherwise there is a risk of damage to the equipment! ● Please do not use the damaged drive or the inverter with missing parts. Danger of injury! ● Do not touch the components of the control system with your hands, otherwise there is a danger of electrostatic damage!
During installation	Danger	● Please install it on metal and other flame retardant objects; Keep away from combustibles. Otherwise, it may cause a fire alarm! ● Do not screw the fixing bolts of equipment elements, especially those marked in red!
	Attention	● Do not let the wire head or screw fall into the driver. Otherwise, the drive will be damaged! ● Please install the drive in a place with less vibration and avoid direct sunlight. ● When more than two inverters are placed in the same cabinet, please pay attention to the installation position to ensure the heat dissipation effect.
During wiring	Danger	● The instructions in this manual must be followed and construction by professional electrical engineering personnel, otherwise unexpected dangers will occur! ● There must be a circuit breaker between the frequency converter and the power supply, otherwise a fire may occur! ● Please confirm that the power supply is in a zero-energy state before wiring, otherwise there is a risk of electric shock! ● According to the standard for the correct specification of the inverter grounding, otherwise there is a risk of electric shock!
	Attention	● Never connect the input power supply to the output terminals (U, V, W) of the frequency converter. Pay attention to the marking of the terminal, do not connect the wrong wire! Otherwise, the drive will be damaged! ● Refer to manual recommendations for wire diameters used. Otherwise, an accident may occur! ● The braking resistor must not be directly connected between the DC bus (+) and (-) terminals. Otherwise, cause a fire! ● The encoder must use shielded wire, and the shielding layer must ensure reliable grounding of single end!
Before Power-on	Danger	● Please confirm whether the voltage level of the input power supply is consistent with the rated voltage level of the inverter. Whether the wiring positions on the power input terminals (R, S, T) and output terminals (U, V, W) are correct; And pay attention to check whether there is a short circuit in the peripheral circuit connected to the driver, and whether the connected lines are tight, otherwise the driver will be damaged! ● Any part of the inverter does not need to carry out voltage test, the product has been tested

Use phase	Security Grade	Precautions
		when leaving the factory. Or cause an accident!
	Attention	● The frequency converter can only be powered on after the cover plate is covered. Otherwise, it may cause electric shock! ● The wiring of all peripheral accessories must follow the instructions of this manual and be correctly wired according to the circuit connection method provided in this manual. Or cause an accident!
After power-on	Danger	● Do not open the cover after power up. Otherwise there is a risk of electric shock! ● Do not touch the driver and peripheral circuits with wet hands. Otherwise there is a risk of electric shock! ● Do not touch any input/output terminals of the inverter. Otherwise there is a risk of electric shock! ● When powering on, the frequency converter automatically carries out safety detection on the external strong current circuit. At this time, never touch the U, V, W terminal or motor terminal of the driver, otherwise there is a danger of electric shock!
	Attention	● If parameter identification is required, be aware of the risk of injury while the motor is rotating. Otherwise, it may cause an accident! ● Do not arbitrarily change the inverter manufacturer parameters. Otherwise, it may cause damage to the equipment!
During operation	Danger	● Do not touch the cooling fan and discharge resistor to test the temperature. Otherwise, it may cause burns! ● Non-professional technicians should not detect the signal in operation. Failure to do so may cause personal injury or equipment damage!
	Attention	● During the operation of the frequency converter, something should be avoided to fall into the equipment. Otherwise, the equipment will be damaged! ● Do not use the contactor on-off method to control the start and stop of the driver. Otherwise, the equipment will be damaged!
During maintenance	Danger	● Do not carry out repair and maintenance of the inverter without professional training. Otherwise, personal injury or equipment damage may occur! ● Do not electrify the equipment for repair and maintenance. Otherwise there is a risk of electric shock! ● Confirm that the input power of the inverter is powered off for 10 minutes before the drive can be maintained and repaired. Otherwise, the residual charge on the capacitor will cause harm to people! ● All pluggable plug-ins must be plugged in and out in the event of a power failure! ● After replacing the frequency converter, the parameters must be set and checked.

Chapter 2 Product Information

2.1 Naming rules

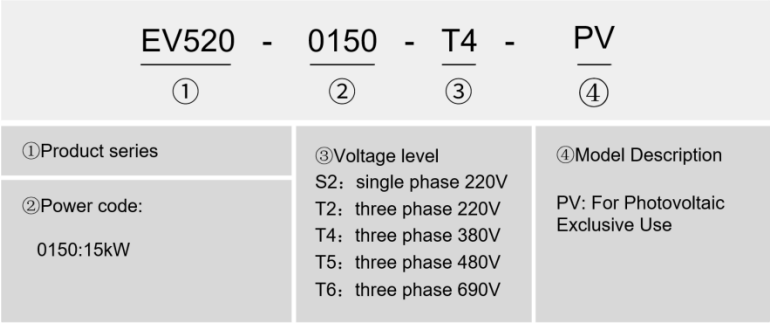


Figure 2-1 Naming Specifications

2.2 Nameplate

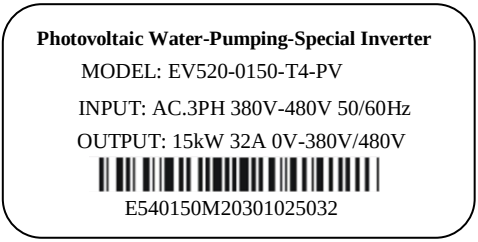


Figure 2-2 Nameplate

2.3 Parameters of EV520-PV series

Model	Power supply capacity kVA	Input current A	Output current A	Adapted motor kW
Single-phase power supply: 220V,50/60Hz				
EV520-0004-S2-PV	1.0	5.4	2.3	0.4
EV520-0007-S2-PV	1.5	8.2	4.0	0.75
EV520-0015-S2-PV	3.0	14.0	7.0	1.5
EV520-0022-S2-PV	4.0	23.0	9.6	2.2
Three-phase power supply: 220V,50/60Hz				
EV520-0037-T2-PV	8.9	14.6	17.0	3.7
EV520-0055-T2-PV	17.0	26.0	25.0	5.5
EV520-0075-T2-PV	21.0	35.0	32.0	7.5
EV520-0110-T2-PV	30.0	46.5	45.0	11
EV520-0150-T2-PV	40.0	62.0	60.0	15

Model	Power supply capacity kVA	Input current A	Output current A	Adapted motor kW
Three-phase power supply: 380V/480V,50/60Hz				
EV520-0007-T4(T5)-PV	1.5	3.4	2.1	0.75
EV520-0015-T4(T5)-PV	3.0	5.0	3.8	1.5
EV520-0022-T4(T5)-PV	4.0	5.8	5.1	2.2
EV520-0037-T4(T5)-PV	5.9	10.5	9.0	3.7
EV520-0055-T4(T5)-PV	8.9	14.6	13.0	5.5
EV520-0075-T4(T5)-PV	11.0	20.5	17.0	7.5
EV520-0110-T4(T5)-PV	17.0	26.0	25.0	11
EV520-0150-T4(T5)-PV	21.0	35.0	32.0	15
EV520-0185-T4(T5)-PV	24.0	38.5	37.0	18.5
EV520-0220-T4(T5)-PV	30.0	46.5	45.0	22
EV520-0300-T4(T5)-PV	40.0	62.0	60.0	30
EV520-0370-T4(T5)-PV	57.0	76.0	75.0	37
EV520-0450-T4(T5)-PV	69.0	92.0	91.0	45
EV520-0550-T4(T5)-PV	85.0	113.0	112.0	55
EV520-0750-T4(T5)-PV	114.0	157.0	150.0	75
EV520-0900-T4(T5)-PV	134.0	180.0	176.0	90
EV520-1100-T4(T5)-PV	160.0	214.0	210.0	110
EV520-1320-T4(T5)-PV	192.0	256.0	253.0	132
EV520-1600-T4(T5)-PV	231.0	307.0	304.0	160
EV520-1850-T4(T5)-PV	240.0	330.0	340.0	185
EV520-2000-T4(T5)-PV	250.0	385.0	377.0	200
EV520-2200-T4(T5)-PV	280.0	430.0	426.0	220
EV520-2500-T4(T5)-PV	355.0	468.0	465.0	250
EV520-2800-T4(T5)-PV	396.0	525.0	520.0	280
EV520-3150-T4(T5)-PV	445.0	590.0	585.0	315
EV520-3500-T4(T5)-PV	500.0	665.0	650.0	350
EV520-4000-T4(T5)-PV	565.0	785.0	725.0	400
EV520-4500-T4(T5)-PV	630.0	800.0	820.0	450
EV520-5000-T4(T5)-PV	700.0	890.0	870.0	500
EV520-5600-T4(T5)-PV	783.0	980.0	950.0	560
EV520-6300-T4(T5)-PV	882.0	1180.0	1100.0	630

2.4 Technical Specification

Item		Specifications
Basic Functions	Maximum frequency	Vector control: 0~500Hz;V/F control: 0~500Hz
	Carrier Frequency	0.8kHz ~ 12kHz. According to the temperature characteristics, automatically adjust the carrier frequency
	Input frequency resolution	Digital setting: 0.01Hz; analog setting: maximum frequency × 0.025%
	Control mode	Open loop vector control (SVC), closed loop vector control (FVC), V/F control
	Motor type	Three-phase asynchronous motor, three-phase permanent magnet synchronous motor
	Starting torque	0.5Hz/150%(SVC);0Hz/180%(FVC)
	Speed range	1:100(SVC) 1:1000(FVC)
	Steady speed accuracy	±0.5%(SVC) ±0.02%(FVC)
	Torque control accuracy	±5%(FVC)
	Overload capacity	150% rated current 60s;180% rated current 3s
	Torque boost	Automatic torque increase; manual torque increase by 0.1~30.0
	V/F curve	Three ways: linear type; multi-point type; N-square type V/F curve (1.2, 1.4, 1.6, 1.8, 2)
	V/F separation	2 ways: full separation, half separation
	Acceleration and deceleration curve	Straight line or S curve acceleration and deceleration mode. Four kinds of acceleration and deceleration time, acceleration and deceleration time range of 0.0~6500.0s
	DC brake	DC braking frequency: 0.00Hz ~ maximum frequency; braking time: 0.0s ~ 36.0s; Braking action current value: 0.0%~ 100.0%
	Jog control	Inching frequency range: 0.00Hz ~ 50.00Hz. jog acceleration and deceleration time 0.0s ~ 6500.0s
	Simple PLC, multi-speed operation	Up to 16-speed operation through built-in PLC or control terminals
	Built-in PID	Convenient for process control closed-loop control system
	Automatic Voltage Adjustment (AVR)	When the grid voltage changes, can automatically keep the output voltage constant
	Overvoltage and overcurrent stall control	Automatic limit of current and voltage during operation to prevent frequent over-current and over-voltage trips
	Fast current limiting function	Reduce the overcurrent fault and protect the normal operation of the frequency converter
	Torque Limiting and Control	"Excavator" feature, automatic torque limit during operation to prevent frequent overcurrent trips. Closed-loop vector mode can realize torque control
Personalized Functions	Excellent performance	Improving the Performance of Asynchronous Motor and Permanent Magnet Synchronous Motor with High Performance Current Vector Control Technology
	Instant stop	Instantaneous power failure through the load feedback energy compensation voltage reduction, to maintain the inverter in a short period of time to continue to run

Item		Specifications
	Virtual IO	Five groups of virtual DIDO, can realize simple logic control
	Timing control function	Timing control function: set time range of 0.0Min ~ 6500.0Min
	Multi-motor switching	Two sets of motor parameters, can realize two motor switching control
	Multi-threaded bus support	Standard: ModbusRTU; optional: ModbusTCP, Profibus-DP, CANlink, CANopen, PROFINET, EtherCAT, BACnet, etc. (bus expansion card required)
	Powerful background software	Support inverter parameter operation and virtual oscilloscope function, can be parameter copy, parameter restore, online update procedures and other functions. Through the virtual oscilloscope can realize the internal state monitoring of the inverter
	Multi-encoder support	Support differential, open collector, resolver, UVW, etc. (requires closed loop expansion card)
	Motor overheat protection	Can support motor temperature sensor input (PT100, PT1000, KTY84, etc., need closed-loop expansion card or temperature acquisition card)
	Command Source	The operation panel is given, the control terminal is given, the serial communication port is given, and the extended communication is given, which can be switched in various ways.
	Frequency source	10 kinds of frequency sources: digital given, analog voltage given, analog current given, pulse given, serial port given, extended communication given. Can be switched in many ways
	Auxiliary frequency source	10 auxiliary frequency sources. Flexible auxiliary frequency fine-tuning, frequency synthesis
Operation	Input terminal	Standard: Five digital input terminals, one of which supports high-speed pulse input up to 100kHz (optional) 2 analog input terminals 2 supports 0~10V voltage input or 0 ~ 20mA current input More input functions can be expanded through the function expansion card
	Output terminal	Standard: 1 high-speed pulse output terminal (optional open collector type), support 0~100kHz square wave signal output (optional) 1 digital output terminal 2 relay output terminals 1 analog output terminal, supports 0 ~ 20mA current output or voltage output More output functions can be expanded through function expansion card
Display and Keyboard Operation	LED display	Dual-row digital tube display as standard, capable of showing more status parameters
	Button locking and function selection	To achieve some or all of the keys to lock, define the scope of action of some of the keys to prevent misoperation. Encoder speed regulation as standard
	Protection function	Power-on motor short circuit detection, output phase loss protection, overcurrent protection, overvoltage protection, undervoltage protection, overheat protection, overload protection, etc.
Environment	Place of use	Indoor, free from direct sunlight, no dust, corrosive gas, flammable gas, oil mist, water vapor, dripping water or salt, etc.
	Altitude	No derating is required for use of 1000m and below, 1% for every 100m increase above 1000m, and the maximum use altitude is 3000m. Please

Item		Specifications
		contact the manufacturer if it exceeds 3000m.
	Ambient temperature	-10 ℃ ~ +50 ℃, when the ambient temperature is 40 ℃ ~ 50 ℃, derating is required, and the derating rate is 1.5 for every 1 ℃ increase in the ambient temperature.
	Humidity	Less than 95% RH, no bead condensation
Optional	LCD Keypad	Large-size LCD keypad, supporting parameter copy, parameter restore, on-line program update, etc.; Bluetooth connection for IoT function. Chinese-English display available, multi-language expandable.
	Closed-loop Expansion Card	Differential-input PG card, resolver PG card, OC-input PG card, UVW expansion card, etc., capable of synchronous motor temperature acquisition.
	Temperature Acquisition Card	Collect motor temperature and ambient temperature, compatible with multiple types of temperature sensors.
	Function Expansion Card	Supports expansion of various digital I/O and analog I/O terminal functions.
	Field-bus Expansion Card	ModbusTCP、Profibus-DP、CANlink、CANopen、PROFINET、EtherCAT、BACnet, etc.
	STO Expansion Card	Supports STO function expansion (Mainboard customization required for STO expansion card, please contact us in advance).

2.5 Inverter Dimensions

2.5.1 Wall Mounting Dimensions

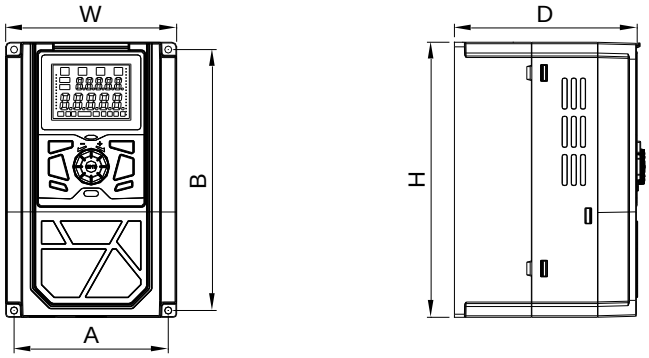


Figure 2-3 Schematic diagram of inverter wall-mounted installation

Models	Installation dimension (mm)		Outline dimension (mm)			Mounting hole diameter	Weight (K)≈
	A	B	W	H	D		
Single phase 220V							
EV520-0004-S2-PV	101	171	112	180	118	Φ 4.6	1.3
EV520-0007-S2-PV							
EV520-0015-S2-PV							
EV520-0022-S2-PV							
Three-phase 220V							
EV520-0037-T2-PV	135	245	150	260	153	φ6	3.9
EV520-0055-T2-PV							
EV520-0075-T2-PV	186	306	210	330.5	188	φ9.5	7.5
EV520-0110-T2-PV							
EV520-0150-T2-PV	238	396	260	420	196	φ8.5	12.5
Three-phase 380V/480V							
EV520-0007-T4(T5)-PV	101	171	112	180	118	φ4.6	1.3
EV520-0015-T4(T5)-PV							
EV520-0022-T4(T5)-PV							
EV520-0037-T4(T5)-PV	101	171	112	180	138	φ4.6	2.1
EV520-0055-T4(T5)-PV							
EV520-0075-T4(T5)-PV	135	245	150	260	153	φ6	3.9
EV520-0110-T4(T5)-PV							
EV520-0150-T4(T5)-PV							

Models	Installation dimension (mm)		Outline dimension (mm)			Mounting hole diameter	Weight (K)≈
	A	B	W	H	D		
EV520-0185-T4(T5)-PV	186	306	210	330.5	188	φ9.5	7.5
EV520-0220-T4(T5)-PV							
EV520-0300-T4(T5)-PV							
EV520-0370-T4(T5)-PV	238	396	260	420	196	φ8.5	12.5
EV520-0450-T4(T5)-PV							
EV520-0550-T4(T5)-PV	272	455	304	470	240	φ9	22.9
EV520-0750-T4(T5)-PV	200	614	278	630	310	φ9	39
EV520-0900-T4(T5)-PV							
EV520-1100-T4(T5)-PV							
EV520-1320-T4(T5)-PV	300	650	454	670	310	φ9	67
EV520-1600-T4(T5)-PV							
EV520-1850-T4(T5)-PV	400	810	520	835	382	φ13	107
EV520-2000-T4(T5)-PV							
EV520-2200-T4(T5)-PV							
EV520-2500-T4(T5)-PV							
EV520-2800-T4(T5)-PV	460(230+230 total 3 holes)	895	720	920	382	φ13	155
EV520-3150-T4(T5)-PV							
EV520-3500-T4(T5)-PV							
EV520-4000-T4(T5)-PV							
EV520-4500-T4(T5)-PV							

2.5.2 Floor mounting dimensions

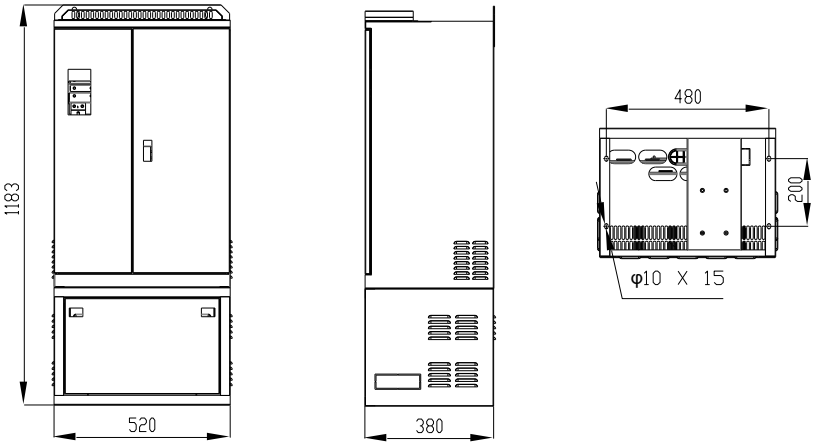


Figure 2-4 185kW ~ 250kW (T4/T5 voltage level) ground installation diagram

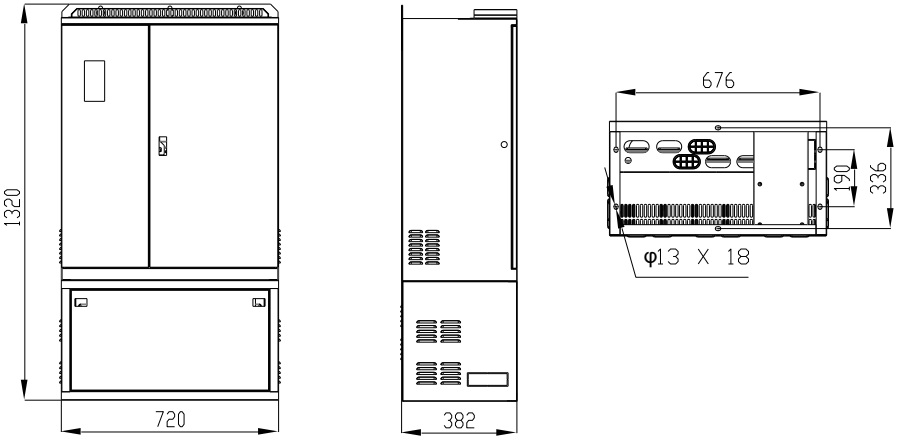


Figure 2-5 280kW ~ 450kW (T4/T5 voltage level) ground installation diagram

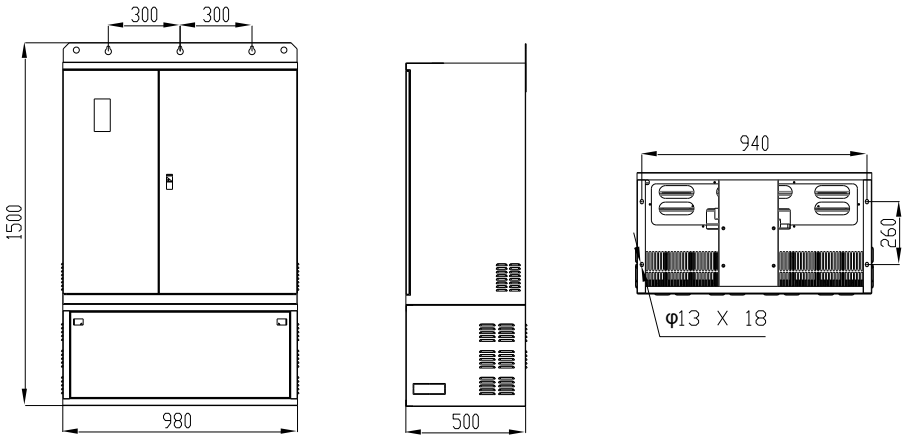
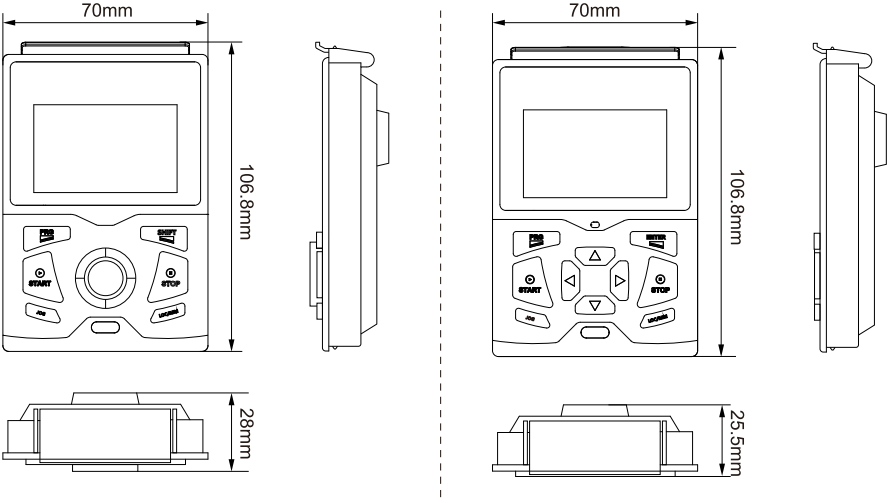


Fig. 2-6 500kW ~ 630kW (T4/T5 voltage level) landing installation diagram

2.5.3 Operation panel structure



Standard: Dual-row LED Keypad

Optional: LCD Keypad

2.6 Daily Maintenance and Maintenance of VFD

2.6.1 Daily maintenance

Due to the influence of environmental temperature, humidity, dust and vibration, it will lead to the aging of the internal components of the inverter, resulting in the potential failure of the inverter or reducing the service life of the inverter. Therefore, it is necessary to implement daily and regular maintenance and maintenance of the inverter.

Daily inspection items:

1) Whether the sound changes abnormally during the operation of the motor
2) Whether the motor produces vibration during operation
3) Whether the installation environment of the frequency converter changes
4) Whether the inverter cooling fan works normally
5) Whether the frequency converter is overheated

Daily cleaning:

1) The frequency converter should always be kept in a clean state
2) Effectively remove the dust on the surface of the inverter to prevent the dust from entering the inverter. Especially metal dust.
3) effectively remove the inverter cooling fan oil

2.6.2 Periodic inspection

Please regularly check the places that are difficult to check during operation. Regular inspection items:

1) Check the air duct and clean it regularly
2) Check whether the screws are loose
3) Check the frequency converter for corrosion
4) Check whether there is arc trace in the terminal
5) Main circuit insulation test

Reminder: When measuring the insulation resistance of the motor with a megohmmeter (please use a DC 500V megohmmeter), disconnect the main circuit line from the frequency converter. Do not use an insulation resistance meter to test the insulation of the control circuit. There is no need to perform a high-voltage test (completed at the factory).

2.6.3 Replacement of vulnerable parts of frequency converter

The wearing parts of the inverter are mainly cooling fans and filtering electrolytic capacitors, and their life is closely related to the environment and maintenance conditions. The general life time is:

Device Name	Lifetime
Fan	2 to 3 years
electrolytic capacitor	4 to 5 years

The user can determine the replacement age according to the running time.

1) Cooling fan

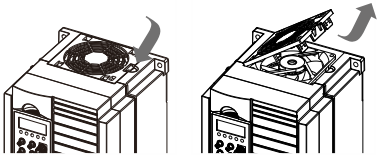
Possible causes of damage: bearing wear, blade aging.

Judgment criteria: whether there are cracks in the fan blades, etc., and whether there is abnormal vibration when the sound is turned on.

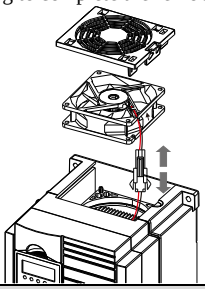
Fan replacement method: after pressing the plastic protective cover buckle of the fan, pull it out; after replacing the fan, ensure that the wind blows upward and pay attention to the wind direction.

Fan Removal (7.5-15kW 3075 Case, 18.5-30kW 3185 Case, 37-45kW 3370 Case)

1 Gently press the buckle on the fan cowl to remove the fan cowl.



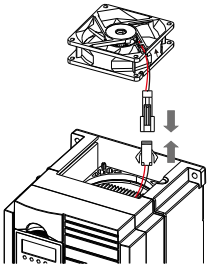
2. After lifting the fan upward, unplug the fan adapter plug to complete the removal.



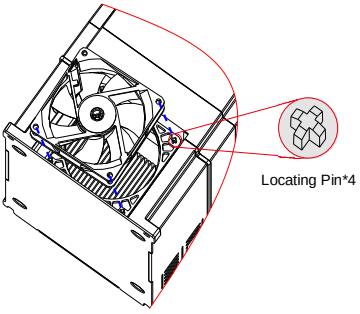
Fan Installation (7.5-15kW 3075 Molded Case, 18.5-30kW 3185 Molded Case, 37-45kW 3370 Molded Case)

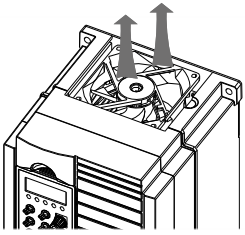
1. Please install the fan according to the reverse steps of removal. Please pay attention to distinguish the forward and reverse directions of the fan;

2. Insert the fan power cord plug into the machine's own adapter socket, as shown in the right figure:

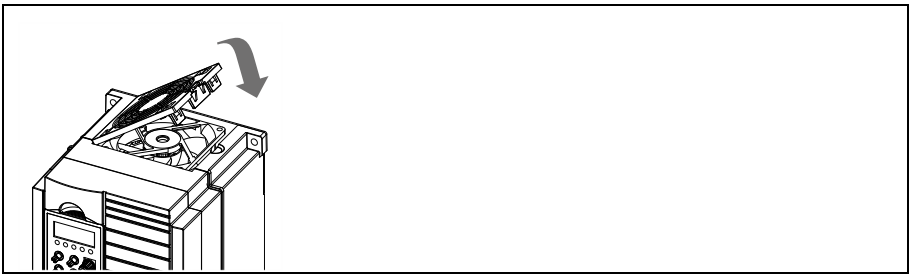


3. Put the fan into the installation part of the machine body, pay attention to align the four fixing holes at the bottom of the fan with the positioning column, place the fan line neatly on the side of the fan, and do not block the inlet and outlet of the fan; Pay attention to the upward direction of the fan;





4. Insert the small buckle on the fan cover into the buckle groove of the body, and gently press the fixed buckle:



2) filter electrolytic capacitor

Possible causes of damage: poor quality of input power supply, high ambient temperature, frequent load jump, electrolyte aging. Discriminant criteria: whether there is liquid leakage, whether the safety valve has been protruding, the determination of electrostatic capacitance, the determination of insulation resistance.

2.6.4 Inverter Storage

After the user purchases the inverter, temporary storage and long-term storage must pay attention to the following points:

1) When storing, try to put it into the company's packing box according to the original packaging.

2) Long-term storage will lead to the deterioration of electrolytic capacitors. It must be ensured that the power is turned on once within 2 years, the power-on time is at least 5 hours, and the input voltage must be slowly increased to the rated value with a voltage regulator.

2.7 Brake Components Selection Guide

Users can choose different resistance values and power according to the actual situation (but the resistance value must not be less than the recommended value in the table, and the power can be large).

The choice of braking resistance needs to be determined according to the power generated by the motor in the actual application system. It is related to the system inertia, deceleration time, and energy of the potential energy load. The customer needs to choose according to the actual situation.

The greater the inertia of the system, the shorter the deceleration time required, and the more frequent the braking, the greater the power and the smaller the resistance of the braking resistor.

2.7.1 Selection of resistance value

When braking, the regenerative energy of the motor is almost all consumed in the braking resistor.

According to the formula: R = U * U/Pb

U in the formula ---- braking voltage of system stable braking

Pb ---- braking power

Note: different systems are not the same, for 380VAC system generally take 700V

2.7.2 Power selection of braking resistor

In theory, the power of the braking resistor is consistent with the braking power, but the derating is

considered to be 70%.

According to the formula: 0.7 * Pr = Pb * D

Pr ---- power of resistance

D ---- braking frequency (proportion of regeneration process in the whole working process)

Common application occasions	Elevator	Unwinding and Unwinding	Centrifuge	Accidental braking resistance	General occasion
Braking frequency value	20% to 30%	-20-30%	50% to 60%	-5%	10%

Frequency converter model	Braking resistor Recommended Power	Braking resistor Recommended resistance	Brake unit	Remarks
Single phase 220V				
EV520-0004-S2-PV	80W	≥ 200Ω	Standard built-in	No special instructions
EV520-0007-S2-PV	80W	≥ 150Ω		
EV520-0015-S2-PV	100W	≥ 100Ω		
EV520-0022-S2-PV	100W	≥ 70Ω		
Three-phase 220V				
EV520-0037-T2-PV	400W	≥ 45Ω	Standard built-in	No special instructions
EV520-0055-T2-PV	800W	≥ 22Ω		
EV520-0075-T2-PV	1000W	≥ 16Ω		
EV520-0110-T2-PV	1500W	≥ 22Ω		
EV520-0150-T2-PV	2500W	≥ 16Ω		
Three-phase 380V				
EV520-0007-T4(T5)-PV	150W	≥ 300Ω	Standard built-in	No special instructions
EV520-0015-T4(T5)-PV	150W	≥ 220Ω		
EV520-0022-T4(T5)-PV	250W	≥ 200Ω		
EV520-0037-T4(T5)-PV	300W	≥ 130Ω		
EV520-0055-T4(T5)-PV	400W	≥ 90Ω		
EV520-0075-T4(T5)-PV	500W	≥ 65Ω		
EV520-0110-T4(T5)-PV	800W	≥ 43Ω		
EV520-0150-T4(T5)-PV	1000W	≥ 32Ω		
EV520-0185-T4(T5)-PV	1300W	≥ 25Ω		
EV520-0220-T4(T5)-PV	1500W	≥ 22Ω		
EV520-0300-T4(T5)-PV	2500W	≥ 16Ω		
EV520-0370-T4(T5)-PV	3.7kW	≥ 16.0Ω	Built-in	Add B after the

Frequency converter model	Braking resistor Recommended Power	Braking resistor Recommended resistance	Brake unit	Remarks
EV520-0450-T4(T5)-PV	4.5kW	≥ 16Ω	optional	inverter model
EV520-0550-T4(T5)-PV	5.5kW	≥ 8Ω		
EV520-0750-T4(T5)-PV	7.5kW	≥ 8Ω		
EV520-0900-T4(T5)-PV	4.5kW × 2	≥ 8Ω × 2		
EV520-1100-T4(T5)-PV	5.5kW × 2	≥ 8Ω × 2		
EV520-1320-T4(T5)-PV	6.5kW × 2	≥ 8Ω × 2		
EV520-1600-T4(T5)-PV	16kW	≥ 2.5Ω		
EV520-1850-T4(T5)-PV	18kW	≥ 2.5Ω	External	
EV520-2000-T4(T5)-PV	20kW	≥ 2.5Ω		
EV520-2200-T4(T5)-PV	22kW	≥ 2.5Ω		
EV520-2500-T4(T5)-PV	12.5kW × 2	≥ 2.5Ω × 2		
EV520-2800-T4(T5)-PV	14kW × 2	≥ 2.5Ω × 2		
EV520-3150-T4(T5)-PV	16kW × 2	≥ 2.5Ω × 2		
EV520-3500-T4(T5)-PV	17kW x 2	≥ 2.5Ω × 2		
EV520-4000-T4(T5)-PV	14kW × 3	≥ 2.5Ω × 3		
EV520-4500-T4(T5)-PV	16kW × 3	≥ 2.5Ω × 3		
EV520-5000-T4(T5)-PV	17kW × 3	≥ 2.5Ω × 3		
EV520-5600-T4(T5)-PV	20kW × 3	≥ 2.5Ω × 3		
EV520-6300-T4(T5)-PV	22kW × 3	≥ 2.5Ω × 3		

Note: × 2 means that two braking units are used in parallel with their respective braking resistors, and × 3 means the same as × 2.

Chapter 3 Mechanical and Electrical Installation

3.1 Mechanical installation

3.1.1 Installation Environment

1) Ambient temperature: The ambient temperature has a great influence on the life of the inverter, and the operating ambient temperature of the inverter is not allowed to exceed the allowable temperature range (-10 ℃ ~ 40 ℃).

2) Install the inverter on the surface of the flame retardant object and install it on the mounting support vertically with screws. When the inverter is working, it is easy to generate a lot of heat, and there should be enough space around to dissipate heat.

3) Please install it in a place that is not easy to vibrate. The vibration shall not be greater than 0.6G. Pay special attention to keep away from punch press and other equipment.

4) Avoid installing in direct sunlight, damp, and water drops.

5) Avoid being installed in places with corrosive, flammable and explosive gases in the air.

6) Avoid being installed in places with oil, dust and metal dust.

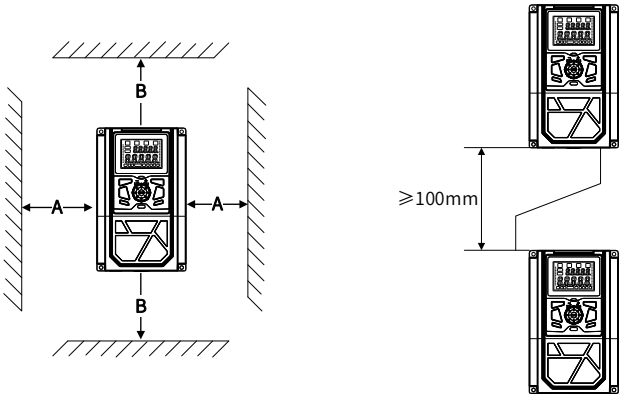


Figure 3-1 Schematic diagram of installation

When installing a single unit: when the inverter power is not more than 22kW, the size may not be considered. When greater than 22kW, A should be greater than 50mm. When installing up and down: Please install the heat insulation deflector shown in the figure when installing up and down the inverter.

Power class	Mounting dimensions	
	B	A
≤ 15kW	≥ 100mm	May not be required
18.5kW ~ 45kW	≥ 200mm	≥ 50mm
≥ 55kW	≥ 300mm	≥ 50mm

3.1.2 Heat Dissipation

Mechanical installation needs to pay attention to the problem of heat dissipation. So please note the following:

1) Please install the inverter vertically to facilitate the upward heat dissipation. But not upside down. If there are more frequency converters in the cabinet, it is best to install side by side. Where upper and lower installation is required, please refer to the schematic diagram in Figure 3-1 to install the heat insulation deflector.

2) The installation space shall be as shown in Figure 3-1 to ensure the heat dissipation space of the inverter. However, please consider the heat dissipation of other devices in the cabinet when arranging.

3) The mounting bracket must be made of flame retardant material.

4) For metal dust applications, it is recommended to use the radiator cabinet outside the installation method. At this time, the space in the fully sealed cabinet should be as large as possible.

3.2 Electrical installation

3.2.1 Selection guidance of peripheral electrical components

Model	Empty open (MCCB) A	Recommended Contactor A	Recommended input side main loop conductor mm ²	Recommended output side Main loop conductor mm ²	Recommended Control Loop conductor mm ²
Single phase 220V					
EV520-0004-S2-PV	10	10	2.5	2.5	1.0
EV520-0007-S2-PV	16	10	2.5	2.5	1.0
EV520-0015-S2-PV	25	16	4.0	4.0	1.0
EV520-0022-S2-PV	32	25	4.0	4.0	1.0
Three-phase 220V					
EV520-0037-T2-PV	40	32	4.0	4.0	1.0
EV520-0055-T2-PV	63	40	4.0	4.0	1.0
EV520-0075-T2-PV	63	40	6.0	6.0	1.0
EV520-0110-T2-PV	100	63	10	10	1.5
EV520-0150-T2-PV	125	100	16	10	1.5
Three-phase 380V/480V					
EV520-0007-T4(T5)-PV	10	10	2.5	2.5	1.0
EV520-0015-T4(T5)-PV	16	10	2.5	2.5	1.0
EV520-0022-T4(T5)-PV	16	10	2.5	2.5	1.0
EV520-0037-T4(T5)-PV	25	16	4.0	4.0	1.0
EV520-0055-T4(T5)-PV	32	25	4.0	4.0	1.0
EV520-0075-T4(T5)-PV	40	32	4.0	4.0	1.0
EV520-0110-T4(T5)-PV	63	40	4.0	4.0	1.0
EV520-0150-T4(T5)-PV	63	40	6.0	6.0	1.0

Model	Empty open (MCCB) A	Recommended Contactor A	Recommended input side main loop conductor mm ²	Recommended output side Main loop conductor mm ²	Recommended Control Loop conductor mm ²
EV520-0185-T4(T5)-PV	100	63	6	6	1.5
EV520-0220-T4(T5)-PV	100	63	10	10	1.5
EV520-0300-T4(T5)-PV	125	100	16	10	1.5
EV520-0370-T4(T5)-PV	160	100	16	16	1.5
EV520-0450-T4(T5)-PV	200	125	25	25	1.5
EV520-0550-T4(T5)-PV	200	125	35	25	1.5
EV520-0750-T4(T5)-PV	250	160	50	35	1.5
EV520-0900-T4(T5)-PV	250	160	70	35	1.5
EV520-1100-T4(T5)-PV	350	350	120	120	1.5
EV520-1320-T4(T5)-PV	400	400	150	150	1.5
EV520-1600-T4(T5)-PV	500	400	185	185	1.5
EV520-1850-T4(T5)-PV	500	400	185	185	1.5
EV520-2000-T4(T5)-PV	600	600	150*2	150*2	1.5
EV520-2200-T4(T5)-PV	600	600	150*2	150*2	1.5
EV520-2500-T4(T5)-PV	800	600	185*2	185*2	1.5
EV520-2800-T4(T5)-PV	800	800	185*2	185*2	1.5
EV520-3150-T4(T5)-PV	800	800	150*3	150*3	1.5
EV520-3500-T4(T5)-PV	800	800	150*4	150*4	1.5
EV520-4000-T4(T5)-PV	1000	1000	150*4	150*4	1.5
EV520-4500-T4(T5)-PV	1200	1200	185*3	185*3	1.5
EV520-5000-T4(T5)-PV	1400	1400	185*3	185*3	1.5
EV520-5600-T4(T5)-PV	1400	1400	185*3	185*3	1.5
EV520-6300-T4(T5)-PV	1600	1600	185*4	185*4	1.5

3.2.2 Schematic diagram of connection with peripheral devices

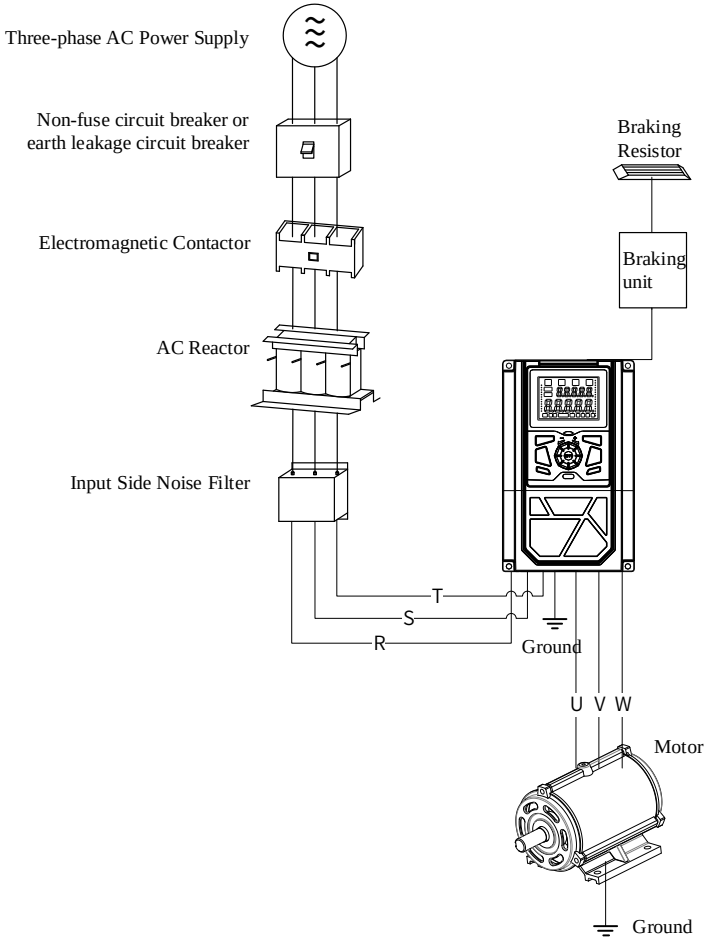


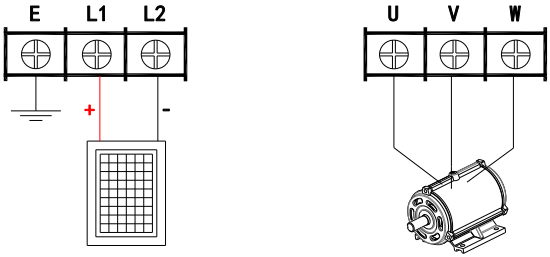
Figure 3-2 Schematic diagram of connection with peripheral devices

3.2.3 Instructions for use of peripheral electrical components

Accessory Name	Function Description
Air switch	Downstream equipment over-current power off.
Contactor	On-off operation of frequency converter. Frequent power-on and power-off operation (less than twice per minute) or direct start-up operation of the frequency converter through the contactor shall be avoided.
AC input reactor	Improve the power factor on the input side; effectively eliminate the higher harmonics on the input side to prevent damage to other equipment due to voltage waveform distortion; eliminate the input current imbalance caused by the imbalance between power phases.
EMC input filter	Reduce the external conduction and radiation interference of the inverter; reduce the conduction interference from the power supply to the inverter, and improve the anti-interference ability of the inverter.
DC reactor	Improve the power factor of the input side; improve the efficiency and thermal stability of the inverter. Effectively eliminate the influence of high harmonics on the input side of the inverter, reduce the external conduction and radiation interference.
AC output reactor	The output side of the inverter generally contains more harmonics. When the motor is far away from the frequency converter, there is a large distributed capacitance in the circuit. One of the harmonics may resonate in the loop, bringing two effects: ◆ Damage the insulation performance of the motor, which will damage the motor for a long time. ◆ Generating large leakage current, causing frequent protection of the inverter. Generally, the distance between the frequency converter and the motor is more than 100m, and it is recommended to install an output AC reactor.

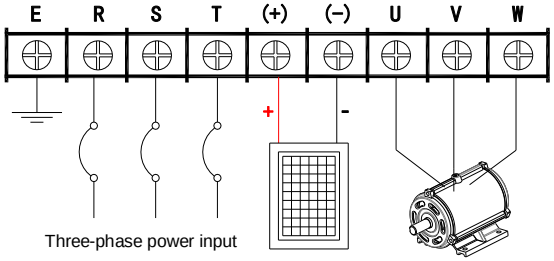
3.3 The terminal block wiring of the main circuit

a) 0.4kW-2.2kW (S2 voltage level) main circuit terminal block wiring diagram



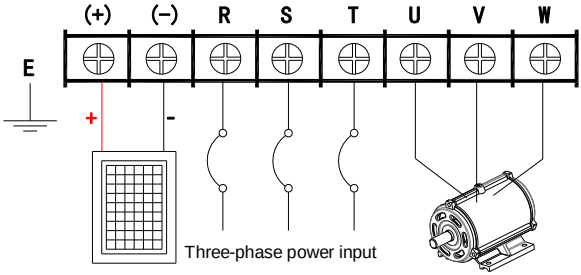
b) 3.7kW-7.5kW (T2 voltage level) main circuit terminal block wiring diagram

0.75kW-18.5kW (T4/T5 voltage level) main circuit terminal block wiring diagram

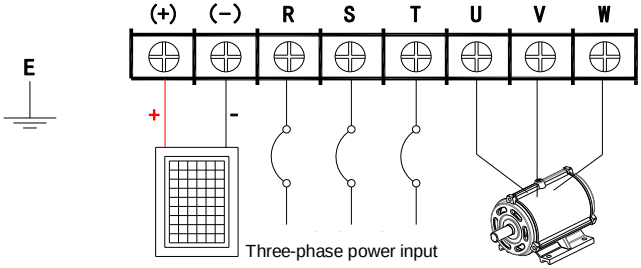


c) 11-15kW (T2 voltage level) main circuit terminal strip wiring diagram

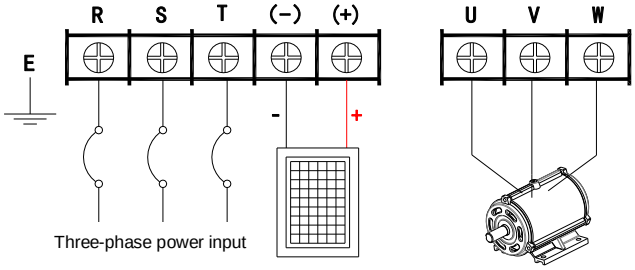
22kW-30kW (T4/T5 voltage level) main circuit terminal block wiring diagram



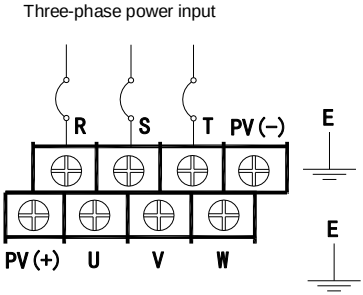
d) 37kW-45kW (T4/T5 voltage level) main circuit terminal block wiring diagram



e) 55kW (T4/T5 voltage level) main circuit terminal strip wiring diagram

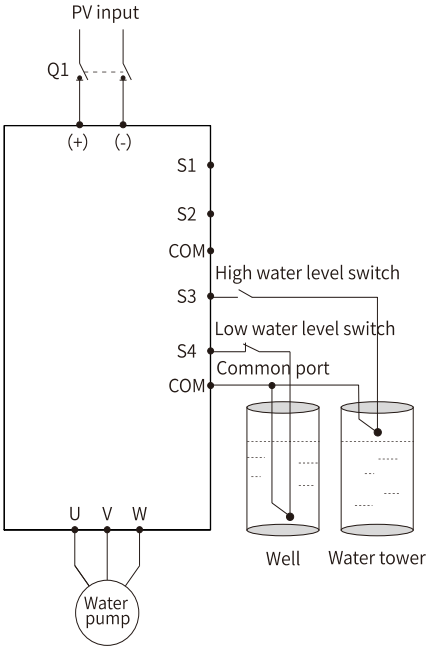


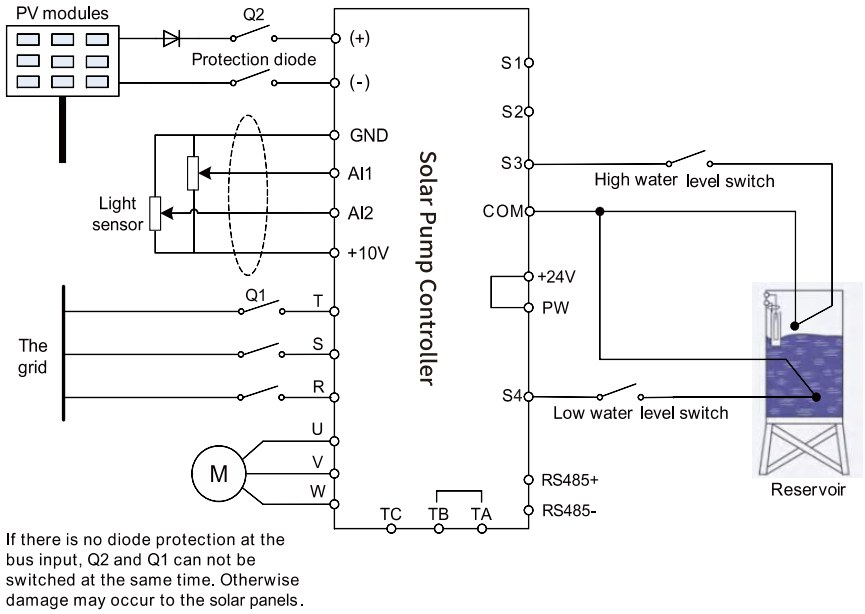
f) 75kW-110kW (T4/T5 voltage level) main circuit terminal block wiring diagram



Terminal Symbol		Function Description	
⏚		Safety protection grounding	Safety protection grounding terminal, each machine must be reliably grounded
Single phase	L1, L2	PV DC input	Photovoltaic panel input terminal
	U, V, W	Controller output	Three-phase AC motor
Three-phase	R, S, T	AC input	Three-phase AC power connected to the grid
	U, V, W	Controller output	Three-phase AC motor
	(+)(-)	PV DC input	Photovoltaic panel input terminal

3.4 Wiring Diagram





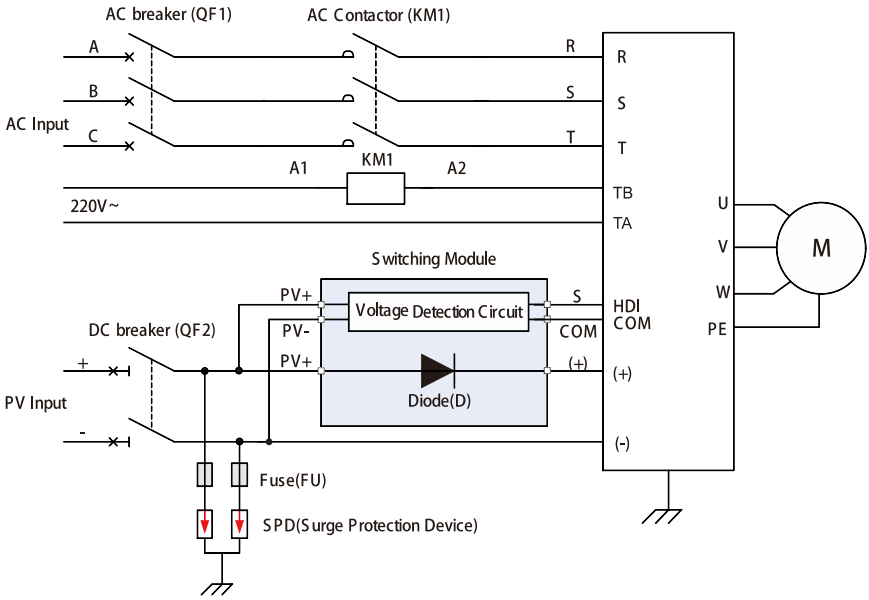


Fig. 3-3 Wiring Diagram

3.5 Control board terminal distribution

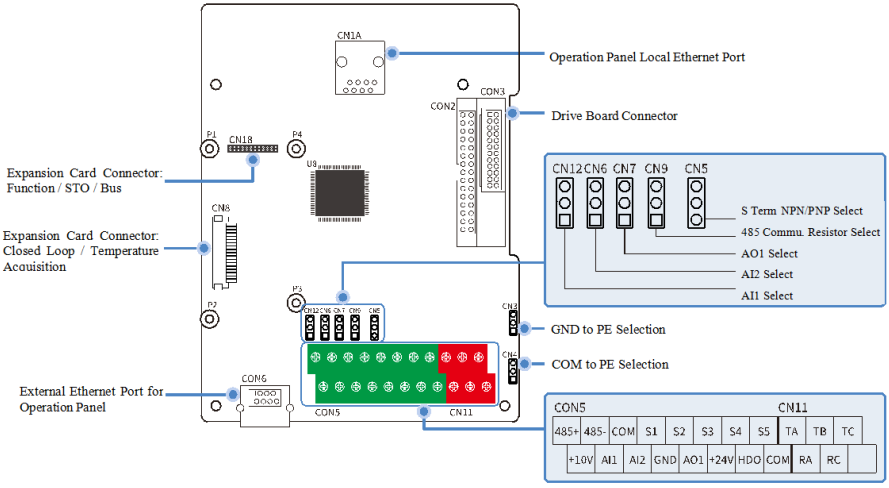
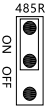
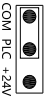
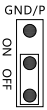
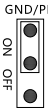
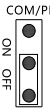
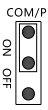


Fig. 3-4 Terminal Distribution of Control Board

3.5.1 Control Panel Jumper Description

Jumper position	Function Description	Jumper position	Function Description
	AI1 input voltage type 0~10V (factory default)		AI1 input current type 0 ~ 20mA
	AI2 input voltage type 0~10V (factory default)		AI2 input current type 0 ~ 20mA
	AO1 output voltage type selection 0~10V (factory default)		AO1 output current type selection 0 ~ 20mA
	485/CAN communication resistor is not short-circuited (factory default)		485/CAN communication resistor short circuit
	+24V and PLC short circuit (factory default)		COM and PLC short circuit

Jumper position	Function Description	Jumper position	Function Description
	GND Disconnect PE Select (Factory Default)		GND connection PE
	COM Off PE Select (factory default)		COM Connection PE

3.5.2 Terminal description of control board

Terminal Name	Terminal Usage and Description
S1 ~ S5	Multi-function digital input 1. Optical coupling isolation, compatible with bipolar input 2. Input impedance: 5.1kΩ 3. Voltage range at level input: 9V ~ 30V
+ 24V-COM	+24V power supply for this machine (current: 150mA)
+ 10V-GND	+10V power supply for this unit (current: 10mA)
COM	Common for +24V
AI1-GND AI2-GND	Analog input, voltage (0~10V)/current (0 ~ 20mA) is optional through the motherboard jumper Input impedance: 10kΩ (voltage input)/250 Ω (current input)
GND	Reference zero potential of +10V (Note: GND is isolated from COM)
HDO	High-speed pulse or open-collector output terminal, whose corresponding common terminal is COM Output frequency range: 0~100kHz
AO1	Analog output terminal Output range: voltage (0~10V)/current (0 ~ 20mA)
TA-TB-TC	TA relay output, TA common terminal, TB normally closed, TC normally open Contact capacity: AC250V/3A,DC30V/1A
RA-RC	RA relay output, RA common, RC normally open Contact capacity: AC250V/3A,DC30V/1A
485 +, 485-	485 communication port, 485 differential signal positive and negative terminals, Please use twisted pair or shielded cable for standard 485 communication interface

3.5.3 Interface Description of Control Panel Operation Panel

Connector Name	Purpose and description of connector
Connector CN1A	Low power 0.4 kW-2.2kW(S2 voltage level), 3.7 kW-7.5kW(T2 voltage level), 0.75 kW-15kW(T4/T5 voltage level) local/external panel interface, suitable for digital panel/LCD panel; High power 18.5kW and above (T4/T5 voltage level) local panel interface, suitable for digital panel/LCD panel.
Connector CON6	High-power 18.5kW and above (T4/T5 voltage level) external panel interface, suitable for digital panel/LCD panel.

3.5.4 Interface Description of Control-Board Expansion Card

Connector Name	Purpose and description of connector
Connector CN8	Connector for closed-loop expansion card and temperature acquisition card. Used to expand various encoders to realize FVC control, as well as motor and ambient-temperature acquisition functions. Optional installation according to the actual encoder type mounted on the motor.
Connector CN18	Connector for function expansion card, field-bus expansion card and STO expansion card. Used to expand I/O functions, industrial bus, STO function, etc. Optional configuration according to actual working-condition requirements.

Note:

1. For low-power range: 0.4kW-2.2kW (S2 voltage class), 3.7kW-7.5kW (T2 voltage class), 0.75kW-15kW (T4/T5 voltage class), only one expansion card can be installed.

2. For high-power range: 18.5kW and above (T4/T5 voltage class), one expansion card can be installed respectively on CN8 (closed-loop / temperature-acquisition expansion card) and CN18 (function / STO / field-bus expansion card). Please contact our company if the configuration fails to meet on-site working conditions.

Chapter 4 Operation and Debugging

4.1 Digital Panel Operation and Application Example (Standard)

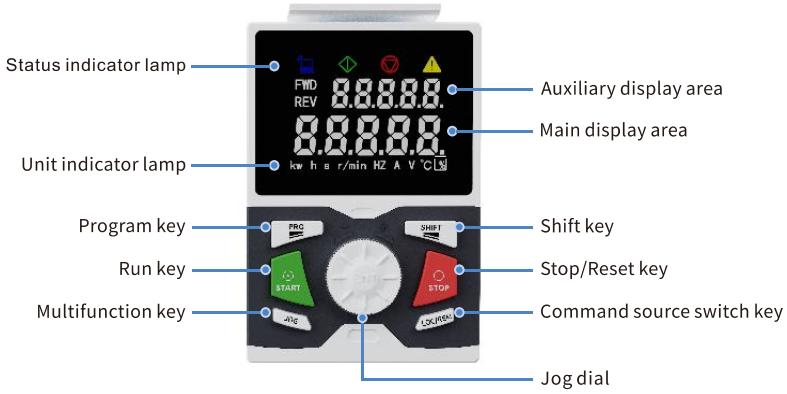


Fig. 4-1 Schematic Diagram of Digital Operation Panel

Jog Dial Instruction

Indicator Status		Status Description
	Jog dial	Rotate clockwise to increase data or function code
		Rotate counterclockwise to decrease data or function code
		Press jog dial to enter menu or confirm data

Digital Panel Application Examples:

Take setting preset frequency P0.08 as an example, change 50.00Hz to 25.00Hz. The steps are as follows:

(1)Under parameter monitoring display interface, press“  ”to enter primary menu P0 ;

(2)Press“  ”enter the secondary menu P0-00;

(3)Rotate clockwise“  ”to enter secondary menu P0-08;

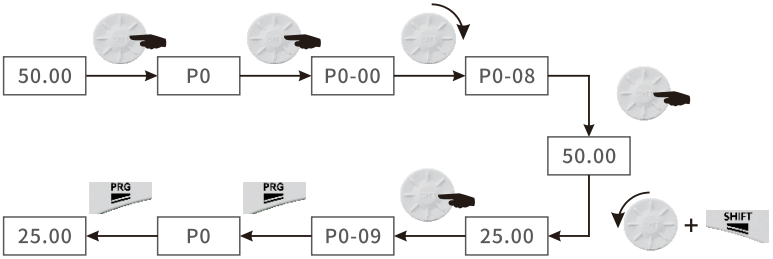
(4)Press“  ”to enter tertiary menu, display 50.00Hz;

(5)Rotate counterclockwise“  ”to reduce current value，press“  ”the key to shift cursor for quick modification on tens, hundreds and thousands digit;

(6)Press“  ”to confirm modification and return to secondary menu showing P0-09, modification

completed;

(7)Press“ PRG ”the key twice to return to monitoring interface, showing 25.00Hz;



Take modifying DC bus voltage on auxiliary display area as example, steps are as follows:

(1)Under parameter monitoring display interface, press“ ”to enter primary menu P0;

(2)Rotate clockwise“ ”to enter secondary menu P7;

(3)Press“ ”to enter menu P7-00;

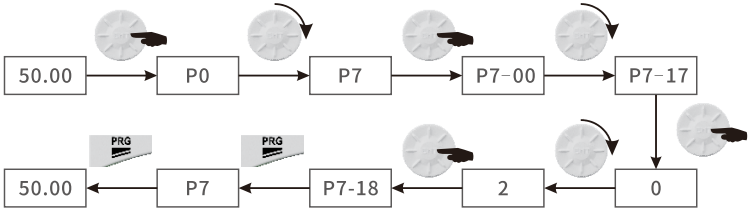
(4) Rotate clockwise“ ”to enter menu P7-17;

(5)Press“ ”to enter tertiary menu, displaying 0 or other values;

(6)Rotate counterclockwise“ ”adjust current value up or down and set it to 2. The value corresponds to the serial number of D0 group monitoring parameters.;

(7)Press“ ”to confirm setting and return to P7-18, modification finished;

(8)Press the key “ PRG ” twice to back to monitoring interface with 25.00Hz displayed.



4.2 LCD Panel Operation & Application Examples (Optional)

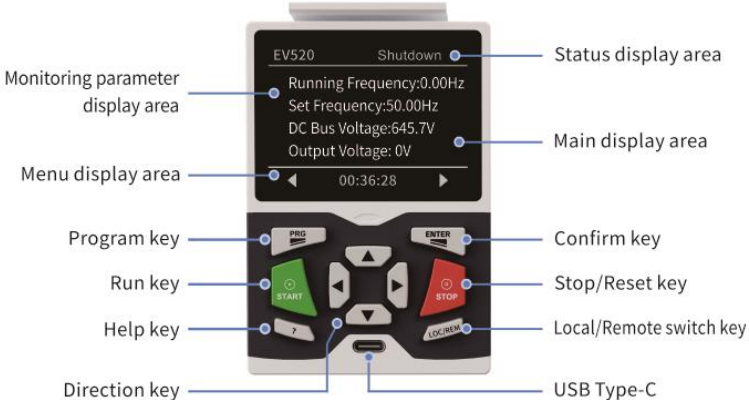
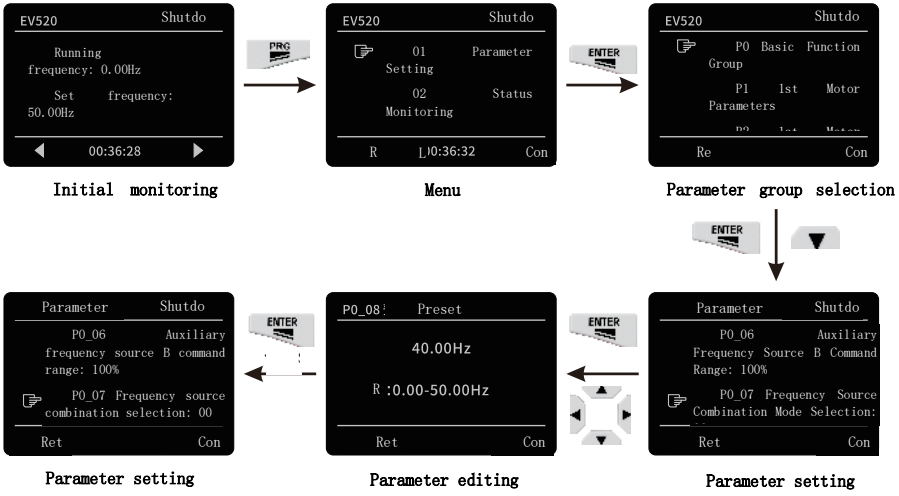


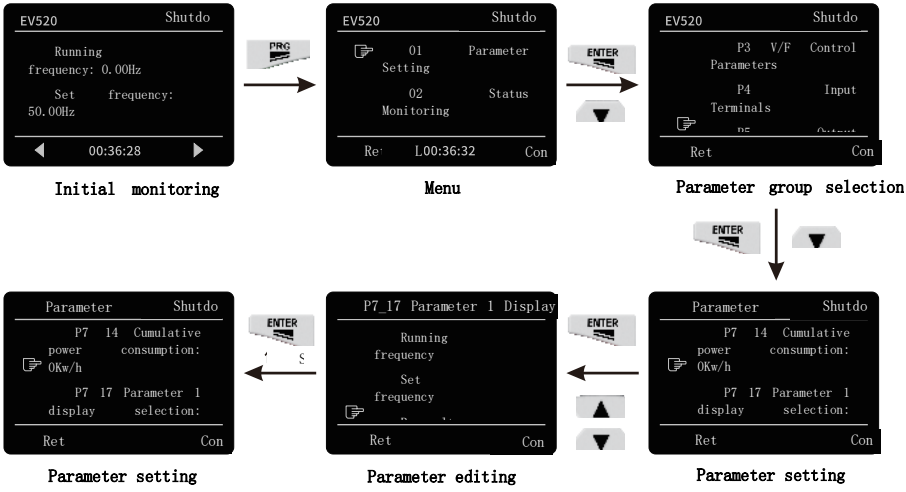
Figure 4-2 Schematic Diagram of LCD Operation Panel

LCD Panel Application Examples:

■ Take setting preset frequency P0_08 as an example, the setup steps are as follows:



■ Take changing display parameter 1 from running frequency to output current on initial monitoring interface as example, setup steps are as follows:



4.3 Commissioning Process

4.3.1 Commissioning Guide

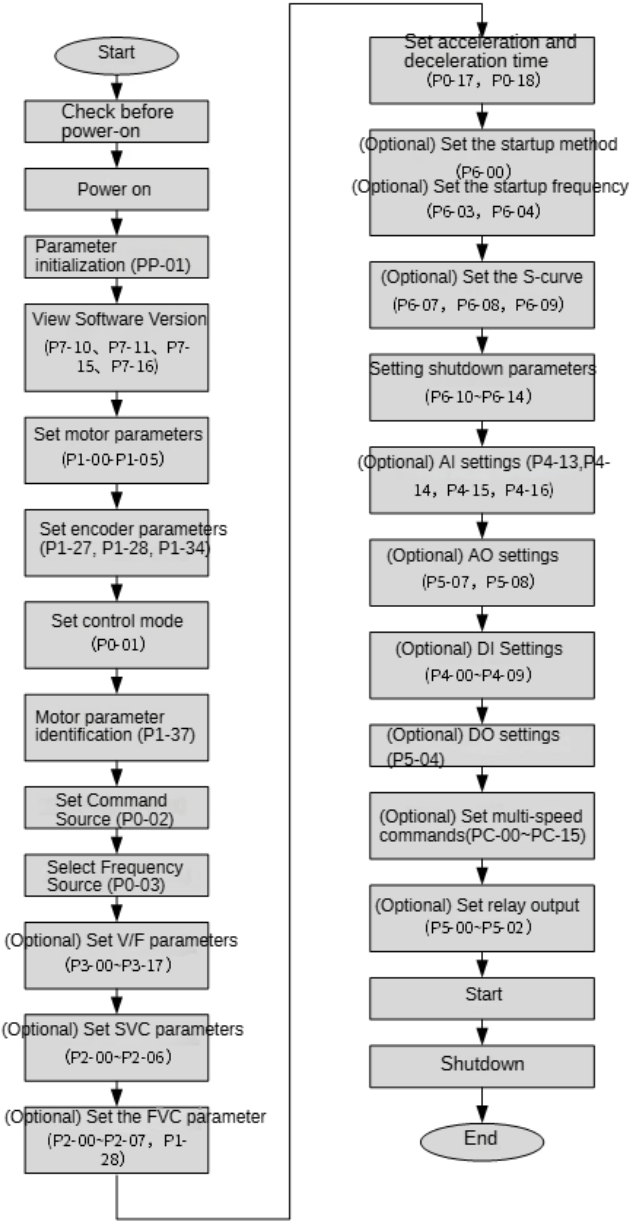


Figure 4-3 Basic Commissioning Flow Chart

Table 4-1 Basic Commissioning Procedure Table

No.	Step	Related Parameters
1	Pre-power-on Inspection	None
2	Power On	None
3	Parameter Initialization	PP-01
4	Check Software Version	P7-10、P7-11、P7-15、P7-16
5	Set Motor Parameters	P1-00-P1-05 Note: Set the corresponding motor type.
6	Set Encoder Parameters	P1-27、P1-28、P1-34
7	Set Control Mode	P0-01
8	Motor Parameter Identification	P1-37
9	Set Command Source	P0-02
10	Select Frequency Source	P0-03
11	Optional: Set V/F Parameters	P3-00～P3-17
12	Optional: Set SVC Parameters	P2-00～P2-06
13	Optional: Set FVC Parameters	P2-00～P2-07、P1-28
14	Set Acceleration/Deceleration Time	P0-17、P0-18
15	Optional: Set Start Mode & Start Frequency	P6-00、P6-03、P6-04
16	Optional: Set S-curve	P6-07、P6-08、P6-09
17	Set Stop Parameters	P6-10～P6-14
18	Optional: AI Configuration	P4-13,P4-14、P4-15、P4-16
19	Optional: AO Configuration	P5-07、P5-08
20	Optional: DI Configuration	P4-00～P4-09
21	Optional: DO Configuration	P5-04
22	Optional: Set Multi-speed Commands	PC-00～PC-15
23	Optional: Set Relay Output	P5-00～P5-02
24	Start	None
25	Stop	None

4.3.2 Commissioning Procedure for V/F Control Mode (Asynchronous Motor Only)

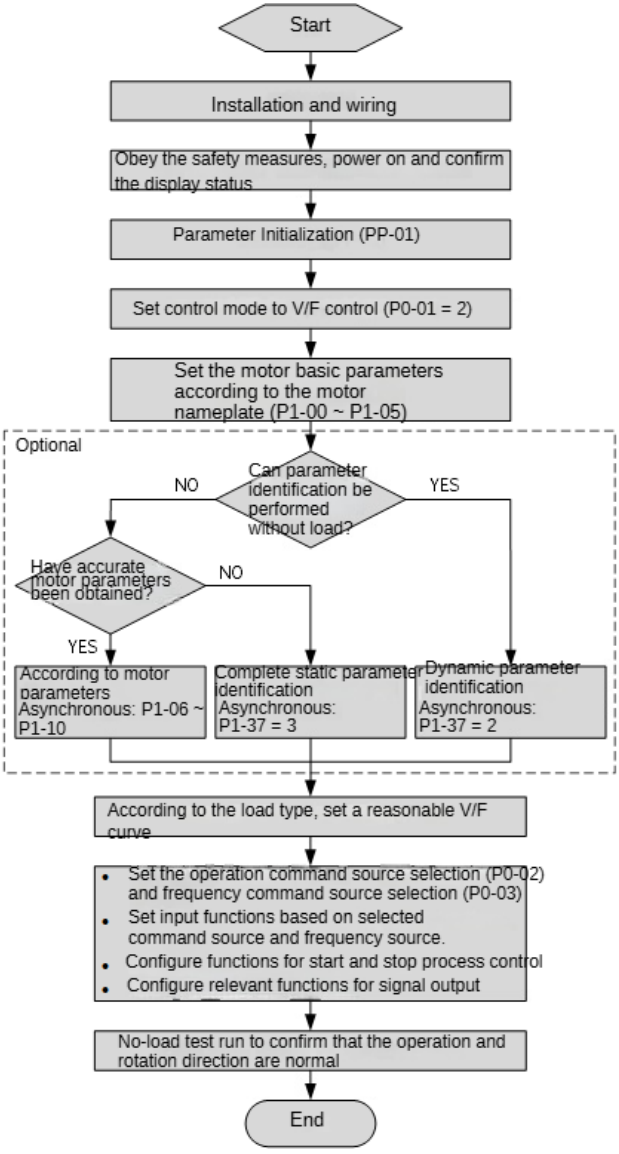


Figure 4-4 Inverter Commissioning Flow Chart (V/F Control)

Chapter 5 Function Parameter Table

The PP-00 is set to a value other than 0, that is, the parameter protection password is set. In the function parameter mode and the user change parameter mode, the parameter menu must be entered after the password is correctly entered. To cancel the password, set the PP-00 to 0.

The parameter menu in the custom parameter mode is not password protected.

Group P and group A are basic function parameters, and group D is monitoring function parameters. The symbols in the menu are described as follows:

"☆": indicates that the set value of this parameter can be changed when the inverter is in shutdown or running state;

"★": Indicates that the setting value of this parameter cannot be changed when the inverter is in operation;

"●": indicates that the value of this parameter is the actual test record value and cannot be changed;

"*": indicates that the parameter is "manufacturer parameter", which is only set by the manufacturer and is not allowed to be operated by the user.

5.1 Basic Functional Parameters

Function code	Name	Setting range	Factory Value	Change
Basic function group P0 group				
P0-01	1st Motor Speed Control Mode	0: Speed sensorless vector control (SVC) 1: Vector control with speed sensor (FVC) 2:V/F control	2	★
P0-02	Run command channel	0: operation panel command channel 1: Terminal Command Channel 2: terminal communication command channel (terminal RS485) 3: automatic operation/shutdown of photovoltaic water lifting 4: extended communication command channel (bus expansion card)	3	☆
P0-03	Master Frequency Source A Command Selection	0: digital setting (preset frequency P0-08,UP/DOWN can be modified, power down without memory) 1: digital setting (preset frequency P0-08,UP/DOWN can be modified, power-down memory 2:AI1 3:AI2 4:AI3 (function expansion card) 5: High-speed pulse input setting (S5) 6: Multi-Segment Instruction 7: Simple PLC 8:PID 9: given terminal communication (terminal RS485) 10: PV MPPT frequency given 11: given extended communication (bus expansion card)	10	★

Function code	Name	Setting range	Factory Value	Change
P0-04	Auxiliary Frequency Source B Command Input Selection	Same P0-03 (main frequency source A command input selection)	0	★
P0-05	Auxiliary Frequency Source B Command Reference Object Selection	0: Relative to maximum frequency 1: Relative to frequency source A	0	☆
P0-06	Auxiliary Frequency Source B Command Range	0% to 150%	100 percent	☆
P0-07	Frequency source combination mode selection	Bits: Frequency Source Selection 0: Primary frequency source A 1: Main and Auxiliary Operation Results (The operation relationship is determined by ten bits) 2: Main frequency source A and auxiliary frequency source B switching 3: Main frequency source A and main and auxiliary operation results switch 4: switching between auxiliary frequency source B and main and auxiliary operation results Ten bits: frequency source primary and secondary operation relationship 0: Primary + Secondary 1: Main-Auxiliary 2: Maximum of both 3: the two minimum	00	☆
P0-08	Preset setting frequency	0.00Hz ~ maximum frequency (P0-10)	50.00Hz	☆
P0-09	Motor rotation direction	0: Consistent 1: in the opposite direction direction	0	☆
P0-10	Maximum output frequency	50.00Hz ~ 500.00Hz	50.00Hz	★
P0-11	Operating frequency upper limit source selection	0:P0-12 setting 1:AI1 2:AI2 3:AI3 (function expansion card) 4: High speed pulse setting (S5) 5: given terminal communication (terminal RS485) 6: communication expansion given (bus expansion card):	0	★
P0-12	Operating frequency upper limit	Lower limit frequency P0-14 ~ maximum frequency P0-10	50.00Hz	☆
P0-13	Operating frequency upper limit offset	0.00Hz ~ maximum frequency P0-10	0.00Hz	☆
P0-14	Lower limit of operating frequency	0.00Hz ~ upper limit frequency P0-12	0.00Hz	☆
P0-15	carrier frequency setting	0.8kHz to 12.0kHz	Model Determination	☆
P0-16	Carrier frequency adjusted with temperature	0: No 1: Yes	1	☆
P0-17	Acceleration time 1	(0~65000)* P0-19	Model Determination	☆
P0-18	Deceleration time 1	(0~65000)* P0-19	Model Determinat	☆

Function code	Name	Setting range	Factory Value	Change
			ion	
P0-19	Acceleration and deceleration time unit	0:1 second 2:0.01 seconds 1:0.1 seconds	1	★
P0-21	Auxiliary frequency source offset frequency when combined	0.00Hz ~ maximum frequency P0-10	0.00Hz	☆
P0-22	Frequency Command Resolution	1:0.1Hz 2:0.01Hz	2	★
P0-23	Digitally set frequency shutdown memory selection	0: No memory 1: Memories	1	☆
P0-24	Motor parameter group selection	0: 1st motor parameter 1: 2nd motor parameter	0	★
P0-25	Reference frequency of acceleration and deceleration time	0: Maximum frequency (P0-10) 1: Set the frequency 2:100Hz	0	★
P0-26	Runtime frequency command UP/DOWN reference	0: Operating frequency 1: Set the frequency	0	★
P0-27	Run Command Bundle Master Frequency Source A Command Selection	Bits: operation panel command binding frequency source selection 0: no binding 1: Digital setting frequency 2:AI1 3:AI2 4:AI3 (function expansion card) 5: High-speed pulse input setting (S5) 6: multi-speed 7: Simple PLC 8:PID 9: given communication (terminal RS485) A: given expansion communication (bus expansion card) Ten bits: terminal command binding frequency source selection Hundred bits: communication command binding frequency source selection (terminal RS485) Thousands: extended communication command binding frequency source selection (bus expansion card)	000	☆
P0-28	Serial port communication protocol selection	Bits: communication protocol selection (terminal RS485) 0:ModbusRTU communication protocol 1: Extended communication protocol Ten: Reserved Hundred bits: extended communication protocol selection (bus expansion card) 0:ModbusRTU communication protocol 1: Extended communication protocol Thousands: CAN communication protocol selection 0:CANLINK communication	0100	☆

Function code	Name	Setting range	Factory Value	Change
		protocol 1:CANOPEN communication protocol		
P1 group: first motor parameters				
P1-00	Motor 1 Type Selection	0: Ordinary asynchronous motor 1: variable frequency asynchronous motor 2: permanent magnet synchronous motor	0	★
P1-01	Motor 1 rated power	0.1kW ~ 1000.0kW	Model Determination	★
P1-02	Rated voltage of motor 1	1V ~ 2000V	Model Determination	★
P1-03	Rated current of motor 1	0.1A ~ 6553.5A	Model Determination	★
P1-04	Rated frequency of motor 1	0.01Hz ~ maximum frequency	Model Determination	★
P1-05	Rated speed of motor 1	1rpm ~ 65535rpm	Model Determination	★
P1-06	Stator resistance of asynchronous motor 1	0.001 Ω ~ 65.535 Ω	self-learning parameters	★
P1-07	Rotor resistance of asynchronous motor 1	0.001 Ω ~ 65.535 Ω	self-learning parameters	★
P1-08	Inductive leakage reactance of asynchronous motor 1	0.01mH ~ 655.35mH	self-learning parameters	★
P1-09	Mutual inductance of asynchronous motor 1	0.1mH ~ 6553.5mH	self-learning parameters	★
P1-10	No-load current of asynchronous motor 1	0.01A ~ P1-03	self-learning parameters	★
P1-11	SVC torque boost	0.0-50.0%	10.0 percent	☆
P1-12	SVC torque boost cut-off frequency	0.00-P1-04	20.00Hz	☆
P1-13	Current Loop Filter Time	0.000~0.100s	0.000s	☆
P1-16	Stator resistance of synchronous motor 1	0.001 Ω ~ 65.535 Ω (Drive power ≤ 55kW) 0.0001 Ω ~ 6.5535 Ω (Drive power> 55kW)	self-learning parameters	★

Function code	Name	Setting range	Factory Value	Change
P1-17	Synchronous motor 1D axis inductance	0.01mH ~ 655.35mH (Drive power ≤ 55kW) 0.001mH ~ 65.535mH (Drive power> 55kW)	self-learning parameters	★
P1-18	Synchronous motor 1Q axis inductance	0.01mH ~ 655.35mH (Drive power ≤ 55kW) 0.001mH ~ 65.535mH (Drive power> 55kW)	self-learning parameters	★
P1-20	Back electromotive force coefficient of synchronous motor	0.1V ~ 6553.5V	self-learning parameters	★
P1-22	Synchronous motor learning compensation angle	0 °~ 360 °	0 °	★
P1-27	Number of encoder lines	1 to 65535	1024	★
P1-28	Encoder Type (Closed Loop Expansion Card)	0:ABZ Incremental Encoder 1:UVW encoder 2: Resolver 5: Single-turn absolute encoder (17 bits)	0	★
P1-30	ABZ incremental encoder AB phase sequence	0: Forward 1: Reverse	0	★
P1-31	Encoder zero position angle	0.0 to 359.9 °	0.0 °	★
P1-34	resolver pole number	1 to 65535	1	★
P1-36	Speed feedback PG disconnection detection time	0.0: no action 0.1s ~ 10.0s	0.0s	★
P1-37	Self-learning of motor parameters	0: No action 1: Asynchronous machine static part parameter self-learning 2: Asynchronous machine dynamic complete self-learning 3: Asynchronous machine static complete self-learning 11: Synchronous on-board self-learning 12: synchronous machine no-load self-learning	0	★
P2 group: first motor vector control parameters				
P2-00	Speed Loop Proportional Gain 1	1 to 100	30	☆
P2-01	Velocity loop integration time 1	10~1000 (0.01s ~ 10.00s)	0.50s	☆
P2-02	Toggle Low Point Frequency 1	0.00-P2-05	5.00Hz	☆
P2-03	Speed Loop Proportional Gain 2	1 to 100	10	☆
P2-04	Velocity Loop Integration Time 2	0.01s ~ 10.00s	1.00s	☆
P2-05	Toggle High Point Frequency 2	P2-02 ~ Maximum Frequency (P0-10)	10.00Hz	☆
P2-06	vector control slip gain	50% to 200%	100 percent	☆
P2-07	SVC speed feedback filter time constant	0.000s ~ 0.100s	0.005s	☆

Function code	Name	Setting range	Factory Value	Change
P2-09	Selection of Torque Upper Limit Command Channel in Speed Control Mode	0: Function code P2-10 setting 1:AI1 2:AI2 3:AI3 (function expansion card) 4: High-speed pulse input setting (S5) 5: communication given (terminal RS485) 6:MIN(AI1,AI2) 7:MAX(AI1,AI2) 8: extended communication given (bus expansion card) Full-scale P2-10 for 1-8 options	0	☆
P2-10	Digital setting of torque upper limit in speed control mode	0.0-200.0%	150.0 percent	☆
P2-11	Torque upper limit command channel selection in speed control mode (power generation)	0: Function code P2-12 setting (does not distinguish between electric and electric generation) 1:AI1 2:AI2 3:AI3 (function expansion card) 4: High-speed pulse input setting 5: communication given (terminal RS485) 6:MIN(AI1,AI2) 7:MAX(AI1,AI2) 8: extended communication given (bus expansion card) Full-scale P2-12 for 1-8 options	0	☆
P2-12	Digital setting of torque upper limit in speed control mode (power generation)	0.0-200.0%	150.0 percent	☆
P2-13	Proportional gain of excitation regulation	0 to 60000	2000	☆
P2-14	integral gain of excitation regulation	0 to 60000	1300	☆
P2-15	torque adjustment proportional gain	0 to 60000	2000	☆
P2-16	torque regulation integral gain	0 to 60000	1300	☆
P2-17	Velocity Loop Integral attribute	Bits: Integral Separation 0: invalid 1: Effective	0	☆
P2-18	Synchronous machine flux weakening mode	0: not weak magnetic 1: Automatic adjustment mode 2: calculation + automatic adjustment comprehensive mode	1	☆
P2-19	field weakening gain of synchronous machine	0 to 50	5	☆
P2-20	Synchronous machine maximum flux weakening current	0 to 300%	50%	☆
P2-21	Maximum torque coefficient in flux weakening region	50 to 200 percent	100 percent	☆
P2-22	Generation Power Limit enable	0: invalid 1: Effective	0	☆
P2-23	Power generation upper limit	0 to 200%	Model Determination	☆

Function code	Name	Setting range	Factory Value	Change
P2-24	Synchronous machine initial position angle detection current	50% to 180%	80%	☆
P2-25	Synchronous machine initial position angle detection	0: Detecting Every Run 1: Do not detect 2: Power-on first operation test	0	☆
P2-27	Synchronous machine saliency adjustment gain	50 to 500	100	☆
P2-28	Maximum torque to current ratio control	0: Not open 1: Open	0	☆
P2-32	Z signal correction	0: Not open 1: Open	1	☆
P2-36	low-speed excitation current	0-80%	30%	☆
P2-37	low speed carrier frequency	0.8K ~ P0-15	1.5KHz	☆
P2-38	SVC low-frequency braking mode	0: No low frequency braking 1: the use of low frequency braking	0	☆
P2-39	SVC Low Frequency Braking Effective Frequency	0 to 10.00Hz	2.00Hz	☆
P2-40	SVC low frequency braking frequency change step	0.0005~1.0000Hz	0.0010Hz	☆
P2-41	SVC low-frequency braking current	0-80%	50%	☆
P2-42	Synchronous machine SVC speed tracking	0: Not enabled 1: enable	0	☆
P2-43	Zero servo enable	0: Not enabled 1: enable	0	☆
P2-44	Switching frequency	0.00-P2-02	0.30Hz	☆
P2-45	Zero servo velocity loop proportional gain	1 to 100	10	☆
P2-46	Zero servo velocity loop integration time	0.01s ~ 10.00s	0.50s	☆
P2-47	Stop anti-reverse enable	0: Not enabled 1: enable	0	☆
P2-48	Shutdown angle	0.0 °~ 10.0 °	0.8 °	☆
P3 group: V/F control parameters				
P3-00	VF Curve Settings	0: Line V/F 1: Multi-point V/F 2: Square V/F 3:1.2V/F 4:1.4V/F 6:1.6V/F 8:1.8V/F 9: Reservations 10:VF complete separation mode 11:VF semi-separated mode	0	★
P3-01	torque boost	0.0%(no torque boost) 0.1-30.0%	Model Determination	☆
P3-02	Torque boost cut-off frequency	0.00Hz ~ maximum frequency	50.00Hz	★
P3-03	Multipoint V/F Frequency Point 1	0.00Hz to P3-05 Hz	5.00Hz	★
P3-04	Multi-point V/F voltage point 1	0.0-100.0%	10.0 percent	★
P3-05	Multi-Point V/F Frequency Point	P3-03 ~ P3-07	25.00Hz	★

Function code	Name	Setting range	Factory Value	Change
	2			
P3-06	Multi-point V/F voltage point 2	0.0-100.0%	50.0 percent	★
P3-07	Multi-Point V/F Frequency Point 3	P3-05 ~ motor rated frequency (P1-04)	50.00Hz	★
P3-08	Multi-Point V/F Voltage Point 3	0.0-100.0%	100.0 percent	★
P3-09	V/F slip compensation gain (reserved)	-	-	-
P3-10	V/F over-excitation gain	0 to 200	64	☆
P3-11	V/F oscillation suppression gain	0 to 100	40	☆
P3-13	V/F separated voltage source	0: Number setting (P3-14) 1:AI1 2:AI2 3:AI3 (function expansion card) 4: High-speed pulse input setting (S5) 5: Multi-segment instruction 6: Simple PLC 7:PID 8: communication given (terminal RS485) 9: extended communication given (bus expansion card) Note: 100.0% corresponds to the rated voltage of the motor	0	☆
P3-14	Digital setting of voltage for V/F separation	0V ~ Rated voltage of motor	0V	☆
P3-15	Voltage acceleration time of V/F separation	0.0s ~ 1000.0s Note: indicates the time from 0V to rated voltage	0.0s	☆
P3-16	Voltage deceleration time of V/F separation	0.0s ~ 1000.0s Note: indicates the time from 0V to the rated voltage of the motor	0.0s	☆
P3-17	V/F Separation Shutdown Mode Selection	0: Frequency/voltage independently reduced to 0 1: The voltage is reduced to 0 and then the frequency is reduced.	0	☆
P3-18	Overcurrent stall action current	50 to 200 percent	150 percent	★
P3-19	Overcurrent stall enable	0: invalid 1: Effective	1	★
P3-20	Overcurrent stall suppression gain	0 to 100	20	☆
P3-21	Double-speed overcurrent stall action current compensation coefficient	50 to 200 percent	50%	★
P3-22	Overvoltage stall action voltage	650V ~ 800.0V	760V	★
P3-23	Overvoltage stall enable	0: invalid 1: Effective	1	★
P3-24	Overvoltage stall suppression frequency gain	0 to 100	60	☆
P3-25	Overvoltage stall suppression voltage gain	0 to 100	30	☆

Function code	Name	Setting range	Factory Value	Change
P3-26	Overvoltage stall maximum rise frequency limit	0 to 50Hz	5Hz	★
P3-34	Power saving mode enabled (valid only in V/F control mode and VF curve is straight V/F)	0: Not enabled 1: enable	0	☆
P3-35	Energy saving mode operation detection current	0-60%	40%	☆
P3-36	Energy-saving mode operation voltage detection ratio	70-100%	80%	☆
P3-37	Acceleration and deceleration time of voltage switching in energy saving mode	0.0-10.0s	1.0S	☆
P4 group: input terminals				
P4-00	S1 terminal function selection	0: No function 1: Forward rotation operation (FWD) or operation instruction 2: Reverse running (REV) or positive and negative running direction (Note: Set 1 and 2 to be used in conjunction with the P4-11) 3: Three-wire operation control 4: forward rotation jog (FJOG) 5: Reverse jog (RJOG) 6: Terminal UP 7: Terminal DOWN 8: Free Parking 9: fault reset (RESET) 10: Run pause 11: External fault normally open input 12: Multi-segment command terminal 1 13: Multi-segment command terminal 2 14: Multi-segment command terminal 3 15: Multi-segment command terminal 4 16: acceleration and deceleration time selection terminal 1 17: acceleration and deceleration time selection terminal 2 18: Frequency command switching 19:UP/DOWN setting clear (terminal, keyboard) 20: control command switching terminal 1 21: acceleration and deceleration prohibition 22:PID Pause 23: Simple PLC status reset 24: Pause of swing frequency 25: Counter input 26: Counter Reset 27: Length count input 28: Length reset 29: Torque control prohibition 30: High-speed pulse input (only valid for S5) 31: Reserved	1	★
P4-01	S2 terminal function selection		2	★
P4-02	S3 terminal function selection		9	★
P4-03	S4 terminal function selection		12	★
P4-04	S5 terminal function selection		13	★
P4-05	S6 terminal function selection (normal use when function expansion card, STO expansion card, this signal is STO1)		0	★
P4-06	S7 terminal function selection (function expansion card, STO expansion card, this signal is STO2)		0	★
P4-07	S8 terminal function selection (function expansion card)		0	★
P4-08	S9 terminal function selection (function expansion card)		0	★
P4-09	S10 terminal function selection (function expansion card)		0	★

Function code	Name	Setting range	Factory Value	Change
		32: Immediate DC braking 33: External fault normally closed input 34: Frequency Modification enable 35:PID action direction is reversed 36: External parking terminal 1 37: Control command switching terminal 2 38:PID integration pause 39: Frequency source A and preset frequency switching 40: Frequency source B and preset frequency switching 41: motor terminal selection function 42: Reserved 43:PID parameter switching 44: User-defined fault 1 45: User-defined fault 2 46: Speed control/torque control switching 47: Emergency stop 48: External parking terminal 2 49: DC brake deceleration 50: The running time is cleared 51: Two-wire/three-wire switching 52: Reverse frequency prohibited 53: Full water signal 54: Water shortage signal 55-59: Reserved		
P4-10	S1 ~ S10 terminal filtering time (S6 and S7 delay is invalid when STO expansion card is used)	0.000s ~ 1.000s	0.010s	☆
P4-11	Terminal control operation mode	0: Two-wire 1 1: Two-line 2 2: Three-line 1 3: Three-line type 2	0	★
P4-12	Terminal UP/DOWN Frequency Rate of Change	0.001Hz/s ~ 65.535Hz/s	1.00Hz/s	☆
P4-13	AI curve 1 minimum input	0.00V ~ P4-15 V	0.00V	☆
P4-14	AI Curve 1 Minimum Input Corresponding Setting	-100.0% to +100.0%	0.0 percent	☆
P4-15	AI curve 1 maximum input	P4-13 ~ +10.00V	10.00V	☆
P4-16	AI Curve 1 Maximum Input Corresponding Setting	-100.0% to +100.0%	100.0 percent	☆
P4-17	AI1 input filter time	0.00s ~ 10.00s	0.10s	☆
P4-18	AI curve 2 minimum input	0.00V ~ P4-20 V	0.00V	☆
P4-19	AI curve 2 minimum input corresponding setting	-100.0% to +100.0%	0.0 percent	☆
P4-20	AI curve 2 maximum input	P4-18 ~ +10.00V	10.00V	☆
P4-21	AI curve 2 maximum input corresponding setting	-100.0% to +100.0%	100.0 percent	☆
P4-22	AI2 input filter time	0.00s ~ 10.00s	0.10s	☆
P4-23	AI curve 3 minimum input	0.00V ~ P4-25 V	0.00V	☆

Function code	Name	Setting range	Factory Value	Change
P4-24	AI curve 3 minimum input corresponding setting	0.00% to +100.0%	0.0 percent	☆
P4-25	AI curve 3 maximum input	P4-23 ~ +10.00V	10.00V	☆
P4-26	AI curve 3 maximum input corresponding setting	0.00% to +100.0%	100.0 percent	☆
P4-27	AI3 input filter time	0.00s ~ 10.00s	0.10s	☆
P4-28	High-speed pulse input minimum frequency	0.00kHz to P4-30 kHz	0.00kHz	☆
P4-29	High-speed pulse minimum input frequency corresponding setting	-100.0% to 100.0%	0.0 percent	☆
P4-30	Maximum input frequency of high-speed pulse	P4-28 to 100.00kHz	50.00kHz	☆
P4-31	High-speed pulse maximum input frequency corresponding setting	-100.0% to 100.0%	100.0 percent	☆
P4-32	Pulse input filter time	0.00s ~ 10.00s	0.10s	☆
P4-33	AI Curve Selection	Bits: AI1 Curve Selection 1: Curve 1(2 points, see P4-13 ~ P4-16) 2: Curve 2(2 points, see P4-18 ~ P4-21) 3: Curve 3(2 points, see P4-23 ~ P4-26) 4: Curve 4(4 points, see A6-00 ~ A6-07) 5: Curve 5(4 points, see A6-08 ~ A6-15) Ten: AI2 curve selection, same as above Hundred bits: AI3 curve selection (function expansion card), same as above	321	☆
P4-34	AI Below Minimum Input Setting Selection	Bits: AI1 is lower than the minimum input setting selected 0: Corresponding minimum input setting 1:0.0 percent Ten position: AI2 is lower than the minimum input setting selection, as above Hundred bits: AI3 is lower than the minimum input setting selection (function expansion card), as above	000	☆
P4-35	S1 delay time	0.0s ~ 3600.0s	0.0s	★
P4-36	S2 delay time	0.0s ~ 3600.0s	0.0s	★
P4-37	S3 Delay Time	0.0s ~ 3600.0s	0.0s	★
P4-38	S1 ~ S5 terminal valid mode selection 1	0: active high 1: active low level Bits: S1 Ten: S2 Hundred bits: S3 Thousands: S4 Ten thousand: S5	00000	★

Function code	Name	Setting range	Factory Value	Change
P4-39	S6, S7 terminal valid mode selection 2 (This function is invalid on S6 and S7 with STO expansion card)	0: active high 1: active low level Bits: S6 (function expansion card) Ten: S7 (function expansion card) Hundred bits: S8 (function expansion card) Thousands: S9 (function expansion card) Ten thousand bits: S10 (function expansion card)	00000	★
P5 group: output terminal				
P5-00	HDO terminal output mode selection	0: Pulse output (HDP) 1: switch output (HDY)	1	☆
P5-01	HDY output function selection	0: No output 1: inverter in operation 2: fault output (fault shutdown) 3: Frequency level detection FDT1 output 4: Frequency Arrival 5: zero speed operation (no output when shutdown) 6: motor overload pre-alarm 7: inverter overload pre-alarm 8: Set the recorded value to reach 9: Specify the value to reach 10: Length to reach 11:PLC cycle completed 12: Accumulated running time arrives 13: Frequency Limiting 14: Torque Limiting 15: Ready to run 16:AI1>AI2 17: Upper limit frequency reached 18: Lower limit frequency reached (operation related) 19: Undervoltage state output 20: Communication Settings (Terminal RS485 or bus expansion card) 21: Positioning complete (reserved) 22: Positioning Approaching (Reserved) 23: 2 in zero speed operation (output when shutdown) 24: Accumulated power-on time arrives 25: Frequency level detection FDT2 output 26: Frequency 1 reaches output 27: Frequency 2 reaches output 28: Current 1 reaches output 29: Current 2 reaches output 30: Timed arrival output 31:AI1 input overrun 32: Under load 33: Reverse operation 34: Zero Current State 35: Module temperature reaches 36: Output current overrun	0	☆
P5-02	Relay 1 Output Function Selection (TA-TB-TC)		2	☆
P5-03	Relay 2 Output Function Selection (RA-RC)		0	☆
P5-04	DO1/T1A-T1C output function selection (function expansion card)		-	☆
P5-05	DO2/T2A-T2C output function selection (function expansion card)		-	☆

Function code	Name	Setting range	Factory Value	Change
		37: lower limit frequency reached (stop also output) 38: alarm output (continue to run) 39: Motor over-temperature pre-alarm 40: this run time to arrive 41: fault output (for free stop fault), and undervoltage does not output		
P5-06	HDP output function selection	0: Operating frequency 1: Set the frequency 2: Output current 3: Output torque 4: Output power 5: Output voltage 6: High-speed pulse input (100.% for 100.0kHz) 7:AI1 8:AI2 9:AI3 (function expansion card) 10: Length 11: Remember the value 12: Communication Settings (terminal RS485 or bus expansion card) 13: Motor speed 14: Output current: 100.0% to 1000.0A 15: output voltage: 100.0 corresponding to 1000.0V 16: Motor output torque (actual value, percentage relative to the motor)	0	☆
P5-07	AO1 Output Function Selection		0	☆
P5-08	AO2 output function selection (function expansion card)		1	☆
P5-09	HDO Output Maximum Frequency	0.01kHz to 100.00kHz	50.00kHz	☆
P5-10	AO1 zero bias coefficient	-100.0% to +100.0%	0.0 percent	☆
P5-11	AO1 gain	-10.00 ~ +10.00	1.00	☆
P5-12	AO2 zero bias coefficient	-100.0% to +100.0%	0.0 percent	☆
P5-13	AO2 gain	-10.00 ~ +10.00	1.00	☆
P5-17	HDY output delay time	0.0s ~ 3600.0s	0.0s	☆
P5-18	Relay 1 output delay time	0.0s ~ 3600.0s	0.0s	☆
P5-19	Relay 2 output delay time	0.0s ~ 3600.0s	0.0s	☆
P5-20	DO1/T1A-T1C output delay time (function expansion card)	0.0s ~ 3600.0s	0.0s	☆
P5-21	DO2/T2A-T2C output delay time (function expansion card)	0.0s ~ 3600.0s	0.0s	☆

Function code	Name	Setting range	Factory Value	Change
P5-22	Output terminal valid state selection	0: Positive logic 1: Anti-Logic Bits: HDO(HDY) Ten: RO1A Hundred: RO2A Thousands: DO1/T1A-T1C (function expansion card) Ten thousand bits: DO2/T2A-T2C (function expansion card)	00000	☆
P6 group: start-stop control				
P6-00	Start-up operation mode	0: Direct Start 1: Speed tracking restart 2: Pre-excitation start (AC asynchronous machine) 3:SVC Quick Start	0	☆
P6-01	Speed tracking mode	0: Start from shutdown frequency 1: start from the frequency 2: Starting from the maximum frequency	0	★
P6-02	Speed tracking	20	20	☆
P6-03	Start frequency	0.00Hz to 10.00Hz	0.00Hz	☆
P6-04	Start frequency hold time	0.0s ~ 100.0s	0.0s	★
P6-05	DC braking current before startup/pre-excitation current	0% to 100%	0%	★
P6-06	DC braking time/pre-excitation time before starting	0.0s ~ 100.0s	0.0s	★
P6-07	Selection of acceleration and deceleration mode	0: straight line acceleration and deceleration 1:S curve acceleration and deceleration A (static) 2:S curve acceleration and deceleration B (dynamic)	0	★
P6-08	S-curve start time scale	0.0%~(100.0%-P6-09)	30.0 percent	★
P6-09	S curve end segment time scale	0.0%~(100.0%-P6-08)	30.0 percent	★
P6-10	Shutdown mode selection	0: Slow down and stop 1: Free Parking	0	☆
P6-11	Parking DC brake start frequency	0.00Hz ~ maximum frequency (P0-10)	0.00Hz	☆
P6-12	Shutdown DC brake waiting time	0.0s ~ 100.0s	0.0s	☆
P6-13	Shutdown DC brake current	0% to 100%	50%	☆
P6-14	Shutdown DC braking time	0.0s ~ 100.0s	0.0s	☆
P6-15	Brake usage rate	0% to 100%	100 percent	☆
P6-18	Speed tracking current size	30% to 200%	Model Determination	☆
P6-21	Degaussing time (SVC valid)	0.00~5.00s	Model Determination	☆

Function code	Name	Setting range	Factory Value	Change
P7 group: keyboard and display				
P7-00	Keyboard type selection	0: General Keyboard 1: new double-row keyboard	1	☆
P7-01	Multi-function key function selection	Bits: 0:JOG is invalid 2: forward and reverse switching 3: forward rotation jog 4: Reverse inching Ten: 0:LOC/REM invalid 1: Switch between the command channel of the operation panel and the remote command channel (terminal command channel or communication command channel)	00	★
P7-02	STOP/RESET key function	0: Only in the keyboard operation mode, STOP/RES key stop function is effective 1: In any operation mode, the STOP/RES key stop function is effective	1	☆
P7-03	Main display LED operation status display parameter 1	0000~FFFF Bit00: Operating frequency 1(Hz) Bit01: Set frequency (Hz) Bit02: Bus voltage (V) Bit03: Output voltage (V) Bit04: Output current (A) Bit05: Output power (kW) Bit06: Output torque (%) Bit07:S terminal input status Bit08:HDO Output Status Bit09:AI1 Voltage (V) Bit10:AI2 Voltage (V) Bit11:AI3 Voltage (V)(Function Expansion Card) Bit12: Count Value Bit13: Length value Bit14: Load Speed Display Bit15:PID Setting	1F	☆
P7-04	Main display LED operation status display parameter 2	0000~FFFF Bit00:PID feedback Bit01:PLC Phase Bit02: High Speed Pulse Input Frequency (kHz) Bit03: Operating frequency 2(Hz) Bit04: Remaining Running Time Bit05: Voltage before AI1 correction (V) Bit06: Voltage before AI2 correction (V) Bit07: Voltage before AI3 correction (V) (Function expansion card) Bit08: Line Speed Bit09: Current power-up time (Hour) Bit10: Current Running Time (Min) Bit11: High-speed pulse input frequency	0	☆

Function code	Name	Setting range	Factory Value	Change
		(Hz) Bit12: communication setting value Bit13: Encoder feedback speed (Hz) Bit14: Main frequency A display (Hz) Bit15: Secondary frequency B display (Hz)		
P7-05	Main display LED shutdown status display parameters	0000~FFFF Bit00: Set frequency (Hz) Bit01: Bus voltage (V) Bit02:S input status Bit03:HDO output status Bit04:AI1 Voltage (V) Bit05:AI2 Voltage (V) Bit06:AI3 Voltage (V)(Function Expansion Card) Bit07: Count value Bit08: Length value Bit09:PLC Phase Bit10: Load Speed Bit11:PID Setting Bit12: High Speed Pulse Input Frequency (kHz)	33	☆
P7-06	Load speed display factor	0.0001~6.5000	1.0000	☆
P7-07	IGBT module radiator temperature	-20.0 ℃ ~ 120.0 ℃	-	●
P7-09	Cumulative Running Time	0h ~ 65535h	-	●
P7-12	Load Speed Display Number of decimal places	Bits: d0-14 number of decimal points 0:0 decimal places 1:1 decimal place 2:2 decimal places Ten digits: number of decimal points of d0-19/d0-29 1:1 decimal place 2:2 decimal places	21	☆
P7-13	Cumulative power-on time	0h ~ 65535h	-	●
P7-14	Accumulated power consumption	0kW ~ 65535 degrees	-	●
P7-17	Show Selection 1	0~73, this value corresponds to the serial number of D0 group monitoring parameters. Example: When set to 0, the content of d0.00 is displayed. This parameter is not only the auxiliary display selection of dual display keyboard, but also the first row of display content of LCD keyboard custom display	0	☆
P7-18	Show Selection 2	0~73, this value corresponds to the serial number of d0 group monitoring parameters. Example: When set to 1, the content of d0.01 is displayed. This parameter is the second row of display content of LCD keyboard custom display	1	☆
P7-19	Show Selection 3	0~73, this value corresponds to the	2	☆

Function code	Name	Setting range	Factory Value	Change
		serial number of d0 group monitoring parameters. Example: When set to 2, the content of d0.02 is displayed. This parameter is the third row of display content of LCD keyboard custom display		
P7-20	Show Selection 4	0~73, this value corresponds to the serial number of d0 group monitoring parameters. Example: When set to 3, the display content is d0.03. This parameter is the fourth row of display content of the LCD keyboard custom display	3	☆
P8 group: auxiliary function				
P8-00	inching operation frequency	0.00Hz ~ maximum frequency (P0-10)	2.00Hz	☆
P8-01	jog acceleration time	0.0s ~ 6500.0s	20.0s	☆
P8-02	inching deceleration time	0.0s ~ 6500.0s	20.0s	☆
P8-03	Acceleration time 2	0.0s ~ 6500.0s	Model Determination	☆
P8-04	Deceleration time 2	0.0s ~ 6500.0s	Model Determination	☆
P8-05	Acceleration time 3	0.0s ~ 6500.0s	Model Determination	☆
P8-06	Deceleration time 3	0.0s ~ 6500.0s	Model Determination	☆
P8-07	Acceleration time 4	0.0s ~ 6500.0s	Model Determination	☆
P8-08	Deceleration time 4	0.0s ~ 6500.0s	Model Determination	☆
P8-09	Jump frequency 1	0.00Hz ~ maximum frequency (P0-10)	0.00Hz	☆
P8-10	Jump frequency 2	0.00Hz ~ maximum frequency (P0-10)	0.00Hz	☆
P8-11	Jump frequency amplitude	0.00Hz ~ maximum frequency (P0-10)	0.00Hz	☆
P8-12	forward and reverse dead time	0.0s ~ 3000.0s	0.0s	☆
P8-13	Reverse operation of motor is prohibited	0: invalid 1: Effective	0	☆
P8-14	Set the frequency below the lower limit frequency operation mode	0: Operation at the lower limit frequency 1: Shutdown 2: Zero speed operation	0	☆
P8-15	droop rate control	0.00-10.00%	0.00 percent	☆
P8-16	Set power-on arrival time	0h ~ 65000h	0h	☆
P8-17	Set Run Arrival Time	0h ~ 65000h	0h	☆

Function code	Name	Setting range	Factory Value	Change
P8-18	Operation protection selection of power terminal	0: No protection 1: Protection	0	☆
P8-19	Frequency detection value (FDT1)	0.00Hz ~ maximum frequency (P0-10)	50.00Hz	☆
P8-20	Frequency detection hysteresis (FDT1)	0.0%~ 100.0%(FDT1 level)	5.0 percent	☆
P8-21	Frequency reach detection width	0.0 to 100.0%(maximum frequency P0-10)	0.0 percent	☆
P8-22	Whether the jump frequency is effective during acceleration and deceleration	0: invalid 1: Effective	0	☆
P8-25	Acceleration time 1 and acceleration time 2 switching frequency point	0.00Hz ~ maximum frequency (P0-10)	0.00Hz	☆
P8-26	Deceleration time 1 and deceleration time 2 switching frequency point	0.00Hz ~ maximum frequency (P0-10)	0.00Hz	☆
P8-27	Terminal jog priority	0: invalid 1: Effective	0	☆
P8-28	Frequency detection value (FDT2)	0.00Hz ~ maximum frequency	50.00Hz	☆
P8-29	Frequency detection hysteresis (FDT2)	0.0%~ 100.0%(FDT2 level)	5.0 percent	☆
P8-30	Any arrival frequency detection value 1	0.00Hz ~ maximum frequency (P0-10)	50.00Hz	☆
P8-31	Arbitrary arrival frequency detection amplitude 1	0.0 to 100.0%(maximum frequency P0-10)	0.0 percent	☆
P8-32	Any arrival frequency detection value 2	0.00Hz ~ maximum frequency (P0-10)	50.00Hz	☆
P8-33	Arbitrary arrival frequency detection amplitude 2	0.0 to 100.0%(maximum frequency P0-10)	0.0 percent	☆
P8-34	Zero current detection level	0.0-300.0% 100.0% corresponding to rated current of motor	5.0 percent	☆
P8-35	Zero current detection delay time	0.01s ~ 600.00s	0.10s	☆
P8-36	Output current overrun	0.0%(not detected) 0.1~300.0%(rated current of motor)	200.0 percent	☆
P8-37	Delay time of output current overrun detection	0.00s ~ 600.00s	0.00s	☆
P8-38	Arbitrary Arrival Current 1	0.0~300.0%(rated current of motor)	100.0 percent	☆
P8-39	Arbitrary Arrival Current 1 Amplitude	0.0~300.0%(rated current of motor)	0.0 percent	☆
P8-40	Arbitrary Arrival Current 2	0.0~300.0%(rated current of motor)	100.0 percent	☆
P8-41	Arbitrary Arrival Current 2 Amplitude	0.0~300.0%(rated current of motor)	0.0 percent	☆
P8-42	Timing function selection	0: invalid 1: Effective	0	☆
P8-43	Timing Run Time Selection	0:P8-44 setting 1:AI1 2:AI2 3:AI3 (function expansion card) Analog input range P8-44	0	☆
P8-44	Timed Running Time	0.0Min ~ 6500.0Min	0.0Min	☆

Function code	Name	Setting range	Factory Value	Change
P8-45	AI1 input voltage protection value lower limit	0.00V ~ P8-46 V	3.10V	☆
P8-46	AI1 input voltage protection value upper limit	P8-45 ~ 11.00V	6.80V	☆
P8-47	Module temperature reached	0 ℃ ~ 100 ℃	75 ℃	☆
P8-48	Cooling fan control mode	0: Running fan 1: The fan has been running	0	☆
P8-49	Wake-up frequency	Sleep Frequency (P8-51)~ Maximum Frequency (P0-10)	0.00Hz	☆
P8-50	Wake-up delay time	0.0s ~ 6500.0s	0.0s	☆
P8-51	Sleep frequency	0.00Hz ~ wake-up frequency (P8-49)	0.00Hz	☆
P8-52	Sleep delay time	0.0s ~ 6500.0s	0.0s	☆
P8-53	Arrival time setting of this operation	0.0Min ~ 6500.0Min	0.0Min	☆
P8-54	output power correction factor	0.00-200.0%	100.0 percent	☆
P9 group: fault and protection				
P9-00	Motor overload protection selection	0: prohibited 1: Permitted	1	☆
P9-01	Motor overload protection gain	0.20~10.00	1.00	☆
P9-02	Motor overload warning coefficient	50% to 100%	80%	☆
P9-03	Overvoltage stall gain	0 to 100	30	☆
P9-04	Overvoltage stall protection voltage	650V ~ 800V	760V	☆
P9-07	Short circuit to ground protection selection	Bits: Power-on short-to-ground protection selection 0: invalid 1: Effective Ten position: selection of short circuit protection to ground before operation 0: invalid 1: Effective	01	☆
P9-08	Brake unit action starting voltage	650V ~ 800V	690V	☆
P9-09	Fault automatic reset times	0 to 20	0	☆
P9-10	Fault HDO action selection during fault auto reset	0: No action 1: Action	0	☆
P9-11	Fault automatic reset waiting time	0.1s ~ 100.0s	5.0s	☆
P9-12	Input phase loss and contactor protection selection (Reserved)	Bit: input phase loss protection selection 0: prohibited 1: Permitted Ten position: selection of contactor pull-in protection 0: prohibited 1: Permitted	11	★
P9-13	Output phase loss protection selection	Bit: Output phase loss protection selection 0: prohibited	01	☆

Function code	Name	Setting range	Factory Value	Change
		1: Permitted Ten bits: output phase loss protection selection before operation 0: prohibited 1: Permitted		
P9-14	First Fault Type	0: No fault 1: Reserved 2: Accelerated overcurrent 3: deceleration overcurrent 4: Constant speed overcurrent 5: Accelerating overvoltage 6: deceleration overvoltage 7: constant speed overvoltage 8: buffer resistance overload 9: Undervoltage 10: inverter overload 11: motor overload 12: Input phase loss 13: Output phase loss 14: Module overheating 15: External fault 16: abnormal communication (terminal RS485) 17: Contactor abnormal 18: Abnormal current detection 19: motor self-learning abnormal 20: Encoder/PG Card Abnormal 21: parameter read/write exception 22: The inverter hardware is abnormal 23: motor short circuit to ground 24: Reserved 25: Reserved 26: RUN TIME to arrive 27: User-defined fault 1 28: User-defined fault 2 29: Power-on Time Arrived 30: Underload 31: Runtime PID feedback lost 40: Fast Limit Timeout 41: Switching motor during operation 42: Speed deviation is too large 43: Motor overspeed (reserved) 45: Motor over-temperature 51: Initial position error 55: Master-slave control slave failure 56:CAN communication failure 57: LCD keyboard communication failure 58: expansion card communication failure	-	●
P9-15	Type of second fault		-	●
P9-16	Third (most recent) failure type		-	●
P9-17	Frequency at third (last) fault	-	-	●
P9-18	Current at third (last) fault	-	-	●

Function code	Name	Setting range	Factory Value	Change
P9-19	Bus voltage at third (latest) fault	-	-	●
P9-20	Input terminal status at third (most recent) fault	-	-	●
P9-21	Output terminal status at third (most recent) fault	-	-	●
P9-22	Converter status at third (most recent) fault	-	-	●
P9-23	Power-on time at third (latest) fault	-	-	●
P9-24	Time of operation at third (most recent) failure	-	-	●
P9-27	Frequency at second fault	-	-	●
P9-28	Current at second fault	-	-	●
P9-29	Bus voltage at second fault	-	-	●
P9-30	Input terminal status at second fault	-	-	●
P9-31	Output terminal status at second fault	-	-	●
P9-32	Converter status at second fault	-	-	●
P9-33	Power-on time at second fault	-	-	●
P9-34	Time of operation at second fault	-	-	●
P9-37	Frequency at first fault	-	-	●
P9-38	Current at first fault	-	-	●
P9-39	Bus voltage at first fault	-	-	●
P9-40	Input terminal status at first fault	-	-	●
P9-41	Output terminal status at first fault	-	-	●
P9-42	Converter status at first fault	-	-	●
P9-43	Power-on time at first fault	-	-	●
P9-44	Time to run on first fault	-	-	●
P9-47	Failsafe action selection 1	Bits: motor overload (FU11) 0: free parking 1: shut down according to the shutdown mode 2: Continue to run Ten digits: input phase missing (FU12)(reserved) Hundred: Output phase missing (FU13) Thousands: external fault (FU15) Ten thousand: abnormal communication (FU16)	00000	☆
P9-48	Fault protection action selection 2	Bits: Encoder/PG card exception (FU20) 0: free parking Ten: function code read and write exception (FU21) 0: free parking 1: shut down according to the shutdown	00000	☆

Function code	Name	Setting range	Factory Value	Change
		mode Hundred bits: inverter overload fault action selection (FU10) 0: Free Stop 1: derating operation Thousands: motor overheating (FU45) Ten Thousand Bits: Running Time Arrived (FU26)		
P9-49	Fail-safe action selection 3	Bits: User-defined fault 1(FU27) 0: free parking 1: shut down according to the shutdown mode 2: Continue to run Ten: User-defined fault 2(FU28) 0: free parking 1: shut down according to the shutdown mode 2: Continue to run Hundred: Power-on Time Arrived (FU29) 0: free parking 1: shut down according to the shutdown mode 2: Continue to run Thousands: Underload (FU30) 0: free parking 1: Slow down and stop 2: Decelerate to 7% of the rated frequency of the motor and continue to run, and automatically return to the set frequency when not under load Ten thousand bits: PID feedback lost at runtime (FU31) 0: free parking 1: shut down according to the shutdown mode 2: Continue to run	00000	☆
P9-50	Fault protection action selection 4	Bit: excessive speed deviation (FU42) 0: free parking 1: shut down according to the shutdown mode 2: Continue to run Ten: motor speed (FU43) Hundred: Initial position error (FU51)	00000	☆
P9-54	Continue operation frequency selection in case of fault	0: Run at the current operating frequency 1: Run at set frequency 2: Operation at upper limit frequency 3: the following limit frequency operation 4: Run at abnormal standby frequency	0	☆
P9-55	Abnormal standby frequency	0.0-100.0% (100.0% corresponds to maximum frequency P0-10)	100.0 percent	☆
P9-56	Motor temperature sensor type (closed loop expansion card/temperature acquisition	0: No sensor 2:PT1000 1:PT100 3:KTY84	0	☆

Function code	Name	Setting range	Factory Value	Change
	card)			
P9-57	Motor overheat protection threshold (closed loop expansion card/temperature acquisition card)	0 ℃-200 ℃	110 ℃	☆
P9-58	Motor overheating pre-alarm threshold (closed-loop expansion card/temperature acquisition card).	0 ℃-200 ℃	90 ℃	☆
P9-59	Instantaneous stop function selection	0: invalid 1: bus voltage constant control 2: Deceleration and shutdown	0	☆
P9-60	Instantaneous stop non-stop recovery voltage	80% to 100.0%	85.0 percent	☆
P9-61	Instantaneous stop non-stop voltage recovery judgment time	0.00s ~ 100.00s	0.50s	☆
P9-62	Instant stop non-stop action voltage	60.0~100.0 (standard bus voltage)	80.0 percent	☆
P9-63	Underload Protection Selection	0: invalid 1: Effective	0	☆
P9-64	Underload detection level	0.0-100.0%	10.0 percent	☆
P9-65	Underload detection time	0.0~60.0s	1.0s	☆
P9-67	over-speed detection value	0.0 to 50.0%(maximum frequency)	20.0 percent	☆
P9-68	over-speed detection time	0.0s: do not detect 0.1~60.0s	1.0s	☆
P9-69	Detection value of excessive speed deviation	0.0 to 50.0%(maximum frequency)	20.0 percent	☆
P9-70	Excessive speed deviation detection time	0.0s: do not detect 0.1~60.0s	5.0s	☆
P9-71	Transient stop gain Kp	0 to 100	80	☆
P9-72	Instantaneous non-stop integral coefficient Ki	0 to 100	20	☆
P9-73	Instant stop non-stop action deceleration time	0~300.0s	0.1s	★
PA group PID function				
PA-00	PID given source selection	0:PA-01 setting 1:AI1 2:AI2 3:AI3 (function expansion card) 4: High-speed pulse input setting (S5) 5: communication given (terminal RS485) 6: Multi-segment instruction given 7: extended communication given (bus expansion card)	0	☆
PA-01	PID value given	0.0-100.0%	50.0 percent	☆
PA-02	PID Feedback Source Selection	0:AI1 1:AI2 2:AI3 (function expansion card) 3:AI1-AI2	0	☆

Function code	Name	Setting range	Factory Value	Change
		4: High-speed pulse input setting (S5) 5: communication given (terminal RS485) 6:AI1 + AI2 7:MAX(|AI1|,|AI2|) 8:MIN(|AI1|,|AI2|) 9: extended communication given (bus expansion card)		
PA-03	PID action direction	0: positive effect 1: The reaction	0	☆
PA-04	PID given feedback range	0 to 65535	1000	☆
PA-05	Proportional gain KP1	0.0~100.0	20.0	☆
PA-06	Integration time Ti1	0.01s ~ 10.00s	2.00s	☆
PA-07	Differential time Td1	0.000s ~ 10.000s	0.000s	☆
PA-08	PID Inverted Cut-off Frequency	0.00 ~ maximum frequency (P0-10)	0.00Hz	☆
PA-09	PID deviation limit	0.0-100.0%	0.0 percent	☆
PA-10	PID Differential Limiting	0.00-100.00%	0.10 percent	☆
PA-11	PID given change time	0.00~650.00s	0.00s	☆
PA-12	PID feedback filtering time	0.00~60.00s	0.00s	☆
PA-13	PID output filter time	0.00~60.00s	0.00s	☆
PA-14	Retention	-	-	☆
PA-15	Proportional gain KP2	0.0~1000.0	20.0	☆
PA-16	Integration time Ti2	0.01s ~ 10.00s	2.00s	☆
PA-17	Differential time Td2	0.000s ~ 10.000s	0.000s	☆
PA-18	PID parameter switching condition	0: Do not switch 1: Switch via S terminal 2: Automatic switching according to deviation 3: Automatic switching according to the operating frequency	0	☆
PA-19	PID parameter switching deviation 1	0.0%~ PA-20	20.0 percent	☆
PA-20	PID parameter switching deviation 2	PA-19 ~ 100.0%	80.0 percent	☆
PA-21	PID initial value	0.0-100.0%	0.0 percent	☆
PA-22	PID initial value holding time	0.00~650.00s	0.00s	☆
PA-23	Maximum positive value of two output deviations	0.00-100.00%	1.00 percent	☆
PA-24	Maximum value of two reverse output deviations	0.00-100.00%	1.00 percent	☆
PA-25	PID Integral Properties	Bits: Integral Separation 0: invalid 1: Effective Ten bits: whether to stop integration after output to limit	00	☆

Function code	Name	Setting range	Factory Value	Change
		0: Continue integration 1: Stop Integral		
PA-26	PID feedback loss detection value	0.0%: Do not judge that feedback is lost 0.1-100.0%	0.0 percent	☆
PA-27	PID feedback loss detection time	0.0s ~ 20.0s	0.0s	☆
PA-28	PID shutdown operation	0: stop without 1: Calculation operation during shutdown	0	☆
PB group Pendulum frequency, fixed length and counting				
Pb-00	Pendulum frequency setting mode	0: Relative to center frequency 1: Relative to the maximum frequency	0	☆
Pb-01	swing frequency amplitude	0.0-100.0%	0.0 percent	☆
Pb-02	Sudden jump frequency amplitude	0.0-50.0%	0.0 percent	☆
Pb-03	Pendulum period	0.1s ~ 3000.0s	10.0s	☆
Pb-04	swing frequency triangle wave rise time	0.1-100.0%	50.0 percent	☆
Pb-05	Set Length	0m ~ 65535m	1000m	☆
Pb-06	Actual length	0m ~ 65535m	0m	☆
Pb-07	Number of pulses per meter	0.1~6553.5	100.0	☆
Pb-08	Set count value	1 to 65535	1000	☆
Pb-09	Specify Count Value	1 to 65535	1000	☆
PC group multi-segment instructions, simple PLC				
PC-00	Multi-Segment Instruction 0	-100.0% to 100.0%	0.0 percent	☆
PC-01	Multi-Segment Command 1	-100.0% to 100.0%	0.0 percent	☆
PC-02	Multi-Segment Command 2	-100.0% to 100.0%	0.0 percent	☆
PC-03	Multi-Segment Command 3	-100.0% to 100.0%	0.0 percent	☆
PC-04	Multi-Segment Command 4	-100.0% to 100.0%	0.0 percent	☆
PC-05	Multi-Segment Command 5	-100.0% to 100.0%	0.0 percent	☆
PC-06	Multi-Segment Instruction 6	-100.0% to 100.0%	0.0 percent	☆
PC-07	Multi-Segment Instruction 7	-100.0% to 100.0%	0.0 percent	☆
PC-08	Multi-Segment Command 8	-100.0% to 100.0%	0.0 percent	☆
PC-09	Multi-Segment Instruction 9	-100.0% to 100.0%	0.0 percent	☆
PC-10	Multi-Segment Command 10	-100.0% to 100.0%	0.0 percent	☆
PC-11	Multi-Segment Command 11	-100.0% to 100.0%	0.0 percent	☆
PC-12	Multi-Segment Instruction 12	-100.0% to 100.0%	0.0 percent	☆
PC-13	Multi-Segment Directive 13	-100.0% to 100.0%	0.0 percent	☆
PC-14	Multi-Segment Instruction 14	-100.0% to 100.0%	0.0 percent	☆
PC-15	Multi-Segment Instruction 15	-100.0% to 100.0%	0.0 percent	☆

Function code	Name	Setting range	Factory Value	Change
PC-16	Simple PLC operation mode	0: End of single operation and shutdown 1: Maintain final value at the end of a single run 2: Always cycle	0	☆
PC-17	Simple PLC power-down memory selection	Bit: power-down memory selection 0: power failure does not remember 1: Power-down memory Ten: stop memory selection 0: shutdown without memory 1: Shutdown memory	00	☆
PC-18	Simple PLC segment 0 operation time	0.0s(h)~6500.0s(h)	0.0s(h)	☆
PC-19	Simple PLC Section 0 Acceleration and Deceleration Time Selection	0 to 3	0	☆
PC-20	Simple PLC Section 1 Operation Time	0.0s(h)~6500.0s(h)	0.0s(h)	☆
PC-21	Simple PLC first acceleration and deceleration time selection	0 to 3	0	☆
PC-22	Simple PLC Section 2 Operation Time	0.0s(h)~6500.0s(h)	0.0s(h)	☆
PC-23	Simple PLC Section 2 Acceleration and Deceleration Time Selection	0 to 3	0	☆
PC-24	Simple PLC Section 3 Operation Time	0.0s(h)~6500.0s(h)	0.0s(h)	☆
PC-25	Simple PLC 3rd Acceleration and Deceleration Time Selection	0 to 3	0	☆
PC-26	Simple PLC Section 4 Operation Time	0.0s(h)~6500.0s(h)	0.0s(h)	☆
PC-27	Simple PLC Section 4 Acceleration and Deceleration Time Selection	0 to 3	0	☆
PC-28	Simple PLC Section 5 Operation Time	0.0s(h)~6500.0s(h)	0.0s(h)	☆
PC-29	Simple PLC Section 5 Acceleration and Deceleration Time Selection	0 to 3	0	☆
PC-30	Simple PLC Section 6 Running Time	0.0s(h)~6500.0s(h)	0.0s(h)	☆
PC-31	Simple PLC Section 6 Acceleration and Deceleration Time Selection	0 to 3	0	☆
PC-32	Simple PLC Section 7 Operating Time	0.0s(h)~6500.0s(h)	0.0s(h)	☆
PC-33	Simple PLC Section 7 Acceleration and Deceleration Time Selection	0 to 3	0	☆
PC-34	Simple PLC Section 8 Operation Time	0.0s(h)~6500.0s(h)	0.0s(h)	☆
PC-35	Simple PLC Section 8 Acceleration and Deceleration Time Selection	0 to 3	0	☆
PC-36	Simple PLC Section 9 Running Time	0.0s(h)~6500.0s(h)	0.0s(h)	☆
PC-37	Simple PLC 9th Acceleration	0 to 3	0	☆

Function code	Name	Setting range	Factory Value	Change
	and Deceleration Time Selection			
PC-38	Simple PLC Section 10 Operating Time	0.0s(h)~6500.0s(h)	0.0s(h)	☆
PC-39	Simple PLC 10th acceleration and deceleration time selection	0 to 3	0	☆
PC-40	Simple PLC Section 11 Operation Time	0.0s(h)~6500.0s(h)	0.0s(h)	☆
PC-41	Simple PLC 11th Acceleration and Deceleration Time Selection	0 to 3	0	☆
PC-42	Simple PLC Section 12 Operation Time	0.0s(h)~6500.0s(h)	0.0s(h)	☆
PC-43	Simple PLC 12 acceleration and deceleration time selection	0 to 3	0	☆
PC-44	Simple PLC Section 13 Operation Time	0.0s(h)~6500.0s(h)	0.0s(h)	☆
PC-45	Simple PLC 13th acceleration and deceleration time selection	0 to 3	0	☆
PC-46	Simple PLC Section 14 Operating Time	0.0s(h)~6500.0s(h)	0.0s(h)	☆
PC-47	Simple PLC 14th acceleration and deceleration time selection	0 to 3	0	☆
PC-48	Simple PLC Section 15 Operating Time	0.0s(h)~6500.0s(h)	0.0s(h)	☆
PC-49	Simple PLC 15th segment acceleration and deceleration time selection	0 to 3	0	☆
PC-50	Simple PLC operation time unit	0:s (seconds) 1:h (hours)	0	☆
PC-51	Multi-segment instruction 0 given method	0: function code PC-00 given 1:AI1 2:AI2 3:AI3 (function expansion card) 4: High-speed pulse input 5:PID 6: preset frequency (P0-08) given, UP/DOWN can be modified	0	☆
PD group communication parameters				
Pd-00	Universal Baud Rate Setting	Bits: MODBUS (terminal RS485) 0:300BPS 1:600BPS 2:1200BPS 3:2400BPS 4:4800BPS 5:9600BPS 6:19200BPS 7:38400BPS 8:57600BPS 9:115200BPS Ten: Reserved Hundred: Reserved Thousands: CAN (Bus Expansion Card) 0:20k 1:50K 2:100K 3:125K 4:250K 5:500K 6:1M	5005	☆

Function code	Name	Setting range	Factory Value	Change
Pd-01	MODBUS data format (terminal RS485)	0: No verification (8-N-2) 1: Even check (8-E-1) 2: odd check (8-O-1) 3: No verification (8-N-1)	3	☆
Pd-02	Local address (terminal RS485)	0: broadcast address 1~247	1	☆
Pd-03	MODBUS response delay (terminal RS485)	0ms -20ms	2	☆
Pd-04	Serial communication timeout (terminal RS485)	0.0: Invalid 0.1s ~ 60.0s	0.0	☆
Pd-05	Data transfer format selection (terminal RS485)	Bits: MODBUS 0: Non-standard MODBUS protocol 1: Standard MODBUS protocol Ten: Reserved	31	☆
Pd-06	Communication read current resolution (terminal RS485)	0:0.01A (valid when ≤ 55kW) 1:0.1A	0	☆
Pd-08	Bus extension card interrupt detection time	0.0: Invalid 0.1s ~ 60.0s	0.0	☆
Pd-10	Debug Communication Baud Rate Settings	5:9600BPS 6:19200BPS 7:38400BPS 8:57600BPS 9:115200BPS	6	☆
Pd-11	Data format of debugging communication	0: No verification (8-N-2) 1: Even check (8-E-1) 2: odd check (8-O-1) 3: No verification (8-N-1)	3	☆
Pd-12	Local address of debugging communication	1 to 247	1	☆
Pd-13	Debugging Communication Response Delay	0ms -20ms	2	☆
Pd-14	Debug Communication Timeout	0.0: Invalid 0.1s ~ 60.0s	0.0	☆
Pd-15	Baud Rate Setting for Internal Communication of Bus Expansion Card	5:9600BPS 6:19200BPS 7:38400BPS 8:57600BPS 9:115200BPS	9	☆
Pd-16	Data format for intra-pair communication of bus expansion card	0: No verification (8-N-2) 1: Even check (8-E-1) 2: odd check (8-O-1) 3: No verification (8-N-1)	3	☆
Pd-17	Bus expansion card internal communication local address	1 to 247	1	☆
Pd-18	Bus Expansion Card Intercommunication Response Delay	0ms -20ms	2	☆
Pd-19	Bus Expansion Card Intercommunication Timeout	0.0: Invalid 0.1s ~ 60.0s	0.0	☆
PE group user customized function code, bus expansion PZD				
PE-00	User function code 0 (PZD1 receive)	P0-00 ~ PP-xx A0-00 ~ Ax-xx	d3-17	☆

Function code	Name	Setting range	Factory Value	Change
PE-01	User function code 1 (PZD2 receive)	d0-00 ~ d0-xx d3-00 ~ d3-xx	d3-18	☆
PE-02	User function code 2 (PZD3 receive)		P0.00	☆
PE-03	User function code 3 (PZD4 receive)		P0.00	☆
PE-04	User function code 4 (PZD5 receive)		P0.00	☆
PE-05	User function code 5 (PZD6 receive)		P0.00	☆
PE-06	User function code 6 (PZD7 receive)		P0.00	☆
PE-07	User function code 7 (PZD8 receive)		P0.00	☆
PE-08	User function code 8 (PZD9 receive)		P0.00	☆
PE-09	User function code 9 (PZD10 receive)		P0.00	☆
PE-10	User function code 10 (PZD11 receive)		P0.00	☆
PE-11	User function code 11 (PZD12 receive)		P0.00	☆
PE-12	User function code 12		P0.00	☆
PE-13	User function code 13		P0.00	☆
PE-14	User function code 14		P0.00	☆
PE-15	User function code 15		P0.00	☆
PE-16	User function code 16		P0.00	☆
PE-17	User function code 17		P0.00	☆
PE-18	User function code 18		P0.00	☆
PE-19	User function code 19		P0.00	☆
PE-20	User function code 20 (PZD1 send)		d0-68	☆
PE-21	User function code 21 (PZD2 send)		d0-69	☆
PE-22	User function code 22 (PZD3 send)		P0.00	☆
PE-23	User function code 23 (PZD4 send)		P0.00	☆
PE-24	User function code 24 (PZD5 send)		P0.00	☆
PE-25	User function code 25 (PZD6 send)		P0.00	☆
PE-26	User function code 26 (PZD7 send)		P0.00	☆
PE-27	User function code 27 (PZD8 send)		P0.00	☆
PE-28	User function code 28 (PZD9 send)		P0.00	☆

Function code	Name	Setting range	Factory Value	Change
PE-29	User function code 29 (PZD10 send)		P0.00	☆
PE-30	User function code 30 (PZD11 send)		P0.00	☆
PE-31	User function code 31 (PZD12 send)		P0.00	☆
PP group function code management				
PP-00	User Password	0 to 65535	0	☆
PP-01	Parameter initialization	0: No action 01: Restore factory parameters, excluding motor parameters 02: Clear Record Information 04: Backup User's Current Parameters 501: Restore current user parameters	0	☆
PP-02	Function parameter group display selection	Bit: d group display selection 0: do not display; 1: display Ten: Group A Display Selection 0: do not display; 1: display	11	★
PP-04	Function code modification attribute	0: modifiable 1: Not modifiable	0	☆
A0 group torque control parameters				
A0-00	Speed/torque control mode selection	0: Speed control 1: Torque control	0	★
A0-01	Torque setting selection in torque control mode	0: Number set 1(A0-03) 1:AI1 2:AI2 3:AI3 (function expansion card) 4: High-speed pulse input (S5) 5: communication given (terminal RS485) 6:MIN(AI1,AI2) 7:MAX(AI1,AI2) 8: extended communication given (bus expansion card) Full scale of 1-8 options, corresponding to A0-03 digital setting	0	★
A0-03	Torque digital setting in torque control mode	-200.0% to 200.0%	150.0 percent	☆
A0-05	Torque control forward maximum frequency	0.00Hz ~ maximum frequency (P0-10)	50.00Hz	☆
A0-06	Torque control reverse maximum frequency	0.00Hz ~ maximum frequency (P0-10)	50.00Hz	☆
A0-07	Torque rise filter time	0.00s ~ 65000s	0.00s	☆
A0-08	Torque drop filter time	0.00s ~ 65000s	0.00s	☆
A1 group virtual DI, virtual DO group				
A1-00	VDI1 terminal function selection	0: No function 1: Forward rotation operation (FWD) or operation instruction 2: Reverse running (REV) or positive and negative running direction (Note: Set 1 and 2 to be used in	0	★
A1-01	VDI2 terminal function selection		0	★
A1-02	VDI3 terminal function selection		0	★

Function code	Name	Setting range	Factory Value	Change
A1-03	VDI4 terminal function selection	conjunction with the P4-11) 3: Three-wire operation control	0	★
A1-04	VDI5 terminal function selection	4: forward rotation jog (FJOG) 5: Reverse jog (RJOG) 6: Terminal UP 7: Terminal DOWN 8: Free Parking 9: fault reset (RESET) 10: Run pause 11: External fault normally open input 12: Multi-segment command terminal 1 13: Multi-segment command terminal 2 14: Multi-segment command terminal 3 15: Multi-segment command terminal 4 16: acceleration and deceleration time selection terminal 1 17: acceleration and deceleration time selection terminal 2 18: Frequency command switching 19:UP/DOWN setting clear (terminal, keyboard) 20: control command switching terminal 1 21: acceleration and deceleration prohibition 22:PID Pause 23: Simple PLC status reset 24: Pause of swing frequency 25: Counter input 26: Counter Reset 27: Length count input 28: Length reset 29: Torque control prohibition 30: High-speed pulse input (only valid for S5) 31: Reserved 32: Immediate DC braking 33: External fault normally closed input 34: Frequency Modification enable 35:PID action direction is reversed 36: External parking terminal 1 37: Control command switching terminal 2 38:PID integration pause 39: Frequency source A and preset frequency switching 40: Frequency source B and preset frequency switching 41: motor terminal selection function 42: Reserved 43:PID parameter switching 44: User-defined fault 1 45: User-defined fault 2 46: Speed control/torque control switching 47: Emergency stop 48: External parking terminal 2 49: DC brake deceleration	0	★

Function code	Name	Setting range	Factory Value	Change
		50: The running time is cleared 51: Two-wire/three-wire switching 52: Reverse frequency prohibited 53-59: Reserved		
A1-05	VDI terminal status setting mode	Bits: VDI1 0: Function code setting (A1.06, and binding with VDO1) 1:DO Status 2:DI Status Ten: VDI2 0: Function code setting (A1.06, and binding with VDO2) 1:DO Status 2:DI Status Hundred bits: VDI3 0: Function code setting (A1.06, and binding with VDO3) 1:DO Status 2:DI Status Thousands: VDI4 0: Function code setting (A1.06 and binding with VDO4) 1:DO Status 2:DI Status Ten thousand: VDI5 0: Function code setting (A1.06 and binding with VDO5) 1:DO Status 2:DI Status	00000	★
A1-06	Virtual VDI terminal status settings	00000~11111	0	★
A1-07	AI1 terminal function selection (as DI)	Same A1-00	0	★
A1-08	AI2 terminal function selection (as DI)	Same A1-00	0	★
A1-09	AI3 terminal function selection (as DI)	Same A1-00	0	★
A1-10	AI as DI Valid State Selection	Bits: AI1 0: active high 1: active low level Ten: AI2 0: active high 1: active low level Hundred: AI3 0: active high 1: active low level	0	★
A1-11	VDO1 Output Function Selection	0: No output 1: inverter in operation 2: fault output (fault shutdown) 3: Frequency level detection FDT1 output	0	☆
A1-12	VDO2 output function selection		0	☆

Function code	Name	Setting range	Factory Value	Change
A1-13	VDO3 Output Function Selection	4: Frequency Arrival 5: zero speed operation (no output when shutdown) 6: motor overload pre-alarm 7: inverter overload pre-alarm 8: Set the recorded value to reach 9: Specify the value to reach 10: Length to reach 11:PLC cycle completed 12: Accumulated running time arrives 13: Frequency Limiting 14: Torque Limiting 15: Ready to run 16:AI1>AI2 17: Upper limit frequency reached 18: Lower limit frequency reached (operation related) 19: Undervoltage state output 20: communication settings (terminal RS485 or bus expansion card) 21: Positioning complete (reserved) 22: Positioning Approaching (Reserved) 23: 2 in zero speed operation (output when shutdown) 24: Accumulated power-on time arrives 25: Frequency level detection FDT2 output 26: Frequency 1 reaches output 27: Frequency 2 reaches output 28: Current 1 reaches output 29: Current 2 reaches output 30: Timed arrival output 31:AI1 input overrun 32: Under load 33: Reverse operation 34: Zero Current State 35: Module temperature reaches 36: Output current overrun 37: lower limit frequency reached (stop also output) 38: alarm output (continue to run) 39: Motor over-temperature pre-alarm 40: this run time to arrive 41: fault output (for free stop fault), and undervoltage does not output	0	☆
A1-14	VDO4 Output Function Selection		-	☆
A1-15	VDO5 Output Function Selection		-	☆
A1-16	VDO1 output delay time	0.0s ~ 3600.0s	0.0s	☆
A1-17	VDO2 output delay time	0.0s ~ 3600.0s	0.0s	☆
A1-18	VDO3 output delay time	0.0s ~ 3600.0s	0.0s	☆
A1-19	VDO4 output delay time	0.0s ~ 3600.0s	0.0s	☆
A1-20	VDO5 output delay time	0.0s ~ 3600.0s	0.0s	☆

Function code	Name	Setting range	Factory Value	Change
A1-21	VDO output terminal valid state selection	0: Positive logic 1: Anti-Logic Bits: VDO1 Ten: VDO2 Hundred: VDO3 Thousands: VDO4 million: VDO5	00000	☆
A2 group second motor control				
A2-00	Motor 2 Type Selection	0: Ordinary asynchronous motor 1: variable frequency asynchronous motor 2: permanent magnet synchronous motor	0	★
A2-01	Motor 2 rated power	0.1kW ~ 1000.0kW	Model Determination	★
A2-02	Rated voltage of motor 2	1V ~ 2000V	Model Determination	★
A2-03	Rated current of motor 2	0.1A ~ 6553.5A	Model Determination	★
A2-04	Rated frequency of motor 2	0.01Hz ~ maximum frequency (P0-10)	Model Determination	★
A2-05	Motor 2 rated speed	1rpm ~ 65535rpm	Model Determination	★
A2-06	Stator resistance of asynchronous motor 2	0.0001Ω ~ 65.5350Ω	Model Determination	★
A2-07	Rotor resistance of asynchronous motor 2	0.0001Ω ~ 65.5350Ω	Model Determination	★
A2-08	Inductive leakage reactance of asynchronous motor 2	0.001mH ~ 655.350mH	Model Determination	★
A2-09	Asynchronous motor 2 mutual inductance	0.01mH ~ 6553.50mH	Model Determination	★
A2-10	No-load current of asynchronous motor 2	0.1A ~ A2-03	Model Determination	★
A2-16	Stator resistance of synchronous motor 2	0.001 Ω ~ 65.535 Ω (Drive power ≤ 55kW) 0.0001 Ω ~ 6.5535 Ω (Drive power> 55kW)	self-learning parameters	★
A2-17	Synchronous motor 2D axis inductance	0.01mH ~ 655.35mH (Drive power ≤ 55kW) 0.001mH ~ 65.535mH (Drive power> 55kW)	self-learning parameters	★
A2-18	Synchronous motor 2Q axis inductance	0.01mH ~ 655.35mH (Drive power ≤ 55kW)	self-learning	★

Function code	Name	Setting range	Factory Value	Change
		0.001mH ~ 65.535mH (Drive power> 55kW)	parameters	
A2-20	Back electromotive force coefficient of synchronous motor	0.1V ~ 6553.5V	self-learning parameters	★
A2-27	Number of encoder lines	1 to 65535	1024	★
A2-28	Encoder Type	0:ABZ Incremental Encoder 1:UVW encoder 2: Resolver	0	★
A2-29	Speed Feedback PG Select	0: Local PG 1: Extended PG (Reserved) 2: High-speed pulse input (S5)	0	★
A2-30	ABZ incremental encoder AB phase sequence	0: Forward 1: Reverse	0	★
A2-31	Encoder mounting angle	0.0 to 359.9 °	0.0 °	★
A2-32	UVW encoder UVW phase sequence	0: Forward 1: Reverse	0	★
A2-34	resolver pole number	1 to 65535	1	★
A2-36	Speed feedback PG disconnection detection time	0.0: no action 0.1s ~ 10.0s	0.0	★
A2-37	Self-learning selection	0: No action 1: Asynchronous machine static part parameter self-learning 2: Asynchronous machine dynamic complete self-learning 3: Asynchronous machine static complete self-learning 11: Synchronous on-board self-learning 12: synchronous machine no-load self-learning	0	★
A2-38	Speed Loop Proportional Gain 1	1 to 100	30	☆
A2-39	Velocity loop integration time 1	0.01s ~ 10.00s	0.50s	☆
A2-40	Toggle Low Point Frequency 1	0.00-A2-43	5.00Hz	☆
A2-41	Speed Loop Proportional Gain 2	1 to 100	10	☆
A2-42	Velocity Loop Integration Time 2	0.01s ~ 10.00s	1.00s	☆
A2-43	Toggle High Point Frequency 2	A2-40 ~ Maximum Frequency (P0-10)	10.00Hz	☆
A2-44	vector control slip gain	50% to 200%	100 percent	☆
A2-45	SVC torque filter constant	0.000s ~ 0.100s	0.015s	☆
A2-47	Upper Torque Limit Source in Speed Control Mode	0:A2-48 setting 1:AI1 2:AI2 3:AI3 (function expansion card) 4: High-speed pulse input (S5) 5: communication given (terminal RS485)	0	☆

Function code	Name	Setting range	Factory Value	Change
		6:MIN(AI1,AI2) 7:MAX(AI1,AI2) 8: extended communication given (bus expansion card) Full scale of 1-8 options, corresponding to A2-48 digital setting		
A2-48	Digital setting of torque upper limit in speed control mode	0.0-200.0%	150.0 percent	☆
A2-49	Torque upper limit command in speed control mode Select (Generation)	0: Function code A2-50 setting 1:AI1 2:AI2 3:AI3 (function expansion card) 4: High-speed pulse input setting (S5) 5: communication given (terminal RS485) 6:MIN(AI1,AI2) 7:MAX(AI1,AI2) 8: extended communication given (bus expansion card) Full scale of 1-8 options, corresponding to P2-12 digital setting	0	☆
A2-50	Upper Torque Limit Figures in Speed Control Mode Setting (Generation)	0.0-200.0%	150.0 percent	☆
A2-51	Proportional gain of excitation regulation	0 to 60000	2000	☆
A2-52	integral gain of excitation regulation	0 to 60000	1300	☆
A2-53	torque adjustment proportional gain	0 to 60000	2000	☆
A2-54	torque regulation integral gain	0 to 60000	1300	☆
A2-55	Velocity Loop Integral attribute	Bits: Integral Separation 0: invalid 1: Effective	0	☆
A2-56	Synchronous machine flux weakening mode	0: not weak magnetic 1: Automatic adjustment mode 2: calculation + automatic adjustment comprehensive mode	1	☆
A2-57	field weakening gain of synchronous machine	0 to 50	5	☆
A2-58	Synchronous machine maximum flux weakening current	0 to 300%	50%	☆
A2-59	Maximum torque coefficient in flux weakening region	50% to 200%	100 percent	☆
A2-60	Generation Power Limit enable	0: invalid 1: Effective	0	☆
A2-61	2nd Motor Speed Control Mode	0: Speed sensorless vector control (SVC) 1: Vector control with speed sensor (FVC) 2:V/F control	2	★
A2-62	Second motor acceleration and deceleration time selection	0: Same as motor 1 2: acceleration and deceleration time 2 3: acceleration and deceleration time 3	0	☆

Function code	Name	Setting range	Factory Value	Change
		4: acceleration and deceleration time 4		
A2-63	2nd motor torque boost	0.0%: automatic torque boost 0.1-30.0%	Model Determination	☆
A2-65	2nd motor oscillation suppression gain	0 to 100	40	☆
A2-66	Synchronous machine output voltage upper limit margin	0% to 50%	5%	☆
A2-67	Synchronous machine initial position angle detection current	50% to 180%	80%	☆
A2-68	Synchronous machine initial position angle detection	0: Detecting Every Run 1: Do not detect 2: Power-on first operation test	0	☆
A2-70	Synchronous machine saliency adjustment gain	50 to 500	100	☆
A2-71	Maximum torque to current ratio control	0: Open 1: Not open.	0	☆
A2-75	Z signal correction	0: Not open 1: Open	1	☆
A2-79	low-speed excitation current	0-80%	30%	☆
A2-80	low speed carrier frequency	0.8K ~ P0-15	1.5KHz	☆
A2-81	SVC low-frequency braking mode	0: No low frequency braking 1: the use of low frequency braking	0	☆
A2-82	SVC Low Frequency Braking Effective Mode	0 to 10.00Hz	2.00Hz	☆
A2-83	SVC low frequency braking frequency change step	0.0005~1.0000Hz	0.0010Hz	☆
A2-84	SVC low-frequency braking current	0-80%	50%	☆
A2-85	Synchronous machine SVC speed tracking	0: Not enabled 1: enable	0	☆
A2-86	Zero servo enable	0: Not enabled 1: enable	0	☆
A2-87	Switching frequency	0.00-F2-02	0.00Hz	☆
A2-88	Zero servo velocity loop proportional gain	1 to 100	10	☆
A2-89	Zero servo velocity loop integration time	0.01s ~ 10.00s	0.50s	☆
A2-90	Stop anti-reverse enable	0: Not enabled 1: enable	0	☆
A2-91	Shutdown angle	0.0 °~ 10.0 °	0.8 °	☆
A3 group dedicated parameter group for photovoltaic water lifting				
A3-00	Photovoltaic system starting voltage	200.0V ~ 800.0V 220V:350.0V 380V:600V	Model Determination	☆
A3-01	Photovoltaic start-up delay time	0~100S	10s	☆
A3-02	Shutdown voltage of photovoltaic system	100.0V ~ 600.0V 220V:350.0V 380V:600.0V	Model Determination	☆

Function code	Name	Setting range	Factory Value	Change
A3-03	Photovoltaic overvoltage	100.0V ~ 800.0V 220V:420.0V 380V:800.0V		☆
A3-04	Photovoltaic overvoltage recovery voltage	100.0V ~ 800.0V 220V:400.0V 380V:780.0V	Model Determination	☆
A3-05	PV proportional gain 1	1 to 5000	1000	☆
A3-06	PV integral gain 1	1 to 1000	200	☆
A3-07	PV proportional gain 2	1 to 5000	1000	☆
A3-08	PV integral gain 2	1 to 1000	200	☆
A3-09	PV control switching voltage point	100.0V ~ 800.0V 220V:300.0V 380V:500.0V	Model Determination	☆
A3-10	Photovoltaic minimum input voltage	100.0V ~ 800.0V 220V:200.0V 380V:450.0V	Model Determination	☆
A3-11	photovoltaic open circuit voltage	100.0V ~ 800.0V 220V:400.0V 380V:700.0V	Model Determination	☆
A3-12	Water level signal selection	0: Do not detect 1: Terminal function test 2: Analog quantity AI1 3: Analog AI2 4: Analog quantity AI3	0	☆
A3-13	Full water signal value	0.0-100.0%	25.0 percent	☆
A3-14	Water shortage signal value	0.0-100.0%	90.0 percent	☆
A3-15	Full water delay	0~1000S	10s	☆
A3-16	Full water fault reset delay	0~1000S	20s	☆
A3-17	Water shortage delay	0~1000S	10s	☆
A3-18	Water shortage fault reset delay	0~1000S	20s	☆
A3-19	Dry pumping operation detection value	1 to 100	0	☆
A3-20	Dry pumping protection delay time	0s ~ 1000s	60s	☆
A3-21	Dry pumping reset delay time	0s ~ 1000s	180s.	☆
A3-22	mppt adjust step time	0.1s ~ 5.0s	20	☆
A3-23	mppt regulated maximum voltage	80.0-100.0%	85.0 percent	☆
A3-24	mppt step regulated voltage	1.0V ~ 50.0V 220V:3.0V 380V:5.0V	Model Determination	☆
A4 group bus expansion card configuration parameters				
A4-00	BACnet MSTP Native Device Address	1-247	1	☆
A4-01	BACnet MSTP Communication Mode Selection	1: Select the A4-02 (set the baud rate of BACnet MSTP) is valid	1	☆
A4-02	Baud rate of BACnet MSTP	0:9600BPS 3:57600BPS 1:19200BPS 4:76800BPS	2	☆

Function code	Name	Setting range	Factory Value	Change
		2:38400BPS 5:115200BPS		
A4-03	BACnet MSTP Communication Timeout	0.0: Invalid 0.1s ~ 60.0s	0.0	☆
A4-20	Bus expansion card Ethernet IP address 1	0~255 (modification takes effect after restart)	192	☆
A4-21	Bus expansion card Ethernet IP address 2	0~255 (modification takes effect after restart)	168	☆
A4-22	Bus expansion card Ethernet IP address 3	0~255 (modification takes effect after restart)	0	☆
A4-23	Bus expansion card Ethernet IP address 4	0~255 (modification takes effect after restart)	20	☆
A4-24	Bus Expansion Card Ethernet Subnet Mask 1	0~255 (modification takes effect after restart)	255	☆
A4-25	Bus Expansion Card Ethernet Subnet Mask 2	0~255 (modification takes effect after restart)	255	☆
A4-26	Bus Expansion Card Ethernet Subnet Mask 3	0~255 (modification takes effect after restart)	255	☆
A4-27	Bus Expansion Card Ethernet Subnet Mask 4	0~255 (modification takes effect after restart)	0	☆
A4-28	Bus Expansion Card Ethernet Gateway 1	0~255 (modification takes effect after restart)	192	☆
A4-29	Bus Expansion Card Ethernet Gateway 2	0~255 (modification takes effect after restart)	168	☆
A4-30	Bus Expansion Card Ethernet Gateway 3	0~255 (modification takes effect after restart)	0	☆
A4-31	Bus Expansion Card Ethernet Gateway 4	0~255 (modification takes effect after restart)	1	☆
A4-32	Bus Expansion Card Ethernet MAC Address High Byte	0~0xFFFF (changes take effect after restart)	0	☆
A4-33	Bus Expansion Card Ethernet MAC Address Middle Byte	0~0xFFFF (changes take effect after restart)	0	☆
A4-34	Bus Expansion Card Ethernet MAC Address Low Byte	0~0xFFFF (changes take effect after restart)	0	☆
A4-35	Bus expansion card Ethernet communication timeout	0.0: Invalid 0.1s ~ 60.0s	0.0s	☆
A5 group control optimization parameters				
A5-00	DPWM switching upper limit frequency	5.00Hz ~ Maximum Frequency (P0-10)	8.00Hz	☆
A5-01	PWM modulation mode	0: Asynchronous 1: synchronous modulation	0	☆
A5-02	Deadband Compensation Mode Selection	0: No compensation 1: Compensation Mode 1	1	☆
A5-03	Random PWM Depth	0: Random PWM is invalid 1~10:PWM carrier frequency random depth	0	☆
A5-04	Fast Current Limit enable	0: Not enabled 1: enable	1	☆
A5-05	Maximum output voltage coefficient	100-120%	110 percent	★
A5-06	Undervoltage point setting	200.0~200.0V	Model Determination	☆

Function code	Name	Setting range	Factory Value	Change
A5-08	Dead Time Adjustment	100-200%	150 percent	★
A5-09	Overpressure point setting	650-820V	Model Determination	★
A6 group AI curve setting				
A6-00	AI curve 4 minimum input	-10.00V ~ A6-02	0.00V	☆
A6-01	AI curve 4 minimum input corresponding setting	-100.0% to +100.0%	0.0 percent	☆
A6-02	AI curve 4 inflection point 1 input	A6-00 ~ A6-04	3.00V	☆
A6-03	AI curve 4 inflection point 1 input corresponding setting	-100.0% to +100.0%	30.0 percent	☆
A6-04	AI curve 4 inflection point 2 input	A6-02 ~ A6-06	6.00V	☆
A6-05	AI curve 4 inflection point 2 input corresponding setting	-100.0% to +100.0%	60.0 percent	☆
A6-06	AI curve 4 maximum input	A6-04 ~ +10.00V	10.00V	☆
A6-07	AI curve 4 maximum input corresponding setting	-100.0% to +100.0%	100.0 percent	☆
A6-08	AI curve 5 minimum input	-10.00V ~ A6-10	-10.00V	☆
A6-09	AI Curve 5 Minimum Input Corresponding Setting	-100.0% to +100.0%	-100.0 percent	☆
A6-10	AI curve 5 inflection point 1 input	A6-08 ~ A6-12	-3.00V	☆
A6-11	AI curve 5 inflection point 1 input corresponding setting	-100.0% to +100.0%	-30.0 percent	☆
A6-12	AI curve 5 inflection point 2 input	A6-10 ~ A6-14	3.00V	☆
A6-13	AI curve 5 inflection point 2 input corresponding setting	-100.0% to +100.0%	30.0 percent	☆
A6-14	AI curve 5 maximum input	A6-12 ~ +10.00V	10.00V	☆
A6-15	AI Curve 5 Maximum Input Corresponding Setting	-100.0% to +100.0%	100.0 percent	☆
A6-24	AI1 Set Jump Point	-100.0% to +100.0%	0.0 percent	☆
A6-25	AI1 Set Jump Amplitude	0.0-100.0%	0.5 percent	☆
A6-26	AI2 Set jump point	-100.0% to +100.0%	0.0 percent	☆
A6-27	AI2 Set Jump Amplitude	0.0-100.0%	0.5 percent	☆
A6-28	AI3 Set Jump Point (Function Expansion Card)	-100.0% to +100.0%	0.0 percent	☆
A6-29	AI3 set jump amplitude (function expansion card)	0.0-100.0%	0.5 percent	☆
A8 group point-to-point communication				
A8-00	Point-to-point communication function selection	0: invalid 1: Effective	0	☆
A8-01	Master-slave selection	0: host 1: from the machine	0	☆

Function code	Name	Setting range	Factory Value	Change
A8-02	The slave command follows the master-slave information interaction	Bits: slave commands follow 0: The slave does not follow the host to run the command. 1: The slave follows the host to run the command. Ten bits: slave fault information transmission 0: slave fault information is not transmitted 1: slave fault information transmission 100: the host shows that the slave is disconnected. 0: slave dropped host does not report fault 1: slave dropped host reported fault	011	★
A8-03	Slight Receive Data Role Selection	0: given torque 1: frequency given	0	☆
A8-04	Receive data zero bias	-100.00% to 100.00%	0.00 percent	★
A8-05	Receive data gain	-10.00~10.00	1.00	★
A8-06	Point-to-point communication interruption detection time	0.0~10.0s	1.0s	☆
A8-07	Point-to-point communication host data transmission cycle	0.001~10.000s	0.001s	☆
A8-11	Main Frequency Control Inspection Frequency	0.2.~ 10.00Hz	0.5Hz	☆
AC group AIAO correction				
AC-00	AI1 Measured voltage 1	-10.00V ~ 10.000V	Factory Calibration	☆
AC-01	AI1 shows voltage 1	-10.00V ~ 10.000V	Factory Calibration	☆
AC-02	AI1 Measured Voltage 2	-10.00V ~ 10.000V	Factory Calibration	☆
AC-03	AI1 shows voltage 2	-10.00V ~ 10.000V	Factory Calibration	☆
AC-04	AI2 Measured voltage 1	-10.00V ~ 10.000V	Factory Calibration	☆
AC-05	AI2 Display Voltage 1	-10.00V ~ 10.000V	Factory Calibration	☆
AC-06	AI2 Measured voltage 2	-10.00V ~ 10.000V	Factory Calibration	☆
AC-07	AI2 Display Voltage 2	-10.00V ~ 10.000V	Factory Calibration	☆
AC-08	AI3 Measured Voltage 1 (Function Expansion Card)	-10.00V ~ 10.000V	Factory Calibration	☆
AC-09	AI3 Display Voltage 1 (Function Expansion Card)	-10.00V ~ 10.000V	Factory Calibration	☆
AC-10	AI3 Measured Voltage 2 (Function Expansion Card)	-10.00V ~ 10.000V	Factory Calibration	☆
AC-11	AI3 Display Voltage 2 (Function Expansion Card)	-10.00V ~ 10.000V	Factory Calibration	☆
AC-12	AO1 Target Voltage 1	-10.00V ~ 10.000V	Factory Calibration	☆
AC-13	AO1 Measured voltage 1	-10.00V ~ 10.000V	Factory Calibration	☆

Function code	Name	Setting range	Factory Value	Change
AC-14	AO1 Target Voltage 2	-10.00V ~ 10.000V	Factory Calibration	☆
AC-15	AO1 measured voltage 2	-10.00V ~ 10.000V	Factory Calibration	☆
AC-16	AO2 Target Voltage 1 (Function Expansion Card)	-10.00V ~ 10.000V	Factory Calibration	☆
AC-17	AO2 measured voltage 1 (function expansion card)	-10.00V ~ 10.000V	Factory Calibration	☆
AC-18	AO2 Target Voltage 2 (Function Expansion Card)	-10.00V ~ 10.000V	Factory Calibration	☆
AC-19	AO2 measured voltage 2 (function expansion card)	-10.00V ~ 10.000V	Factory Calibration	☆

5.2 Monitoring Parameters

Function code	Name	Minimum Unit	Correspondence Address
Group d0 basic monitoring parameters			
d0-00	Operating frequency (Hz)	0.01Hz	7000H
d0-01	Set frequency (Hz)	0.01Hz	7001H
d0-02	Bus voltage (V)	0.1V	7002H
d0-03	Output voltage (V)	1V	7003H
d0-04	Output current (A)	0.01A	7004H
d0-05	Output power (kW)	0.1kW	7005H
d0-06	Output torque (%)	0.1 percent	7006H
d0-07	S terminal input status	1	7007H
d0-08	HDO Output Status	1	7008H
d0-09	AI1 voltage (V)	0.01V	7009H
d0-10	AI2 Voltage (V)/Current (mA)	0.01V/0.01mA	700AH
d0-11	AI3 Voltage (V)(Function Expansion Card)	0.01V	700BH
d0-12	Count value	1	700CH
d0-13	Length value	1	700DH
d0-14	Load speed display	1	700EH
d0-15	PID setting	1	700FH
d0-16	PID feedback	1	7010H
d0-17	PLC Phase	1	7011H
d0-18	Input pulse frequency (Hz)	0.01kHz	7012H
d0-19	Feedback speed (Hz)	0.01Hz	7013H
d0-20	Remaining Running Time	0.1Min	7014H
d0-21	Voltage before AI1 correction	0.001V	7015H

Function code	Name	Minimum Unit	Correspondence Address
d0-22	Voltage (V)/Current (mA) before AI2 correction	0.001V/0.01mA	7016H
d0-23	AI3 Pre-Calibration Voltage (Function Expansion Card)	0.001V	7017H
d0-24	linear velocity	1m/Min	7018H
d0-25	Current power-on time	1Min	7019H
d0-26	Current Running Time	0.1Min	701AH
d0-27	High-speed pulse input frequency	1Hz	701BH
d0-28	Communication setting value	0.01 percent	701CH
d0-29	Encoder feedback speed	0.01Hz	701DH
d0-30	Main frequency A display	0.01Hz	701EH
d0-31	Secondary frequency B display	0.01Hz	701FH
d0-32	View arbitrary memory address values	1	7020H
d0-34	Motor temperature value	1 ℃	7022H
d0-35	Target torque (%)	0.1 percent	7023h
d0-36	Rotary position	1	7024H
d0-37	Power Factor Angle	0.1 °	7025H
d0-38	ABZ position	1	7026H
d0-39	V/F separation target voltage	1V	7027H
d0-40	V/F Split Output Voltage	1V	7028H
d0-41	Visual display of S input status	1	7029H
d0-42	Visual display of HDO input status	1	702AH
d0-43	Visual display of S function status 1 (function 01-40)	1	702BH
d0-44	S Function Status Visual Display 2 (Functions 41-80)	1	702CH
d0-45	Fault message	1	702DH
d0-58	Z signal counter	1	703AH
d0-59	Set frequency (%)	0.01 percent	703BH
d0-60	Operating frequency (%)	0.01 percent	703CH
d0-61	Converter status	1	703DH
d0-62	Current fault coding	1	703EH
d0-63	Point-to-point communication sending value	0.01 percent	703FH
d0-64	Point-to-Point Communication Received Value	1	7040H
d0-65	Torque upper limit	0.1 percent	7041H
d0-66	Bus Expansion Card Type	1	7042H

Function code	Name	Minimum Unit	Correspondence Address
d0-67	Bus expansion card software version	0.01	7043H
d0-68	Converter composite status (for bus expansion card)	1	7044H
d0-69	Frequency converter operating frequency (for bus expansion card)	0.01Hz	7045H
d0-70	Frequency converter operating speed (for bus expansion card)	1RPM	7046H
d0-71	Inverter output current (for bus expansion card)	0.1A	7047H
d0-73	Motor serial number	0: Motor 1 1: Motor 2	7049H
d0-74	Actual output torque of motor	-100~100%	704AH
Group d3 communication monitoring parameters			
d3-16	Communication given frequency value	0.01 percent	7310H
d3-17	Communication given run command value	1	7311H
d3-18	Communication control DO output value	1	7312H
d3-19	Communication control AO1 output value	1	7313H
d3-20	Communication control AO2 output (function expansion card)	1	7314H
d3-21	Communication control high-speed pulse output value	1	7315H
d3-22	COMMUNICATION CONTROL COMPOSITE COMMAND VALUE	1	7316H
d3-23	Communication given speed value	1	7317H

Chapter 6 Solar Water Pumping Function Description

6.1 Water Level Alarm Detection

Water level alarm detection is the core protection function of photovoltaic water lifting system to ensure safe operation, prevent waste of water resources and equipment damage. It mainly monitors the water level of reservoir and water source pool (well water, river water, etc.) in real time, and is divided into two scenarios: high water level alarm and low water level alarm, which are suitable for different operation requirements. The system collects the water level signal through the water level sensor (floating ball type, static pressure type, etc.). The water level signal detection method can be set through parameter A3-12 (water level signal selection), which can be 0 (no detection), 1 (terminal function detection), 2-4 (analog quantity AI1-AI3), and the default value is 0; the real-time water level data is compared with the preset high and low water level thresholds (corresponding parameters A3-13 full water signal value and A3-14 water shortage signal value) to achieve accurate alarm and linkage control.

When it is detected that the water level of the water source pool is lower than the preset low water level threshold (A3-14) and the duration reaches the set value of the parameter A3-17 (water shortage delay) (the adjustment range is 0~1000S, the default is 10S), the system determines that the water source is insufficient, immediately triggers the low water level alarm, and automatically cuts off the running power of the water pump to prevent the impeller wear and motor overheating and burning due to water shortage, the set time of the parameter A3-18 (water shortage fault reset delay) shall be met, the alarm shall be automatically released, and the system can resume operation manually or automatically. When it is detected that the water level of the reservoir is higher than the preset high water level threshold (A3-13) and the duration reaches the set value of the parameter A3-15 (full water delay), the high water level alarm will be triggered and the water supply by the pump will be stopped synchronously to avoid the waste of water resources caused by overflow of the reservoir; after the water level falls back to the normal range, the set time of the parameter A3-16 (full water fault reset delay) shall be met, the alarm shall be released and the system shall be restored.

A3-12	Water level signal selection	0: Do not detect 1: Terminal function test 2: Analog quantity AI1 3: Analog AI2 4: Analog quantity AI3	0	☆
A3-13	Full water signal value	0.0-100.0%	25.0 percent	☆
A3-14	Water shortage signal value	0.0-100.0%	90.0 percent	☆
A3-15	Full water delay	0~1000S	10s	☆
A3-16	Full water fault reset delay	0~1000S	20s	☆
A3-17	Water shortage delay	0~1000S	10s	☆
A3-18	Water shortage fault reset delay	0~1000S	20s	☆

6.2 PV Voltage Fault Detection

Photovoltaic voltage fault detection is mainly aimed at real-time monitoring of the output voltage of the photovoltaic module array, troubleshooting the problem of abnormal voltage on the photovoltaic side, ensuring the stability of system power generation and avoiding damage to the controller due to voltage fault. The system collects the input voltage, open circuit voltage (corresponding parameter A3-11), working voltage and other parameters of the photovoltaic array in real time, and compares them with the preset normal voltage range (determined according to the photovoltaic module specifications, system configuration and related parameters) to determine whether there is a voltage fault.

The photovoltaic voltage is too low. When it is detected that the photovoltaic input voltage is continuously lower than the parameter A3-10 (photovoltaic minimum input voltage) and the duration exceeds 1S, it is determined to be a photovoltaic voltage too low fault. The possible causes include photovoltaic module blocking, module aging, poor line contact, insufficient light intensity, etc. The system immediately stops the pump operation and triggers a fault alarm. The display screen indicates "photovoltaic voltage too low".

When it is detected that the photovoltaic open circuit voltage or working voltage is continuously higher than the parameter A3-03 (photovoltaic overvoltage), and the time exceeds 1S, it is determined that the photovoltaic voltage is too high fault. Possible reasons include too strong light, abnormal number of components in series, short circuit of lines, etc., to avoid damage to the controller due to voltage failure.

When the photovoltaic overvoltage fault is removed, the photovoltaic voltage falls back to the parameter A3-04 (photovoltaic overvoltage recovery voltage) and below, and after being stable for a period of time, the system can automatically reset and resume operation. In addition, the system photovoltaic start-up and stop voltage also need to follow the corresponding parameter setting, in which the parameter A3-00 (photovoltaic system start-up voltage) is the core voltage condition for system start-up, the parameter A3-02 (photovoltaic system shutdown voltage) is the voltage threshold for system shutdown. The system starts when the photovoltaic voltage reaches the startup voltage and meets other operating conditions, and the system stops when it is lower than the shutdown voltage.

A3-00	Photovoltaic system starting voltage	200.0V ~ 800.0V 220V:350.0V 380V:600V	Model Determination	☆
A3-01	Photovoltaic start-up delay time	0~100S	10s	☆
A3-02	Shutdown voltage of photovoltaic system	100.0V ~ 600.0V 220V:350.0V 380V:600.0V	Model Determination	☆
A3-03	Photovoltaic overvoltage	100.0V ~ 800.0V 220V:420.0V 380V:800.0V	Model Determination	☆
A3-04	Photovoltaic overvoltage recovery voltage	100.0V ~ 800.0V 220V:400.0V 380V:780.0V	Model Determination	☆

6.3 Dry pumping operation judgment

The judgment of dry pumping operation is a special protection function of the photovoltaic water pumping system for water shortage operation of the water pump. The core purpose is to prevent the water pump from idling under the condition of no water source and insufficient water source, resulting

in serious faults such as wear of the water pump impeller, damage of seals, overheating and burning of the motor, and prolong the service life of the water pump. The system uses the current detection value to judge, combined with the corresponding parameter settings, to ensure the accuracy of dry pumping judgment, to avoid misjudgment, wherein the parameter A3-19 (dry pumping operation detection value) is used to set the current threshold reference of dry pumping judgment, when the set value is 0, dry pumping operation is not judged. The parameter A3-20 (dry pumping protection delay time) is used to set the delay time of dry pumping judgment to prevent false triggering of protection due to instantaneous water shortage.

A3-19	Dry pumping operation detection value	0 to 100.0	0	☆
A3-20	Dry pumping protection delay time	0s ~ 1000s	60s	☆
A3-21	Dry pumping reset delay time	0s ~ 1000s	180s.	☆

6.4 Fault reset

In the photovoltaic MPPT mode, the failure of the module is assumed to be automatically reset. For self-recoverable minor faults (such as short-term photovoltaic voltage overvoltage and undervoltage, instantaneous water level abnormality), when the system detects that the fault factors are eliminated, and relevant parameters (voltage, water level, current, etc.) continue to stabilize in the normal range and reach the corresponding reset delay setting time (such as A3-04 recovery voltage stabilization time corresponding to photovoltaic overvoltage fault, A3-16 full water reset delay corresponding to water level fault, and A3-18 water shortage reset delay), the system will automatically complete the reset, without manual operation, automatically restore the pump operation and photovoltaic power supply logic, suitable for unattended scenes.

P9-11	Fault automatic reset waiting time	0.1s ~ 1000.0s	30.0s	☆

6.5 Operation judgment

The operation judgment function is the core control logic of the photovoltaic water pumping system. It is used to judge whether the system has normal operation conditions, realize automatic start-stop and operation state adjustment of the water pump, and ensure safe and efficient operation of the system. The core judgment basis includes three categories: photovoltaic power supply conditions, water level conditions and equipment state. All judgment logic strictly follows the corresponding parameter settings above to ensure accurate judgment and stable operation.

The specific judgment logic is as follows: First, the photovoltaic power supply condition judgment. The system detects the output voltage and power of the photovoltaic array in real time. When the photovoltaic voltage reaches the set value of the parameter A3-00 (photovoltaic system starting voltage) and the duration reaches the parameter A3-01 (photovoltaic starting delay time), the photovoltaic voltage is not lower than the parameter A3-10 (photovoltaic minimum input voltage) and not higher than the parameter A3-03 (photovoltaic overvoltage), it is determined that the photovoltaic power supply condition is met; the second is the judgment of water level conditions. The water level of the water source pool is higher than the parameter A3-14 value (water shortage signal value), the water level of the reservoir is lower than the parameter A3-13 value (water shortage signal value), there is no water level alarm (full water and water shortage delay are not triggered), and the water level signal detection mode (A3-12) is set to meet the operation requirements, and the water level conditions are determined to be met. The third is judged, check whether the controller has faults (such as motor overheating, overcurrent fault, overheating fault, etc.), the equipment has no fault, is in standby state, and has no dry pumping fault alarm, and determines that the equipment is in normal state.

When the above three conditions are met at the same time, the system determines that it has the operating conditions, automatically starts the water pump, and enters the normal water supply operation state; If any one of the conditions is not met, the system determines that it does not have the operating conditions and maintains the standby state. If it is already in the operating state, it will immediately stop the operation and trigger the corresponding alarm (such as water level alarm, photovoltaic voltage fault alarm and dry pumping alarm) according to the specific conditions. During operation, the system continuously monitors various conditions and corresponding parameters in real time. In case of photovoltaic voltage lower than the A3-02 (shutdown voltage of photovoltaic system), abnormal water level, dry pumping, etc., the system will immediately shut down and give an alarm. After the conditions are restored and the corresponding reset delay is met, the system will resume operation automatically or manually.

P0-02	Run command channel	0: operation panel command channel 1: Terminal Command Channel 2: Communication command channel 3: automatic operation/shutdown of photovoltaic water lifting	0	☆
A3-00	Photovoltaic system starting voltage	200.0V ~ 800.0V 220V:350.0V 380V:600V	Model Determination	☆
A3-01	Photovoltaic start-up delay	0~100S	10s	☆

	time			
A3-02	Shutdown voltage of photovoltaic system	100.0V ~ 600.0V 220V:350.0V 380V:600.0V	Model Determination	☆

6.6 PV MPPT Operation Logic

After the system is started, the MPPT controller first scans the voltage and current of the photovoltaic array, collects the output power data under different voltages, and determines the voltage (MPP voltage) corresponding to the maximum power point under the current lighting condition. Then, the controller adjusts the output frequency and duty cycle of the inverter to stabilize the output voltage of the photovoltaic array near the MPP voltage to ensure the maximum power output of the photovoltaic module. Among them, the parameter A3-22(mppt adjustment step time) sets the interval time of MPPT tracking adjustment to avoid system instability caused by too frequent adjustment; The parameter A3-23(mppt adjustment maximum voltage) sets the upper limit of MPP voltage adjustment to prevent photovoltaic overvoltage fault caused by too high adjustment voltage; Parameter A3-24(mppt step adjustment voltage, adjustment range 1.0V ~ 50.0V,220V model defaults to 3.0V, the 380V model defaults to 5.0V) to set the voltage amplitude for each adjustment to ensure accurate and efficient adjustment.

When the light intensity and ambient temperature change (such as cloud cover, alternate day and night, temperature fluctuation), the maximum power point of the photovoltaic array will shift accordingly. The MPPT controller monitors the power change in real time, performs rapid scanning and dynamic adjustment according to the step time set by the parameter A3-22, and re-tracks the new maximum power point to ensure that the system always works in the best power generation efficiency range. For example, when the illumination is enhanced, the maximum power point voltage and power of the photovoltaic array will rise. The MPPT controller adjusts the voltage according to the step set by the A3-24, and automatically adjusts the output voltage to follow the rise to maintain the maximum power output; when the illumination is weakened, it will automatically reduce the output Voltage to avoid power loss.

PV MPPT regulation maximum voltage = PV open circuit voltage (A3-23) * MPPT regulation maximum voltage (A3-11)

A3-05	PV proportional gain 1	1 to 5000	1000	☆
A3-06	PV integral gain 1	1 to 1000	200	☆
A3-07	PV proportional gain 2	1 to 5000	1000	☆
A3-08	PV integral gain 2	1 to 1000	200	☆
A3-09	PV control switching voltage point	100.0V ~ 800.0V 220V:300.0V 380V:500.0V	Model Determination	☆
A3-10	Photovoltaic minimum input voltage	100.0V ~ 800.0V 220V:200.0V 380V:450.0V	Model Determination	☆

A3-11	photovoltaic open circuit voltage	100.0V ~ 800.0V 220V:400.0V 380V:700.0V	Model Determination	☆
A3-22	mppt adjust step time	0.1s ~ 5.0s	20	☆
A3-23	mppt regulated maximum voltage	80.0-100.0%	85.0 percent	☆
A3-24	mppt step regulated voltage	1.0V ~ 50.0V 220V:3.0V 380V:5.0V	Model Determination	☆

Chapter 7 Fault Diagnosis and Countermeasures

7.1 Adjustment guide before commissioning of frequency converter

1) Open loop vector control mode (P0-01 = 0)

The control mode is to control the speed and torque of the motor in the application of the motor without encoder speed feedback. In this control mode, the motor parameters need to be self-learned to complete the automatic tuning of the motor parameters.

Problems and failures	treatment countermeasures
Overload or overcurrent fault is reported during motor start-up	■ The motor parameters (P1-01 ~ P1-05) are set according to the motor nameplate; ■ Self-learning (P1-37) of motor parameters is carried out. If conditions permit, it is better to carry out complete self-learning of motor dynamics.
Slow response of torque or speed below 5Hz, motor vibration	■ To improve the response of torque and speed, it is necessary to strengthen the proportional adjustment of the speed ring (P2-00 increase the set value by 10) or reduce the integration time of the speed ring (P2-01 decrease by 0.05); ■ If vibration occurs, you need to weaken the P2-00 and P2-01 the parameter value.
More than 5Hz torque or speed response is slow, motor vibration.	■ To improve the response of torque and speed, it is necessary to strengthen the proportional adjustment of the speed ring (P2-03 increase the set value by 10) or reduce the integration time of the speed ring (P2-04 decrease by 0.05); ■ If vibration occurs, you need to weaken the P2-03 and P2-04 the parameter value.
Low speed accuracy	■ When the load speed deviation of the motor is too large, the vector slip compensation gain (P2-06) shall be increased by 10%.
Large speed fluctuation	■ When the motor speed has abnormal fluctuations, the speed filtering time (P2-07) can be appropriately increased by 0.001s.
The motor is noisy	■ Appropriately increase the carrier frequency value (P0-15) in 1.0KHz (note: increase the carrier frequency motor leakage current will increase).
Insufficient motor torque or output	■ Whether the torque upper limit is limited, increase the torque upper limit (P2-10) in speed mode; increase the torque command in torque mode.

2) Closed loop vector control mode (P0-01 = 1)

This mode is used in applications where the motor has encoder speed feedback. It is necessary to correctly set the number of encoder lines, encoder type and signal direction to complete the automatic tuning of motor parameters.

Problems and failures	treatment countermeasures
Start-up overcurrent or overload fault	■ Set the number of encoder lines, type, encoder direction correctly.
Overload is reported during motor rotation or overcurrent fault	■ The motor parameters (P1-01 ~ P1-05) are set according to the motor nameplate; ■ Self-learning (P1-37) of motor parameters is carried out. If conditions

Problems and failures	treatment countermeasures
	permit, it is better to carry out complete self-learning of motor dynamics.
Slow response of torque or speed below 5Hz, motor vibration	■ To improve the response of torque and speed, it is necessary to strengthen the proportional adjustment of the speed ring (P2-00 increase the set value by 10) or reduce the integration time of the speed ring (P2-01 decrease by 0.05); ■ If vibration occurs, you need to weaken the P2-00 and P2-01 the parameter value.
More than 5Hz torque or speed response is slow, motor vibration.	■ To improve the response of torque and speed, it is necessary to strengthen the proportional adjustment of the speed ring (P2-03 increase the set value by 10) or reduce the integration time of the speed ring (P2-04 decrease by 0.05); ■ If vibration occurs, you need to weaken the P2-03 and P2-04 the parameter value.
Large speed fluctuation	■ When the motor speed has abnormal fluctuations, the speed filtering time (P2-07) can be appropriately increased by 0.001s.
The motor is noisy	■ Appropriately increase the carrier frequency value (P0-15) in units of 1.0kHz (note: increase the carrier frequency motor leakage current will increase).
Insufficient motor torque or output	■ Whether the torque upper limit is limited, increase the torque upper limit (P2-10) in speed mode; increase the torque command in torque mode.

3)V/F control mode (P0-01 = 2 factory default)

This mode is used in applications where the motor has no encoder speed feedback. It is not sensitive to the motor parameters and only needs to correctly set the rated voltage and rated frequency of the motor.

Problems and failures	treatment countermeasures
Motor oscillation during operation	■ Increase the shock suppression parameter (P3-11) by 10 (maximum adjustment to 100).
Overcurrent for high-power starting	■ Reduce the torque boost (P3-01), adjusted in units of 0.5%.
The motor is noisy	■ Appropriately increase the carrier frequency value (P0-15) in 1.0kHz (note: increase the carrier frequency motor leakage current will increase).
Large current in operation	■ Correctly set the rated voltage (P1-02) and rated frequency (P1-04) of the motor; ■ Reduce the torque boost (P3-01), adjusted in units of 0.5%.
Overvoltage for sudden unloading and overvoltage for deceleration	■ Make sure that the overvoltage stall enable (P3-23) is set to enable. Increase the overvoltage stall gain (P3-24/P3-25, ex-factory 30) by 10 (the maximum is 100); ■ Decrease the overvoltage stall action voltage (P3-22 factory 770V) by 10V (minimum adjustment to 700V).
Sudden overload report overcurrent, accelerated report overcurrent	■ Increase the overcurrent stall gain (P3-20 factory 20) by 10 (maximum adjusted to 100); ■ Reduce the overcurrent stall action current (P3-18 factory 150%) by 10% (minimum adjustment to 50%).

7.2 Fault Alarm and Countermeasures

The following fault types may be encountered during the use of the inverter. Please refer to the following methods for simple fault analysis:

Fault Name	Operating surface Panel Display	Troubleshooting	fault handling countermeasures
Accelerated overcurrent	FU02	Inverter output circuit is grounded or short-circuited	■ Eliminate peripheral faults and detect whether the motor or interrupt contactor is short-circuited.
		Control mode is FVC or SVC without parameter identification	■ Set the motor parameters according to the motor nameplate and identify the motor parameters.
		Under the condition of rapid acceleration, the acceleration time is set too short.	■ Increase the acceleration time.
		Overcurrent stall suppression setting not appropriate	■ Make sure that the overcurrent stall suppression function (P3-19 = 1) is enabled; ■ The set value of overcurrent stall action current (P3-18) is too large, and it is recommended to be adjusted within 120 to 150; ■ The overcurrent stall suppression gain (P3-20) setting is too small, it is recommended to adjust within 20 to 40.
		Manual torque boost or V/F curve not appropriate	■ Adjust manual lift torque or V/F curve.
		Start the rotating motor	■ Select speed tracking start or wait for the motor to stop and then start.
		by external interference	■ Check the historical fault record. If the current value is far from reaching the overcurrent point value at the time of the fault, find the interference source. If there are no other sources of interference, the driver board or current sensor may be a problem.
deceleration overcurrent	FU03	Inverter output circuit is grounded or short-circuited	■ Eliminate peripheral faults and detect whether the motor is short-circuited or open-circuited.
		Control mode is FVC or SVC without parameter identification	■ Set the motor parameters according to the motor nameplate and identify the motor parameters.
		Under the condition of rapid deceleration, the deceleration time is set too short.	■ Increase the deceleration time.
		Overcurrent stall suppression setting not appropriate	■ Make sure that the overcurrent stall suppression function (P3-19) is enabled; ■ The set value of overcurrent stall action current (P3-18) is too large, and it is recommended to be adjusted within 120 to 150; ■ The overcurrent stall suppression gain (P3-20) setting is too small, it is

Fault Name	Operating surface Panel Display	Troubleshooting	fault handling countermeasures
			recommended to adjust within 20 to 40.
		No additional braking unit and braking resistor	■ Add brake unit and resistor.
		by external interference	■ Check the historical fault record. If the current value is far from reaching the overcurrent point value at the time of the fault, find the interference source. If there are no other sources of interference, the driver board or current sensor may be a problem.
Constant speed overcurrent	FU04	Inverter output circuit is grounded or short-circuited	■ Eliminate peripheral faults and detect whether the motor is short-circuited or open-circuited.
		Control mode is FVC or SVC without parameter identification	■ Set the motor parameters according to the motor nameplate and identify the motor parameters.
		Overcurrent stall suppression setting not appropriate	■ Confirm the overcurrent stall. The inhibition function (P3-19) has been enabled; ■ The set value of overcurrent stall action current (P3-18) is too large, and it is recommended to be adjusted within 120 to 150; ■ The overcurrent stall suppression gain (P3-20) setting is too small, it is recommended to adjust within 20 to 40.
		Frequency converter selection is small	■ In the stable operation state, if the running current has exceeded the rated current of the motor or the rated output current value of the inverter, please select the inverter with higher power level.
		by external interference	■ Check the historical fault record. If the current value is far from reaching the overcurrent point value at the time of the fault, find the interference source. If there are no other sources of interference, the driver board or current sensor may be a problem.
accelerating overvoltage	FU05	High input voltage	■ The voltage is adjusted to the normal range.
		There is an external force in the acceleration process to drag the motor to run.	■ Cancel the additional power or add a braking resistor.
		Inappropriate overvoltage suppression setting	■ Make sure that the overvoltage suppression function (P3-23) is enabled; ■ Overvoltage suppression action voltage (P3-22) setting value is too large, recommended in 770V ~ 700V

Fault Name	Operating surface Panel Display	Troubleshooting	fault handling countermeasures
			adjustment; ■ Overvoltage suppression gain (P3-24) setting is too small, it is recommended to adjust within 30 to 50.
		No additional braking unit and braking resistor	■ Add brake unit and resistor.
		Acceleration time is too short	■ Increase the acceleration time.
deceleration overvoltage	FU06	Inappropriate overvoltage suppression setting	■ Make sure that the overvoltage suppression function (P3-23) is enabled; ■ Overvoltage suppression action voltage (P3-22) setting value is too large, recommended in 770V ~ 700V adjustment; ■ Overvoltage suppression gain (P3-24) setting is too small, it is recommended to adjust within 30 to 50.
		There is an external force in the deceleration process to drag the motor to run.	■ Cancel the additional power or add a braking resistor.
		Deceleration time is too short	■ Increase the deceleration time.
		No additional braking unit and braking resistor	■ Add brake unit and resistor.
constant speed overvoltage	FU07	Verify that the overvoltage suppression function (P3-23) is enabled	■ Make sure that the overvoltage suppression function (P3-23) is enabled; ■ Overvoltage suppression action voltage (P3-22) setting value is too large, recommended in 770V ~ 700V adjustment; ■ Overvoltage suppression frequency gain (P3-24) setting is too small, it is recommended to adjust within 30 to 50; ■ Overvoltage suppression maximum rise frequency (P3-26) setting is too small, it is recommended to adjust within 5~20Hz.
		There is an external force during operation to drag the motor to run	■ Cancel the additional power or add a braking resistor.
Control power failure	FU08	Input voltage not within specification	■ The voltage shall be adjusted to the range required by the specification.
Undervoltage fault	FU09	Instantaneous power failure	■ The instantaneous stop function (P9-59) is enabled to prevent instantaneous power failure and undervoltage fault.
		The voltage at the input end of the frequency converter is not within the range required by the specification.	■ Adjust the voltage to the normal range.
		Busbar voltage not normal	■ Seek technical support.

Fault Name	Operating surface Panel Display	Troubleshooting	fault handling countermeasures
		Rectifier bridge, buffer resistor, drive board and control board are abnormal	■ Seek technical support.
Inverter overload	FU10	Whether the load is too large or the motor is locked	■ Reduce the load and check the motor and mechanical condition.
		Frequency converter selection is small	■ Choose a frequency converter with a larger power level.
Motor overload	FU11	Whether the motor protection parameter P9-01 setting is appropriate	■ Set this parameter correctly.
		Whether the load is too large or the motor is locked	■ Reduce the load and check the motor and mechanical condition.
Input phase loss	FU12	Three-phase power input abnormal	■ Check and eliminate problems in peripheral circuits.
		Driver, lightning protection board, main control board and rectifier bridge are abnormal	■ Seek technical support.
Output phase loss	FU13	Motor fault	■ Check whether the motor is open.
		The lead wire from the converter to the motor is not normal.	■ Troubleshoot peripheral faults.
		Unbalanced three-phase output of inverter when motor is running	■ Check whether the three-phase winding of the motor is normal and eliminate the fault.
		Driver board, IGBT module abnormal	■ Seek technical support.
Module overheating	FU14	The ambient temperature is too high	■ Reduce the ambient temperature.
		Air duct blockage	■ Clean the air duct.
		Fan damage	■ Replace the fan.
		Damaged module thermistor	■ Replace the thermistor.
		Inverter module damaged	■ Replace the inverter module.
External device failure	FU15	The signal of the external fault is input through the multi-function terminal S.	■ Troubleshoot peripheral faults, confirm that the machine is allowed to restart (P8-18) and reset the operation.
Communication failure (terminal RS485)	FU16	The upper computer is not working properly	■ Check the upper computer wiring.
		Communication line is not normal	■ Check the communication cable.
		Communication expansion card P0-28 set incorrectly	■ Set the communication expansion card type correctly.
		Communication parameter Pd group setting is incorrect	■ Set the communication parameters correctly.
		After the above tests, you can try to restore the factory settings.	
Contactor fault	FU17	Abnormal drive board and power supply	■ Replace the driver board or power board.
		Contactor abnormal	■ Replace the contactor.
		Lightning protection plate abnormal	■ Replace the lightning protection plate.
Current detection fault	FU18	Check current sensor for abnormality	■ Replace the current sensor.

Fault Name	Operating surface Panel Display	Troubleshooting	fault handling countermeasures
		Abnormal drive board	■ Replace the drive plate.
Motor self-learning fault	FU19	Motor parameters not set according to nameplate	■ Set the motor parameters correctly according to the nameplate.
		Parameter identification process timeout	■ Check the inverter to motor lead.
		Abnormal encoder	■ Check whether the number of encoder lines is set correctly and P1-27, and check whether the signal lines of the encoder are connected correctly and firmly.
Encoder failure	FU20	Encoder model mismatch	■ Set the encoder type correctly according to the actual situation.
		Encoder wiring error	■ Detection of PG card power and phase sequence.
		Broken encoder	■ Replace the encoder.
		PG card abnormal	■ Replace the PG card.
EEPROM read/write fault	FU21	EEPROM chip damage	■ Replace the main control board.
Short circuit to ground fault	FU23	Motor short circuit to ground	■ Replace the cable or motor.
Cumulative Run Time Reach Fault	FU26	Cumulative running time reaches set value	■ Use the parameter initialization function to clear the record information.
User-defined fault 1	FU27	Input signal of user-defined fault 1 via multi-function terminal S	■ Reset run.
User-defined fault 2	FU28	Input signal of user-defined fault 2 via multi-function terminal S	■ Reset run.
Accumulated power-on time reaches fault	FU29	Accumulated power-on time reaches the set value	■ Use the parameter initialization function to clear the record information.
Underload fault	FU30	Inverter running current is less than P9-64	■ Confirm whether the load is separated or P9-64, and whether the P9-65 parameter setting conforms to the actual operating conditions.
Runtime PID feedback loss fault	FU31	PID feedback less than PA-26 setpoint	■ Check the PID feedback signal or set PA-26 to a suitable value.
Wave-by-wave current limiting fault	FU40	Whether the load is too large or the motor is locked	■ Reduce the load and check the motor and mechanical condition.
		Frequency converter selection is small	■ Choose a frequency converter with a larger power level.
Runtime switching Motor fault	FU41	Change current motor selection via terminals during converter operation	■ The motor switching operation shall be carried out after the frequency converter is shut down.
Excessive speed deviation fault	FU42	Incorrect encoder parameter setting	■ Set the encoder parameters correctly.
		No parameter identification	■ Motor parameter identification.

Fault Name	Operating surface Panel Display	Troubleshooting	fault handling countermeasures
		Excessive speed deviation P9-69 detection parameters and unreasonable P9-70 setting	■ According to the actual situation, set the detection parameters reasonably.
Motor over-speed fault	FU43	Incorrect encoder parameter setting	■ Set the encoder parameters correctly.
		No parameter identification	■ Motor parameter identification.
		Motor over-speed detection parameter P9-67 and P9-68 setting unreasonable	■ According to the actual situation, set the detection parameters reasonably.
Motor over-temperature	FU45	Temperature sensor access error	■ Connect the temperature sensor correctly.
		Temperature sensor type selection error	■ Selecting the correct temperature sensor type (P9-56)
		P9-57 temperature protection threshold and unreasonable P9-58 setting	■ According to the actual situation, set the detection parameters reasonably.
Initial position error	FU51	Unconnected motor in vector mode	■ Please connect the motor
		Control mode setting error	■ Please set the correct control mode
Point-to-point slave failure	FU55	Point-to-point communication slave dropped	■ Check the slave
CAN communication failure	FU56	The upper computer is not working properly	■ Check the upper computer wiring.
		Communication line is not normal	■ Check the communication cable.
		Communication expansion card P0-28 set incorrectly	■ Set the communication expansion card type correctly.
		Communication parameter Pd group setting is incorrect	■ Set the communication parameters correctly.
LCD keyboard or PC debugging tool communication failure	FU57	PD-14 setting error	■ PD-14 set to 0
		Communication parameter Pd-10 ~ Pd-13 group setting is incorrect	■ Set the communication parameters correctly.
Extended communication failure	FU58	PD-19 setting error	■ PD-14 set to 0
		Communication parameter Pd-15 ~ Pd-18 group setting is incorrect	■ Set the communication parameters correctly.
Full water alarm	FU46	Full water alarm	■ Full water alarm signal trigger, automatic shutdown. When the signal is eliminated, the delay is automatically restored. ■ Check whether the full water signal is triggered by mistake.
Water shortage alarm	FU47	Water shortage alarm	■ Water shortage signal trigger, automatic shutdown. When the signal is eliminated, the delay is automatically restored

Fault Name	Operating surface Panel Display	Troubleshooting	fault handling countermeasures
Dry pumping alarm	FU48	Dry pumping alarm	■ When the current for detecting long-term operation is less than the set value, it will automatically stop. After the dry pumping fault reset time, automatic reset.

7.3 Common Faults and Treatment Methods

The following faults may be encountered during the use of the inverter. Please refer to the following methods for simple fault analysis:

Serial Number	Fault phenomenon	Possible causes	Solution
1	No display on power-on	No or too low grid voltage	■ Check input power.
		Switching power supply fault on the converter drive board	■ Check the bus voltage.
		The connection between the control board and the drive board and the keyboard is broken.	■ Reseat the 30-core cable.
		Inverter buffer resistance damage	■ Seek services from manufacturers.
		Control board and keyboard fault	
		Damaged rectifier bridge	
2	Power-on always shows 510-A	Poor connection between driver board and control board	■ Reseat the 30-core cable.
		Related devices on the control board are damaged	■ Seek services from manufacturers.
		The motor or motor line has a short circuit to ground	
		Current sensor fault	
		Grid voltage too low	
3	Power-on display "FU23" alarm	Motor or output line short to ground	■ Measure the insulation of the motor and output lines with a shaking table.
		Inverter damage	■ Seek services from manufacturers.
4	The power-on inverter shows normal, and "510-A" is displayed after operation and the inverter is shut down immediately.	The fan is damaged or stalling.	■ Replace the fan.
		Peripheral control terminal wiring is short-circuited	■ Troubleshoot external short circuit.
5	Frequent FU14 (module overheat) fault	Carrier frequency setting too high	■ Reduce the carrier frequency (P0-15).
		The fan is damaged or the air duct is blocked.	■ Replace the fan and clean the air duct.

Serial Number	Fault phenomenon	Possible causes	Solution
		Damage to internal components of the converter (thermocouple or others)	■ Seek services from manufacturers.
6	The motor does not rotate after the frequency converter is running	Motor and motor line	■ Reconfirm the correct connection between the frequency converter and the motor.
		Inverter parameter setting error (motor parameter)	■ Restore the factory parameters and reset the use parameter group; ■ Check whether the encoder parameters are set correctly and the rated parameters of the motor are set correctly, such as the rated frequency and rated speed of the motor; ■ Check that the P0-01 (control mode), P0-02 (operation mode) and settings are correct; ■ V/F mode, heavy load start, adjust the P3-01 (torque boost) parameters.
		Poor connection between driver board and control board	■ Do you reseat the connection line and make sure the connection is firm.
		Drive board failure	■ Seek services from manufacturers.
7	S terminal failure	Parameter setting error	■ Check and reset the parameters associated with group P4.
		External signal error	■ Reconnect the external signal line.
		PLC and +24V jumper loose	■ Reconfirm the PLC with the +24V jumper and make sure it is tight.
		Control board fault	■ Seek services from manufacturers.
8	When closed-loop vector control, the motor speed cannot be increased	Encoder failure	■ Replace the code wheel and reconfirm the wiring.
		Wrong wire connection or poor contact of encoder	■ Replace the PG card.
		PG card fault	■ Seek services from manufacturers.
		Drive board failure	
9	Frequency converter frequently reports overcurrent and overvoltage faults	Motor parameter setting is incorrect	■ Re-set the motor parameters or motor self-learning.
		Acceleration and deceleration time is not appropriate	■ Set the appropriate acceleration and deceleration time.
		load fluctuation	■ Seek services from manufacturers.
10	Power-on (or running) report FU17	Soft start contactor is not closed	■ Check whether the contactor cable is loose; ■ Check whether the contactor is faulty; ■ Check whether the 24V power supply of the contactor is faulty;

Serial Number	Fault phenomenon	Possible causes	Solution
			■ Seek services from manufacturers.
11	The motor stops freely or has no braking capacity when decelerating or decelerating to a stop	Encoder disconnection or over-voltage stall protection in effect	■ When there is a speed sensor in vector control mode (P0-01 = 1), please check the encoder wiring; ■ If the braking resistors are configured, select Overvoltage Stall enable as Inactive (set P3-23 = 0) to turn off the overvoltage stall.

Appendix A Communication Data Address Definition

The EV520-PV series inverter supports Modbus communication protocol. The upper computer can control, monitor and modify the functional parameters of the inverter through Modbus communication protocol.

EV520-PV communication data can be divided into functional code data and non-functional code data, the latter including running commands, running status, running parameters, alarm information, etc.

A.1 EV520-PV function code data

The function code data is an important setting parameter of the frequency converter. There are P group and A group function parameters EV520-PV. The parameter groups are as follows:

EV520-PV Function code data	Group P (Read and Write)	P0, P1, P2, P3, P4, P5, P6, P7, P8, P9, PA, PB, PC, PD, PE, PF
	Group A (Read and Write)	A0, A1, A2, A3, A4, A5, A6, A7, A8, A9, AA, AB, AC, AD, AE, AF

The function code data communication address is defined as follows:

1、When reading function code data for communication

For P0-PF and A0-AF group function code data, the upper eight bits of the communication address are directly the function group number, and the lower eight bits are directly the serial number of the function code in the function group, for example, as follows:

P0-16 function parameter, its communication address is F010H, where F0H represents P0 group function parameter, 10H represents the hexadecimal data format of serial number 16 in the function group. AC-08 function parameter, its communication address is AC08H, where ACH represents the AC group function parameter, and 08H represents the hexadecimal data format of serial number 8 in the function group.

2、When writing function code data for communication

For the P0-PF group function code data, its communication address is eight bits higher, according to whether to write EEPROM, divided into 00-0F or P0-PF, the lower eight bits directly for the function code in the function group serial number, for example, as follows:

Write function in parameter P0-16:

When it is not necessary to write into EEPROM, its communication address is 0010H;

When it is necessary to write to EEPROM, its communication address is F010H.

For the A0-AF group function code data, its communication address is eight bits higher, according to whether it needs to be written into EEPROM, it is distinguished as 40-4F or A0-AF, and the lower eight bits are directly the serial number of the function code in the function group, for example, as follows:

Write function parameter AC-08:

When it is not necessary to write into EEPROM, its communication address is 4C08H;

When it is necessary to write to EEPROM, its communication address is AC08H.

A.2 EV520-PV non-function code data

EV520-PV Non-function code data	Status data (readable)	d group monitoring parameters, inverter fault description, inverter running state
	Control parameters (writable)	Control command, communication setting value, digital output terminal control, analog output AO1 control, analog output AO2 control, high-speed pulse (FMP) output control, parameter initialization

1、Status Data

The status data is divided into d groups of monitoring parameters, inverter fault description, inverter operation status.

d group parameters monitoring parameters

For the description of group d monitoring data, see the relevant description in Chapter 5 and Chapter 6, and its address is defined as follows:

d0-dF, the high eight bits of the communication address are 70 ~ 7F, and the low eight bits are the serial number of the monitoring parameter in the group, for example, as follows:

d0-11, its mailing address is 700BH

Inverter Fault Description

When the communication reads the inverter fault, the communication address is fixed at 8000H, and the upper computer can obtain the current inverter fault code by reading the address data. The description of the fault code is defined in the P9-14 function code in Chapter 5.

Operation status of frequency converter

When the communication reads the running status of the inverter, the communication address is set to 3000H, and the upper computer can obtain the current running status information of the inverter by reading the data, which is defined as follows:

Communication address of frequency converter running status	Read Status Word Definition		
3000h	1: forward rotation operation	2: Reverse Run	3: Shutdown

2、Control parameters

The control parameters are divided into control commands, digital output terminal control, analog output AO1 control, analog output AO2 control, and high-speed pulse (FMP) output control.

3、Control command

When the P0-02 (command source) is selected as 2: communication control, the upper computer can control the start and stop of the inverter through the communication address, and the control command is defined as follows:

Control Command Address	Command Function		
2000h	1: forward rotation operation 2: Reverse Run 3: forward rotation jog	4: Reverse inching 5: Free Shutdown	6: Slow down and stop 7: fault reset

4、Communication setting value

The communication setting value is mainly selected by the user EV520-PV the medium frequency source, torque upper limit source, VF separate voltage source, PID given source, PID feedback source,

etc. as the given data at the given communication time, and its communication address is 1000H. When the upper computer sets the communication address value, its data range is -10000~10000, corresponding to the given value -100.00%-100.00%.

Digital output terminal control

When the digital output terminal function is selected as 20: communication control, the upper computer can control the digital output terminal of the inverter through the communication address, which is defined as follows:

Digital output terminal control communication address	command content
2001H	BiT0: None BiT1: None BiT2:RELAY1 output control BiT3:RELAY2 output control BiT4:HD0 output control

5、Analog output AO1, AO2, high-speed pulse output FMP control

When the analog output AO1 and AO2 and the high-speed pulse output FMP output function are selected as 12: communication setting, the upper computer can control the analog output and high-speed pulse output of the frequency converter through the communication address, which is defined as follows

Output control communication address		command content
AO1	2002H	0 ~ 7FFF means 0% ~ 100
AO2	2003H	

6、Parameter initialization

When it is necessary to initialize the parameters of the frequency converter through the upper computer, this function needs to be used.

If the PP-00 (user password) is not 0, it is necessary to verify the password first. After the verification is passed, the upper computer performs parameter initialization within 30 seconds.

The communication address for user password verification in communication is 1F00H. If the correct user password is directly written into the address, the password verification can be completed.

The address for parameter initialization for communication is 1F01H, and its data content is defined as follows:

Parameter initialization communication address	Command Function
1F01H	1: Restore factory parameters 2: Clear record information 4: Restore user backup parameters 501: Backup User's Current Parameters

Appendix B Modbus Communication Protocol

EV520-PV series inverters provide RS485 communication interface and support Modbus-RTU communication protocols. Users can achieve centralized control through the computer or PLC, through the communication protocol to set the inverter operation command, modify or read the function code parameters, read the inverter working status and fault information.

B .1 Content of Agreement

The serial communication protocol defines the content and format of information transmitted in serial communication. These include: host polling (or broadcast) format; host encoding method, including: the function code of the required action, transmission data and error checking. The response of the slave also adopts the same structure, including: action confirmation, return data and error check. If the slave makes an error when receiving the information, or cannot complete the action required by the master, it will organize a fault message as a response to the host.

Application mode

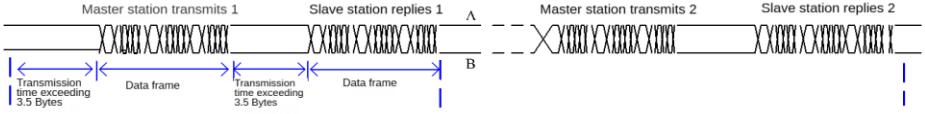
The frequency converter is connected to the "single master and multiple slave" PC/PLC control network with RS485 bus as a communication slave.

bus structure

(1) Single-host multi-slave **topology** system. Each communication device in the network has a unique slave address, one of which is used as a communication host (usually a flat PC upper computer, PLC, HMI, etc.). The host starts communication and reads or writes parameters to the slave. Other devices are communication slave machines and respond to the host's inquiry or communication operation to the machine. Only one device can send data at a time, while the other devices are in the receiving state.

The setting range of the slave address is 1 to 247, and 0 is the broadcast communication address. The slave addresses in the network must be unique.

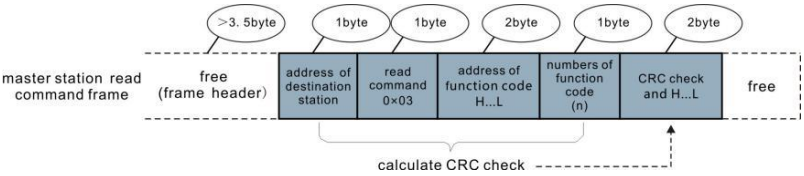
(2) Asynchronous serial **communication transmission mode**, half duplex transmission mode. In the process of serial asynchronous communication, data is sent one frame of data at a time in the form of a message. It is agreed in the Modbus-RTU protocol that when the idle time of no data on the communication data line is greater than the transmission time of 3.5Byte, it indicates the start of a new communication frame.



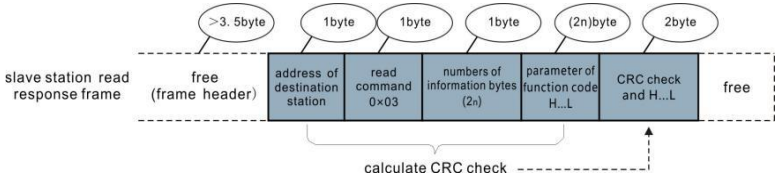
The built-in communication protocol of EV520-PV series inverter is Modbus-RTU slave communication protocol, which can respond to the "query/command" of the host, or make corresponding actions according to the "query/command" of the host, and communicate data response.

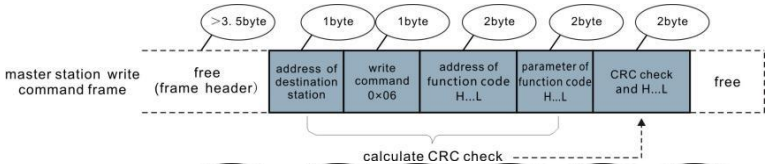
The host can refer to a personal computer (PC), industrial control equipment or programmable logic controller (PLC), etc. The host can not only communicate with a slave alone, but also release broadcast information to all lower slave machines. For the individual access "query/command" of the host, the accessed slave returns a response frame rate; for the broadcast information sent by the host, the slave does not need to feedback the response to the host.

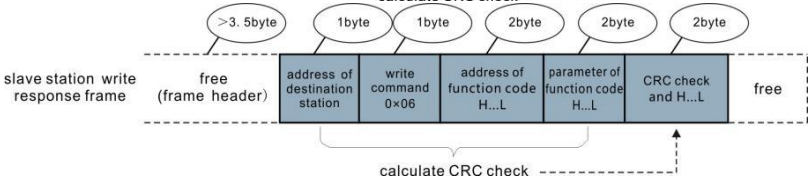
(3) Communication Data Structure The Modbus protocol communication data format of EV520-PV series inverters is as follows. Inverters only support reading or ѡ2 byte Word parameters. The corresponding communication read operation command is Ox03; The write operation command is Ox06, and byte or bit read and write operations are not supported:



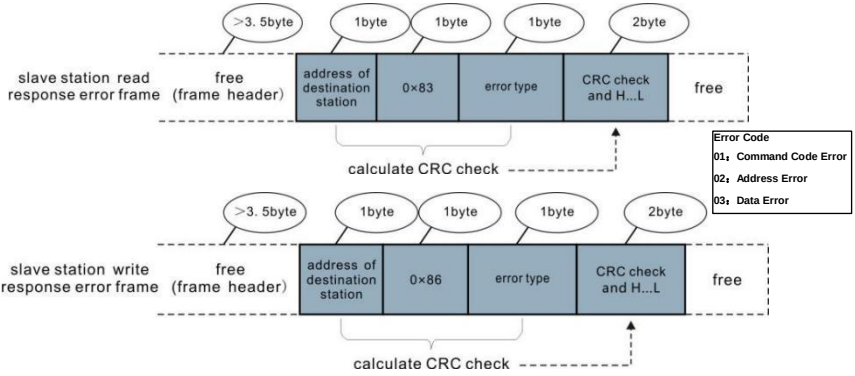
In theory, the upper computer can read several consecutive function codes at a time (I. e. n can reach 12 at most), but it should be noted that the last function code of the function code group cannot be crossed, otherwise the reply will be wrong.







If the slave detects a communication frame error, or if the read and write are unsuccessful due to other reasons, it will reply to the error frame.



Data Frame Field Description

Frame header START	Idle with a transfer time greater than 3.5 characters.
slave address ADR	Communication address range: 1~247;0 = broadcast address.
Command Code CMD	03: Read slave machine parameters; 06: Write slave machine parameters.
Function code address H	The internal parameter address of the frequency converter is expressed in hexadecimal. It is divided into functional code type and non-functional code type (such as running state parameters, running commands, etc.) parameters, etc., see the address definition for details. When transmitting, the high byte is preceded by the low byte.
Function code address L	
Number of function codes H	The number of function codes read in this frame. If it is 1, it means 1 function code is read. When transmitting, the high byte is preceded by the low byte. This protocol can only rewrite one function code at a time, without this field.
Number of function codes L	
Data H	Reply data, or close-up data, is transmitted with the high byte first and the low byte second.
Data L	
CRCCHK Low	Detection value: CRC16 check value. When transmitting, the low byte comes first and the high byte comes after. The calculation method is detailed in the description of CRC check in this section.
CRCCHK High	
END	3.5 character time.

CMD calibration method

Verification method-CRC verification method:

The CRC(Cyclical Redundancy Check) uses the RTd frame format, and the message includes an error detection field based on the CRC method.

The CRC field detects the contents of the entire message.

The CRC field is two bytes and contains a 16-bit binary value.

It is calculated by the transmission device and added to the message.

The receiving device recalculates the CRC of the received message and compares it with the value in the received CRC field. If the two CRC values are not equal, then there is an error in the transmission.

The CRC is stored in 0xFFFF first, and then a procedure is called to process the consecutive 8-bit bytes in the message with the value in the current register.

Only the 8Bit data in each character is valid for CRC, and the start and stop bits and parity bits are invalid.

In the CRC generation process, each 8-bit character is individually or (XOR) with the contents of the register, and the result is moved in the direction of the least significant bit, and the most significant bit is filled with 0.

The LSB is extracted and detected. If the LSB is 1, the register alone is the exclusive OR of the preset value, and if the LSB is 0, it is not performed. The whole process is repeated 8 times. After the last bit (bit 8) is completed, the next 8-bit byte is independently XOR-ed with the current value of the register.

The value in the final register is the CRC value after all the bytes in the message have been executed.

When a CRC is added to a message, the low byte is added first, then the high byte.

The simple CRC function is as follows:

```
unsigned int crc_chk_value（unsigned char *data_value,unsigned char length）
{
 unsigned int crc_value=0xFFFF;
```

```
    int i;
     while（length--）
     {
            crc_value^=*data_value++;
            for（i=0;i<8;i++）
            {
                if（crc_value&0x0001）
               {
                        crc_value = （crc_value > > 1 ）^0xa001;
                }
                else
                {
              crc_value=crc_value>>1;
                }
            }
    }
    return（crc_value）;
}
```

Address definitions for communication parameters

Read and write function code parameters (some function codes cannot be changed, only for manufacturers to use or monitor)

Function code parameter address marking rules:

The rule is represented by the function code group number and label number as the parameter address:

High byte: P0 ~ PF (group P), A0 ~ AF (group A), 70 ~ 7F (group d); Low byte: 00 ~ FF

For example, if the range function code is P3-12, the access address of the function code is expressed as 0 × F30C.

Note: PF group: parameters can neither be read nor changed; d group: only read, parameters can not be changed.

Some parameters cannot be changed when the inverter is in operation. Some parameters cannot be changed regardless of the state of the inverter. When changing the function code parameters, pay attention to the range, unit and related instructions of the parameters.

Function code group number	Communication Access Address	Communication modifies the address of the function code in RAM
P0 ~ PE group	0 ×F000~0 ×FEFF	0 × 0000~0 × 0EFF
A0 ~ AC group	0 ×A000~0 ×ACFF	0 x 4000~0 x 4CFF
group d0	0 x 7000~0 x 70FF	

Note that because EEPROM is frequently stored, it will reduce the service life of EEPROM, so some function codes do not need to be stored in communication mode, just change the value in RAM.

If it is a P group parameter, to realize this function, it can be realized by changing the high order F of the function code address to 0.

If it is a group A parameter, to realize this function, it can be realized by changing the high bit A of the function code address to 4.

The corresponding function code address is indicated as follows:

High byte: 00 ~ 0F (group P), 40 ~ 4F (group A); Low byte: 00 ~ FF.

For example, the function code P3-12 is not stored in EEPROM, and the address is 030C; The function code A0-05 is not stored in EEPROM, and the address is 4005;

This address indicates that only RAM can be written and cannot be read. When reading, it is an invalid address. For all parameters, the command code 07H can also be used to implement this function.

Shutdown/Operation Parameters Section

Parameter Address	Parameter Description	Parameter Address	Parameter Description
1000	* Communication setting value (decimal) -10000~10000	1010	PID Settings
1001	Operating frequency	1011	PID feedback
1002	Bus voltage	1012	PLC Steps
1003	Output voltage	1013	High-speed pulse input frequency, 0.01kHz
1004	Output current	1014	Feedback speed in 0.1Hz
1005	Output power	1015	Remaining Running Time
1006	Output torque	1016	Voltage before AI1 correction
1007	Running speed	1017	Voltage before AI2 correction
1008	S input flag	1018	AI3 Pre-Calibration Voltage (Function Expansion Card)
1009	HDO Output Flag	1019	linear velocity
100A	AI1 voltage	101A	Current power-on time
100B	AI2 voltage	101B	Current Running Time
100c	AI3 Voltage (Function Expansion Card)	101C	High-speed pulse frequency input, unit 1Hz
100D	Count value input	101D	Communication setting value
100E	Length value input	101E	Actual feedback speed
100F	Load speed	101F	Main frequency A display
		1020	Secondary frequency B display

Note: The communication setpoint is a percentage of the relative value, 10000 corresponds to 100.00%, and -10000 corresponds to -100.00%.

For the data of frequency dimension, the percentage is the percentage relative to the maximum frequency (P0-10); for the data of torque dimension, the percentage is P2-10 and A2-48 (the upper limit of torque is set, corresponding to the first and second motors respectively).

Control command input to converter (write only)

Command Word Address	Command Function		
2000	0001: running forward 0002: Reverse Run 0003: forward jog	0004: reverse inching 0005: free stop	0006: Slow down and stop 0007: fault reset

Read converter status (read only)

Status Word Address	Status word function		
3000	0001: running forward	0002: Reverse Run	0003: Shutdown

Parameter lock password verification (if the return is 8888H, the password verification passes)

Password Address	Enter the contents of the password
1F00	*****

Digital output terminal control (write only)

Command Address	command content
2001	BIT2:RELAY1 Output Control BIT3:RELAY2 Output Control BIT4:HDO Output Control

Analog Output AO1 Control (Write Only)

Command Address	command content
2002	0 ~ 7FFF means 0% ~ 100

Analog Output AO2 Control (Write Only)

Command Address	command content
2003	0 ~ 7FFF means 0% ~ 100

High Speed Pulse Output Control (Write Only)

Command Address	command content
2004	0 ~ 7FFF means 0% ~ 100

Inverter Fault Description

Frequency converter fault address	Inverter fault information		
8000	0000: No fault 0001: Reserved 0002: Accelerated overcurrent 0003: deceleration overcurrent 0004: Constant speed over current 0005: acceleration overvoltage 0006: deceleration overvoltage 0007: constant speed overvoltage 0008: buffer resistor overload fault 0009: undervoltage fault 000A: Inverter overload 000B: Motor overload 000C: Input phase loss (reserved)	000D: Output phase loss 000E: Module overheating 000F: External fault 0010: abnormal communication 0011: Contactor abnormal 0012: current detection fault 0013: motor self-learning fault 0014: encoder/PG card fault 0015: parameter read/write exception 0016: inverter hardware fault 0017: motor short circuit to ground fault 0018: Reserved 0019: Reserved 001A: Run Time Arrived	001B: User-defined fault 1 001C: User-defined fault 2 001D: Power-on Time Arrived 001E: Underload 001F: Runtime PID Feedback Missing 0028: Fast current limit timeout fault 0029: Switching motor fault during operation 002A: excessive speed deviation 002B: Motor overspeed 002D: Motor over-temperature 0033: Error in initial position 0037: Point-to-point slave failure 0038:CAN communication failure 0039: LCD keyboard communication failure 003A: Bus expansion card communication failure

Pd group communication parameter description

Pd-00	Baud rate (terminal RS485)	Factory Value	5005
	Setting range	Bits: Modbus baud rate	
		Bits: MODBUS (terminal RS485) 0:300BPS 1:600BPS 2:1200BPS 3:2400BPS 4:4800BPS 5:9600BPS 6:19200BPS 7:38400BPS 8:57600BPS 9:115200BPS	Ten: Reserved Hundred: Reserved Thousands: CAN (Bus Expansion Card) 0:20k 1:50K 2:100K 3:125K 4:250K 5:500K 6:1M

This parameter is used to set the data transmission rate between the upper computer and the frequency converter. Note that the baud rate set by the upper computer and the frequency converter must be consistent, otherwise, communication cannot be carried out. The greater the baud rate, the faster the communication speed.

Pd-01	MODBUS data format (terminal RS485)	Factory Value	3
	Setting range	0: no verification: data format <8-N-2> 1: even test: data format <8-E-1> 2: odd check: data format <8-O-1> 3: no verification: data format <8-N-1>	

The data format set by the upper computer and the frequency converter must be consistent, otherwise, the communication cannot be carried out.

Pd-02	Local address (terminal RS485)	Factory Value	1
	Setting range	1~247,0 is the broadcast address	

When the local address is set to 0, it is the broadcast address, and the broadcast function of the upper computer is realized.

The local address is unique (except for the broadcast address), which is the basis for point-to-point communication between the upper computer and the inverter.

Pd-03	MODBUS Response Delay (terminal RS485)	Factory Value	2ms
	Setting range	0 to 20ms	

Response delay: refers to the intermediate time between the end of the inverter data acceptance and the data sent to the upper computer. If the response delay is less than the system processing time, the response delay is subject to the system processing time, if the response delay is longer than the system processing time, the system will wait until the response delay time to send data to the upper computer.

Pd-04	Serial communication timeout (terminal RS485)	Factory Value	0.0s
	Setting range	0.0s (invalid);0.1~60.0s	

When the function code is set to 0.0s, the communication timeout parameter is invalid.
When the function code is set to a valid value, if the interval between one communication and the next communication exceeds the communication timeout time, the system will report a communication fault error (FU16). Usually, it is set to invalid. If the secondary parameter is set in a continuous communication system, the communication condition can be monitored.

Pd-05	Communication protocol selection (terminal RS485)	Factory Value	31
	Setting range	Bits: MODBUS 0: Non-standard MODBUS protocol 1: Standard MODBUS protocol	
		Ten: Reserved	

Pd-05 = 1: Select the standard Modbus protocol.
Pd-05 = 0: When reading the command, the number of bytes returned from the slave is one byte more than that of the standard Modbus protocol. For details, please refer to the "Communication Data Structure" section of this protocol.

Pd-06	Communication Read Current Resolution (terminal RS485)	Factory Value	0
	Setting range	0:0.01A (valid when ≤ 55kW); 1:0.1A	

The output unit used to determine the current value when the communication reads the output current.

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