



High performance universal vector control frequency converter

ATS600 Ultra Series

User Manual



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Preface

Thank you for purchasing the AC drive developed by our company.

AC drives vector control general purpose vfd with high quality, multiple functions and low noise.

The Ultra series Ultra-Precise drive is a high-performance vector-controlled frequency converter redefined based on the 600 series platform. The Ultra precisely aligns with market demands, retaining the full range of modular models while expanding multiple premium features, including synchronous-asynchronous integrated control, 16KHz carrier, safe torque off (STO), and voltage vector control (VVC). This series supports simultaneous selection of IO, PG, and communication function cards. With proprietary drive and control technology, it empowers high-end intelligent manufacturing and fosters a sustainable future together.

We provide information of model selection, installation, parameter setting, field debugging, fault diagnosis and daily maintenance for users in this manual.

First-time Use

For the users who use this product for the first time, read the manual carefully. If in doubt concerning some functions or performances, contact the technical support personnel of Our company to ensure correct use.

ATTENTIONS

- Please power off when wiring.
- Electronic components inside AC drive are especially sensitive to static electricity, do not put anything into internal of AC drive. And do not touch main circuit board.
- After power cut, if indicator is still lamp, it still have high voltage in AC drive. It is very dangerous, please do not touch internal circuit and components.
- Please ensure the grounding terminals of AC drive is grounded correctly.
- Never connect input power supply with output terminal U,V,W of AC drive.

Chapter 1 Safety and Attentions

Users are requested to read this chapter carefully when installing, commissioning and repairing this product and perform the operation according to safety precautions as set forth in this chapter without fail. Our company will bear no responsibility for any injury and loss as a result of any violation operation.

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

Safety signs in this manual		
	DANGER	Dangers caused by operations beyond requirements may lead to serious injury, and even death.
	CAUTION	Dangers caused by operations beyond requirements may lead to moderate damages or minor injuries, as well as equipment damages.

Please read this chapter carefully when installing, debugging, and repairing this system, and be sure to follow the safety precautions required in this chapter. Any harm or loss caused by illegal operations is not related to our company.

1.1. Safety Matters

Use Stage	Safety Grade	Precautions
Before Installation	DANGER	➤ Do not install the product if the package is with water, or component is missing or broken; ➤ Do not install the product if the label on the package is not identical to that on the inverter.
	CAUTION	➤ Be careful of carrying or transportation. Risk of devices damage; ➤ Do not use damaged product or the inverters missing component. Risk of injury; ➤ Do not touch the parts of control system with bare hands. Risk of ESD hazard.
Installation	DANGER	➤ Installation base shall be metal or other non-flammable material. Risk of fire;

Use Stage	Safety Grade	Precautions
		➤ Do not install inverter in an environment containing explosive gases, otherwise there is danger of explosion; ➤ Do not unscrew the fixing bolts, especially the bolts with red mark.
	CAUTION	➤ Do not leave cable strips or screws in the inverter. Risk of inverter damage; ➤ Install the product at the place with less vibration and no direct sunlight; ➤ Consider the installation space for cooling purpose when two or more inverters are placed in the same cabinet.
Wiring	DANGER	➤ Wiring must be performed by authorized and qualified personnel. Risk of danger; ➤ Circuit-breaker should be installed between inverter and the mains. Risk of fire; ➤ Make sure the input power supply has been completely disconnected before wiring. Failure to comply may result in personnel injury and/or equipment damage; ➤ Since overall leakage current of this equipment may be bigger than 3.5mA, for safety's sake, this equipment and its associated motor must be well grounded so as to avoid risk of electric shock; ➤ Never connect the power cables to the output terminals (U,V,W) of the AC drive. Pay attention to the marks of the wiring terminals and ensure correct wiring. Failure to comply will result in damage to the AC drive; ➤ Install braking resistors at terminals (P+) and (P- or PB) only. Failure to comply may result in equipment

Use Stage	Safety Grade	Precautions
		damage.
	CAUTION	➤ Since all adjustable frequency AC drives from Our company have been subjected to hi-pot test before delivery, users are prohibited from implementing such a test on this equipment. Failure to comply may result in equipment damage. ➤ Signal wires should to the best of the possibility be away from main power lines. If this cannot be ensured, vertical cross-arrangement shall be implemented, otherwise interference noise to control signal may occur. ➤ If motor cables are longer than 100m, it is recommend- ed output AC reactor be used. Failure to comply may result in faults.
Before Power-on	DANGER	➤ Inverter shall be power-on only after the front cover is assembled. Risk of electrical hazard.
	CAUTION	➤ Verify that the input voltage is identical to the rated voltage of product, correct wiring of input terminals R,S, T or L1, L2 and output terminals U, V, and W, wiring of inverter and its peripheral circuits, and all wires should be in good connection. Risk of inverter damage.
After Power-on	DANGER	➤ Do not open the cover after power. Risk of electrical hazard; ➤ Do not touches any input/output terminals of inverter with bare hands. Risk of electrical hazard.
	CAUTION	➤ If auto tuning is required, be careful of personal injury when motor is running. Risk of accident; ➤ Do not change the defaults of parameters. Risk of devices damage.
During	DANGER	➤ Non-professionals shall not detect signals during

Use Stage	Safety Grade	Precautions
Operation		operation. Risk of personal injury or device damage; ➤ Do not touch the fan or the discharging resistor to check the temperature. Failure to comply will result in personal burnt.
	CAUTION	➤ Prevent any foreign items from being left in the devices during operation. Risk of device damage; ➤ Do not control start/stop of inverter by ON/OFF of contactor. Risk of device damage.
Main-tenance	DANGER	➤ Please do not make repair and maintenance over equipment in a charged state, or it will give rise to electric shock hazard! ➤ AC drive can be put into maintenance and repair only you confirm the AC drive charge light out, or the remaining electric charge of capacitance will cause damages to people! ➤ Any people who are not trained professionally cannot make repair and maintenance, or it will cause personal injuries or equipment troubles!

1.2. Use Considerations

1.2.1. Motor Insulation Inspection

When the motor is used for the first time or when the motor is reused after being kept, or when periodical inspection is performed, insulation inspection shall be conducted with motor so as to avoid damaging the inverter because of the insulation failure of the motor windings. The motor wires must be disconnected from the inverter during the insulation inspection. It is recommended to use the 500V mega meter, and the insulating resistance measured shall be 5MΩ at least.

1.2.2. Motor Thermal Protection

If the motor rating does not match that of the inverter, especially when the rated

power of the inverter is higher than that of the motor, adjust motor protection parameters in the inverter or install thermal relay to protect motor.

1.2.3. Operating with the Frequency Higher than Grid Power Frequency

Output frequency of is 0.00Hz ~ 500Hz. If product is required to operate above 50.00Hz, please take the endurance of mechanical devices into consideration.

1.2.4. Mechanical Vibrations

Inverter may encounter mechanical resonance point of the load device at certain output frequencies which can be avoided by setting the skip frequency parameters of the inverter.

1.2.5. Motor Heat and Noise

Since output voltage of inverter is PWM wave and contains a certain amount of harmonics, so that the temperature, noise and vibration of the motor will be higher than those when the inverter runs at grid power frequency.

1.2.6. Voltage-sensitive device or capacitor on output side of the AC drive

Do not install the capacitor for improving power factor or lightning protection voltage-sensitive resistor on the output side of the AC drive because the output of the AC drive is PWM wave. Otherwise, the AC drive may suffer transient over current or even be damaged.

1.2.7. Contactor at the I/O terminal of the AC drive

When a contactor is installed between the input side of the AC drive and the power supply, the AC drive must not be started or stopped by switching the contactor on or off. If the AC drive has to be operated by the contactor, ensure that the time interval between switching is at least one hour since frequent charge and discharge will shorten the service life of the capacitor inside the AC drive; When a contactor is installed between the output side of the AC drive and the motor, do not turn off the contactor when the AC drive is active. Otherwise, modules inside the AC drive may be damaged.

1.2.8. Applied with the Rated Voltage

Apply product with the rated voltage. Failure to comply will damage inverter. If required,

take a transformer to boost or step-down voltage.

1.2.9. Do Not Apply a 3-Phase Input Inverter to 2-Phase Input Applications

Do not apply a 3-phase input FR inverter to 2-phase input applications. Otherwise, it will result in faults or damage inverter.

1.2.10. Lightning Protection

The product has integrated lightning over-current protection device which has certain self-protection capacity against the lightning. Additional protection devices have to be installed between inverter and power supply in the area where lightning occurs frequently.

1.2.11. Altitude De-rating

In places where the altitude is above 1000 m and the cooling effect reduces due to thin air, it is necessary to de-rate the AC drive. Contact Our company for technical support.

1.2.12. Adaptable Motor

Standard adaptive motor is quadrupole squirrel- cage asynchronous induction motor. If it is not above- mentioned motor, please select AC drive upon rated current of moter. If you need to drive permanent magnet synchronous motor, please consult our company; The cooling fan of non variable frequency motor and rotor spindle are coaxially connected. While despinning, the fan cooling effect also declines at the same time. Hence, for overheated occasion of moter, you shall install strong exhaust fan or change variable frequency motor;

AC drives have built- in adaptive motor standard parameters. It is necessary to make motor parameter identification or amend default values to accord with actual values, or it will influence operation effects and protective values;

As short circuit existing inside cable or motor will cause inverter alarming, en explosion. Therefore, please make insulation short- circuit test of initial installed motor and cable first. And the test also is necessary in routine maintenance.

Chapter 2 Product Brief Introduction

2.1. Position and content of nameplate



2.2. Nameplate model description and rated parameters

ATS600-U- 4 T - 2.2 G B / 4.0 P B

① ② ③ ④ ⑤

Voltage level	1	2: 220V 3: 380V 7: 690V
Adapted motor power	3	0.4kW ~ 1200kW
Accessory type	5	B: Brake unit (B): Optional built-in Brake uni

2.3. Specifications and models of AC drives

This series of 380V products comes with a built-in braking unit as standard for 37kW and below, an optional built-in braking unit for 45kW to 160kW, and an external braking unit for 160kW and above products; A built-in DC reactor is standard for 160KW and above.

Models	Adaptive motor (KW)	Rated capacity (KVA)	Rated input current (A)	Rated output current(A)
Single-phase 220V range: -15% ~ 20%				
ATS600U-2S-0.4GB	0.4	1	5.4	2.3
ATS600U-2S-0.75GB	0.75	1.5	8.2	4
ATS600U-2S-1.5GB	1.5	2.8	14	7
ATS600U-2S-2.2GB	2.2	3.8	23	9.6
ATS600U-2S-4.0GB	4	5.9	40	17
ATS600U-2S-5.5GB	5.5	8.5	60	25
ATS600U-2S-7.5GB	7.5	10.5	75	32
Input Single-phase 220V range: -15% ~ 20%, Output Three-phase 0 - 400V				
ATS600U-2S/4T-0.75GB	0.75	1.5	7.3	2.3
ATS600U-2S/4T-1.5GB	1.5	2.8	13.3	3.8
ATS600U-2S/4T-2.2GB	2.2	3.8	17.9	5.1
ATS600U-2S/4T-4.0GB	4	5.9	31.5	9
ATS600U-2S/4T-5.5GB	5.5	8.5	45.5	13
ATS600U-2S/4T-7.5GB	7.5	10.5	59.5	17
ATS600U-2S/4T-11GB	11	14.5	87.5	25
ATS600U-2S/4T-15GB	15	19.5	112	32
ATS600U-2S/4T-18.5GB	18.5	24	129.5	37
ATS600U-2S/4T-22GB	22	28.5	157.5	45
ATS600U-2S/4T-30GB	30	39	210	60
Three-phase 220V range: -15% ~ 20%				
ATS600U-2T-0.4GB	0.4	1	2.7	2.1
ATS600U-2T-0.75GB	0.75	1.5	4.2	3.8

Models	Adaptive motor (KW)	Rated capacity (KVA)	Rated input current (A)	Rated output current(A)
ATS600U-2T-1.5GB	1.5	2.8	7.7	7
ATS600U-2T-2.2GB	2.2	3.8	12	9
ATS600U-2T-4.0GB	4	5.9	19	17
ATS600U-2T-5.5GB	5.5	8.5	28	25
ATS600U-2T-7.5GB	7.5	10.5	35	32
ATS600U-2T-11GB	11	14.5	47	45
ATS600U-2T-15GB	15	19.5	65	60
ATS600U-2T-18.5GB	18.5	24	80	75
ATS600U-2T-22G(B)	22	28.5	97	90
ATS600U-2T-30G(B)	30	39	115	110
ATS600U-2T-37G(B)	37	48	166	152
ATS600U-2T-45G(B)	45	58.5	190	176
ATS600U-2T-55G(B)	55	71.5	214	210
ATS600U-2T-75G	75	97.5	307	304
ATS600U-2T-93G	93	121	389	377
ATS600U-2T-110G	110	143	435	426
ATS600U-2T-132G	132	171.5	468	465
ATS600U-2T-160G	160	208	590	585
ATS600U-2T-200G	200	260	785	725
ATS600U-2T-220G	220	286	783	820
Three-phase 380V range: -15% ~ 20%				
ATS600U-4T-0.75GB/1.5PB	0.75/1.5	1.5/2.5	3.4/5	2.1/3.8
ATS600U-4T-1.5GB/2.2PB	1.5/2.2	2.5/3.4	5/5.8	3.8/5.1
ATS600U-4T-2.2GB/4.0PB	2.2/4	3.4/5.9	5.8/10.5	5.1/9
ATS600U-4T-4.0GB/5.5PB	4/5.5	5.9/8.5	10.5/14.6	9/13
ATS600U-4T-5.5GB/7.5PB	5.5/7.5	8.5/11	14.6/20.5	13/17
ATS600U-4T-7.5GB/11PB	7.5/11	11/16	20.5/26	17/25
ATS600U-4T-11GB/15PB	11/15	16/21	26/35	25/32

Models	Adaptive motor (KW)	Rated capacity (KVA)	Rated input current (A)	Rated output current(A)
ATS600U-4T-15GB/18.5PB	15/18.5	21/24	35/38.5	32/37
ATS600U-4T-18.5GB/22PB	18.5/22	24/30	38.5/46.5	37/45
ATS600U-4T-22GB/30PB	22/30	30/39	46.5/62	45/60
ATS600U-4T-30GB/37PB	30/37	39/49	62/76	60/75
ATS600U-4T-37GB/45PB	37/45	49/59	76/92	75/90
ATS600U-4T-45G(B)/55P(B)	45/55	59/72	92/113	90/110
ATS600U-4T-55G(B)/75P(B)	55/75	72/100	113/157	110/152
ATS600U-4T-75G(B)/93P(B)	75/93	100/116	157/180	152/176
ATS600U-4T-93G(B)/110P(B)	93/110	116/138	180/214	176/210
ATS600U-4T-110G(B)/132P(B)	110/132	138/167	214/256	210/253
ATS600U-4T-132G(B)/160P(B)	132/160	167/200	256/307	253/304
ATS600U-4T-160G/185P	160/185	200/225	307/345	304/340
ATS600U-4T-185G/200P	185/200	225/250	345/385	340/377
ATS600U-4T-200G/220P	200/220	250/280	385/430	377/426
ATS600U-4T-220G/250P	220/250	280/309	430/468	426/465
ATS600U-4T-250G/280P	250/280	309/349	468/525	465/520
ATS600U-4T-280G/315P	280/315	349/398	525/590	520/585
ATS600U-4T-315G/355P	315/355	398/434	590/665	585/650
ATS600U-4T-355G/400P	355/400	434/494	665/785	650/725
ATS600U-4T-400G/450P	400/450	494/560	785/883	725/820
ATS600U-4T-450G/500P	450/500	560/615	883/920	820/900
ATS600U-4T-500G/550P	500/550	615/676	920/1020	900/1000
ATS600U-4T-550G/630P	550/630	676/775	1020/1120	1000/1100
ATS600U-4T-630G	630	775	1220	1150
ATS600U-4T-710G	710	870	1315	1250
ATS600U-4T-800G	800	980	1560	1450
ATS600U-4T-900G	900	1100	1760	1710
ATS600U-4T-1000G	1000	1230	1960	1900

Models	Adaptive motor (KW)	Rated capacity (KVA)	Rated input current (A)	Rated output current(A)
Three-phase 690V range: -15% ~ 20%				
ATS600U-7T-30GB	30	39	42	38
ATS600U-7T-37GB	37	49	49.5	47
ATS600U-7T-45GB	45	59	58	55
ATS600U-7T-55GB	55	72	70	65
ATS600U-7T-75G	75	100	90	86
ATS600U-7T-93G	93	116	105	100
ATS600U-7T-110G	110	138	130	120
ATS600U-7T-132G	132	167	170	150
ATS600U-7T-160G	160	200	200	175
ATS600U-7T-185G	185	225	208	198
ATS600U-7T-200G	200	250	235	215
ATS600U-7T-220G	220	280	247	245
ATS600U-7T-250G	250	309	265	260
ATS600U-7T-280G	280	349	305	299
ATS600U-7T-315G	315	398	350	330
ATS600U-7T-355G	355	434	382	374
ATS600U-7T-400G	400	494	435	410
ATS600U -7T-450G	450	560	490	465
ATS600U-7T-500G	500	615	595	550
ATS600U-7T-550G	550	675	605	600
ATS600U-7T-630G	630	775	684	650
ATS600U-7T-710G	710	870	768.5	730
ATS600U-7T-800G	800	980	860	825
ATS600U-7T900G	900	1100	955	920
ATS600U-7T-1000G	1000	1230	1060	1025
ATS600U-7T-1250G	1200	1540	1265	1250

2.4. Technical Features

Control performance	
Highest frequency	Vector control: 0 ~ 600Hz VF control: 0 ~ 1200Hz
Carrier frequency	1KHz ~ 15kHz; the carrier frequency can be adjusted automatically according to the load characteristics.
Input frequency resolution	Digital setting: 0.01Hz Analog setting: maximum frequency × 0.1%
Control mode	V/F control; Open loop vector control (SVC); Closed loop vector control (FVC); Voltage vector control (VVC)
Motor Type	Asynchronous motor, permanent magnet synchronous motor
Starting torque	G type machine: 0.5Hz/180% (open loop vector control, closed loop vector control) P type machine: 0.5Hz/120% (open loop vector control)
Speed range	1: 200 (open loop vector control) 1: 1000 (closed loop vector control)
Steady speed accuracy (speed control accuracy)	Rated synchronous speed Open loop vector control: $\leq \pm 0.5\%$ Closed loop vector control: $\leq \pm 0.2\%$
Torque Response	$\leq 40\text{ms}$ (open loop vector control) $\leq 20\text{ms}$ (Closed loop vector control)
Overload capability	G type machine: 150% rated current for 60 seconds; 180% rated current for 3 seconds P type machine: 120% rated current for 60 seconds; 150% rated current for 3 seconds
Torque boost	Automatic torque boost; manual torque boost 0.1% ~ 30.0%
V/F curve	Three ways: linear type; multi-point type; square type V/F curve
Acceleration and deceleration curve	Linear or S-curve acceleration and deceleration mode; four kinds of acceleration and deceleration time; acceleration

	and deceleration time range 0.0s ~ 3000.0s
DC brake	DC braking frequency: 0.0Hz ~ maximum frequency, braking time: 0.0 ~ 36.0 seconds, braking action currentvalue: 0.0% ~ 100.0%
Jogging Control	Jog frequency range: 0.00Hz ~ 50.00Hz; Jog acceleration and deceleration time 0.0s ~ 3000.0s
Simple PLC & multi step speed operation	Built-in PLC or control terminal,16 steps speed can be set
Built-in PID	Process control closed-loop control system can be easily realized
Automatic voltage regulation(AVR)	When the grid voltage changes, it can automatically keep the output voltage constant
Torque Limiting and Control	"Excavator" feature, automatically limit the torque during operation to prevent frequent overcurrent tripping; closed-loop vector mode can realize torque control
Personalization	
Power-on peripheral device safety self-check	It can realize safety detection of peripheral equipment such as grounding, short circuit, etc.
Common DC bus function	It can realize the function of sharing the DC bus of multiple inverters
MF.K key	Programmable keys: forward and reverse operation, forward and reverse jog operation, terminal operation, communication operation switching function selection
Textile swing frequency control	Various triangular wave frequency control functions
Fixed-Length Control Function	Built in fixed length control module
Quick current limiting function	Built in fast current limiting algorithm reduces the probability of overcurrent reporting in the frequency converter and improves the overall anti-interference ability of the machine
Timing control	Timing control function: Set time range 0h ~ 65535h

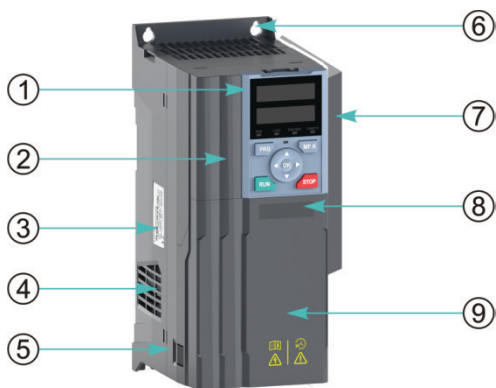
Standardization of keyboard extension cords	Customers can use standard network cables to extend the keyboard.
Run Command Channel	Three channels: operation panel given, control terminal given, serial communication port given. Switchable in a variety of ways
Frequency source	There are 10 kinds of frequency sources: digital given, analog voltage given, analog current given, pulse given, serial port given. Switchable in a variety of ways
Auxiliary frequency source	10 auxiliary frequency sources. Auxiliary frequency fine-tuning and frequency synthesis can be flexibly realized
Features	Synchronous asynchronous integration Heavy load and light load integration Quick settings for safety torque shutdown function, elevator mode, tension control mode and other application macros
Input and Output	
External analog power supply	+10V, Load capacity of 100mA
External digital power supply	+24V, Load capacity of 200mA
Digital input	D1- DI7 multifunctional editable digital input terminal, HDI high-speed pulse input
Digital output	FM, Pulse output or open collector switch output can be selected
Digital terminal power mode	NPN or PNP can be selected
Analog input	Two analog inputs, voltage 0-10V or current 0/4-20mA selectable
Analog output	Two analog output puts, voltage 0-10V or current 0/4-20mA selectable
Programmable relay output	Two relay outputs, contact capacity: 250VAC/3A or 30DC/1A

STO Mode	STO1 - +24V , STO2 - +24V
Compatible with multiple encoders	Optional collector open circuit ABZ encoder card, serial communication encoder, differential input ABZ encoder card, sine cosine encoder card, and rotary encoder card.
Compatible with multiple communication protocols	Standard Modbus 485 communication protocol, with optional matching resistors Optional bus modules and protocols such as Profinet, Profibus, Ethercat, Canopen, Modbus-TCP, etc
Operation and Display	
LED Display	Dual digital display function parameter settings, status parameter viewing, and fault code viewing
LCD Display	Optional, available in multiple languages including Chinese, English, Russian, etc
Extended external display	RJ45 interface, LED or LCD selectable
Parameter copying	Using LED and LCD can achieve fast parameter replication
Key locking and function selection	Implement partial or complete locking of keys, define the scope of action of some keys to prevent accidental operation
Protection function	
Overpressure stall	Automatic control of bus voltage to prevent overvoltage faults
Automatic current limiting protection	Automatic output current limitation to prevent overcurrent faults
Overload pre alarm and warning	Overload early warning and protection
Output load drop protection	Load drop alarm function
Input and output phase loss protection	Automatic detection and alarm function for input and output phase loss
Process PID given and	The PID automatic identification of whether the given and

feedback	feedback are lost during the loss detection process, as well as the loss alarm function
Output ground short circuit protection	Effective protection function against ground short circuit output
Output phase to phase short circuit protection	Effective protection function for output phase to phase short circuit
Environmental characteristics	
Usage location	Indoor, not exposed to direct sunlight, free from dust, corrosive gases, flammable gases, oil mist, water vapor, dripping or salt, etc
Altitude	Below 1000 meters, downgrading is required for use above 1000 meters
Ambient temperature	-10 °C ~ +50 °C (ambient temperature is between 40 °C ~ 50 °C, please reduce the rating for use)
Humidity	Less than 95% RH, no condensation of water droplets
Vibration	Less than 5.9 meters per second (0.6g)
Storage temperature	-20°C ~ +60°C
Pollution level	IP20
Product standard	
Product compliance with safety standards	IEC61800-5-1:2007
The product complies with EMC standards	IEC61800-3:2005

2.5. All components schematic diagram of AC drive

2.5.1. Product Appearance Diagram

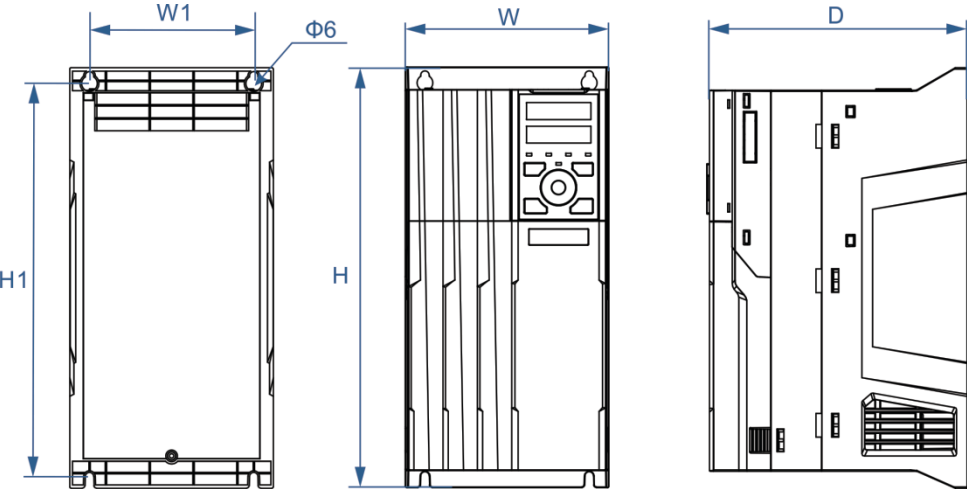


All components and names of the plastic shell AC drive

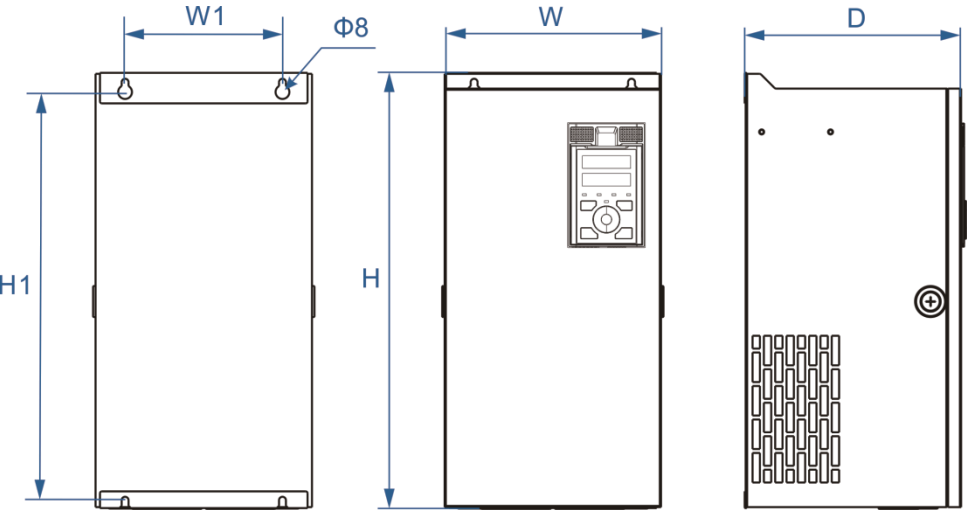
No.	Name	Description
1	Keyboard	LED and LCD operation panel
2	Top cover	Protect internal components
3	Series Label	Refer to 2.3 "Naming Rules".
4	Bottom frame	Protect internal components
5	Middle frame	Protect internal components
6	Mounting hole	Install fixed hole positions
7	Extension module	Extended functional components
8	Logo	Brand
9	Terminal cover	Protect internal components

2.5.2. Appearance and installation dimensions

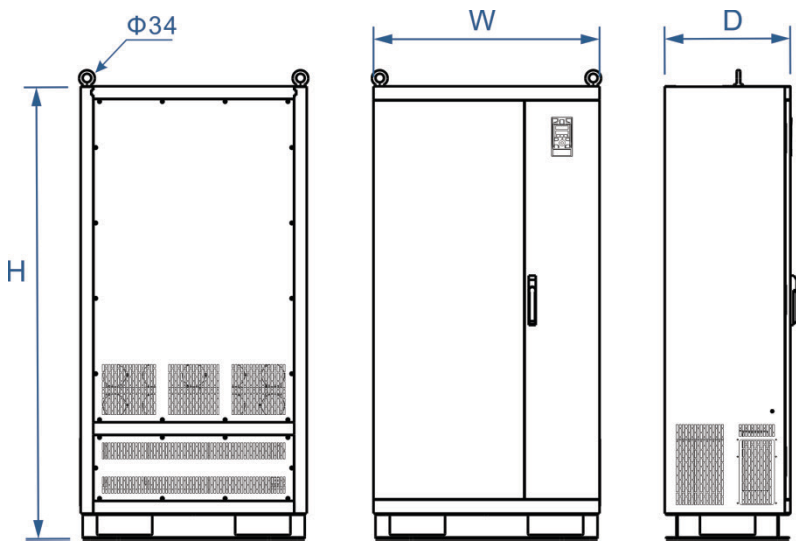
2.5.2.1. 0.4kW ~ 22kW plastic shell external dimensions and installation dimensions



2.5.2.2. 30kW ~ 450kW sheet metal chassis appearance, size and installation dimensions



2.5.2.3. 500kW ~ 1000kW cabinet type chassis appearance and installation dimensions



2.5.2.4. Table of external dimensions and installation dimensions

Model (Dimension unit: mm)	Mounting hole		Overall dimensions			Installation aperture
	W1	H1	W	H	D	
Single-phase 220V range: -15% ~ 20%						
ATS600U -2S-0.4GB	65	205	80	216	143	Φ5
ATS600U -2S-0.75GB						
ATS600U -2S-1.5GB						
ATS600U -2S-2.2GB						
ATS600U -2S-4.0GB	90	270	102	245	168	Φ5
ATS600U -2S-5.5GB	125	305	155	320	196	Φ6
ATS600U -2S-7.5GB						
Input Single-phase 220V range: -15% ~ 20%, Output Three-phase 0 - 400V						
ATS600U -2S/4T-0.75GB	65	205	80	216	143	Φ5
ATS600U -2S/4T-1.5GB						
ATS600U -2S/4T-2.2GB	80	234	102	245	168	Φ5

Model (Dimension unit: mm)	Mounting hole		Overall dimensions			Installation aperture
	W1	H1	W	H	D	
ATS600U -2S/4T-4.0GB						
ATS600U -2S/4T-5.5GB	125	305	155	320	196	Φ6
ATS600U -2S/4T-7.5GB						
ATS600U-2S/4T-11GB						
ATS600U-2S/4T-15GB	130	376	170	445	215	Φ6.5
ATS600U-2S/4T-18.5GB						
ATS600U-2S/4T-22GB	160	425	220	445	220	Φ7
ATS600U-2S/4T-30GB						
Three-phase 220V range: -15% ~ 20%						
ATS600U-2T-0.4GB	65	205	80	216	143	Φ5
ATS600U-2T-0.75GB						
ATS600U-2T-1.5GB						
ATS600U-2T-2.2GB						
ATS600U-2T-4.0GB	90	270	102	245	168	Φ5
ATS600U-2T-5.5GB	125	305	155	320	196	Φ6
ATS600U-2T-7.5GB						
ATS600U-2T-11GB	130	376	170	445	215	Φ6.5
ATS600U-2T-15GB	160	425	220	445	220	Φ7
ATS600U-2T-18.5GB						
ATS600U-2T-22G(B)	160	495	245	510	280	Φ7
ATS600U-2T-30G(B)	245	500	316	514	256	Φ10
ATS600U-2T-37G(B)						
ATS600U-2T-45G(B)	290	580	350	600	265	Φ10
ATS600U-2T-55G(B)						
ATS600U-2T-75G	290	940	383	960	340	Φ12
ATS600U-2T-93G	300	1040	410	1060	380	Φ12
ATS600U-2T-110G						

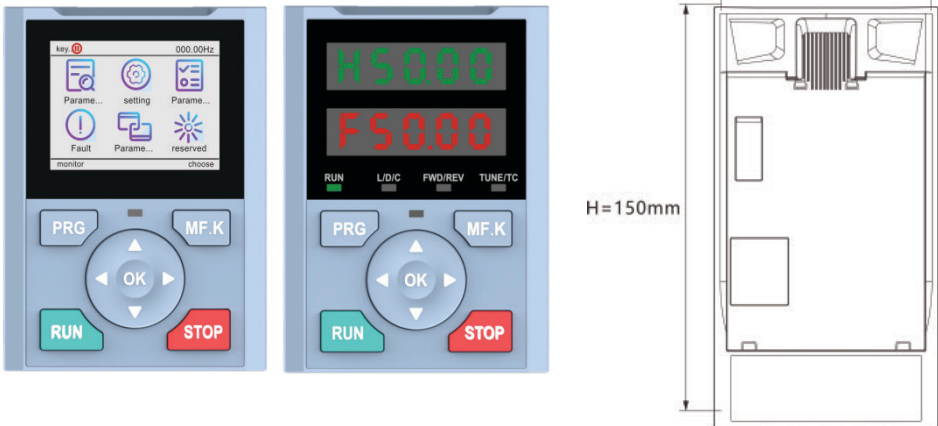
Model (Dimension unit: mm)	Mounting hole		Overall dimensions			Installation aperture
	W1	H1	W	H	D	
ATS600U-2T-132G	420	1100	470	1120	380	Φ12
ATS600U-2T-160G	500	1255	640	1275	405	Φ12
ATS600U-2T-200G	500	1255	640	1275	405	Φ12
ATS600U-2T-220G						
Three-phase 380V range: -15% ~ 20%						
ATS600U-4T-0.75GB/1.5PB	65	205	80	216	143	Φ5
ATS600U-4T-1.5GB/2.2PB						
ATS600U-4T-2.2GB/4.0PB						
ATS600U -4T-4.0GB/5.5PB	80	234	102	245	168	Φ5
ATS600U -4T-5.5GB/7.5PB						
ATS600U -4T-7.5GB/11PB	90	270	115	280	168	Φ5
ATS600U -4T-11GB/15PB	125	305	155	320	196	Φ6
ATS600U -4T-15GB/18.5PB						
ATS600U -4T-18.5GB/22PB	130	376	170	445	215	Φ6.5
ATS600U -4T-22GB/30PB						
ATS600U -4T-30GB/37PB	160	425	220	445	220	Φ7
ATS600U -4T-37GB/45PB						
ATS600U -4T-45G(B)/55P(B)	160	495	245	510	280	Φ7
ATS600U -4T-55G(B)/75P(B)	245	500	316	514	256	Φ10
ATS600U -4T-75G(B)/93P(B)						
ATS600U-4T-93G(B)/110P(B)	290	580	350	600	265	Φ10
ATS600U-4T-110G(B)/132P(B)						
ATS600U -4T-132G(B)/160P(B)	270	700	360	720	335	Φ12
ATS600U -4T-160G/185P	290	940	383	960	340	Φ12
ATS600U -4T-185G/200P	300	1040	410	1060	380	Φ12
ATS600U -4T-200G/220P						
ATS600U -4T-220G/250P						

Model (Dimension unit: mm)	Mounting hole		Overall dimensions			Installation aperture
	W1	H1	W	H	D	
ATS600U -4T-250G/280P	420	1100	470	1120	380	Φ12
ATS600U -4T-280G/315P						
ATS600U -4T-315G/355P	500	1255	640	1275	405	Φ12
ATS600U -4T-355G/400P	500	1255	640	1275	405	Φ12
ATS600U -4T-400G/450P						
ATS600U -4T-450G/500P						
ATS600U -4T-500G/550P	/	/	900	1800	500	Vertical
ATS600U -4T-550G/630P						
ATS600U -4T-630G						
ATS600U -4T-710G	/	/	1100	2200	600	Vertical
ATS600U -4T-800G						
ATS600U -4T-900G	/	/	1300	2300	600	Vertical
ATS600U -4T-1000G						
Three-phase 690V range: -15% ~ 20%						
-7T-30GB						
-7T-37GB						
-7T-45GB						
-7T-55GB						
-7T-75G						
-7T-93G						
-7T-110G						
-7T-132G						
-7T-160G						
-7T-185G						
-7T-200G						
-7T-220G						
-7T-250G						

Model (Dimension unit: mm)	Mounting hole		Overall dimensions			Installation aperture
	W1	H1	W	H	D	
-7T-280G						
-7T-315G						
-7T-355G						
-7T-400G						
-7T-450G						
-7T-500G						
-7T-550G						
-7T-630G						
-7T-710G						
-7T-800G						
-7T900G						
-7T-1000G						
-7T-1250G						

Attention: B has an internal brake unit, (B) is equipped with an internal brake unit, and empty: an external brake unit is optional.

2.5.3. External keyboard and mounting bracket



The LED keyboard and LCD keyboard have the same external dimensions and installation dimensions, and use the same external bracket. The opening size of the external bracket is: W: 77.5mm * H: 150mm.

2.6. Optional accessories

For detailed functions and usage instructions of the selected accessories, please refer to the relevant accessory instructions. If you need the above optional accessories, please specify them when placing an order.

Name	Model	Function
Built in braking unit	B	'B' comes standard with a built-in energy consuming braking unit, while '(B)' comes with an optional built-in one
Feedback Unit	CL100	Feed back the energy generated by the device during the braking process to the power grid or storage devices to improve energy utilization efficiency and reduce energy loss
External operation panel	600U-LED/LCD	LED dual display digital tube display and operation, LCD screen display and operation
keyboard tray	700-SJ-21-B	The external operation panel uses a perforated self fastening bracket

Name	Model	Function
Keyboard extension cable	RJ45 Ethernet cable	Standard 8-core Ethernet cable connects the operation panel to the frequency converter
DC reactor	DCL	Limit the AC component in the current, improve power factor, reduce current pulsation, suppress harmonics, and prevent sudden changes in current
Input reactor	ACR	Suppress surge voltage and surge current, reduce voltage fluctuations, improve power factor, and protect motors
Output reactor	OCR	Suppress high-order harmonics, limit voltage change rate, increase transmission distance, balance the distributed capacitive load of cables, increase the short-circuit impedance of the main circuit, and protect the motor
Input filter	RFI	Suppress high-order harmonics, prevent interference, improve system power factor, and alleviate three-phase imbalance
Output filter	RFO	Reduce the harmonics and commutation gap of the main power supply, protect the driving power electronic components from the impact of peak current of the main power supply, suppress the harmonic interference of the driving output, and improve the reliability of the system

Do not install capacitors or surge suppressors on the output side of the frequency converter, as this may cause faults in the frequency converter or damage to the capacitors and surge suppressors. The input/output (main circuit) of the frequency converter contains harmonic components, which may interfere with the communication equipment of the frequency converter accessories. Therefore, install anti-interference filters to minimize interference.

Detailed information and options of peripheral devices refer to the selection of peripheral devices.

Connection with peripheral devices

Three-phase
AC power

R S T

Use within the allowable power supply specification of the AC drive

Moulded case
circuit breaker or
earth leakage
circuit breakers

Select a proper breaker to resist large in-rush current that flows into the AC drive at power-on

Electromagnetic
Contactor

To guarantee safety, use an electromagnetic contactor. Do not use it to start or stop the AC drive because such operation reduces the service life of the AC drive

Input AC reactor

Suppress the high order harmonic to improve power factor

Input side EMC
filter

Reduce the electromagnetic interference on the input side.

Break unit

Braking resistor

BR

P+

Ground

Output
Reactors

Motor

Ground

Example of Connection with Peripheral Devices

2.7. Expansion card

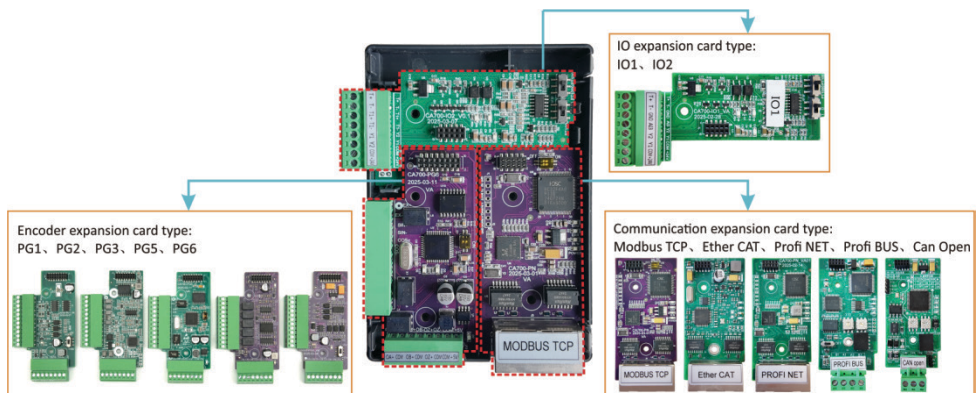
Type	Model	The order code
I/O Expansion card 1	IO1	1 channel AI (Ai3), 2 channels Y (Y1, Y2) terminals, 1 channel (PT100/PT1000) temperature detection.
I/O Expansion card 1	IO2	2 channels Y (Y1, Y2) terminals, 2 channel (PT100/PT1000) temperature detection.
CANOPEN communication expansion card	CANOPEN	CANOPEN communication expansion card
PROFINET communication expansion card	PN	Compliant with the internationally recognized Profinet Ethernet standard. This card is installed on the frequency converter to improve communication efficiency, facilitate the networking function of the frequency converter, and make the frequency converter a slave station of the fieldbus, accepting control from the fieldbus master station.
PROFIBUS communication expansion card	DP	The Profibus DP fieldbus adapter card complies with the internationally recognized Profibus fieldbus standard, which can improve communication efficiency on the frequency converter, achieve networking functions, and make the frequency converter a slave station of the fieldbus, accepting control from the fieldbus master station. This DP expansion card can achieve Profibus DP communication.
Ethercat communication card	ETHERCAT	EtherCAT fieldbus adapter card, suitable for ultra-high speed I/O networks.
Modbus TCP bus card	MODBUS TCP	Modbus TCP protocol is an industrial communication protocol based on Ethernet and

Type	Model	The order code
		TCP/IP protocol, which is an extended application of Modbus protocol in Ethernet environment.
Collector open ABZ encoder card	PG1	Open collector PG card (PG1 card is only used for asynchronous applications); Compatible with complementary output, encoder card output DC power optional +12.
Serial Communication Encoder	PG2	By replacing traditional analog signals with digital signal transmission, the anti-interference ability and transmission distance are greatly improved.
Differential input ABZ encoder card	PG3	ABZ differential signal input PG card; 1: 1 differential frequency division output; Suitable for closed-loop vector control (VC) of asynchronous traction machines.
Sine and cosine encoder card	PG5	Support sine and cosine signal input; Support differential frequency division output; Suitable for synchronous traction machine closed-loop vector control (VC)
Rotary transformer interface card	PG6	Suitable for rotary transformers; Suitable for synchronous traction machine closed-loop vector control (VC).

Expansion card installation diagram



Schematic diagram of the built-in expansion card in the expansion card box



2.8. Brake Assembly 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, the power can be large.) The choice of brake resistance needs to be determined according to the power generated by the motor in the actual application system, which is related to the inertia of the system, deceleration time, and the energy of the potential energy load, etc., which needs to be selected by the customer according to the actual situation. The greater the inertia of the system, the shorter the deceleration time required, and the more frequent the braking resistance, the greater the braking resistance needs to be selected and the smaller the resistance value

2.8.1. Choice of resistance value

During braking, the regenerative energy of the motor is almost entirely consumed in the braking resistance. According to the formula:

$$U^2/R=P_b$$

- U---- braking voltage of stable braking system (different systems are different, generally 700V for 380VAC system);
- P_b ---- Braking power.

2.8.2. Power selection of braking resistor

In theory, the power of the braking resistor is the same as the braking power, but considering a derating of 70%. According to the formula:

$$0.7 \cdot P_r = P_b \cdot D$$

- P_r - power of the resistor;
- D - Braking frequency (the proportion of regeneration process to the entire working process), generally taken as 10%. Please refer to the table below:

Application industry	Lift	Roll up and roll up	Centrifuge	Accidental braking load
Proportion	20% ~ 30%	20% ~ 30%	50% ~ 60%	5%

Recommended selection table for braking units and braking resistors

Model	Applicable motor (kW)	Brake unit	Braking resistor resistance value	Braking resistor power
Three-phase 380V range: -15% ~ 20%				
ATS600U -4T-0.75GB/1.5PB	0.75	Standard built-in	250 - 350Ω	0.1kW
ATS600U -4T-1.5GB/2.2PB	1.5	Standard built-in	200 - 300Ω	0.2kW
ATS600U -4T-2.2GB/4.0PB	2.2	Standard built-in	150 - 250Ω	0.25kW
ATS600U -4T-4.0GB/5.5PB	4	Standard built-in	100 - 150Ω	0.3kW
ATS600U -4T-5.5GB/7.5PB	5.5	Standard built-in	80 - 100Ω	0.5kW
ATS600U -4T-7.5GB/11PB	7.5	Standard built-in	60 - 80Ω	0.7kW
ATS600U -4T-11GB/15PB	11	Standard built-in	40 - 50Ω	1kW
ATS600U -4T-15GB/18.5PB	15	Standard built-in	30 - 40Ω	1.5kW
ATS600U -4T-18.5GB/22PB	18.5	Standard built-in	25 - 30Ω	2kW
ATS600U -4T-22GB/30PB	22	Standard built-in	20 - 25Ω	2.5kW
ATS600U -4T-30GB/37PB	30	Standard built-in	15 - 20Ω	3kW
ATS600U -4T-37GB/45PB	37	Standard built-in	15 - 20Ω	3.5kW
ATS600U -4T-45G(B)/55P(B)	45	Optional built-in	10 - 15Ω	4.5kW
ATS600U -4T-55G(B)/75P(B)	55	Optional built-in	10 - 15Ω	5.5kW

Model	Applicable motor (kW)	Brake unit	Braking resistor resistance value	Braking resistor power
ATS600U -4T-75G(B)/93P(B)	75	Optional built-in	8 - 10Ω	7.5kW
ATS600U -4T-93G(B)/110P(B)	93	Optional built-in	8 - 10Ω	9kW
ATS600U -4T-110G(B)/132P(B)	110	Optional built-in	6 - 8Ω	11kW
ATS600U -4T-132G(B)/160P(B)	132	Optional built-in	6 - 8Ω	13.5kW
ATS600U -4T-160G/185P	160	CBR600-4T200	4 - 6Ω	16kW
ATS600U -4T-185G/200P	185	CBR600-4T200	4 - 6Ω	18.5kW
ATS600U -4T-200G/220P	200	CBR600-4T315	4 - 6Ω	20kW
ATS600U -4T-220G/250P	220	CBR600-4T315	6 - 8Ω * 2	11kW * 2
ATS600U -4T-250G/280P	250	CBR600-4T315	6 - 8Ω * 2	12.5kW * 2
ATS600U -4T-280G/315P	280	CBR600-4T315	4 - 6Ω * 2	14kW * 2
ATS600U -4T-315G/355P	315	CBR600-4T450	4 - 6Ω * 2	16kW * 2
ATS600U -4T-355G/400P	355	CBR600-4T450	4 - 6Ω * 3	11kW * 3
ATS600U -4T-400G/450P	400	CBR600-4T450	4 - 6Ω * 3	14kW * 3
ATS600U -4T-450G/500P	450	CBR600-4T630	4 - 6Ω * 4	10kW * 4
ATS600U -4T-500G/550P	500	CBR600-4T630	4 - 6Ω * 4	12.5kW * 4

Model	Applicable motor (kW)	Brake unit	Braking resistor resistance value	Braking resistor power
ATS600U -4T-550G/630P	550	CBR600-4T630	4 - 6Ω * 4	14kW * 4
ATS600U -4T-630G	630	CBR600-4T630	4 - 6Ω * 4	16kW * 4
Three-phase 690V range: -15% ~ 20%				
ATS600U -7T-30GB	30	Standard built-in	40-60Ω	3kW
ATS600U -7T-37GB	37	Standard built-in	40-50Ω	3.5kW
ATS600U -7T-45GB	45	Standard built-in	20-40Ω	4.5kW
ATS600U -7T-55GB	55	Standard built-in	20-35Ω	5.5kW
ATS600U -7T-75G	75	CBR600-7T75	20-25Ω	7.5kW
ATS600U -7T-93G	93	CBR600-7T132	15-20Ω	9kW
ATS600U -7T-110G	110	CBR600-7T132	15-20Ω	11kW
ATS600U -7T-132G	132	CBR600-7T132	15-20Ω	13.5kW
ATS600U -7T-160G	160	CBR600-7T200	12-15Ω	16kW
ATS600U -7T-185G	185	CBR600-7T200	12-15Ω	18.5kW
ATS600U -7T-200G	200	CBR600-7T200	12-15Ω	20kW
ATS600U -7T-220G	220	CBR600-7T315	7.5-10Ω	22kW
ATS600U -7T-250G	250	CBR600-7T315	7.5-10Ω	25kW
ATS600U -7T-280G	280	CBR600-7T315	7.5-10Ω	28kW
ATS600U -7T-315G	315	CBR600-7T315	7.5-10Ω	32kW
ATS600U -7T-355G	355	CBR600-7T450	5.6-6Ω	36kW
ATS600U -7T-400G	400	CBR600-7T450	5.6-6Ω	40kW
ATS600U -7T-450G	450	CBR600-7T450	5.6-6Ω	45kW
ATS600U -7T-500G	500	CBR600-7T630	3.9-4Ω	50kW
ATS600U -7T-550G	550	CBR600-7T630	3.9-4Ω	55kW
ATS600U -7T-630G	630	CBR600-7T630	3.9-4Ω	63kW

BE CAREFUL:

It is recommended to select the braking resistor according to the recommended

resistance range in the table above. In the table, * 2 represents the parallel use of two sets of braking resistors, * 3 represents the parallel use of three sets of braking resistors, and * 4 represents the parallel use of four sets of braking resistors. A larger resistance value can ensure safety in case of brake system failure, but if the resistance value is too high, the braking capacity will decrease, which may cause overvoltage protection in the driver.

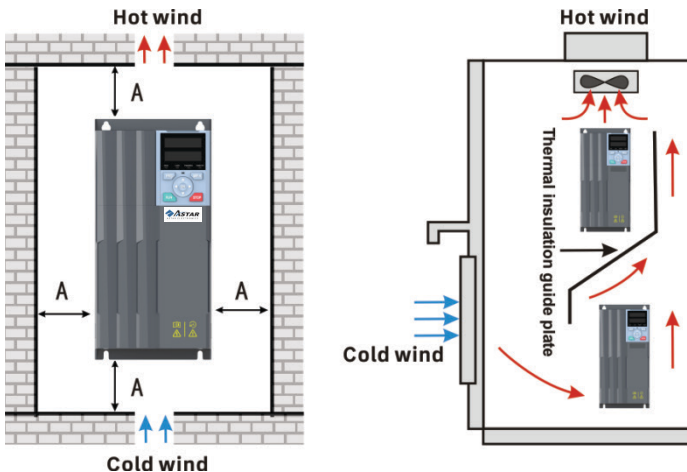
Please install the braking resistor in a well ventilated metal cover. The temperature of the braking resistor is very high during operation, so do not touch it directly

Chapter 3 Mechanical and electrical installation

3.1. Mechanical installation

3.1.1. Installation Environment

- Ambient temperature: The ambient temperature has a great impact on the life of the frequency converter. The operating ambient temperature of the frequency converter must not exceed the allowable temperature range ($-10^{\circ}\text{C} \sim 50^{\circ}\text{C}$).
- Mount the frequency converter on a flame-retardant surface, ensuring sufficient space around it for heat dissipation. Frequency converters generate a significant amount of heat during operation. Secure it vertically to the mounting bracket using screws.
- Please install in a location where vibration is minimal. Vibration should not exceed 0.6G. Pay special attention to keeping it away from equipment such as punch presses.
- Avoid placing it in direct sunlight, in humid environments, or where there are water droplets.
- Avoid storing in places where there are corrosive, flammable, or explosive gases in the air.
- Avoid installing it in places with oil stains, dust, or metal dust.



Note: When installing a single unit, $A \geq 100\text{mm}$. When installing the frequency converter vertically, please follow the heat insulation guide plate shown in the installation diagram.

3.1.2. Heat dissipation issues during product installation :

- Please install the frequency converter vertically to facilitate heat dissipation upwards , but do not invert it. If there are multiple frequency converters in the cabinet, please install them side by side. In cases where vertical installation is required, please refer to the diagram above and install heat insulation guide plates.
- The installation space should conform to the "Individual Installation Diagram" to ensure sufficient space for the inverter's heat dissipation. When arranging the components, please consider the heat dissipation of other devices within the cabinet.
- The mounting bracket must be made of flame-retardant material.
- For applications involving metal dust, it is recommended to use an in-cabinet installation method. In this case, the fully enclosed space inside the cabinet should be as large as possible.

3.2. Electrical installation

External Electrical Components Selection Guide

Model	Breaker (A)	Contactor (A)	Input side main circuit wire (mm ²)	Output side main circuit wires (mm ²)	Control loop wiring (mm ²)
Input voltage: Single -phase 220V Range: -15% ~ +20%					
ATS600U -2S-0.4GB	16	10	2.5	2.5	1
ATS600U -2S-0.75GB	16	10	2.5	2.5	1
ATS600U -2S-1.5GB	20	16	4	2.5	1
ATS600U -2S-2.2GB	32	20	6	4	1
ATS600U -2S-4.0GB	40	32	6	4	1
ATS600U -2S-5.5GB	63	40	10	4	1
ATS600U -2S-7.5GB	63	40	10	6	1
Input voltage: Three-phase 380V Range: -15% ~ +20%					
ATS600U -4TB-0.75GB/1.5PB	10	10	2.5	2.5	1
ATS600U -4TB-	16	10	2.5	2.5	1

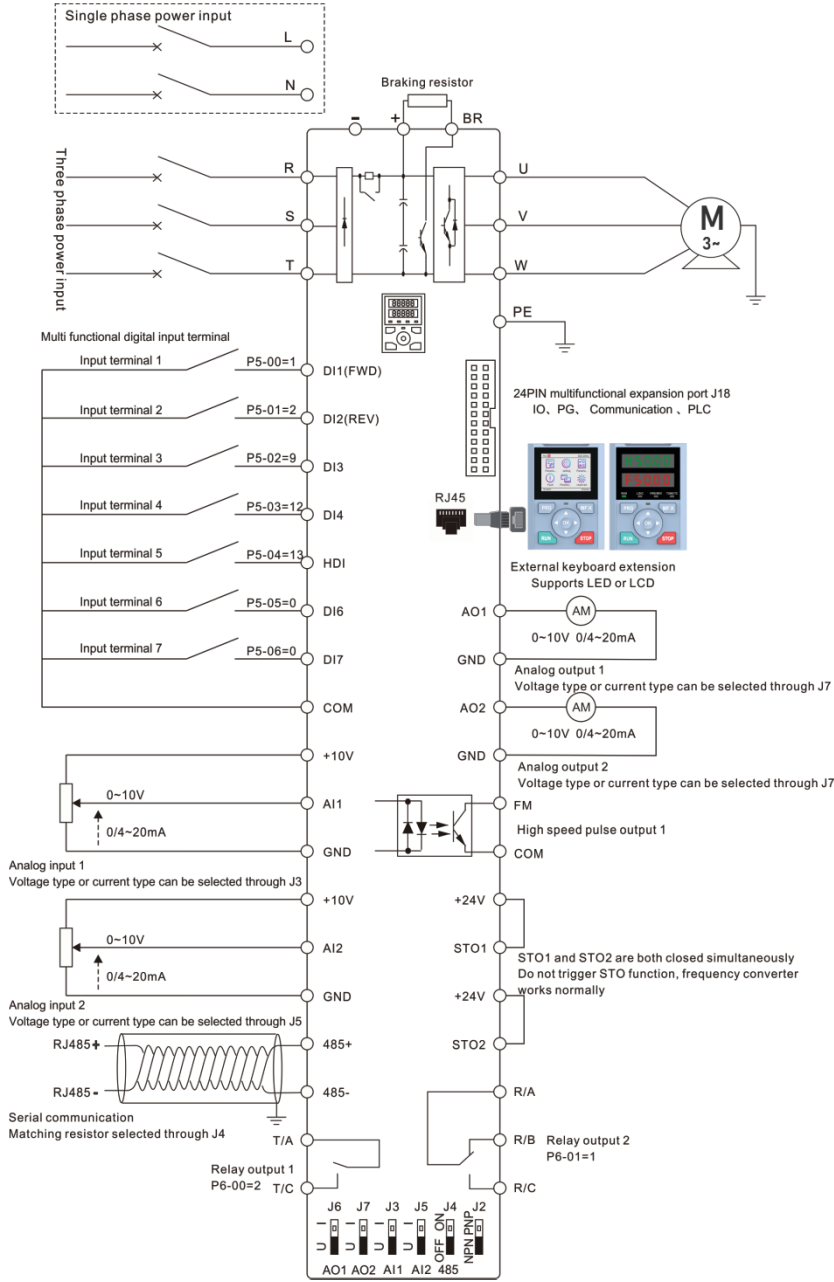
Model	Breaker (A)	Contactor (A)	Input side main circuit wire (mm ²)	Output side main circuit wires (mm ²)	Control loop wiring (mm ²)
1.5GB/2.2PB					
ATS600U -4TB-2.2GB/4.0PB	16	10	2.5	2.5	1
ATS600U -4T-4.0GB/5.5PB	25	16	4	4	1
ATS600U -4TB-5.5GB/7.5PB	32	25	4	4	1
ATS600U -4T-7.5GB/11PB	40	32	4	4	1
ATS600U -4T-11GB/15PB	63	40	4	4	1
ATS600U -4TB-15GB/18.5PB	63	40	6	6	1
ATS600U -4T-18.5GB/22PB	100	63	6	6	1
ATS600U -4T-22GB/30PB	100	63	10	10	1
ATS600U -4T-30GB/37PB	125	100	16	10	1
ATS600U -4T-37GB/45PB	160	100	16	16	1
ATS600U -4T-45G(B)/55P(B)	200	125	25	25	1
ATS600U -4T-55G(B)/75P(B)	250	125	35	25	1
ATS600U -4T-75G(B)/93P(B)	250	160	50	35	1
ATS600U -4T-93G(B)/110P(B)	350	160	70	35	1

Model	Breaker (A)	Contactor (A)	Input side main circuit wire (mm ²)	Output side main circuit wires (mm ²)	Control loop wiring (mm ²)
ATS600U -4T-110G(B)/132P(B)	350	350	120	120	1
ATS600U -4T-132G(B)/160P(B)	400	400	150	150	1
ATS600U -4T-160G/185P	500	400	185	185	1
ATS600U -4T-185G/200P	500	400	185	185	1
ATS600U -4T-200G/220P	630	600	150 * 2	150 * 2	1
ATS600U -4T-220G/250P	630	600	150 * 2	150 * 2	1
ATS600U -4T-250G/280P	800	600	150 * 2	150 * 2	1
ATS600U -4T-280G/315P	800	800	150 * 2	150 * 2	1
ATS600U -4T-315G/355P	1000	800	150 * 3	150 * 3	1
ATS600U -4T-355G/400P	1000	800	150 * 4	150 * 4	1
ATS600U -4T-400G/450P	1250	1000	150 * 4	150 * 4	1
ATS600U -4T-450G/500P	1250	1000	150 * 4	150 * 4	1
ATS600U -4T-500G/550P	1250	1000	150 * 4	150 * 4	1
ATS600U -4T-550G/630P	1,600	1 200	150 * 4	150 * 4	1
ATS600U-4T-630G	1,600	1,600	150 * 4	150 * 4	1

Model	Breaker (A)	Contactor (A)	Input side main circuit wire (mm ²)	Output side main circuit wires (mm ²)	Control loop wiring (mm ²)
Input voltage: Three-phase 690V Range: -15% ~ +20%					
ATS600U -7T-30GB	80	50	10	10	1
ATS600U -7T-37GB	100	65	16	16	1
ATS600U -7T-45GB	100	80	25	25	1
ATS600U -7T-55GB	125	115	35	35	1
ATS600U -7T-75G	160	150	50	50	1
ATS600U -7T-93G	225	170	70	70	1
ATS600U -7T-110G	250	205	95	95	1
ATS600U -7T-132G	315	245	120	120	1
ATS600U -7T-160G	350	300	120	120	1
ATS600U -7T-185G	400	400	150	150	1
ATS600U -7T-200G	400	400	150	150	1
ATS600U -7T-220G	500	410	185	185	1
ATS600U -7T-250G	500	410	185	185	1
ATS600U -7T-280G	630	475	240	240	1
ATS600U -7T-315G	630	475	2×120	2×120	1
ATS600U -7T-355G	700	620	2×120	2×120	1
ATS600U -7T-400G	800	620	2×150	2×150	1
ATS600U -7T-450G	800	620	2×150	2×150	1
ATS600U -7T-500G	1000	800	2×185	2×185	1
ATS600U -7T-550G	1000	800	2×185	2×185	1
ATS600U -7T-630G	1250	800	2×240	2×240	1

3.3. Wiring method

3.3.1. Terminal wiring diagram



3.3.2. Main circuit terminals and wiring

Terminal markings	name	illustrate
L, N	Single-phase power input terminals	Single-phase 220V AC power connection point
R, S, T	Three-phase power input terminals	AC three-phase power input connection point
P(+), (-)	DC bus positive and negative terminals	Common DC bus input point
P(+), BR	Energy-consuming braking resistor connection terminals	Connecting the braking resistor
U, V, W	Inverter output terminals	Connecting a three-phase motor
PE	Grounding terminal	Grounding terminal

Wiring precautions:

Input power supply L, N or R, S, T: Input side wiring of the frequency converter, no phase sequence requirement.

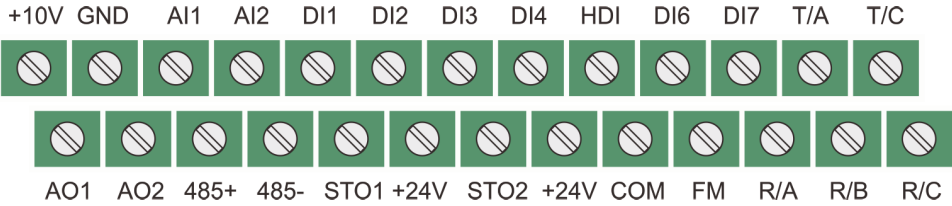
- DC bus P(+), (-): Note that there is residual voltage at the DC bus P(+) and (-) terminals immediately after a power outage. Wait until the power indicator light on the driver board goes out and confirm that the power outage has lasted for 10 minutes before proceeding with wiring operations, otherwise there is a risk of electric shock.
- The wiring length for the braking unit should not exceed 10m. Twisted-pair cable or tightly packed parallel wiring should be used.
- Do not connect the braking resistor directly to the DC bus, as this may damage the frequency converter or even cause a fire.
- The braking resistor is connected to terminals P(+) and PB.
- When selecting a braking resistor, refer to the recommended values, and the wiring distance should be less than 5m. Otherwise, it may damage the frequency converter.

Inverter output side U, V, W:

- Capacitors or surge absorbers should not be connected to the output side of the frequency converter, otherwise the frequency converter will frequently trigger protection or even be damaged.

- When the motor cable is too long, electrical resonance is easily generated due to the influence of distributed capacitance, which can lead to insulation failure of the motor or generate a large leakage current that triggers the inverter's overcurrent protection. When the motor cable length exceeds 100m, an AC output reactor must be installed near the inverter.
- Grounding terminal $\oplus$ PE : The terminal must be reliably grounded, and the resistance of the grounding wire must be less than 0.1Ω. Otherwise, it may cause abnormal operation or even damage to the equipment. The grounding terminal $\oplus$ and the neutral (N) terminal of the power supply must not be shared.

3.3.3. Programmable multifunction control terminal



3.3.4. Control Terminal Function Description

Terminal symbol	Terminal name	Function Description
+10V-GND	External +10V power supply	It provides +10V power and has a maximum output current of 100mA. It is generally used as an external potentiometer power supply, with a potentiometer resistance range of 1 to 5kΩ.
24V-COM	External +24V power supply	It provides +24V power and is generally used as a power supply for digital input/output terminals and external sensors. Maximum output current: 200mA
AI1-GND	Analog input terminal 1	Input range: DC 0 ~ 10V or 0 ~ 20mA AI1 is selected by J3 on the control board, and is set to voltage mode by default. AI2 is selected by J4 on the control board, and is set to voltage mode by default. Input impedance: 100KΩ for voltage input, 500Ω for current input
AI2-GND	Analog input terminal 2	

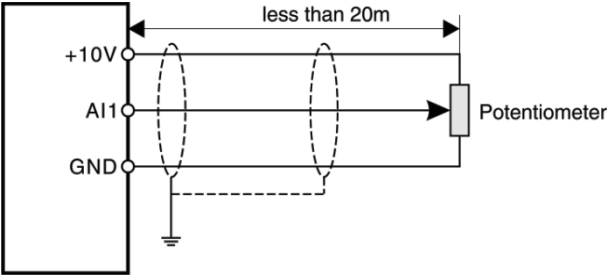
Terminal symbol	Terminal name	Function Description
		Modify P5-15=2 and P5-20=2 to correspond to the inputs 4~20mA for AI1 and AI2 respectively.
DI1-COM	Number input 1	Optically isolated, compatible with bipolar input, NPN or PNP mode switched via J2 switch, factory defaults to NPN mode. Input impedance: 3.3kΩ Voltage range for level input: 9 ~ 30V The HDI5 can be used as a high-speed input port with a maximum input frequency of 50kHz.
DI2-COM	Number input 2	
DI3-COM	Number input 3	
DI4-COM	Number input 4	
HDI5-COM	Number input 5	
DI6-COM	Number input 6	
DI7-COM	Number input 7	
AO1-GND	Analog output 1	Output range: DC 0 ~ 10V or 0 ~ 20mA AO1 is selected by J6 on the control board and is set to voltage mode at the factory. AO2 is selected by J7 on the control board and is set to voltage mode at the factory.
AO2-GND	Analog output 2	
FM-COM	High-speed pulse output	Programmable optocoupler isolation, open collector output, maximum frequency: 50kHz When the collector is open, the output is consistent with the Y1 specification. Output voltage range: 0/24VDC, output current range: 50mA
+24V-STO1	Safety torque shutdown function	The Err48 fault is triggered. The fault type can be identified by checking the U1-35 value. 1: STO1 is disconnected; 2: STO2 disconnected; 3: Both STO1 and STO2 are disconnected.
+24V-STO2		
485+-485-	Modbus communication	The Modbus communication interface allows selection of whether a matching resistor is required via J4.
T/A - T/C	Relay output 1	(T/A - T/C) and (R/A - R/C) normally open terminal R/A - R/B normally closed terminal Contact drive capability: AC250V, 3A, COSφ=0.4; DC30V, 1A
R/A R/B R/C	Relay output 2	

Terminal symbol	Terminal name	Function Description
RJ45 interface	External keyboard interface	External LED and LCD keyboard interfaces can be extended using standard network cables.

3.3.5. Signal input terminal wiring instructions

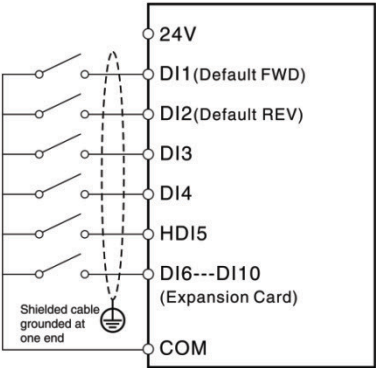
AI analog input terminal:

Because weak analog voltage signals are particularly susceptible to external interference, shielded cables are generally required, and the wiring distance should be as short as possible, not exceeding 20m, as shown in the figure below. In situations where analog signals are severely interfered with, filter capacitors or ferrite cores need to be added to the analog signal source side.

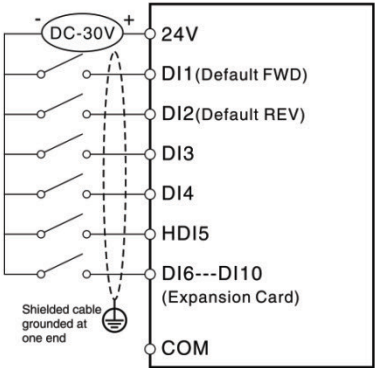


DI digital input terminals:

DI wiring mode 1 (factory default wiring mode):
When the DI DIP switch is in NPN mode, no external power supply is used



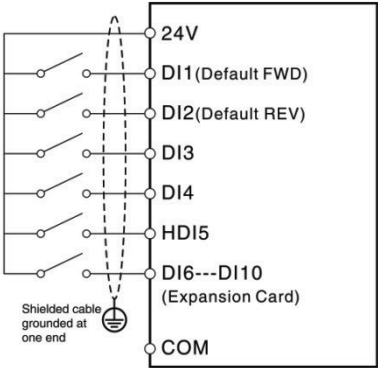
DI wiring mode 2 :
Use an external power supply when the DI DIP switch is in NPN mode



Wiring diagram of NPN mode for digital input terminals

DI wiring mode 3 :

No external power supply is used when the DI DIP switch is in PNP mode



DI wiring mode 4 :

Use an external power supply when the DI DIP switch is in PNP mode

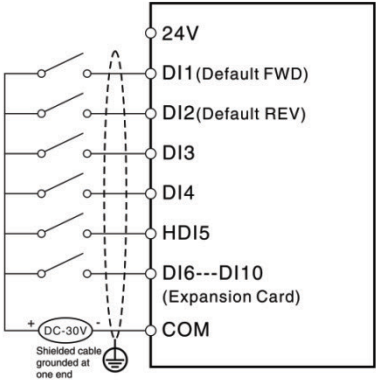


Figure 3-14 Wiring diagram of digital input terminals in four different modes

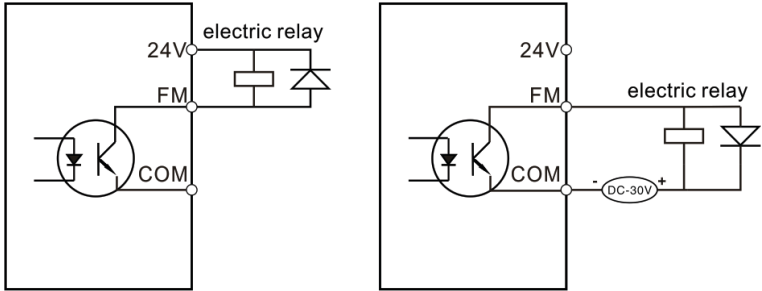
Wiring diagram for PNP mode digital input terminals

Shielded cables are generally required, and the wiring distance should be as short as possible, not exceeding 20 meters. When using an active drive, necessary filtering measures must be taken to address crosstalk in the power supply. Contact control is recommended.

FM digital output terminals:

When a digital output terminal needs to drive a relay, absorption diodes should be installed on both sides of the relay coil, and the driving capability should not exceed 50mA. Otherwise, it may easily damage the 24V DC power supply.

Note: Make sure to install the absorption diode with the correct polarity, as shown in the figure below. Otherwise, when there is output at the digital output terminal, it will immediately burn out the DC 24V power supply.



FM wiring diagram for digital output terminals

Chapter 4 Operation and Display

4.1. Introduction to Operation and Display Interface

The operation panel allows for the modification of inverter function parameters, monitoring of inverter operating status, and control of inverter operation (start, stop). Its appearance and functions are shown in the figure below.



LCD display operation panel

LED display operation panel

4.2. Keyboard button description

Button	Name	Function
PRG	Programming Exit Key	Entering or exiting from the first-level menu, or returning to the parent menu.
OK	Confirm button	Enter the menu screen step by step and confirm the settings.
▲	Increment key (+)	Increment of data or function code
▼	Decrease key (-)	Decreasing of data or function code
◀	Shift key (left)	In the shutdown and operation display interfaces, you

Button	Name	Function
▶	Shift key (right)	can cycle through the display parameters. For specific display meanings, please refer to pages 7-29 and 7-30. When modifying parameters, you can select the parameter's modification position.
RUN	Run key	In keyboard operation mode, it is used to perform operations.
STOP	Stop/Reset button	When the program is running, pressing this key will stop the operation. It can be used for reset operation when in fault alarm state. The properties of this key are constrained by function code P7-27.
MF.K	Jog Run key/Function key	P7-28 is set to 0 for jog operation , and P7-28 is set to 1 for directional buttons. Pressing this button reverses the direction . The factory default setting for P7-28 is 3 for panel and remote switching (see P7-28 group function parameter settings for more functions).

LED digital display control panel, keyboard indicator lights, function menu

indicator lights	name	meaning	color
RUN	Operating status indicator	Light on – Inverter is running. Off – The frequency converter is in a stopped state. Flashing light indicates the frequency converter is in sleep mode.	green
L/D/C	Control mode indicator light	Off – The frequency converter is in keypad control mode. Light on – Inverter is in terminal control mode Flashing – The frequency converter is in remote communication control mode.	red
FWD/REV	Running	Extinction - Forward Rotation State	red

indicator lights	name	meaning	color
	direction indicator	Bright - Reverse state Flash – The target frequency is opposite to the actual frequency or is in a reverse operation prohibited state.	
TUNE/TC	Tuning/Torque Control/Fault Indicator	Bright - Torque Control Flashing light – Tuning/Fault Status	red

Digital display area

The 5-digit LED display shows the set frequency, output frequency, various monitoring data, and alarm codes. Function codes are typically displayed in decimal; for example, function code P0-11 is displayed as "50.00," representing the decimal number "50.00." When the function code value is displayed in hexadecimal, the highest digit of the display shows "H.," indicating that the current function code value is displayed in hexadecimal mode. For example, function code P7-29 is displayed as "H.003F," in which case the value of P7-29 is the hexadecimal number "0x3f."

Users can freely set the monitoring data for stop and run status according to function codes P7-29/P7-30. See function codes P7-29/P7-30 for details.

4.3. Organization of inverter function codes

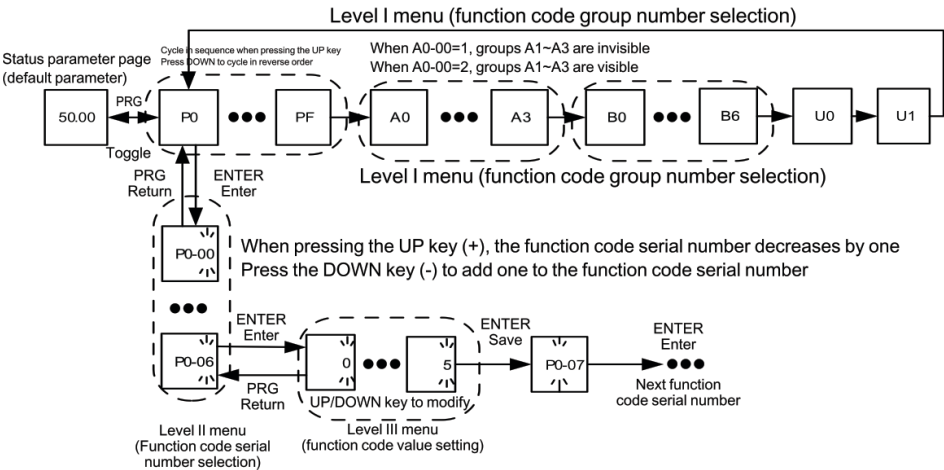
The meanings of the various function codes of the frequency converter are shown in the table

Function code group	Function Description	illustrate
P0 ~ PF	Basic function parameter group	Compatible with this series of function codes
A0 ~ A3	Second motor parameter group	The parameters of the second motor, acceleration/deceleration time, and control mode can be set independently.
B0 ~ B6	Enhanced function	System parameter settings, user function code customization, optimized control, AI/AO calibration,

Function code group	Function Description	illustrate
	parameter group	master-slave control, brake function and sleep function
C0 ~ CF	Special machine function selection group	Choose to use different professional frequency converter functions
U0 ~ U1	Monitoring parameter group	U0 is the fault log parameter group, and U1 is the user monitoring parameter group, used to view the relevant output status.

4.4. Instructions for viewing and modifying function codes

The inverter function code parameters adopt a three-level menu structure, which can be viewed and modified through the operation panel. The three levels of menu are: Function Parameter Group (Level I menu) → Function Code (Level II menu) → Function Code Set Value (Level III menu). The operation flow is shown in the figure below. In the status parameter interface, different status parameters can be viewed using the "shift key".

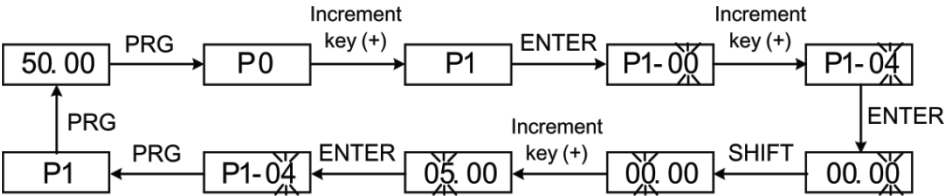


Flowchart of three-level menu operation

Note: When operating in a three-level menu, you can press either the "PRG" key or the "ENTER" key to return to the second-level menu. However, pressing the "ENTER" key will

save the current parameter modification value and move it to the next function code; while pressing the "PRG" key will discard the current parameter modification.

Example: Change function code P1-04 from 0.00Hz to 5.00Hz.



Parameter setting operation flowchart

In the third-level menu state, if the parameter does not have a flashing bit, it means that the function code parameter value cannot be modified. For specific reasons, please refer to the function code attribute description.

4.5. Function Code Menu Mode and Switching Instructions

4.5.1. Definition and Operation of Multi-function Shortcut Keys

MF.K button can be defined by function code P7-28.

p7-28	MF.K key function selection		Factory value	3
	Set range	0	Forward jog	
		1	Forward/reverse switching	
		2	Reverse jog	
		3	Switching between panel and remote control	
		4	Switch the frequency source on the panel (press MF.K keys to cycle through the frequencies).	
		5	Switching between panel, keyboard, and remote control	

MF.K key is a multi-function key, and its function can be set using this function code . It can be used to switch between stop and run modes.

0: Forward jogging

MF.K keys on the keyboard to perform forward jog (FJOG).

1: Forward/reverse switching

via the MF.K key is only effective when the command source is the operation panel command channel.

2: Reverse inching

Reverse jog can be achieved using the MF.K keys on the keyboard .

3: Switching between panel control and remote control (terminal or communication)

This refers to switching the command source, specifically switching between the current command source and keyboard control (local operation). If the current command source is keyboard control, this key function is invalid.

4: Switch the frequency source on the panel (press MF.K keys to cycle through the frequency sources).

Keyboard frequency source switching: When the main frequency source X is the panel frequency source and the auxiliary frequency source Y is another frequency source, you can switch the target frequency source in a loop by pressing the MF.K key.

5: Switching between panel, terminal , and communication control

Initiate control switching by pressing the MF.K key to cycle through control commands: keyboard control, terminal control, and communication control.

4.6. Preparation before operation

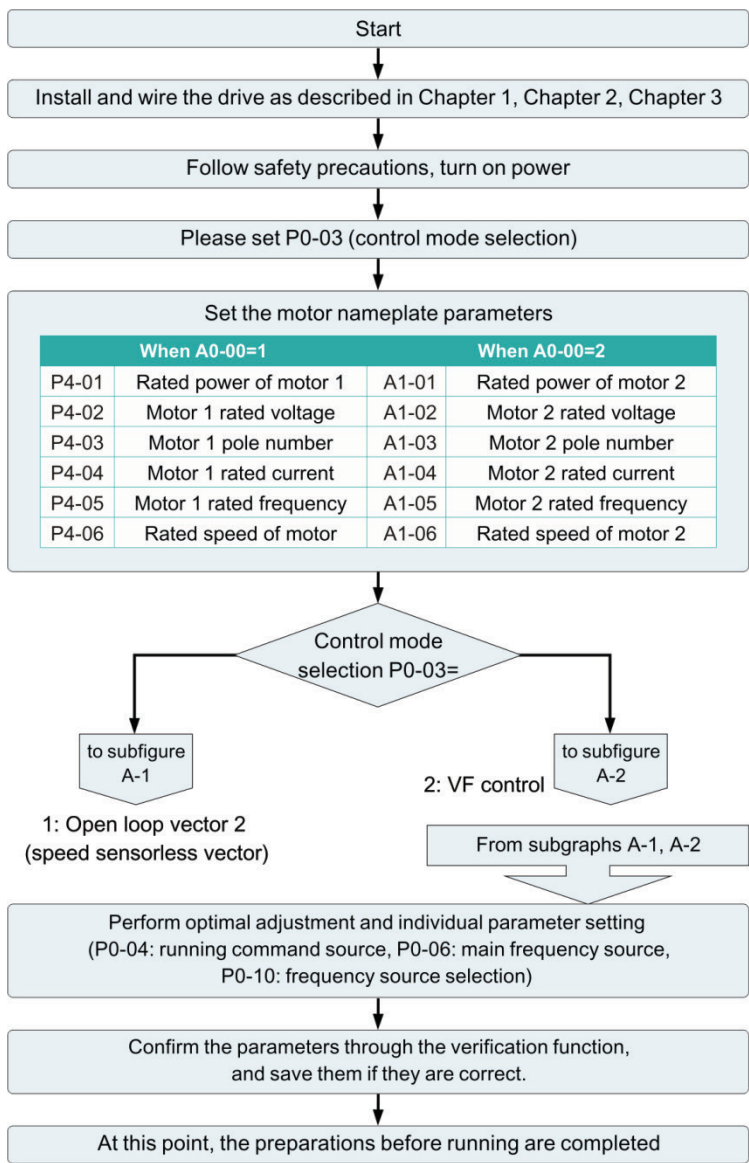
4.6.1. Pre-run procedures

The flowcharts in this section illustrate the basic steps required to start the frequency converter. Please refer to the corresponding flowcharts based on the specific application of the frequency converter. This section only covers basic settings.

flow chart	Sub-flowchart	Purpose
A	-	Basic steps from installation and wiring to operation
-	A-1	Operation under open-loop vector (sensorless vector) control mode
-	A-2	Operation under V/F control mode

Flowchart A (Connecting the motor for operation with minimal setting changes)

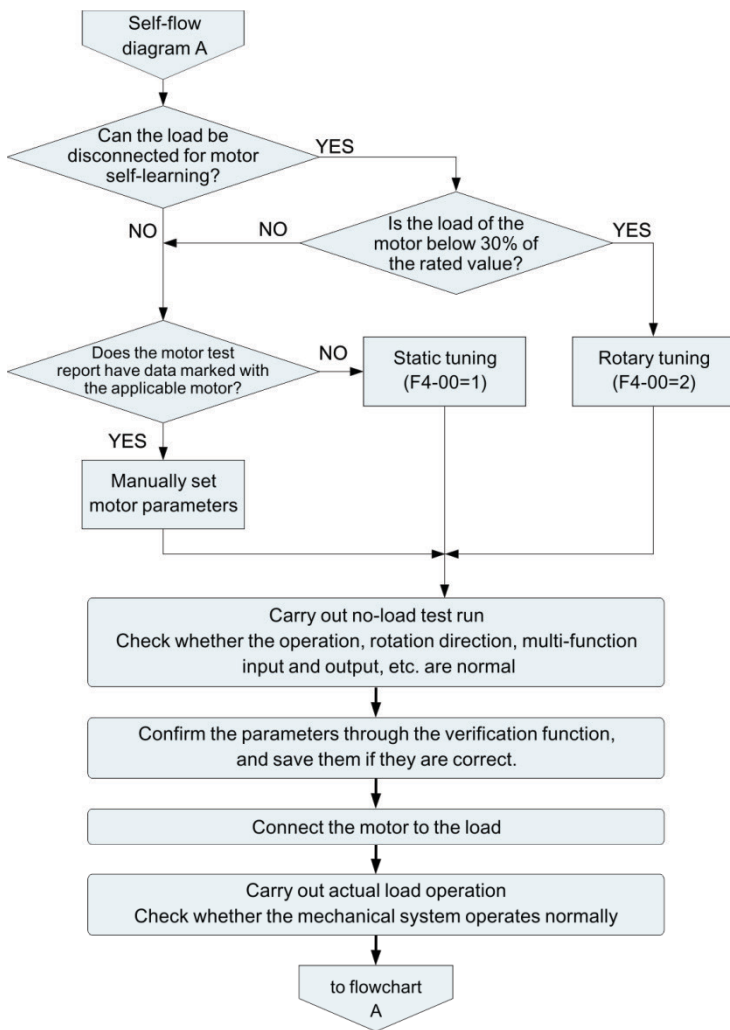
Flowchart A illustrates the operation of connecting the motor with minimal setting changes. Settings may vary depending on the application; for applications that do not require high-precision control, please use the inverter's initial setting parameters



Basic steps before operation (illustration)

Sub-flowchart A-1 (Motor operation under open-loop vector control)

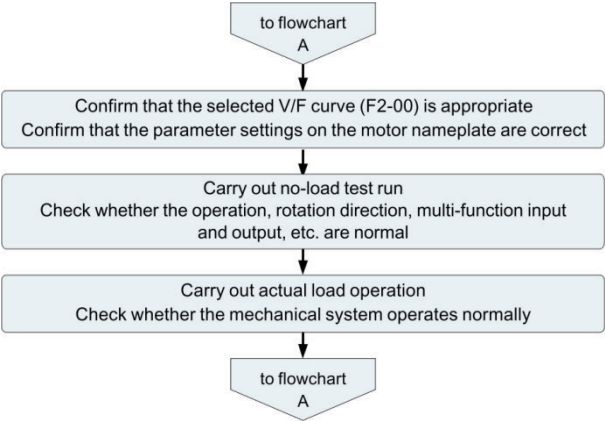
Sub-flowchart A-1 illustrates the startup steps for open-loop vector (sensorless vector) control. Vector control is more effective in applications requiring high starting torque or torque limiting.



Sub-flowchart A-1: Schematic diagram of the operation steps of open-loop vector control.

Sub-flowchart A-2 (Simple motor operation under V/F control mode)

When operating via V/F control, please set the parameters according to the following flowchart. V/F control is particularly effective in applications such as fans or pumps.



Sub-flowchart A-2V/F control mode operation steps

4.6.2. Viewing Status Parameters

In both stop and run states, various status parameters can be displayed using the shift keys. The function codes P7-29 (running parameters) and P7-30 (stopping parameters) select the parameter to be displayed in the run/stop state by binary bits. There are sixteen running/stopping status parameters that can be selected for display or not. For detailed explanations, please refer to the parameter descriptions for P7-29 and P7-30 in Chapter 5.

4.7. Inverter start/stop control

4.7.1. Selection of Start/Stop Signal Source

The inverter's start/stop control commands come from three sources: panel control, terminal control, and communication control, which can be selected through function parameter P0-04.

P0-04	Run command source settings		Factory value: 0	illustrate
	Set range	0	Control panel command channel (LED off)	Press the RUN or STOP button to start or stop the machine.
		1	Terminal command channel (LED on)	The DI terminal needs to be defined as the start/stop command terminal.
		2	Communication command channel (LED flashing)	Using the MODBUS-RTU protocol

4.7.1.1. Panel Start/Stop Control

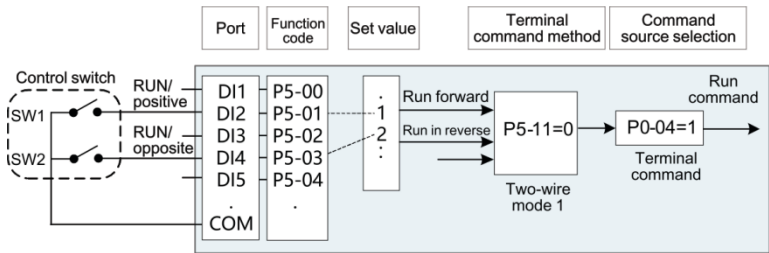
By operating the keyboard, setting function code P0-04 to 0 enables panel start/stop control. Pressing the "RUN" key on the keyboard will start the inverter (the RUN indicator light will illuminate). While the inverter is running, pressing the "STOP" key on the keyboard will stop the inverter (the RUN indicator light will turn off).

4.7.1.2. Terminal start/stop control

Terminal start/stop control is suitable for applications where sampling toggle switches and electromagnetic switches are used for system start/stop, and is also suitable for electrical designs where the controller controls the operation of the frequency converter with dry contact signals.

This series of frequency converters offers multiple terminal control modes. The terminal command mode is determined by function code P5-11, and the input ports for start/stop control signals are determined by function codes P5-00 to P5-04. For detailed setting methods, please refer to the detailed explanations of function codes P5-11, P5-00, and P5-04.

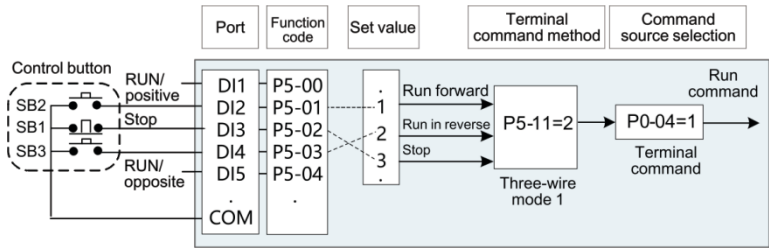
Example 1: The inverter is required to use a toggle switch as the inverter start/stop switch, with the forward run switch signal connected to port DI2 and the reverse run switch signal connected to port DI4. The usage and setting method is shown in the figure below.



Two-wire terminal control start/stop diagram

In the control mode shown in the diagram above, when the SW1 command switch is closed, the frequency converter runs in the forward direction; when the SW1 command switch is open, the frequency converter stops. When the SW2 command switch is closed, the frequency converter runs in the reverse direction; when the SW2 command switch is open, the frequency converter stops. If SW1 and SW2 are closed or opened simultaneously, the frequency converter will stop running.

Example 2: The inverter is required to use a push-button electromagnetic switch as its start/stop switch. Connect the start button signal to port DI2, the stop button signal to port DI3, and the reverse run button signal to port DI4. The usage and setup method is shown in the diagram below: Terminal control start/stop schematic diagram.



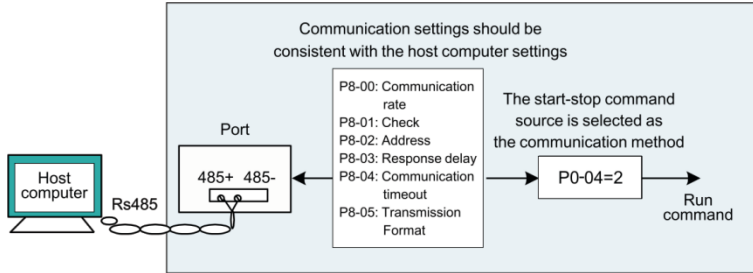
Three-wire terminal control start/stop diagram

In the control mode shown in the diagram above, during normal startup and operation, the SB1 button must remain closed; opening it will immediately stop the inverter. The commands of the SB2 and SB3 buttons take effect on the closing action edge, and the operating status of the inverter is determined by the last button action of these three buttons.

4.7.1.3. Communication Start-Stop Control

This application demonstrates how a host computer controls a frequency converter via RS485 communication. By selecting communication as the control command source (P0-04=2), the inverter can be started and stopped via communication. The relevant function

codes for communication settings are shown in the following figure:



Communication control start/stop diagram

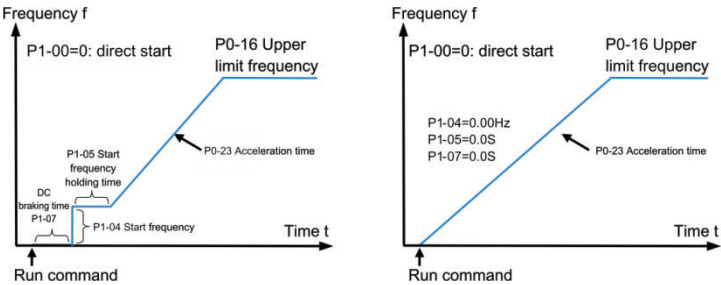
In the diagram above, setting the communication timeout time (P8-04) function code to a non-zero value activates the automatic shutdown function of the inverter after a communication timeout fault. This prevents the inverter from running uncontrollably due to communication line failures or host computer malfunctions. This function can be enabled in some applications.

The inverter's communication port uses the MODBUS-RTU slave protocol. The host computer must use the MODBUS-RTU master protocol to communicate with it. For specific definitions of the communication protocol, please refer to the "Modbus Communication Protocol" section of this manual.

4.7.2. Startup Mode

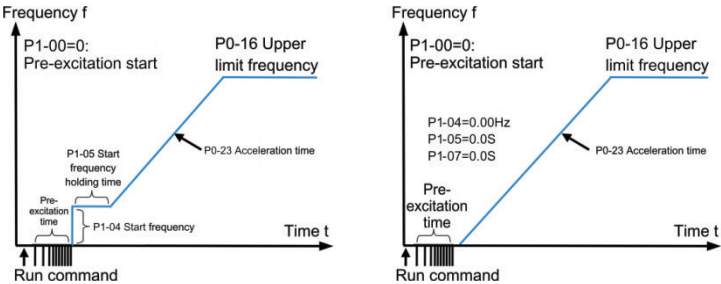
The inverter has three starting modes: direct start, speed tracking start, and asynchronous pre-excitation start, which can be selected through function parameter P1-00.

P1-00=0, direct start mode, suitable for most small inertia loads. The frequency curve of the start process is shown in the figure below. Its "DC braking" function before start is suitable for driving elevators and heavy-duty loads; "start frequency" is suitable for driving equipment that requires starting torque impact start, such as cement mixer equipment.



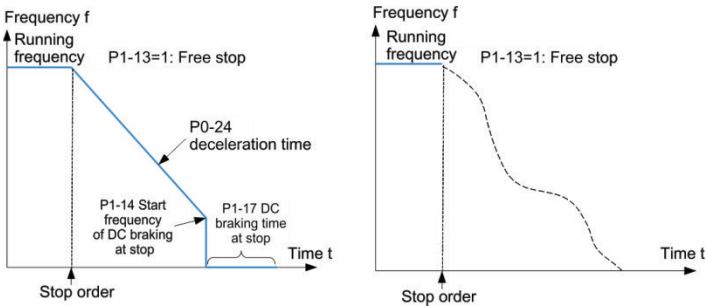
Direct Startup Diagram

The method of P1-00=2 is only applicable to induction asynchronous motor loads. Pre-excitation of the motor before startup can improve the fast response characteristics of the asynchronous motor and meet the application requirements of short acceleration time. The frequency curve of the startup process is shown below.



4.7.3. Shutdown Mode

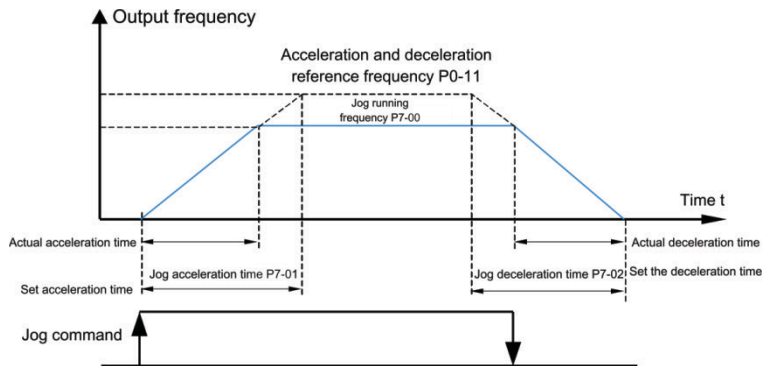
The inverter has two shutdown modes: deceleration stop and free stop, which are selected by function code P1-13.



Shutdown diagram

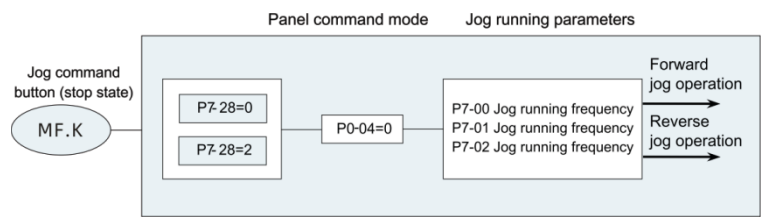
4.7.4. Jogging Operation

In many applications, it is necessary to run the frequency converter at a low speed for a short period of time to test the condition of the equipment or perform other debugging actions. In such cases, jogging is a convenient method.



Schematic diagram of jog operation

4.7.4.1. Parameter setting and operation of jog operation via the control panel

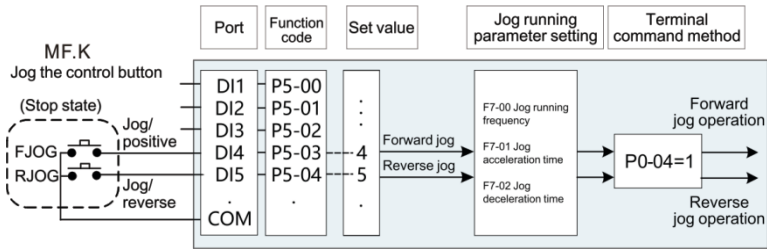


Jog parameter setting diagram

After setting the relevant function code parameters as shown in the figure above, when the inverter is stopped, press the MF.K key and the inverter will start running at low speed in the forward direction. Release the MF.K key and the inverter will decelerate and stop.

4.7.4.2. Parameter settings and operation for jogging via DI port

On some production equipment that requires frequent inching operations, such as textile machinery, it is more convenient to control inching with buttons or keys. The relevant function code settings are shown in the figure below:



DI mode jog parameter setting diagram

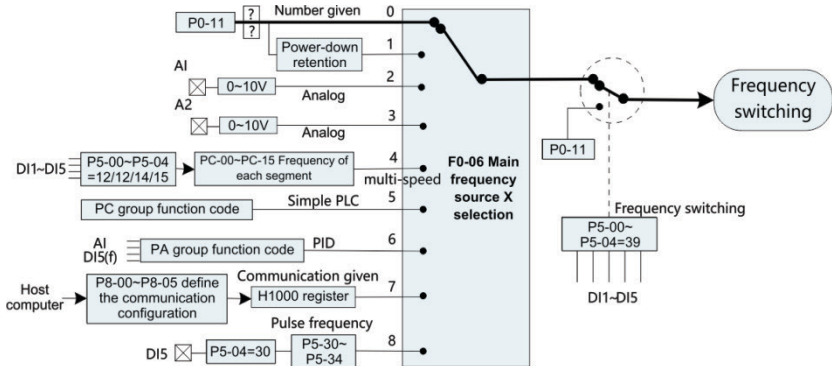
After setting the relevant function code parameters as shown in the diagram above, with the inverter stopped, pressing the FJOG button will start the inverter to run at low speed in forward rotation. Releasing the FJOG button will cause the inverter to decelerate and stop. Similarly, pressing the RJOG button will perform a reverse jogging operation.

4.8. Frequency control of frequency converter

The frequency converter is equipped with two frequency input channels, named main frequency source X and auxiliary frequency source Y respectively. It can operate on a single channel, switch at any time, or even combine them by setting a calculation method to meet different control requirements in the application site.

4.8.1. Source selection for the given main frequency

There are 9 types of main frequency sources for the inverter, namely digital setting (UP/DOWN power failure memory), digital setting (UP/DOWN power failure memory), AI1, AI2, PULSE input, multi-segment instruction, simple PLC, PID, communication setpoint, etc., and one of them can be selected through P0-06 setting.



Main frequency source X setting diagram

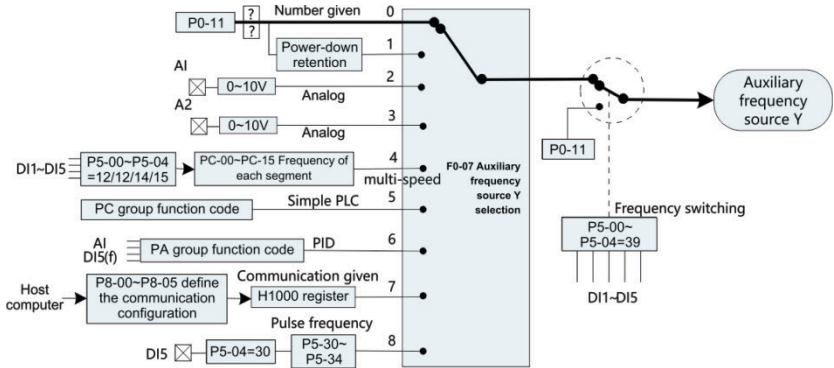
As can be seen from the different frequency sources in the figure, the operating frequency of the frequency converter can be determined by function codes, adjusted manually in real time, given by analog signals, given by multi-speed terminal commands, or controlled by the built-in PID controller through external feedback signals; it can also be controlled by communication with a host computer.

The diagram above shows the relevant function codes for each frequency source setting. You can refer to the detailed description of the corresponding function code when setting it.

4.8.2. Usage method with auxiliary frequency setting

The auxiliary frequency source Y is the same as the main frequency source and can be selected via P0-07.

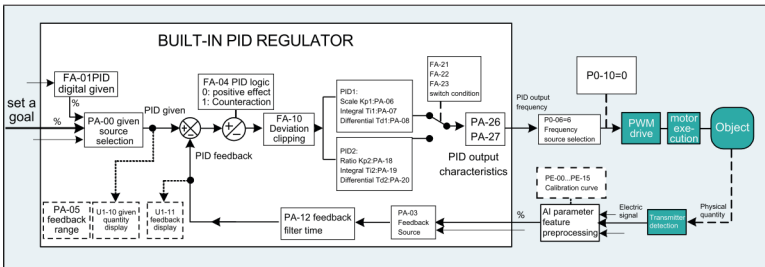
In practical use, the relationship between the target frequency and the main and auxiliary frequency sources is set through P0-10.



Auxiliary frequency source Y setting diagram

4.8.3. Frequency Closed-Loop Control for Process Control

This series of frequency converters has a built-in PID controller. With the selection of frequency command channels, users can easily realize automatic adjustment of process control, such as constant temperature, constant pressure, tension control applications.



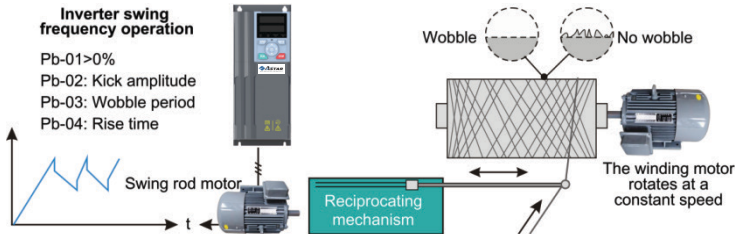
Frequency closed-loop control diagram

When using PID frequency closed-loop control, the frequency source P0-06=6 needs to be selected: that is, the PID output frequency needs to be selected. The PID-related parameters are in the PA group function parameters, and the relationship of the relevant PID function codes is shown in the figure above.

This series of frequency converters has two built-in equivalent PID calculation units, whose characteristic parameters can be set separately. This is suitable for applications that use different PID adjustment characteristics according to the working conditions, emphasizing the adjustment speed and accuracy of the PID respectively. The switching between the two can be automatic or controlled by external DI terminal signals.

4.8.4. Setting the Swing Frequency Working Mode

In textile and chemical fiber processing equipment, the oscillation frequency function can improve the uniformity and density of yarn winding, as shown in the figure below. This can be achieved by setting function codes Pb-00 to Pb-04; for specific methods, please refer to the detailed descriptions of the corresponding function codes.

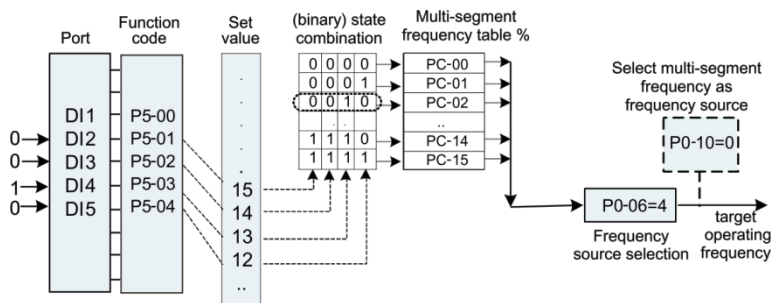


Swing frequency application setup diagram

4.8.5. Multi-speed mode settings

For applications that do not require continuous adjustment of the inverter's operating frequency and only need a few frequency values, this series of inverters can set up to 16

operating frequencies when using multi-speed control. These frequencies can be selected through a combination of four DI input signals. Setting the function code corresponding to the DI port to a function value of 12-15 designates it as a multi-frequency command input port. The required multi-frequency is then set through the multi-frequency table in the PC group. Specifying "Frequency Source Selection" as the multi-frequency setting mode is shown in the figure below.



Multi-speed control diagram

In the diagram above, DI2, DI3, DI4, and DI5 are selected as signal input terminals for specifying multiple frequencies. These are then used to form a 4-bit binary number, which is used to select multiple frequencies based on the state combination value. When (DI5, DI4, DI3, DI2) = (0, 0, 1, 0), the number of state combinations is 2, and the frequency value set by the PC-02 function code will be selected as the target operating frequency.

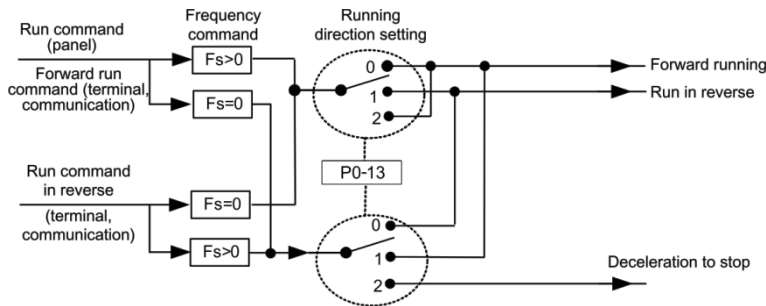
This series of frequency converters can set up to 4 DI ports as multi-segment frequency command input terminals, and also allows for multi-segment frequency setting with fewer than 4 DI ports. For missing setting bits, the status is always calculated as 0.

4.8.6. Setting the motor rotation direction

After restoring the inverter to factory settings, press the "RUN" button. The direction of the inverter driving the motor is called forward. If the rotation direction is opposite to the direction required by the equipment, please turn P0-13=1 or disconnect the power (note that you need to wait for the main capacitor of the inverter to discharge the charge) and swap any two of the UVW output lines of the inverter to eliminate the problem of rotation direction.

In some drive systems, only forward rotation is allowed, and reverse rotation is not permitted. In this case, P0-13=2. If a reverse command is issued, the inverter will

decelerate to 0 and enter a stop state, while FWD/REV on the control panel will continuously flash. See the logic diagram below.



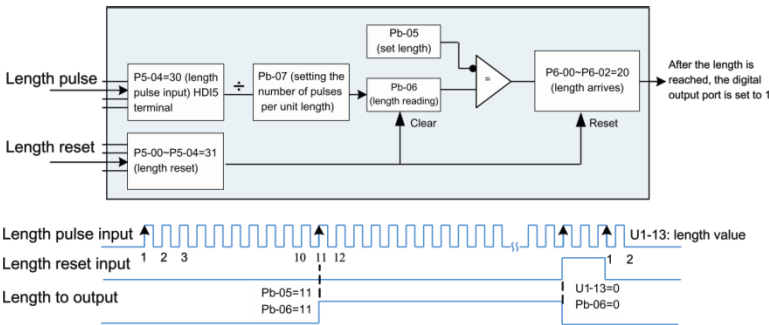
Schematic diagram of motor rotation direction

For applications where motor reverse rotation is not permitted, do not change the direction of rotation by modifying function codes, as restoring factory settings will reset the two function codes mentioned above. In this case, you can use function 50 of the digital input terminal DI to disable reverse rotation.

4.8.7. How to use the inverter's counting function

The count value needs to be acquired through the DI terminal (DI function selection is 29). When the count value reaches the set count value Pb-08, the multi-function digital switch outputs the "set count value reached" ON signal, and then the counter stops counting.

When the count value reaches the specified count value Pb-09, the multi-function digital switch outputs an "specified count value reached" ON signal. At this time, the counter continues to count until the "set count value" is reached, at which point the counter stops.



Counting mode function code setting diagram

Notice:

1. The specified count value Pb-09 should not be greater than the set count value Pb-08.
2. When the pulse frequency is high, the DI5 port must be used.
3. The switch ports for "Set Count Reached" and "Specified Count Reached" cannot be used interchangeably.
4. In the RUN/STOP state of the frequency converter, the counter will keep counting until the "set count value" is reached.
5. The count value can be retained even after power failure.
6. By feeding back the count to the switch output signal, an automatic shutdown system can be created.

4.9. Motor characteristic parameter setting and automatic tuning**4.9.1. Motor parameters to be set**

When the frequency converter operates in "vector control" (P0-03=1) mode, it is highly dependent on accurate motor parameters. This is one of the important differences from "VF control" (P0-03=2) mode. In order for the frequency converter to have good drive performance and operating efficiency, the frequency converter must obtain accurate parameters of the controlled motor.

The required motor parameters are as follows (default function code for motor 1):

Motor 1 Parameters	Parameter Description	illustrate
P4-01 ~ P4-06	Motor rated power, voltage, current, frequency, speed	Model parameters, manually input
P4-07 ~ P4-11	Equivalent stator resistance, inductive reactance, rotor inductance, etc. inside the motor	Tuning parameters

4.9.2. Automatic tuning and identification of motor parameters

Methods for frequency converters to obtain the internal electrical parameters of the controlled motor include: dynamic identification, static identification, and manual input of motor parameters.

Identification method	Applicable situations	Recognition effect
Idle Dynamic Identification	Suitable for synchronous and asynchronous motors. Ideal for applications where the motor can be easily disconnected from the application system.	Optimal
Load dynamic identification	Suitable for synchronous and asynchronous motors. Ideal for applications where the motor cannot be easily disconnected from the application system.	Can
Static identification	This is only applicable to asynchronous motors, where it is difficult to disconnect the motor from the load, and where dynamic operation identification is not permitted.	Poor
Manually input parameters	This applies only to asynchronous motors. In situations where the motor and application system are difficult to separate, copy the parameters of the same model motor that was previously successfully identified by the inverter and input them into the corresponding function codes P4-01 to P4-11.	Can

The automatic tuning steps for motor parameters are as follows:

The following explanation uses the parameter identification method of the default motor 1 as an example. The identification method of motor 2 is the same.

Step 1: If the motor can be completely disconnected from the load, mechanically disconnect the motor from the load while the power is off, allowing the motor to rotate freely without load.

Step 2: After powering on, first select the inverter command source (P0-04) as the operation panel command channel.

Step 3: Accurately enter the motor's nameplate parameters (e.g., P4-01 to P4-06). Please enter the following parameters according to the actual parameters of the motor (select according to the current motor):

Motor selection	Parameter Description	
Motor 1	P4-01: Rated power of the motor P4-02: Rated voltage of the motor P4-04: Rated Current of Motor	P4-05: Rated frequency of motor P4-06: Rated speed of the motor
Motor 2	A1-01 ~ A1-06 : Same as the definitions above.	

Step 4: If it is an asynchronous motor, select 2 (Dynamic Full Tuning) from P4-00 (tuning selection; for motor 2, this corresponds to function code A1-00), and press ENTER to confirm. At this time, the keyboard will display:



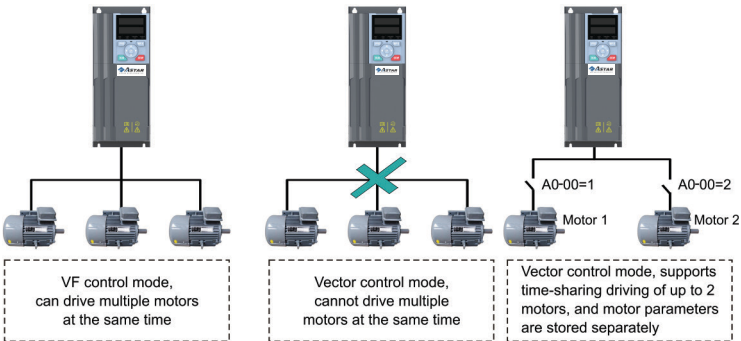
Then press the RUN key on the keypad. The inverter will drive the motor to accelerate, decelerate, and rotate in both directions. The running indicator light will illuminate, and the operation will last for approximately 2 minutes. When the above display information disappears and returns to the normal parameter display state, the tuning is complete. After this complete tuning, the inverter will automatically calculate the following parameters of the motor:

Motor selection	Parameter Description	
Motor 1	P4-07: No-load current of motor 1	P4-10: Mutual inductance of motor 1
	P4-08: Stator resistance of motor 1	P4-11: Leakage inductance of motor 1
	P4-09: Rotor resistance of motor 1	
Motor 2	A1-07 ~ A1-11 : Definitions are the same as above.	

If the motor cannot be completely disconnected from the load, select 1 (static tuning) for P4-00 (P1-00 for motor 2), and then press the RUN key on the keypad to start the motor parameter identification operation.

4.9.3. Setting and switching of multiple motor parameters

The currently valid motor parameter group can be specified via function code A0-00 or selected via digital input terminal function 41. However, when digital input terminal function 41 is valid, it takes priority, and the A0-00 setting is invalid.

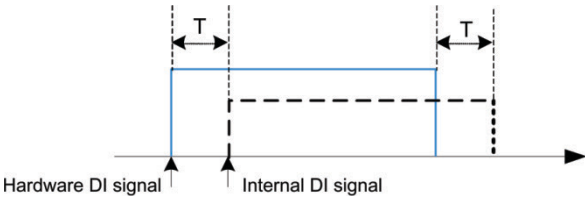


Schematic diagram of switching between multiple motors

4.10. How to use the DI port of a frequency converter

The control board has 7 DI ports, numbered DI1 to DI7 . The internal hardware of the DI ports is equipped with a 24V DC power supply for detection. Users only need to short-circuit the DI port with the COM port to input the DI signal to the frequency converter. In the factory default state, P5-13=00000 , the DI port is valid (logic 1) when shorted; when the DI port is floating, the DI is invalid (logic 0). Users can also change the valid mode of the DI port, that is, the DI port is invalid (logic 0) when shorted; when the DI port is floating, the DI is valid (logic 1). In this case, the corresponding bit of P5-13 needs to be modified to 1. These two function codes correspond to the valid mode settings of DI1 to DI7 respectively .

The inverter also features a software filtering time (P5-10) for the input signals at the DI port, which improves interference immunity. For the DI1 to DI3 input ports, a port signal delay function is also provided for applications requiring delay processing.



DI Delay Setting Diagram

above 7 DI ports can be defined in function codes P5-00 to P5-06. Each DI can select from 63 functions as needed. Please refer to the detailed description of function codes P5-00 to P5-06 for details.

Due to hardware design limitations, only the HDI port can accept high-frequency pulse signals. For applications requiring high-speed pulse counting, please configure the HDI port.

4.11. How to use the DO port of a frequency converter

The control board has three built-in digital outputs: RELAY1 , RELAY2 , and FM (used for Y function) . FM is a transistor-type output that can drive a 24V DC low -voltage signal circuit; the relay output can drive a 220VAC control circuit.

By setting the values of function parameters P6-00 to P6-02, the functions of each digital output can be defined. These can be used to indicate various operating states and alarms of the frequency converter, with approximately 45 function settings in total, allowing

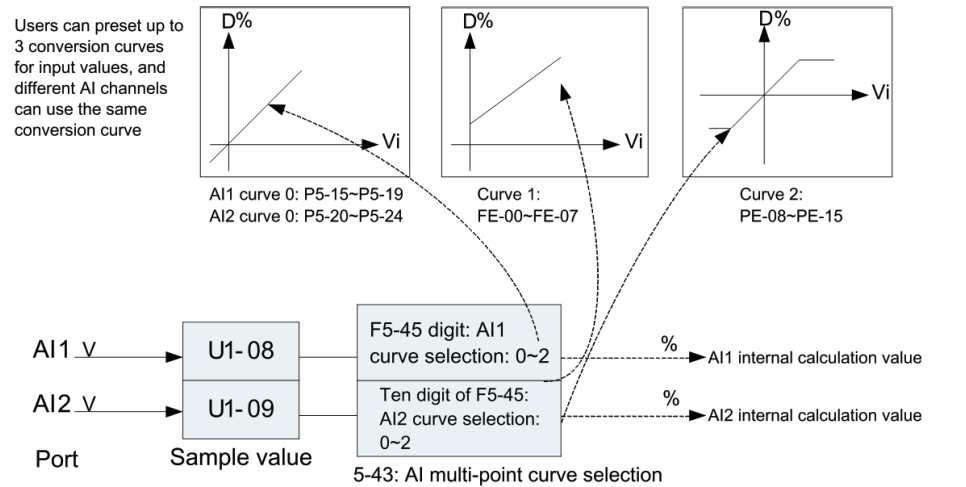
users to achieve specific automatic control requirements. Please refer to the detailed description of the function code parameters in group P6 for specific setting values.

4.12. AI Input Signal Characteristics and Preprocessing

The inverter supports a total of 2 AI resources.

port	Input signal characteristics
AI1-GND	When jumper switches AI1 and AI2 have “ IU ” in the “ U ” position, they can accept 0-10V DC signals; when jumper switches AI1 and AI2 have “ IU ” in the “ I ” position, they can accept 0-20mA current signals .
AI2-GND	

AI can be used as a frequency converter when external voltage and current signals are used as frequency source, torque source, voltage source when VF is separated, PID source, or feedback.



AI signal corresponds to actual given diagram

The sampled values from the AI port can be read from function codes U1-08 and U1-09. The converted calculated values are used for subsequent internal calculations and cannot be read directly by the user.

4.13. How to use the AO port of the frequency converter

The frequency converter supports two AO outputs.
port

Input signal characteristics

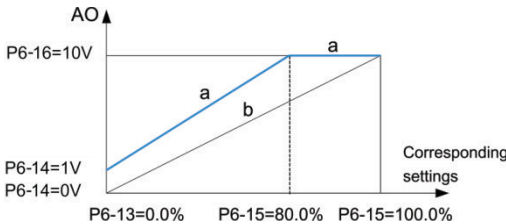
AO1-GND

When jumper switches AO1 and AO2 are in the " U " position, they can output a 0-10V DC signal ; when jumper switches AO1 and AO2 are in the " I " position , they can output a 0-20mA current signal .

AO2-GND

AO1 and AO2 can be used to indicate internal operating parameters in analog mode. The attribute of the indicated parameter can be selected through function codes P6-09 and P6-10.

The specified operating parameters can be modified before output. The modified characteristic curve is shown as the slanted line in the figure below. For details on function codes P6-13 to P6-16, please refer to the relevant description of AO parameters .

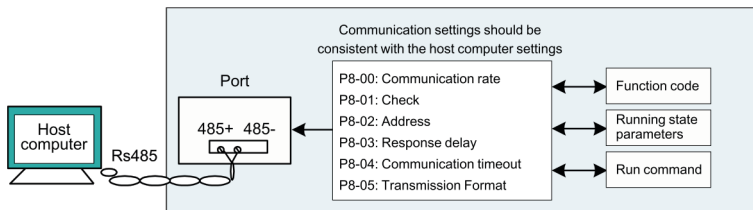


AO output diagram

4.14. How to use serial communication in frequency converters

The hardware communication parameters for the communication port can be configured in group P8. Setting the communication rate and data format to be consistent with the host computer is a prerequisite for normal communication.

this series of frequency converters has a built-in MODBUS-RTU slave communication protocol. The host computer can use the serial port to query or modify the frequency converter's function code, various operating status parameters, and send operating commands and operating frequencies to the frequency converter.



Communication settings diagram

This series of systems organizes function codes, various operating status parameters, and various operating instructions according to " register parameter addresses , " defining the protocol for communication data exchange between the host computer and other systems.

For a more detailed explanation, please refer to the chapter " Modbus Communication Protocol " .

4.15. Password settings

The inverter provides a user password protection function. When P7-49 is set to a non-zero value, it represents the user password. Password protection is activated after returning to the status parameter interface. At this time, pressing the PRG key will display "-----", showing only the status parameters. You must press the key on the "-----" interface, and the panel will display "00000". Only after correctly entering the user password can you enter the normal menu to view and set function codes. Otherwise, the panel will display "-----", and you will not be able to access the function codes. To disable password protection, you must log in with a password following the steps above and set P7-49 to 0.

Chapter 5 arameter Description

5.1. P0 group basic function parameters

P0-00	Product Model	Product Model: 5-digit display, 2 decimal places	###.##
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For user viewing only, cannot be modified.

P0-01	Inverter type display	Range: 0 ~ 1	0
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0: Type G, suitable for constant torque loads with specified rated parameters.

1: Type P is suitable for variable torque loads (fans, pumps, etc.) with specified rated parameters.

P0-02	Rated current	Range: 0.1A ~ 3000.0A	Model confirmed
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This is for user viewing only and cannot be modified.

P0-03	Motor control method	Range: 01 ~ 13	02
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Units: Motor control mode selection

1: Open-loop vector control (sensorless vector control)

2: VF control

3: Closed-loop vector (with velocity sensor vector)

Tens: Motor type selection

0: Asynchronous motor

1: Synchronous motor

P0-04	Source of execution instructions	Range: 0 ~ 2	0
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Select the input channel for the inverter control commands.

Inverter control commands include: start, stop, forward rotation, reverse rotation, jogging, etc.

0: Control panel command channel ("L/D/C" light is off);

The operation is controlled by the RUN, STOP/RES ET buttons on the control panel .

1: Terminal command channel ("L/D/C" light is always on);

The operation commands are controlled by multi-function input terminals such as FWD, REV, JOGF, and JOGR.

2: Communication command channel ("L/D/C" light flashing)

The execution command is given by the host computer via communication.

P0-05	Runtime Up/Down frequency modification instruction base	Range: 0 ~ 1	1
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0: Operating frequency

1: Set frequency

This parameter is only valid when the frequency source is digitally set, and it determines whether the up/down button or terminal up/down action modifies the set frequency or the operating frequency. The biggest difference lies in the acceleration and deceleration processes.

P0-06	Main frequency source X selection	Range: 0 ~ 9	1
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Select the input channel for the inverter's main setpoint frequency. There are 9 main setpoint frequency channels in total:

0: Up/Down frequency changes are not remembered during shutdowns.

The initial value is the value of P0-11 "Digital setting preset frequency".

The inverter's set frequency value can be changed using the up and down keys on the keyboard (or the UP and DOWN keys on the multi-function input terminal). "Does not remember after shutdown" means that the inverter's changed frequency setting value is not remembered after shutdown. After the inverter stops, the set frequency value reverts to the P0-11 "Digital Setting Preset Frequency" value.

1: Up/Down frequency modification for power-off memory

The initial value is the value of P0-11 "Digital setting preset frequency".

The inverter's set frequency value can be changed using the up and down keys on the keyboard (or the UP and DOWN keys on the multi-function input terminal). "Power failure" means that when the inverter is powered on again after a power outage, the set frequency will be the frequency set before the last power failure.

2: AI1

3: AI2

The frequency is determined by the analog input terminals. The driver control board provides two analog input terminals (AI1, AI2).

AI1 and AI2 can be 0V to 10V voltage input or 0mA to 20mA current input, selected by the DIP switch on the control board. The 4 to 20mA input can be selected by the user through P5-15=2 (AI1) and P5-20=2 (AI2).

The user can freely select the curves showing the relationship between the input voltage

values of AI1 and AI2 and the target frequency through P5-45.

The driver provides four sets of correspondence curves, two of which are linear relationships (two-point correspondence) and two are arbitrary curves with four-point correspondence. Users can set these curves using function codes P5-15 to P5-24 and PE group function codes.

Function code P5-45 is used to set the two analog input channels AI1 and AI2, selecting which of the four curves to use.

When AI is used as the frequency reference, the voltage/current input corresponding to the setting of 100.0% refers to the percentage relative to the maximum output frequency P0-14.

4: Multi-speed

Select the multi-speed operation mode. You need to set the P5 group "Input Terminals" and the PC group "Multi-speed and PLC" parameters to determine the correspondence between the given signal and the given frequency.

5: Simple PLC

Select the simplified PLC mode. When the frequency source is a simplified PLC, you need to set the "Multi-speed and PLC" parameters of the PC group to determine the given frequency.

6 : PID

Select process PID control. At this point, you need to configure the PA group's "PID function". The inverter's operating frequency is the frequency value after the PID controller has applied. For the meanings of the PID setpoint, setpoint, and feedback source, please refer to the PA group's "PID function" description.

7: Communication given

The main frequency source is provided by the host computer through communication (see MODBUS communication protocol for specific parameters).

8 : PULSE pulse frequency given

The pulse frequency is given by inputting from the HDI terminal of the control board, and the pulse ramp can be set by P5-30 to P5-34.

9: Up/Down frequency modification, shutdown memory, power failure memory not remembered.

When the machine is stopped while powered on, it will resume operation at the frequency modified by UP/DOWN. After power is cut off and then powered on again, it will operate at the output frequency of P0-11.

P0-07	Auxiliary frequency source Y selection	Range: 0 ~ 9	0
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When the auxiliary frequency source is used as an independent frequency-given channel, its usage is the same as that of the main frequency source X.

When the auxiliary frequency source is used to superimpose the given values (the units digit of P0-10 is 1, 2, 3, or 4), the following special characteristics apply:

1. When the auxiliary frequency source is digitally set, the preset frequency (P0-11) has no effect. The frequency can be adjusted up or down based on the main set frequency by using the up and down keys on the keyboard (or the UP and DOWN keys on the multi-function input terminal).
2. When the auxiliary frequency source is an analog input setpoint (AI1, AI2), the 100% setting corresponds to the range of the auxiliary frequency source (see the explanations on P0-08 and P0-09). If you need to adjust the frequency up or down based on the main setpoint frequency, please set the corresponding setting range of the analog input to -n% to +n% (see the explanations on P5-15 to P5-24).

Note: The auxiliary frequency source Y must be selected at a different value than the primary frequency source X. In other words, the primary and auxiliary frequency sources cannot use the same frequency setting channel.

P0-08	Auxiliary frequency source Y range selection	Range: 0 ~ 2	0
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0 : relative to the maximum frequency;

1 : Relative to frequency source X;

P0-08 is used to determine the object relative to this range. If it is relative to the maximum frequency (P0-14), the range is a fixed value. If it is relative to the main frequency source X, the range will change with the change of the main frequency X.

2: The range is the same as 0, but the main and auxiliary outputs have no negative frequency output.

This is equivalent to selecting P8-08=0, and the range does not include the set negative frequency output.

P0-09	Auxiliary frequency source Y range	Range: 0% ~ 100%	100%
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When the frequency source is selected as frequency superposition given (refer to P0-10 setting), it is used to determine the adjustment range of the auxiliary frequency source .

8

4: Switching between auxiliary frequency source Y and main/auxiliary calculation results
When the multi-function input terminal function 18 (frequency switching) is invalid, the auxiliary frequency Y is used as the target frequency.

When the multi-function input terminal function 18 (frequency switching) is active, the result of the main and auxiliary calculations is used as the target frequency.

Tens: Frequency source master-slave operation relationship:

0: Main frequency source X + auxiliary frequency source Y

The sum of the primary frequency X and the auxiliary frequency Y is used as the target frequency. This implements the function of frequency superposition.

1: Main frequency source X - Auxiliary frequency source Y

The difference between the main frequency X and the auxiliary frequency Y is taken as the target frequency.

2: MAX (Main frequency source X, auxiliary frequency source Y)

The target frequency is determined by taking the one with the larger absolute value between the main frequency X and the auxiliary frequency Y.

3: MIN (Main frequency source X, auxiliary frequency source Y)

The target frequency is the one with the smallest absolute value between the main frequency X and the auxiliary frequency Y.

P0-11	Preset frequency	0.00Hz to maximum frequency P0-14	50.00Hz
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When the main frequency source is selected as "digital setting" or "terminal UP/DOWN", the function code value is the preset frequency of the frequency setting of the frequency converter.

P0-13	Motor running direction selection	Range: 0 ~ 2	0
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0: Direction consistent, consistent with the current running direction of the motor.

1: The direction is opposite, opposite to the current direction of motor operation.

2: Reverse rotation is prohibited. When a reverse rotation command is issued, the inverter will decelerate to 0Hz and enter a stop state.

By changing this function code, the direction of the motor can be changed without altering any other parameters. This is equivalent to changing the direction of motor rotation by adjusting any two lines of the motor (U, V, W).

Note: The motor's running direction will return to its original state after parameter initialization. Use with caution in situations where changing the motor's direction is

strictly prohibited after the system has been debugged.

P0-14	Maximum output frequency	When P0-20=1, the adjustable range is: 50.0Hz ~ 1200.0Hz; When P0-20=2, the adjustable range is: 50.00Hz ~ 600.00Hz;	50.00Hz
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When P0-21=1, it has 1 decimal place and a frequency range of 50.0Hz to 1200.0Hz.

When P0-21=2, it has 2 decimal places and a range of 50.00Hz to 600Hz.

P0-15	Upper limit frequency source	Range: 0 ~ 3	0
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This function code is used to define the source of the upper limit frequency.

0: Digital setting P0-16

1: AI1, input setting 100% corresponds to P0-14

2: AI2, input setting 100% corresponds to P0-14

3: Communication settings, provided by the host computer via communication (see MODBUS communication protocol for details). 4: PULSE settings, the pulse ramp can be set from P5-30 to P5-34.

To prevent "runaway" due to material breakage, an upper limit frequency can be set using analog signals. When the frequency converter reaches the upper limit frequency value, torque control becomes ineffective, and the frequency converter continues to operate at the upper limit frequency.

P0-16	Upper limit frequency	Lower limit frequency P0-18 ~ Maximum frequency P0-14	50.00Hz
P0-17	Upper limit frequency offset	0.00 Hz ~ Maximum frequency P0-14	0.00Hz

When the upper limit frequency is given by analog or Pulse, this parameter serves as an offset for the analog signal. Its function is to add the offset frequency to the analog upper limit frequency setting to obtain the final upper limit frequency setting.

P0-18	Lower limit frequency	0.00Hz to upper limit frequency P0-16	0.00Hz
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When the frequency converter starts running, it starts from the starting frequency. If the given frequency is lower than the lower limit frequency during operation, the frequency converter will continue to run at the lower limit frequency until the frequency converter stops or the given frequency is higher than the lower limit frequency.

P0-19	Command source binding selection	Range: 000 ~ 888	000
-------	----------------------------------	------------------	-----

Define the binding combinations between 3 types of running command channels and 9 types of given frequency channels to facilitate frequency source switching.

- 0: No binding
- 1: Digital frequency setting
- 2: AI1
- 3: AI2
- 4: Multi-speed
- 5: Simple PLC
- 6: PID
- 7: Communication given
- 8: PULSE setting (HDI)

Units: Operation panel command binding frequency source selection

Tens: Terminal command binding frequency source selection

Hundreds: Communication command binding frequency source selection

The meaning of the frequency given channel above is the same as that of the main frequency X selection P0-06. Please refer to the description of function code P0-06. Different command channels can be bundled with the same frequency given channel. When a command source has a bundled frequency source, the frequency sources set by P0-06 to P0-10 will no longer function during the validity period of that command source.

P0-20	Frequency decimal selection	Range: 1-2	2
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This parameter is used to determine the resolution of all frequency-related function codes.

- 1: 1 decimal place
- 2: 2 decimal places

P0-21	acceleration/deceleration time unit	Range: 0 ~ 2	1
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To meet the needs of various on-site operations, this product offers three acceleration/deceleration time units: 1 second, 0.1 seconds, and 0.01 seconds.

- 0 : 1 second
- 1 : 0.1 seconds
- 2 : 0.01 seconds

Note: When modifying the parameters of this function, the number of decimal places displayed for the four acceleration and deceleration times will change, and the

corresponding acceleration and deceleration times will also change. Please pay special attention during application .

P0-22	Acceleration/deceleration time reference frequency	Range: 0 to 2	0
-------	--	---------------	---

This parameter is used to define the reference frequency for acceleration and deceleration time, and its meaning is shown in the "Acceleration and Deceleration Time Diagram":

0: Maximum frequency (P0-14)

1: Preset frequency (P0-11)

2: Rated frequency of the motor (P4-05 or A1-05)

P0-23	Acceleration time 1	Range: 0.0s ~ 3000.0s<1>	10.0s
P0-24	Deceleration time 1	Range: 0.0s ~ 3000.0s<1>	10.0s

<1> is the range of acceleration/deceleration time unit P0-21=1, when P0-21=0: 0s ~ 30000s ; when P0-21=2: 0.00s ~ 300.00s;

Acceleration time refers to the time required for the frequency converter to accelerate from zero frequency to the acceleration/deceleration reference frequency (determined by P0-22), as shown in t1 in the figure below.

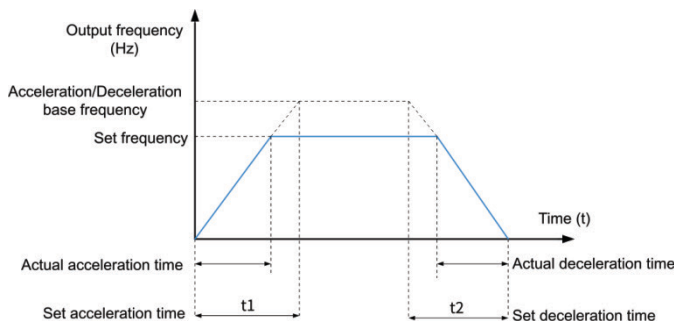
The deceleration time refers to the time required for the frequency converter to decelerate from the acceleration/deceleration reference frequency (determined by P0-22) to zero frequency, as shown in t2 in the figure below.

This product offers four acceleration/deceleration times, which users can switch between using the digital input terminal (DI). The four acceleration/deceleration times are interconnected.

Configure via the following function codes:

Group 1: P0-23, P0-24; Group 2: P7-03, P7-04;

Group 3: P7-05, P7-06; Group 4: P7-07, P7-08;



Acceleration and deceleration time diagram

P0-25	Overmodulation voltage boost	Range: 0% ~ 10%	3%
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This parameter is used to improve the inverter's output voltage capability in the constant power range, with the motor's rated voltage as 100%. A higher value indicates a higher voltage boost capability, but also a higher current ripple content, which should be considered during use. Generally, no modification is needed.

P0-26	carrier frequency	Range: 0.5kHz ~ 16.0kHz	Model confirmed
-------	-------------------	-------------------------	-----------------

This function adjusts the carrier frequency of the frequency converter. Adjusting the carrier frequency can reduce motor noise, avoid resonance points in the mechanical system, reduce leakage current to ground, and reduce interference generated by the frequency converter.

When the carrier frequency is low, the higher harmonic components of the output current increase, motor losses increase, and motor temperature rise increases.

When the carrier frequency is high, the motor loss decreases and the motor temperature rise decreases, but the inverter loss increases, the inverter temperature rise increases, and the interference increases.

Adjusting the carrier frequency will affect the following performance:

carrier frequency	Low → High
motor noise	Large → Small
Output current waveform	Bad → Good
Motor temperature rise	High → Low
Inverter temperature rise	Low → High
Leakage current	Small → Large

External radiation interference	Small → Large
---------------------------------	---------------

Inverters with different power ratings have different factory-set carrier frequencies. Although users can modify them as needed, it is important to note that setting the carrier frequency higher than the factory default will cause the inverter's heatsink to overheat. In this case, the user needs to derate the inverter; otherwise, there is a risk of the inverter overheating and triggering an alarm.

Inverter power	Carrier frequency range	Factory-set carrier frequency
0.75KW ~ 5.5KW	0.5kHz ~ 16.0kHz	6.0kHz
7.5KW ~ 75KW	0.5kHz ~ 16.0kHz	4.0kHz
93KW ~ 1200KW	0.5kHz ~ 16.0kHz	2.0kHz

P0-27	Carrier frequency adjusts with temperature	Range: 0 to 1	1
-------	--	---------------	---

0: Invalid

1. Effective: The frequency converter can automatically adjust the carrier frequency according to its own temperature, which can reduce the possibility of the frequency converter overheating alarm.

P0-28	Parameter initialization	Range: 0-5	0
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0: No operation

- 1: Restore factory settings, excluding motor parameters, P8-00 and P8-05 recorded information, and frequency decimal point P0-20.
- 2: Clear the recorded information , including fault record group U0, cumulative power-on time P7-33, cumulative running time P7-34, and power consumption P7-72.
- 3: Back up the user's current parameters
- 4: Restore user backup parameters
- 5: Restore all parameters , including motor parameters, to factory default values.

p0-29	Upload to keyboard, download to inverter parameter selection	Range: 0 ~ 7	0
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Uploading is the process by which the frequency converter stores the function code

parameter values to the keyboard.

Downloading involves the keyboard writing the stored inverter parameter values into the inverter. Therefore, the keyboard must have uploaded parameters before it can download parameters .

- 0 : No function
- 1: Upload parameters
- 2: Download P4/A1 group parameters
- 3: Download parameters excluding P4/A1 groups
- 4: Download all parameters
- 5: Download the modified parameters for group P4/A1
- 6: Download the modified parameters except for P4/A1 groups.
- 7: Download all modified parameters

5.2. P1 group start/stop control function group

P1-00	Startup method	Range: 0 ~ 2	0
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0: Direct start. When the DC braking time setting is not 0, DC braking is performed first, followed by start-up. Suitable for situations where small inertia loads may reverse during startup.

- 1: Speed tracking restart: The frequency converter first judges the speed and direction of the motor, and then starts the motor at a frequency corresponding to the tracked motor speed, so as to implement a smooth and shock-free start for the rotating motor. It is suitable for instantaneous power outage restart of large inertia loads.
- 2: Asynchronous motor pre-excitation start, used to establish a magnetic field before the asynchronous motor starts to reduce the current surge during rapid start-up.

P1-01	Speed tracking method	Range: 0 ~ 2	0
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To complete the speed tracking process in the shortest time, the inverter is selected to track the motor speed.

- 0: Tracking downwards from the frequency at the time of the power outage; this method is usually chosen.
- 1: Used for situations where tracking starts from the target frequency and restarting after a long power outage;
- 2: Tracking starts from the current speed, generally used for generating loads.

P1-02	Maximum current for speed tracking	Range: 30% ~ 150%	100%
P1-03	Speed tracking speed	Range: 1 ~ 100	20

When using the speed tracking restart mode, select the current and speed for speed tracking. Higher parameters result in faster tracking. However, excessively high parameters may cause unreliable tracking.

P1-04	Startup frequency	Range: 0.00Hz ~ 10.00Hz	0.00Hz
P1-05	Startup frequency retention time	Range: 0.0s ~ 100.0s	0.0s
P1-06	Starting DC braking current	Range: 0% ~ 100%	0%
P1-07	DC braking time	Range: 0.0s ~ 100.0s	0.0s

Starting DC braking is generally used in situations where the motor must be stopped before it can be restarted.

If the starting method is direct start, the inverter will first apply DC braking according to the set starting DC braking current, and then start running after the set starting DC braking time. The larger the DC braking current, the greater the braking force.

The starting DC braking current is a percentage of the inverter's rated current.

P1-08	Acceleration/deceleration frequency curve selection	Range: 0 ~ 2	0
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0: Linear acceleration/deceleration

1 : S-curve acceleration/deceleration A

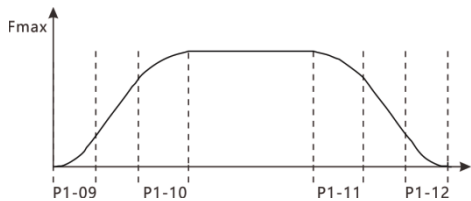
2 : S-curve acceleration/deceleration B

P 1-09	The S-curve accelerates for a short period of time.	Range: 0.0% ~ 100.0%	20.0%
P1-10	The acceleration of the S-curve ends in the period of time	Range: 0.0% ~ 100.0%	20.0%
P1-11	S-curve deceleration in the initial period	Range: 0.0% ~ 100.0%	20.0%
P1-12	The period after the S-curve deceleration ends	Range: 0.0% ~ 100.0%	20.0%

The above parameters can be used to set the driver to start smoothly without any shocks during initial acceleration. The acceleration/deceleration curves can be adjusted to different degrees using the set values. When starting S-curve acceleration/deceleration,

the driver will generate acceleration/deceleration curves at different rates based on the original acceleration/deceleration time.

Note: If acceleration/deceleration time = 0, the S-curve function is invalid.



S-curve acceleration/deceleration diagram

P1-13	Shutdown methods	Range: 0 to 1	0
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0: Deceleration and Stop. After the stop command is valid, the frequency converter reduces the output frequency according to the deceleration method and the defined acceleration and deceleration time. The frequency stops after it drops to 0.

1: Free Stop: After the stop command is valid, the frequency converter immediately terminates its output. The load stops freely due to mechanical inertia.

P1-14	DC braking start frequency during shutdown	Range: 0.00Hz ~ P0-14	0.00Hz
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During deceleration and shutdown, when this frequency is reached, the DC braking process for shutdown begins. Setting this value too high can easily cause overvoltage.

P1-15	DC braking waiting time during shutdown	Range: 0.0s ~ 100.0s	0.0 s
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After the operating frequency drops to the DC braking start frequency, the inverter first stops outputting for a period of time before initiating the DC braking process. This is to prevent overcurrent and other faults that may occur if DC braking is initiated at higher speeds.

P1-16	Shutdown braking DC current	Range: 0% ~ 100%	0%
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This parameter is used to set the percentage of the DC braking current, with the inverter's rated current as 100%. The larger the braking current, the more obvious the braking effect; however, if the braking current is too large, the braking time P1-17 should not be set too long.

P1-17	DC braking time during shutdown	Range: 0.0s ~ 36.0s	0.0s
-------	---------------------------------	---------------------	------

This parameter is used to set the DC braking duration; a value of 0 indicates no DC

braking process.

P1-21	Demagnetization time	Range: 0.01s ~ 3.00s	0.50s
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This parameter is used to set the waiting time required for the inverter to stop freely and restart, reducing the impact of residual magnetism on startup.

P1-23	Instantaneous or non-instantaneous mode selection	Range: 0 ~ 2	0
-------	---	--------------	---

This parameter is used to set the method to prevent shutdown due to undervoltage of the busbar caused by voltage drop in the mains power grid. It is commonly used in applications such as wind turbines.

0: Invalid. The machine continues to operate at the given frequency even when the mains voltage experiences a momentary power outage. This may result in an undervoltage fault and shutdown.

1. Automatic deceleration rate adjustment: In the event of a momentary power outage in the mains, the deceleration rate is automatically adjusted to maintain inverter operation. Once the mains voltage is restored, it automatically accelerates to the target frequency. However, if the mains power outage is prolonged, an undervoltage fault will still occur, causing the inverter to shut down.

2: Deceleration Stop: In the event of a momentary power outage or a sudden drop in voltage, the frequency converter will decelerate and stop according to P1-24. If restarting is required after stopping, a restart signal must be given again.

P1-24	The deceleration time during instantaneous stop and continuous deceleration.	Range: 0.0s ~ 100.0s	10.0s
P1-25	Instantaneous stop without effective voltage	Range: 60% ~ 85%	80%

This parameter is used to determine the threshold for whether the grid voltage will momentarily fail. When the bus voltage is lower than P1-25, the inverter will decelerate according to the method set in P1-23 to maintain a constant bus voltage. 100% correspondence with inverter voltage level.

P1-26	Instantaneous stop without continuous voltage recovery	Range: 85% ~ 100%	90%
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This parameter is used to determine the threshold for whether the grid voltage has returned to normal. When the bus voltage is greater than P1-26, the frequency

converter will no longer decelerate. When the duration is greater than P1-27, the frequency converter will start to accelerate until it reaches the set frequency. 100% correspondence with the frequency converter voltage level.

P1-27	Instantaneous stop and continuous recovery voltage judgment	Range: 0.0s ~ 300.0s	0.3s
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This parameter is used to determine the time for grid voltage recovery. The timer starts when the grid voltage is higher than P1-26, and is reset to 0 otherwise.

P1-28	Instantaneous stop with automatic gain adjustment	Range: 0 ~ 100	40
P1-29	Instantaneous stop and continuous automatic adjustment of points	Range: 1 ~ 100	20

This setting only takes effect when the instantaneous stop/non-stop mode is selected with P1-23=1. It is used to adjust the deceleration rate and generally does not need to be modified.

P1-30	Speed tracking current Kp	Range: 0 ~ 1000	300
P1-31	Speed tracking current Ki	Range: 0 ~ 1000	600

By properly configuring Kp and Ki, high-precision tracking of the current loop can be achieved, thereby improving the overall speed control performance of the frequency converter. For further optimization, it is recommended to conduct experimental verification based on specific motor parameters and load characteristics.

5.3. P2 group V/F control parameters

his set of function codes is only valid for V/F control (P0-03 = 0 2), and is invalid for vector control.

V/F control is suitable for general loads such as fans and water pumps, or for applications where one frequency converter drives multiple motors, or where the power of the frequency converter is one level smaller or two levels larger than the power of the motor.

P2-00	V/F curve setting	Range: 0 ~ 7	0
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For fan and pump loads, square V/F control can be selected:

0: Linear V/F curve. Suitable for ordinary constant torque loads;

1. Multi-point V/F curves. Suitable for special loads such as dehydrators and centrifuges;
 2: Squared V/F curve. Suitable for centrifugal loads such as fans and pumps;
 3 to 5: These correspond to the 1.7th, 1.5th, and 1.3th order V/F curves, respectively, falling between a straight line and a square curve.

6: V- F completely separated mode. In this mode, the inverter's output frequency and output voltage are independent of each other. The output frequency is determined by the frequency source, while the output voltage is determined by P2-15 (V- F separated voltage source).

The V- F fully separated mode is generally used in applications such as induction heating, inverter power supply, and torque motor control.

7: V F semi-separation mode.

In this case, V and F are proportional, but the proportional relationship can be set by voltage source P2-15, and the relationship between V and F is also related to the rated voltage and rated frequency of the motor in group P1.

Assuming the voltage source input is X (X is a value from 0 to 100%), the relationship between the inverter output voltage V and the frequency F is as follows:

$$V/F = 2 * X * (\text{motor rated voltage}) / (\text{motor rated frequency})$$

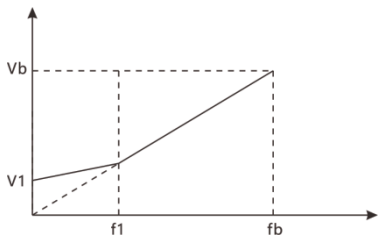
P2-01	Torque boost	Range: 0.0% ~ 30.0%	0.0%
P2-02	Torque boost cutoff frequency	Range: 0.00Hz to maximum frequency	25.00Hz

To compensate for the low-frequency torque characteristics of V/F control, the inverter output voltage is boosted at low frequencies.

If the torque boost setting is too high, the motor is prone to overheating and the frequency converter is prone to overcurrent. Generally, the torque boost should not exceed 8.0%.

Adjusting this parameter effectively can prevent overcurrent during startup. For larger loads, it is recommended to increase this parameter; for lighter loads, decrease it. When the torque boost is set to 0.0, the inverter automatically boosts torque.

Torque boost cutoff frequency: The torque boost is effective below this frequency. Above this set frequency, the torque boost fails. See the manual torque boost diagram for details.



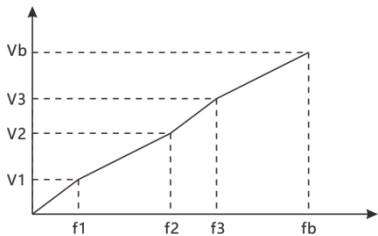
V1: Manual torque boost voltage; Vb: Maximum output voltage
F1: Torque boost cutoff frequency; fb: Rated operating frequency

Manual torque boosting diagram

P2-03	V/F frequency point P1	Range: 0.00Hz ~ P2-05	1.30Hz
P2-04	V/F voltage point V1	Range: 0.0% ~ 100.0%	5.2%
P2-05	V/F frequency point P2	Range: P2-03 ~ P2-07	2.50Hz
P2-06	V/F voltage point V2	Range: 0.0% ~ 100.0%	8.8%
P2-07	V/F frequency point P3	Range: 0.00Hz ~ 50.00Hz	15.00Hz
P2-08	V/F voltage point V3	Range: 0.0% ~ 100.0%	35.0%

The six parameters P2-03 to P2-08 define multiple V/F curves.
The V/F curve setting is usually determined based on the motor's load characteristics.
Note: $V1 < V2 < V3$, $F1 < F2 < F3$. Setting the voltage too high at low frequencies may cause the motor to overheat or even burn out, and the inverter may experience overspeed or overcurrent protection.

Fb: Motor rated frequency P4-05
Vb: Rated voltage of the motor (P4-02)



V/F curve setting diagram

P2-	slip compensation	Range: 0.0% ~ 200.0%	50.0%
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P2-09	coefficient		
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Setting this parameter can compensate for the slip caused by the load during V/F control, thus reducing the change in motor speed with load during V/F control. Generally, 100.0% corresponds to the rated slip of the motor when it is under rated load.

This value can be increased appropriately when the motor speed under load is lower than the given speed, and vice versa. Generally, no adjustment is needed.

P2-10	Flux Braking Gain	Range: 0 ~ 200	100
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This parameter can suppress the rise of bus voltage during the deceleration process of the frequency converter; the higher the value, the better the suppression effect.

Flux braking increases the motor terminal current by increasing the inverter's output voltage, thereby improving the regenerative energy dissipation capacity and suppressing the rise in bus voltage. A higher gain results in a higher motor current; please be mindful of this in applications. In cases where a braking resistor is also present, it is recommended to set this value to 0; otherwise, abnormalities may occur during deceleration due to excessively high deceleration current.

P2-11	Oscillation suppression gain	Range: 0 ~ 100	Model confirmed
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This parameter is used to suppress motor oscillation. Increase this value appropriately when motor oscillation occurs, but keep it as small as possible when there is no oscillation to avoid excessive impact on V/F operation. Generally, no modification is needed.

P2-13	VF slip compensation time constant	Range: 0.02s ~ 1.00s	0.30s
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This parameter sets the slip compensation time constant. Decreasing this value can improve response speed, but speed fluctuations may increase. Increasing this value will improve speed stability, but the response speed will slow down. Generally, no modification is needed.

P2-15	When VF is separated, the output voltage source is selected.	Range: 0 ~ 7	0
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0: Numerical setting (P2-16)

1: AI1

2: AI2

3: Multi-segment instructions

4: Simple PLC

5: PID

6: Communication given

7: PULSE pulse setting (HDI) 100.0% corresponds to the motor's rated voltage.

P2-16	V/F separate output voltage digital setting	Range: 0V to rated voltage of the motor	0V
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This parameter is used to set the voltage output value when the V/F voltage is separated and the voltage source is a digital setting value.

P2-17	V/F separation output voltage acceleration time	Range: 0.0 ~ 3000.0s	1.0s
P2-18	V/F separation output voltage deceleration time	Range: 0.0 ~ 3000.0s	1.0s

P2-17 is used to set the acceleration time of the voltage output from 0 to the rated voltage when V/F is separated.

P2-18 is used to set the deceleration time of the voltage output from the rated voltage to 0 when V/F is separated.

P2-19	V/F separation shutdown method selection	Range: 0 ~ 1	0
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0: Frequency and output voltage deceleration time are independent.

1: After the voltage is reduced to 0, the frequency is then reduced.

P2-20	VF overflow velocity enable	Range: 0 ~ 1	1
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0: Off

1: Enable

The default overcurrent shunt gain is effective. P9-05 (VF overcurrent shunt protection gain) is 0 to 100, with a factory value of 20; P9-06 (VF overcurrent shunt protection current) is 50% to 200%, with a factory value of 150%.

P2-21	VF overvoltage stall enable	Range: 0 ~ 1	1
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0: Off

1: Enable

The overvoltage stall gain is enabled by default. P9-03 (overvoltage stall protection gain) is 0 to 100, with a factory value of 30. P9-04 (overvoltage stall protection voltage) is 200 to 850V, with a factory value of 760V.

P2-	VF overvoltage stall	Range: 0 ~ 100	30
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22	suppression frequency gain		
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Increasing the VF overvoltage stall suppression frequency gain (P2-22) will improve the control effect of the bus voltage, but the output frequency will fluctuate. If the output frequency fluctuates significantly, P2-22 can be appropriately reduced. The function of P2-22 is equivalent to that of P9-03.

P2-23	Overvoltage stall maximum rise frequency limit	Range: 0 ~ 50Hz	30
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Overvoltage suppression maximum rise frequency limit .

5.4. P3 group vector control parameters

The P2 group function code is only valid for vector control, that is, it is valid when P0-03 = 1 and invalid when P0-03 = 2 .

P3-00	Switching frequency P1	Range: 0.00 ~ P3-02	5.00 Hz
P3-02	Switching frequency P2	Range: P3-00 ~ P0-14	10.00 Hz
P3-04	Low-frequency speed ratio gain	Range: 0.1 ~ 10.0	4.0
P3-05	Low-frequency speed integral time	Range: 0.01s ~ 10.00s	0.50s
P3-06	High-frequency speed proportional gain	Range: 0.1 ~ 10.0	2.0
P3-07	High-frequency speed integral time	Range: 0.01 ~ 10.00s	1.00s

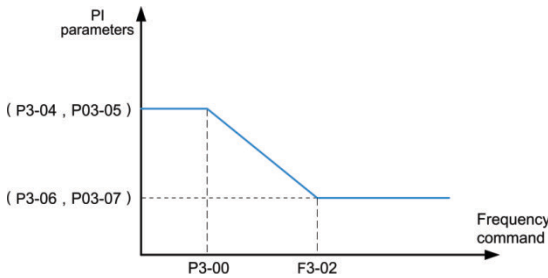
P3-00 switches to frequency 1, and P3-02 switches to frequency 2. P3-04/P3-05 and P3-06/P3-07 are the PI controller parameters for low speed and high speed, respectively. Their switching relationship is shown in the "Speed Loop PI Parameter Switching Diagram". By setting the proportional gain and integral time of the speed controller, the dynamic response characteristics of vector control can be adjusted. Increasing the proportional gain and decreasing the integral time can both accelerate the dynamic response of the speed loop. Excessive proportional gain or insufficient integral time may cause system oscillations.

Suggested adjustment method:

If the factory parameters do not meet the requirements, fine-tune them based on the factory values. First, increase the proportional gain to ensure that the system does not

oscillate; then decrease the integral time to make the system have both fast response characteristics and small overshoot.

Note: Improper PI parameter settings may lead to excessive speed overshoot, or even overvoltage faults during overshoot fallback.



Speed loop PI parameter switching diagram

P3-08	Speed ring integral attribute selection	Range: 0 ~ 1	0
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0: Integral action is applied during acceleration and deceleration, resulting in a fast response in rapid acceleration scenarios, but may lead to speed overshoot .

1: Integral separation during acceleration and deceleration can effectively reduce speed overshoot in rapid acceleration situations, but the response speed will be slower .

P3-11	Torque current regulator Kp	Range: 0 ~ 30000	2200
P3-12	Torque current regulator Ki	Range: 0 ~ 30000	1500
P3-13	Excitation current regulator Kp	Range: 0 ~ 30000	2200
P3-14	Excitation current regulator Ki	Range: 0 ~ 30000	1500

The vector control current loop PI adjustment parameter is automatically obtained after the asynchronous machine is fully tuned and generally does not need to be modified. The integral regulator of the current loop does not use integral time as the unit of measurement; instead, it directly sets the integral gain. Setting the current loop PI gain too high may cause the entire control loop to oscillate. Therefore, when current oscillations or torque fluctuations are large, the PI proportional gain or integral gain here can be manually reduced.

P3-15	Flux Braking Gain	Range: 0 ~ 200	0
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This parameter can suppress the rise of bus voltage during the deceleration process of

the frequency converter; the higher the value, the better the suppression effect. Flux braking increases the motor terminal current by increasing the inverter's output voltage, thereby improving the regenerative energy dissipation capacity and suppressing the rise in bus voltage. A higher gain results in a higher motor current; please be mindful of this in applications. In cases where a braking resistor is also present, it is recommended to set this value to 0; otherwise, abnormalities may occur during deceleration due to excessively high deceleration current.

P3-16	Field weakening torque correction factor	Range: 50% ~ 200%	100%
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This parameter is used to correct the motor torque value in the constant power range and generally does not need to be modified.

P3-17	slip compensation gain	Range: 50% ~ 200%	100%
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This parameter is used to adjust the speed stability of the motor. When the speed is too high, decrease this parameter, and vice versa.

P3-18	Velocity loop feedback filter time constant	Range: 0.000 ~ 1.000s	0.015s
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This parameter sets the filtering time constant for the speed feedback value. Increasing this value improves speed stability but reduces system response speed; decreasing this value improves system response speed but reduces speed stability. Generally, no modification is needed.

P3-19	Speed loop output filter time constant	Range: 0.000 ~ 1.000s	0.000s
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This parameter is used to set the filtering time constant for the torque setpoint, which helps improve speed stability. It is generally not required to set.

P3-20	Electric torque upper limit source	Range: 0 ~ 4	0
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0 : P3-21

1 : AI1, AI straight line settings refer to P5-15 ~ P5-19, multi-point curve settings refer to P5-45 and PE group.

2 : AI2, AI straight line settings refer to P5-20 ~ P5-24, multi-point curve settings refer to P5-45 and PE group.

3 : Communication given, written directly by the host computer through the communication address, 100% corresponding to P3-21, refer to the Modbus communication protocol for details.

4 : PULSE is given. Refer to the function codes P5-30 to P5-33 for the setting instructions.

100% corresponds to P3-21 .

P3-21	Electric torque limit	Range: 0.0% ~ 200.0%	150.0%
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This parameter is used to set the upper limit of the inverter's motoring torque. When the actual direction of the motor's rotation is the same as the direction of the torque, it is considered motoring; otherwise, it is considered braking.

In situations where different settings are required for electric torque and braking torque, they can be set separately using P3-21 and P3-23.

For example, in cam load applications, since there is a periodic change between electric and braking states, appropriately reducing the upper limit of the braking torque P3-23 can effectively reduce the rise of the inverter bus voltage without affecting the normal operation of the load.

P3-22	Braking torque upper limit source	Range: 0 ~ 4	0
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0 : P3-23

1 : AI1, AI straight line settings refer to P5-15 ~ P5-19, multi-point curve settings refer to P5-45 and PE group.

2 : AI2, AI straight line settings refer to P5-20 ~ P5-24, multi-point curve settings refer to P5-45 and PE group.

3 : Communication is given by the host computer through the communication address, which corresponds to P3-21 100% of the time. For details, please refer to the appendix Modbus communication protocol.

4 : PULSE is given. Refer to the function codes P5-30 to P5-33 for the setting instructions .

100% corresponds to P3-23 .

P3-23	Braking torque limit	Range: 0.0 ~ 200.0%	150.0%
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This parameter is used to set the upper limit of the inverter's braking torque. This parameter is also used to set the upper limit of the inverter's motoring torque. When the actual direction of the motor's rotation is the same as the direction of the torque, it is in motoring mode; otherwise, it is in braking mode.

In situations where different settings are required for electric torque and braking torque, they can be set separately using P3-21 and P3-23.

For example, in cam load applications, since there is a periodic change between electric and braking states, appropriately reducing the upper limit of the braking torque P3-23 can effectively reduce the rise of the inverter bus voltage without affecting the normal

operation of the load.

P3-24	Synchronous motor low-speed magnetizing current	Range: 0.0% ~ 80.0%	25.0%
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When used for SVC control of synchronous motors, the compensation current is increased in the low-speed range .

P3-25	Synchronous motor magnetization cutoff frequency	Range: 0% ~ 100%	10%
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In the SVC control of a synchronous machine, the frequency range in which the low-speed magnetizing current acts is below the cutoff frequency .

P3-26	Pre-excitation time	Range: 0s ~ 5s	0s
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When enabling pre-excitation startup, the pre-excitation duration under vector SVC control .

P3-27	Synchronous motor initial position identification enable selection	Range: 0 ~ 2	1
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Synchronous motor initial position identification enable selection , and synchronous machine control initial position detection method enable .

0 : Initial position detection is not enabled.

1 : Identification Method 1

2 : Identification Method 2

P3-28	Initial position identification voltage given percentage	Range: 30% ~ 150 %	80%
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Selection of the injection current threshold for initial position identification of the synchronizing machine .

P3-29	Synchronous machine start-up minimum carrier frequency	Range: 0.8 ~ P0-26 (set carrier frequency)	2.0
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Low-speed carrier frequency setting for synchronous machine control .

P3-40	VVC high-pass filter coefficient	Range: 0 ~ 65535	100
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The high-pass filter adjustment coefficient is used in the VVC control algorithm of the

synchronous machine .

P3-41	VVC oscillation suppression gain coefficient	Range: 0 ~ 65535	100
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The gain coefficient used in the VVC control algorithm of a synchronous machine to suppress oscillations is applied .

P3-42	VVC oscillation suppression damping coefficient	Range: 0 ~ 500	100
-------	---	----------------	-----

The damping coefficient for suppressing oscillation adjustment in the VVC control algorithm of the synchronous machine is used for setting.

5.5. P4 Group First Motor Parameters

P4-00	Motor parameter tuning	Range: 0 ~ 2	0
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Note: Before tuning, the correct motor rating parameters (P4-01 to P4-06) must be set.

0: No operation, i.e., tuning is prohibited.

1: Static tuning, suitable for situations where the motor and load are not easily separated and rotary tuning is not possible.

Operation Description: After setting this function code to 1 and pressing the RUN button to confirm, the frequency converter will perform static tuning.

2: Rotary Tuning

To ensure the dynamic control performance of the frequency converter, please select rotary tuning. During rotary tuning, the motor must be disconnected from the load (no-load). After selecting rotary tuning, the frequency converter will first perform static tuning. After static tuning is completed, the motor will accelerate according to the setting on P4-12.

Accelerate to 80% of the motor's rated frequency and maintain it for a period of time, then decelerate to zero speed according to the deceleration set on P4-13, and the rotational tuning ends.

Operation instructions: After setting the function code to 2 and pressing the RUN button to confirm, the frequency converter will perform rotary tuning.

Tuning operation instructions:

When P4-00 is set to 1 or 2, press the ENTER key. The message "TUNE" will then flash. Press the RUN key to begin parameter tuning. The "TUNE" message will then stop

flashing. After tuning is complete, the display will return to the stop screen. Tuning can be stopped by pressing the STOP key during the tuning process.

Once tuning is complete, the value of P4-00 automatically returns to 0.

P4-01	Motor 1 Rated Power	Range: 0.1kW ~ 1000.0kW	Model confirmed
P4-02	Motor 1 Rated Voltage	Range: 1V ~ 1500V	380V
P4-03	Motor 1 Number of poles	Range: 2–64	Model confirmed
P4-04	Motor 1 rated current	Range: 0.1A ~ 6000.0A <1>	P4-01 confirmed
P4-05	Motor 1 rated frequency	Range: 0.01Hz ~ P0-14	50.00Hz
P4-06	Motor 1 rated speed	Range: 1 rpm to 60000 rpm	P4-01 confirmed

<1>When the rated power of the motor P4-01 is less than or equal to 30KW, P4-04 has two decimal places; when P4-01 is greater than or equal to 30KW, it has one decimal place.

The above function codes are parameters from the motor nameplate. Regardless of whether V/F or vector control is used, the relevant parameters must be accurately set according to the motor nameplate.

To obtain better V/F or vector control performance, motor parameter tuning is required, and the accuracy of the tuning results is closely related to the correct setting of the motor nameplate parameters.

P4-07	Motor 1 no-load current	Range: 0.01A ~ P4-04 <1>	Model confirmed
P4-08	Motor 1 stator resistance	Range: $0.001\Omega \sim 65.535\Omega$ <2>	Model confirmed
P4-09	Motor 1 rotor resistance	Range: $0.001\Omega \sim 65.535\Omega$ <2>	Model confirmed
P4-10	Motor 1 mutual inductance	Range: 0.1 Mh ~ 6553.5 Mh <2>	Model confirmed
P4-11	Motor 1 leakage inductance	Range: 0.01Mh ~ 655.35Mh <2>	Model confirmed

<1> When the rated power of the motor P4-01 is greater than 30KW, P4-4 has one decimal place; when P4-01 is less than or equal to 30KW, it has two decimal places.

<2> When the rated power of the motor P4-01 is greater than 30KW, add 1 decimal place. When P4-01 is less than or equal to 30KW, the number of decimal places is shown in the table.

Function code parameters P4-07 to P4-11 are generally not found on the motor nameplate and need to be obtained through inverter tuning. "Static tuning" can only obtain three parameters from P4-07 to P4-09, while "rotary tuning" obtains the values of all five function codes.

Note: When P4-01 is modified, the values of motor parameters P4-02 to P4-11 will change accordingly.

P4-12	Acceleration during dynamic full tuning	Range: 1.0s ~ 6000.0s	10.0s
P4-13	Deceleration during dynamic full tuning	Range: 1.0s ~ 6000.0s	10.0s

The above function codes represent the acceleration and deceleration times when the motor is fully tuned. Users can set this parameter appropriately according to the actual situation of the motor.

P4-17	synchronous motor stator resistance	Range: 0.001Ω ~ 65.535Ω	Model confirmed
P4-18	Synchronous motor D-axis inductance	Range: 0.01Mh ~ 655.35Mh	Model confirmed
P4-19	Synchronous motor Q-axis inductance	Range: 0.01Mh ~ 655.35Mh	Model confirmed
P4-20	Synchronous motor back electromotive force	Range: 1V ~ 65535V	Model confirmed
P4-21	Synchronous motor no-load current	Range: 0.0% ~ 50.0%	10.0%

P4-17 to P4-21 are generally not found on the motor nameplate and need to be obtained through inverter tuning. "Static tuning" only yields three parameters (P4-07 to P4-09), while "rotary tuning" yields the values of all five function codes. If P4-21 returns 0 during "rotary tuning," it is recommended to change it to the factory default value of 10.0%.

P4-28	Encoder pulse lines (before 4x frequency)	Range: 1 to 65535	1024
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The encoder pulse line count (before 4x frequency multiplication) refers to the number of physical pulse signals directly output by the encoder per revolution, usually determined by the number of lines on the encoder's optical or magnetic grating. The following are key points:

Basic definition

The pulse count is the inherent resolution of an encoder. For example, a 100-line encoder outputs 100 pulses per revolution (without frequency multiplication). In practical applications, a frequency multiplication circuit is often used to subdivide the signal (e.g.,

100 lines become 400 pulses/revolution), but the original pulse count is still the hardware basis.

Common range

Incremental encoders: typical values are 100~5000 lines (industrial standards commonly include 100, 250, 500, 1024, 2048, etc.).

High-resolution encoders: up to tens of thousands of lines, but signal processing capabilities need to be considered.

Selection Criteria

Accuracy requirements: The higher the line count, the higher the angular resolution (e.g., 100 lines correspond to 3.6° /pulse, 1024 lines correspond to 0.35° /pulse).

Speed Limitation: High line counts may result in high-frequency signals, requiring matching with the controller's sampling frequency.

Supplementary Explanation

The "line count" of an absolute encoder may be expressed in bits (e.g., 12 bits = 4096 "lines"). Mechanical installation must take into account shaft load and the encoder's maximum permissible speed .

P4-29	Encoder phase sequence selection	Range: 0 ~ 1	0
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0: Positive , consistent with the current direction of motor operation.

1: Reverse direction , opposite to the current direction of motor operation.

P4-30	Encoder type	Range: 0 ~ 4	0
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0: ABZ encoder , PG1 (open collector ABZ encoder card), PG3 (differential input ABZ encoder card) selection

1: UVW encoder , (UVW encoder card) selection

2: Line-saving encoder (bus or serial encoder card selection)

3: Rotary encoder , PG6 (rotary transformer encoder card) selection

4: Sine/cosine encoder , PG5 (sine/cosine encoder interface card) selection

P4-31	Number of pole pairs of rotary encoder	Range: 1 to 65535	1
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The number of pole pairs in a rotary encoder usually refers to the number of periodic structures of its internal magnetic rings or gratings, which directly affects the resolution and signal output characteristics .

The number of pole pairs refers to the number of pairs of magnetic poles (N/S poles) or grating lines in the encoder rotor.

For example : an 8-pole magnetic encoder means that the rotor has 8 pairs (16) of magnetic poles.

The more pole pairs there are, the higher the number of signal cycles per turn. Combined with electronic subdivision (such as 4x frequency multiplication), the resolution can be improved.

For example: 8 pole pairs x 4 times the frequency = 32 pulses/revolution (mechanical angular resolution 11.25°). A 2048-line optical encoder (without the concept of magnetic poles) directly relies on the number of grating lines.

P4-32	Encoder mounting position angle	Range: $0.0^\circ \sim 359.9^\circ$	0.0°
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The mounting position angle of an encoder refers to the relative angular offset between the rotor and the load shaft during mechanical installation, directly affecting zero-point alignment and signal feedback accuracy. Position angle deviations can cause the encoder's electrical and mechanical zero points to misalign, requiring software compensation or mechanical adjustment for alignment.

5.6. P5 group input terminals

This series of frequency converters comes standard with 7 multi-function digital input terminals (of which HDI can be used as a high-speed pulse input terminal) and 2 analog input terminals.

P5-00	DI1 terminal function	Range: 0 ~ 63	1
P5-01	DI2 terminal function	Range: 0 ~ 63	2
P5-02	DI3 terminal function	Range: 0 ~ 63	9
P5-03	DI4 terminal function	Range: 0 ~ 63	12
P5-04	DI5 terminal function	Range: 0 ~ 63	13
P5-05	DI6 terminal function	Range: 0 ~ 63	0
P5-06	DI7 terminal function	Range: 0 ~ 63	0

This parameter is used to set the function corresponding to the digital multifunction input terminal. The specific functions are shown in the attached table below .

Setting value	Function	illustrate
0	No function	Even if there is a signal input, the frequency converter will not operate. Unused segments can be set to non-functional to prevent malfunction.
1	Forward rotation (FWD)	The inverter's forward and reverse rotation is controlled via external terminals.
2	Reverse operation (REV)	
3	Three-line operation control	This terminal is used to determine whether the frequency converter is operating in three-wire control mode.
4	Forward jog (FJOG)	FJOG indicates forward inching operation, and RJOG indicates reverse inching operation. For the inching operation frequency and inching acceleration/deceleration time, please refer to the detailed description of function codes P7-00, P7-01, and P7-02.
5	Reverse Jog (RJOG)	
6	Terminal UP	When this function is active, it will modify the frequency increment and decrement commands based on the frequency given by the external terminal. When the frequency source is set to digital, the set frequency can be adjusted up and down. The up/down rate of change is set via P5-12 .
7	Terminal DOWN	
8	Free parking	The inverter output is blocked, and the motor stopping process is not controlled by the inverter. This is a common method used for loads with high inertia where there are no requirements for stopping time.
9	Fault reset (RESET)	External fault reset function. Same function as the RESET key on the keyboard.
10	pause operation	The frequency converter decelerates and stops, but all operating parameters are in a memorized state, such as PLC parameters, oscillation parameters, and PID parameters. After this signal disappears, the frequency converter resumes operation to the state before stopping.
11	External fault normally open input	When an external fault signal is sent to the frequency converter, the frequency converter reports an Err28 fault and shuts down according to the shutdown method set on P9-

Setting value	Function	illustrate
		23.
12	Multi-speed terminal 1	A total of 16 segments can be set through the digital status combination of these four terminals. For detailed combinations, please refer to the multi-segment instruction function description.
13	Multi-speed terminal 2	
14	Multi-speed terminal 3	
15	Multi-speed terminal 4	
16	Acceleration/deceleration time selection terminal 1	Four acceleration/deceleration time settings can be selected by combining the digital states of these two terminals. For detailed combinations, please refer to the function description of the acceleration/deceleration time selection terminal .
17	Acceleration/deceleration time selection terminal 2	
18	Frequency source switching	This terminal is used to switch between the main frequency source X and the P0-10 setting frequency source.
19	Reset UP/DOWN settings (terminals, keypad)	This terminal can be used to clear the frequency value changed by UP/DOWN, restoring the given frequency to the value set by P0-11.
20	Run command to switch terminals	When the command source is not the keyboard, this terminal allows switching between terminal control and keyboard control. When communication is involved, this terminal allows for both communication and keyboard control.
21	Acceleration and deceleration prohibited	Ensure that the frequency converter is not affected by external signals (except for shutdown commands) and maintain the current output frequency.
22	PID failure (paused)	When the frequency source P0-06 is a PID controller, PID failure will cause the inverter to maintain the current frequency output .
23	PLC Status Reset	If the PLC pauses during execution and resumes operation, this terminal can be activated to restore the simple PLC to its initial state.
24	Swing frequency pause	The frequency swing is paused, and the frequency converter outputs at the center frequency.
25	DI input timer start	The timer input signal is active when the set

Setting value	Function	illustrate
		closing/opening time is reached. The timer output function is then active. It requires the use of Y1 output function 17 and P7-39 and P7-40 .
26	Immediate DC braking	When this terminal is active, the inverter immediately applies DC braking , with the braking current set by P1-16 .
27	External fault normally closed input	When an external fault signal is sent to the frequency converter, the frequency converter reports an Err28 fault and shuts down according to the shutdown method set on P9-23.
28	Roll diameter reset	When tension is controlled, the roll diameter setting is restored to its initial value.
29	Counter input	The terminal for inputting the counting pulse, in conjunction with Pb-08, enables the function of setting the counting value .
30	Counter Reset	Clear the counter's count value to zero .
31	STO1 input	When the STO1-24V terminal is used for setting the safe torque shutdown function mode, disconnecting it will report an Err48 fault; closing it will reset the fault.
32	Torque control disabled	The inverter is disabled in torque control mode; it is switched to speed control.
33	PULSE (pulse) frequency input	This is the pulse input terminal (valid only for HDI) .
34	Frequency setting activation terminal	When the terminal is active, the inverter does not respond to frequency changes .
35	Reverse the direction of PID control	When this terminal is active, the PID action direction is opposite to the direction set by PA-04 .
36	External parking terminal 1	When the command source P0-04 is the operation panel, this terminal can be used to stop the frequency converter, which is equivalent to the function of the STOP key on the keyboard .
37	Control command switching terminal 2	Used for switching between terminal control and communication control.
38	PID integral pause terminal	When this terminal is active, the PID integral control is paused, but the PID proportional and derivative control functions remain active.

Setting value	Function	illustrate
39	Frequency source X and preset frequency switching terminal	If this terminal is active, then frequency source X is replaced with a preset frequency (P0-11) .
40	Frequency source Y and preset frequency switching terminal	If this terminal is active, the frequency source Y is replaced with the preset frequency (P0-11) .
41	Motor selection terminal	This allows for the switching of parameters between two sets of motors, Motor 1 and Motor 2 .
42	Fire mode trigger	If this terminal is active, then the fire mode enable will be activated and STO1 and STO2 will be active.
43	PID parameter switching terminal	When this terminal is invalid, the first set of PID parameters is used; when it is valid, the second set of PID parameters is used. See the PA group description for details.
44	Speed control/torque control switching	This terminal switches the inverter between torque control and speed control modes. When this terminal is invalid, the inverter operates in the mode defined by Pd-10 (speed / torque control mode) ; when this terminal is valid, it switches to the other mode.
45	Emergency stop	When this terminal is active, the inverter stops at the fastest speed, and the current during this stopping process is at the set upper current limit. This function is used to meet the requirement that the inverter needs to be shut down as quickly as possible when the system is in an emergency.
46	External parking terminal 2	Under any control mode (panel control, terminal control, communication control), this terminal can be used to decelerate and stop the frequency converter. At this time, the deceleration time is fixed as deceleration time 2 (P7-04).
47	Deceleration DC Braking	When this terminal is active, the inverter first decelerates to the DC braking start frequency before switching to DC braking mode.
48	Runtime reset to zero	When this terminal is active, the timing of the inverter's current run is reset to zero. This function needs to be used in conjunction with

Setting value	Function	illustrate
		timed run (P7-36) and the current run time setting (P7-38).
49	Two-wire/three-wire switching	Used to switch between two-wire control mode and three-wire control mode.
50	Do not reverse	This terminal is active and inverter reverse rotation is prohibited.
51	User-defined fault 1	When the fault setting terminal is active, the inverter outputs an Err30 fault.
52	User-defined fault 2	When the fault setting terminal is active, the inverter outputs an Err31 fault.
53	Sleep input	The sleep function is enabled or disabled via external terminals. When the switch is closed, the sleep function is forced to be enabled. When the switch is open, the inverter is forced to exit the sleep state and enter the wake-up running state (unrelated to PID calculation).
54	Emergency signals for residential elevators	Elevator application emergency stop enable digital signal selection.
55	Civil elevator maintenance signal	Elevator application maintenance signal enable digital signal selection, B5-15=maintenance speed .
56	Initial roll diameter selection terminal 1	the initial roll diameter source C1-11=0 for tension control .
57	Initial roll diameter selection terminal 2	
58	Roll diameter calculation stopped	When the tension control roll diameter value reaches C1-20, the roll diameter setting function of the DO terminal is effective.
59	Input circle	The tension control DI terminal should be connected to the digital input signal for the number of turns.
60	Rewind/unwind switch	Tension control allows for selection of winding and unwinding states.
61	STO2 input	When the STO2-24V terminal is used for setting the safe torque shutdown function mode, disconnecting it will report an Err48 fault; closing it will reset the fault.
62	Tension control material thickness 1	When parameter C1-21 is selected as 0: the material thickness is set by the DI terminal. C1-22~C1-26 can digitally set 4 initial material thicknesses, which are determined by the logic
63	Tension control material thickness 2	

Setting value	Function	illustrate
		level of the DI terminal.
67	Water level detection switch 1	The photovoltaic water pump application is effective in detecting full water levels in the reservoir.
68	Water level detection switch 2	Photovoltaic water pumps are effective in detecting low water levels in submerged wells.
69	Photovoltaic power supply switching	Manually switching the power supply mode is effective in photovoltaic water pump applications.

Multi-segment instruction function description

K4	K3	K2	K1	Frequency setting	Corresponding parameters
OFF	OFF	OFF	OFF	Multi-speed 0	PC-00
OFF	OFF	OFF	ON	Multi-speed 1	PC-01
OFF	OFF	ON	OFF	Multi-speed 2	PC-02
OFF	OFF	ON	ON	Multi-speed 3	PC-03
OFF	ON	OFF	OFF	Multi-speed 4	PC-04
OFF	ON	OFF	ON	Multi-speed 5	PC-05
OFF	ON	ON	OFF	Multi-speed 6	PC-06
OFF	ON	ON	ON	Multi-speed 7	PC-07
ON	OFF	OFF	OFF	Multi-speed 8	PC-08
ON	OFF	OFF	ON	Multi-speed 9	PC-09
ON	OFF	ON	OFF	Multi-speed 10	PC-10
ON	OFF	ON	ON	Multi-speed 11	PC-11
ON	ON	OFF	OFF	Multi-speed 12	PC-12
ON	ON	OFF	ON	Multi-speed 13	PC-13
ON	ON	ON	OFF	Multi-speed 14	PC-14
ON	ON	ON	ON	Multi-speed 15	PC-15

The four multi-segment instruction terminals can be combined into 16 states, each state corresponding to one of the 16 instruction settings, as shown in the table below.

Acceleration/deceleration time selection terminal function description

Terminal 2	Terminal 1	Acceleration/deceleration time selection	Corresponding parameters
OFF	OFF	Acceleration/deceleration time 1	P0-23, P0-24
OFF	ON	Acceleration/deceleration time 2	P7-03, P7-04
ON	OFF	Acceleration and deceleration time 3	P7-05, P7-06
ON	ON	Acceleration and deceleration time 4	P7-07, P7-08

P5-10	DI terminal filtering time	Range: 0.000 ~ 1.000s	0.010s
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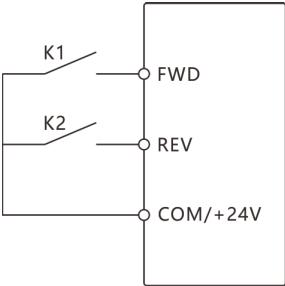
Adjust the sensitivity of the DI terminal. If the digital input terminal is susceptible to interference and malfunctions, increasing this parameter will enhance anti-interference capability, but will reduce the sensitivity of the DI terminal.

P5-11	Terminal command method	Range: 0 ~ 4	0
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This parameter defines five different ways to control the operation of the frequency converter via external terminals.

0 : Two-wire operation mode 1. This is the most commonly used two-wire mode. The forward and reverse rotation of the motor is determined by commands from the FWD and REV terminals.

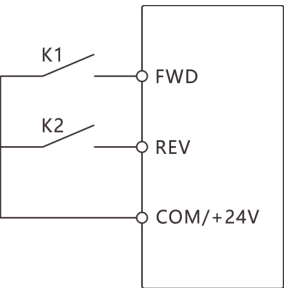
K1	K2	Run command
0	0	stop
1	0	Forward
0	1	Reversal
1	1	stop



Two-line operation mode 1

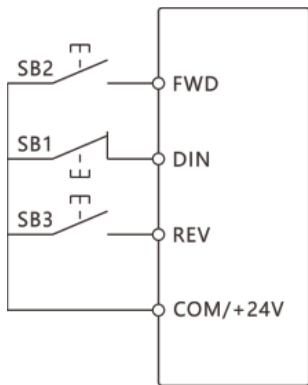
1: Two-wire operation mode 2. In this mode , FWD is the enable terminal. The direction is determined by the state of REV.

K1	K2	Run command
0	0	stop
0	1	stop
1	0	Forward
1	1	Reversal



Two-line operation mode 2

2: Three-wire operation mode 1. In this mode , Din is the enable terminal, and the direction is controlled by FWD and REV respectively. However, the pulse is valid, and it must be completed by disconnecting the Din terminal signal when stopping.

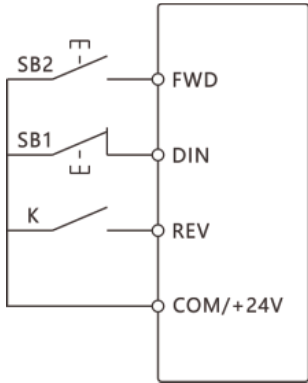


Three-line operation mode 1

in:
SB1: Stop button
SB2: Forward Rotation Button
SB3: Reverse button
D IN is a multi-function input terminal for DI1 to HDI. In this case, the function of the corresponding DI terminal should be defined as function 3 , "three-wire operation control".

3: Three-wire operation mode 2. The enable terminal of this mode is Din. The operation command is given by FWD, and the direction is determined by the state of REV.
The shutdown command is executed by disconnecting the Din signal.

K	Run command
0	Forward
1	Reversal



Three-line operation mode 2

in:

SB1: Stop button

SB2: Run button

DIN is the multi-function input terminal for DI1 to HDI. In this case, the function of the corresponding DI terminal should be defined as function 3, "three-wire operation control".

4: Rising edge pulse operation. The DI terminal operation signal is a pulse signal, and operation stops when a stop signal is given to the DI terminal. It enables DI terminal 01 (forward rotation) or 02 (reverse rotation) operation functions, pulse-type, rising edge jump start and stop. It is mostly used for point-contact type without interlock start and stop.

P5-12	Terminal UP/DOWN change rate	Range: 0.01Hz/s ~ 100.00Hz/s	1.00Hz/s
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Use the UP/DOWN terminals to adjust the rate of change when setting the frequency.

P5-13	Terminal valid logic 1	Range: 0 0000 ~ 1 1111	00000
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0: High level

1: Low level

Units digit: DI1

Tens digit: DI2

Hundreds digit: DI3

Thousands: DI4

Ten thousandths place: DI5

Select the effective level of terminals DI1 to DI5.

Used to set the valid status mode of digital input terminals.

When selected as active high, the corresponding DI terminal is active when connected to COM and inactive when disconnected.

When selected as active low, the corresponding DI terminal is ineffective when connected to COM and active when disconnected.

P5-15	AI1 minimum input value	Range: 0.00V ~ 10.00V	0.00V
P5-16	AI1 minimum input corresponding settings	Range: -100.0% to 100.0%	0.0%
P5-17	AI1 Maximum Input Value	Range: 0.00V ~ 10.00V	10.00V

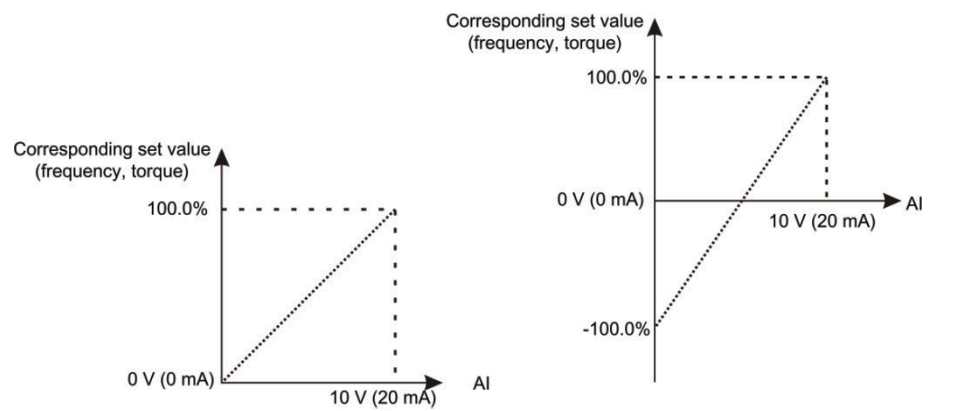
P5-18	AI1 maximum input corresponding settings	Range: -100.0% to 100.0%	100.0%
P5-19	AI1 Input Filtering Time	Range: 0.00s ~ 10.00s	0.10s

The above function code defines the relationship between the analog input voltage and the set value represented by the analog input. When the analog input voltage exceeds the set maximum or minimum input range, the excess part will be calculated based on the maximum or minimum input.

When the analog input is a current input, 1mA of current is equivalent to 0.5V of voltage.

(AI2 settings are the same as AI1 settings)

The nominal value corresponding to 100% varies depending on the application. Please refer to the specifications for each application. The following figures illustrate several setting scenarios:



Simulate the correspondence between given and set quantities

P5-20	AI2 minimum input value	Range: 0.00V ~ 10.00V	0.00V
P5-21	AI2 minimum input corresponding settings	Range: -100.0% to 100.0%	0.0%
P5-22	AI2 maximum input value	Range: 0.00V ~ 10.00V	10.00V
P5-23	AI2 maximum input corresponding settings	Range: -100.0% to 100.0%	100.0%
P5-24	AI2 Input Filtering Time	Range: 0.00s ~ 10.00s	0.10s

This function is used in the same way as AI1.

P5-	AI3 minimum input value	Range: 0.00V ~ 10.00V	0.00V
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25			
P5-26	AI3 minimum input corresponding settings	Range: -100.0% to 100.0%	0.0%
P5-27	AI3 Maximum Input Value	Range: 0.00V ~ 10.00V	10.00V
P5-28	AI3 maximum input corresponding settings	Range: -100.0% to 100.0%	100.0%
P5-29	AI3 Input Filtering Time	Range: 0.00s ~ 10.00s	0.10s

Some expansion cards support this function, and it is used in the same way as AI1.

P5-30	PULSE (pulse) input minimum frequency	Range: 0.00kHz ~ 50.00kHz	0.00kHz
P5-31	PULSE input minimum frequency corresponding to setting	Range: -100.0% to 100.0%	0.0%
P5-32	PULSE (pulse) input maximum frequency	Range: 0.00kHz ~ 50.00kHz	50.00KHz
P5-33	PULSE input maximum frequency corresponding to setting	Range: -100.0% to 100.0%	100.0%
P5-34	PULSE Input Filtering Time	Range: 0.00s ~ 10.00s	0.10s

PULSE input quantization is similar to analog input quantization.

P5-35	DI1 activation delay time	Range: 0.0s ~ 3600.0s	0.0s
P5-36	DI1 disconnection delay time	Range: 0.0s ~ 3600.0s	0.0s
P5-37	DI2 activation delay time	Range: 0.0s ~ 3600.0s	0.0s
P5-38	DI2 disconnection delay time	Range: 0.0s ~ 3600.0s	0.0s
P5-39	DI3 activation delay time	Range: 0.0s ~ 3600.0s	0.0s
P5-40	DI3 disconnection delay time	Range: 0.0s ~ 3600.0s	0.0s

Used to set the delay time for the inverter to respond to changes in the state of the DI terminal.

Currently, only DI1, DI2, and DI3 have the function of setting the delay time.

P5-41	AI1 as a DI terminal function selection	Range: 0 ~ 63 , function is the same as ordinary DI terminal .	0
P5-	AI2 as a DI terminal	Range: 0 ~ 63 , function is the	0

42	function selection	same as ordinary DI terminal .	
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This parameter sets whether AI is used as a digital DI terminal. When AI is used as a digital DI terminal, its function is exactly the same as that of a regular DI.

It is important to note that the AI input range remains unchanged at 0-10V. AI is high when the voltage is >6V and low when it is <4V. There is a 2V hysteresis loop. That is, AI is high when the voltage rises from 0V to >6V, and low only when the voltage drops from >6V to 4V.

P5-44	Effective mode selection when AI is used as a DI terminal	Range : 0X00 ~ 0X11	0 X00
-------	---	---------------------	-------

This parameter is used to set the level selection when AI is used as a digital input (DI) terminal.

0: High level is active. When AI rises from 0V to >6V, it is a high level. When it drops from >6V to 4V, it is a low level.

1: Active low level. When AI rises from 0V to <6V, it is low level. When it drops from >6V to 4V, it is low level.

Units digit, AI1:

Tens , AI2:

P5-45	AI curve selection	Range: 0 0 ~ 22	00
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This parameter is used for AI curve selection; 0 represents a straight line, while 1 and 2 represent 4-point curves. Each curve also has a corresponding function code setting.

Units digit: AI1

0:2 points, line P5-15 ~ P5-19

1: Multi-point curve 1: PE-00 ~ PE-07

2: Multi-point curve 2: PE-08 ~ PE-15

Tenth place: AI2

0:2 points, line P5-20 ~ P5-24

1: Multi-point curve 1: PE-00 ~ PE-07

2: Multi-point curve 2: PE-08 ~ PE-15

Hundreds: Reserved

P5-48	Terminal control power-on self-run delay time	Range: 0.01s ~ 360.00s	0.00s
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This function is used to start the terminal control when the protection P7-41=0, and the run command is present when the frequency converter is powered on, so the frequency

converter starts directly.

5.7. P6 group output terminals

The frequency converter comes standard with 2 multi-function analog output terminals, 1 multi-function digital output terminal, and 2 multi-function relay output terminals .

P6-00	Control board relay RELAY1 output (TA/TB/TC) selection	Range: 0 ~ 49	2
P6-01	Control board relay RELAY2 output (RA/RB/RC) selection	Range: 0 ~ 49	1
P6-02	Y1 Output Selection (Optional Expansion Card Supported Function)	Range: 0 ~ 49	1
P6-03	Y2 Output Selection (Optional Expansion Card Supported Function)	Range: 0 ~ 49	1

The function selection for the multi-function output terminal is as follows:

Setting value	Function	illustrate
0	No function	The terminal output has no function.
1	Inverter in operation	This indicates that the frequency converter is running and has an output frequency (which can be zero). At this time, it outputs an ON signal.
2	Fault Output	When the frequency converter malfunctions, it outputs an ON signal.
3	Frequency level detection PDT1 arrival	Please refer to the detailed descriptions of function codes P7-22 and P7-23.
4	Frequency reached	Frequency arrival, see page 7-24 for details.
5	Running at zero speed	When the inverter is running and the output frequency is zero, it outputs an ON signal.
6	Motor overload warning	Before the motor overload protection function is activated, it judges the situation based on the warning threshold and outputs an ON signal after the value is exceeded. See pages 9-00 to 9-02 for details.
7	Inverter overload warning	Output an ON signal 10 seconds before the inverter overload protection occurs.
8	PLC cycle	After the simple PLC completes one cycle, it outputs a

Setting value	Function	illustrate
	complete	pulse signal with a width of 250ms.
9	Cumulative running time reached	The inverter outputs an ON signal when the cumulative running time exceeds the set time. The cumulative set time is set by P7-20.
10	Frequency limited	When the set frequency exceeds the upper or lower frequency limit and the inverter output frequency reaches the upper or lower frequency limit, an ON signal is output.
11	Ready to run	With power established in both the main circuit and control circuit, the inverter's protection functions remain inactive, the inverter is in an operational state, and an ON signal is output.
12	AI1>AI2	When the value of analog input AI1 is greater than that of another input AI2, an ON signal is output.
13	Upper limit frequency reached	When the operating frequency reaches the upper limit frequency P0-16, an ON signal is output.
14	Lower limit frequency reached	When the operating frequency reaches the lower limit frequency P0-18, an ON signal is output.
15	Undervoltage output	The inverter outputs an ON signal when it is in an undervoltage state.
16	Communication settings	For communication settings, please refer to Appendix A, Communication Protocol.
17	Timer output	When the timer can function as a time relay, the timer output function is effective when the timer input signal is valid for the set closing or opening time. It needs to be used in conjunction with function 25 of the DI input and P7-39 and P7-40.
18	Reverse operation	When the frequency converter is running in reverse, it outputs an ON signal.
19	reserve	
20	Set length reached	When the actual length detected exceeds the set length, an ON signal is output.
21	Torque limit	When the torque limiting function is activated, the stall protection function will automatically activate.
22	Current 1 arrives	Please refer to the explanations of function codes P7-45 and P7-46.
23	Frequency 1 arrives	Please refer to the explanations of function codes P7-43 and P7-44.
24	Module temperature	When the inverter module heatsink temperature (P7-32) reaches the set module temperature threshold (P7-

Setting value	Function	illustrate
	reached	69), an ON signal is output.
25	Loading	When the frequency converter is in a load-free state, it outputs an ON signal.
26	The cumulative power-on time has reached	When the cumulative power-on time of the frequency converter (P7-33) exceeds the power-on arrival time set by P7-51, an ON signal is output.
27	Timed arrival output	will output an ON signal and Err39 fault after the current running time reaches the set timing time (P7-38) .
28	reserve	
29	Set count value reached	When the count value reaches the value set by Pb-08, an ON signal is output.
30	The specified count value has been reached.	When the actual length count value detected reaches the length count value set by Pb-09, an ON signal is output.
31	Motor 1, Motor 2 indicators	When the current motor is motor number 2, output an ON signal.
32	Brake control output	When the brake is active, an ON signal is output. See group B5 settings for details.
33	Running at zero speed 2	When the inverter output frequency is 0, it outputs an ON signal. This signal is also ON when the inverter is stopped.
34	Frequency level detection PDT2 arrival	Please refer to the explanations of function codes P7-55 and P7-56.
35	Zero current state	Please refer to the explanations for function codes P7-59 and P7-60.
36	Software current overlimit	Please refer to the explanations of function codes P7-61 and P7-62.
37	When the lower frequency limit is reached, the system will still output even when it is shut down.	When the operating frequency reaches the lower limit frequency, an ON signal is output. This signal is also ON in the shutdown state.
38	Alarm output	When a frequency converter malfunctions and the fault handling mode is to continue operation, the frequency converter will output an alarm.
39	Motor overheating pre-alarm output	Channel 1 Temperature Detection: When the P9-38 sensor detects that the temperature has reached the

Setting value	Function	illustrate
		P9-36 pre-alarm threshold, it outputs an ON signal. Channel 2 temperature detection: When the P9-48 sensor detects that the temperature has reached the P9-46 pre-alarm threshold, it outputs an ON signal.
40	AI1 Input Limit Exceeded	When the value of analog input AI1 is less than P7-67 (lower limit of AI1 input protection) or greater than P7-68 (upper limit of AI1 input protection), an ON signal is output.
41-42	reserve	
43	Frequency reaches 2	Please refer to the explanations of function codes P7-57 and P7-58.
44	Current reaches 2	Please refer to the explanations of function codes P7-63 and P7-64.
45	Fault output (no output when undervoltage)	When the frequency converter malfunctions and is not undervoltage, it outputs an ON signal.
48	Photovoltaic water pump control valve	In photovoltaic water pump mode, the output ON signal switches between photovoltaic power supply and grid power supply.
49	Motor running direction output	When the motor runs in reverse, it outputs an ON signal.

P6-04	FM terminal output mode selection	Range: 0 ~ 1	0
P6-05	FMR Output Selection	Range: 0 ~ 45, same as Y1 output selection	0

The FM terminal can be used as a high-speed pulse terminal (FMP) (P6-04=0) or as an open-collector switch output terminal (P6-04=1). When the FM terminal is used as an FMP, its maximum output frequency is set by P6-12, and its corresponding function output is set by P6-11.

P6-09	AO1 output selection	Range: 0 ~ 16	0
P6-10	AO2 output selection	Range: 0 ~ 16	0
P6-11	FMP Output Selection	Range: 0 ~ 16	0

The analog outputs AO1 and AO2 have an output range of 0V to 10V, or 0mA to 20mA. The range of analog outputs and their corresponding calibration functions are shown in

the table below:

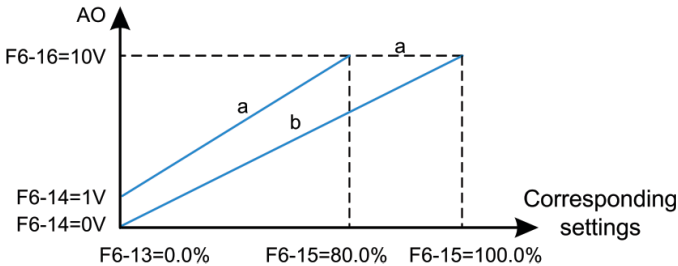
Setting value	Function	Functional range (corresponding to 0.0%~100.0% of pulse or analog output)
0	Operating frequency	0 to maximum output frequency, i.e., 100% corresponds to the maximum frequency.
1	Set frequency	0 to maximum output frequency, i.e., 100% corresponds to the maximum frequency.
2	Output current	0 to 2 times the motor's rated current, that is, 100% corresponds to 2 times the motor's rated current.
3	Output power	0 to 2 times the rated power, that is, 100% corresponds to 2 times the rated power of the motor.
4	Output voltage	0 to 1.2 times the rated voltage of the frequency converter, that is, 100% corresponds to 1.2 times the rated voltage of the frequency converter.
5	AI1	0V ~ 10V (or 0 ~ 20mA), that is, 100% corresponds to 10V or 20mA.
6	AI2	0V ~ 10V (or 0 ~ 20mA), that is, 100% corresponds to 10V or 20mA.
7	Communication settings	For values from 0.0% to 100.0%, please refer to Appendix A, "Modbus Communication Protocol".
8	Output torque (absolute value)	0 to 2 times the rated torque of the motor, that is, 100% corresponds to 2 times the rated torque of the motor.
9	length	0 to 2 times the set length, that is, 100% corresponds to 2 times the set length.
10	Count value	0 to 2 times the set count value, that is, 100% corresponds to 2 times the set count value.
11	motor speed	The rotational speed corresponding to the maximum frequency P0-14 from 0 to 100% is the speed corresponding to P0-14.
12	bus voltage	0V to 1000V, meaning 100% corresponds to 1000V.
13	PULSE pulse input	0.01kHz ~ 100.00kHz
14	Output current	100% corresponds to 1000.0A
15	Output voltage	0V ~ 1000V
16	Output torque (actual value)	-2 times the rated torque of the motor ~ 2 times the rated torque of the motor

P6-12	FMP output maximum frequency	Range: 0.01kHz ~ 100.00kHz	50.00
P6-13	AO1 output lower limit	Range: -100.0% ~ P6-15	0.0%

P6-14	The lower limit corresponds to the AO1 output.	Range: 0.00V ~ 10.00V	0.00V
P6-15	AO1 Output Limit	Range: P6-13 ~ 100.0%	100.0%
P6-16	The upper limit corresponds to the AO1 output.	Range: 0.00 ~ 10.00V	10.00V
P6-17	AO2 output lower limit	Range: -100.0% ~ P6-19	0.0%
P6-18	The lower limit corresponds to AO2 output.	Range: 0.00V ~ 10.00V	0.00V
P6-19	AO2 Output Limit	Range: P6-17 ~ 100.0%	100.0%
P6-20	The upper limit corresponds to the AO2 output.	Range: 0.00 ~ 10.00V	10.00V

The above function codes define the correspondence between output values and analog outputs. When the output value exceeds the set maximum or minimum output range, the upper or lower limit output is used for calculation.

When the analog output is current-type, 1mA of current corresponds to 0.5V of voltage. In different applications, the analog output quantity corresponding to 100% of the output value varies. As shown in the figure below, there are two different linear graphs, a and b.



Analog output upper and lower limit correspondence

P6-26	Main relay T disconnection delay	Range: 0.0s ~ 3600.0s	0.0s
P6-27	Main relay R disconnection delay	Range: 0.0 ~ 3600.0S	0.0s
P6-28	Y1 low-level output delay	Range: 0.0 ~ 3600.0S	0.0s
P6-29	Y2 low-level output delay	Range: 0.0 ~ 3600.0S	0.0s

This setting determines the inverter's delay time for different output state changes, such

as when the Y terminal state changes or when the relay output state changes.

5.8. P7 Accessibility Features and Keyboard Display

P7-00	Jog operation frequency	Range: 0.00Hz ~ P0-14 (maximum frequency)	6.00Hz
P7-01	Inching acceleration time	Range: 0.0s ~ 3000.0s	10.0s
P7-02	Inching deceleration time	Range: 0.0s ~ 3000.0s	10.0s

Define the set frequency and acceleration/deceleration time of the inverter during jogging. The jogging process is started and stopped according to start mode 0 (P1-00, direct start) and stop mode 0 (P1-13, deceleration stop).

The jog acceleration time refers to the time required for the frequency converter to accelerate from 0Hz to the maximum output frequency (P0-14).

The inching deceleration time refers to the time required for the frequency converter to decelerate from the maximum output frequency (P0-14) to 0Hz.

P7-03	Acceleration Time 2	Range: 0.0s ~ 3000.0s	10.0s
P7-04	Deceleration time 2	Range: 0.0 ~ 3000.0s	10.0s
P7-05	Acceleration Time 3	Range: 0.0 ~ 3000.0s	10.0s
P7-06	Deceleration time 3	Range: 0.0 ~ 3000.0s	10.0s
P7-07	Acceleration Time 4	Range: 0.0 ~ 3000.0s	10.0s
P7-08	Deceleration time 4	Range: 0.0 ~ 3000.0s	10.0s

The acceleration/deceleration time can be selected from P0-23, P0-24, and the three acceleration/deceleration times mentioned above. Their meanings are the same; please refer to the relevant explanations for P0-23 and P0-24.

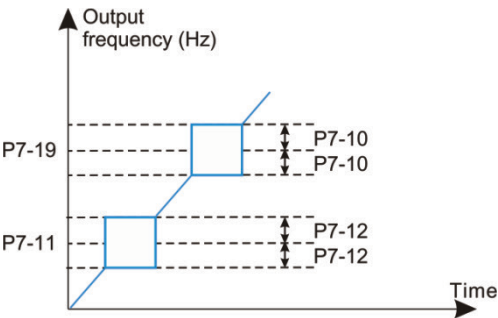
The acceleration/deceleration time during inverter operation can be selected from 1 to 4 using different combinations of the multi-function digital input terminal DI. Please refer to function codes P5-00 to P5-04.

P7-09	Jump frequency 1	Range: 0.00Hz ~ P0-14 (maximum frequency)	0.00Hz
P7-10	Jump frequency 1 amplitude	Range: 0.00Hz ~ P0-14 (maximum frequency)	0.00Hz

P7-11	Jump frequency 2	Range: 0.00Hz ~ P0-14 (maximum frequency)	0.00Hz
P7-12	Jump frequency 2 amplitude	Range: 0.00Hz ~ P0-14 (maximum frequency)	0.00Hz

When the set frequency is within the jump frequency range, the actual operating frequency will be at the jump frequency boundary that is closer to the set frequency.

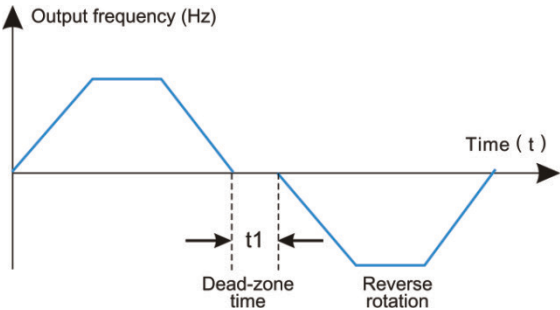
By setting a jump frequency, the inverter can avoid the mechanical resonance point of the load. This inverter can be set with two jump frequencies. If two adjacent jump frequencies are set to the same value, this function will not work at that frequency.



Jump frequency diagram

P7-15	Forward and reverse dead zone time	Range: 0.0s ~ 3000.0s	0.0s
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Set the transition time at zero frequency at the output during the forward and reverse transition of the frequency converter. See the diagram below:



Forward and reverse dead zone time diagram

P7-16	Keyboard knob precision	Range: 0 ~ 8	02
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This parameter defines the resolution at which the keyboard adjusts the set frequency in the monitoring menu mode. When the Up/Down keys are pressed, the frequency is

increased or decreased based on the set resolution.

0: Default mode

1: 0.1Hz

2: 0.5Hz

3: 1Hz

4: 2Hz

5: 4Hz

6: 5Hz

7: 8Hz

8: 10Hz

P7-17	Frequency below the lower limit	Range: 0 ~ 2	0
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0: Operating at the following frequency limits

1 : Shutdown

2: Zero-speed operation

Select the inverter's operating status when the set frequency is below the lower limit frequency. To prevent the motor from running at low speed for extended periods, this function can be used to select shutdown.

P7-18	Sagging	Range: 0.0% ~ 100.0%	0.0%
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This function is generally used for load distribution when multiple motors are driving the same load.

Droop control refers to the process of reducing the output frequency of the frequency converter as the load increases. When multiple motors drive the same load, the output frequency of the motor in the load decreases more, thereby reducing the load on that motor and achieving a more even load distribution among multiple motors.

This parameter refers to the frequency drop when the inverter is operating at its rated load.

P7-19	Delay time for shutdown when frequency is below the lower limit	Range: 0.0s ~ 600.0s	0.0s
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When the set frequency is lower than the lower limit frequency and the action is selected as shutdown, the action is delayed by time P7-19.

P7-20	Set cumulative running time	Range: 0h ~ 65000h	0h
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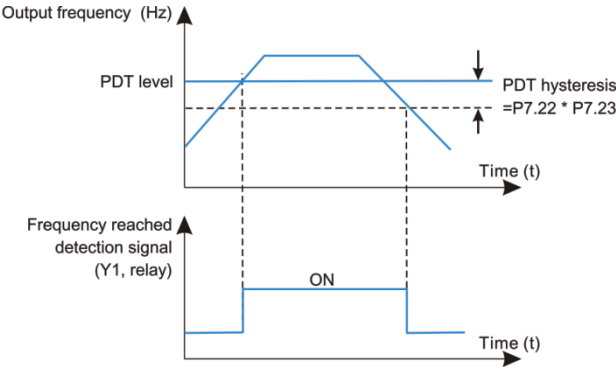
Preset the inverter's running time. This function is disabled when set to 0.
 When the cumulative running time (P7-34) reaches this set running time, the inverter's multi-function digital terminal outputs a running time reached signal (multi-function output 9) ON signal, and at the same time , the inverter reports a cumulative time reached fault Err40.

P7-21	Inching priority	Range: 0 ~ 2	0
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- 0 : Invalid
 1 : Jog priority mode 1
 2 : Jog Priority Mode 2
 1. Jogging will still be effective in case of user fault or PID loss ;
 2. The shutdown mode and DC braking can be set.

P7-22	Frequency detection value (PDT1 level)	Range: 0.00Hz ~ P0-14 (maximum frequency)	50.00Hz
P7-23	Frequency check hysteresis (PDT1 hysteresis)	Range: 0.0% ~ 100.0%	5.0%

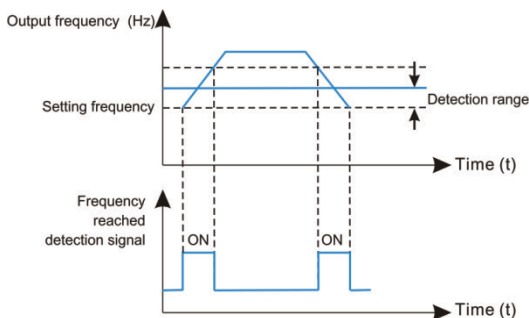
Set the detection value for the output frequency and the hysteresis value for releasing the output action.



FDT level diagram

P7-24	Frequency reaches detection width	Range: 0.0% ~ 100.0%	0.0 %
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When the inverter's output frequency reaches the set frequency value, this function can adjust its detection amplitude. See the diagram below:



Frequency arrival detection amplitude diagram

P7-26	Fan control	Range: 0 ~ 2	1
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0: Fan running continuously

1: The fan runs when the frequency converter is running.

This is used to select the operating mode of the cooling fan. When selected as 1, the fan runs when the inverter is running. When the inverter is stopped, the fan runs if the radiator temperature is higher than 40 degrees Celsius. When the radiator temperature is lower than 40 degrees Celsius when the inverter is stopped, the fan does not run.

When the setting is 0, the fan runs continuously after power-on.

2: Once the set temperature P7-42 is reached, the machine will start operating .

P7-27	STOP/RESET function	Range: 0 ~ 1	1
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0 : Only valid when using keyboard controls.

1 : The stop or reset function is effective under all control modes.

P7-28	MF.K key function selection	Range: 0 ~ 6	6
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MF.K key is a multi-function key, and its function can be set using this function code . It can be used to switch between stop and run modes.

0: Forward jogging

MF.K keys on the keyboard to perform forward jog (FJOG).

1: Forward/reverse switching

via the MF.K key is only effective when the command source is the operation panel command channel.

2: Reverse inching

Reverse jog can be achieved using the MF.K keys on the keyboard .

3: Switching between panel control and remote control (terminal or communication)

This refers to switching the command source, specifically switching between the current command source and keyboard control (local operation). If the current command source is keyboard control, this key function is invalid.

4: Switch the frequency source on the panel (press MF.K keys to cycle through the frequency sources).

Keyboard frequency source switching: When the main frequency source X is the panel frequency source and the auxiliary frequency source Y is another frequency source, you can switch the target frequency source in a loop by pressing the MF.K key.

5: Switching between panel, terminal , and communication control

Initiate control switching by pressing the MF.K key to cycle through control commands: keyboard control, terminal control, and communication control.

6 : Key presses are invalid

The MF and K keys on the keyboard are currently disabled and have no operational function.

P7-29	LED Operation Display	Range: 0000 ~ 0xPFPF	H.4 8 1F
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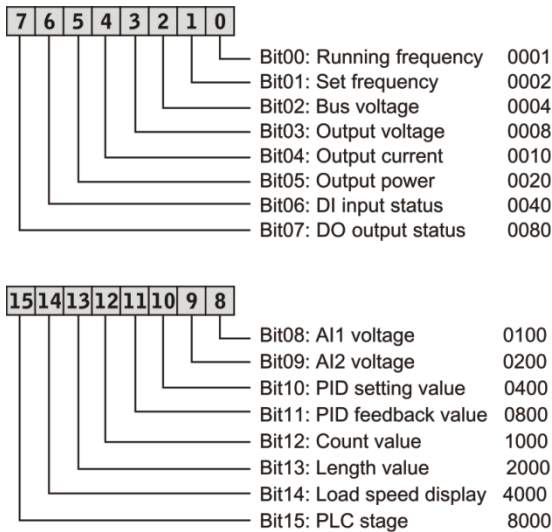
This function code sets the parameters displayed on the LEDs during inverter operation. Setting the corresponding bit of this function code to 1 displays the corresponding monitoring parameter. When multiple function codes are selected, they can be switched using the shift keys on the operation panel. Press and hold the center confirmation key on the LED keypad for 1 second to cycle through the first and second rows of LED displays; press the shift keys again to switch the panel display content. The green LED indicator between L/D/C and TUNE/TC is off when the first row of LED displays is switched, and on when the green LED indicator is on, the second row of LED displays is switched.

Note: When this function code is set to H.0000, the default display frequency is the running frequency.

Example settings:

The hexadecimal value corresponding to each quantity to be displayed has been calculated, as shown in the figure below. Each displayed quantity corresponds to a set value. For example, to display only the bus voltage, set the corresponding 0004 to P7-29 (H.0004). To display multiple values, simply add the corresponding values together. For example, to display both bus voltage and output current, add 0004 + 0010 = 0014, and set 0014 to P7-29 (H.0014). The sum exceeding 10 is represented by A, B, C, D, E, and F,

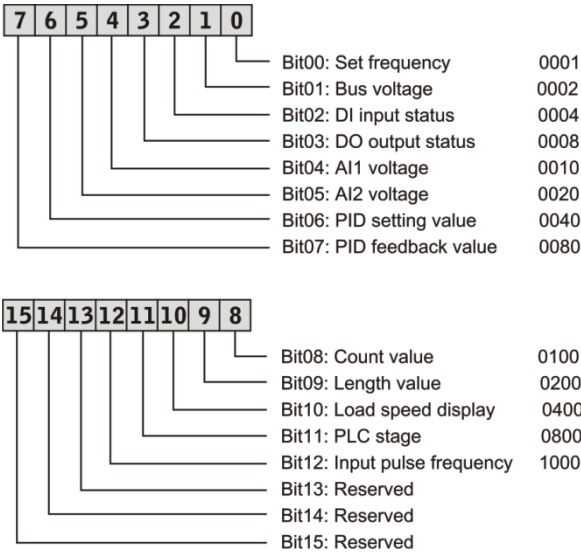
representing 10 , 11 , 12 , 13 , 14 , and 15 respectively.



LED operation display position correspondence diagram

P7-30	LED Stop Display	Range: 000 1 ~ 0x1PPF	H.0003
-------	------------------	-----------------------	--------

This function code sets the parameters displayed on the LEDs when the inverter stops. If the corresponding position of this function code is 1, the monitoring parameter corresponding to that position will be displayed. When multiple function codes are selected, they can be switched using the shift keys on the operation panel.



LED stop display corresponding diagram

The setup method is shown on page 7-29 , as in the “ LED Stop Display Correspondence Diagram ” . Set the hexadecimal value corresponding to the quantity to be displayed into page 7-30 , and the stop display will be enabled.

Press and hold the center confirmation key on the LED keypad for 1 second to cycle through the first and second rows of LED displays. Then press the shift key to switch the panel display content. The green LED indicator between L/D/C and TUNE/TC is off when the first row of LED displays is switched, and the green LED indicator is on when the second row of LED displays is switched.

P7-31	Load speed display coefficient	Range: 0.001 ~ 655.00	1.000
-------	--------------------------------	-----------------------	-------

This parameter maps the inverter's output frequency to the load speed. It's used when there are no high-speed pulses but the load speed needs to be displayed. The load speed (U1-22) = P7-31 * operating frequency. The unit can be speed or Hz; please set the specific parameter value according to your actual situation.

P7-32	Radiator temperature	Range: 12℃ ~ 100℃	Measured value
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The display shows the temperature of the inverter module's IGBTs. The over-temperature protection value of the inverter module's IGBTs may vary depending on the model.

P7-33	Cumulative power-on time	Range: 0h ~ 65535h	Measured value
-------	--------------------------	--------------------	----------------

Record the cumulative power-on time of the frequency converter. If the power-on time is less than 1 hour, do not record it.

P7-34	Cumulative running time	Range: 0h ~ 65535h	Measured value
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Record the cumulative running time of the frequency converter; if the running time is less than 1 hour, do not record it.

P7-36	Current run timer enable selection	Range: 0 ~ 1	0
-------	------------------------------------	--------------	---

0 : Disable

1 : Enable

P7-37	Current time source selection for the next timer run	Range: 0 ~ 2	0
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0: Digital setting P7-38

1: AI1 (AI 1 uses P7-38 as 100%)

2: AI2 (AI 2 uses P7-38 as 100%)

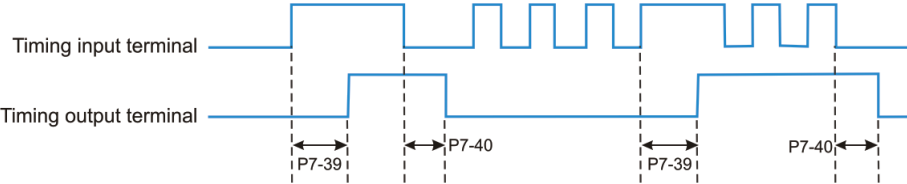
P7-38	Current run time setting value	Range: 0.0 min ~ 6500.0 min	0.0min
-------	--------------------------------	-----------------------------	--------

When the current running timer is valid on P7-36 and the current running time source is selected as 0, and when P7-38 is set and the switch output is selected as function 27, the inverter will output an ON signal when the running time reaches the set time. At the same time, the inverter will report a fault Err39 indicating that the current running time has reached the set time.

P7-39	High-level timing time	Range: 0.0s ~ 6000.0s	2.0s
P7-40	Low level timing time	Range: 0.0s ~ 6000.0s	2.0s

When the timer input terminal is " on " for a longer period than P7-39, the timer function output is turned on.

When the timer input terminal is " disconnected " for a longer period than P7-40, the output of this timer function is disconnected.



Timer input/output action diagram

P7-41	Start protection function	Range: 0 ~ 2	1
-------	---------------------------	--------------	---

0 : Invalid (Start terminal command valid, start directly)

1 : Effective

2: When in keyboard control mode, it will automatically restart after a power outage and subsequent power-on.

This parameter is used to increase the safety protection factor. If set to 1, it has two effects:

1. The run command is present when the frequency converter is powered on. The run command must be removed before the run protection state can be eliminated .
2. If the run command still exists when the frequency converter is reset due to a fault, the run command must be cancelled before the run protection status can be cleared. This prevents the motor from running automatically without the driver's knowledge, which could cause danger.

If set to 0, and the run command is present when the inverter is powered on, the inverter will start directly. The terminal control power-on self-run delay time is P5-48.

When P7-41 is set to 2, and is under keyboard control, the power-on delay time after a power failure is B0-05.

P7-42	Fan start-up temperature	Range: 10 ~ 90°C	60°C
-------	--------------------------	------------------	------

This parameter is valid when P7-36=2. When the radiator temperature P7-32 detection value reaches the P7-42 set value, the inverter cooling fan will start running. When the P7-32 detection value is less than the P7-42 set value, the cooling fan will stop running.

P7-43	Frequency reaches detection value 1	Range: 0.00Hz ~ P0-14 (maximum frequency)	50.00Hz
P7-44	Frequency detection value 1 reaches width	Range: 0.0% ~ 100.0%	0.0%

When the inverter's output frequency is within the positive and negative detection amplitude range of detection value 1, the multi-function output terminal outputs an ON signal. For the DO output action, please refer to the diagram showing the frequency reaching the detection amplitude .

P7-45	Current reaches detection value 1	Range: 0.0% ~ 300.0%	100.0%
P7-46	Current detection value 1 reaches width	Range: 0.0% ~ 300.0%	0.0%

When the output current of the frequency converter is within the positive and negative detection width of the detection value 1, the frequency converter's multi-function output terminal outputs an ON signal.

P7-49	User password	Range: 0 ~ 65535	0
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P7-49 Setting any non-zero number will activate the password protection function. You must enter the correct password the next time you access the menu; otherwise, you will not be able to view or modify the function parameters. Please remember your user password.

Setting P7-49 to 0 will clear the set user password and disable the password protection function.

P7-50	Is the jump frequency effective during acceleration and deceleration?	Range: 0 ~ 1	0
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0: Invalid

1: Effective

P7-51	Set power-on arrival time	Range: 0h ~ 65530h	0h
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The timer function is disabled when the value is 0.

When the cumulative power-on time of the frequency converter reaches the value set by P7-51, the multi-function output terminal (26: cumulative power-on time reached) outputs an ON signal.

P7-53	Acceleration time 1/2 frequency switching point	Range: 0.00Hz to maximum frequency (P0-14)	0.00Hz
P7-54	Deceleration time 1/2 frequency switching point	Range: 0.00Hz to maximum frequency (P0-14)	0.00Hz

When the operating frequency during acceleration is less than P7-53, select acceleration time 2 (P7-03); when the operating frequency during acceleration is greater than P7-53, select acceleration time 1 (P0-23).

When the operating frequency during deceleration is greater than P7-54, select acceleration time 1 (P0-24); when the operating frequency during deceleration is less than P7-54, select deceleration time 2 (P7-04).

P7-55	Frequency detection value (PDT2 level)	Range: 0.00Hz to maximum frequency (P0-14)	50.00Hz
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P7-56	Frequency detection PDT2 hysteresis value	Range: 0.0% ~ 100.0%	5.0%
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Same meaning as PDT1, see P7-22, P7-23 and FDT level diagram for details.

P7-57	Frequency reaches detection value 2	Range: 0.00Hz to maximum frequency (P0-14)	50.00Hz
P7-58	Frequency reaches detection amplitude 2	Range: 0.0% ~ 100.0%	0.0%

The meaning is the same as that of frequency arrival detection value 1. See P7-43, P7-44 and the diagram of frequency arrival detection amplitude for details .

P7-59	Zero current detection value	Range: 0.0% ~ 300.0%	10.0%
P7-60	Zero current detection delay time	Range: 0.01s ~ 300.00s	1.00s

When the inverter outputs current during operation, which is less than or equal to the zero current detection level and lasts for more than the zero current detection delay time, the inverter outputs an ON signal when function 35 is selected on the multi-function terminal.

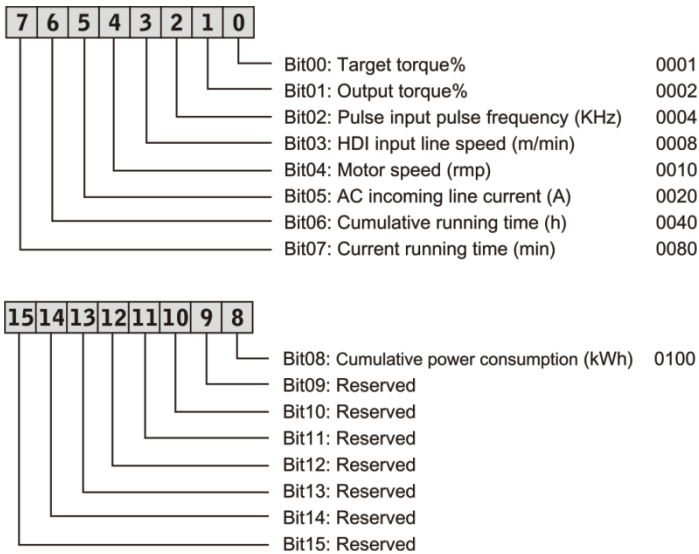
P7-61	Output current amplitude detection	Range: 20.0% ~ 400.0%	200.0%
P7-62	Maximum allowable time for software overcurrent	Range: 0s ~ 3600.0s	0s

When the frequency converter is running and the output current is greater than the output current amplitude detection value P7-61, and the duration exceeds the software overcurrent point detection delay time P7-62, the frequency converter outputs an ON signal when multi-function output terminal selection 36 is selected.

P7-63	Current reaches detection value 2	Range: 20.0% ~ 300.0%	100.0%
P7-64	Current reaches detection amplitude 2	Range: 0.0% ~ 300.0%	0.0%

This has the same meaning as "current reaches detection 1", see page 7-45 and page 7-46 for details.

P7-65	LED operating display parameters 2	Range: 0x0 ~ 0x1PF	H.010
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LED2 operation display position for the diagram

The setup method is shown on page 7-29 . As shown in the figure above, set the hexadecimal value corresponding to the quantity to be displayed into page 7-65 , and the display will be activated.

P7-67	AI1 Input Voltage Lower Limit	Range: 0.00V ~ P7-68	2.00V
P7-68	AI1 Input Voltage Limit	Range: P7-67 ~ 11.00V	8.00V

When the value of analog input AI1 is less than P7-67, or AI1 input is greater than P7-68, the inverter's multi-function terminal outputs an " AI1 input over limit " ON signal to indicate whether the input voltage of AI1 is within the set range.

P7-69	Module temperature reached	Range: 0°C ~ 90°C	70°C
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When the inverter module temperature reaches the set value of P7-69, the multi-function output terminal outputs an ON signal.

P7-70	Output power display correction factor	Range: 0.001 ~ 3.000	1.000
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The output power display is equal to the output power * P7-70, which can be viewed via monitoring code U1-05.

P7-71	Linear velocity display correction coefficient	Range: 0.000 ~ 60.000	1.000
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Linear velocity = P7-71 * number of HDI pulses sampled per second / Pb-07, which can be

viewed through monitoring parameter U1-14.

P7-72	Cumulative electricity consumption (kWh)	Range: 0 ~ 65535	Measured value
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The cumulative power consumption of the frequency converter to date can only be viewed and cannot be modified.

P7-73	Performance software version	Range: 0 ~ 65535	##
P7-74	Functional software version	Range: 0 ~ 65535	##

The inverter control board has a built-in program version. P7-73 indicates the program application type, and P7-74 indicates the program sequence.

P7-75	Enhanced function parameter display selection	Range: 0 ~ 1	1
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0: Hide enhanced feature parameter groups: A0 ~ A3, B0 ~ B5

1: Display Enhancement Function Parameter Groups: A0 ~ A3, B0 ~ B5

Note: If using an LCD keyboard, P7-75 will display the LCD keyboard version number.

P7-76	Motor speed display correction coefficient	Range: 0.0010 ~ 3.0000	1.0000
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This function should correct the difference between the actual motor speed in U1-14 and the speed displayed in P7-29, and proportionally increase or decrease the displayed speed.

P7-80	Fire mode enable	Range: 0 ~ 2	0
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0: Off

1: Fire Mode One

2: Fire Mode Two

P7-81	Setting frequency in fire mode	Range: 0Hz ~ P0-14 (maximum frequency)	50.00Hz
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Fire mode function introduction:

1. When P7-80 is set to 0: Fire suppression mode is not activated.
2. When P7-80 is set to 1 (Fire Mode 1): At this time, digital input terminals (DI1-DI5) are function 42, which is the fire mode enable terminal (rising edge triggered). When this function is valid, the inverter operates at the frequency set by P7-81. If a fault is reported during inverter operation, it will continue to run without stopping. When this function is

valid, the inverter will run automatically; when this function is invalid, a stop command is required from the command source to stop the inverter.

Note: In this mode, if an emergency occurs after the fire mode is activated, pressing the emergency stop button will allow the machine to stop (the DI4 terminal is set to emergency stop function 45 by default).

3. When P7-80 is set to 2 (Fire Mode Two): At this time, digital input terminals (DI1-DI5) are function 42, which is the fire mode enable terminal (rising edge triggered). When this function is active, the inverter operates at the frequency set by P7-81. If a fault is reported during inverter operation, it will continue to run without stopping. When this function is active, the inverter will run automatically and cannot be stopped until the inverter is powered off or explodes.

P7-82	Motor output disconnection detection interval	0 ~ 100S 0: This function is not working.	0
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Instructions for the "Output Disconnection Function Test" during shutdown cycle:

1. When P7-82 is set to 0, the shutdown output disconnection detection is not enabled; it is disabled by default.
2. This function is enabled when setting P7-82 is not 0. For example, if a 10-second time cycle detection is set, the inverter will actively perform a detection every 10 seconds. (Note: It is recommended that this cycle time not be too short, preferably set to 10 seconds or more.)

Disconnecting any one of the U , V , or W phases of the motor will cause the inverter to output " Err24 " , indicating a phase loss fault and alerting the user that the output side of the motor is disconnected.

5.9. P8 group communication parameters

P8-00	baud rate settings	Range: 0 ~ 7	5
P8-01	Data format	Range: 0 ~ 3	0

Baud rate settings:

- 0:300 BPS
- 1:600 BPS
- 2: 1200 BPS
- 3: 2400 BPS

4: 4800 BPS

5: 9600 BPS

6 : 19200 BPS

7 : 38400 BPS

Baud rate is the data transmission rate between the host computer and the frequency converter. The higher the baud rate, the faster the communication speed.

Data format:

0: No validation: Data format <8,N,2>

1: Even parity: Data format <8,E,1>

2: Odd parity: Data format <8,O,1>

3: No test 1: Data format <8,N,1>

Note that the baud rate and data format set by the host computer and the frequency converter must be consistent; otherwise, communication will not be possible.

P8-02	Mailing address	Range: 0 to 247 (0 is the broadcast address)	1
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When the local address is set to 0, which is the broadcast address, the host computer broadcast function is enabled.

Note: The local address is unique (except for broadcasts), which is the basic condition for realizing point-to-point communication between the host computer and the frequency converter.

P8-03	Response time	Range: 0ms ~ 30ms	2ms
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Response delay refers to the time interval between the end of data reception by the frequency converter and the transmission of data to the host computer. If the response delay is less than the system processing time, the response delay is based on the system processing time. If the response delay is longer than the system processing time, the system will wait after processing the data until the response delay time is reached before sending the data to the host computer.

P8-04	Communication timeout	Range: 0.0s ~ 30.0s	0.0s
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When the function code is set to 0.0s, the communication timeout parameter is invalid.

When this function code is set to a non-zero value, if the interval between one communication and the next exceeds the communication timeout period, the system will report a communication failure error (Err27). Normally, this is set to invalid. Setting this parameter in a system with continuous communication allows for monitoring of the

communication status.

P8-05	Communication format selection	Range: 0 ~ 1	0
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0: Standard Modbus protocol.

1. When reading commands, the slave device returns one more byte than the standard Modbus protocol. Refer to the Modbus communication protocol documentation.

P8-11	Communication protocol selection	Range: 0 ~ 1	0
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0: Modbus protocol

1: Communication Expansion Card

When selecting the communication expansion card, select function P8-11=1. When it is 1, the communication expansion card will disconnect and cause an Err27 fault.

5.10. P9 Group Faults and Protection

P9-00	Motor overload protection selection	Range: 0 ~ 1	1
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0: Prohibited. There is no motor overload protection function, which poses a risk of motor overheating and damage. It is recommended to use a heating relay between the inverter and the motor.

1: Allowed. It has motor overload protection function. The relationship between protection time and motor current is shown in the schematic diagram of motor overload protection curve .

P9-01	Motor overload protection gain	Range: 0.20 ~ 10.00	1.00
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To effectively protect different motors from overload, P9-01 needs to be set appropriately. Refer to the motor overload protection instructions for usage.

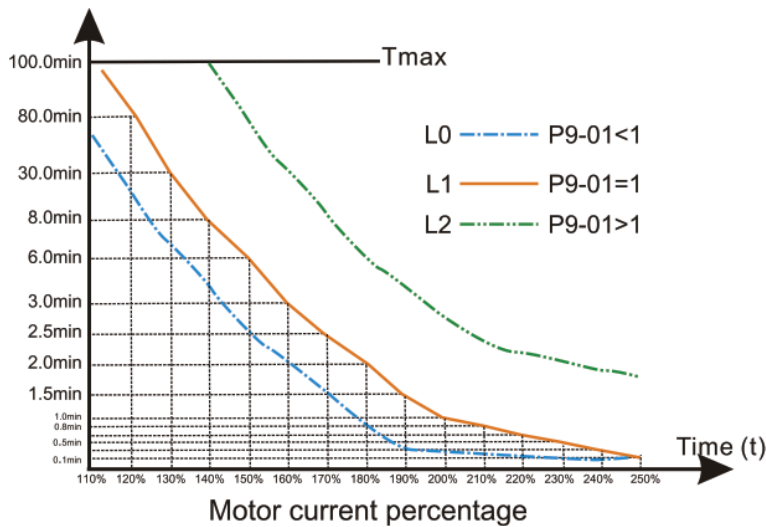
The inverse time curve is shown in Figure 5-21. In the figure, L1 represents the relationship between the motor protection time and the motor current when P9-01=1. When the user needs...

To change the protection time for a specific current in the motor, simply modify P9-01. The timing relationship is as follows:

Required protection time $T = P9 - 01 \times T(L1)$

Example: If a user needs to change the protection time for 150% rated current to 3 minutes, first find in Figure 5-20 that the protection time for 150% motor current is 6.0 minutes. Then $P9-01 = \text{required protection time } T / T(L1) = 3 \text{ minutes} / 6 \text{ minutes} = 0.5$.

The maximum overload protection time for the motor is 100 minutes, and the minimum overload time is 0.1 minutes. Customers should set this according to their needs. Furthermore, when the motor experiences an overload, the inverter will report Err14 to prevent damage from continuous overheating.



Motor overload protection curve diagram

Note: By default, there is no overload protection below 110% of the motor's rated current. When overload protection below 110% of the motor's rated current is required, please set the motor overload protection current coefficient P9-35 appropriately.

Motor current percentage = (actual current / rated current) × P9-35

Example: If a user needs to set the protection time to 30.0 min at 90% of the rated current, first find the current corresponding to 30.0 min on L1 in Figure 5-20, which is 130%. $P9-35 = (130\%/90\%) \times 100\% = 144\%$. Note: The minimum current protection value is 55%.

P9-02	Motor overload warning factor (%)	Range: 50% ~ 100%	80%
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This function provides a warning signal to the control system before the motor overload fault protection, thus providing pre-protection against motor overload. The larger the value, the smaller the warning lead time.

When the cumulative output current of the frequency converter exceeds the product of the set overload protection time and P9-02, the multi-function digital output terminal selects " Motor Overload Pre-alarm ON " to output a switch signal. Terminal function is

6 ; see the function code setting instructions for P6-00 to P6-02 for details.

P9-03	Overvoltage stall protection gain	Range: 000 ~ 100	030
P9-04	Overvoltage stall protection voltage	Range: 200.0 ~ 850.0V	760.0V <1>

<1> This value is the factory default value for 380V class frequency converters; the factory default value is 380V for 200V class frequency converters.

During the deceleration process of the frequency converter, when the DC bus voltage exceeds the overvoltage stall protection voltage, the frequency converter stops decelerating and maintains the current operating frequency. It will continue to decelerate after the bus voltage drops.

Overvoltage stall gain is used to adjust the inverter's ability to suppress overvoltage during deceleration. A higher value indicates stronger overvoltage suppression. Ideally, this gain should be set as low as possible without causing overvoltage.

For loads with low inertia, the overvoltage stall gain should be small; otherwise, it will slow down the system's dynamic response. For loads with high inertia, this value should be large; otherwise, the suppression effect will be poor, and overvoltage faults may occur.

When the overvoltage stall gain is set to 0, the overvoltage stall function is canceled.

P9-05	VF Over-Slip Protection Gain	Range: 0 ~ 100	20
P9-06	VF overcurrent stall protection current	Range: 50% ~ 200%	150%
P9-07	VF weak magnetic region current stall protection coefficient	Range: 50% ~ 200%	50 %

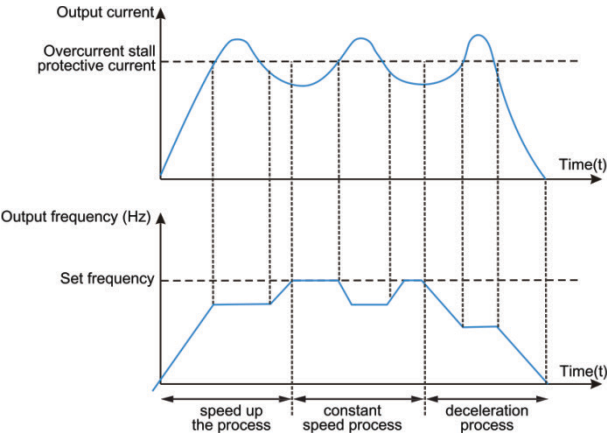
Overcurrent stall protection: When the inverter output current reaches the set overcurrent stall protection current (P9-06), the inverter will stop accelerating during acceleration, reduce the output frequency during constant speed operation, and slow down the descent speed during deceleration operation until the current is less than the overcurrent stall protection current (P9-06), at which point the operating frequency will return to normal. See Figure 5-21 for details.

Overcurrent stall protection current: Selects the current protection point for overcurrent stall function. If this parameter value is exceeded, the inverter will initiate overcurrent stall protection. This value is a percentage of the inverter's rated current.

Overcurrent suppression gain: This adjusts the inverter's ability to suppress overcurrent

during acceleration and deceleration. A higher value indicates stronger overcurrent suppression. Ideally, this gain should be set as low as possible without causing overcurrent.

For loads with low inertia, the overcurrent shunt gain should be small; otherwise, it will slow down the system's dynamic response. For loads with high inertia, this value should be large; otherwise, the suppression effect will be poor, and overcurrent faults may occur. In applications with very low inertia, it is recommended to set the overcurrent suppression gain to less than 20. When the overcurrent shunt gain is set to 0, the overcurrent shunt function is disabled.



Overcurrent Flow Protection Diagram

P9-08	Overpressure stall allowable rise limit	Range: 0.0% ~ 50.0%	10.0%
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The maximum allowable adjustment amount when adjusting the frequency during overvoltage stall generally does not need to be modified.

P9-11	Number of automatic fault resets	Range: 0 ~ 20	0
P9-12	Fault relay operation selection during automatic fault reset	Range: 0 ~ 1	0

After selecting the inverter fault automatic reset function, this parameter setting can determine whether the fault relay needs to be activated during the fault reset process, so as to shield the fault alarm caused by it and allow the equipment to continue to operate.

P9-13	Automatic fault reset interval	Range: 0.1s ~ 100.0s	1.0s
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The waiting time between a fault alarm and automatic fault reset.

P9-14	Input phase loss enable selection	Range: 0 ~ 1	1
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0: Invalid

1: Valid . The fault code Err23 occurs when an input phase loss happens.

P9-15	Output phase loss enable selection	Range: 0 ~ 1	1
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0: Invalid

1: Valid . The fault code is Err2 when an output phase loss occurs.

P9-16	Power-on short-circuit protection selection	Range: 0 ~ 1	1
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0: Invalid

1: Valid . Allows the inverter to detect whether the motor is short-circuited to ground when powered on. If this fault occurs, the fault code Err20 will be displayed .

P9-17	Automatic reset selection for undervoltage fault	Range: 0 ~ 1	0
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0: Manual reset. After an undervoltage fault occurs, even if the current bus voltage returns to normal, the fault still exists and the undervoltage fault needs to be manually cleared (Err12).

1: Automatic reset: After an undervoltage fault occurs, the inverter automatically clears the undervoltage fault Err12 based on the current bus voltage.

P9-18	Overvoltage suppression mode selection	Range: 0 ~ 2	1
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0: Invalid

1: Overvoltage suppression mode 1, mainly used to prevent overvoltage faults caused by the rise in bus voltage due to energy feedback during motor deceleration.

2: Overvoltage suppression mode 2 is mainly used in situations where the load center of gravity deviates from the physical center, causing the bus voltage to rise due to energy feedback from the load itself during constant speed operation, resulting in overvoltage .

P9-19	Overexcitation effective state selection	Range: 0 ~ 2	2
-------	--	--------------	---

0: Invalid

1: Effective constant speed and deceleration process during operation.

2: Effective only during deceleration

Generally used in applications requiring rapid shutdown, flux braking dissipates the feedback energy from deceleration at the motor terminals, effectively preventing

overvoltage faults. The strength of the suppression effect can be adjusted by regulating the flux braking gain P2-10(VF).

When using a braking resistor for overvoltage suppression, please set P9-19 to 0 (invalid), otherwise abnormalities may occur during deceleration .

P9-20	Overvoltage suppression mode 2 limit value	Range: 1.0% ~ 150.0%	100.0%
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The maximum value that can be adjusted when overvoltage suppression mode 2 is active. The smaller this value is, the smaller the rise in bus voltage, but the longer the deceleration time.

P9-22	Fault protection action 1	Range: 0 ~ 22202	00000
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The meaning of each digit setting is the same as that of the units digit.

Units digit: Motor overload - Err14

0: Free Parking

1: Shut down the machine using the shutdown procedure.

2: Continue running

Tens: Reserved

Hundreds digit: Input phase missing - Err23

Thousands digit: Output phase loss - Err24

Ten-thousands digit: Parameter read/write error - Err25

P9-23	Fault protection action 2	Range: 0 ~ 22202	00000
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For the meaning of each setting in Fault Protection Action 2, please refer to Fault Protection Action 1.

Units digit: Communication failure - Err27

0: Free Parking

1: Shut down the machine using the shutdown procedure.

2: Continue running

Tens digit: External fault - Err28

Hundreds digit: Speed deviation too large fault - Err29

Thousands: User-defined fault 1-Err30

Ten thousandths place: User-defined fault 2-Err31

P9-24	Fault protection action 3	Range: 0 ~ 22202	00000
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For the meaning of each setting in Fault Protection Action 3, please refer to Fault

Protection Action 1.

Units digit: PID feedback loss during runtime - Err32

0: Free Parking

1: Shut down the machine using the shutdown procedure.

2: Continue running

Tens: Load failure - Err34

Hundreds: Reserved

Thousands: Current consecutive run time reached -Err39

Ten thousandths place: Cumulative running time reached -Err40

Note: For fault protection actions 1 to 3, when " free stop " is selected , the inverter will display Err** and stop directly.

" Stop by Stop " is selected : the inverter displays Ala** and stops by stop, and Err** is displayed after stopping.

" Continue running " is selected : the inverter continues to run and displays Ala**, and the operating frequency is set by P9-26.

P9-26	Frequency selection for continued operation during failure	Range: 0 ~ 4	1
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0: Run at the current operating frequency

1: Run at the set frequency

2: Run at the maximum frequency

3: Operating at the following frequency limits

4 : Operate at the standby frequency setting P9-27

P9-27	Abnormal standby frequency setting	Range: 0.0% ~ 100.0%	100.0%
-------	------------------------------------	----------------------	--------

This value is a percentage relative to the maximum frequency and takes effect when an abnormal standby frequency is selected by P9-26 and a fault occurs .

P9-28	Load drop protection selection	Range: 0 ~ 1	0
P9-29	Load drop detection level	Range: 0.0% ~ 80.0%	20.0%
P9-30	Load drop detection time	Range: 0.0s ~ 100.0s	5.0s

When the load shedding protection is enabled (P9-28=1), if the inverter output current is less than the load shedding detection level set by P9-29 (P9-29 * motor rated current) and the duration exceeds the load shedding detection time of P9-30, the inverter outputs

a load shedding fault Err34. Alternatively, the operating state after a load shedding can be selected via P9-24.

P9-31	Speed deviation too large detection value	Range: 0.0% ~ 100.0%	20.0%
P9-32	Excessive speed deviation requires detection time	Range: 0.0s ~ 100.0s	0.0s

This function is only available in vector and non-torque control mode, and 100% of P9-31 corresponds to the maximum frequency P0-14.

When the frequency converter detects a deviation between the actual motor speed and the set speed, and the speed deviation value exceeds the excessive speed deviation detection value P9-31, and the duration exceeds the excessive speed deviation detection time P9-32, the frequency converter reports Err29. The frequency converter's operating status after a fault can also be defined using P9-23.

When the speed deviation is too large and the detection time is 0.0s, the speed deviation protection is ineffective.

P9-33	Overspeed detection value	Range: 0.0% ~ 100.0%	20.0%
P9-34	Overspeed detection time	Range: 0.0s ~ 100.0s	2.0s

This function is only available in vector and non-torque control mode, and 100% of P9-34 corresponds to the maximum frequency P0-14.

When the frequency converter detects that the actual speed of the motor exceeds the maximum speed of the frequency converter, the excess value is greater than the overspeed detection value P9-33, and the duration is greater than the overspeed detection time P9-34, the frequency converter reports an Err43 fault.

When the overspeed detection time is 0.0s, the overspeed protection is ineffective.

P9-35	Motor overload protection current coefficient	Range: 100% ~ 200%	100%
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This parameter is used to achieve overload protection below 110% of the motor's rated current and must be used in conjunction with P9-00 to P9-02.

P9-36	Motor overheating pre-alarm threshold 1	Range: 0-200°C	80°C
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This function is used by the temperature detection expansion card to detect motor temperature. When the value is not 0, motor temperature detection is enabled, and the

system detects the motor temperature through the analog input signal of the temperature probe. When the sensor detects that the motor temperature has reached the set value, the relay ON signal (P6-00~P6-02=39) is triggered.

P9-37	Motor overheat protection value 1	Range: 0-200°C	100°C
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This function is activated when the selected temperature alarm type P9-38 is not 0. When the sensor detects that the motor temperature has reached the set value, it will report an Err38 fault.

P9-38	Temperature sensor type selection 1	Range: 0 ~ 2	0
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The temperature expansion card function allows you to select the sensor type.

0: No temperature sensor

1: PT100

2: PT1000

P9-36, P9-37, and P9-38 are the parameter groups for the first channel temperature detection function, used in the IO1 expansion card.

P9-40	Light load current detection	Range: 0.0% ~ 100.0%	20.0%
P9-41	Light load current detection time	Range: 0 ~ 3000s	0s
P9-42	Light load fault self-reset time	Range: 0 ~ 60000s	0s

This function is used for light load current detection. P9-40 is the percentage of the motor's rated current P4-04. When P9-41=0, the light load current detection function is turned off, and when P9-42=0, the light load fault self-reset function is turned off. After the frequency converter starts running, if the value of P9-41 is not 0, the current will be detected (P9-40 X P4-04). If the current value is less than the set value of P9-40 after the time of P9-41, the Err60 fault protection will be reported. After the time of P9-42 during the fault, the frequency converter will clear the fault and run automatically. If the fault is manually reset during the period when the frequency converter has not cleared the fault automatically, the frequency converter will not run automatically.

P9-44	AI2-PTC protection threshold	Range: 0.00 ~ 10.00V	0.00V
P9-45	AI2-PTC protection threshold continuous detection time	Range: 0.0 ~ 10.0s	0.0s

After the PTC is connected to AI2, if the PTC voltage exceeds the voltage set on P9-44 and

the duration reaches the time set on P9-45, error err38 will be reported.

P9-46	Motor overheating pre-alarm threshold 2	Range: 0-200°C	80°C
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This function is used by the temperature detection expansion card to detect motor temperature. When the value is not 0, motor temperature detection is enabled, and the system detects the motor temperature through the analog input signal of the temperature probe. When the sensor detects that the motor temperature has reached the set value, the relay ON signal (P6-00~P6-02=39) is triggered.

P9-47	Motor overheat protection value 2	Range: 0-200°C	100°C
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This function is activated when the selected temperature alarm type P9-38 is not 0. When the sensor detects that the motor temperature has reached the set value, it will report an Err38 fault.

P9-48	Temperature sensor type selection 2	Range: 0 ~ 2	0
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The temperature expansion card function allows you to select the sensor type.

0: No temperature sensor

1: PT100

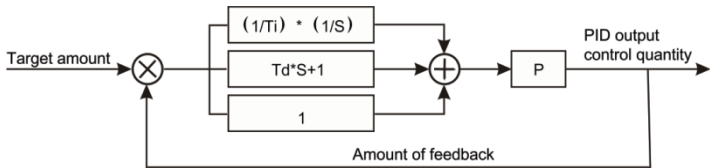
2: PT1000

P9-46, P9-47, and P9-48 are the parameter groups for the second-channel temperature detection function, used in the IO2 expansion card.

5.11. PA group PID function

PID control is a common method in process control. It involves performing proportional, integral, and derivative operations on the difference between the controlled variable feedback signal and the target signal, and adjusting the output frequency of the frequency converter to form a closed-loop system, thereby stabilizing the controlled variable at the target value.

It is suitable for process control applications such as flow control, pressure control, and temperature control.



Schematic diagram of process PID principle

PA-00	PID given source	Range: 0 ~ 6	0
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0: PID function code PA-01

1: AI1

2: AI2

3: Communication given

4: PULSE given

5: Multi-segment instruction setting

6: Up/Down modification of PA-01 (effective when P0-06=6)

When the frequency source is selected as PID, i.e., P0-06 or P0-07 is selected as 6, this group of functions will be active.

This parameter determines the target value given to the process PID controller.

The target value set for the process PID is a relative value, and the set range is 0 to 100%.

The PID range (PA-05) is not required because the system operates on relative values (0-100%) regardless of the range setting. However, if a PID range is set, the actual values of the PID setpoint and feedback signals can be visually observed through the keyboard display.

PA-01	PID digital setpoint	Range: 0.0% ~ 100.0%	50.0%
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When PA-00=0 is selected, the target source is the keyboard input. This parameter needs to be set.

PA-02	PID given change time	Range: 0.00s ~ 650.00s	0.00s
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The PID setpoint change time refers to the time required for the actual PID value to change from 0.0% to 100.0%.

When the PID input changes, the actual PID input value does not respond immediately.

Instead, it changes linearly over time to prevent sudden changes in the input.

PA-03	PID feedback source	Range: 0 ~ 7	0
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0: AI1

1: AI2

2: AI1-AI2

3: Communication given

4: PULSE given

5: $AI1 + AI2$

6: $\text{MAX}(|AI1|, |AI2|)$

7: $\text{MIN}(|AI1|, |AI2|)$

This parameter is used to select the feedback signal channel for the process PID. The feedback value of the process PID is also a relative value, with a setting range of 0.0% to 100.0%.

PA-04	PID direction of action	Range: 0 ~ 1	0
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0 : Positive action. When the feedback signal of the PID controller is less than the setpoint, the inverter output frequency increases. This is used in applications such as tension control during winding.

1 : Reverse action. When the PID feedback signal is less than the setpoint, the inverter output frequency decreases. This is used in applications such as tension control during unwinding. This function is affected by reversing the PID's action direction (function 35) on the multi-function terminal; caution is required during use.

PA-05	PID setpoint feedback range	Range: 0 ~ 65535	1000
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The PID setpoint feedback range is dimensionless and is used for PID setpoint display U1-10 and PID feedback display U1-11.

The relative value of the PID feedback is 100.0%, corresponding to the feedback range PA-05. For example, if PA-05 is set to 4000, then when the PID is given 60.0%, the PID feedback display U1-10 will be 2400.

PA-06	Proportional gain P	Range: 0.0 ~ 100.0	20.0
PA-07	Integral Time I	Range: 0.01s ~ 10.00s	2.00s
PA-08	Differential time D	Range: 0.000s ~ 10.000s	0.000s

Proportional gain Kp1:

The value of Kp1 determines the overall regulation intensity of the PID controller; the larger the value, the greater the regulation intensity. A value of 100.0 indicates that when the deviation between the PID feedback and the setpoint is 100.0%, the PID controller's adjustment of the output frequency command is at its maximum frequency.

Integration Time Ti1:

The integral time determines the intensity of the integral control of the PID controller. The shorter the integral time, the greater the control intensity. The integral time refers to

the time after which the integral controller continuously adjusts to reach its maximum frequency when the deviation between the PID feedback and the setpoint is 100%.

Differential time Td1:

The derivative time determines the strength of the PID controller's adjustment to the rate of change of deviation. A longer derivative time results in a stronger adjustment. The derivative time refers to the time within which the feedback quantity changes by 100.0%, at which point the adjustment of the derivative controller reaches its maximum frequency.

PA-09	PID reverse cutoff frequency	Range: 0.00 Hz to maximum frequency (P0-14)	0.00Hz
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In some cases, the PID can only control the setpoint and feedback to the same state when the PID output frequency is negative (i.e. the inverter is reversing). However, excessively high reversing frequencies are not allowed in some situations. PA-09 is used to determine the upper limit of the reversing frequency.

PA-10	Deviation Limit	Range: 0.0% ~ 100.0%	0.0%
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When the deviation between the PID setpoint and the feedback is less than PA-10, the PID controller stops adjusting. This ensures a stable output frequency when the deviation between the setpoint and feedback is small, which is very effective in some closed-loop control applications.

PA-11	Differential limiting	Range: 0.00 % ~ 100.00 %	0.10%
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In a PID controller, the derivative is quite sensitive and can easily cause system oscillations. Therefore, the derivative effect of the PID is generally limited to a small range. PA-11 is used to set the range of the PID derivative output.

PA-12	PID feedback filter time	Range: 0.00s ~ 60.00s	0.00s
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PA-12 is used to filter PID feedback. This filtering helps reduce the impact of disturbances on the feedback, but it will affect the response performance of the process closed-loop system.

PA-13	PID feedback loss of detection value	Range: 0.0% ~ 100.0%	0.0%
PA-14	PID feedback loss detection time	Range: 0.0s ~ 3600.0s	0s

This function code is used to determine whether PID feedback has been lost.

When the PID feedback value is less than the feedback loss detection value PA-13 and the

duration exceeds the PID feedback loss detection time PA-14, the inverter will perform protection according to the unit digit selection of P9-24, and the fault report ERR32 and alarm ALA32 will be issued.

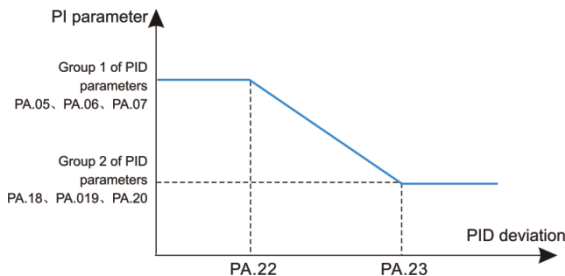
PA-18	Proportional gain P2	Range: 0.0 ~ 100.0	20.0
PA-19	Integration time I2	Range: 0.01s ~ 10.00s	2.00s
PA-20	Differential time D2	Range: 0.000s ~ 10.000s	0.000s
PA-21	PID parameter switching conditions	Range: 0 ~ 2	0
PA-22	PID parameter switching deviation 1	Range: 0.0% ~ PA-23	20.0%
PA-23	PID parameter switching deviation 2	Range: PA-22 ~ 100.0%	80.0%

In some applications, a single set of PID parameters may not meet the requirements of the entire operation, necessitating the use of different PID parameters under varying conditions. This set of function codes is used for switching between two sets of PID parameters. The setting method for regulator parameters PA-18 to PA-20 is similar to that for parameters PA-06 to PA-08. PA-21 is the PID parameter switching condition.

PA-21=0 : Do not switch, use the first set of PID parameters.

PA-21=1 : DI terminal switching. The function selection of the multi-function terminal should be set to 43 (PID parameter switching terminal). When the terminal is invalid, select parameter group 1 (PA-06 ~ PA-08). When the terminal is valid, select parameter group 2 (PA-18 ~ PA-20).

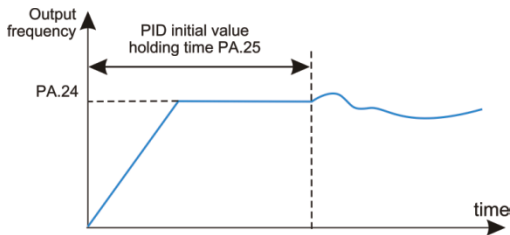
PA-21=2 : Automatic switching based on deviation. When the absolute value of the deviation between the setpoint and the feedback is less than the PID parameter switching deviation 1 (PA-22), parameter group 1 is selected for the PID parameters. When the absolute value of the deviation between the setpoint and the feedback is greater than the PID switching deviation 2 (PA-23), parameter group 2 is selected for the PID parameters. When the deviation between the setpoint and the feedback is between switching deviation 1 and switching deviation 2, the PID parameters are the linear interpolation values of the two sets of PID parameters, as shown in the figure below.



PID parameter switching diagram

PA-24	PID initial value	Range: 0.0% ~ 100.0%	0.0%
PA-25	PID initial value hold time	Range: 0.00s ~ 650.00s	0.00s

When the frequency converter starts, the PID output is fixed at the initial PID value PA-24. After holding the initial PID value for a period of PA-25, the PID begins closed-loop regulation. The following diagram illustrates the function of the initial PID value.



PID initial value function diagram

PA-26	Maximum positive deviation between two outputs	Range: 0.00% ~ 100.00%	1.00%
PA-27	The maximum value of the opposite deviation between the two outputs	Range: 0.00% ~ 100.00%	1.00%

This function limits the difference between two PID outputs to suppress excessively rapid changes in the PID output, thus making the inverter operate more smoothly. Stable. PA-26 and PA-27 correspond to the maximum absolute value of the output deviation during forward and reverse rotation, respectively.

PA-28	PID integral attribute	Range: 0 0 ~ 1 1	00
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Units digit: Integral separation selection

0: Invalid

1: Effective

If integral separation is enabled, then when the multi-function digital DI integral pause (function 38) is enabled, the PID integral operation stops, and only the proportional and derivative actions of the PID are effective.

When the integral separation option is set to invalid, integral separation is invalid regardless of whether the multifunction digital DI is enabled.

Tens digit: Whether to stop integration after the output reaches the limit (selection)

0: Continue accumulating points

1: Stop scoring

After the PID controller output reaches its maximum or minimum value, you can choose whether to stop the integral action. If you choose to stop the integral, the PID controller will stop calculating integrals, which can reduce the PID controller's overshoot.

PA-29	PID Stop Calculation	Range: 0 ~ 1	0
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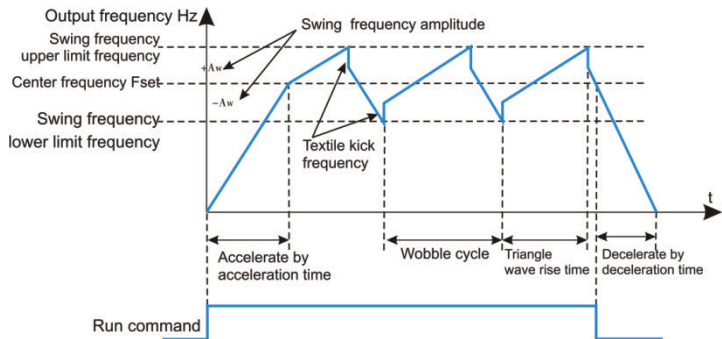
0: In the stopped state, the PID does not operate.

1: PID calculation in shutdown state

5.12. PB group pendulum frequency, fixed length and counting

The oscillation function is suitable for industries such as textiles and chemical fibers, as well as occasions requiring lateral movement and winding functions.

The frequency swing function refers to the inverter output frequency swinging up and down around the set frequency. The trajectory of the operating frequency on the time axis is shown in the figure below. The swing amplitude is set by PB-00 and PB-01. When PB-01 is set to 0, the swing amplitude is 0, and the frequency swing has no effect.



Schematic diagram of oscillation frequency operation

PB-00	Swing setting method	Range: 0 ~ 1	0
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This parameter is used to determine the baseline amount of the swing amplitude.

0: Relative center frequency (P0-06 frequency source), is a variable amplitude system.

The amplitude changes with the center frequency (set frequency).

1: The relative maximum frequency (P0-14) is a fixed amplitude system with a fixed amplitude.

PB-01	Swing frequency amplitude	Range: 0.0% ~ 100.0%	0.0%
PB-02	Jump frequency amplitude	Range: 0.0% ~ 50.0%	0.0%

This parameter is used to determine the swing frequency amplitude and jump frequency values.

When the swing amplitude is set relative to the center frequency (PB-00=0), the swing amplitude $AW = \text{frequency source P0-07} \times \text{swing amplitude PB-01}$. When the swing amplitude is set relative to the maximum frequency (PB-00=1), the swing amplitude $AW = \text{maximum frequency P0-14} \times \text{swing amplitude PB-01}$.

The jump frequency amplitude is the percentage of the jump frequency relative to the swing amplitude during operation, i.e.: $\text{Jump frequency} = \text{Swing amplitude } AW \times \text{Jump frequency amplitude PB-02}$. If the swing amplitude is selected relative to the center frequency (PB-00=0), the jump frequency is a variable value. If the swing amplitude is selected relative to the maximum frequency (PB-00=1), the jump frequency is a fixed value.

The swing frequency is constrained by the upper and lower limits of the frequency range.

PB-03	Swing frequency period	Range: 0.1s ~ 3000.0s	10.0s
PB-04	Triangular wave rise time coefficient	Range: 0.1% ~ 100.0%	50.0%

Oscillation period: The time value of one complete oscillation period.

The rise time coefficient of the triangular wave, Pb-04, is the percentage of the rise time of the triangular wave relative to the oscillation period, Pb-03. $\text{Triangular wave rise time} = \text{oscillation period Pb-03} \times \text{triangular wave rise time coefficient Pb-04}$, in seconds.

The falling time of the triangular wave = the oscillation period Pb-03 $\times$ (1 - the rising time coefficient of the triangular wave Pb-04), in seconds.

PB-05	Set length	Range: 0m ~ 65535m	1000m
PB-06	Actual length	Range: 0m ~ 65535m	0m
PB-07	Number of pulses per m	Range: 0.1 ~ 6553.5	100.0

The above function codes are used for fixed-length control.

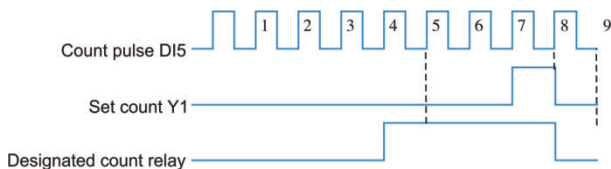
Length information needs to be acquired through the multi-function digital input terminal. The actual length PB-06 can be calculated by dividing the number of pulses sampled by the terminal by the number of pulses per meter PB-07. When the actual length is greater than or equal to the set length PB-05, the multi-function digital terminal outputs a "length reached" ON signal.

During the length control process, the length can be reset via the multi-function DI terminal (DI function selection is 31). Please refer to P5-00 to P5-04 for specific settings. In the application, the corresponding input terminal function needs to be set to "length count input" (DI function selected as 30). When the pulse frequency is high, the HDI port must be used.

PB-08	Set count value	Range: 1 ~ 65535	1000
PB-09	Specify count value	Range: 1 ~ 65535	1000

The count value needs to be acquired through a multi-function digital input terminal. In the application, the corresponding input terminal function needs to be set to "counter input" (function 28). When the pulse frequency is high, the DI5 port must be used. When the count value reaches the set count value PB-08, the multi-function digital output will show an "ON" signal indicating that the set count value has been reached. When the count value reaches the specified count value PB-09, the multi-function digital output will show an "specified count value reached" ON signal.

The specified count value PB-09 should not exceed the set count value PB-08. The following diagram illustrates the functions of reaching the set count value and the specified count value.



Diagrams showing the setting and specifying of a count value.

5.13. PC group multi-segment instruction and simple PLC function

The simplified PLC function is achieved by integrating a programmable logic controller (PLC) into the frequency converter to automatically control multiple frequency segments. Running time, running direction, and running frequency can be set to meet process requirements.

This series of intelligent frequency converters can achieve 16-speed change control, with 4 acceleration and deceleration times to choose from.

After the PLC completes one cycle, an ON signal can be output from the multi-function digital output terminal Y1 and the multi-function relays RELAY1 and RELAY2. See pages 6-00 to 6-02 for detailed instructions.

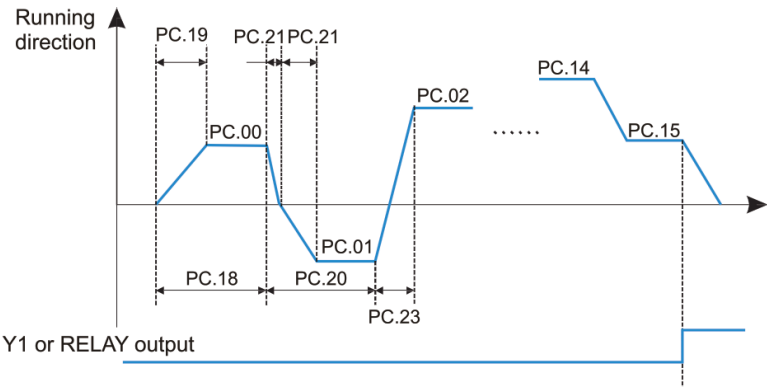
PC-00	Multi-speed 0	Range: -100.0% ~ 100.0%	0.0%
PC-01	Multi-speed 1	Range: -100.0% ~ 100.0%	0.0%
PC-02	Multi-speed 2	Range: -100.0% ~ 100.0%	0.0%
PC-03	Multi-speed 3	Range: -100.0% ~ 100.0%	0.0%
PC-04	Multi-speed 4	Range: -100.0% ~ 100.0%	0.0%
PC-05	Multi-speed 5	Range: -100.0% ~ 100.0%	0.0%
PC-06	Multi-speed 6	Range: -100.0% ~ 100.0%	0.0%
PC-07	Multi-speed 7	Range: -100.0% ~ 100.0%	0.0%
PC-08	Multi-speed 8	Range: -100.0% ~ 100.0%	0.0%
PC-09	Multi-speed 9	Range: -100.0% ~ 100.0%	0.0%
PC-10	Multi-speed 10	Range: -100.0% ~ 100.0%	0.0%
PC-11	Multi-speed 11	Range: -100.0% ~ 100.0%	0.0%
PC-12	Multi-speed 12	Range: -100.0% ~ 100.0%	0.0%
PC-13	Multi-speed 13	Range: -100.0% ~ 100.0%	0.0%
PC-	Multi-speed 14	Range: -100.0% ~ 100.0%	0.0%

14			
PC-15	Multi-speed 15	Range: -100.0% ~ 100.0%	0.0%

When frequency sources P0-06, P0-07, and P0-10 are selected and determined to be in multi-speed operation mode, PC-00 to PC-15 need to be set to determine its characteristics.

Note: The signs of PC-00 to PC-15 determine the operating direction of the simplified PLC. A negative value indicates reverse operation.

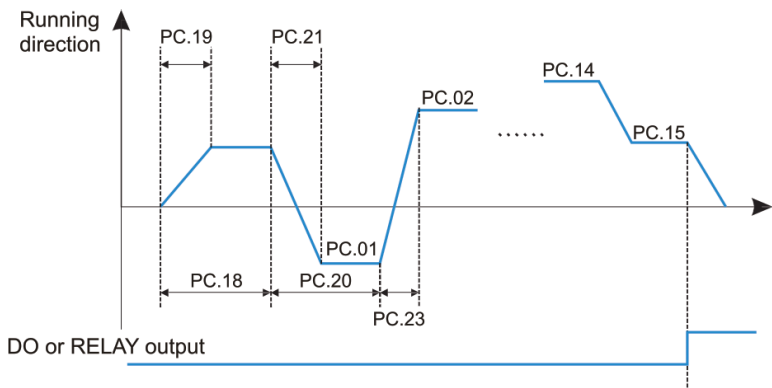
Simplified PLC diagram:



Simplified PLC diagram

PC-16	Simple PLC operation	Range: 0 ~ 2	0
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The basic PLC function has two roles: as a frequency source or as a voltage source separated from the voltage generator (VF). The diagram below shows a simplified PLC used as a frequency source. When the simplified PLC is used as a frequency source, the sign of PC-00 to PC-15 determines the direction of operation; a negative value indicates that the frequency converter is running in the opposite direction.



Simplified PLC diagram

When used as a frequency source, the PLC has three operating modes; when used as a VF-separated voltage source, it does not have these three modes. Specifically:

0: Shutdown after a single run

The frequency converter automatically stops after completing one cycle and requires a new run command to restart.

1: Retain final value after a single run

After completing a single cycle, the frequency converter automatically maintains the operating frequency and direction of the last segment.

2: Keep looping

After completing one cycle, the frequency converter automatically starts the next cycle until a stop command is given.

PC-17	PLC power-off memory selection	Range: 0 ~ 3	0
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This function code determines the inverter's shutdown and power-off memory mode during PLC operation.

0: Does not remember if power is lost or the device is stopped.

1: Remembers memory after power failure and does not remember memory after shutdown.

2: It does not remember when power is off, but remembers when the device is off.

3: Power-off memory and shutdown memory

PLC power-off memory refers to remembering the PLC's operating stage and frequency before a power outage, and resuming operation from the remembered stage upon the next power-on. If you choose not to remember, the PLC process will restart each time it is

powered on.

PLC shutdown memory records the previous PLC operation stage and frequency when the PLC stops, and resumes operation from the remembered stage the next time it starts. If you choose not to remember, the PLC process will start over every time you start the PLC.

PC-18	PLC running time segment 0	Range: 0.0 ~ 6500.0	0.0
PC-19	PLC Segment 0: Time Adjustment/Subtraction Selection	Range: 0 ~ 3 (representing acceleration/deceleration times 1 ~ 4 respectively)	0
PC-20	PLC first stage of operation time	Range: 0.0 ~ 6500.0	0.0
PC-21	PLC First Stage Add/Subtract Time Selection	Range: 0 ~ 3 (representing acceleration/deceleration times 1 ~ 4 respectively)	0
PC-22	PLC second stage running time	Range: 0.0 ~ 6500.0	0.0
PC-23	PLC Second Stage Add/Subtract Time Selection	Range: 0 ~ 3 (representing acceleration/deceleration times 1 ~ 4 respectively)	0
PC-24	PLC third stage running time	Range: 0.0 ~ 6500.0	0.0
PC-25	PLC third stage time adjustment selection	Range: 0 ~ 3 (representing acceleration/deceleration times 1 ~ 4 respectively)	0
PC-26	PLC running time 4th stage	Range: 0.0 ~ 6500.0	0.0
PC-27	PLC 4th stage time adjustment selection	Range: 0 ~ 3 (representing acceleration/deceleration times 1 ~ 4 respectively)	0
PC-28	PLC running time (5th stage)	Range: 0.0 ~ 6500.0	0.0
PC-29	PLC 5th stage time adjustment selection	Range: 0 ~ 3 (representing acceleration/deceleration times 1 ~ 4 respectively)	0
PC-30	PLC running time 6th stage	Range: 0.0 ~ 6500.0	0.0
PC-31	PLC 6th stage time adjustment selection	Range: 0 ~ 3 (representing acceleration/deceleration times 1 ~ 4 respectively)	0
PC-32	PLC running time segment 7	Range: 0.0 ~ 6500.0	0.0

PC-33	PLC 7th stage time adjustment selection	Range: 0 ~ 3 (representing acceleration/deceleration times 1 ~ 4 respectively)	0
PC-34	PLC running time segment 8	Range: 0.0 ~ 6500.0	0.0
PC-35	PLC 8th segment: Time adjustment selection	Range: 0 ~ 3 (representing acceleration/deceleration times 1 ~ 4 respectively)	0
PC-36	PLC running time segment 9	Range: 0.0 ~ 6500.0	0.0
PC-37	PLC 9th segment: Time adjustment selection	Range: 0 ~ 3 (representing acceleration/deceleration times 1 ~ 4 respectively)	0
PC-38	PLC running time segment 10	Range: 0.0 ~ 6500.0	0.0
PC-39	PLC 10th stage time adjustment selection	Range: 0 ~ 3 (representing acceleration/deceleration times 1 ~ 4 respectively)	0
PC-40	PLC 11th running time	Range: 0.0 ~ 6500.0	0.0
PC-41	PLC 11th segment: Time adjustment selection	Range: 0 ~ 3 (representing acceleration/deceleration times 1 ~ 4 respectively)	0
PC-42	PLC 12th segment running time	Range: 0.0 ~ 6500.0	0.0
PC-43	PLC 12th segment: Time adjustment selection	Range: 0 ~ 3 (representing acceleration/deceleration times 1 ~ 4 respectively)	0
PC-44	PLC 13th running time	Range: 0.0 ~ 6500.0	0.0
PC-45	PLC 13th segment: Time adjustment selection	Range: 0 ~ 3 (representing acceleration/deceleration times 1 ~ 4 respectively)	0
PC-46	PLC running time segment 14	Range: 0.0 ~ 6500.0	0.0
PC-47	PLC 14th segment: Time adjustment selection	Range: 0 ~ 3 (representing acceleration/deceleration times 1 ~ 4 respectively)	0
PC-48	PLC running time segment 15	Range: 0.0 ~ 6500.0	0.0
PC-49	PLC Segment 15: Time Adjustment Selection	Range: 0 ~ 3 (representing acceleration/deceleration times 1 ~ 4 respectively)	0

PC-50	PLC running time unit selection	Range: 0 ~ 1	0
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Define the execution time of each of the 16 program segments and the acceleration/deceleration speed selection for each segment. The acceleration/deceleration time selections 0 to 3 represent acceleration/deceleration time 0: P0-23, P0-24; acceleration/deceleration time 1: P7-03, P7-04; acceleration/deceleration time 2: P7-05, P7-06; acceleration/deceleration time 3: P7-07, P7-08, respectively.

PC-50 defines the unit of time for each segment of PLC operation.

0: s(s),

1: h (hours)

PC-51	Multi-speed priority mode selection	Range: 0 ~ 1	1
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Multi-speed priority means that when not all multi-speed terminals are 0, the multi-speed command value is executed first.

0: Multi-speed is not prioritized

1: Multi-speed priority

PC-52	Multi-stage speed priority acceleration/deceleration time selection	Range: 0 ~ 3	0
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When multiple speeds are prioritized, the acceleration/deceleration method is selected when executing multiple speeds.

0: Acceleration/deceleration time 1

1: Acceleration/deceleration time 2

2: Acceleration/deceleration time 3

3: Acceleration/deceleration time 4

PC-53	Multi-speed PC-00 ~ PC-15 unit selection	Range: 0 ~ 3	0
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This is used to select the multi-speed units PC-00 to PC-15 to meet the needs of different occasions for multi-speed frequency units.

0:%

1: H z

PC-55	Multi-segment instruction 0 given mode	Range: 0 ~ 5	0
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This parameter determines the given channel for Multi-Segment Instruction 0. Besides PC-00, Multi-Segment Instruction 0 offers several other options, facilitating switching

between multi-segment instructions and other frequency sources. Switching between the two frequency sources can be easily achieved whether the multi-segment instruction is used as the frequency source or a simple PLC is used as the frequency source.

0: Function code PC-00 given

1: AI1

2: AI2

3: PULSE pulse

4: PID

5: Preset frequency setting (P0-11), UP/DOWN can be modified.

C3-48	Pulse-type multi-speed enable	Range: 0 ~ 1	0
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This function is used for pulse signal input when controlling multi-speed terminals.

0: Invalid

1: Enable

5.14. PD group torque control

Torque control can only be performed when control mode P0-03 is vector control, thereby controlling the motor output torque through torque commands. The following precautions should be taken when using torque control:

1. Torque control is in effect

To enable torque control, set PD-10 to 1, or set the multifunction DI terminal function to 44 before use.

In addition, torque control can be disabled (function 32) through the multi-function digital DI terminal. When the torque disable function is effective, the frequency converter is fixed in speed control mode.

2. Setting torque command and speed limit

Torque commands can be set via Pd-00 and Pd-01. When the torque source is not digitally set, the corresponding PD-01 setting value should be entered at 100%. The speed limit can be set digitally using Pd-03 and Pd-04, or by setting the upper limit frequency P0-15, P0-16, and P0-17.

3. Setting the direction of torque command

During torque control, the direction of the torque command is related to the direction of the running command and the input torque value, as shown in the table below:

Run command	Input torque value (calculated percentage)	Torque command direction
Forward	>0	Forward direction
Forward	<0	Reverse direction
Reversal	>0	Reverse direction
Reversal	<0	Forward direction

Speed and torque mode switching

When the speed control/torque control switching (function 44) is set on the multi-function digital DI terminal, the control mode is equivalent to the inverted value of Pd-10 when the speed control/torque control switching function of the corresponding terminal is effective; otherwise, the control mode is determined by Pd-10.

PD-00	Torque command source selection	Range: 0 ~ 6	0
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Pd-00 is used to select the torque setting source, and there are 7 torque setting methods.

0: Digital setting (Pd-01), which means that the target torque is directly set using the Pd-01 value.

1: AI1

2: AI2

The target torque is determined by the analog input terminals. This series of control boards provides two analog input terminals (AI1, AI2).

AI1 and AI2 can accept 0V to 10V voltage input or 0mA to 20mA current input, selectable via DIP switches on the control board. The relationship between the input voltage values of AI1 and AI2 and the target torque can be freely selected by the user through P5-45.

This series provides 4 sets of corresponding curves, of which 2 sets are linear relationships (2-point correspondence) and 2 sets are arbitrary curves with 4-point correspondence. Users can set these curves using function codes P5-15 to P5-23 and PE group function codes.

Function code P5-45 is used to set the two analog input channels AI1 and AI2, selecting which of the four curves to use.

When AI is used as the torque setpoint, the voltage/current input corresponding to the setting of 100.0% refers to the percentage relative to the torque digital setting PD-01.

3: Communication given

The target torque is given via communication. The host computer provides the data

through communication address 0x1000, and the data format is...

The range is -100.00% to 100.00%, where 100.00% refers to the percentage of the relative torque digital setting PD-01.

4: PULSE pulse (HDI)

The target torque is given via a high-speed pulse at the HDI terminal.

Pulse input signal specifications: Voltage range 9V ~ 30V, frequency range 0kHz ~ 50kHz.

The pulse input can only be obtained from the multi-function input terminal HDI.

The relationship between the HDI terminal input pulse frequency and the corresponding setting is set through P5-30 to P5-34. This relationship is a linear relationship between two points. The 100.0% setting corresponding to the pulse input refers to the percentage of the relative torque digital setting PD-01.

5: MIN(AI1,AI2)

The target torque is given by the minimum value of analog quantities AI1 and AI2.

6: MAX(AI1,AI2)

The target torque is given by the maximum value of analog quantities AI1 and AI2.

Full scale correspondence for options 1 to 6 (Pd-01).

PD-01	Torque digital setpoint	Range: -200.0% ~ 200.0%	150.0%
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The torque setting uses a relative value, with 100.0% corresponding to the motor's rated torque. The setting range is -200% to 200%, indicating that the inverter's maximum torque is twice the motor's rated torque. When the motor power exceeds the inverter power, it will be limited to the inverter's maximum torque.

PD-03	Maximum frequency in the positive direction of torque control	Range: 0.00Hz to maximum frequency (P0-14)	50.00Hz
PD-04	Maximum frequency in the opposite direction of torque control	Range: 0.00Hz to maximum frequency (P0-14)	50.00Hz

Used to set the maximum forward or reverse operating frequency of the frequency converter under torque control mode.

When the frequency converter is in torque control, if the load torque is less than the motor output torque, the motor speed will continue to increase. In order to prevent accidents such as runaway of the mechanical system, the maximum speed of the motor must be limited during torque control.

PD-06	Torque command filtering time	Range: 0.00s ~ 10.00s	0.00s
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Setting this parameter value can make torque commands smoother and control more compliant, but the response will be slower accordingly .

PD-07	Torque mode frequency acceleration time	Range: 0.0s ~ 1000.0s	10.0s
PD-08	Torque mode frequency deceleration time	Range: 0.0s ~ 1000.0s	10.0s

This parameter is used to set the acceleration and deceleration time at the maximum frequency during torque control, in order to reduce starting shock.

PD-10	Speed/Torque Mode Selection	Range: 0 ~ 1	0
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0: Speed Mode

1: Torque Mode

5.15. PE Group AI Multi-Point Curve Setting

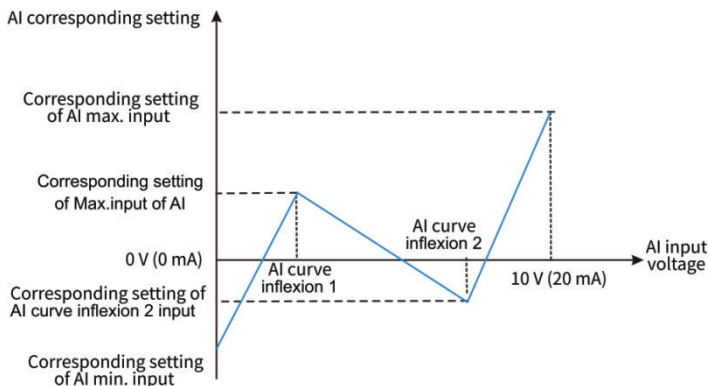
PE-00	Curve 1 Minimum Input	Range: -10.00V ~ PE-02	0.00V
PE-01	Curve 1 Minimum Input Corresponding Setting	Range: -100.0% to 100.0%	0.0%
PE-02	Curve 1 Inflection Point 1 Input	Range: PE-00 ~ PE-04	3.00V
PE-03	Curve 1 Inflection Point 1 Input Corresponding Settings	Range: -100.0% to 100.0%	30.0%
PE-04	Curve 1 Inflection Point 2 Input	Range: PE-02 ~ PE-06	6.00V
PE-05	Curve 1 Inflection Point 2 Input Corresponding Settings	Range: -100.0% to 100.0%	60.0%
PE-06	Curve 1 Maximum Input	Range: PE-06 ~ 10.00	10.00V
PE-07	Curve 1 Maximum Input Corresponding Setting	Range: -100.0% to 100.0%	100.0%
PE-08	Curve 2 Minimum Input	Range: -10.00 ~ PE-10	0.00V
PE-09	Curve 2 Minimum Input Corresponding Settings	Range: -100.0% to 100.0%	0.0%
PE-10	Input at inflection point 1 of curve 2	Range: PE-08 ~ PE-12	3.00V
PE-11	Curve 2 Inflection Point 1 Input Corresponding	Range: -100.0% to 100.0%	30.0%

	Settings		
PE-12	Curve 2 Inflection Point 2 Input	Range: PE-10 to PE-14	6.00V
PE-13	Curve 2 Inflection Point 2 Input Corresponding Settings	Range: -100.0% to 100.0%	60.0%
PE-14	Curve 2 Maximum Input	Range: PE-12 ~ 10.00V	10.00V
PE-15	Curve 2 Maximum Input Corresponding Setting	Range: -100.0% to 100.0%	100.0%

The above function code defines the relationship between the analog input voltage and the set value represented by the analog input. When the analog input voltage exceeds the set value...

The range of the maximum or minimum input will be used, and any part outside of that range will be calculated using the maximum or minimum input.

When the analog input is a current input, 1mA of current is equivalent to 0.5V of voltage. Curves 1 and 2 are consistent with the quantization of analog inputs in group P5, except that the analog quantization of group P5 is linear while the curves in group PE can be set to curves. Therefore, the use of multi-point curves for analog inputs is more flexible. The schematic diagram is shown in the multi-point curve diagram.



Multi-point curve corresponding diagram

PE-24	AI1 sets the jump point	Range: -100.0% to 100.0%	0.0%
PE-25	AI1 sets the jump range	Range: 0.0% ~ 100.0%	0.5%
PE-26	AI2 sets the jump point	Range: -100.0% to 100.0%	0.0%

PE-27	AI2 sets the jump range	Range: 0.0% ~ 100.0%	0.5%
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Analog inputs AI1 and AI2 both have a set value jump function.

The jump function refers to fixing the corresponding set value of the analog quantity to the value of the jump point when the corresponding set value of the analog quantity changes within the range above and below the jump point.

For example, if the voltage of analog input AI1 fluctuates around 5.00V, with a fluctuation range of 4.90V to 5.10V, and the minimum input of AI1 is 0.00V corresponding to 0.0%, while the maximum input is 10.00V corresponding to 100%. Therefore, the detected AI1 value would fluctuate between 49.0% and 51.0%. By setting the AI1 jump point PE-24 to 50.0% and the AI1 jump amplitude PE-25 to 1.0%, the aforementioned AI1 input, after being processed by the jump function, will have a fixed AI1 input value of 50.0%. AI1 is transformed into a stable input, eliminating fluctuations.

5.16. PF group manufacturer parameters

The manufacturer's parameter set cannot be changed by the user.

5.17. Group A0 Second Motor Parameter Settings

When users need to switch between two motors, they can do so through function 41 of the A0-00 or multi-function digital DI terminal. In addition, the two motors can have their nameplate parameters set separately, motor parameter tuning performed, and VF or vector control settings configured individually. Parameters related to VF or vector control performance can also be set separately.

The three groups of function codes A1, A2, and A3 correspond to the motor parameters, VF parameter settings, and vector control parameters of the second motor, respectively. The definitions and usage methods of all parameters in group A are consistent with those of the first motor, so they will not be repeated here. Users can refer to the description of the relevant parameters of the first motor.

A0-00	Motor selection	Range: 1 ~ 2	1
-------	-----------------	--------------	---

1: Motor No. 1

2: Motor No. 2

When the current motor is No. 1, start the frequency converter to execute the P4 group

settings; when the current motor is No. 2, start the frequency converter to execute the A1 group settings .

A0-01	Second motor control method	Range: 1 ~ 2	2
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1: Open-loop vector control (sensorless vector control)

2: VF control

A0-02	Second motor acceleration/deceleration time selection	Range: 0 ~ 4	0
-------	---	--------------	---

0: Same as the first motor

1: Acceleration/deceleration time 1, P0-23, P0-24

2: Acceleration/deceleration time 2, P7-03, P7-04

3: Acceleration/deceleration time 3, P7-05, P7-06

4: Acceleration/deceleration time 4, P7-07, P7-08

5.18. Parameters of the second motor in group A1

A1-00	Motor parameter tuning	Range: 0 ~ 2	0
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0: No function

1: Static Tuning

2: Dynamic Full Tuning

A1-01	Motor 2 Rated Power	Range: 0.1 kW ~ 1000.0 kW	Model confirmed
A1-02	Motor 2 rated voltage	Range: 1V ~ 1500V	380V
A1-03	Motor 2 Number of poles	Range: 2–64	Model confirmed
A1-04	Motor 2 rated current	Range: 0.1 ~ 6000.0A	A1-01 confirmed
A1-05	Motor 2 rated frequency	Range: 0.01Hz to maximum frequency (P0-14)	50.00Hz
A1-06	Motor 2 rated speed	Range: 1 rpm to 60000 rpm	A1-01 confirmed
A1-07	Motor 2 no-load current	Range: 0.1 ~ 6000.0A	A1-01 confirmed
A1-08	Motor 2 stator resistance	Range: 0.001 ohm to 65.535 ohm	Model confirmed
A1-09	Motor 2 rotor resistance	Range: 0.001 ohm to 65.535 ohm	Model confirmed
A1-10	Motor 2 mutual inductance	Range: 0.1mH ~ 6553.5mH	Model confirmed
A1-11	Motor 2 Leakage	Range: 0.01mH ~ 655.35mH	Model confirmed

	Inductance React		
A1-12	Acceleration during dynamic full tuning	Range: 1.0s ~ 600.0s	10.0s
A1-13	Deceleration during dynamic full tuning	Range: 1.0s ~ 600.0s	10.0s

Same as the usage method of the first motor parameters in group P4.

5.19. A2 Group Second Motor VF Parameter Setting

The detailed description of the function codes in this group is the same as that in group P2. For VF control function codes not listed in this group, use group P2 directly.

A2-00	Torque boost	Range: 0.0% ~ 30.0%	0.0%
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When the parameter is set to 0, it indicates automatic torque boost.

A2-02	Oscillation suppression gain	Range: 0 ~ 100	Model confirmed
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5.20. A3 Group Second Motor Vector Control Parameters

This group of parameters functions similarly to the P3 group of parameters and is effective when the motor is the second motor. For detailed function code descriptions, please refer to the P3 group function code description.

A3-00	Switching frequency P1	Range: 1.00Hz ~ A3-02	5.00Hz
A3-02	Switching frequency P2	Range: A3-00 ~ P0-14	10.00Hz
A3-04	Low-frequency speed ratio gain	Range: 0.1 ~ 10.0	4.0
A3-05	Low-frequency speed integral time	Range: 0.01s ~ 10.00s	0.50s
A3-06	High-frequency speed proportional gain	Range: 0.1 ~ 10.0	2.0
A3-07	High-frequency speed integral time	Range: 0.01s ~ 10.00s	1.00s
A3-08	Speed ring integral attribute selection	Range: 0 ~ 1	0
A3-11	Torque current regulator Kp	Range: 0 ~ 30000	2000
A3-12	Torque current regulator Ki	Range: 0 ~ 30000	1300
A3-13	Excitation current regulator Kp	Range: 0 ~ 30000	2000
A3-14	Excitation current regulator Ki	Range: 0 ~ 30000	1300

A3-15	Flux Braking Gain	Range: 100 ~ 200	000
A3-16	Field weakening torque correction factor	Range: 50% ~ 150%	100%
A3-17	slip compensation coefficient	Range: 50% ~ 200%	100%
A3-18	Velocity loop feedback filter time constant	Range: 0.000s ~ 1.000s	0.015s
A3-19	Speed loop output filter time constant	Range: 0.000s ~ 1.000s	0.000s
A3-20	Electric torque upper limit source	Range: 0 ~ 4	0
A3-21	Electric torque limit	Range: 0.0% ~ 200.0%	150.0%
A3-22	Braking torque upper limit source	Range: 0 ~ 4	0
A3-23	Braking torque limit	Range: 0.0% ~ 200.0%	150.0%

5.21. B0 Group System Parameters

B0 is used to manage the inverter's function code groups, which can be set by the user as needed.

B0-00	Function code read-only selection	Range: 0 ~ 1	0
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0: Invalid

1. Except for B0-00, all function codes can only be viewed and cannot be modified to prevent accidental parameter manipulation.

B0-03	Is the jogging frequency related to the lower limit frequency?	Range: 0 to 1	0
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0: Association

1: Not related

This function is used to associate the jog function with the lower limit frequency of P0-18. When B0-03=0 is set, the lower limit frequency of jog will be the value set by P0-18; when B0-03=1 is set, the jog operation frequency is from 0.00Hz to the value set by P7-00.

B0-04	Vector running frequency display selection	Range: 0 ~ 1	0
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0: Real-time frequency

1: Set frequency

B0-05	Keyboard control operation power failure auto-start delay time	Range: 1.0s ~ 100.0s	3.0s
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When the start protection P7-41=2 is effective, and when under keyboard control, the self-start delay time after power failure and power-on during operation is B0-05.

5.22. B1 Group User Function Code Customization

This frequency converter provides users with 31 customizable function codes to facilitate viewing, modifying parameters, and quick operation. After customizing a function code using group B1, users can view and modify the custom function code by entering the user menu mode - USER. For instructions on entering and exiting the user menu mode, please refer to the function code menu mode and switching instructions.

B1-00	Clear custom function code selection	Range: 0 ~ 1	0
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0: Invalid

1. Clear user-defined function codes. After clearing, B1-01 to B1-31 will all be uP0.00.

Factory-reset user-defined function codes can be restored via P0-28 .

B1-01	Custom function code 1	Range: uP0-00 ~ uU1-xx	uP0-03
B1-02	Custom function code 2	Range: uP0-00 ~ uU1-xx	uP0-04
B1-03	Custom function code 3	Range: uP0-00 ~ uU1-xx	uP0-06
B1-04	Custom function code 4	Range: uP0-00 ~ uU1-xx	uP0-23
B1-05	Custom function code 5	Range: uP0-00 ~ uU1-xx	uP0-24
B1-06	Custom function code 6	Range: uP0-00 ~ uU1-xx	uP4-00
B1-07	Custom function code 7	Range: uP0-00 ~ uU1-xx	uP4-01
B1-08	Custom function code 8	Range: uP0-00 ~ uU1-xx	uP4-02
B1-09	Custom function code 9	Range: uP0-00 ~ uU1-xx	uP4-04
B1-10	Custom function code 10	Range: uP0-00 ~ uU1-xx	uP4-05
B1-	Custom function code 11	Range: uP0-00 ~ uU1-xx	uP4-06

11			
B1-12	Custom function code 12	Range: uP0-00 ~ uU1-xx	uP4-12
B1-13	Custom function code 13	Range: uP0-00 ~ uU1-xx	uP4-13
B1-14	Custom function code 14	Range: uP0-00 ~ uU1-xx	uP5-00
B1-15	Custom function code 15	Range: uP0-00 ~ uU1-xx	uP5-01
B1-16	Custom function code 16	Range: uP0-00 ~ uU1-xx	uP5-02
B1-17	Custom function code 17	Range: uP0-00 ~ uU1-xx	uP6-00
B1-18	Custom function code 18	Range: uP0-00 ~ uU1-xx	uP6-01
B1-19	Custom function code 19	Range: uP0-00 ~ uU1-xx	uP0-00
B1-20	Custom function code 20	Range: uP0-00 ~ uU1-xx	uP0-00
B1-21	Custom function code 21	Range: uP0-00 ~ uU1-xx	uP0-00
B1-22	Custom function code 22	Range: uP0-00 ~ uU1-xx	uP0-00
B1-23	Custom function code 23	Range: uP0-00 ~ uU1-xx	uP0-00
B1-24	Custom function code 24	Range: uP0-00 ~ uU1-xx	uP0-00
B1-25	Custom function code 25	Range: uP0-00 ~ uU1-xx	uP0-00
B1-26	Custom function code 26	Range: uP0-00 ~ uU1-xx	uP0-00
B1-27	Custom function code 27	Range: uP0-00 ~ uU1-xx	uP0-00
B1-28	Custom function code 28	Range: uP0-00 ~ uU1-xx	uP0-00
B1-29	Custom function code 29	Range: uP0-00 ~ uU1-xx	uP0-00
B1-30	Custom function code 30	Range: uP0-00 ~ uU1-xx	uP0-00
B1-31	Custom function code 31	Range: uP0-00 ~ uU1-xx	uP0-00

The first letter of the user-customized function code range, a small "u", indicates the

user-customized function code, and the remaining symbols represent the function code. For example, uP0-03 indicates that the customized function code is P0-03, but uP0-00 indicates that the customized function code is empty.

5.23. Group B2 Optimized Control Parameters

B2-00	Dead zone compensation enable selection	Range: 0 ~ 1	1
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0: No compensation

1: Compensation

B2-01	PWM method	Range: 0 ~ 1	0
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0: Asynchronous modulation

1. Synchronous modulation only applies to VF control mode and when the operating frequency is higher than 85Hz.
Synchronous modulation refers to the inverter's carrier frequency changing linearly with the output frequency. It is generally used at higher frequencies and is beneficial for improving output voltage quality. Asynchronous modulation, on the other hand, uses a constant carrier frequency and is more effective at lower frequencies.

B2-02	PWM 7-band/5-band selection	Range: 0 ~ 1	0
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0: Seven sections in total

1: Automatic switching between seven and five segments

When using PWM seven-segment continuous modulation, the inverter has higher switching losses but lower current ripple; in the five-segment intermittent modulation mode, the switching losses are lower, but the current ripple is higher and the motor noise increases.

B2-03	CBC Current Limiting Enable Selection	Range: 0 ~ 1	1
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0: Prohibited

1: Enabled. This significantly reduces the risk of overcurrent faults in the frequency converter, enabling uninterrupted operation. If the frequency converter experiences prolonged rapid current limiting, a fault Err33 will occur, indicating that the frequency converter is overloaded and needs to be shut down.

B2-04	Braking point	Range: 330.0V ~ 800.0V	690.0V<1>
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<1> is the value for a 380V inverter; for a 200V inverter, this value is 360.0V.

This value represents the braking resistor's activation voltage. When a braking resistor is present and the bus voltage is greater than B2-04, the inverter will release excess braking energy through the braking resistor to prevent overvoltage.

B2-05	undervoltage point	Range: 150.0V ~ 500.0V	350.0V<1>
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<1> is the value for a 380V inverter; for a 200V inverter, this value is 200.0V.

This value is the inverter's undervoltage fault detection point. When the inverter bus voltage is lower than this value and the inverter is in operation, it will output an Err12 undervoltage fault. The reset method for the undervoltage fault can be selected via P9-17 .

B2-06	Random PWM depth setting	Range: 0 ~ 6	0
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This feature is only active with VF. Random PWM can soften the monotonous and harsh motor sound and reduce external electromagnetic interference. Different random PWM depths produce different effects; 0 indicates ineffective.

B2-07	0Hz operating mode selection	Range: 0 ~ 2	0
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0: No current output

1: Normal operation

2: Output the shutdown DC braking current B1-16

B2-08	Low-frequency carrier limiting method selection	Range: 0 ~ 2	0
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0: Default restriction method;

1: The low-frequency carrier frequency should not exceed 1/2 of the corresponding control method;

2: No restrictions, all frequency bands have the same carrier frequency.

B2-11	Fast rate limiting mode	Range: 0 ~ 1	0
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0: Disable fast rate limiting

1: Enable fast rate limiting

Current-by-wave (CBC) is a real-time, cycle-by-cycle current protection and control mechanism in frequency converters. Its core objective is to limit the instantaneous value of the output current within a safe threshold by dynamically adjusting the switching state of the power devices, preventing damage to inverter power devices (such as IGBTs) due

to overcurrent, while also ensuring the stability of motor operation .

B2-14	Terminal UP/Down mode	Range: 0 ~ 1	0
B2-15	Terminal UP/Down mode 1 delay time	Range: 0.00s ~ 120.00s	0.26s

This function is used to select the terminal control UP/Down mode:

0: Terminal connection is always active.

1: Terminal rise delay effective

When B2-14=1, the delay time is B2-15.

5.24. AIAO correction parameters for group B3

B3-00	AI1 displays voltage 1	Range: -9.999V ~ 10.000V	3.000V
B3-01	AI1 measured voltage 1	Range: -9.999V ~ 10.000V	3.000V
B3-02	AI1 displays voltage 2	Range: -9.999V ~ 10.000V	8.000V
B3-03	AI1 measured voltage 2	Range: -9.999V ~ 10.000V	8.000V
B3-04	AI2 displays voltage 1	Range: -9.999V ~ 10.000V	3.000V
B3-05	AI2 measured voltage 1	Range: -9.999V ~ 10.000V	3.000V
B3-06	AI2 displays voltage 2	Range: -9.999V ~ 10.000V	8.000V
B3-07	AI2 measured voltage 2	Range: -9.999V ~ 10.000V	8.000V

Function codes B3-00 to B3-07 are used to correct the error between the actual input value of the AI analog signal and the AI value displayed by the inverter, in order to eliminate the influence of zero bias and linearity of the AI input port. This group of function parameters has been calibrated at the factory, and users can calibrate it again according to the actual usage conditions. However, this parameter will be restored when the factory settings are reset. Generally, calibration is not required in the application field. Measured voltage refers to the actual voltage measured by a multimeter or other measuring instruments. Displayed voltage refers to the voltage displayed by the inverter sampling. AI1 and AI2 display voltages correspond to function codes U1-19 and U1-20, respectively.

During calibration, input two voltage values into each AI input port, and accurately input the values measured by the multimeter and the values read from the U0 group into the function code mentioned above. The inverter will then automatically perform zero bias and gain calibration of the AI.

B3-12	AO1 target voltage 1	Range: -9.999V ~ 10.000V	3.000V
B3-13	AO1 measured voltage 1	Range: -9.999V ~ 10.000V	3.000V
B3-14	AO1 target voltage 2	Range: -9.999V ~ 10.000V	8.000V
B3-15	AO1 measured voltage 2	Range: -9.999V ~ 10.000V	8.000V
B3-16	AO2 target voltage 1	Range: -9.999V ~ 10.000V	3.000V
B3-17	AO2 measured voltage 1	Range: -9.999V ~ 10.000V	3.000V
B3-18	AO2 target voltage 2	Range: -9.999V ~ 10.000V	8.000V
B3-19	AO2 measured voltage 2	Range: -9.999V ~ 10.000V	8.000V

Function codes B3-12 to B3-19 are used to correct the error between the actual and theoretical output values of AO analog quantities. They have already been calibrated at the factory and generally do not require further calibration in the application field.

Restoring factory settings will revert to the factory calibration values.

Target voltage refers to the theoretical output voltage value of the frequency converter. U1-37 and U1-38 correspond to the target voltages AO1 and AO2, respectively. Measured voltage refers to the actual output voltage value measured by instruments such as a multimeter.

During calibration, after inputting the target voltage and the measured voltage into the corresponding function codes, the inverter will automatically correct the output value.

5.25. B4 group master-slave control parameters

Master-slave control refers to the point-to-point communication between two or more frequency converters to exchange data, thereby achieving speed synchronization or current balancing among multiple frequency converters. This is commonly used in multi-drive applications, such as sand dredgers and coal mine belt conveyors. Please correctly

configure the frequency converter communication group P8 before use.

When using RS-485 communication for master-slave control, the frequency converter must no longer communicate normally with the host computer using RS-485 communication; otherwise, the system will malfunction. The following precautions should be taken when using master-slave control:

1. Determining the master and slave directions

When using master-slave control and speed synchronization control is required, please ensure that the actual running directions of the master and slave motors are consistent before operation.

When the directions of the master and slave machines are inconsistent, the actual running direction of the motor can be changed by selecting the motor direction P0-13 or by changing the wiring sequence between the motor and the inverter output terminal.

2. Master and slave control parameter settings

When multiple frequency converters are used to drive the same load, there are two control methods for the master and slave units:

- 1. The master control mode P0-03 is set to vector, and the slave control is also vector and torque control. This mode is used in most cases.
- 2. Set both the master and slave control P0-03 to VF. Then, set an appropriate droop rate P7-18. Refer to P7-18 for the setting method. Otherwise, an imbalance in the current between the master and slave will occur.
- 3. When the mechanical transmission ratios of the master and slave inverters are the same, the maximum frequencies P0-14 of the master and slave inverters must be the same .
- 4. When the master B4-02=0, the slave acceleration and deceleration time needs to be set to 0; when the master B4-02=1, the slave acceleration and deceleration time needs to be consistent with the master.
- 5. A system can have only one master unit, but can have multiple slave units. They can be connected according to the communication method used, and support 485 communication.

B4-00	Master-Slave Control Enable Selection	Range: 0 ~ 1	0
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0: Prohibited

1: Enable, enabling master-slave control.

B4-	Master/Slave Selection	Range: 0 ~ 1	0
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01			
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0: Host

1: Slave

B4-02	Host transmission frequency selection	Range: 0 ~ 1	0 <2>
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0: Operating frequency. The acceleration/deceleration time of the slave device must be set to 0 in this case; otherwise, the speeds of the master and slave devices will be out of sync during acceleration and deceleration.

1: Target frequency. At this point, the acceleration and deceleration times need to be set to be consistent for both the master and slave devices. Otherwise, the speeds of the master and slave devices will be out of sync during acceleration and deceleration .

B4-03	The slave device follows the master's command source selection.	Range: 0 ~ 1	0 <1>
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0: Do not follow, meaning the slave device will not start after the master device starts. This can be used to check if the system communication is normal.

1: Follow, meaning the slave device follows the master's command source to start and stop synchronously.

B4-04	Slave receives frequency coefficient	Range: 0.00% ~ 600.00%	100.00% <1>
B4-05	Slave receives torque coefficient	Range: -10.00 ~ 10.00	1.00 <1>
B4-06	Slave receives torque bias	Range: -50.00% ~ 50.00%	0.00% <1>

B4-04 to B4-06 are only effective for slave devices and are used to define the relationship between the slave device receiving data and the master device.

Let the data sent by the master be x , the data used by the slave be Y , and the data received by the slave be $K(B4-04/B4-05)$. Then $Y = K * x + b$. At frequency, $b = 0$; at torque, $b = B4-06$.

B4-07	Frequency deviation threshold	Range: 0.20% ~ 10.00%	0.50% <1>
B4-08	Master-slave communication disconnection detection time	Range: 0.00s ~ 10.0s	0.1s <1>

Set the master-slave communication interruption detection time; a value of 0 indicates no detection.

Note: <1> Only effective on the slave device, <2> Only effective on the master device.

B4-11	Main frequency gain	Range: 0.00 % ~ 300.00 %	100.00%
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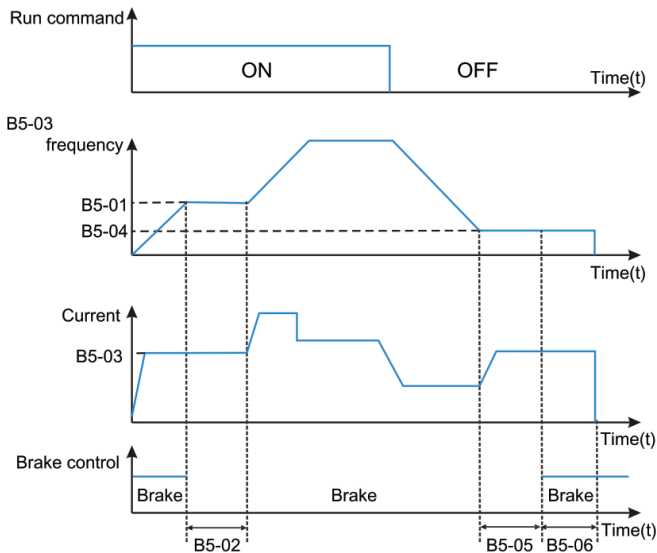
The main frequency gain is the target frequency gain coefficient of the host frequency source P0-06, and the output frequency = target frequency x (B4-11).

B4-12	Master-Auxiliary Synthesis Gain	Range: 0.00 % ~ 300.00 %	100.00%
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The master-slave synthesis gain is the result of the host frequency source selection P0-10 fed back to the target frequency gain coefficient, and the output frequency = target frequency x (B4-12).

5.26. B5 Group Brake Function Parameters

The brake control process is shown in the following diagram:



Schematic diagram of brake control process

The braking process is as follows:

1. After receiving the run command, the frequency converter accelerates to the opening frequency set by B5-03 forward rotation or B5-05 reverse rotation.
2. After the frequency reaches the opening frequency, the opening frequency is

maintained by setting the pre-opening delay time B5-01 of the brake.

3. If B5-12=1 is set, opening the brake requires checking the current condition; the output current must reach the current threshold set in B5-07. The default is 0, and no current is checked.

4. When the brake is not released, the output can be limited by setting B5-10. With DO function 32 "Brake Control Output" set, after the set delay time after the brake is released, relay B5-08 outputs a valid signal to control the brake release and begin acceleration to the set frequency.

5. After receiving the shutdown command, the frequency converter decelerates to the forward rotation frequency B5-04 or the reverse rotation shutdown frequency B5-06.

6. After the operating frequency reaches the set value for closing, after the pre-closing delay time B5-02, the relay outputs a closing signal to control the brake to close. After the set post-closing delay time B5-09, the inverter starts to stop. You can choose between free stop or deceleration stop mode.

7. By default, B5-11 is 0, and the shutdown mode is free stop. You can set B5-11 to 1 to change it to perform deceleration stop after the delay after the gate is closed.

B5-00	Brake control enable selection	Range: 0 ~ 1	0
B5-01	Brake release delay	Range: 0 ~ 20.0s	0s
B5-02	Brake closing delay	Range: 0 ~ 20.0s	0.3
B5-03	Rising forward rotation brake opening frequency	Range: 0.00Hz ~ 20.00Hz	2.50Hz
B5-04	Rising forward rotation brake closing frequency	Range: 0.00Hz ~ 20.00Hz	1.50Hz
B5-05	Frequency of descent and reversal brake opening	Range: 0.00Hz ~ 20.00Hz	2.50Hz
B5-06	Frequency of descent and reversal brake closure	Range: 0.00Hz ~ 20.00Hz	1.50Hz
B5-07	Brake opening current threshold	Range: 0 ~ 100.0	40.0
B5-08	Frequency holding time after brake release	Range: 0 ~ 20.0s	0.5s
B5-09	Frequency holding time after brake deactivation	Range: 0 ~ 20.0s	0.5s

B5-10	Current limit during holding brake	Range: 50.0% ~ 200.0%	120.0%
B5-11	Stop mode after brake is closed	Range: 0 ~ 1	0

B5-00 Brake Control Enable Selection

0: Prohibited

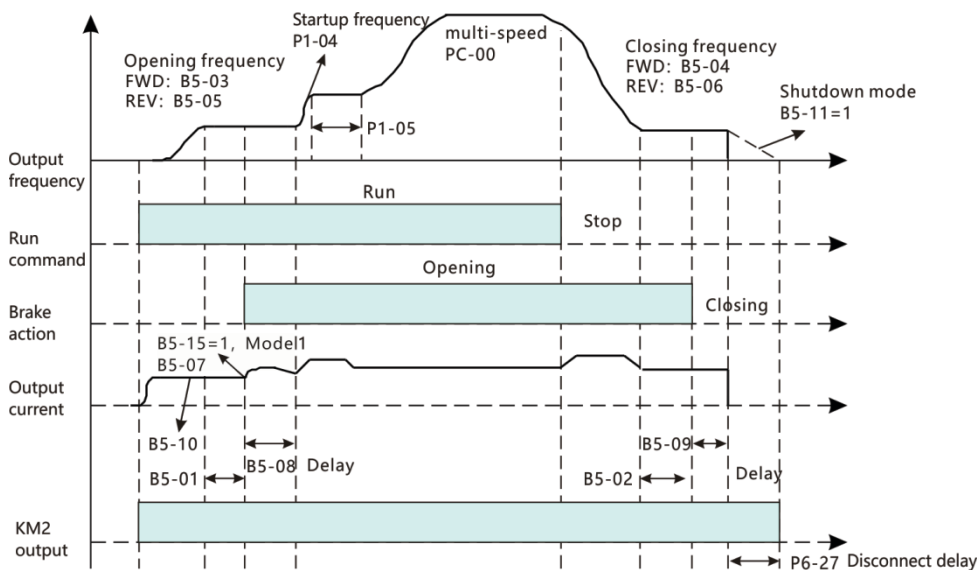
1: Enable

By setting function codes B5-01 to B5-12 , the comfort of elevator startup and stopping can be well adjusted, similar to the brake logic diagram above. The exact meaning of each function code is shown in the following figure, which adds the option to set the startup frequency and the startup frequency hold time .

P1-04	Startup frequency	Range: 0.00 ~ 10.00Hz	5.00Hz
P1-05	Startup frequency retention time	Range: 0.00 ~ 10.00s	0.00s
P6-00	Relay 1 output	Range: 0 ~ 46	32-inch brake output
P6-01	Relay 2 output	Range: 0 ~ 46	1 Run
P6-27	Relay 2 disconnect delay	Range: 0 ~ 3600.0s	0

If the elevator requires selection of a start buffer frequency, the start frequency can be controlled by setting P1-04 and the start frequency delay P1-05.

When using relay 1 for brake control, the brake output function needs to be set to P6-00=32. If KM2 is connected, the function of relay 2 is set to run output P6-01=1. The delay of relay R2 output needs to be set. It is recommended to use the relay disconnection delay P6-27 for setting .



B5-03 (Upward forward rotation brake opening frequency), B5-04 (Upward forward rotation brake closing frequency), B5-05 (Downward reverse rotation brake opening frequency), and B5-06 (Downward reverse rotation brake closing frequency) are used for frequency determination when the elevator is ascending and descending.

B5-11 Stop mode after brake deactivation

0: Free Stop

1: Deceleration and Stop

This parameter allows you to select either a direct free stop or a deceleration to 0 stop after the brake is closed .

B5-12	Brake release mode	Range: 0 ~ 1	0
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0: Open according to frequency

The condition for releasing the brake is that the frequency output of the inverter reaches the frequency set by B5-03 (rising) and B5-05 (falling), and then the time set by B5-01 (brake release delay) is elapsed before the brake is released.

1: Open according to frequency and current

In addition to the inverter output reaching the frequency set by B5-03 (rising) and B5-05 (falling), the inverter current must also reach the value set by B5-07 (brake opening current) to determine when the brake is released.

B5-13	Civil elevator dedicated function enable	Range: 0 ~ 1	0
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0: Off

1: Enable , special function for residential elevators turned on.

B5-14	Elevator emergency operation frequency	Range: 0.00Hz ~ P0-14Hz (maximum frequency)	20.00Hz
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When an emergency signal is input, the frequency converter will enter emergency operation mode, and the operating frequency will be the frequency set by the function code. In emergency operation mode, the frequency converter will select acceleration/deceleration time 4 as the current acceleration/deceleration time.

B5-15	Elevator maintenance and operation frequency	Range: 0.00Hz ~ P0-14Hz (maximum frequency)	20.00Hz
-------	--	--	---------

When a maintenance signal is input, the inverter will operate at the maintenance frequency.

B5-16	Elevator emergency signal processing mode	Range: 0 ~ 1	1
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0 : Elevator not running

The inverter does not output when an emergency signal is input.

1 : UPS Powered Operation

When an emergency signal is input, the frequency converter is powered by the UPS and can operate and output at the emergency frequency.

B5-17	Elevator Ascent Correction Frequency	Range: 0.00Hz ~ 5.00Hz	0.00Hz
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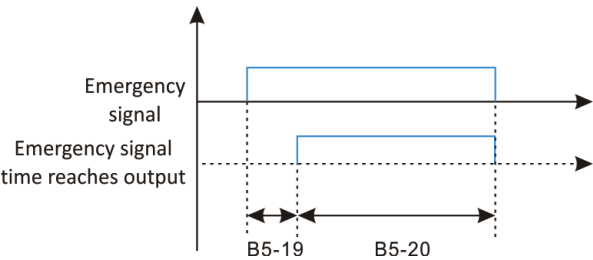
This parameter is used to correct the leveling accuracy of the elevator in power generation mode. For example, when the elevator is half-loaded and ascends, it is exactly at the leveling position, but when it is unloaded and ascends, it exceeds the leveling position. Increasing this value can correct the leveling accuracy.

B5-18	Elevator descent correction frequency	Range: 0.00Hz ~ 5.00Hz	0.00Hz
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This parameter is used to correct the leveling accuracy of the elevator in electric mode. For example, when the elevator is half-loaded and descending, it is exactly at the leveling position, but when it is unloaded and descending, it cannot reach the leveling position. Increasing this value can correct the leveling accuracy.

B5-19	Elevator emergency signal validity period	Range: 0.0 ~ 3600.0	0.0
B5-20	Elevator emergency signal invalid time	Range: 0.0 ~ 3600.0	0.0

These two parameters are used to set the effective and ineffective time of the emergency signal output. When the emergency signal is effective, the inverter starts timing. When the time exceeds the value set by B5-19 , if the output terminal function (Y1 Y2 R1 R2) is selected as 46 (emergency signal time reached) function, the terminal outputs a valid signal and maintains it for the time set by B5-20 . After the time of B5-20 is exceeded , the terminal outputs an invalid signal.



The emergency signal output indicates that the elevator is sensitive to the noise of the cooling fan. The elevator fan is silent (P7-26=2), and the cooling fan starts according to the temperature.

5.27. Group B6 Sleep/Wake Function Parameters

This set of parameters is mainly used to implement the sleep and wake-up functions in constant pressure water supply applications. Please note the following when using it:

- 1. Please select the method for controlling the sleep function according to your application requirements. (B6-00)
- 2. If the frequency source uses PID, whether the PID is operated in sleep mode is affected by function code PA-29. In this case, it is necessary to select PID operation when the system is stopped (PA-29=1).
- 3. Under normal circumstances, please set the wake-up frequency ((100.0% - B6-03 wake-up difference) * P0-14 maximum output frequency) to be greater than the sleep frequency B6-01 .

B6-00	Hibernation Selection	Range: 0 ~ 3	0
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0: Hibernation function is disabled.

1: Digital input terminal (DI) controls sleep function

After defining the stator digital input (DI) terminal as function 53, it will go into sleep

mode after a delay of the time set by B6-02 when DI is active.

2: The sleep function is controlled by the PID setpoint and feedback value. In this case, the frequency source P0-06 of the frequency converter must be a PID controller. Refer to the simplified PLC diagram.

3: Control the hibernation function according to the operating frequency.

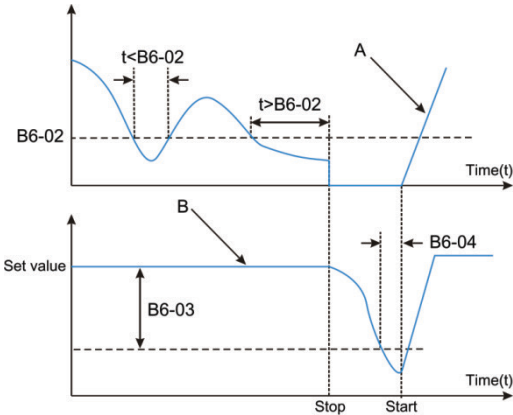
During inverter operation, if the set frequency is less than or equal to the B6-01 sleep frequency, it enters sleep mode; otherwise, if the inverter set frequency is greater than the wake-up frequency (B6-03 wake-up difference * P0-14 maximum output frequency), it enters wake-up mode.

B6-01	Sleep frequency	Range: 0.00Hz ~ P0-14 (maximum frequency)	0.00Hz
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When B6-00=1, this function is invalid.

When the hibernation function is active and the operating frequency is lower than this value, after the sleep delay time B6-02, the inverter starts to sleep (stops).

See the diagram : A = PID output; B = PID feedback value.



Schematic diagram of hibernation process frequency

B6-02	Sleep delay	Range: 0.0s ~ 3600.0s	20.0s
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the hibernation process frequency diagram for its function.

B6-03	wake-up difference	Range: 0.0% ~ 100.0%	10.0%
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When B6-00=2, this parameter uses the maximum pressure as a reference, that is, the maximum pressure is 100%;

When B6-00=3, this parameter takes the maximum frequency P0-14 as the reference, that is, the maximum frequency is 100% , and the unit becomes Hz .

When the difference between the given value and the feedback value exceeds the value defined by this parameter, the PID controller restarts after a wake-up delay of B6-04. PA-04=0 positive action, wake-up value = set value - wake-up difference; PA-04=1 negative action, wake-up value = set value + wake-up difference.

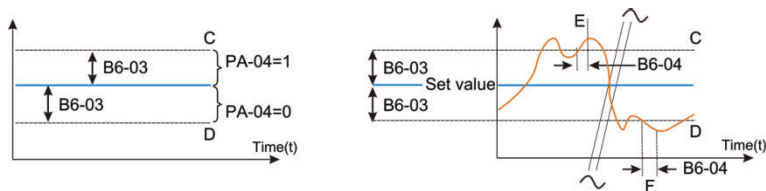
See the illustration:

C = wake-up value, when parameter PA-04 = 1.

D = wake-up value, when parameter PA-04 = 0.

If the feedback value is greater than the wake-up value and the duration exceeds parameter B6-04 (wake-up delay), the PID function will restart.

If the feedback value is less than the wake-up value and the duration exceeds parameter B6-04 (wake-up delay), the PID function will restart.



Wake-up diagram

B6-04	Wake-up delay	Range: 0.0s ~ 3600.0s	0.5s
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Set the wake-up delay time; refer to the wake-up diagram for the function.

B6-05	Sleep delay frequency output selection	Range: 0 ~ 1	0
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0: PID automatic adjustment

1: Sleep frequency B6-01

B6-07	wake-up frequency	Range: 0.0 Hz to P0-14 (maximum frequency)	0.0Hz
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This parameter is used for frequency wake-up, and the system will run according to the set wake-up frequency value when waking up.

5.28. BA Group Virtual Terminal Function Parameters

For details on this set of parameters, please refer to the functional parameter table.

5.29. C1 group tension control function parameters

For details on these parameters, please refer to the chapter "Tension Control".

5.30. C3 Group Photovoltaic Functional Parameters

For details on this set of parameters, please refer to the "Photovoltaic Water Pump" manual.

5.31. U0 group fault record parameters

The frequency converter provides three sets of fault record parameters, all of which are read-only, facilitating users' viewing and troubleshooting of frequency converter fault-related information. For details, please refer to the "Function Code Parameter Table" or "Fault Diagnosis and Countermeasures" sections.

5.32. U1 Group Status Monitoring Parameters

The U1 parameter group is used to monitor relevant variable information during the operation of the frequency converter. Customers can view it through the panel for convenient on-site debugging, or read the parameter group values through communication for use in host computer monitoring. The communication address is 0x71xx.

Among them, U1-00 to U1-31 are the operation and shutdown monitoring parameters defined in P7-29 and P7-30.

U1-00	Operating frequency (Hz)	Minimum unit: 0.01Hz
U1-01	Set frequency (Hz)	Minimum unit: 0.01Hz
U1-02	Bus voltage (V)	Minimum unit: 0.1V
U1-03	Output voltage (V)	Minimum unit: 1V
U1-04	Output current (A)	Minimum unit: 0.1A
U1-05	Output power (KW)	Minimum unit: 0.1kW
U1-06	DI Input status, hexadecimal number	Minimum unit: 1

Displays the current DI terminal input status value. After conversion to binary data, each bit corresponds to one DI input signal; 1 indicates a high-level signal, and 0 indicates a low-level signal. The correspondence between each bit and the input terminal is as follows:

Bit0	Bit1	Bit2	Bit3	Bit4	Bit5	Bit6	Bit7
DI1	DI2	DI3	DI4	DI5	reserve	reserve	reserve

Bit8	Bit9	Bit10	Bit11	Bit12	Bit13	Bit14	Bit15
reserve	reserve	reserve	reserve	reserve	reserve	reserve	reserve

U1-07	DO Output status, in hexadecimal.	Minimum unit: 1
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Displays the current output status value of the DO terminal. After conversion to binary data, each bit corresponds to one DO signal; a value of 1 indicates a high output level, and a value of 0 indicates a low output level. The correspondence between each bit and the output terminal is as follows:

Bit0	Bit1	Bit2	Bit3	Bit4	Bit5	Bit6	Bit7
Relay 1	Relay 2	reserve	reserve	reserve	reserve	reserve	reserve
Bit8	Bit9	Bit10	Bit11	Bit12	Bit13	Bit14	Bit15
reserve	reserve	reserve	reserve	reserve	reserve	reserve	reserve

U1-08	A I1 corrected voltage	Minimum unit: 0.01V
U1-09	A I2 corrected voltage	Minimum unit: 0.01V
U1-10	PID setpoint, PID setpoint (percentage) * PA-05	Minimum unit: 1
U1-11	PID feedback, PID feedback value (percentage) * PA-05	Minimum unit: 1
U1-12	Count value	Minimum unit: 1
U1-13	Length value	Minimum unit: 1
U1-14	motor speed	Smallest unit: rpm
U1-15	In the PLC stage, during multi-segment speed operation, the current segment...	Minimum unit: 1
U1-16	PULSE pulse input frequency	Minimum unit: 0.01kHz
U1-17	Feedback speed, actual operating frequency of the motor	Minimum unit: 0.1Hz
U1-18	P7-38 Remaining Time of the Timer	Minimum unit: 0.1 Min
U1-19	A I1 Voltage before correction	Minimum unit: 0.001V
U1-20	I2 voltage before correction	Minimum unit: 0.001V
U1-21	D15 High-speed pulse sampling line speed, refer to page 7-71 for usage.	Minimum unit: 1 m/min
U1-22	Load speed display (set load speed when the machine is stopped), refer to page 7-	Minimum unit: Custom

	31 for usage.	
U1-23	Power-on time	Minimum unit: 1 Min
U1-24	Runtime	Minimum unit: 0.1 Min
U1-25	PULSE is the pulse input frequency, and it differs from U1-16 only in the unit.	Minimum unit: 1Hz
U1-26	Communication setting frequency value	Minimum unit: 0.01%
U1-27	Main frequency display	Minimum unit: 0.01Hz
U1-28	Auxiliary frequency display	Minimum unit: 0.01Hz
U1-29	The target torque is 100% of the motor's rated torque.	Minimum unit: 0.1%
U1-30	Output torque, based on 100% of the motor's rated torque.	Minimum unit: 0.1%
U1-31	Output torque, based on 100% of the inverter's rated current.	Minimum unit: 0.1%
U1-32	The upper limit of torque is based on 100% of the inverter's rated current.	Minimum unit: 0.1%
U1-33	VF Separation Target Voltage	Minimum unit: 1V
U1-34	VF Separate Output Voltage	Minimum unit: 1V
U1-35	Fault information (1: STO1, 2: STO2, 3: STO1 and STO2)	Minimum unit: 1
U1-36	Current motor serial number	Minimum unit: 1
U1-37	AO1 target voltage	Minimum unit: 0.01V
U1-38	AO2 target voltage	Minimum unit: 0.01V
U1-39	Inverter operating status (0: Stop, 1: Forward rotation, 2: Reverse rotation, 3: Fault)	Minimum unit: 1
U1-40	Current fault of frequency converter	Minimum unit: 1
U1-41	Distributor's limited-time offer ends in time.	Minimum unit: 1h
U1-42	AC incoming current	Minimum unit: 0.1A
U1-43	PLC remaining time in current stage	Minimum unit: 0.1
U1-46	Encoder feedback frequency	Minimum unit: 0.1 Hz
U1-47	Cumulative running time 1 (Cumulative running time = U1-47 + U1-48)	Minimum unit: 1h
U1-48	Cumulative running time 2 (Cumulative running time = U1-47 + U1-48)	Minimum unit: 1 min

U1-50	Motor temperature 1	Minimum unit: 1°C
U1-51	Encoder position	Minimum unit: 1
U1-54	UPS 220V markings (0: not connected, 1: connected)	Minimum unit: 0
U1-55	Proportional adjustment of actual speed	Minimum unit: 0.01Hz
U1-57	Motor temperature 2	Minimum unit: 1°C

Note: Cumulative running time = Cumulative running time 1 + Cumulative running time 2
= U1-47 + U1-48

Chapter 6 Synchronous Motor Open-Loop Vector (SVC) Commissioning Guide

6.1. Configure synchronization type, control mode, and motor parameters.

1) Set the motor type to synchronous motor and the control mode to SVC, i.e., P0-03=11.

Note: The tens digit of P0-03 indicates the motor type selection, and the units digit indicates the control mode;

Tens digit: 1: synchronous motor, 0: asynchronous motor;

Units digit: 1: SVC, 2: VF/VVC, 3: FVC

2) Set P4-01 ~ P4-06 according to the actual motor parameters.

6.2. Parameter identification

1) Connect the motor. If there is a load, set P4-00 to 1; if it is an empty shaft, set P4-00 to 2. The digital tube will display TUNE. To ensure the control effect, it is best to set the motor to no load and set P4-00 to 2.

2) Press the RUN button to perform parameter identification. Wait for TUNE to disappear, and the parameter identification will end.

3) The identification process lasts about 1 minute. You can press the STOP button to exit midway. During this period, current will be sent to run the motor at the set acceleration and deceleration time until it reaches 60% of the motor's rated frequency. Observe whether the motor runs smoothly. If it is not smooth, press STOP to exit. After reaching 60% of the motor's rated frequency, it will decelerate and stop after a period of time.

4) After the parameter identification is completed, check whether the parameters P4-17~P4-20 are normal.

6.3. No-load test run

1) Set the speed to a smaller range, such as P0-11=20Hz.

2) Press the run button and check if the motor can accelerate to the set frequency and if the motor current is very low. If the motor can accelerate to the set frequency and the motor current is very low, the frequency converter is basically normal. Set the frequency to the motor's rated frequency and check if the motor can accelerate to

the set frequency.

6.4. Quick Start Trial Run

Set this step only if rapid start-stop is required; otherwise, skip this step. Reduce the motor acceleration time (e.g., set it to 1 second), change the speed loop and current loop PI parameter settings, press the run button, and check if the motor can quickly accelerate to the set frequency.

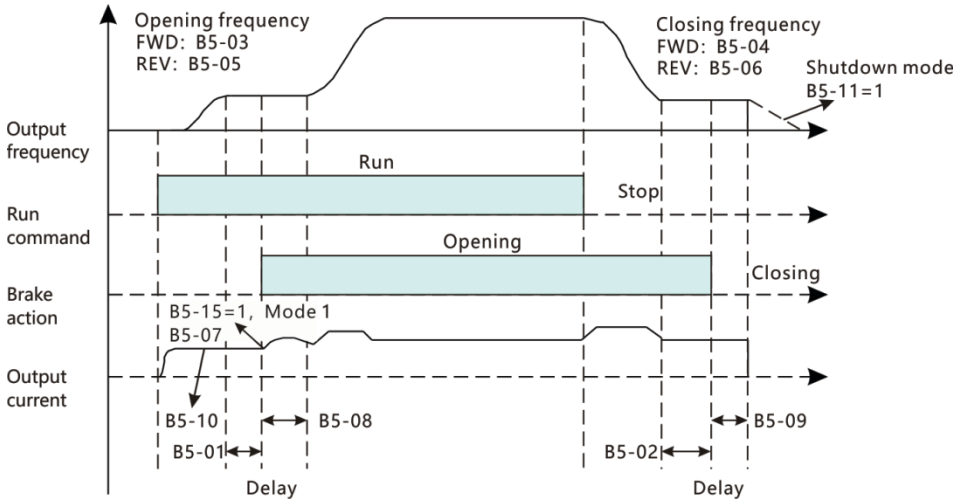
6.5. Load and run

After completing the above 5 steps, the motor can be run under load, and the frequency converter can be used normally.

Note: If the system response does not meet expectations when loading or changing the system's moment of inertia, parameters P3-04 and P3-06 need to be adjusted appropriately. If a different type of motor is used, the motor's rated frequency and rated current generally need to be set before parameter identification.

Chapter 7 Brake Logic Instructions

7.1. Brake Logic Diagram



7.2. Brake Logic Process

- 1) After receiving the run command, the frequency converter accelerates to the opening frequency set by B5-03 forward rotation or B5-05 reverse rotation.
- 2) After the frequency reaches the opening frequency, the opening frequency is maintained by setting the pre-opening delay time B5-01 of the brake.
- 3) If B5-12=1 is set, opening the brake requires checking the current condition; the output current must reach the current threshold set in B5-07. The default is 0, and no current is checked.
- 4) When the brake is not open, the output can be limited by setting B5-10. With DO function 32 "Brake Control Output" set, after the set delay time after the brake is opened, relay B5-08 outputs a valid signal to control the brake to open and begin accelerating to the set frequency.
- 5) After receiving the shutdown command, the frequency converter decelerates to the forward rotation frequency B5-04 or the reverse rotation shutdown frequency B5-06.
- 6) After the operating frequency reaches the set value for closing, after the pre-closing delay time B5-02, the relay outputs a closing signal to control the brake to close. After

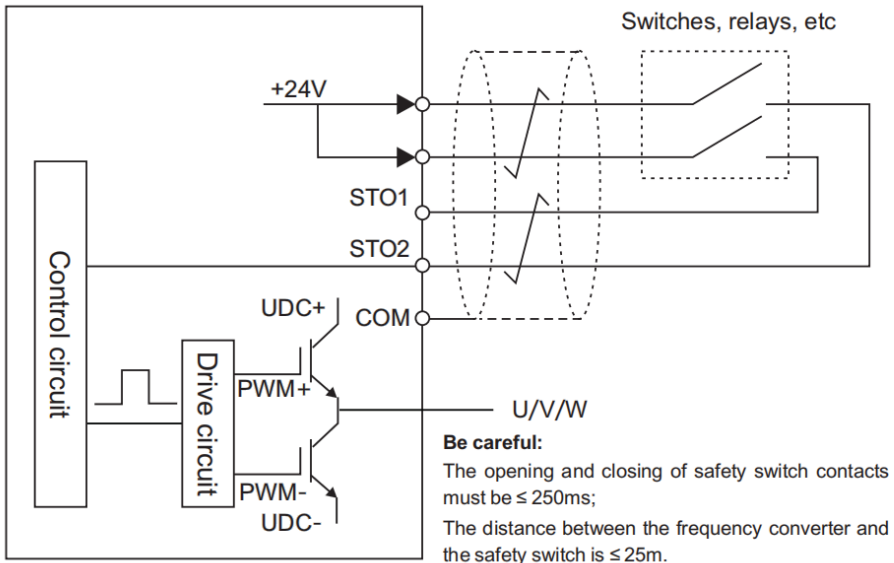
the set post-closing delay time B5-09, the inverter starts to stop. You can choose between free stop or deceleration stop mode.

7) By default, B5-11 is 0, and the shutdown mode is free shutdown. You can set B5-11 to 1 to change it to perform deceleration shutdown after the delay after the gate is closed.

Chapter 8 Overview of STO and other safety features

8.1. STO Function Overview

Reference standards: IEC 61508-1, IEC 61508-2, IEC 61508-3, IEC 61508-4, IEC 62061, ISO 13849-1, IEC 61800-5-2. This series of frequency converters features a Stop-On (STO) function, automatically stopping the inverter upon shutdown. An internal stop signal is set within the inverter; when triggered, the inverter will automatically stop operating. The stop signal can be triggered by inputting specific control commands or using an external sensor, causing the inverter to stop outputting current. This function offers high safety and reliability, effectively preventing unnecessary equipment damage and personal injury. When using the frequency converter, please set the STO function parameters appropriately to ensure its normal operation and optimal performance.



8.2. STO Functional Logic

STO function input status and corresponding faults:

STO Input Status	Corresponding to STO fault
STO1 and STO2 are opened simultaneously.	The inverter malfunctions when the STO function is triggered.
STO1 and STO2 are closed simultaneously.	The inverter can operate normally without triggering the STO function.
STO1, STO2 Any one that is open	The Err48 fault is triggered. The fault type can be identified by checking the U1-35 value. 1: STO1 is disconnected; 2: STO2 is disconnected; 3: Both STO1 and STO2 are disconnected.

8.3. STO Function Installation Checklist

Before installing STO, please perform a self-check according to the table below to ensure that STO is effective .

No.	project
1	Ensure that the frequency converter can be freely operated and stopped during commissioning.
2	Stop the frequency converter (if it is running), disconnect the input power supply, and isolate the frequency converter from the power supply via a switch.
3	Connect the circuit correctly according to the STO circuit diagram.
4	Check that the STO input cable is properly connected, and that the +24V and shielding are connected to GND and COM.
5	Power-on self-test
6	When the motor stops, test the STO method: Send a stop command to the frequency converter (if it is running) and wait for the motor shaft to stop; Activate the STO function and send a start command to the driver to ensure that the motor remains stationary. Stop activating the STO circuit.
7	Restart the frequency converter and check if the motor is running normally.
8	Test the STO method while the motor is running: Start the frequency converter to ensure the motor operates normally;

No.	project
	Activate the STO circuit; The inverter triggered an STO fault Err48 (check the fault type and handling in U1-35), ensuring the motor stops; Stop activating the STO circuit.
9	Restart the frequency converter and check if the motor is running normally.

8.4. Fire mode association function code

Function code	Name	Description (setting range)	Factory Default
P7-80	Fire mode selection	0: Disabled; 1: Enable mode 1, allows terminal emergency stop; 2: Enable mode 2, no shutdown allowed.	0
P7-81	Fire mode frequency setting	0 ~ P0-14	50.00Hz
P5-02	DI3 terminal function selection	0 ~ 71	42
P5-03	DI 4- terminal function selection	0 ~ 71	45

8.5. Fire mode function introduction

- 1) When P7-80 is set to 0: Fire suppression mode is not activated.
- 2) When P7-80 is set to 1 (Fire Mode 1): At this time, digital input terminals (DI1-DI5) are function 42, which is the fire mode enable terminal (rising edge triggered). When this function is active, the inverter operates at the frequency set by P7.81. If a fault is reported during inverter operation, it will continue to run without stopping. When this function is active, the inverter will run automatically; when this function is inactive, a stop command is required from the command source to stop the inverter.

Note: In this mode, if an emergency occurs after the fire mode is activated, pressing the emergency stop button will allow the machine to stop (the DI4 terminal is set to

emergency stop function 45 by default).

When P7-80 is set to 2 (Fire Mode Two): Digital input terminals (DI1-DI5) are function 42, which is the fire mode enable terminal (rising edge triggered). When this function is active, the inverter operates at the frequency set by P7-81. If a fault is reported during inverter operation, it will continue to run without stopping. When this function is active, the inverter will run automatically and cannot be stopped until the inverter is powered off or fails.

Chapter 9 Tension control

9.1. Tension control related function codes

See function code group C1 in the function parameter table.

9.2. Introduction to Tension Control Scheme

There are two ways to control tension: 1. Control the output torque of the motor; 2. Control the motor speed.

9.3. Two methods of tension control

9.3.1. Open-loop torque control mode

Open-loop control refers to a mode where there is no tension feedback signal; the frequency converter achieves control solely by controlling the output frequency or torque, regardless of whether it's open-loop or closed-loop vector control. Torque control mode means the frequency converter controls the motor's torque, not its frequency; the output frequency automatically changes with the material's speed. According to the formula $F=T/R$ (where F is the material tension, T is the winding shaft torque, and R is the winding radius), it can be seen that if the winding shaft torque can be adjusted according to changes in the winding diameter, the tension on the material can be controlled. This is the basis for open-loop torque mode tension control. Another reason for its feasibility is that the tension on the material originates solely from the winding shaft torque, which primarily acts on the material.

9.3.2. Closed-loop speed control mode

Closed-loop control refers to the need for tension (position) detection feedback signals to form a closed-loop regulation. Speed control mode refers to the inverter adjusting the output frequency based on the feedback signal to achieve the control objective. Speed-mode inverters can operate in any of three modes: sensorless vector control, sensor-based vector control, and V/F control. The principle of this control mode is to calculate a matching frequency setpoint f_1 based on the material linear velocity and the actual roll diameter, and then use the tension (position) feedback signal to perform PID calculations

to generate a frequency adjustment value f_2 . The final frequency output is $f = f_1 + f_2$. f_1 can basically match the linear velocity of the take-up (untake-off) roll with the material linear velocity, and then f_2 only needs slight adjustment to meet the control requirements, effectively resolving the contradiction between fast response and control stability in closed-loop control. In this mode, the tension setting is invalid; the target value for system control is set in the FA-00 PID setpoint, and the control result is to stabilize the tension (position) feedback signal at the PID setpoint. Note that when using position signals (such as tension levers or floating rollers) for feedback, changing the setpoint (PID input) may not necessarily change the actual tension. Changing the tension requires modifying mechanical configurations such as the counterweight of the tension lever or floating roller.

9.4. Control mode selection section

C1-00	Tension control mode	0: Invalid 1: Open-loop torque mode 2: Closed-loop speed mode	0
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Use this parameter to select the tension control mode.

- 1) Tension control is ineffective
- 2) Open-loop torque control mode: No tension detection and feedback are required. The frequency converter controls the tension on the material by controlling the output torque. For optimal control of the output torque, the frequency converter requires vector control with a speed sensor.
- 3) Closed-loop speed mode: Requires tension detection and feedback. The inverter uses PID closed-loop control to output the frequency, achieving the set tension. The inverter controls the output frequency, and the control method can be any of the following: sensorless vector control, V/F control, or closed-loop vector control.

C1-01	Unwinding/rewinding mode	0: Receiving the Paper 1: Unrolling the roll	0
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Selecting the take-up/unwind mode can be used in conjunction with the take-up/unwind switch terminal. When the take-up/unwind switch terminal is invalid, the actual take-up/unwind mode is the same as the function code setting. When the take-up/unwind switch terminal is valid, the actual take-up/unwind mode is the opposite of the function code setting.

Relationship between tension direction and unwinding/rewinding:

The tension direction is fixed to the direction of the winding tension, which is consistent with the operating direction when there is no tension control. When switching between winding and unwinding, you only need to change C1-01 or use the winding and unwinding switching terminal, without having to change the forward and reverse operation commands at the same time.

C1-02	Maximum frequency of roll-up	0.00Hz to maximum frequency	30.00Hz
C1-03	Unwinding upper limit frequency	0.00Hz to maximum frequency	10.00Hz

When tension control is effective, the upper limit frequency for both winding and unwinding modes is determined by C1-02 and C1-03.

C1-04	Transmission ratio	0.01~600.00	1.85
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Mechanical transmission ratio = motor speed / reel speed. The mechanical transmission ratio must be set correctly for tension control.

9.5. Tension setting section

C1-05	Tension setting source	0: Function code setting (C1-06) 1: AI1 2: AI2 3: AI3 (Expansion Card) 4: PULSE Input Pulse Setting 5: Communication given	0
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This parameter determines the source of tension control:

1) 0: Tension is set digitally, and the specific value is set in C1-06.

2) 1: AI1, 2: AI2, 3: AI3. Tension is set via analog signals, such as using a potentiometer. When setting tension via analog signals, the maximum tension must be set. The maximum value set for the analog signal usually corresponds to the maximum tension.

3) 4: Tension setting is done via pulse input. The pulse input terminal must be DI5. When selecting pulse-based tension setting, the maximum tension must be set. Typically, the maximum pulse value corresponds to the maximum tension.

4) 5: Communication settings. When using a host computer for control, the tension can be set via communication.

C1-06	Tension setting	0~30000N	0N
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When C1-05 is set to 0, the tension controlled by the frequency converter is determined by this parameter.

C1-07	Maximum tension	0~30000N	0N
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When C1-05 selects either analog or pulse control as the tension source, this parameter determines the maximum value of the analog quantity or the pulse.

9.6. Roll diameter calculation parameters

C1-08	Roll diameter calculation method	0: Function code setting (C1-10) 1: Linear velocity calculation 2: Cumulative Thickness Calculation 3: AI1 4: AI2 5: AI3 (Expansion Card) 6: PULSE pulse input	0
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- 1) 0: Set via function code
- 2) 1: Calculate the roll diameter using linear velocity
- 3) 2: Thickness accumulation method for calculating roll diameter
- 4) 3, 4, 5: Calculate the roll diameter using the analog AI terminal.
- 5) Calculate roll diameter using PILSE pulse input

C1-09	Maximum roll diameter	1~10000mm	1100mm
C1-10	Scroll diameter	1~10000mm	320mm

When selecting option 3, 4, 5, or 6 for the C1-08 roll diameter calculation method, the maximum input quantity should correspond to the maximum roll diameter. At the same time, the roll diameter calculated by the frequency converter itself is limited by this parameter.

C1-09 is the setting for the diameter of the reel. If the inverter calculates a diameter lower than this value due to improper parameter settings, it will be subject to the limitations of this parameter.

C1-11	Initial volume source	0: DI terminal setting 1: AI1 2: AI2 3: AI3 (Expansion Card)	320
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Select the input channel for the initial volume size.

0: The initial roll diameter is set digitally by C1-12~15 via the DI terminal logic.

1: AI1, 2: AI2, 3: AI3 The initial roll diameter is determined by analog signals, selecting different ports for the analog input.

C1-16	Convex diameter filtering time	0.0s ~ 100.0s	1.0s
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The filtering time for roll diameter calculation prevents the roll diameter from changing too quickly.

C1-19	Roll diameter reset selection	0: Resetting the roll diameter is prohibited during operation. 1: Roll diameter reset is allowed during operation.	0
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The roll diameter reset condition selection is based on the DI terminal function being active. C1-19 sets whether the roll diameter can be reset after restarting.

C1-20	Roll diameter reaches set value	1~10000mm	0mm
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When the roll diameter value reaches C1-20, the DO terminal setting roll diameter function is effective.

9.7. Thickness cumulative calculation of roll diameter parameters

C1-21	Material thickness selection	0: DI terminal setting 1: AI1 2: AI2 3: AI3 (Expansion Card) 4: Communication Settings	0
C1-22	Maximum thickness	0.01~100.00mm	0.00mm

When parameter C1-21 is selected as 0: the material thickness is set by the DI terminal. C1-22~C1-26 can digitally set 4 initial material thicknesses, which are determined by the logic level of the DI terminal.

When C1-21 parameters are selected as 1, 2, or 3, the maximum analog input should correspond to the maximum thickness of C1-22.

C1-28	Roll diameter reaches set value	1~10000	1
C1-29	Number of rings per layer	1~10000	1

This refers to the number of times the material is wound into a single layer and the spool

rotates; it is generally used for wire.

9.8. Linear velocity calculation roll diameter parameters

C1-30	Linear velocity input source	0: Function code settings (C1-31) 1: AI1 2: AI2 3: AI3 (Expansion Card) 4: PULSE input pulse setting 5: Communication given	0
C1-31	Maximum linear velocity	0.1~6000.0 m/min	1000m/min

C1-30: When the linear velocity input source is 0, the linear velocity is the value set in C1-31.

After using analog inputs AI (1, 2, 3) as linear velocity input sources, the maximum analog input needs to be set to the correct maximum linear velocity C1-31.

When the linear velocity input source is 4, the linear velocity is given by the PULSE input pulse.

When the linear velocity input source is 5, the linear velocity is given via communication.

C1-32	Actual value of linear velocity	actual value	actual value
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C1-32: This parameter displays the real-time value of the linear velocity.

C1-33	Lower limit of frequency for roll diameter calculation	0.00Hz ~ Maximum frequency	1.50Hz
C1-34	Roll diameter calculation delay	0.0 ~ 100.0s	6.0s

C1-33 This parameter indicates that when the inverter's operating frequency is lower than the frequency set by this parameter, the roll diameter will no longer be included in the calculation change.

C1-34 Delay time for roll diameter calculation.

9.9. Tension compensation parameters

C1-40	Upper limit of moment of inertia compensation torque	0.0~50.0%	5.0%
C1-41	static friction compensation coefficient	0.0~50.0%	0.0%
C1-	Dynamic friction	0.0~50.0%	0.0%

42	compensation coefficient		
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C1-40: Used to compensate for the rotational inertia of the system itself, including the inertia of the motor, transmission system, and reel, etc. This inertia is fixed and independent of the reel diameter. This parameter can be automatically obtained through self-learning operation of the compensation coefficient (this function is retained in the current version), or it can be set manually. When the reel is empty or small, if the material tension decreases during acceleration, the coefficient is increased; conversely, the coefficient is decreased.

C1-41~42: Taking winding as an example: Due to frictional resistance, the tension of the material decreases, which is more pronounced when winding small coils, and also causes the tension to become nonlinear. This can be improved by setting this parameter.

C1-44	High-speed torque compensation coefficient	0.0~50.0%	0.0%
C1-45	High-speed torque compensation basis	0: Frequency 1: Linear velocity	0
C1-46	High-speed torque compensation speed limit	10.0~100.0%	100.0%

C1-44 Adjusts compensation for high-speed torque.

When adjusting the compensation for high-speed torque using C1-45, high speed is based on frequency or linear velocity.

C1-46 is the upper limit of high-speed compensation adjustment.

9.10. Taper parameters

C1-48	Taper mode	0: Curve taper 1: Straight taper	0
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Taper mode selection

C1-49	Taper setting source	0: Function code setting (C1-50) 1: AI1 2: AI2 3: AI3 (Expansion Card)	0
C1-50	Taper setting	0.000~1.000	0.000
C1-51	Taper correction amount	1~10000mm	100mm
C1-	Taper inflection point 1	1~10000mm	100mm

52			
C1-53	Taper setting 1	0.000~1.000	0.000
C1-54	Taper inflection point 2	1~10000mm	200mm
C1-55	Taper setting 2	0.000~1.000	0.000

Functions C1-48 to C1-55 are used to calculate the tension taper coefficient Taper.

Actual tension setting: $F = F_0 \times \text{Taper}$; where F_0 : set tension . The two calculation modes of Taper are described below.

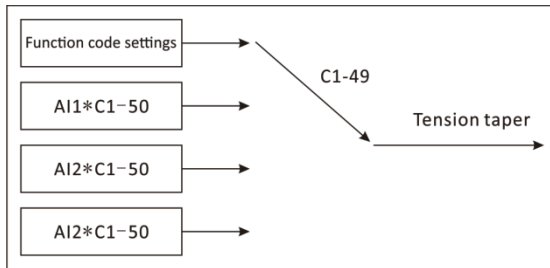
1. Taper-related parameters for curve C1-48=0: C1-49, C1-50, C1-51 ; Taper calculation :

Taper coefficient : $\text{Taper} = 1 - K \times (1 - (D_0 + D_1) / (D + D_1)) = 1 - K(D - D_0) / (D + D_1)$;

Where D_0 : empty roll diameter , D : current roll diameter , D_1 : tension taper correction amount , K : tension taper, and tension taper K is the input.

As shown in the figure below.

Taper setting source



C1-48=1 Related parameters for linear taper: C1-50, C1-52, C1-53, C1-54, C1-55; Taper calculations:

- ① $D_0 \leq D \leq C1-52$, $\text{Taper} = 1 - C1-52 \times (D - D_0) / 1000$
- ② $D = \text{Taper diameter 1 (C1-52)}$, $\text{Taper1} = C1-53 / 1000$
- ③ $C1-52 \leq D \leq C1-54$, $\text{Taper} = \text{Taper1} - C1-53 \times (D - C1-52) / 1000$
- ④ $D = \text{Taper diameter 2 (C1-54)}$, $\text{Taper2} = \text{Taper1} - C1-53 \times (C1-54 - C1-52) / 1000$
- ⑤ $C1-54 \leq D \leq D_{\text{max}}$, $\text{Taper} = \text{Taper2} - C1-55 \times (D - C1-54) / 1000$

C1-56	Disconnection detection selection	0: Invalid 1: Effective	0
C1-57	Lower limit of disconnection detection frequency	0.00Hz ~ Maximum frequency	10.00Hz

C1-58	Wire breakage detection error	1~1000mm	10mm
C1-59	Disconnection detection time	0.1~60.0s	1.0s

When C1-56=1, automatic detection is performed based on changes in roll diameter.

The method only provides a basis for material breakage detection when the roll diameter is calculated using linear velocity. Sensitivity and accuracy are balanced by adjusting C1-57, C1-58, and C1-59 to achieve the desired effect for practical applications.

1: Output frequency > C1-57;

2: When the abnormal change in roll diameter is greater than C1-58 and the duration is greater than C1-59.

If conditions 1 and 2 are met simultaneously, the frequency converter will report a material shortage fault (Err30). Advantages of this method: no increase in hardware cost; Disadvantages: more difficult to debug.

There are many limitations. In tension (position) closed-loop applications, in addition to the two methods mentioned above for detecting material breakage, the effectiveness of PID line breakage protection can also be tested.

9.11. Automatic roll changing parameters

C1-60	Pre-drive speed gain	-50.0%~50.0%	0.0%
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When changing rolls during operation, in order to prevent excessive impact, the take-up shaft (unwind shaft) needs to be rotated in advance, and the linear speed of the rotation is consistent with the linear speed of the material during operation. This is the pre-drive function.

When the pre-drive terminal is active, the inverter will automatically calculate the output frequency based on the detected linear speed and roll diameter to achieve linear speed matching. This parameter can adjust the linear speed matching relationship; when set to a negative value, the surface speed of the pre-drive roller will be lower than the linear speed of the material in operation.

During pre-drive, it is generally necessary to pause the roll diameter calculation (controlled by the roll diameter calculation pause terminal) or set function code C1-63 to

1.

C1-61	Pre-drive torque limiting selection	0: PD-02 settings 1: Set the amplitude limit	1
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		according to the tension.	
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During pre-drive, select the torque limiting setting mode. If selected as 1, the output torque can be limited according to the tension setting and the current roll diameter.

Use with C1-62.

C1-62	Pre-drive torque gain	-50.0%~50.0%	0.0%
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When C1-61 is selected as 1, the torque limit value during pre-drive can be adjusted through this parameter, and the tension can be increased or decreased according to the system control requirements.

C1-63	Pre-drive roll diameter calculation selection	0: Calculation 1: Stop calculation	1
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Choose whether to stop roll diameter calculation during pre-drive. Generally, roll diameter calculation should be stopped.

C1-64	Delay for roll diameter calculation after pre-drive ends	0.0s~10.0s	3.0s
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If the volume diameter calculation is stopped during pre-drive, this function code determines that the volume diameter calculation will only begin after a certain time has elapsed after the pre-drive ends, which can prevent the volume diameter calculation from fluctuating too much at the moment the pre-drive ends.

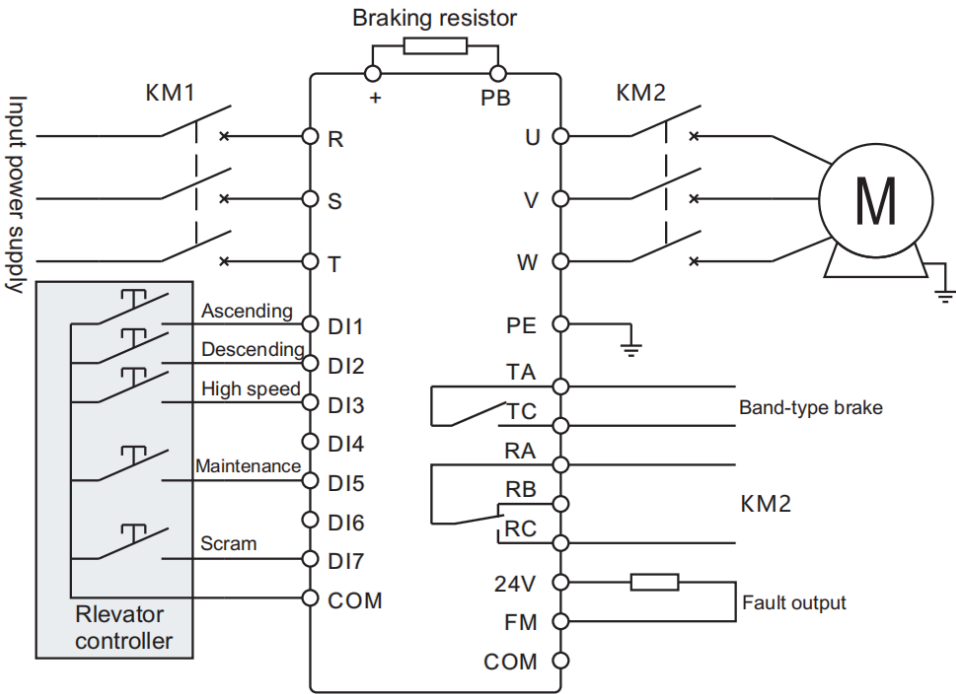
9.12. Enhanced features

C1-65	Torque adaptive selection	0: Prohibited 1: Enable	0
C1-66	Initial torque setting source selection	0: Function code setting (C1-67) 1: AI1 2: AI2 3: AI3 (Expansion Card) 4: PULS E Input Pulse Setting 5: Communication given	10
C1-67	Initial torque setting	0.0%~200.0%	0.0%

Chapter 10 Civil Elevator Application Guide

10.1. Single/Multi-Speed Terminal Elevator Controller

For an elevator controller with only one multi-speed conversion terminal, the high-speed segment and the leveling speed segment are controlled by switching the high-speed terminal on and off. The wiring diagram of this type of elevator controller and frequency converter is as follows:



Wiring diagram of single/multi-speed terminal elevator controller and frequency converter

Based on the on-site wiring connections between the controller, inverter, and motor, for elevators without a running contactor (KM2), the R2 wiring can be omitted. Similarly, for elevator controllers without fault signal reception, the FM wiring can also be omitted. After completing the wiring, follow the steps below to complete the commissioning.

1) To set the high-speed and leveling speeds, the elevator controller uses a high-speed terminal to switch between high-speed and leveling speeds. The corresponding

parameters for setting multiple speeds are: PC-00 = leveling speed , PC-01 = high speed .

2) For inspection speed settings, some elevator controllers share the inspection speed with the leveling speed and do not have an inspection signal output. In this case, the inspection signal line can be left unconnected, and this step can be skipped. For those with an inspection signal output, the inspection speed can be set through the function code. The corresponding parameter for setting the inspection speed is: B5-15=Inspection Speed .

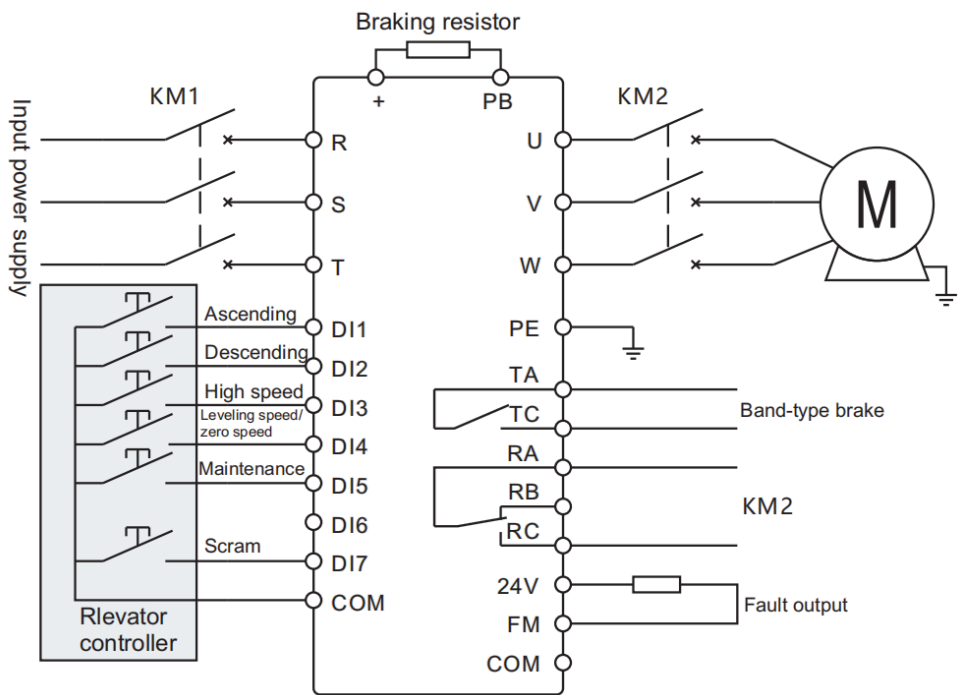
3) For emergency stop signals, some elevator controllers do not have emergency stop signals, so the emergency stop signal line can be left unconnected and this step can be skipped; if an emergency stop signal exists, set DI7 to emergency stop signal P5-06=54 .

4) For maintenance and operation testing, switch the elevator controller to maintenance operation mode and test by pressing the up or down button to check if the running direction is consistent. If not, swap the up and down signal lines, i.e., swap the DI1 and DI2 signal lines, or swap any two of the motor output lines U , V , and W.

5) Normal mode trial operation: Switch the elevator controller to normal operation mode for testing, and adjust the acceleration and deceleration times according to the site conditions .

10.2. Dual multi-speed terminal elevator controller

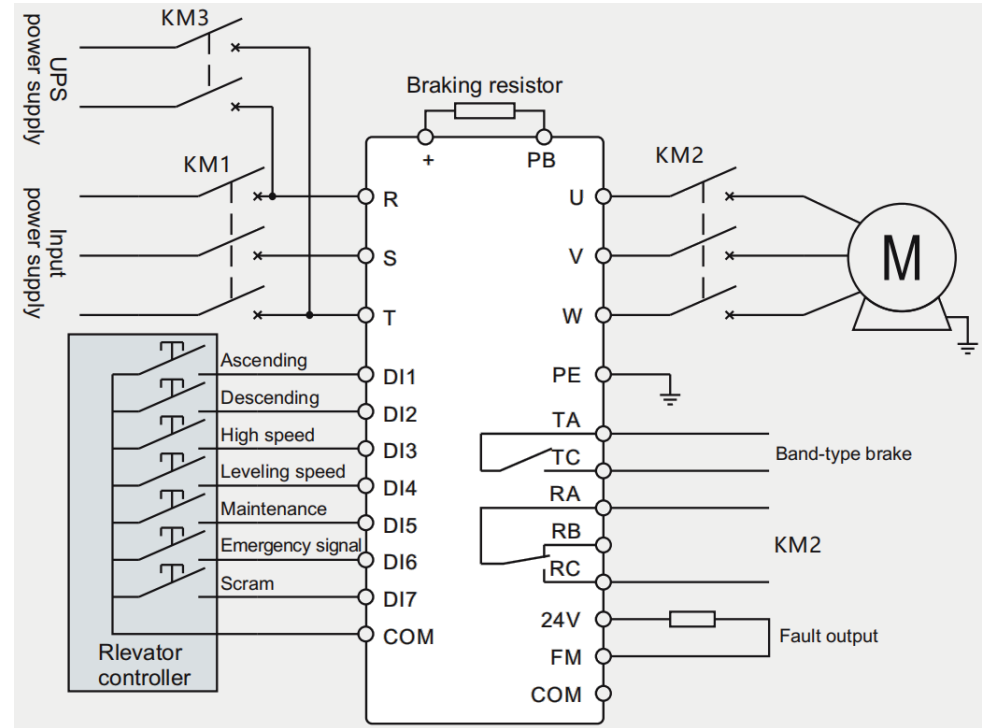
For an elevator controller with two multi-speed conversion terminals, its high speed is controlled by the on/off state of one terminal, while the other terminal controls the leveling speed or zero speed depending on the controller. The wiring diagram of the elevator controller with two multi-speed terminals and the frequency converter is as follows:



dual multi-speed terminal elevator controller and frequency converter

10.3. Emergency Operation Mode

During elevator operation, a sudden power outage could trap passengers inside the elevator car. This series of elevators supports emergency UPS power supply for power outage emergencies. Emergency signals can be received via inverter terminal DI6, as shown in the wiring diagram



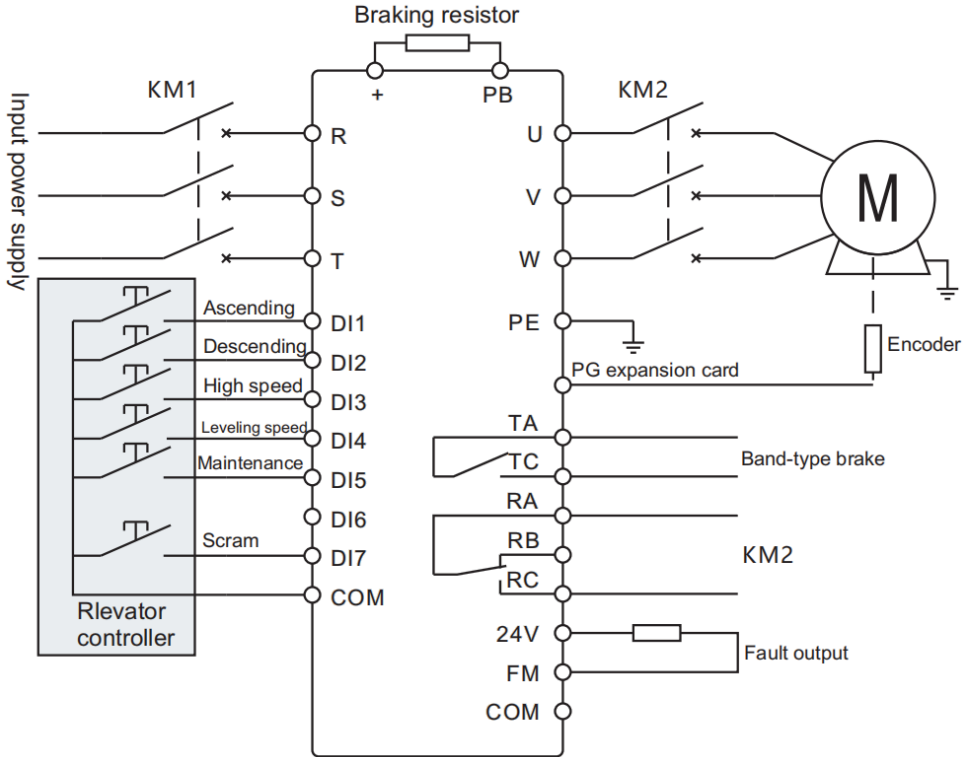
Emergency mode

When the mains voltage fails, the elevator controller switches to UPS power supply and sends an emergency signal to the frequency converter. Upon receiving the emergency signal, the frequency converter automatically switches to emergency mode. Selecting a frequency converter with an appropriate voltage rating can support single-phase 220V and three-phase 380V UPS power supplies. In emergency mode, when the elevator controller sends a running signal to the frequency converter, the frequency converter will operate at the emergency operating frequency set in B5-14, and its acceleration and deceleration times will follow the times set in P7-07 and P7-08.

10.4. Closed-loop elevator control

This series of frequency converters supports closed-loop control for elevator applications and provides various PG cards for use with different encoders. Please refer to Chapter 5 for PG card information. The wiring diagram between the elevator controller and the

frequency converter for closed-loop elevator control is shown below:



Closed-loop elevator control wiring diagram

Based on the on-site wiring connections between the controller, inverter, and motor, and the wiring between the PG card and encoder, for elevators without a running contactor (KM2), the R2 wiring can be omitted. Similarly, for elevator controllers without fault signal reception, the FM wiring can also be omitted. After completing the wiring, follow these steps to complete the commissioning:

- Set the high speed and leveling speed. According to the wiring method in the figure, set the parameters of the multiple speeds as follows: PC-00=0, PC-01=leveling speed, PC-02=high speed.
- For inspection speed settings, some elevator controllers share the inspection speed with the leveling speed and do not have an inspection signal output. In this case, the inspection signal line can be left unconnected, and this step can be skipped. For those with an inspection signal output, the inspection speed can be set through the function code. Set inspection DI5, P5-04=55, and the corresponding parameter for

setting the inspection speed is: B5-15=inspection speed.

- For emergency stop signals, some elevator controllers do not have emergency stop signals, so the emergency stop signal line can be left unconnected and this step can be skipped; if an emergency stop signal exists, set DI7 to emergency stop signal P5-06=54.
- For maintenance and operation testing, switch the elevator controller to maintenance operation mode and test by pressing the up or down button to check if the running direction is consistent. If not, swap the up and down signal lines, i.e., swap the DI1 and DI2 signal lines, or swap any two of the motor output lines U, V, and W.
- Check the encoder direction. Switch the elevator controller to maintenance mode and test upward or downward. Verify that the output frequency matches the positive or negative signal of the U1-46 encoder feedback speed. That is, if the output frequency is positive, the speed feedback from U1-46 must also be positive; if the output frequency is negative, the speed feedback from U1-46 must also be negative. If the directions are inconsistent, set P4-29 to 1 or swap the A and B phase pulses of the encoder. After completion, recheck that the output frequency matches the direction of U1-46.
- In closed-loop control mode, set the encoder line count P4-28 according to the encoder settings, and set P0-03=3 (asynchronous FVC) or 13 (synchronous FVC) to switch to closed-loop control mode. Switch the elevator controller to maintenance operation mode, press the up or down button to test and check if the elevator is running normally.
- Normal mode trial operation: Switch the elevator controller to normal operation mode for testing, and adjust the acceleration and deceleration times according to the site conditions.

10.5. Multi-speed setting method

Different elevator controllers have different combinations of signals output from their multi-speed terminals, resulting in different parameter settings for leveling speed and high speed. The speed parameters for the PC group are set as a percentage, with 100.0% corresponding to the maximum frequency (the value set in P0-14). The corresponding speed setting parameters for these combinations are shown in the table below:

DI3(P5-02=12)	DI4(P5-03=13)	Set speed
0	0	PC-00
1	0	PC-01
0	1	PC-02
1	1	PC-03

his product supports 4 sets of acceleration/deceleration times, with the time selection parameter ranging from 0 to 3. The corresponding acceleration/deceleration time settings are shown in the table below:

project	Group 0	Group 1	Group 2	Group 3
Acceleration time	P0-23	P7-03	P7-05	P7-07
deceleration time	P0-24	P7-04	P7-06	P7-08

10.6. Detailed introduction of the B5 group civil elevator application association function code

You need to set B5-13=1 to enable the function of linking residential elevators.

B5-13	Civil elevator dedicated function enable	0: Off 1 : Enable	0
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Elevator Applications Combining B5 Group Brake Logic

B5-00	Brake control enable selection:	0: Prohibited 1: Enable	0
B5-01	Brake release delay	0 ~ 20.0s	0s
B5-02	Brake closing delay	0 ~ 20.0s	0.3
B5-03	Rising forward rotation brake opening frequency	0.00Hz ~ 20.00Hz	2.50Hz
B5-04	Rising forward rotation brake closing frequency	0.00Hz ~ 20.00Hz	1.50Hz
B5-	Frequency of descent and reversal	0.00Hz ~ 20.00Hz	2.50Hz

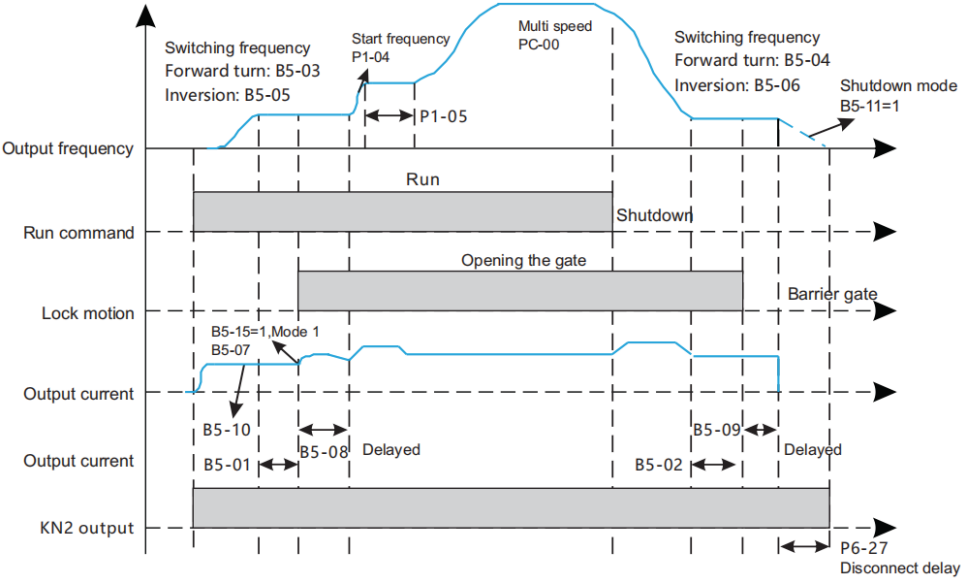
05	brake release		
B5-06	Frequency of descent and reversal brake closure	0.00Hz ~ 20.00Hz	1.50Hz
B5-07	Brake opening current threshold	0 ~ 100.0	40.0
B5-08	Frequency holding time after brake release	0 ~ 20.0s	0.5s
B5-09	Frequency holding time after brake deactivation	0 ~ 20.0s	0.5s
B5-10	Current limit during holding brake	50.0% ~ 200.0%	120.0%
B5-11	Stop mode after brake is closed	0: Free Stop 1: Deceleration and Stop	0

By setting function codes B5-01 to B5-12 , the comfort of elevator startup and shutdown can be well adjusted, similar to the brake logic diagram above. The exact meaning of each function code is shown in the following figure, which adds the option to set the startup frequency and the startup frequency hold time.

P1-04	Startup frequency	0.00 ~ 10.00Hz	5.00Hz
P1-05	Startup frequency retention time	0.00 ~ 10.00s	0.00s
P6-00	Relay 1 output	0 ~ 46	32-inch brake output
P6-01	Relay 2 output	0 ~ 46	1 Run
P6-27	Relay 2 disconnect delay	0 ~ 3600.0s	0

If the elevator requires selection of a start buffer frequency, the start frequency can be controlled by setting P1-04 and the start frequency delay P1-05.

When using relay 1 for brake control, the brake output function needs to be set to P6-00=32. If KM2 is connected, the function of relay 2 is set to run output P6-01=1. The delay of relay R2 output needs to be set. It is recommended to use the relay disconnection delay P6-27 for setting .



B5-03 (Upward forward rotation brake opening frequency), B5-04 (Upward forward rotation brake closing frequency), B5-05 (Downward reverse rotation brake opening frequency), and B5-06 (Downward reverse rotation brake closing frequency) are used for frequency determination when the elevator is ascending and descending.

B5-11	Stop mode after brake is closed	0: Free Stop 1: Deceleration and Stop	0
-------	---------------------------------	--	---

This parameter allows you to select either a direct free stop or a deceleration to 0 stop after the brake is closed .

B5-12	Brake release mode	0: Open according to frequency 1 : Open according to frequency and current	0
-------	--------------------	---	---

0: Open according to frequency

The condition for releasing the brake is that the frequency output of the inverter reaches the frequency set by B5-03 (rising) and B5-05 (falling), and then the time set by B5-01 (brake release delay) is elapsed before the brake is released.

1: Open according to frequency and current

In addition to the inverter output reaching the frequency set by B5-03 (rising) and B5-05 (falling), the inverter current must also reach the value set by B5-07 (brake opening

current) to determine when the brake is released.

B5-14	Elevator emergency operation frequency	0.00Hz ~ P0-14Hz	20.00Hz
-------	--	------------------	---------

When an emergency signal is input, the frequency converter will enter emergency operation mode, and the operating frequency will be the frequency set by the function code. In emergency operation mode, the frequency converter will select acceleration/deceleration time 4 as the current acceleration/deceleration time.

B5-15	Elevator maintenance and operation frequency	0.00Hz ~ P0-14Hz	20.00Hz
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When a maintenance signal is input, the inverter will operate at the maintenance frequency.

B5-16	Elevator emergency signal processing mode	0: Elevator not working 1: UPS power supply operation	1
-------	---	--	---

0 : Elevator not running

The inverter does not output when an emergency signal is input.

1 : UPS Power Supply Operation

When an emergency signal is input, the frequency converter is powered by the UPS and can operate and output at the emergency frequency.

B5-17	Elevator Ascent Correction Frequency	0.00Hz ~ 5.00Hz	0
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This parameter is used to correct the leveling accuracy of the elevator in power generation mode. For example, when the elevator is half-loaded and ascends, it is exactly at the leveling position, but when it is unloaded and ascends, it exceeds the leveling position. Increasing this value can correct the leveling accuracy.

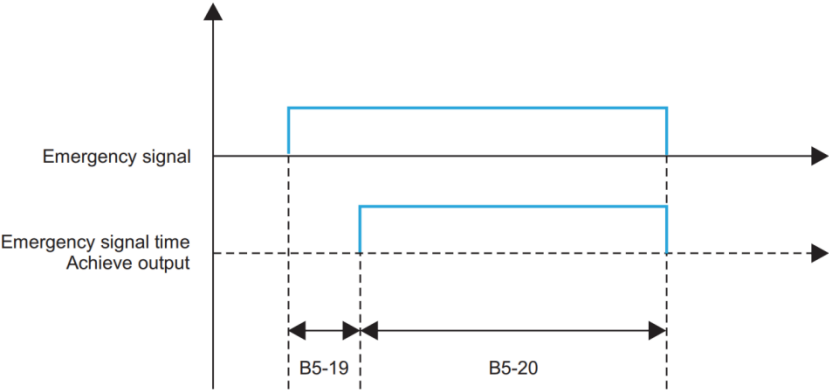
B5-18	Elevator descent correction frequency	0.00Hz ~ 5.00Hz	0
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This parameter is used to correct the leveling accuracy of the elevator in electric mode. For example, when the elevator is half-loaded and descending, it is exactly at the leveling position, but when it is unloaded and descending, it cannot reach the leveling position. Increasing this value can correct the leveling accuracy.

B5-19	Elevator emergency signal validity period	0 ~ 3600.0	0
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B5-20	Elevator emergency signal invalid time	0 ~ 3600.0	0
-------	--	------------	---

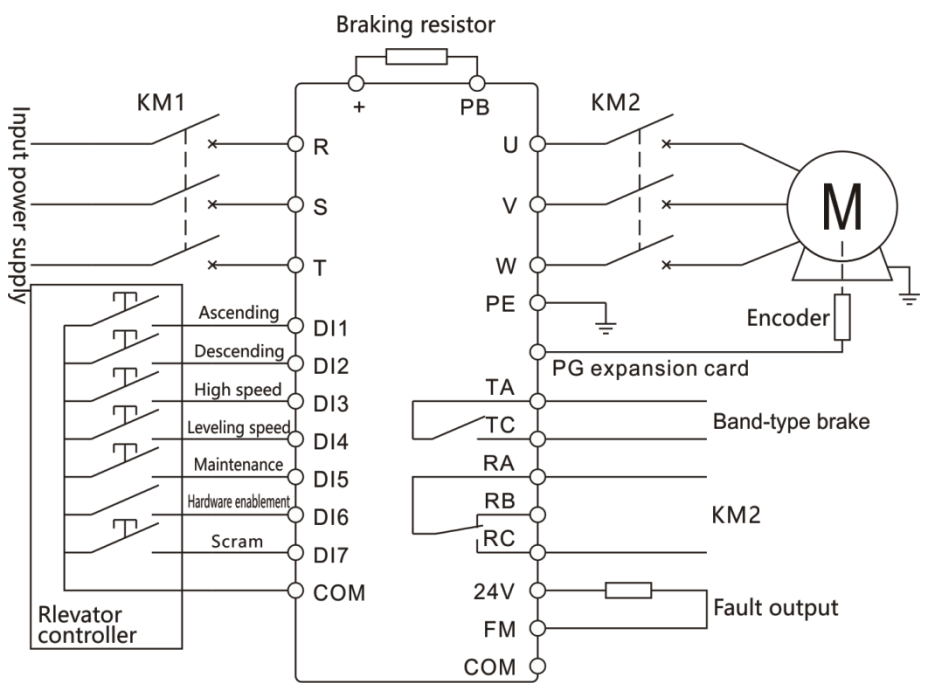
These two parameters are used to set the effective and ineffective time of the emergency signal output. When the emergency signal is effective, the inverter starts timing. When the time exceeds the value set by B5-19 , if the output terminal function (Y1 Y2 R1 R2) is selected as 46 (emergency signal time reached) function, the terminal outputs a valid signal and maintains it for the time set by B5-20 . After the time of B5-20 is exceeded , the terminal outputs an invalid signal.



The emergency signal output indicates that the elevator is sensitive to the noise of the cooling fan. The elevator fan is silent (P7-26=2), and the cooling fan starts according to the temperature.

10.7. Typical elevator application: output contactor feedback enable function

The following diagram illustrates the connection between a single-speed/multi-speed terminal elevator controller and a frequency converter:
Add a hardware feedback enable to DI6 as shown in the figure below.



Typical function code settings

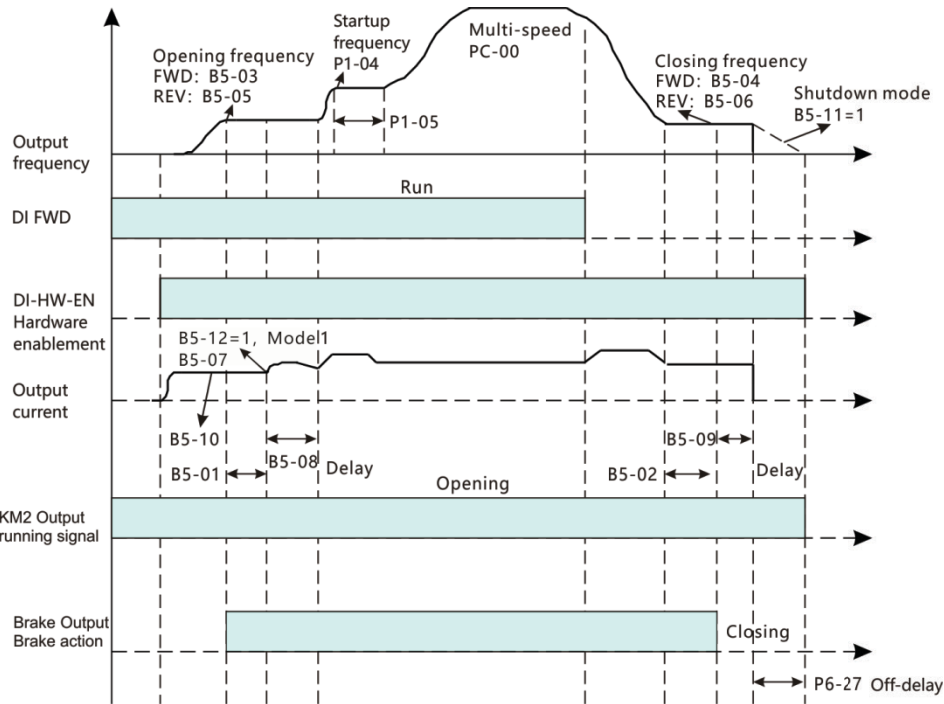
Parameter value	describe	Parameter range	Setting value
P5-00	DI1 terminal function	0 ~ 71	1: Forward rotation
P5-01	DI2 terminal function		2: Reverse operation
P5-02	DI3 terminal function		13: Multi-speed 1 terminal
P5-03	DI4 terminal function		14: Multi-speed 2-terminal
P5-04	DI5 terminal function		45: Emergency Stop
P5-05	DI6 terminal function		58: Hardware feedback signal
P6-00	Control board relay 1 output	0 ~ 48	1: Operation signal output
P6-01	Control board relay 2 output	0 ~ 48	32: Brake signal output
B5-00	General-purpose brake	0 ~ 1	1: Enable brake control

Parameter value	describe	Parameter range	Setting value
	control enable		
B5-01	Brake release delay	0 ~ 20.0s	Configure as needed
B5-02	Brake closing delay	0 ~ 20.0s	Configure as needed
B5-03	Frequency of brake release during upward rotation (forward rotation)	0 ~ 20.00hz	Configure as needed
B5-04	Rising brake closing frequency (forward rotation)	0 ~ 20.00hz	Configure as needed
B5-05	Lowering brake release frequency (reverse)	0 ~ 20.00hz	Configure as needed
B5-06	Lowering the brake closing frequency (reverse)	0 ~ 20.00hz	Configure as needed

Process steps description:

1. Set the above-mentioned function codes
2. When the inverter is started by DI1 or DI2, the inverter control relay 1 output is energized (KM2). The inverter waits for the hardware feedback signal from DI6. During this period, the inverter will not run, and there will be no output on the UVW three phases. The waiting time is set to 0~100s using function code B5-22. The default value is 0, indicating no error message during the wait. Setting other values will result in an error ERR-49 if no feedback is received after the set time.
3. After DI6 receives feedback, the frequency converter starts running and runs to the operating frequency set by B5-03 (reverse to the frequency set by B5-05). When this frequency is reached, the circuit breaker opens and remains at the time set by B5-01, and the control relay 2 set at this time is activated.
4. Upon receiving the DI stop command, the frequency converter slows down to the operating frequency set in B5-04 (reverse by setting the frequency in B5-06), and after reaching this frequency, the circuit breaker is closed and held for the time set in B5-02.
5. When the gate closing conditions are met, the KM3 output is disconnected, and then the speed is reduced to stop according to the stop mode set by B5-11. The default value of B5-11 is 0, which is a free stop. B5-11 can be set to 1 for deceleration stop mode.
6. After shutdown , the KM2 output is disconnected, the operating status is shutdown,

and the output frequency and output current are 0.



Elevator start-up delay hardware feedback enable timing diagram

Chapter 11 Photovoltaic water pump

11.1. Electrical wiring

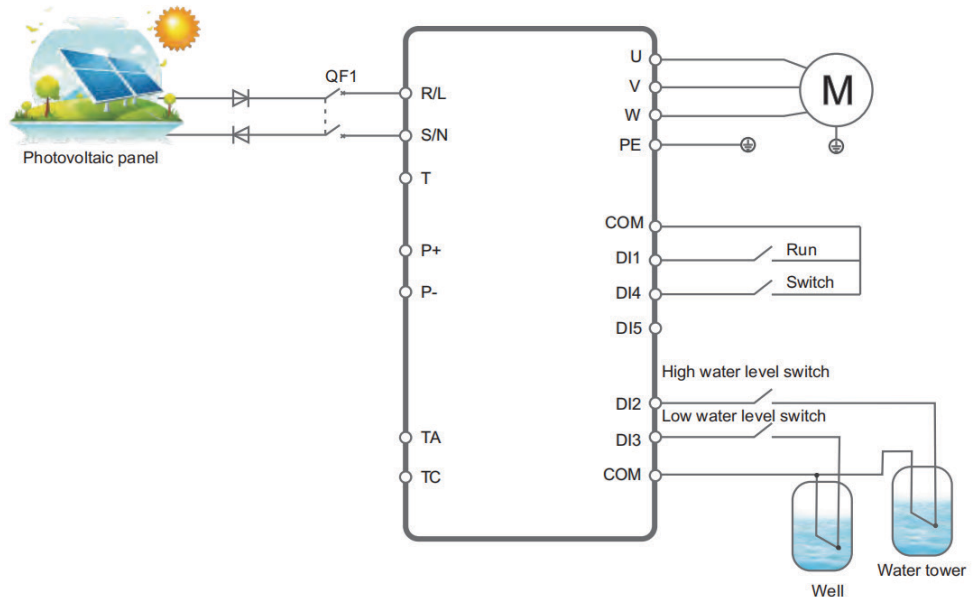
Please connect the wires according to the diagram below. Please note the following when connecting the wires:

1. Connect the power output of the photovoltaic panel to the "+" and "-" terminals. Please make sure the polarity is not reversed.
2. Connect the grid input to the "R", "S", and "T" terminals. Before use, make sure that the voltage level of the frequency converter is consistent with the voltage level of the grid.
3. If the power grid is a single-phase power source, it can be connected to any two of the terminals "R", "S", and "T".

11.2. Debugging Guide

11.2.1. Solar panel power supply commissioning steps:

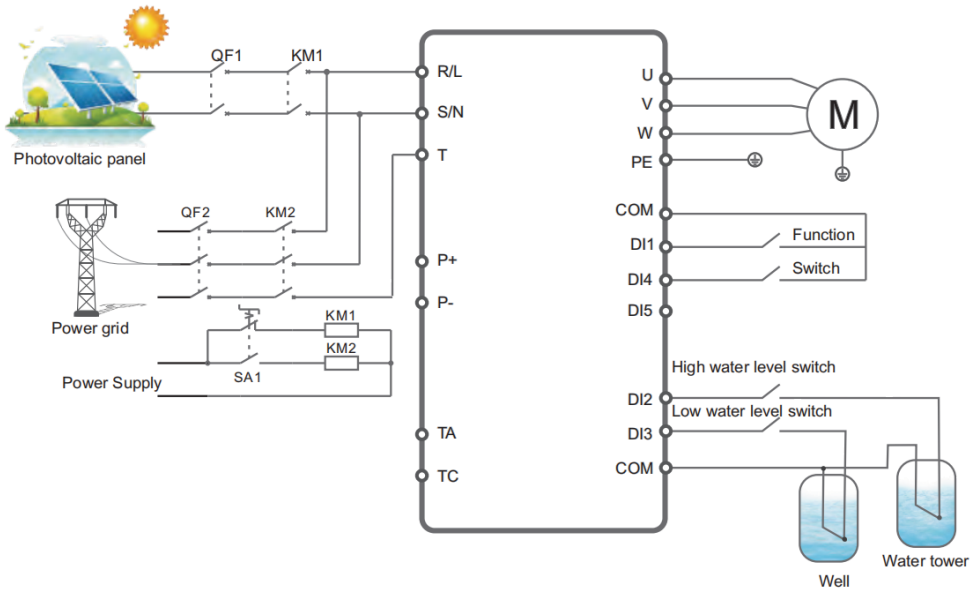
Wiring diagram is as follows



1. Verify the inverter model and wiring. After confirming that everything is correct, close QF1 to power on .
 2. Correctly set the motor parameters, and input P4-00~P4-06 according to the motor nameplate; set the command source P0-04 as required, and set the DI terminals P5-01=67 (full water tank detection is valid), P5-02=68 (low water well detection is valid), P5-03=69 (manual power supply mode switching is valid), and P6-00=48 (water pump control valve). The frequency converter has power-off memory for both panel commands and communication commands, that is, it remembers the commands before power failure and retains the commands after power is restored.
 3. Set C3-00=1 (PV active), set C3-03=open circuit voltage, and set C3-04=1 (PV power supply mode).
 4. Set the MPPT starting voltage (C3-02). This value is generally set to about 80% of the open-circuit voltage of the photovoltaic panel. If this value is set accurately, it will help the inverter track the maximum power point more quickly.
- If the frequency converter is running under "RUN" and the operating frequency is very low or the water output is very low under normal lighting conditions, the water pump wiring may be reversed. Simply swap the wiring of any two phases of the water pump.
- Note: Other optimization parameters can be set as needed. Please refer to the parameter list in Part 4 for details.

11.2.2. Power grid commissioning steps:

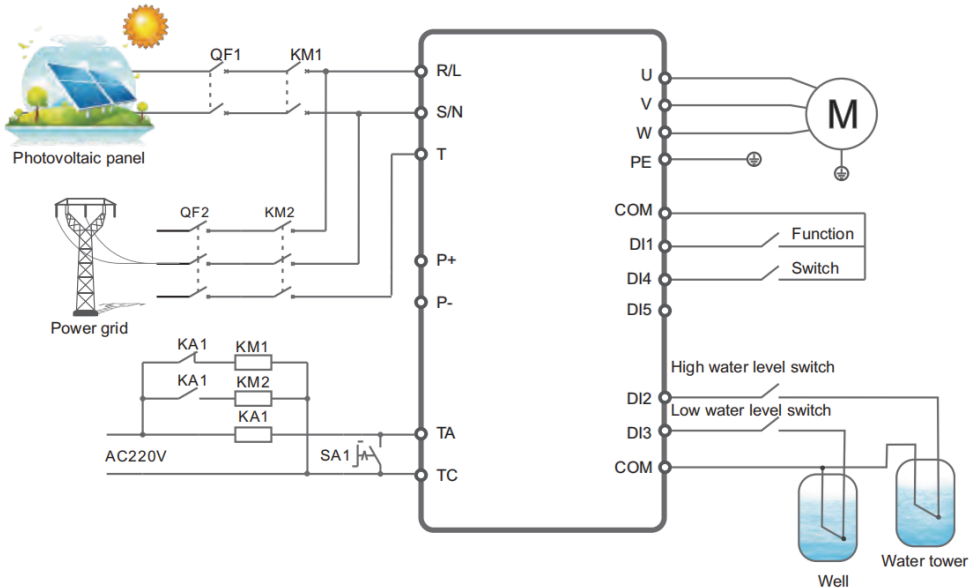
Wiring diagram is as follows



1. Check if the wiring is correct. If there is no diode protection installed at the DC bus input terminal, the photovoltaic panel switch QF1 and the grid input switch QF2 must not be closed at the same time, otherwise the photovoltaic panel will be damaged.
 2. First, disconnect the photovoltaic panel switch QF1, then close the grid switch QF2.
 3. Correctly set the motor parameters, and input P4-00~P4-06 according to the motor nameplate; set the command source P0-04 as required, and set the DI terminal P5-01=67 (full water tank detection is valid), P5-02=68 (low water well detection is valid), P6-00=48 (water pump control valve). The frequency converter has power-off memory for both the panel and communication commands, that is, it remembers the commands before power failure and retains the commands after power is restored.
 4. Set C3-00=1 (PV invalid), set C3-04=2 (grid power supply mode).
 5. Press "RUN" to run the frequency converter. If the operating frequency is very low or the water output is very low under normal lighting conditions, the water pump wiring may be reversed. Simply swap the wiring of any two phases of the water pump.
- Note: Other optimization parameters can be set as needed. Please refer to the parameter list in Part 4 for details.

11.2.3. Automatic switching and commissioning steps between photovoltaic panels and grid power supply:

Wiring diagram is as follows



1. Please connect the wires correctly according to the diagram above. After ensuring that everything is correct, close QF1 and QF2 simultaneously:
2. Correctly set the motor parameters, and input P4-00~P4-06 according to the motor nameplate; set the command source P0-04 as required, and set the DI terminals P5-01=67 (full water tank detection is valid), P5-02=68 (low water well detection is valid), P5-03=69 (manual power supply mode switching is valid), and P6-00=48 (water pump control valve). The frequency converter has power-off memory for both the panel and communication commands, that is, it remembers the commands before power failure and retains the commands after power is restored.
3. Set C3-00=1 (PV active), set C3-04=0 (automatic power supply mode switching).
4. Set the MPPT starting voltage (C3-02). This value is generally set to about 80% of the open-circuit voltage of the photovoltaic panel. If this value is set accurately, it will help the inverter track the maximum power point more quickly.
5. When the system is powered on, it defaults to giving priority to photovoltaic panel power supply. When the TA and TB are activated, the power supply is switched to the

photovoltaic panel. After the bus voltage is stable and meets the conditions, it is allowed to run. When the light is insufficient, the inverter determines that the light is weak according to its own weak light algorithm. The inverter automatically stops and the TA and TB are activated, switching to grid power supply and running automatically. After the running time reaches C3-22 time, it switches back to photovoltaic panel power supply. This logic is used to determine the switching operation in a loop.

6. Features such as low light warning and abnormal water level warning can be set for groups C3-15 to C3-21 as needed.

7. Press "RUN" to run the frequency converter. If the operating frequency is very low or the water output is very low under normal lighting conditions, the water pump wiring may be reversed. Simply swap the wiring of any two phases of the water pump.

Note: Other optimization parameters can be set as needed. Please refer to the parameter list in Part 4 for details.

11.3. Digital Keyboard Display

11.3.1. Monitoring shows

The digital display shows different information in turn according to the inverter's operating status. If no button is pressed, the current operating frequency (U1-00) is displayed by default. Pressing the "shift key" will switch to the next monitored value.

1. When the frequency converter is in the stopped state, pressing the "shift key" will cause the digital display to cycle through the following:

Operating frequency (U1-00) --- Set frequency (U1-01) --- Bus voltage (U1-02).

2. When the frequency converter is running, pressing the "shift key" will cycle through the displayed code:

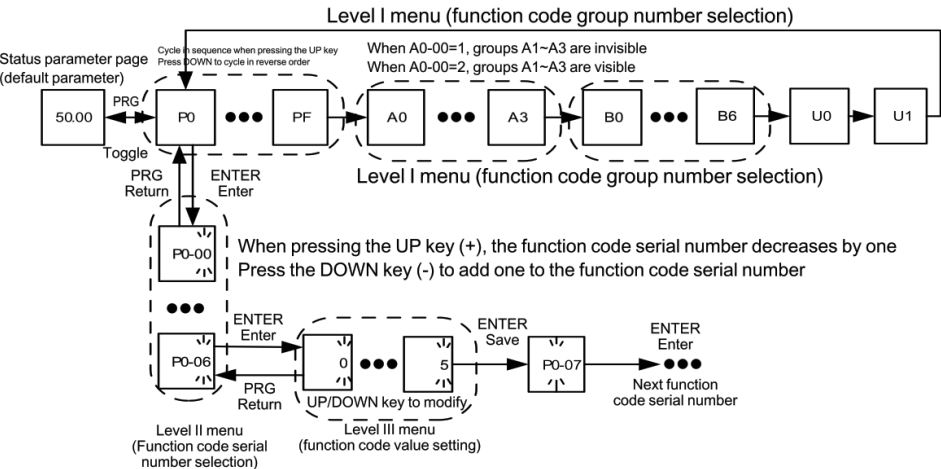
Operating frequency (U1-00) --- Set frequency (U1-01) --- Bus voltage (U1-02) --- Output voltage (U1-03) --- Output current (U1-04) --- Output power (U1-05).

11.3.2. Menu mode

The inverter function code parameters adopt a three-level menu structure, and the parameters can be viewed and modified through the operation panel.

The menus are as follows: Function Parameter Group (Level I Menu) → Function Code (Level II Menu) → Function Code Setting Value (Level III Menu). The operation flow is shown in the figure below. When in the status parameter interface, you can use the "shift

key" to view different status parameters.



11.4. Parameter list

The function code symbols are explained as follows:

“☆” indicates that the parameter can be changed during shutdown and operation.

“★” indicates that this parameter cannot be changed during operation.

“●” indicates that the value of this parameter is an actual test record value or a manufacturer-defined value and cannot be changed.

Function code	Name	Content	Factory set up	Change	Address
C3-00	Photovoltaic water pump enabling	0: Invalid 1: Enable	0	★	C300
C3-01	Vmppt voltage given mode	0: Manually specified 1: Automatic tracking	1	★	C301
C3-02	Vmppt voltage start voltage	0.0~800.0V	600.0V	☆	C302
C3-03	PV open circuit voltage setting	0.0~800.0V	750.0V	★	C303
C3-04	Power supply selection	0: Automatic switching 1: Photovoltaic power supply 2: Power grid supply	1	★	C304
C3-05	Vmppt interval	0.0~100.0S The Vmppt voltage is	1.0s	☆	C305

Function code	Name	Content	Factory set up	Change	Address
		automatically adjusted at intervals set by C3-05.			
C3-06	Vmppt hysteresis	0.0~50.0V When the deviation value is less than this value, Vmppt will no longer be adjusted, which is used to reduce the jitter of the output frequency.	2.0V	☆	C306
C3-07	Vmppt step size	0.0~100.0V Adjustment of upper and lower range amplitude when automatically adjusting Vmmpt voltage	10.0V	☆	C307
C3-08	Vmppt voltage limit	230.0~750.0V	650.0V	☆	C308
C3-09	Vmppt lower voltage limit	230.0~750.0V	300.0V	☆	C309
C3-10	CVT proportional gain	0.0~100.0 Target frequency scaling factor 1 The larger the value, the greater the effect and the faster the adjustment.	1.0	☆	C30A
C3-11	CVT integral coefficient	0.0~100.0 Integral coefficient of target frequency 1 The larger the value, the greater the effect and the faster the adjustment.	1.0	☆	C30B
C3-12	CVT proportional gain 1	0.0~100.0 Target frequency scaling factor 2 The larger the value, the greater the effect and the faster the adjustment.	1.0	☆	C30C
C3-13	CVT integral coefficient 1	0.0~100.0 Integral coefficient 2 of the target frequency The larger the value, the greater the effect and the faster the adjustment.	1.0	☆	C30D
C3-14	CVT switching	0.0~1000.0V	2.0V	☆	C30E

Function code	Name	Content	Factory set up	Change	Address
	point	When the absolute value of the difference between the PV voltage and the reference voltage is greater than the set value of C3-14, switch to proportional coefficient 2 of C3-12 and integral coefficient of C3-13; otherwise, use proportional coefficient 1 of C3-10 and proportional coefficient 1 of C3-11.			
C3-15	Light Weak Detection Frequency	0~Running frequency setting	20.00Hz	☆	C30F
C3-16	Light-weak sleep delay	5.0~6553.5s	600.0s	☆	C310
C3-17	Light-weak wake-up time	0.0~6553.5s	200.0s	☆	C311
C3-18	Water tank full water dormancy delay	0.0~6553.5s	60.0s	☆	C312
C3-19	Water storage tank low water start-up delay	0.0~6553.5s	600.0s	☆	C313
C3-20	Well hibernation delay due to water shortage	0.0~6553.5s	600.0s	☆	C314
C3-21	Well start-up hibernation delay	0.0~6553.5s	600.0s	☆	C315
C3-22	Automatic switching mode grid power supply operation time	0~65535min	60.0min	☆	C316

11.5. Parameter Details

C3-00	Photovoltaic water pump enabling	Range: 0~1	0
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0: Invalid, standard model

1: Valid, photovoltaic water pump parameter group is effective.

C3-01	Vmppt voltage given mode	Range: 0~1	1
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0: Manually specified, runs according to a fixed Vmppt format.

1: Automatic tracking, tracking the Vmppt maximum power point.

C3-02	Vmpp voltage manually set value	Range: 0.0V~800.0V	600.0V
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This parameter is the target voltage that the inverter first tracks during the startup phase.

C3-03	PV open circuit voltage setting	Range: 0.0V~800.0V	750.0V
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This parameter represents the open-circuit voltage of the solar panel and must be set according to the panel's specifications.

C3-04	Power supply selection	Range: 0~2	750.0V
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0: Automatic switching

When the system is powered on, it defaults to prioritizing power supply to the photovoltaic panels. TA1 and TB1 are turned on, and the power supply switches to the photovoltaic panels. After the bus voltage is stable and the starting conditions are met, operation is allowed. When there is insufficient sunlight, the inverter determines that there is insufficient sunlight based on its own weak light algorithm. The inverter automatically stops and TA1 and TB1 are turned off. TA1 and TC1 are turned on to switch to grid power supply and run automatically. After the running time reaches C3-22, it automatically stops and switches to photovoltaic panel power supply. This logic is used to determine and switch operation in a loop.

1: Select photovoltaic panel power supply mode.

The inverter operates by tracking the maximum power point using the MPPT algorithm. When weak light is detected, if the inverter's power supply is changed from the external circuit to the grid, DI4 can be used to switch to grid function. If the power supply needs to be switched back to photovoltaic panel power, simply disconnect DI4 (set function code P5-03 to 69 to enable DI4 power switching).

2: Power grid supply

At this time, the frequency converter is operating in grid power supply mode, and the MPPT algorithm is invalid.

C3-05	Vmppt interval	Range: 0.0~100.0S The Vmppt voltage is automatically adjusted at intervals set by C3-05.	1.0s
C3-06	Vmppt hysteresis	Range: 0.0~50.0V When the deviation value is less than this value, Vmppt will no longer be adjusted, which is used to reduce the jitter of the output frequency.	2.0V
C3-07	Vmppt step size	Range: 0.0~100.0V Adjustment of upper and lower range amplitude when automatically adjusting Vmppt voltage	10.0V

The above three parameters represent the response speed of MPPT in tracking the target voltage. The larger the value, the faster the response, but the system may be unstable.

C3-08	Vmppt voltage limit	Range: 230.0~750.0V	650.0V
C3-09	Vmppt lower voltage limit	Range: 230.0~750.0V	300.0V

The above two parameters define the upper and lower limits of the target voltage that MPPT tracks.

C3-10	CVT proportional gain	Range: 0.0~100.0 Target frequency scaling factor 1 The larger the value, the greater the effect and the faster the adjustment.	1.0
C3-11	CVT integral coefficient	Range: 0.0~100.0 Integral coefficient of target frequency 1 The larger the value, the greater the effect and the faster the adjustment.	1.0
C3-12	CVT proportional gain 1	Range: 0.0~100.0 Target frequency scaling factor 2 The larger the value, the greater the effect and the faster the adjustment.	1.0
C3-	CVT integral	Range: 0.0~100.0	1.0

13	coefficient 1	Integral coefficient 2 of the target frequency The larger the value, the greater the effect and the faster the adjustment.	
C3-14	CVT switching point	Range: 0.0~1000.0V When the absolute value of the difference between the PV voltage and the reference voltage is greater than the set value of C3-14, switch to proportional coefficient 2 of C3-12 and integral coefficient of C3-13; otherwise, use proportional coefficient 1 of C3-10 and proportional coefficient 1 of C3-11.	2.0V

The above five parameters are speed adjustment parameters during MPPT tracking of the target voltage. These parameters will also indirectly affect the MPPT tracking speed. The larger the value, the faster the response, but the system may be unstable.

C3-15	Light Weak Detection Frequency	Range: 0 ~ operating set frequency	20.00Hz
C3-16	Light-weak sleep delay	Range: 5.0~6553.5s	600.0s
C3-17	Light-weak wake-up time	Range: 0.0~6553.5s	200.0s

When the frequency converter operates in photovoltaic mode (C3-03=1)

If the operating frequency is lower than C3-15 for a period of time exceeding C3-16, the inverter will stop and report a weak light warning err50. After the inverter enters the weak light state, it will automatically start running after a delay time C3-17.

When the frequency converter is operating in automatic switching mode (C3-03=0)

If the operating frequency is lower than C3-15 for a period of time exceeding C3-16, switch to grid power supply mode. After running for C3-22, automatically switch to photovoltaic mode to see if the sunlight has recovered. This logic is used to cycle through the operation.

This function group is invalid when the frequency converter is operating in grid mode

(C3-03=2).

Note: When the light is too weak and the bus voltage is lower than the undervoltage point, the frequency converter will directly report an undervoltage.

C3-18	Water tank full water dormancy delay	Range: 0.0~6553.5s	60.0s
C3-19	Water storage tank low water start-up delay	Range: 0.0~6553.5s	600.0s

Set function code P5-01 to 67 to enable DI2 water level detection.
 When the DI2 water level detector detects that the water tank is full, after a delay of C3-18, the inverter alarm err51 enters the full water sleep state. When the DI2 water level detector fails to detect the water level, after a time of C3-19, the inverter exits the full water state and automatically runs according to the command before shutdown.

C3-20	Well hibernation delay due to water shortage	Range: 0.0~6553.5s	600.0s
C3-21	Well start-up hibernation delay	Range: 0.0~6553.5s	600.0s

Set function code P5-02 to 68 to enable DI3 water level detection.
 When the DI3 water level detects that the well is empty, after a delay of C3-20, the inverter alarm err52 enters the low water sleep state. When no empty water is detected, after C3-21, the inverter exits the low water state and automatically runs according to the command before shutdown.

C3-22	Automatic switching mode grid power supply operation time	Range: 0~65535min	60.0min
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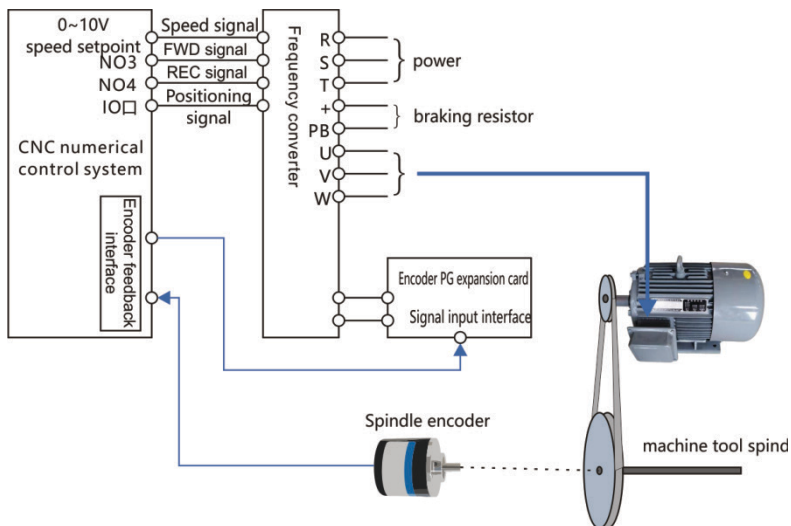
This parameter determines the automatic switch to photovoltaic mode after running C3-22 for a certain period of time when operating in grid mode.

Chapter 12 Position control

This frequency converter is equipped with a high-precision position control module PG card, which realizes precise positioning of equipment through closed-loop/open-loop control. It is suitable for mechanical processing, automated production lines, logistics and other scenarios. It supports encoder feedback control mode, and the positioning accuracy can reach $\pm 1\text{mm}$ (depending on the configuration). It is commonly used for CNC machine tool spindle positioning.

12.1. Basic wiring diagram

(Taking CNC machine tools as an example)



12.2. Application Notes

1. When the shaft and encoder adopt indexing control, the main shaft encoder must be synchronously connected to the main shaft in a 1:1 ratio.
2. The spindle encoder cable connects to the CNC system, which then connects the cable to the inverter's PG card interface. Currently, it supports ABZ encoders and rotary encoders.
3. The spindle positioning function selects the indexing mode, which is 4 times the number of encoder lines. The position of the spindle in one rotation is 0 to 4 times the

number of encoder lines, corresponding to 0 to 360 degrees for one rotation of the motor.

4. The third point is the theoretical case where the spindle rotates one revolution for every one revolution of the motor. In actual machine tools, the motor and spindle have a gear ratio, which can be learned through the C3-74 adaptive learning function to learn the current proportional coefficient.

5. The spindle positioning mode can be enabled by C4-00 = 1 positioning mode, and then the command can be run to directly enter the positioning mode to complete the positioning control, or the DI function can be selected to switch between speed mode and position mode for positioning control.

12.3. Functional Parameter Description

C4-00	Positioning control is effective	0: Invalid 1: Enable	0
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When C4-00 is set to 1, the positioning function is enabled. Note that it requires encoder feedback signal and motor self-learning to complete before running in vector mode.

C4-01	Location mode selection	0: Incremental 1: Absolute form 2: Indexing plate	2
-------	-------------------------	---	---

Positioning mode selection: 0 incremental, 1 absolute, 2 fractional.

C4-02	Positioning encoder selection	0: Motor closed-loop control encoder 1: Dedicated encoder for spindle positioning	0
C4-03	spindle encoder line count	Range: 1~65535	1024

C4-02 Positioning Encoder Selection: 0. Motor closed-loop control encoder: Generally, there is only one encoder used for position control. 1. Spindle positioning dedicated encoder: Generally, there are two encoders: the encoder on the spindle is used for position control, and there is another encoder on the motor for speed regulation.

C4-03 Set the number of encoder lines

C4-04	Main shaft transmission ratio numerator	Range: 1~10000	1
C4-05	Main shaft drive ratio denominator	Range: 1~10000	1

C4-04/C4-05 defines the rotational ratio between the spindle and the motor.

C4-06	Origin selection	0: Encoder signal 1: DI terminal signal	0
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Is the origin selection for C4-06 positioning based on an encoder signal or a DI terminal trigger signal?

C4-07	Locating the zero-point search direction	0~2	2
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C4-07 setting 0: Same direction as F0-13 setting.

Setting 1: Opposite to the direction set by F0-13

Setting 2: Consistent with the currently set frequency direction

C4-08	Positioning zero-point retrieval frequency	Range: 0~F0-16	10.00hz
C4-09	Positioning control start frequency	Range: 0~F0-14	20.00hz
C4-10	Acceleration time (positioning control)	Range: 1~65535	3.00s
C4-11	Deceleration time (positioning control)	Range: 1~65535	3.00s

C4-08 Position control zero-point frequency

C4-09 Frequency of start of position control function

C4-10~11 Positioning control acceleration and deceleration times. These two times are used to calculate the pulse count settings for the acceleration, constant speed, and deceleration processes.

C4-12	Proportional Gain 1	Range: 0~100.00	1.00
C4-17	Proportional Gain 2	Range: 0~100.00	10.00
C4-18	Proportional gain switching position deviation level 1	Range: 0~30000	5
C4-19	Proportional gain switching position deviation level 2	Range: 0~30000	50

The proportional gain is the target frequency output by the position control loop.

C4-14	Positioning completion deviation range	Range: 0-1000	10
C4-15	Deviation limit after positioning	Range: 0~1000	2

C4-14 and C4-15 position control positioning is completed and deviation is modified.

C4-	Indexing and positioning	Range: 0~65535	0
-----	--------------------------	----------------	---

20	position		
----	----------	--	--

When C4-20 is selected as the indexing type for C4-01, the indexing positioning control takes a 1024 encoder line count as an example. 0 ~ 4096 corresponds to 0 ~ 360° position for one revolution of the motor shaft.

C4-46	Remember current position	Range: 0~2	0
-------	---------------------------	------------	---

The function of C4-46 is to obtain the current encoder position value equivalent to the origin when C4-01 is in indexing control, and then record the current value so that the stop point of the next position control is the point recorded by C4-46 when it is set to 1. If the position memory is successful after C4-46 is set to 1, it will be automatically set to 2.

C4-47	Encoder line count ratio factor	Range: 0~2	0
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The C4-47 is a machine tool with a direct-drive spindle motor and no speed-changing mechanism. The ratio of motor to spindle speed is as follows: (Belt drives have losses or errors, making a perfect 1:1 ratio impossible).

C4-49	Positioning completion and holding time	0.000~1000.0	2.0
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After the position control is completed, the machine will automatically stop after holding the position for the time set by C4-49.

C3-65	Positioning control acceleration time	Range: 0~3000.0	21.0
C3-66	Positioning control deceleration time	Range: 0~3000.0	21.0

The two parameters, C3-65 and C3-66, represent the acceleration and deceleration times during the actual position control process.

C3-67	Machine tool low voltage setting value	Range: 0~C3-68	0
C3-68	Machine tool medium voltage setting value	Range: C3-67~C3-69	0
C3-69	High-end voltage setting value for machine tools	Range: C3-68~10.00	0

C3-67~69 are the voltage settings for three gears when a CNC machine tool has gear ratio speed regulation. The specific settings need to be based on the actual machine.

C3-70	Position control setting origin deviation value	Range: -1000~1000	100
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C3-70 is for offset compensation of the current position value recorded by the position control (operation of the memory function of C4-46). Due to the inertia and aging of the

machine, certain deviations may occur, which need to be set according to the actual degree of machine inertia.

C3-71	Low-gear ratio coefficient of machine tool	Range: 0.000~10.000	1.000
C3-72	Machine tool medium gear ratio coefficient	Range: 0.000~10.000	1.000
C3-73	High-end gear ratio coefficient for machine tools	Range: 0.000~10.000	1.000
C3-74	Position control adaptive learning function	Range: 0~2	0

C3-71~73 refers to the three gear ratios of CNC machine tools (low, medium, and high gears) representing the ratio of spindle speed to motor speed.

The C3-74 adaptive learning function automatically learns the three-level coefficient operation of C3-71~73 machine tools. The specific operation is as follows:

Set P0-03=2, VF control.

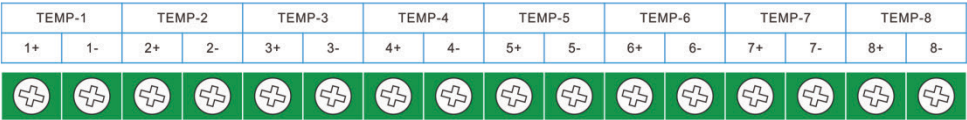
Based on the frequency of the current gear, set C3-74=1. The machine will automatically run to the set frequency and hold for 5 seconds. Then, based on the feedback frequency, it will automatically calculate the speed ratio between the motor and the spindle and automatically assign the value to the corresponding function code.

After successful learning, C3-74 will be automatically changed to 2.

Chapter 13 Temperature inspection

It supports an 8-channel temperature monitoring expansion card function, which can connect up to 8 temperature sensors to read actual temperature values. The temperature sensor type (PT100, PT1000), temperature bias value, and error threshold of each channel can be set. The function code can be used to view which channel is reporting a temperature error.

13.1. Terminal diagram



13.2. Functional parameters description and temperature monitoring card usage

C5-00	Temperature monitoring function switch	0~1	0
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When setting C5-00 to 1 and enabling the temperature monitoring card function, a temperature monitoring card needs to be connected to the hardware.

C5-01	First channel temperature value	Range: -50~200	0
C5-02	Second channel temperature value	Range: -50~200	0
C5-03	Third channel temperature value	Range: -50~200	0
C5-04	Fourth channel temperature value	Range: -50~200	0
C5-05	Fifth channel temperature value	Range: -50~200	0
C5-06	Sixth channel temperature value	Range: -50~200	0
C5-07	Seventh channel temperature value	Range: -50~200	0
C5-08	Eighth channel temperature value	Range: -50~200	0

C5-01~08 are temperature values read by the frequency converter from the temperature inspection card; they are read-only function codes and cannot be manually set.

C5-09	First-channel temperature sensor type	Range: 0~2	0
C5-10	Second-channel temperature sensor type	Range: 0~2	0
C5-11	Third-channel temperature sensor type	Range: 0~2	0
C5-12	Fourth temperature sensor type	Range: 0~2	0
C5-13	Fifth temperature sensor type	Range: 0~2	0
C5-14	Sixth-channel temperature sensor type	Range: 0~2	0
C5-15	Seventh-channel temperature sensor type	Range: 0~2	0
C5-16	Eighth-channel temperature sensor type	Range: 0~2	0

C5-09~16 sets the type of 8 temperature sensors: 0 for no temperature sensor, 1 for PT100, and 2 for PT1000.

The frequency converter is manually set and then sent to the temperature monitoring card.

C5-17	First-channel temperature alarm threshold	Range: 0~200	80
C5-18	Second temperature alarm threshold	Range: 0~200	80
C5-19	Third-channel temperature alarm threshold	Range: 0~200	80
C5-20	Fourth-channel temperature alarm threshold	Range: 0~200	80
C5-21	Fifth temperature alarm threshold	Range: 0~200	80
C5-22	Sixth temperature alarm threshold	Range: 0~200	80
C5-23	Seventh-channel temperature alarm threshold	Range: 0~200	80
C5-24	Eighth-channel temperature alarm threshold	Range: 0~200	80
C5-36	Temperature error message for the first 4 channels	Range: H.0000~1111	H.0000
C5-37	Rear 4-channel temperature error message	Range: H.0000~1111	H.0000

C5-17~24 allows setting the temperature alarm thresholds for channels 1 to 8. When C5-

01~08 reaches the corresponding alarm temperature value, the inverter will report an error Err-50.

C5-36 defaults to H.0000, and from left to right, they represent error messages for channels 4 through 1. 0 indicates that the channel has not reached the error message and 1 indicates that the error message has been reached.

C5-37 defaults to H.0000, and the error messages from left to right are for channels 8 to 5 respectively.

For example: error message from the first path, error message from the third path, error message from the fifth path, error message from the sixth path.

C5-36 is H.0101

C5-36 is H.0011

C5-25	First-path temperature bias	Range: -10~10	0
C5-26	Second-path temperature bias	Range: -10~10	0
C5-27	Third-path temperature bias	Range: -10~10	0
C5-28	Fourth-channel temperature bias	Range: -10~10	0
C5-29	Fifth-channel temperature bias	Range: -10~10	0
C5-30	Sixth-channel temperature bias	Range: -10~10	0
C5-31	Seventh-channel temperature bias	Range: -10~10	0
C5-32	Eighth-way temperature bias	Range: -10~10	0

C5-25~32 correspond to the temperature offset values of the first to eighth channels, ranging from -10 to 10°C, to compensate for the offset error in the system or measurement caused by actual on-site temperature changes.

C5-35	Collection cycle	Range: 1~99	5
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The C5-35 sets the period for each channel of the temperature monitoring card to acquire voltage and convert it into temperature value.

the application control circuit is shown below:

1TB		1TG		2TB		2TG		3TB		3TG		4TB		4TG	
K1A	K1C	K2A	K2C	K3A	K3C	K4A	K4C	K5A	K5C	K6A	K6C	K7A	K7C	K8A	K8C

The contactor outputs the control terminal, TB (1-4) frequency converter output signal, and TG (1-4) bypass output signal.

- K1A-K1C Channel 1 Frequency Converter Normally Open Output Signal;
- K2A-K2C first bypass normally open output signal;
- K3A-K3C Second Channel Frequency Converter Normally Open Output Signal;
- K4A-K4C second bypass normally open output signal;
- K5A-K5C 3rd normally open inverter output signal;
- K6A-K6C 3rd bypass normally open output signal;
- K7A-K7C 4th inverter normally open output signal;
- K8A-K8C 4th bypass normally open output signal;

14.2. Water supply control

14.2.1. TB/TG Operation and Switch

- TB operation refers to the control of a pump or motor by the output of a frequency converter.
- TG operation refers to the control of a pump or motor by the output of an industrial power supply.
- TB/TG switch refers to switching the control of a pump or motor from TB to TG, or vice versa.

14.2.2. Operation Selection

The frequency converter controls the pump's startup and operation. Based on pressure feedback, the frequency converter can determine which or how many pumps should be woken up and operated. In practice, at any given time, the frequency converter can only drive one pump. For example, when the first pump reaches its maximum limit frequency and the system requests another pump to work, the frequency converter switches the first pump to TG mode (power frequency) and then wakes up the second pump and drives it to operate at the appropriate frequency.

14.3. Signal output terminal wiring instructions

In multi-pump applications, an AC contactor and a power frequency bypass circuit should be configured between the motor and the inverter output. The AC contactor and the power frequency bypass should be mechanically interlocked, and the circuit should be logically interlocked to avoid short circuits or damage to related equipment.

Pay attention to the power phase sequence on the motor or pump. For example, L1, L2, and L3 should correspond to the U, V, and W frequencies and output sequence of the frequency converter. Please check the power phase sequence before running the system to avoid motor reversal when switching between frequency converter and mains frequency.

When the motor's power frequency bypass branch is in operation, an overcurrent protection device should be installed. Because weak analog voltage signals are particularly susceptible to external interference, shielded cables are generally required, and the wiring distance should be as short as possible, not exceeding 20 meters. In situations where analog signals are severely interfered with, a filter capacitor or ferrite core should be added to the analog signal source side.

14.4. Functional Parameter Description

Description of Customized Non-Standard Program Software:

Function code	name	content	Factory set up
P0-04	Source of execution instructions	0: Keyboard panel command channel 1: Terminal command channel 2: Communication command channel	1
P0-06	Main frequency source X selection	0: Up/Down frequency changes are not remembered during shutdowns. 1: Up/Down frequency modification for power-off memory 2: AI1 3: AI2 4: Multi-speed 5: Simple PLC 6: Constant pressure water supply 7: Communication given 8: PULSE setting 9: Up/Down frequency modification is not remembered during shutdown or	6

Function code	name	content	Factory set up
		power failure.	
P0-07	Auxiliary frequency source Y selection	Same as P0-06	0
P0-10	Frequency source selection	Units: Frequency source selection 0: Main frequency source X 1: The result of primary and secondary operations (the operational relationship is determined by the tens digit) 2: Switching between main frequency source and auxiliary frequency source Y 3: Switching between main frequency source and main/auxiliary operation results 4: Switching between auxiliary frequency source Y and main/auxiliary calculation results Tens: Frequency source master-slave operation relationship 0: Primary + Secondary 1: Primary-Secondary 2: The maximum value of the two 3: Minimum of the two	00
P0-11	Preset frequency	0.00Hz ~ Maximum frequency P0-14	50.00Hz
P0-13	Motor running direction selection	0: Consistent with the current motor direction 1: Opposite to the current motor direction 2: Do not reverse	0
P0-14	Maximum output frequency	P0-20=1, adjustable range 50.0~1200.00Hz P0-20=2, adjustable range 50.00Hz~600.00Hz	50.00Hz
P0-16	Upper limit frequency	Lower frequency limit P0-18 ~ Maximum frequency P0-14	50.00Hz
P0-18	Lower limit frequency	0.00Hz ~ Upper limit frequency P0-16	20.00Hz
P0-23	Acceleration time	0.0s~3000.0s	10.0s
P0-24	deceleration time	0.0s~3000.0s	10.0S

Function code	name	content	Factory set up
P0-28	Parameter initialization	0: No operation 1: Restore factory settings, excluding motor parameters, recorded information, and frequency decimal point.	0
Group P4 - Motor parameter group			
P4-01	Motor rated power	0.1KW~1000.0kw	model Sure
P4-02	Motor rated voltage	1V~1500V	380V
P4-04	Motor rated current	0.01A~600.00A	P4-01 Sure
P4-05	Motor rated frequency	0.01Hz~P0-14	50.00Hz
P4-06	Motor rated speed	1rpm~60000rpm	P4-01 Sure
P7 Group - Accessibility			
P7-16	Keyboard knob precision	0: Default mode 1:0.1Hz 2: 0.5Hz 3:1Hz 4:2Hz 5:4Hz 6:5Hz 7:8Hz 8:10Hz 9: 0.01Hz 10: 0.05Hz	02
P7-49	User password	0~65536	0
P8 Group - Communication parameters			
P8-00	baud rate settings	0:300 BPS 1:600 BPS 2: 1200 BPS 3: 2400 BPS 4: 4800 BPS 5: 9600 BPS 6: 19200 BPS 7: 38400 BPS	5
P8-01	Data format	0: No checksum <8,N,2> 1: Even parity <8,E,1>	0

Function code	name	content	Factory set up
		2: Odd parity <8,0,1> 3: No checksum 1<8,N,1>	
P8-02	Mailing address	0~247 (0 is the broadcast address)	1
PA Group - PID function			
PA-00	PID given source	0: PID function code PA-01 1: AI1 2: AI2 3: Communication given 4: PULSE given 5: Multi-segment instruction setting 6: Up/Down modification of PA-01 (effective when P0-06=6)	0
PA-01	PID digital setpoint	0.0% ~ 100.0%	50.0%
PA-02	PID given change time	0.00s ~ 650.00s	0.00s
PA-03	PID feedback source	0: AI1 1: AI2 2: AI1-AI2 3: Communication given 4: PULSE given 5: AI1 + AI2 6: MAX(AI1 , AI2) 7: MIN(AI1 , AI2)	0
PC Group - Water Pump Function			
PC-16	Forced pump reduction limit deviation value	0.00~650.00	0.50
PC-17	Low water level fault automatic reset time	0s~3600s	30s
PC-18	Water pump mode	0 : One-to-one 1 : One to two 2 : One to three 3 : One to four	3
PC-19	High voltage alarm value	0.00~650.00	15.00
PC-20	High voltage alarm delay time	0s~6000s (setting the time to 0 disables the high-voltage alarm function by default)	0s

Function code	name	content	Factory set up
PC-21	Low pressure alarm value	0.00~650.00	0.50
PC-22	Low voltage alarm delay time	0s~6000s (setting the time to 0 disables the low-pressure alarm function by default)	0S
PC-23	Antifreeze function switch	0 : Turn off antifreeze function 1 : Turn on the antifreeze function	1
PC-24	Antifreeze frequency	0Hz ~ Upper limit frequency	10.00Hz
PC-25	Anti-freeze operation time	0 min ~ 65000 min	10min
PC-26	Antifreeze interval	0 min ~ 65000 min	50min
PC-27	Water shortage function switch	0 : Turn off water shortage function 1 : Activate the water shortage function	1
PC-28	Minimum water shortage value	0.00~650.00	1.00
PC-29	Water shortage delay time	0s~200s	60s
PC-30	Pump delay time	0~6000s	8s
PC-31	Reduce pump delay time	0s~6000s	3s
PC-32	Pump delay start time	0s~60s	3s
PC-33	Pump No. 1 malfunction	0 : Normal pump 1 : Faulty pump	0
PC-34	Pump No. 2 malfunction	0 : Normal pump 1 : Faulty pump	0
PC-35	Pump No. 3 malfunction	0 : Normal pump 1 : Faulty pump	0
PC-36	Pump No. 4 malfunction	0 : Normal pump 1 : Faulty pump	0
PC-37	Circulation pump time	0s~65535s	1440s
PC-38	One-to-one standby pump switch	0 : Shut down the standby pump. 1 : Start the standby pump (one-to-one connection)	0
PC-39	Upper computer debugging water pump card mode	0 : Disable debug mode 1 : Enable debug mode	0
PC-40	Pump pressure	0.00~650.00	0.10

Function code	name	content	Factory set up
	deviation value		
PC-41	Forced frequency after pump reduction	0~Maximum frequency	40.00Hz
PC-42	Dormant pressure allowable deviation range	0.00~650.00	0.10
PC-43	Wake-up pressure deviation value	0.00~650.00	0.30
PC-44	hibernation delay time	0.0s~3600.0s	20.0S
PC-45	Wake-up delay	0.0s~3600.0s	0.5S
PC-46	PID feedback setpoint range	0.00~655.35	16.00
PC-47	AI1 minimum input value	0.00V~AI1 maximum input value	0.00V
PC-48	AI1 Maximum Input Value	AI1 minimum input value ~10.00	10.00V
PC-49	AI2 minimum input value	0.00V~AI2 maximum input value	0.00V
PC-50	AI2 maximum input value	0~Maximum frequency	40.00Hz

14.5. Apply macro-fixed parameters

Fixed function code	Curing parameters	Curing value
P7-16	Keyboard knob precision	10
P7-29	LED Operation Display	0xc11
P7-65	LED Operation Display 2	0
PA-00	PID given source	6 (UP/Down change PA-01 settings)
PC-44	Sleep delay	30.0
PC-46	PID range	10.00
PC-19	High voltage alarm value	8.00
PC-20	High voltage alarm delay time	1s

Fixed function code	Curing parameters	Curing value
PC-21	Low pressure alarm value	1.00
PC-22	Low voltage alarm delay time	60s
PC-18	Constant pressure water supply mode	0 (one-to-one)

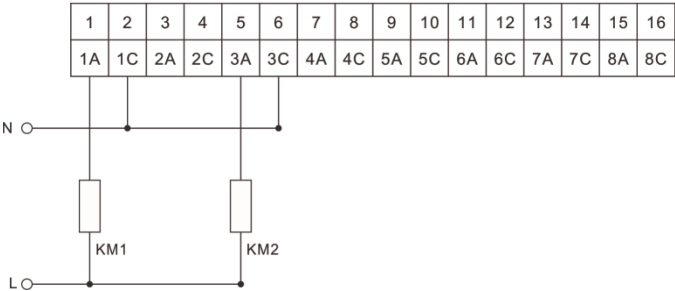
14.6. PC-39 Debugging Mode Instructions

When the PC-39 debugging mode is enabled, the inverter does not need to be running. Commands can be sent directly from the host computer to open or close the control circuit terminals.

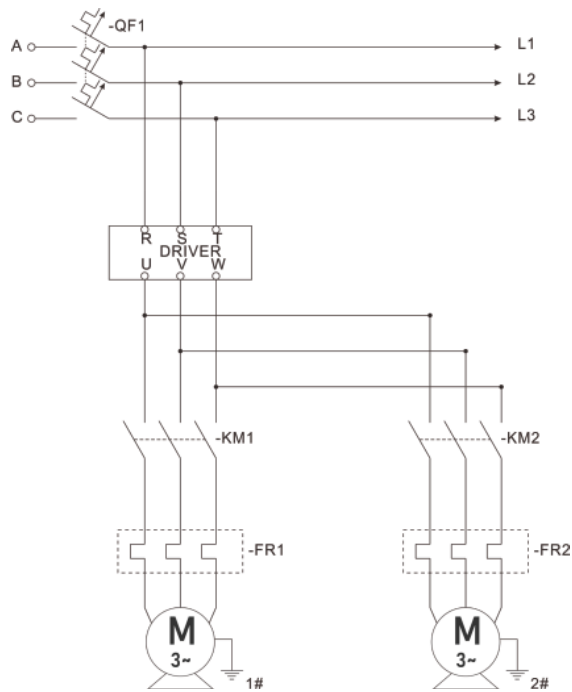
address	Write value description
0x7401	0: Disable A1-C1 and A2-C2 outputs ; 1: Enable A1-C1 output and disable A2-C2 output ; 2: Disable A1-C1 output and enable A2-C2 output .
0x7402	0: Disable A3-C3 and A4-C4 outputs 1: Enable A3-C3 output and disable A4-C4 output ; 2: Disable A3-C3 output and enable A4-C4 output .
0x7403	0: Disable A5-C5 and A6-C6 outputs ; 1: Enable A5-C5 output and disable A6-C6 output ; 2: Disable A5-C5 output and enable A6-C6 output .
0x7404	0: Disable A7-C7 and A8-C8 outputs ; 1: Enable A7-C7 output and disable A8-C8 output ; 2: Disable A7-C7 output and enable A8-C8 output .

14.7. PC-38 One-use-one-spare-use instructions

First, enable the one-in-one-standby function, PC-38=1, and the cycle time is PC-37. The one-in-one-standby function means that one pump runs while the other stops .



Terminal wiring diagram



Control loop diagram

Chapter 15 Fault diagnosis and countermeasures

15.1. Fault alarms and countermeasures

If a fault occurs during system operation, the inverter will immediately protect the motor and stop outputting power, and the corresponding inverter fault relay contacts will activate. The inverter panel will display a fault code. The corresponding fault types and common solutions are detailed in the table below. The information listed in the table is for reference only; please do not attempt to repair or modify the system yourself. If you are unable to resolve the fault, please seek technical support from our company or your product distributor.

Fault Name	Fault Codes	Troubleshooting	Troubleshooting strategies
Inverter module protection	Err01	1. Check whether there is a phase-to-phase or phase-to-ground short circuit at the motor connection terminals U, V, and W. 2. Is the module overheating? 3. Check if the internal wiring of the frequency converter is loose. 4. Are the main control board, driver board, or module functioning properly?	1. Short circuit due to contact 2. Are the fan and air duct working properly? 3. Reconnect all loose wires. 4. Seek technical support
Overcurrent during acceleration	Err04	1. There is a grounding or short circuit in the inverter output circuit. 2. Incorrect motor parameters 3. Acceleration time is too short 4. V/F torque increase or inappropriate curve 5. Input voltage is too low 6. Start the rotating motor. 7. Sudden load increase during acceleration 8. The selected frequency converter is too small.	1. Troubleshoot external faults 2. Check and identify parameters. 3. Increase acceleration time 4. Adjust V/F to increase torque or curve 5. Adjust the voltage to the normal range. 6. Select speed tracking start or wait for the motor to stop before starting. 7. Cancel sudden load increases 8. Select a frequency

Fault Name	Fault Codes	Troubleshooting	Troubleshooting strategies
			converter with a higher power rating.
Overcurrent during deceleration	Err05	1. There is a grounding or short circuit in the inverter output circuit. 2. Incorrect motor parameters 3. The deceleration time is too short. 4. Input voltage is too low 5. Sudden load application during deceleration 6. No braking unit or braking resistor. 7. Excessive flux braking gain	1. Troubleshoot external faults 2. Identify motor parameters 3. Increase deceleration time 4. Adjust the voltage to the normal range. 5. Cancel sudden load increases 6. Install braking unit and resistor 7. Reduce the magnetic flux braking gain
Overcurrent during constant speed operation	Err06	1. There is a grounding or short circuit in the inverter output circuit. 2. Incorrect motor parameters 3. Input voltage is too low 4. Are there any sudden increases in load during operation? 5. The selected frequency converter is too small.	1. Troubleshoot external faults 2. Check and identify parameters. 3. Adjust the voltage to the normal range. 4. Cancel sudden load increases 5. Select a frequency converter with a higher power rating.
Overvoltage during acceleration	Err08	1. Input voltage is too high 2. During acceleration, an external force drives the motor. 3. Acceleration time is too short 4. No braking unit or braking resistor. 5. Incorrect motor parameters	1. Adjust the voltage to the normal range. 2. Eliminate additional power source or add braking resistor. 3. Increase acceleration time 4. Install a braking unit and resistor. 5. Check and identify parameters.
Overvoltage during deceleration	Err09	1. Input voltage is too high 2. During deceleration, an external force drives the motor. 3. Deceleration time is too short	1. Adjust the voltage to the normal range. 2. Eliminate additional power source or add braking

Fault Name	Fault Codes	Troubleshooting	Troubleshooting strategies
		4. No braking unit or braking resistor.	resistor. 3. Increase deceleration time 4. Install a braking unit and resistor.
Overvoltage during constant speed operation	Err10	1. Input voltage is too high 2. During acceleration, an external force drives the motor.	1. Adjust the voltage to the normal range. 2. Eliminate additional power source or add braking resistor.
Undervoltage fault	Err12	1. Momentary power outage 2. The inverter input voltage is not within the range specified in the standard. 3. Abnormal bus voltage 4. The rectifier bridge and buffer resistor are not functioning properly. 5. Driver board malfunction 6. Control panel malfunction	1. Reset fault 2. Adjust the voltage to the normal range. 3. Seek technical support
Drive overload fault	Err13	1. Is the load too large or is the motor stalled? 2. The selected frequency converter is too small.	1. Reduce the load and check the condition of the motor and machinery. 2. Select a frequency converter with a higher power rating.
Motor overload fault	Err14	1. Is the setting of motor protection parameter P9-01 appropriate? 2. Is the load too large or is the motor stalled? 3. The selected frequency converter is too small.	1. Set this parameter correctly. 2. Reduce the load and check the condition of the motor and machinery. 3. Select a frequency converter with a higher power rating.
Driver overheating	Err15	1. The ambient temperature is too high. 2. Duct blockage 3. Fan malfunction 4. Damaged module thermistor 5. Inverter module damaged	1. Lower the ambient temperature 2. Clean the air ducts 3. Replace the fan 4. Replace the thermistor 5. Replace the inverter module

Fault Name	Fault Codes	Troubleshooting	Troubleshooting strategies
Current detection fault	Err17	Are the internal wiring connections of the frequency converter loose? Is the current sensing device functioning properly? 3. Is the main control board or driver board functioning properly?	1. Check the wiring 2. Seek technical support
Ground short circuit	Err20	Motor short circuit to ground	Replace cable or motor
Tuning timeout fault	Err21	Motor parameter self-learning timeout	Manually input the parameters of motor group P4
Encoder failure	Err22	Incorrect encoder wiring	Check wiring
Input phase loss fault	Err23	1. The three-phase input power supply is abnormal. 2. Driver board malfunction 3. Surge protection board malfunction 4. Main control board malfunction	1. Inspect and eliminate problems in the external wiring. 2. Seek technical support
Output phase loss fault	Err24	1. The wiring from the frequency converter to the motor is faulty. 2. The inverter's three-phase output is unbalanced when the motor is running. 3. Driver board malfunction 4. Module error	1. Troubleshoot external faults 2. Check if the three-phase windings of the motor are normal and troubleshoot any faults. 3. Seek technical support
Parameter read/write barrier	Err25	1. Damaged EEPROM chip	1. Replace the main control board
Communication failure	Err27	1. Is the host computer working? 2. Is the communication connection normal? 3. Are the communication parameters in group P8 correct?	1. Check the wiring of the host computer, etc. 2. Check the communication wiring. 3. Verify the parameters in group P8.
External faults	Err28	1. Input external normally open or normally closed fault signals via the multi-function DI	1. Fault Reset

Fault Name	Fault Codes	Troubleshooting	Troubleshooting strategies
		terminal.	
Excessive speed deviation	Err29	1. The load is too heavy and the acceleration time is set too short. 2. Fault detection parameters P9-31 and P9-32 are set improperly.	1. Extend the set acceleration/deceleration time 2. Reset P9-31 and P9-32
User-defined fault 1	Err30	1. User-defined fault 1 signal input via multi-function terminal DI	1. Reset
User-defined fault 2	Err31	2. User-defined fault 2 signal input via multi-function terminal DI	1. Reset
PID feedback lost during runtime	Err32	1. The PID feedback value is less than the PA-13 setpoint.	1. Check the feedback signal or reset PA-13.
Fast rate limiting	Err33	1. Overload or stalling 2. The acceleration time is set too short.	1. Reduce the load or replace with a higher power frequency inverter. 2. Appropriately extend the acceleration time
Loading failure	Err34	1. Load failure detection conditions have been met. For specific usage, please refer to pages 9-28-9-30.	1. Reset or reset the detection conditions.
Input power failure	Err35	Input voltage is not within the specified range Too frequent power-on and power-off	1. Adjust the input voltage 2. Extend the power-on and power-off cycles
Parameter storage error	Err37	1. Abnormal communication between DSP and EEPROM chip	1. Replace the main control board 2. Seek manufacturer services
Motor overheating	Err38	1. Motor overheat warning P9-37 setting value	1. Adjust the P9-37 setting. 2. Check the motor or sensor.
The running time has reached	Err39	1. The inverter's current running time is greater than the P7-38 set value.	1. Reset
Cumulative running time	Err40	1. Cumulative running time reaches the set value P7-20	1. Use the parameter initialization function 2 to

Fault Name	Fault Codes	Troubleshooting	Troubleshooting strategies
reached			clear the recorded time or reset the cumulative running time.
Switching motors during operation	Err42	1. Switch motors via terminals during operation.	1. Switch motors after shutdown.
Motor overspeed fault	Err43	1. Incorrect encoder parameter settings 2. No parameter identification was performed. 3. Exceeding the maximum frequency by 30%	1. Correctly set encoder parameters 2. Identify motor parameters
Dual-chip communication failure	Err44	Control board malfunction abnormal drive and control connection port	Check drive and control connections Replace the control board
Magnetic pole position detection failed	Err45	1. Incorrect motor parameters	1. Check the parameters on the motor nameplate.
Master-slave control communication disconnected	Err46	No master was set, but a slave was set. Communication line malfunction or incorrect communication parameters	1. Configure the host and reset the fault. 2. Check the communication cable and communication parameters P8 group.
SVC stop speed feedback abnormal fault	Err47	1. It's possible that the motor parameters haven't been self-learned, or there are abnormal protection mechanisms in place due to the motor not being connected.	1. The default time setting for P9-09 is 5 seconds. Setting the time to 0 seconds will disable this fault. The range is 0~100.0 seconds.
STO failure	Err48	1. STO-24V disconnected	1. Both +24V-STO1 and +24V-STO2 are closed.
Elevator feedback timeout	Err49	DI elevator feedback signal hardware failure The actual elevator feedback signal set in DI	1. Check the hardware equipment. 2. Check the DI setting for the elevator feedback signal source.
Photovoltaic inverter light weakness alarm	Err50	1. When C3-00=1, the operating frequency is lower than the C3-15 setting value when photovoltaic power is enabled.	1. If the lighting is weak, reduce the voltage of C3-15 or switch to AC power.

Fault Name	Fault Codes	Troubleshooting	Troubleshooting strategies
Photovoltaic inverter full water alarm	Err5 1	1. With C3-00=1 and photovoltaic enabled, the DI setting of function 67 is effective.	1. Check the water level in the pool.
Photovoltaic inverter low water alarm	Err5 2	1. With C3-00=1, the DI setting of function 68 is effective when photovoltaic power is enabled.	1. Check the water level in the pool.
Lost at midnight	Err54	1. Incorrect motor parameter settings 2. Poor contact between the encoder and the PG card. 3. Encoder or PG card damaged.	1. Reset motor parameters or tune the motor. 2. Check the wiring connections between the encoder, PG card, and frequency converter. 3. Replace the encoder or PG card.
Light load current detection fault	Err60	The percentage of the motor's rated current detected under light load current is too low. The light load current detection time is too short.	1. Increase the percentage of light load current detection (P9-40 value) 2. Turn off the light load current detection time P9-41=0
Locking malfunction	Err70	1. A lock password has been set.	1. Turn off the lock time
Communication failure	ER485	1. Communication failure between display panel and control board	1. Poor contact between the motherboard and the display panel. Try unplugging and replugging the network cable or replacing the network cable.

15.2. Common Faults and Their Troubleshooting Methods

The following faults may occur during the use of frequency converters. Please refer to the following methods for simple fault analysis.

Fault phenomenon	Possible reasons	Solution
No display after power-on	1. The mains voltage is either nonexistent or too low. 2. Faulty switching power supply on the inverter driver	1. Check the input power supply 2. Check bus voltage 3. Re-plug the keyboard and the 30-pin ribbon cable.

Fault phenomenon	Possible reasons	Solution
	board 3. Rectifier bridge damaged 4. Damaged inverter buffer resistor 5. Control board and keyboard malfunction 6. The connection between the control board, driver board, and keyboard is broken.	4. Seek manufacturer services
Power-on display "Err20" alarm	1. Short circuit to ground in the motor or output line. 2. Damaged frequency converter.	1. Use a megohmmeter to measure the insulation of the motor and output wires. 2. Seek manufacturer services
Frequent Err15 (module overheating) fault reports	1. Carrier frequency setting is too high 2. The fan is damaged or the air duct is blocked. 3. Damage to internal components of the frequency converter (thermocouple or other).	1. Reduce carrier frequency (P0-26) 2. Replace the fan and clean the air duct. 3. Seek manufacturer services
The motor does not rotate after the frequency converter is running.	1. Motor and motor wires 2. Inverter parameter settings are incorrect (motor parameters) 3. Poor contact in the wiring between the driver board and the control board. 4. Driver board failure	1. Reconfirm the wiring between the frequency converter and the motor. 2. Replace the motor or eliminate the mechanical fault. 3. Check and reset the motor parameters.
DI terminal failure	1. Incorrect parameter settings 2. External signal error 3. The DI DIP switch is in the wrong position. 4. Control board malfunction	1. Check and reset the relevant numbers in group P5. 2. Reconnect the external signal cable 3. Reconfirm that the position of the DI DIP switch is consistent with the wiring method. 4. Seek manufacturer services
The frequency converter frequently reports overcurrent and	1. Incorrect motor parameter settings 2. Inappropriate acceleration and deceleration timing	1. Reset the motor parameters or perform motor tuning. 2. Set appropriate acceleration and deceleration times.

Fault phenomenon	Possible reasons	Solution
overvoltage faults.	3. Load fluctuations	3. Seek manufacturer services

15.3. Common faults of synchronous motors and their handling methods

15.3.1. Motor with heavy load start

If the motor fails to start under load, you can try the following steps:

1) Increase the upper limit of torque current (P3-21)

When the load exceeds the inverter's torque output, the inverter will be in a stalled state. In this case, P3-21 can be increased appropriately.

2) Increase the speed PI control parameter, modify the resistance value, or perform static identification to correct the motor resistance.

The motor resistance parameter (P4-17) significantly affects the motor's low-speed load-carrying capacity. When the resistance parameter (P4-17) exceeds the actual resistance value by a large margin (e.g., 200% of the actual resistance value), the motor may reverse at low speed with the maximum torque current. When the resistance parameter (P4-17) is significantly lower than the actual resistance value (e.g., 50% of the actual resistance value), the motor may operate in a step-by-step manner, or rotate for a period and then stop. Increasing the low-speed value P3-04 and decreasing the speed loop integral time P3-05 may improve the problems caused by an excessively low resistance parameter.

15.3.2. Adjust the speed loop PI parameters (generally no adjustment is needed).

1) Under normal circumstances, if the proportional coefficient of the speed PI regulation is too large, it will cause high-frequency speed oscillation, and mechanical vibration or electromagnetic noise will be significantly increased; if the proportional coefficient is too small and the integral time is too small or the load inertia is too large, it will cause low-frequency speed oscillation, and the speed overshoot will be obvious. If there is no discharge measure, it may cause overvoltage.

2) If the speed PI parameter needs adjustment, first increase the integral time, then increase the proportional gain without causing speed oscillations. If the effect is not ideal, then decrease the integral time. Generally, the larger the system inertia, the smaller the integral time and the larger the proportional gain. To increase the speed filter coefficient, the integral time should be increased, and the proportional gain can be

increased appropriately.

Note: The inertia of the transmission system equals the motor inertia plus the load inertia. The motor inertia is directly proportional to the motor's mass and the square of its diameter; the transmission load inertia is directly proportional to the load mass and the square of the transmission wheel diameter; if there is a speed reduction or speed increase device, the inertia is directly proportional to the speed increase ratio and inversely proportional to the speed reduction ratio.

For loads with high inertia, if a fast speed response is required, the integral time needs to be reduced, but this can easily cause speed overshoot and inverter overvoltage, necessitating a discharge device. If no discharge device is available, the integral time can be increased.

15.3.3. Adjust the current loop PI parameters (generally no adjustment is needed).

Generally, increasing the proportional and integral coefficients will speed up the current response, but too large a coefficient will cause speed oscillations (specifically manifested as the motor not turning, or turning erratically in both directions, while emitting high-frequency electromagnetic noise). If adjustment is needed, first adjust the proportional coefficient; if the effect is not ideal, then adjust the integral coefficient. The current loop PI parameters are related to the motor stator resistance, inductance, system carrier frequency, and current sampling filtering time. With a constant system carrier frequency, the proportional coefficient is proportional to the inductance, and the integral coefficient is proportional to the resistance. Therefore, by identifying the parameters, the direction of adjustment can be roughly determined.

15.3.4. Small inductor motor

For servo motors or other low-inductance motors, it is recommended that the stator inductance per phase should meet the following conditions (unit [H]):

$L > \frac{5 \times 10^{-3} \times V_{dc}}{I_N}$ The V_{dc} inverter bus voltage and I_N the motor rated current are specified. If

the motor inductance is too small, the motor current ripple will be large. At high currents, the inverter will enter a wave-by-wave current limiting state due to the ripple current. The maximum value of P3-21 in the program is limited $\frac{150 \times I_N}{I_{MN}}$ to the inverter's rated current and I_{MN} the I_N set motor rated current. The value of P3-21 needs to be

reduced according to the actual torque limit setting. The larger the current ripple, the smaller P3-21 should be; it may reach $\frac{110 \times I_{IN}}{I_{MN}}$ a certain value. At low currents and high speeds, current regulation may be too slow (specifically, the motor current at high speeds is significantly larger than the actual required current, and the current fluctuates significantly). The current PI proportional parameter needs to be increased. Increasing it too much can sometimes lead to uncontrolled current, and the inverter may also enter a wave-by-wave current limiting state (this occurs at low speeds, specifically, the motor does not rotate, or rotates erratically in both directions, while emitting high-frequency electromagnetic noise).

Chapter 16 Modbus communication protocol

The frequency converter provides an RS485 communication interface and supports the Modbus communication protocol. Users can achieve centralized control via a computer or PLC, and use this communication protocol to set the frequency converter's operating commands, modify or read function code parameters, and read the frequency converter's operating status and fault information.

16.1. Communication frame structure

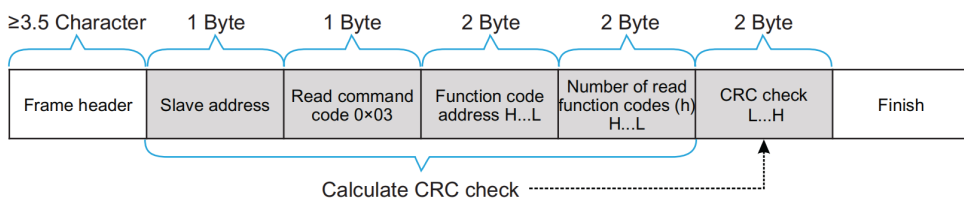
The Modbus-RTU protocol communication data format of the frequency converter is as follows.

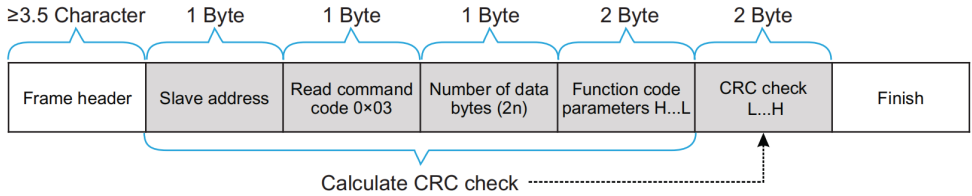
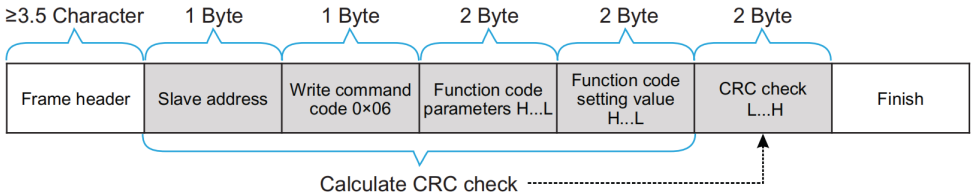
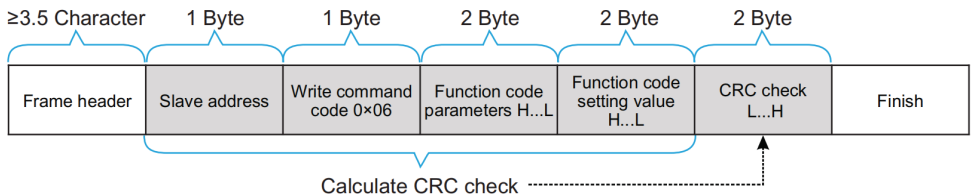
Frame Header START	3.5 character time
Slave Address ADR	Communication addresses: 1 ~ 247 (set by P8-02)
Command Code CAD	03: Read slave parameters; 06: Write slave parameters
Data content DATA(n-1)	Data contents: function code parameter address, number of function code parameters, function code parameter values, etc.
Data content DATA(n-2)	
...	
Data content DATA0	
CRC CHK low-order bits	Detection value: CRC16 checksum. During transmission, the low byte comes first, followed by the high byte. See the CRC checksum explanation in this section for the calculation method.
CRC CHK high byte	
END	3.5 character time

Command code (CAD) and data description (DATA)

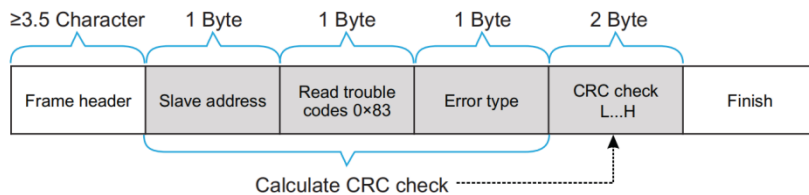
The read operation instruction 0x03H reads n words, with a maximum of 12 words that can be read, i.e., n = 1 to 12.

Host reads command frame



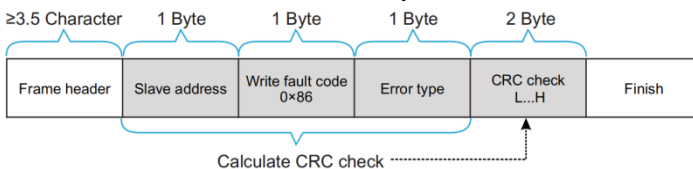
Slave read response frame**Host write command frame****Slave write response frame**

If the slave device detects a communication frame error, or if read/write fails for other reasons, it will reply with an error frame. The slave station reads the error frame as an acknowledgment.



Error type:

(01: Command code error; 02: Address error; 03: Data error; 04: Command cannot be processed.)

The slave station writes an error response frame.

Example: Read the contents of two consecutive parameters starting from P0-03 of the frequency converter with slave address P8-02 being 01.

The host sends frames as shown in the figure:

Frame header ≥3.5 Character	Slave address 0×01	Read command code 0×03	Function code address 0×F0 0×03	Number of read function codes 0×00 0×02	CRC check 0×07 0×0B	Finish
--------------------------------	-----------------------	---------------------------	---------------------------------------	---	------------------------	--------

The slave device's reply frame is shown in the figure:

Frame header ≥3.5 Character	Slave address 0×01	Read command code 0×03	Data bytes 0×04	P0.03 parameter value 0×00 0×00	P0.04 parameter value 0×00 0×00	CRC check 0×FA 0×33	Finish
-----------------------------------	-----------------------	------------------------------	--------------------	--	--	------------------------	--------

Note: If the write command is unsuccessful, the failure reason will be returned.

16.2. Address definition of communication parameters

This section contains the communication information, used to control the operation of the frequency converter, its status, and related parameter settings.

Read/write function code parameters (some function codes cannot be changed and are only for manufacturer or monitoring use):

Function code parameter address identification rules:

The rule for representing parameter addresses using function code group numbers and **labels is as follows:**

High-order byte: P0 ~ PF (P group), A0 ~ AF (A group), B0 ~ BF (B group), C0 ~ CF (C group), D0 ~ DF (D group), 70 ~ 7F (U group) Low-order byte: 00 ~ FF

For example, P0-11 is represented by the address F00B;

Notice:

PF group: Parameters cannot be read or modified;

Group U: Read-only, parameters cannot be modified.

Some parameters cannot be changed when the frequency converter is running; some parameters cannot be changed regardless of the frequency converter's state. When changing function code parameters, pay attention to the parameter range, unit, and related instructions.

Function code group number	Communication access address	Communication modifies the function code address in RAM (write-only).
P0 ~ PE group	0 ×F000 ~ 0 ×FEFF	0 ×0000 ~ 0 ×0 EFF

Function code group number	Communication access address	Communication modifies the function code address in RAM (write-only).
Groups A0 to AE	0 ×A000 ~ 0 ×AFFF	0 ×4000 ~ 0 ×4F FF
Groups B0 to BE	0 ×B000 ~ 0 ×B FFF	0 ×5000 ~ 0 ×5F FF
Groups C0 to CE	0 ×C000 ~ 0 ×C FFF	0 ×6000 ~ 0 ×6F FF
Groups U0 and U1	0 ×7000, 0 ×71××	

Note that frequent storage of EEPROM will reduce its lifespan. Therefore, some function codes do not need to be stored in communication mode; the values in RAM can be changed instead.

If it is a group of P parameters, to achieve this function, simply change the high-order bit F of the function code address to 0.

If the parameter is set to A, to achieve this function, simply change the high-order A bit of the function code address to 4.

The corresponding function code addresses are represented as follows: High byte: 00 ~ 0F (P group), 40 ~ 4F (A group) Low byte: 00 ~ FF

For example, function code P0-11 is not stored in EEPROM, and its address is represented as 000B; this address indicates that only writing to RAM is allowed, and reading is not allowed. When reading, it is an invalid address.

Shutdown/Operation Parameters Section:

Address	Parameter Description	Address	Parameter Description
0 ×1000 / 0 ×9000	1000: Communication setting value (-10000 ~ 10000) (decimal) (unit: 0.01%), readable and writable.	0 ×1014	AI1 pre-correction voltage (unit: 0.001V) Read-only
	9000: Communication setting frequency: 0Hz ~ P0-14 (minimum unit: 0.01Hz), read/write	0 ×1015	AI2 pre-correction voltage (unit: 0.001V) Read-only
0 ×1001	Set frequency (unit: 0.01Hz), read-only	0 ×1016	Actual linear velocity (unit: 1m/min), read-only
0 ×1002	Operating frequency (unit: 0.01Hz), read-only	0 ×1017	Load speed (unit: custom, refer to page 7-31 for usage), read-only
0 ×1003	Bus voltage (unit: 0.1V), read-only	0 ×1018	Current power-on time (unit: 1 min), read-only

Address	Parameter Description	Address	Parameter Description
0 ×1004	Output voltage (unit: 0.1V), read-only	0 ×1019	Current running time (unit: 0.1 min) Read-only
0 ×1005	Output current (unit: 0.1A), read-only	0 ×101A	Input pulse frequency (unit: 1Hz), read-only
0 ×1006	Output power (unit: 0.1kW), read-only	0 ×101B	Main frequency X display (unit: 0.01Hz), read-only
0 ×1007	DI Input Flag (unit: 1), Read-only	0 ×101C	Auxiliary frequency Y display (unit: 0.01Hz), read-only
0 ×1008	DO output flag (unit: 1), read-only	0 ×101D	Target torque (unit: 0.1%), with the motor's rated torque as 100%, read-only.
0 ×1009	PID setting (unit: 1), read-only	0 ×101E	Output torque (unit: 0.1%), with the motor's rated torque as 100%, read-only.
0 ×100A	PID feedback (unit: 1), read-only	0 ×101F	Output torque (unit: 0.1%), with the inverter's rated current at 100%, read-only.
0 ×100B	AI1 voltage (unit: 0.01V), read-only	0 ×1020	Upper limit of torque (unit: 0.1%) With the inverter's rated current at 100%, read-only
0 ×100C	AI2 voltage (unit: 0.01V), read-only	0 ×1021	VF separates the target voltage (unit: 1V), read-only.
0 ×100D	AO1 output voltage (unit: 0.01V) Read-only	0 ×1022	VF Separation and Transportation out Voltage (unit: 1V), read-only
0 ×100E	PLC steps (unit: 1), read-only	0 ×1023	Reserved, read-only
0 ×100F	Rotational speed (unit: 1 rpm), read-only	0 ×1024	Motor 1/2 Instruction (unit: 1), read-only
0 ×1010	Input count value (unit: 1), read-only	0 ×1025	Length value input (unit: 1) Read-only
0 ×1011	Input pulse frequency (unit: 0.01kHz), read-only	0 ×1026	AO2 output voltage (unit: 0.01V), read-only
0 ×1012	Feedback speed (unit: 0.1Hz), read-only	0 ×1027	Inverter status (unit: 1), read-only
0 ×1013	Remaining runtime (in 0.1 min), read-only	0 ×1028	Current fault (unit: 1), read-only

Example 1: Read the operating frequency of the first device: 0x01 0x03 0x10 0x02 0x00 0x01 0x21 0x0A

0x10 0x02 (1002) is the operating frequency address, and 0x00 0x01 (0001) is a data value.

0x21 0x0A (210A) CRC checksum

Example 2: Simultaneously read the bus voltage, output voltage, and output current of the first device: 0x01 0x03 0x10 0x03 0x00 0x03 CRC check value, the meaning of which is similar to that in Example 1.

Note: Communication settings are percentages of relative values; 10000 corresponds to 100.00%, and -10000 corresponds to -100.00%.

For data in the dimension of frequency, the percentage is a percentage relative to the maximum frequency (P0-14); for data in the dimension of torque, the percentage is P3-21, P3-23, A3-21, A3-23.

The D0 output terminal needs to be selected with function 16 (communication control).

The AO output needs to be selected with function 7 (communication control output).

Type	Address	Command content	
Control command input (Write only)	0 ×2000	0001: Forward rotation; 0002: Reverse rotation; 0003: Forward jog; 0004: Reverse jog; 0005: Free stop; 0006: Deceleration stop; 0007: Fault reset; 0008: Fault reset (Fault reset is only available in communication control mode)	
Status reading (Read-only)	0 ×3000	0001: Forward rotation; 0002: Reverse rotation; 0003: Stop	
Digital output terminal control (write only)	0 ×2001	BIT0: RELAY1 output control; BIT1: DO1 output control; BIT2: RELAY2 output control	
Analog output AO1 control (write only)	0 ×2002	0-7FFF represents 0% to 100%.	
Analog output AO2 control (write only)	0 ×2003	0-7FFF represents 0% to 100%.	
Inverter failure address	0 ×8000	0000: No fault 0002: Reserved 0004: Accelerating overcurrent 0006: Constant-speed overcurrent 0008: Accelerated	0001: Reserved 0003: Reserved 0005: Deceleration overcurrent 0007: Stop overcurrent 0009: Deceleration overvoltage

Type	Address	Command content	
		overvoltage	000B: Stop overvoltage
		000A: Constant speed	000D: Inverter overload
		overvoltage	000F: Module overheating
		000C: Undervoltage fault	0011: Current detection
		000E: Motor overload	fault
		0010: Reserved	0013: Reserved
		0012: Reserved	0015: Motor tuning fault
		0014: Motor to ground	0017: Input phase loss
		short circuit fault	0019: EEPROM read/write
		0016: Reserved	error
		0018: Output phase loss	001B: Communication
		001A: Password entry	error
		exceeded the limit.	001D: Speed deviation is
		001C: External Fault	too large
		001E: User-defined fault 1	001F: User-defined fault 2
		0020: PID feedback lost	0021: Hardware current
		during runtime	limiting failure
		0022: Loadout	0023: Buffer resistor
		0024: Contactor	overload fault
		malfunction	0025: Agent's operating
		0026: Motor overheating	time has arrived.
		(reserved)	0027: Current running
		0028: Cumulative running	time has expired.
		time reached	0029: Power-on time has
		002A: Motor switching	arrived
		failure during operation	002B: Motor Overspeed
		002C: Reserved	002D: Reserved
		002E: Reserved	002F: Point-to-slave fault

Return address when communication fails: Read failure 83XX, Write failure 86XX.

16.3. Virtual communication address function

For the communication addresses in the above standard, such as the control command address 0x2000 and the status read address 0x3000, the communication function can be achieved by setting the hexadecimal address through the function code.

Function code setting instructions:

C3-53 Virtual Communication Enable Settings 1

The C3-54 control command needs to be used in conjunction with the C3-62 and C3-63

function codes (for writing).

Example Test 1:

parameter	C3-63				C3-62			
Control word position number	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Setting value	8	7	6	5	4	3	2	1

Control word illustration 1

The combination of C3-63 and C3-62 represents bits 7-0 of the control command word. Bit7 corresponds to communication fault reset, Bit6 corresponds to fault reset, Bit5 corresponds to deceleration and stop, Bit4 corresponds to free stop, Bit3 corresponds to reverse jogging, Bit2 corresponds to forward jogging, Bit1 corresponds to reverse, and Bit0 corresponds to forward rotation. Write values 1 through 8 to the corresponding numbers to represent their respective functions.

For example: Set address 0x1111 as the control command address.

Test 1: Set the low bit of the C3-62 control command word to 0x4321 and the high bit of the C3-63 control command word to 0x8765.

Communication to address 0x1111

Write value 1 to Bit0 to correspond to the forward rotation function of the frequency converter;

Write value 2 to correspond to Bit 1 for the frequency converter inversion function;

Write value 3 to Bit2 to correspond to the forward jog function of the frequency converter;

Write value 4 to Bit3 to enable the inverted jog function of the strain gauge.

Write value 5 to Bit 4 to correspond to the free stop function of the frequency converter;

Write value 6 to Bit5 to correspond to the frequency converter deceleration and stop function;

Write value 7 to Bit 6 to enable the frequency converter fault reset function;

Write value 8 to Bit7 to switch the frequency converter communication fault reset function;

Example Test 2:

parameter	C3-63				C3-62			
Control word position number	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Setting value	6	8	3	2	1	5	7	4

Control word illustration 2

Test 2: Set the low bit of the C3-62 control command word to 0x1574 and the high bit of the C3-63 control command word to 0x6832.

Communication to address 0x1111

Writing value 1 to Bit3 corresponds to the forward jog function of the strain gauge.

Write value 2 to Bit4 to enable the inverted jog function of the strain gauge.

Write value 3 to Bit 5 to correspond to the frequency converter's free stop function;

Write value 4 to Bit0 to correspond to the forward rotation function of the frequency converter;

Write value 5 to Bit2 to enable forward jog function of the frequency converter;

Write value 6 to Bit7 to switch the frequency converter communication fault reset function;

Write value 7 to Bit1 to correspond to the frequency converter inversion function;

Write value 8 to Bit6 to enable the frequency converter fault reset function;

C3-55 Frequency Setting (Write)

After setting the C3-55 function code, the communication operation can modify the frequency source by setting the address of C3-55 (the frequency source must be the communication source P0-06=7).

C3-56 running status (read)

After setting the C3-56 function code, the communication operation can read the current operating status value of the frequency converter by setting the address of C3-56 (01 for forward rotation, 02 for reverse rotation, and 03 for shutdown).

C3-57 operating frequency (read)

After setting the C3-57 function code, the communication operation can read the current operating frequency value of the frequency converter by setting the address of C3-57.

C3-58 Output Voltage (Read)

After setting the C3-58 function code, the communication operation can read the current inverter's output voltage value by setting the address of C3-58.

C3-59 Output Current (Read)

After setting the C3-59 function code, the communication operation can read the current output current value of the frequency converter by setting the address of C3-59.

C3-60 Output Power (Read)

After setting the C3-60 function code, the communication operation can read the current inverter's output power value by setting the address of C3-60.

C3-61 read error (read)

After setting the C3-61 function code, the communication operation can read the current inverter's fault value by setting the address of C3-61.

Note: The addresses set by the above function codes are not allowed to have the same address value, otherwise it will cause an address conflict and only one will be valid.

Chapter 17 Function & Parameter Table

The function code symbols are explained as follows:

The function code symbols are explained as follows:

“☆” indicates that the parameter can be changed during shutdown and operation.

“★” indicates that this parameter cannot be changed during operation.

“●” indicates that the value of this parameter is an actual test record value or a manufacturer-defined value and cannot be changed.

The communication address in the function parameter table is written in hexadecimal.

17.1. Functional group parameters

Function code	name	content	Factory set up	Change	address
P0 Group - Basic Function Group					
P0-00	Product Model	Product Model: 5-digit display, 2 decimal places	70#.##	●	F000
P0-01	Inverter type display	0: Type G 1: P type	0	★	F001
P0-02	Rated current	0.1A ~ 3000.0A	model Sure	●	F002
P0-03	Motor control method	Units: Motor control mode selection 1: Open-loop vector control (sensorless vector control) 2: VF control 3: Closed-loop vector (with velocity sensor vector) Tens: Motor type selection 0: Asynchronous motor 1: Synchronous motor	02	★	F003
P0-04	Source of execution instructions	0: Operation panel operation command channel (LED off) 1: Terminal command channel (LED lit) 2: Communication command channel (LED flashing)	0	★	F004
P0-05	Runtime Up/Down frequency	0: Operating frequency 1: Set frequency	1	★	F005

Function code	name	content	Factory set up	Change	address
	modification instruction base				
P0-06	Main frequency source X selection	0: Up/Down frequency changes are not remembered during shutdowns. 1: Up/Down frequency modification for power-off memory	1	★	F006
P0-07	Auxiliary frequency source Y selection	2: AI1 3: AI2 4: Multi-speed 5: Simple PLC 6: PID 7: Communication given 8: PULSE setting 9: Up/Down frequency modification, shutdown memory, power failure memory not retained.	0	★	F007
P0-08	Auxiliary frequency source Y range selection	0: relative to the maximum frequency 1: Relative to frequency source X 2: The range is the same as 0, but the main and auxiliary outputs have no negative frequency output.	0	☆	F008
P0-09	Auxiliary frequency source Y range	0% ~ 100%	100%	☆	F009
P0-10	Frequency source selection	Units: Frequency source selection 0: Main frequency source X 1: The result of primary and secondary operations (the operational relationship is determined by the tens digit) 2: Switching between main frequency source X and auxiliary frequency source Y 3: Switching between main	00	☆	F00A

Function code	name	content	Factory set up	Change	address
		frequency source X and main/auxiliary operation results 4: Switching between auxiliary frequency source Y and main/auxiliary operation results Tens: Frequency source master-slave operation relationship 0: Primary + Secondary 1: Primary - Secondary 2: The maximum value of both 3: Minimum of the two			
P0-11	Preset frequency	0.00Hz ~ Maximum frequency P0-14	50.00Hz	☆	F00B
P0-13	Motor running direction selection	0: Consistent with the current motor direction 1: Opposite to the current motor direction 2: Do not reverse	0	☆	F00D
P0-14	Maximum output frequency	When P0-20=1, the adjustable range is 50.0Hz ~ 1200.0Hz; When P0-20=2, the adjustable range is 50.00Hz ~ 600.00Hz;	50.00Hz	★	F00E
P0-15	Upper limit frequency source	0: Given a number (P0-16) 1: AI1 2: AI2 3: Communication given 4: PULSE settings	0	★	F00F
P0-16	Upper limit frequency	Lower limit frequency P0-18 ~ Maximum frequency P0-14	50.00Hz	☆	F010
P0-17	Upper limit frequency offset	0.00 ~ Maximum frequency P0-14	0.00Hz	☆	F011
P0-18	Lower limit frequency	0.00Hz ~ Upper limit frequency P0-16	0.00Hz	☆	F012
P0-19	Command source	Units: Operation panel	000	☆	F013

Function code	name	content	Factory set up	Change	address
	binding selection	command binding frequency source selection 0: No binding 1: Digital frequency setting 2: AI1 3: AI2 4: Multi-speed 5: Simple PLC 6: PID 7: Communication given 8: PULSE setting (DI5) Tens: Terminal command binding frequency source selection Hundreds: Communication command binding frequency source selection			
P0-20	Frequency decimal selection	1: 1 decimal place 2: 2 decimal places	2	★	F014
P0-21	acceleration/deceleration time unit	0:1 second 1:0.1 seconds 2:0.01 seconds	1	★	F015
P0-22	Acceleration/deceleration time reference frequency	0: Maximum frequency (P0-14) 1: Preset frequency (P0-11) 2: Rated frequency of the motor (P4-05 or A1-05)	0	★	F016
P0-23	Acceleration time 1	0s ~ 30000s (P0-21=0) 0.0s ~ 3000.0s (P0-21=1) 0.00s ~ 300.00s (P0-21=2)	10.0s	☆	F017
P0-24	Deceleration time 1	0s ~ 30000s (P0-21=0) 0.0s ~ 3000.0s (P0-21=1) 0.00s ~ 300.00s (P0-21=2)	10.0s	☆	F018
P0-25	Overmodulation voltage boost	0% ~ 10%	3%	★	F019
P0-26	carrier frequency	0.5kHz ~ 16.0kHz	model Sure	☆	F01A
P0-27	Carrier frequency adjusts with temperature	0: Invalid 1: Effective;	1	☆	F01B

Function code	name	content	Factory set up	Change	address
P0-28	Parameter initialization	0: No operation 1: Restore factory settings, excluding motor parameters, P8-00 and P8-05 recorded information, and frequency decimal point P0-20. 2: Clear log information 3: Back up the user's current parameters 4: Restore user backup parameters 5: Restore all parameters	0	★	F01C
P0-29	Upload to keyboard, download to inverter parameter selection	0: No function 1: Upload parameters 2: Download P4/A1 group parameters 3: Download parameters excluding P4/A1 groups 4: Download all parameters 5: Download the modified parameters for group P4/A1 6: Download the modified parameters except for P4/A1 groups. 7: Download all modified parameters	0	★	F01D
P1 Group - Start-Stop Control					
P1-00	Startup method	0: Start directly 1: Speed Tracking 2: Asynchronous motor pre-excitation start	0	☆	F100
P1-01	Speed tracking method	0: Starting from the downtime frequency 1: Start from the target frequency 2: Start from the highest frequency	0	★	F101
P1-02	Maximum current for speed tracking	30% ~ 150%	100%	★	F102

Function code	name	content	Factory set up	Change	address
P1-03	Speed tracking speed	1 ~ 100	20	☆	F103
P1-04	Startup frequency	0.00Hz ~ 10.00Hz	0.00Hz	☆	F104
P1-05	Startup frequency retention time	0.0s ~ 100.0s	0.0s	★	F105
P1-06	Starting DC braking current	0% ~ 100%	0%	★	F106
P1-07	DC braking time	0.0s ~ 100.0s	0.0s	★	F107
P1-08	Acceleration/deceleration frequency curve selection	0: Straight line 1: S-curve A 2: S-curve B (P1-09 ~ P1-12, unit is 0.01s)	0	★	F108
P1-09	The S-curve accelerates for a short period of time.	0.0% ~ 100.0%	20.0%	★	F109
P1-10	The acceleration of the S-curve ends in a short period of time.	0.0% ~ 100.0%	20.0%	★	F10A
P1-11	S-curve deceleration in the initial period	0.0% ~ 100.0%	20.0%	★	F10B
P1-12	The period after the S-curve deceleration ends	0.0% ~ 100.0%	20.0%	★	F10C
P1-13	Shutdown methods	0: Deceleration and Stop 1: Free Stop	0	☆	F10D
P 1 -14	DC braking start frequency during shutdown	0.00Hz ~ P0-14	0.00Hz	☆	F10E
P1-15	DC braking waiting time during shutdown	0.0s ~ 100.0s	0.0s	☆	F10F
P1-16	Shutdown braking DC current	0% ~ 100%	0%	☆	F110
P1-17	DC braking time during shutdown	0.0s ~ 36.0s	0.0s	☆	F111
P1-21	Demagnetization	0.01s ~ 3.00s	0.50s	★	F115

Function code	name	content	Factory set up	Change	address
	time				
P1-23	Instantaneous or non-instantaneous mode selection	0: Invalid 1: Automatically adjust deceleration rate 2: Deceleration and Stop	0	★	F117
P1-24	The deceleration time during instantaneous stop and continuous deceleration.	0.0s ~ 100.0s	10.0s	★	F118
P1-25	Instantaneous stop without effective voltage	60% ~ 85%	80%	★	F119
P1-26	Instantaneous stop and continuous voltage recovery	85% ~ 100%	90%	★	F11A
P1-27	Instantaneous stop and continuous recovery voltage judgment	0.0s ~ 300.0s	0.3s	★	F11B
P1-28	Instantaneous stop with automatic gain adjustment	0 ~ 100	40	☆	F11C
P1-29	Instantaneous stop and continuous automatic adjustment of points	1 ~ 100	20	☆	F11D
P1-30	Speed tracking current Kp	0 ~ 1000	300	☆	F11E
P1-31	Speed tracking current Ki	0 ~ 1000	600	☆	F11F
P2 group - V/F control parameters					
P2-00	V/F curve setting	0: Straight line VF curve 1: Multi-point VF curve 2: Squared VF curve 3: 1.7 power curve 4: 1.5 power curve 5: 1.3 power curve	0	★	F200

Function code	name	content	Factory set up	Change	address
		6: VF Fully Separated Mode 7: V/F semi-separation mode			
P2-01	Torque boost	0.0% ~ 30.0%	0.0%	☆	F201
P2-02	Torque boost cutoff frequency	0.00Hz to maximum frequency	25.00Hz	★	F202
P2-03	V/F frequency point P1	0.00Hz ~ P2-05	1.30Hz	★	F203
P2-04	V/F voltage point V1	0.0% ~ 100.0%	5.2%	★	F204
P2-05	V/F frequency point P2	P2-03 ~ P2-07	2.50Hz	★	F205
P2-06	V/F voltage point V2	0.0% ~ 100.0%	8.8%	★	F206
P2-07	V/F frequency point P3	0.00Hz ~ 50.00Hz	15.00Hz	★	F207
P2-08	V/F voltage point V3	0.0% ~ 100.0%	35.0%	★	F208
P2-09	slip compensation coefficient	0.0% ~ 200.0%	50.0%	☆	F209
P2-10	Flux Braking Gain	0 ~ 200	100	☆	F20A
P2-11	Oscillation suppression gain	0 ~ 100	model Sure	☆	F20B
P2-13	VF slip compensation time constant	0.02s ~ 1.00s	0.30s	☆	F20D
P2-15	When VF is separated, the output voltage source is selected.	0: Numerical setting (P2-16) 1: AI1 2: AI2 3: Multi-segment instructions 4: Simple PLC 5: PID 6: Communication given 7: PULSE pulse setting (DI5) 100.0% corresponds to the motor's rated voltage.	0	☆	F20F
P2-16	V/F separate output voltage digital setting	0V ~ Motor rated voltage	0V	☆	F210
P2-17	V/F separation output voltage acceleration time	0.0 ~ 3000.0s	1.0s	☆	F211

Function code	name	content	Factory set up	Change	address
P2-18	V/F separation output voltage deceleration time	0.0 ~ 3000.0s	1.0s	☆	F212
P2-19	V/F separation shutdown method selection	0: Frequency and output voltage deceleration time are independent. 1: After the voltage is reduced to 0, the frequency is then reduced.	0	☆	F213
P2-20	VF overflow velocity enable	0: Close 1: Enable	1	★	F214
P2-21	VF overvoltage stall enable	0: Close 1: Enable	1	★	F215
P2-22	VF overvoltage stall suppression frequency gain	0 ~ 100	30	☆	F216
P2-23	Overvoltage stall maximum rise frequency limit	0 ~ 50Hz	5	☆	F217
P3 Group - Vector Control Parameters					
P3-00	Switching frequency P1	0.00 ~ P3-02	5.00 Hz	☆	F300
P3-02	Switching frequency P2	P3-00 ~ P0-14	10.00 Hz	☆	F302
P3-04	Low-frequency speed ratio gain	0.1 ~ 10.0	4.0	☆	F304
P3-05	Low-frequency speed integral time	0.01s ~ 10.00s	0.50s	☆	F305
P3-06	High-frequency speed proportional gain	0.1 ~ 10.0	2.0	☆	F306
P3-07	High-frequency speed integral time	0.01 ~ 10.00s	1.00s	☆	F307
P3-08	Speed ring integral attribute selection	0: Points are effective 1: Integral Separation	0	★	F308
P3-11	Torque current regulator Kp	0 ~ 30000	2200	☆	F30B
P3-12	Torque current regulator Ki	0 ~ 30000	1500	☆	F30C

Function code	name	content	Factory set up	Change	address
P3-13	Excitation current regulator Kp	0 ~ 30000	2200	☆	F30D
P3-14	Excitation current regulator Ki	0 ~ 30000	1500	☆	F30E
P3-15	Flux Braking Gain	0 ~ 200	0	☆	F30F
P3-16	Field weakening torque correction factor	50% ~ 200%	100%	☆	F310
P3-17	slip compensation gain	50% ~ 200%	100%	☆	F311
P3-18	Velocity loop feedback filter time constant	0.000 ~ 1.000s	0.015s	☆	F312
P3-19	Speed loop output filter time constant	0.000 ~ 1.000s	0.000s	☆	F313
P3-20	Electric torque upper limit source	0: P3-21 1: AI1 2: AI2 3: Communication given 4: PLUSE setting (analog range corresponds to P3-21)	0	☆	F314
P3-21	Electric torque limit	0.0% ~ 200.0%	150.0%	☆	F315
P3-22	Braking torque upper limit source	0: P3-23 1: AI1 2: AI2 3: Communication given 4: PLUSE setting (analog range corresponds to P3-23)	0	☆	F316
P3-23	Braking torque limit	0.0 ~ 200.0%	150.0%	☆	F317
P3-24	Synchronous motor low-speed magnetizing current	0.0% ~ 80.0%	25.0%	★	F318
P3-25	Synchronous motor magnetization cutoff frequency	0% ~ 100%	10%	★	F319
P3-26	Pre-excitation time	0s ~ 5s	0s	★	F31A
P3-27	Synchronous motor initial position	0: Disable 1: Identification Method One	1	★	F31B

Function code	name	content	Factory set up	Change	address
	identification enable selection	2: Identification Method Two			
P3-28	Initial position identification voltage given percentage	30% ~ 150 %	80%	★	F31C
P3-29	Synchronous machine start-up minimum carrier frequency	0.8 ~ P0-26 Set carrier frequency	2.0	★	F31D
P3-40	VVC high-pass filter coefficient	0 ~ 65535	100	☆	F328
P3-41	VVC oscillation suppression gain coefficient	0 ~ 65535	100	☆	F329
P3-42	VVC oscillation suppression damping coefficient	0 ~ 500	100	☆	F32A
P4 Group - First Motor Parameters					
P4-00	Motor parameter tuning	0: No function 1: Static Tuning 2: Rotary Tuning	0	★	F400
P4-01	Motor 1 Rated Power	0.1kw ~ 1000.0kw	model Sure	★	F401
P4-02	Motor 1 Rated Voltage	1V ~ 1500V	380V	★	F402
P4-03	Motor 1 Number of poles	2 ~ 64	model Sure	○	F403
P4-04	Motor 1 rated current	0.01A ~ 600.00A (motor rated power ≤30.0KW) 0.1A ~ 6000.0A (motor rated power >30.0KW)	P4-01 Sure	★	F404
P4-05	Motor 1 Rated Frequency	0.01Hz ~ P0-14	50.00Hz	★	F405
P4-06	Motor 1 rated speed	1rpm ~ 60000rpm	P4-01 Sure	★	F406
P4-07	Motor 1 no-load current	0.01A ~ P4-04 (Motor rated power ≤30.0KW) 0.1A ~ P4-04 (Motor rated power > 30.0KW)	model Sure	★	F407

Function code	name	content	Factory set up	Change	address
P4-08	Motor 1 stator resistance	0.001Ω ~ 65.535Ω	model Sure	★	F408
P4-09	Motor 1 rotor resistance	0.001Ω ~ 65.535Ω	model Sure	★	F409
P4-10	Motor 1 mutual inductance	0.1Mh ~ 6553.5 Mh	model Sure	★	F40A
P4-11	Motor 1 leakage inductance	0.01Mh ~ 655.35Mh	model Sure	★	F40B
P4-12	Acceleration during dynamic full tuning	1.0s ~ 6000.0s	10.0s	☆	F40C
P4-13	Dynamically fully tuned deceleration	1.0s ~ 6000.0s	10.0s	☆	F40D
P4-17	synchronous motor stator resistance	0.001Ω ~ 65.535Ω	model Sure	★	F411
P4-18	Synchronous motor D-axis inductance	0.01Mh ~ 655.35Mh	model Sure	★	F412
P4-19	Synchronous motor Q-axis inductance	0.01Mh ~ 655.35Mh	model Sure	★	F413
P4-20	Synchronous motor back electromotive force	1V ~ 65535V	model Sure	★	F414
P4-21	Synchronous motor no-load current	0.0% ~ 50.0%	10.0%	★	F415
P4-28	Encoder pulse line count (Before 4th harmonic)	1 ~ 65535	1024	★	F41C
P4-29	Encoder phase sequence selection	0: Positive 1: Reverse	0	★	F41D
P4-30	Encoder type	0: ABZ encoder 1: UVW encoder 2: Line-saving encoder 3: Rotary encoder 4: Sine/Cosine Encoder	0	★	F41E
P4-31	Number of pole pairs of rotary encoder	1 ~ 65535	1	★	F41F
P4-32	Encoder mounting position angle	0.0° - 359.9°	0.0°	★	F420

Function code	name	content	Factory set up	Change	address
P5 Group - Input Terminals					
P5-00	DI1 terminal function	0: No function 1: Forward Rotation (FWD) 2: Reverse operation (REV) 3: Three-wire operation control 4: Forward Jog (FJOG) 5: Reverse Jog (RJOG) 6: Terminal UP 7: Terminal DOWN 8: Free Parking 9: Fault Reset (RESET) 10: Operation paused 11: Normally open input for external faults 12: Multi-segment instruction terminal 1 13: Multi-segment instruction terminal 2 14: Multi-segment instruction terminal 3 15: Multi-segment instruction terminal 4 16: Acceleration/deceleration time selection terminal 1 17: Acceleration/deceleration time selection terminal 2 18: Frequency source switching 19: Reset UP/DOWN settings 20: Run command to switch terminals 21: Acceleration and deceleration prohibited 22: PID failure (paused) 23: PLC Status Reset 24: Frequency Pause 25: DI input timing starts	1	★	F500
P5-01	DI2 terminal function		2	★	F501
P5-02	DI3 terminal function		9	★	F502
P5-03	DI4 terminal function		12	★	F503
P5-04	DI5 terminal function		13	★	F504
P5-05	DI6 terminal function		0	★	F505
P5-06	DI7 terminal function		0	★	F506
P5-07	reserve		0	●	F507
P5-08	reserve		0	●	F508
P5-09	reserve		0	●	F509

Function code	name	content	Factory set up	Change	address
		26: Immediate DC braking 27: External fault normally closed input 28: Roll diameter reset 29: Counter Input 30: Counter Reset 31: STO1 input 32: Torque control disabled 33: Pulse Input 34: Frequency setting activation terminal 35: PID action direction reversed terminal 36: External parking terminal 37: Control command switching terminal 2 38: PID Integral Pause Terminal 39: Frequency source X and preset frequency switching terminal 40: Frequency source Y and preset frequency switching terminal 41: Motor selection terminal 42: Fire mode triggered 43: PID parameter switching terminal 44: Speed control/torque control switching 45: Emergency Stop 46: External terminal shutdown 47: Deceleration DC Braking 48: This run time is reset to zero. 49: Two-wire/three-wire switching 50: Do not reverse 51: User-defined fault 1 52: User-defined fault 2			

Function code	name	content	Factory set up	Change	address
		53: Sleep Input 54: Emergency Signals for Civil Elevators 55: Civil elevator maintenance signal 56: Initial roll diameter selection terminal 1 57: Initial roll diameter selection terminal 2 58: Roll diameter calculation stops 59: Inputting Circles 60: Rewind/Unwind Switch 61: STO2 input 62: Tension control material thickness 1 63: Tension control material thickness 2 64: Retain 65: Retain 66: Retain 67: Water level detection switch 1 68: Water level detection switch 2 69: Photovoltaic power supply switching 70: Retain 71: Retain			
P5-10	DI terminal filtering time	0.000 ~ 1.000s	0.010s	☆	F50A
P5-11	Terminal command method	0: Two-line type 1 1: Two-line type 2 2: Three-line type 1 3: Three-line type 2 4: Rising edge pulse operation	0	★	F50B
P5-12	Terminal UP/DOWN change rate	0.01Hz/s ~ 100.00Hz/s	1.00Hz/s	☆	F50C
P5-13	Terminal valid logic	0: High level	00000	★	F50D

Function code	name	content	Factory set up	Change	address
	1	1: Low level Units digit: DI1; Tens digit: DI2; Hundreds digit: DI3; Thousands: DI4; Ten thousandths place: DI5			
P5-15	AI1 minimum input value	0.00V ~ 10.00V	0.00V	☆	F50F
P5-16	AI1 minimum input corresponding settings	-100.0% ~ 100.0%	0.0%	☆	F510
P5-17	AI1 Maximum Input Value	0.00V ~ 10.00V	10.00V	☆	F511
P5-18	AI1 maximum input corresponding settings	-100.0% ~ 100.0%	100.0%	☆	F512
P5-19	AI1 Input Filtering Time	0.00s ~ 10.00s	0.10s	☆	F513
P5-20	AI2 minimum input value	0.00V ~ 10.00V	0.00V	☆	F514
P5-21	AI2 minimum input corresponding settings	-100.0% ~ 100.0%	0.0%	☆	F515
P5-22	AI2 maximum input value	0.00V ~ 10.00V	10.00V	☆	F516
P5-23	AI2 maximum input corresponding settings	-100.0% ~ 100.0%	100.0%	☆	F517
P5-24	AI2 Input Filtering Time	0.00s ~ 10.00s	0.10s	☆	F518
P5-25	AI3 minimum input value	0.00V ~ 10.00V	0.00V	☆	F519
P5-26	AI3 minimum input corresponding settings	-100.0% ~ 100.0%	0.0%	☆	F51A
P5-27	AI3 Maximum Input Value	0.00V ~ 10.00V	10.00V	☆	F51B
P5-28	AI3 maximum input corresponding settings	-100.0% ~ 100.0%	100.0%	☆	F51C

Function code	name	content	Factory set up	Change	address
P5-29	AI3 Input Filtering Time	0.00s ~ 10.00s	0.10s	☆	F51D
P5-30	PULSE (pulse) input minimum frequency	0.00kHz ~ 50.00kHz	0.00kHz	☆	F51E
P5-31	PULSE input minimum frequency corresponding to setting	-100.0% ~ 100.0%	0.0%	☆	F51F
P5-32	PULSE (pulse) input maximum frequency	0.00kHz ~ 50.00kHz	50.00KHz	☆	F520
P5-33	PULSE input maximum frequency corresponding to setting	-100.0% ~ 100.0%	100.0%	☆	F521
P5-34	PULSE Input Filtering Time	0.00s ~ 10.00s	0.10s	☆	F522
P5-35	DI1 activation delay time	0.0s ~ 3600.0s	0.0s	☆	F523
P5-36	DI1 disconnection delay time	0.0s ~ 3600.0s	0.0s	☆	F524
P5-37	DI2 activation delay time	0.0s ~ 3600.0s	0.0s	☆	F525
P5-38	DI2 disconnection delay time	0.0s ~ 3600.0s	0.0s	☆	F526
P5-39	DI3 activation delay time	0.0s ~ 3600.0s	0.0s	☆	F527
P5-40	DI3 disconnection delay time	0.0s ~ 3600.0s	0.0s	☆	F528
P5-41	AI1 as a DI terminal function selection	0 ~ 71, functions the same as ordinary DI terminals.	0	★	F529
P5-42	AI2 as a DI terminal function selection	0 ~ 71, functions the same as ordinary DI terminals.	0	★	F52A
P5-44	Effective mode selection when AI is used as a DI terminal	Units digit, AI1: 0: Active high. 1: Active low Tens, AI2: 0: Active high. 1: Active low	0x00	☆	F52C

Function code	name	content	Factory set up	Change	address
		Hundreds: Reserved			
P5-45	AI curve selection	AI Multi-Point Curve Selection: Units digit: AI1 0:2 points, line P5-15 ~ P5-19 1: Multi-point curve 1: PE-00 ~ PE-07 2: Multi-point curve 2: PE-08 ~ PE-15 Tenth place: AI2 0:2 points, line P5-20 ~ P5-24 1: Multi-point curve 1: PE-00 ~ PE-07 2: Multi-point curve 2: PE-08 ~ PE-15 Hundreds: Reserved	0x00	☆	F52D
P5-48	Terminal control power-on self-run delay time	0.00s ~ 360.00s (Valid when terminal control P7-41=0)	0.00s	☆	F530
P6 Group - Output Terminals					
P6-00	Control board relay RELAY1 Output (TA/TB/TC) Selection	0: No output 1: Inverter running signal (RUN) 2: Fault Output	2	☆	F600
P6-01	Control board relay RELAY2 Output (RA/RB/RC) Selection	3: Frequency level detection PDT1 arrival 4: Frequency Arrival (PAR) 5: Running at zero speed	1	☆	F601
P6-02	Y1 Output Selection (Optional accessories support this feature)	6: Motor overload warning 7: Inverter overload pre-alarm 8: PLC cycle complete	1	☆	F602
P6-03	Y2 Output Selection (Optional accessories support this feature)	9: Cumulative running time reached 10: Frequency limited 11: Ready to run 12: AI1 > AI2 13: Maximum frequency reached 14: Lower limit frequency	1	☆	F603

Function code	name	content	Factory set up	Change	address
		reached 15: Undervoltage output 16: Communication Settings 17: Timer Output 18: Reverse operation 19: Retain 20: Set length reached 21: Torque Limiting 22: Current 1 arrives 23: Frequency 1 arrives 24: Module temperature reached 25: Loading 26: Cumulative power-on time reached 27: Timed arrival output 28: Retain 29: Set counter value reached 30: The specified count value has been reached. 31: Motor 1, Motor 2 indicator 32: Brake control output 33: Running at zero speed 2 34: Frequency level detection PDT2 arrival 35: Zero current state 36: Software current exceeds limit 37: Lower limit frequency reached, output even when shutdown. 38: Alarm Output 39: Motor overheating pre-alarm output 40: AI1 input limit exceeded 41, 42: Retain 43: Frequency reaches 2 44: Current reaches 2 45: Fault output (no output			

Function code	name	content	Factory set up	Change	address
		under low voltage) 46, 47: Retain 48: Photovoltaic water pump control valve 49: Motor running direction output			
P6-04	FM terminal output mode selection	0: Pulse Output (FMP) 1: Open Collector Switch Output (FMR)	0	☆	F604
P6-05	FMR Output Selection	Same as Y1 output selection	0	☆	F605
P6-09	AO1 output selection	0: Operating frequency 1: Set frequency 2: Output current (100% corresponds to twice the motor's rated current) 3: Output power (100% corresponds to twice the rated power of the motor) 4: Output voltage (100% corresponds to 1.2 times the rated voltage of the frequency converter) 5: Simulate AI1 input values 6: Simulate AI2 input values 7: Communication Settings 8: Output torque 9: Length 10: Count value 11: Motor speed 12: Bus voltage (0 to 3 times the rated voltage of the frequency converter) 13: Pulse Input 14: Output current (100% corresponds to 1000.0A) 15: Output voltage (100.0% corresponds to 1000.0V) 16: Output torque (actual torque value - 2 times rated	0	☆	F609
P6-10	AO2 output selection		0	☆	F60A
P6-11	FMP Output Selection		0	☆	F60B

Function code	name	content	Factory set up	Change	address
		to 2 times rated)			
P6-12	FMP output maximum frequency	0.01kHz ~ 100.00kHz	50.00	☆	F60C
P6-13	AO1 output lower limit	-100.0% ~ P6-15	0.0%	☆	F60D
P6-14	The lower limit corresponds to the AO1 output.	0.00V ~ 10.00V	0.00V	☆	F60E
P6-15	AO1 Output Limit	P6-13 ~ 100.0%	100.0%	☆	F60F
P6-16	The upper limit corresponds to the AO1 output.	0.00 ~ 10.00V	10.00V	☆	F610
P6-17	AO2 output lower limit	-100.0% ~ P6-19	0.0%	☆	F611
P6-18	The lower limit corresponds to AO2 output.	0.00V ~ 10.00V	0.00V	☆	F612
P6-19	AO2 Output Limit	P6-17 ~ 100.0%	100.0%	☆	F613
P6-20	The upper limit corresponds to the AO2 output.	0.00 ~ 10.00V	10.00V	☆	F614
P6-21	Main relay T energizing delay	0.0s ~ 3600.0s	0.0s	☆	F615
P6-22	Main relay R energizing delay	0.0s ~ 3600.0s	0.0s	☆	F616
P6-23	Y1 high-level output delay	0.0s ~ 3600.0s	0.0s	☆	F617
P6-25	FM as Y terminal output delay	0.0s ~ 3600.0s	0.0s	☆	F619
P6-26	Main relay T disconnection delay	0.0s ~ 3600.0s	0.0s	☆	F61A
P6-27	Main relay R disconnection delay	0.0 ~ 3600.0S	0.0s	☆	F61B
P6-28	Y1 low-level output delay	0.0 ~ 3600.0S	0.0s	☆	F61C
P6-29	Y2 low-level output delay	0.0 ~ 3600.0S	0.0s	☆	F61D

Function code	name	content	Factory set up	Change	address
P7 Group - Accessibility and Keyboard Display					
P7-00	Jog operation frequency	0.00Hz to maximum frequency	6.00Hz	☆	F700
P7-01	Inching acceleration time	0.0s ~ 3000.0s	10.0s	☆	F701
P7-02	Inching deceleration time	0.0s ~ 3000.0s	10.0s	☆	F702
P7-03	Acceleration Time 2	0.0s ~ 3000.0s	10.0s	☆	F703
P7-04	Deceleration time 2	0.0 ~ 3000.0s	10.0s	☆	F704
P7-05	Acceleration Time 3	0.0 ~ 3000.0s	10.0s	☆	F705
P7-06	Deceleration time 3	0.0 ~ 3000.0s	10.0s	☆	F706
P7-07	Acceleration Time 4	0.0 ~ 3000.0s	10.0s	☆	F707
P7-08	Deceleration time 4	0.0 ~ 3000.0s	10.0s	☆	F708
P7-09	Jump frequency 1	0.00Hz to maximum frequency	0.00Hz	☆	F709
P7-10	Jump frequency 1 amplitude	0.00Hz to maximum frequency	0.00Hz	☆	F70A
P7-11	Jump frequency 2	0.00Hz to maximum frequency	0.00Hz	☆	F70B
P7-12	Jump frequency 2 amplitude	0.00Hz to maximum frequency	0.00Hz	☆	F70C
P7-15	Forward and reverse dead zone time	0.0s ~ 3000.0s	0.0s	☆	F70F
P7-16	Keyboard knob precision	0: Default mode 1: 0.1Hz 2: 0.5Hz 3: 1Hz 4: 2Hz 5: 4Hz 6: 5Hz 7: 8Hz 8: 10Hz 9: 0.01Hz 10: 0.05Hz	0 2	☆	F710
P7-17	Frequency below the lower limit	0: Operating at the following frequency limit	0	☆	F711

Function code	name	content	Factory set up	Change	address
		1: Shutdown 2: Zero-speed operation			
P7-18	Sagging	0.0% ~ 100.0%	0.0%	☆	F712
P7-19	Delay time for shutdown when frequency is below the lower limit	0.0s ~ 600.0s	0.0s	☆	F713
P7-20	Set cumulative running time	0h ~ 65000h	0h	☆	F714
P7-21	Inching priority	0: Invalid 1: Jog priority mode 1 2: Jog Priority Mode 2 1) Jogging is still effective in case of user fault or PID loss. 2) The shutdown mode and DC braking can be set.	1	☆	F715
P7-22	Frequency detection value (PDT1 level)	0.00Hz to maximum frequency	50.00Hz	☆	F716
P7-23	Frequency check hysteresis (PDT1 hysteresis)	0.0% ~ 100.0%	5.0%	☆	F717
P7-24	Frequency reaches detection width	0.0% ~ 100.0%	0.0%	☆	F718
P7-25	reserve		0	●	F719
P7-26	Fan control	0: Fan running continuously 1: The fan operates when the frequency converter is running. (The fan will continue to run even when the machine is stopped if the temperature is above 40°C.) 2 : Operation begins once the set temperature (P7-42) is reached.	1	★	F71A
P7-27	STOP/RESET function	0: Only valid when using keyboard controls. 1: The stop or reset function	1	☆	F71B

Function code	name	content	Factory set up	Change	address
		is effective under all control modes.			
P7-28	MF.K key function selection	0: Forward jogging 1: Switching between forward and reverse directions 2: Reverse inching 3: Switching between panel and remote control 4: Switch the frequency source on the panel (press MF.K keys to cycle through the frequency sources). 5: Switching between panel, terminal, and remote control 6: Button inactive	6	★	F71C
P7-29	LED Operation Display	0000 ~ 0xPFPF (hexadecimal number) 0000 to 0xPFPF Bit00: Operating frequency 0001 Bit01: Set frequency 0002 Bit02: Bus voltage 0004 Bit03: Output Voltage 0008 Bit04: Output Current 0010 Bit05: Output Power 0020 Bit06 : DI Input Status 0040 Bit07: DO Output Status 0080 Bit08: AI1 Voltage 0100 Bit09: AI2 Voltage 0200 Bit10: PID setpoint	H.4 8 1F	☆	F71D

Function code	name	content	Factory set up	Change	address
		0400 Bit11: PID feedback value 0800 Bit12: Count value 1000 Bit13: Length value 2000 Bit14: Load speed display 4000 Bit15: PLC Stage 8000			
P7-30	LED Stop Display	1 to 0x1PPF (hexadecimal number) Bit00: Set frequency 0001 Bit01: Bus voltage 0002 Bit02: DI Input Status 0004 Bit03: DO Output Status 0008 Bit04: AI1 Voltage 0010 Bit05: AI2 Voltage 0020 Bit06: PID Setpoint 0040 Bit07: PID Feedback Value 0080 Bit08: Count value 0100 Bit09: Length value 0200 Bit10: Load speed display 0400 Bit11: PLC Stage 0800 Bit12: Input pulse frequency 1000 Bits 13-15: Reserved	H.00 0 3	☆	F71E

Function code	name	content	Factory set up	Change	address
P7-31	Load speed display coefficient	0.001 ~ 655.00	1.000	☆	F71F
P7-32	Radiator temperature	12°C ~ 100°C	Measured value	●	F720
P7-33	Cumulative power-on time	0h ~ 65535h	Measured value	●	F721
P7-34	Cumulative running time	0h ~ 65535h	Measured value	●	F722
P7-36	Current run timer enable selection	0: Disable 1: Enable	0	★	F724
P7-37	Current time source selection for the next timer run	0: Digital setting P7-38 1: AI1 2: AI2 (AI with P7-38 as 100%)	0	★	F725
P7-38	Current run time setting value	0.0 min ~ 6500.0 min	0.0min	☆	F726
P7-39	High-level timing time	0.0s ~ 6000.0s	2.0s	☆	F727
P7-40	Low level timing time	0.0s ~ 6000.0s	2.0s	☆	F728
P7-41	Start protection function	0: Invalid (Start terminal command valid, start directly) 1: Effective 2: When in keyboard control mode, it will automatically restart after a power outage and subsequent power-on.	1	☆	F729
P7-42	Fan startup temperature	10 ~ 90°C	60°C	☆	F72A
P7-43	Frequency reaches detection value 1	0.00Hz ~ P0-14	50.00Hz	☆	F72B
P7-44	Frequency detection value 1 reaches width	0.0% ~ 100.0%	0.0%	☆	F72C
P7-45	Current reaches detection value 1	0.0% ~ 300.0%	100.0%	☆	F72D

Function code	name	content	Factory set up	Change	address
P7-46	Current detection value 1 reaches width	0.0% ~ 300.0%	0.0%	☆	F72E
P7-49	User password	0 ~ 65535	0	☆	F731
P7-50	Is the jump frequency effective during acceleration and deceleration?	0: Invalid 1: Effective	0	☆	F732
P7-51	Set power-on arrival time	0h ~ 65530h	0h	☆	F733
P7-53	Acceleration time 1/2 frequency switching point	0.00Hz to maximum frequency (P0-14)	0.00Hz	☆	F735
P7-54	Deceleration time 1/2 frequency switching point	0.00Hz to maximum frequency (P0-14)	0.00Hz	☆	F736
P7-55	Frequency detection value (PDT2 level)	0.00Hz to maximum frequency (P0-14)	50.00Hz	☆	F737
P7-56	Frequency detection PDT2 hysteresis value	0.0% ~ 100.0%	5.0%	☆	F738
P7-57	Frequency reaches detection value 2	0.00Hz to maximum frequency (P0-14)	50.00Hz	☆	F739
P7-58	Frequency reaches detection amplitude 2	0.0% ~ 100.0%	0.0%	☆	F73A
P7-59	Zero current detection value	0.0% ~ 300.0%	10.0%	☆	F73B
P7-60	Zero current detection delay time	0.01s ~ 300.00s	1.00s	☆	F73C
P7-61	Output current amplitude detection	20.0% ~ 400.0%	200.0%	☆	F73D
P7-62	Maximum allowable time for software overcurrent	0s ~ 3600.0s	0s	☆	F73E
P7-63	Current reaches detection value 2	20.0% ~ 300.0%	100.0%	☆	F73F

Function code	name	content	Factory set up	Change	address
P7-64	Current reaches detection amplitude 2	0.0% ~ 300.0%	0.0%	☆	F740
P7-65	LED operating display parameters 2	0x0 ~ 0x1PF Bit00: Target torque % 0001 Bit01: Output torque % 0002 Bit02: Pulse input pulse frequency (kHz) 0004 Bit03: DI5 high-speed pulse sampling linear velocity (m/min) 0008 Bit04: Motor speed (rpm) 0010 Bit05: AC Incoming Current (A) 0020 Bit06: Cumulative running time (h) 0040 Bit07: Current run time (min) 0080 Bit08: Cumulative power consumption (kWh) 0100 Bit09 ~ Bit15: Reserved	H.010	☆	F741
P7-67	AI1 Input Voltage Lower Limit	0.00V ~ P7-68	2.00V	☆	F743
P7-68	AI1 Input Voltage Limit	P7-67 ~ 11.00V	8.00V	☆	F744
P7-69	Module temperature reached	0°C ~ 90°C	70°C	☆	F745
P7-70	Output power display correction coefficient	0.001 ~ 3.000	1.000	☆	F746
P7-71	Linear velocity display correction coefficient	Linear velocity = P7-71 * number of HDI pulses sampled per second / PB-07	1.000	☆	F747
P7-72	Cumulative electricity consumption (kWh)	0 ~ 65535	Measured value	●	F748
P7-73	Performance software version	Performance software version number	##	●	F749

Function code	name	content	Factory set up	Change	address
P7-74	Functional software version	Functional software version number	##	●	F74A
P7-75	Enhanced function parameter display selection	0: Hide the enhanced feature parameter group: A0 ~ A3, B0 ~ B5 1: Display Enhancement Parameter Group: A0 ~ A3, B0 ~ B5	1	☆	F74B
P7-76	Motor speed display correction coefficient	0.0010 ~ 3.0000	1.0000	☆	F74C
P7-80	Fire mode enable	0 : Off 1: Enable	0	☆	F750
P7-81	Setting frequency in fire mode	0Hz ~ P0-14	50.00Hz	☆	F751
P8 Group - Communication Parameters					
P8-00	baud rate settings	0:300 BPS 1:600 BPS 2: 1200 BPS 3: 2400 BPS 4: 4800 BPS 5: 9600 BPS 6: 19200 BPS 7: 38400 BPS	5	☆	F800
P8-01	Data format	0: No checksum <8,N,2> 1: Even parity <8,E,1> 2: Odd parity <8,O,1> 3: No checksum 1<8,N,1>	0	☆	F801
P8-02	Mailing address	0 ~ 247 (0 is the broadcast address)	1	☆	F802
P8-03	Response time	0ms ~ 30ms	2ms	☆	F803
P8-04	Communication timeout	0.0s ~ 30.0s	0.0s	☆	F804
P8-05	Communication format selection	0: Standard Modbus RTU protocol 1: Non-standard ModBusRTU protocol	0	☆	F805
P8-06	reserve	reserve	0	☆	F806

Function code	name	content	Factory set up	Change	address
P8-11	Communication protocol selection	0 : Modbus protocol 1: Communication Expansion Card	0	☆	F80B
P9 Group - Fault and Protection					
P9-00	Motor overload protection selection	0: Prohibited 1: Allowed	1	☆	F900
P9-01	Motor overload protection gain	0.20 ~ 10.00	1.00	☆	F901
P9-02	Motor overload warning coefficient (%)	50% ~ 100%	80%	☆	F902
P9-03	Overvoltage stall protection gain	000 ~ 100	030	☆	F903
P9-04	Overvoltage stall protection voltage	200.0 ~ 850.0V	760.0V	★	F904
P9-05	VF Over-Slip Protection Gain	0 ~ 100	20	☆	F905
P9-06	VF overcurrent stall protection current	50% ~ 200%	150%	★	F906
P9-07	VF weak magnetic region current stall protection coefficient	50% ~ 200%	50 %	★	F907
P9-08	Overpressure stall allowable rise limit	0.0% ~ 50.0%	10.0%	☆	F908
P9-11	Number of automatic fault resets	0 ~ 20	0	☆	F90B
P9-12	Fault relay operation selection during automatic fault reset	0: No action 1: Actions	0	☆	F90C
P9-13	Automatic fault reset interval	0.1s ~ 100.0s	1.0s	☆	F90D
P9-14	Input phase loss enable selection	0: Invalid 1: Effective	1	☆	F90E
P9-15	Output phase loss enable selection	0: Invalid 1: Effective	1	☆	F90F
P9-16	Power-on short-	0: Invalid	1	☆	F910

Function code	name	content	Factory set up	Change	address
	circuit protection selection	1: Effective			
P9-17	Automatic reset selection for undervoltage fault	0: Manual fault reset is required after an undervoltage fault. 1: After an undervoltage fault, the fault is automatically reset based on the bus voltage.	0	☆	F911
P9-18	Overvoltage suppression mode selection	0: Invalid 1: Overvoltage Suppression Mode 1 2: Overvoltage Suppression Mode 2	1	★	F912
P9-19	Overexcitation activation status selection	0: Invalid 1: Effective constant speed and deceleration process during operation. 2: Effective only during deceleration	2	★	F913
P9-20	Overvoltage suppression mode 2 limit value	1.0% ~ 150.0%	100.0%	★	F914
P9-22	Fault protection action 1	0 ~ 22202; Units digit: Motor overload - Err14 0: Free Parking 1: Shut down the machine using the shutdown method. 2: Continue running Tens: Reserved Hundreds digit: Input phase missing - Err23 Thousands digit: Output phase loss - Err24 Ten-thousands digit: Parameter read/write error - Err25	00000	☆	F916
P9-23	Fault protection action 2	0 ~ 22222; Units digit: Communication	00000	☆	F917

Function code	name	content	Factory set up	Change	address
		failure - Err27 0: Free Parking 1: Shut down the machine using the shutdown procedure. 2: Continue running Tens digit: External fault - Err28 Hundreds digit: Speed deviation too large fault - Err29 Thousands: User-defined fault 1-Err30 Ten thousandths place: User-defined fault 2-Err31			
P9-24	Fault protection action 3	0 ~ 22022; Units digit: PID feedback loss during runtime - Err32 0: Free Parking 1: Shut down the machine using the shutdown procedure. 2: Continue running Tens: Load failure - Err34 Hundreds digit: Software overcurrent - Err16 Thousands: Current consecutive run time reached -Err39 Ten thousandths place: Running time reaches -Err40	00000	☆	F918
P9-26	Frequency selection for continued operation during failure	0: Run at the current operating frequency 1: Run at the set frequency 2: Run at the maximum frequency 3: Operating at the following frequency limits 4: Operate at the standby frequency setting P9-27	1	☆	F91A

Function code	name	content	Factory set up	Change	address
P9-27	Abnormal standby frequency setting	0.0% ~ 100.0%	100.0%	☆	F91B
P9-28	Load drop protection selection	0: Invalid 1: Effective	0	☆	F91C
P9-29	Load drop detection level	0.0% ~ 80.0%	20.0%	★	F91D
P9-30	Load drop detection time	0.0s ~ 100.0s	5.0s	☆	F91E
P9-31	Speed deviation too large detection value	0.0% ~ 100.0%	20.0%	☆	F91F
P9-32	Excessive speed deviation requires detection time	0.0s ~ 100.0s	0.0s	☆	F920
P9-33	Overspeed detection value	0.0% ~ 100.0%	20.0%	☆	F921
P9-34	Overspeed detection time	0.0s ~ 100.0s	2.0s	☆	F922
P9-35	Motor overload protection current coefficient	100% ~ 200%	100%	☆	F923
P9-36	Motor overheating pre-alarm threshold 1	0 - 200°C	80°C	☆	F924
P9-37	Motor overheat protection value 1	0 - 200°C	100°C	☆	F925
P9-38	Temperature sensor type selection 1	0: No temperature sensor 1: PT100 2: PT1000	0	☆	F926
P9-40	Light load current detection	0.0% ~ 100.0% (Motor rated current P4-04)	20.0%	☆	F928
P9-41	Light load current detection time	0 ~ 3000 s (0 = light load current detection off)	0s	☆	F929
P9-42	Light load fault self-reset time	0 ~ 60,000 s (0 = Light load fault self-reset disabled)	0s	☆	F92A
P9-44	AI2-PTC protection threshold	0.00 ~ 10.00V	0.00V	☆	F92C
P9-45	AI2-PTC protection threshold continuous	0.0 ~ 100.0V	0.0s	☆	F92D

Function code	name	content	Factory set up	Change	address
	detection time				
P9-46	Motor overheating pre-alarm threshold 2	0 - 200°C	80°C	☆	F92 E
P9-47	Motor overheat protection value 2	0 - 200°C	100°C	☆	F92 F
P9-48	Temperature sensor type selection 2	0: No temperature sensor 1: PT100 2: PT1000	0	☆	F9 30
PA Group - PID Function					
PA-00	PID given source	0: PID function code PA-01 1: AI1 2: AI2 3: Communication given 4: PULSE given 5: Multi-segment instruction setting 6: Up/Down modification of PA-01 (effective when P0-06=6)	0	☆	FA00
PA-01	PID digital setpoint	0.0% ~ 100.0%	50.0%	☆	FA01
PA-02	PID given change time	0.00s ~ 650.00s	0.00s	☆	FA02
PA-03	PID feedback source	0: AI1 1: AI2 2: AI1-AI2 3: Communication given 4: PULSE given 5: AI1 + AI2 6: MAX(AI1 , AI2) 7: MIN(AI1 , AI2)	0	☆	FA03
PA-04	PID direction of action	0: Positive effect 1: Reaction	0	☆	FA04
PA-05	PID setpoint feedback range	0 ~ 65535	1000	☆	FA05
PA-06	Proportional gain P	0.0 ~ 100.0	20.0	☆	FA06
PA-07	Integral Time I	0.01s ~ 10.00s	2.00s	☆	FA07
PA-08	Differential time D	0.000s ~ 10.000s	0.000s	☆	FA08

Function code	name	content	Factory set up	Change	address
PA-09	PID reverse cutoff frequency	0.00 Hz ~ Maximum frequency (P0-14)	0.00Hz	☆	FA09
PA-10	Deviation Limit	0.0% ~ 100.0%	0.0%	☆	FA0A
PA-11	Differential limiting	0.00% ~ 100.00%	0.10%	☆	FA0B
PA-12	PID feedback filter time	0.00s ~ 60.00s	0.00s	☆	FA0C
PA-13	PID feedback loss of detection value	0.0% ~ 100.0%	0.0%	☆	FA0D
PA-14	PID feedback loss detection time	0.0s ~ 3600.0s	0s	☆	FA0E
PA-18	Proportional gain P2	0.0 ~ 100.0	20.0	☆	FA12
PA-19	Integration time I2	0.01s ~ 10.00s	2.00s	☆	FA13
PA-20	Differential time D2	0.000s ~ 10.000s	0.000s	☆	FA14
PA-21	PID parameter switching conditions	0: Do not switch 1: DI terminal 2: Automatic switching based on deviation	0	☆	FA15
PA-22	PID parameter switching deviation 1	0.0% ~ PA-23	20.0%	☆	FA16
PA-23	PID parameter switching deviation 2	PA-22 ~ 100.0%	80.0%	☆	FA17
PA-24	PID initial value	0.0% ~ 100.0%	0.0%	☆	FA18
PA-25	PID initial value hold time	0.00s ~ 650.00s	0.00s	☆	FA19
PA-26	Maximum positive deviation between two outputs	0.00% ~ 100.00%	1.00%	☆	FA1A
PA-27	The maximum value of the opposite deviation between the two outputs	0.00% ~ 100.00%	1.00%	☆	FA1B
PA-28	PID integral attribute	Units digit: Separation of integrals 0: Invalid 1: Effective	00	☆	FA1C

Function code	name	content	Factory set up	Change	address
		Tens digit: Output to the limit, whether to stop integration. 0: Continue accumulating points 1: Stop scoring			
PA-29	PID Stop Calculation	0: No operation during shutdown 1: Operations during shutdown	0	☆	FA1D
PB group - oscillation frequency, fixed length and counting					
PB-00	Swing setting method	0: relative to the center frequency 1: Relative to the maximum frequency	0	☆	FB00
PB-01	Swing frequency amplitude	0.0% ~ 100.0%	0.0%	☆	FB01
PB-02	Jump frequency amplitude	0.0% ~ 50.0%	0.0%	☆	FB02
PB-03	Oscillation period	0.1s ~ 3000.0s	10.0s	☆	FB03
PB-04	Triangular wave rise time coefficient	0.1% ~ 100.0%	50.0%	☆	FB04
PB-05	Set length	0m ~ 65535m	1000m	☆	FB05
PB-06	Actual length	0m ~ 65535m	0m	☆	FB06
PB-07	Number of pulses per m	0.1 ~ 6553.5	100.0	☆	FB07
PB-08	Set count value	1 ~ 65535	1000	☆	FB08
PB-09	Specify count value	1 ~ 65535	1000	☆	FB09
PC Group - Multi-segment instruction and simple PLC functions					
PC-00	Multi-speed 0	-100.0% ~ 100.0%	0.0%	☆	FC00
PC-01	Multi-speed 1	-100.0% ~ 100.0%	0.0%	☆	FC01
PC-02	Multi-speed 2	-100.0% ~ 100.0%	0.0%	☆	FC02
PC-03	Multi-speed 3	-100.0% ~ 100.0%	0.0%	☆	FC03
PC-04	Multi-speed 4	-100.0% ~ 100.0%	0.0%	☆	FC04

Function code	name	content	Factory set up	Change	address
PC-05	Multi-speed 5	-100.0% ~ 100.0%	0.0%	☆	FC05
PC-06	Multi-speed 6	-100.0% ~ 100.0%	0.0%	☆	FC06
PC-07	Multi-speed 7	-100.0% ~ 100.0%	0.0%	☆	FC07
PC-08	Multi-speed 8	-100.0% ~ 100.0%	0.0%	☆	FC08
PC-09	Multi-speed 9	-100.0% ~ 100.0%	0.0%	☆	FC09
PC-10	Multi-speed 10	-100.0% ~ 100.0%	0.0%	☆	FC0A
PC-11	Multi-speed 11	-100.0% ~ 100.0%	0.0%	☆	FC0B
PC-12	Multi-speed 12	-100.0% ~ 100.0%	0.0%	☆	FC0C
PC-13	Multi-speed 13	-100.0% ~ 100.0%	0.0%	☆	FC0D
PC-14	Multi-speed 14	-100.0% ~ 100.0%	0.0%	☆	FC0E
PC-15	Multi-speed 15	-100.0% ~ 100.0%	0.0%	☆	FC0F
PC-16	PLC operation mode	0: Shutdown after a single run 1: Retain final value in a single run 2: Keep looping	0	☆	FC10
PC-17	PLC power-off memory selection	0: Does not remember if power is lost or the device is stopped. 1: Remembers memory after power failure and does not remember memory after shutdown. 2: It does not remember when power is off, but remembers when the device is off. 3: Power-off memory and shutdown memory	0	☆	FC11
PC-18	PLC running time segment 0	0.0 ~ 6500.0	0.0	☆	FC12
PC-19	PLC Segment 0: Time Adjustment/Subtraction Selection	0 to 3 (representing acceleration/deceleration times 1 to 4 respectively)	0	☆	FC13

Function code	name	content	Factory set up	Change	address
PC-20	PLC first stage of operation time	0.0 ~ 6500.0	0.0	☆	FC14
PC-21	PLC First Stage Add/Subtract Time Selection	0 to 3 (representing acceleration/deceleration times 1 to 4 respectively)	0	☆	FC15
PC-22	PLC second stage running time	0.0 ~ 6500.0	0.0	☆	FC16
PC-23	PLC Second Stage Add/Subtract Time Selection	0 to 3 (representing acceleration/deceleration times 1 to 4 respectively)	0	☆	FC17
PC-24	PLC third stage running time	0.0 ~ 6500.0	0.0	☆	FC18
PC-25	PLC third stage time adjustment selection	0 to 3 (representing acceleration/deceleration times 1 to 4 respectively)	0	☆	FC19
PC-26	PLC running time 4th stage	0.0 ~ 6500.0	0.0	☆	FC1A
PC-27	PLC 4th stage time adjustment selection	0 to 3 (representing acceleration/deceleration times 1 to 4 respectively)	0	☆	FC1B
PC-28	PLC running time (5th stage)	0.0 ~ 6500.0	0.0	☆	FC1C
PC-29	PLC 5th stage time adjustment selection	0 to 3 (representing acceleration/deceleration times 1 to 4 respectively)	0	☆	FC1D
PC-30	PLC running time segment 6	0.0 ~ 6500.0	0.0	☆	FC1E
PC-31	PLC 6th stage time adjustment selection	0 to 3 (representing acceleration/deceleration times 1 to 4 respectively)	0	☆	FC1F
PC-32	PLC running time segment 7	0.0 ~ 6500.0	0.0	☆	FC20
PC-33	PLC 7th stage time adjustment selection	0 to 3 (representing acceleration/deceleration times 1 to 4 respectively)	0	☆	FC21
PC-34	PLC running time segment 8	0.0 ~ 6500.0	0.0	☆	FC22
PC-35	PLC 8th segment: Time adjustment selection	0 to 3 (representing acceleration/deceleration times 1 to 4 respectively)	0	☆	FC23

Function code	name	content	Factory set up	Change	address
PC-36	PLC running time segment 9	0.0 ~ 6500.0	0.0	☆	FC24
PC-37	PLC 9th segment: Time adjustment selection	0 to 3 (representing acceleration/deceleration times 1 to 4 respectively)	0	☆	FC25
PC-38	PLC running time segment 10	0.0 ~ 6500.0	0.0	☆	FC26
PC-39	PLC 10th stage time adjustment selection	0 to 3 (representing acceleration/deceleration times 1 to 4 respectively)	0	☆	FC27
PC-40	PLC 11th running time	0.0 ~ 6500.0	0.0	☆	FC28
PC-41	PLC 11th segment: Time adjustment selection	0 to 3 (representing acceleration/deceleration times 1 to 4 respectively)	0	☆	FC29
PC-42	PLC 12th segment running time	0.0 ~ 6500.0	0.0	☆	FC2A
PC-43	PLC 12th segment: Time adjustment selection	0 to 3 (representing acceleration/deceleration times 1 to 4 respectively)	0	☆	FC2B
PC-44	PLC 13th running time	0.0 ~ 6500.0	0.0	☆	FC2C
PC-45	PLC 13th segment: Time adjustment selection	0 to 3 (representing acceleration/deceleration times 1 to 4 respectively)	0	☆	FC2D
PC-46	PLC running time segment 14	0.0 ~ 6500.0	0.0	☆	FC2E
PC-47	PLC 14th segment: Time adjustment selection	0 to 3 (representing acceleration/deceleration times 1 to 4 respectively)	0	☆	FC2F
PC-48	PLC running time segment 15	0.0 ~ 6500.0	0.0	☆	FC30
PC-49	PLC Segment 15: Time Adjustment Selection	0 to 3 (representing acceleration/deceleration times 1 to 4 respectively)	0	☆	FC31
PC-50	PLC running time unit selection	0: s(s), 1: h (hours)	0	☆	FC32
PC-51	Multi-speed priority mode selection	0: Multi-speed is not prioritized 1: Multi-speed priority	1	☆	FC33

Function code	name	content	Factory set up	Change	address
PC-52	Multi-stage speed priority acceleration/deceleration time selection	0: Acceleration/deceleration time 1 1: Acceleration/deceleration time 2 2: Acceleration/deceleration time 3 3: Acceleration/deceleration time 4	0	☆	FC34
PC-53	Multi-speed PC-00 ~ PC-15 unit selection	0: % 1: Hz	0	☆	FC35
PC-55	Multi-segment instruction 0 given mode	0: Function code PC-00 given 1: AI1 2: AI2 3: PULSE pulse 4: PID 5: Preset frequency setting (P0-11), UP/DOWN can be modified.	0	☆	FC37
PD-group torque control					
PD-00	Torque command source selection	0: Digital Setting (PD-01) 1: AI1 2: AI2 3: Communication given 4: PULSE pulse frequency setting 5: MIN(AI1,AI2) 6: MAX(AI1,AI2) (Options 1-6 correspond to PD-01 for full scale)	0	★	FD00
PD-01	Torque digital setpoint	-200.0% ~ 200.0%	150.0%	☆	FD01
PD-03	Maximum frequency in the positive direction of torque control	0.00Hz to maximum frequency (P0-14)	50.00Hz	☆	FD03
PD-04	Maximum frequency in the opposite direction of torque control	0.00Hz to maximum frequency (P0-14)	50.00Hz	☆	FD04

Function code	name	content	Factory set up	Change	address
PD-06	Torque command filtering time	0.00s ~ 10.00s	0.00s	☆	FD06
PD-07	Torque mode frequency acceleration time	0.0s ~ 1000.0s	10.0s	☆	FD07
PD-08	Torque mode frequency deceleration time	0.0s ~ 1000.0s	10.0s	☆	FD08
PD-10	Speed/Torque Mode Selection	0: Speed Mode 1: Torque Mode	0	★	FD0A
PE Group - AI Multi-point Curve Setting					
PE-00	Curve 1 Minimum Input	-10.00V ~ PE-02	0.00V	☆	FE00
PE-01	Curve 1 Minimum Input Corresponding Setting	-100.0% ~ 100.0%	0.0%	☆	FE01
PE-02	Curve 1 Inflection Point 1 Input	PE-00 ~ PE-04	3.00V	☆	FE02
PE-03	Curve 1 Inflection Point 1 Input Corresponding Settings	-100.0% ~ 100.0%	30.0%	☆	FE03
PE-04	Curve 1 Inflection Point 2 Input	PE-02 ~ PE-06	6.00V	☆	FE04
PE-05	Curve 1 Inflection Point 2 Input Corresponding Settings	-100.0% ~ 100.0%	60.0%	☆	FE05
PE-06	Curve 1 Maximum Input	PE-06 ~ 10.00	10.00V	☆	FE06
PE-07	Curve 1 Maximum Input Corresponding Setting	-100.0% ~ 100.0%	100.0%		FE07
PE-08	Curve 2 Minimum Input	-10.00 ~ PE-10	0.00V	☆	FE08
PE-09	Curve 2 Minimum Input Corresponding	-100.0% ~ 100.0%	0.0%	☆	FE09

Function code	name	content	Factory set up	Change	address
	Settings				
PE-10	Input at inflection point 1 of curve 2	PE-08 ~ PE-12	3.00V	☆	FE0A
PE-11	Curve 2 Inflection Point 1 Input Corresponding Settings	-100.0% ~ 100.0%	30.0%	☆	FE0B
PE-12	Curve 2 Inflection Point 2 Input	PE-10 ~ PE-14	6.00V	☆	FE0C
PE-13	Curve 2 Inflection Point 2 Input Corresponding Settings	-100.0% ~ 100.0%	60.0%	☆	FE0D
PE-14	Curve 2 Maximum Input	PE-12 ~ 10.00V	10.00V	☆	FE0E
PE-15	Curve 2 Maximum Input Corresponding Setting	-100.0% ~ 100.0%	100.0%	☆	FE0F
PE-24	AI1 sets the jump point	-100.0% ~ 100.0%	0.0%	☆	FE18
PE-25	AI1 sets the jump range	0.0% ~ 100.0%	0.5%	☆	FE19
PE-26	AI2 sets the jump point	-100.0% ~ 100.0%	0.0%	☆	FE1A
PE-27	AI2 sets the jump range	0.0% ~ 100.0%	0.5%	☆	FE1B
PF Group - Manufacturer Specifications					
PF-00	Manufacturer password	0 ~ 65535	*****	☆	FF00
Group A0 - Second Motor Parameter Settings					
A0-00	Motor selection	1: Motor No. 1 2: Motor No. 2	1	★	A000
A0-01	Second motor control method	1: Open-loop vector control (sensorless vector control) 2: VF control	2	★	A001
A0-02	Second motor acceleration/deceleration time	0: Same as the first motor 1: Acceleration/deceleration time 1	0	☆	A002

Function code	name	content	Factory set up	Change	address
	selection	2: Acceleration/deceleration time 2 3: Acceleration/deceleration time 3 4: Acceleration/deceleration time 4			
Group A1 - Second Motor Parameters					
A1-00	Motor parameter tuning	0: No function 1: Static Tuning 2: Dynamic Full Tuning	0	★	A100
A1-01	Motor 2 Rated Power	0.1 kW ~ 1000.0 kW	model Sure	★	A101
A1-02	Motor 2 rated voltage	1V ~ 1500V	380V	★	A102
A1-03	Motor 2 Number of poles	2 ~ 64	model Sure	●	A103
A1-04	Motor 2 rated current	0.01A ~ 600.00A (Motor rated power ≤30.0KW) 0.1A ~ 6000.0A (motor rated power >30.0KW)	A1-01 Sure	★	A104
A1-05	Motor 2 rated frequency	0.01Hz to maximum frequency (P0-14)	50.00Hz	★	A105
A1-06	Motor 2 rated speed	1rpm ~ 60000rpm	A1-01 Sure	★	A106
A1-07	Motor 2 no-load current	0.01A ~ A1-04 (Motor rated power ≤ 30.0KW) 0.1A ~ A1-04 (Motor rated power > 30.0KW)	A1-01 Sure	★	A107
A1-08	Motor 2 stator resistance	0.001 ohm ~ 65.535 ohm	model Sure	★	A108
A1-09	Motor 2 rotor resistance	0.001 ohm ~ 65.535 ohm	model Sure	★	A109
A1-10	Mutual inductance of motor 2	0.1mH ~ 6553.5mH	model Sure	★	A10A
A1-11	Motor 2 Leakage Inductance React	0.01mH ~ 655.35mH	model Sure	★	A10B
A1-12	Acceleration during dynamic full tuning	1.0s ~ 600.0s	10.0s	☆	A10C
A1-13	Deceleration during dynamic full tuning	1.0s ~ 600.0s	10.0s	☆	A10D

Function code	name	content	Factory set up	Change	address
Group A2 - Second Motor VF Parameter Setting					
A2-00	Torque boost	0.0% ~ 30.0%	0.0%	☆	A200
A2-02	Oscillation suppression gain	0 ~ 100	model Sure	☆	A202
Group A3 - Vector Control Parameters for the Second Motor					
A3-00	Switching frequency P1	1.00Hz ~ A3-02	5.00Hz	☆	A300
A3-02	Switching frequency P2	A3-00 ~ P0-14	10.00Hz	☆	A302
A3-04	Low-frequency speed ratio gain	0.1 ~ 10.0	4.0	☆	A304
A3-05	Low-frequency speed integral time	0.01s ~ 10.00s	0.50s	☆	A305
A3-06	High-frequency speed proportional gain	0.1 ~ 10.0	2.0	☆	A306
A3-07	High-frequency speed integral time	0.01s ~ 10.00s	1.00s	☆	A307
A3-08	Speed ring integral attribute selection	0: Points are effective 1: Integral Separation	0	★	A308
A3-11	Torque current regulator Kp	0 ~ 30000	2000	☆	A30B
A3-12	Torque current regulator Ki	0 ~ 30000	1300	☆	A30C
A3-13	Excitation current regulator Kp	0 ~ 30000	2000	☆	A30D
A3-14	Excitation current regulator Ki	0 ~ 30000	1300	☆	A30E
A3-15	Flux Braking Gain	100 ~ 200	000	☆	A30F
A3-16	Field weakening torque correction factor	50% ~ 150%	100%	☆	A310
A3-17	slip compensation coefficient	50% ~ 200%	100%	☆	A311
A3-18	Velocity loop feedback filter time constant	0.000s ~ 1.000s	0.015s	☆	A312
A3-19	Speed loop output	0.000s ~ 1.000s	0.000s	☆	A313

Function code	name	content	Factory set up	Change	address
	filter time constant				
A3-20	Electric torque upper limit source	0: P3-21 2: AI2 1: AI1 (Analog measurement range corresponds to P3-21) 3: Communication given 4: PLUSE given	0	☆	A314
A3-21	Electric torque limit	0.0% ~ 200.0%	150.0%	☆	A315
A3-22	Braking torque upper limit source	0: P3-23 2: AI2 1: AI1 (Analog measurement range corresponds to P3-23) 3: Communication given 4: PLUSE given	0	☆	A316
A3-23	Braking torque limit	0.0% ~ 200.0%	150.0%	☆	A317
Group B0 - System Parameters					
B0-00	Function code read-only selection	0: Invalid 1: Read-only	0	☆	B000
B0-01	reserve	reserve	0	☆	B001
B0-02	reserve	reserve	0	●	B002
B0-03	Inching and lower limit frequency correlation	0: Association 1: Not related	0	☆	B003
B0-04	Vector running frequency display selection	0: Real-time frequency 1: Set frequency	0	☆	B004
B0-05	Keyboard control operation power failure auto-start delay time	1.0s ~ 100.0s (Effective when keyboard control P7-41=2)	3.0s	☆	B005
Group B1 - User Function Code Customization					
B1-00	Clear custom function code selection	0: Invalid 1: Effective	0	☆	B100
B1-01	Custom function code 1	uP0-00 ~ uU1-xx	uP0-03	☆	B101
B1-02	Custom function	uP0-00 ~ uU1-xx	uP0-04	☆	B102

Function code	name	content	Factory set up	Change	address
	code 2				
B1-03	Custom function code 3	uP0-00 ~ uU1-xx	uP0-06	☆	B103
B1-04	Custom function code 4	uP0-00 ~ uU1-xx	uP0-23	☆	B104
B1-05	Custom function code 5	uP0-00 ~ uU1-xx	uP0-24	☆	B105
B1-06	Custom function code 6	uP0-00 ~ uU1-xx	uP4-00	☆	B106
B1-07	Custom function code 7	uP0-00 ~ uU1-xx	uP4-01	☆	B107
B1-08	Custom function code 8	uP0-00 ~ uU1-xx	uP4-02	☆	B108
B1-09	Custom function code 9	uP0-00 ~ uU1-xx	uP4-04	☆	B109
B1-10	Custom function code 10	uP0-00 ~ uU1-xx	uP4-05	☆	B10A
B1-11	Custom function code 11	uP0-00 ~ uU1-xx	uP4-06	☆	B10B
B1-12	Custom function code 12	uP0-00 ~ uU1-xx	uP4-12	☆	B10C
B1-13	Custom function code 13	uP0-00 ~ uU1-xx	uP4-13	☆	B10D
B1-14	Custom function code 14	uP0-00 ~ uU1-xx	uP5-00	☆	B10E
B1-15	Custom function code 15	uP0-00 ~ uU1-xx	uP5-01	☆	B10F
B1-16	Custom function code 16	uP0-00 ~ uU1-xx	uP5-02	☆	B110
B1-17	Custom function code 17	uP0-00 ~ uU1-xx	uP6-00	☆	B111
B1-18	Custom function code 18	uP0-00 ~ uU1-xx	uP6-01	☆	B112
B1-19	Custom function code 19	uP0-00 ~ uU1-xx	uP0-00	☆	B113
B1-20	Custom function code 20	uP0-00 ~ uU1-xx	uP0-00	☆	B114
B1-21	Custom function code 21	uP0-00 ~ uU1-xx	uP0-00	☆	B115

Function code	name	content	Factory set up	Change	address
B1-22	Custom function code 22	uP0-00 ~ uU1-xx	uP0-00	☆	B116
B1-23	Custom function code 23	uP0-00 ~ uU1-xx	uP0-00	☆	B117
B1-24	Custom function code 24	uP0-00 ~ uU1-xx	uP0-00	☆	B118
B1-25	Custom function code 25	uP0-00 ~ uU1-xx	uP0-00	☆	B119
B1-26	Custom function code 26	uP0-00 ~ uU1-xx	uP0-00	☆	B11A
B1-27	Custom function code 27	uP0-00 ~ uU1-xx	uP0-00	☆	B11B
B1-28	Custom function code 28	uP0-00 ~ uU1-xx	uP0-00	☆	B11C
B1-29	Custom function code 29	uP0-00 ~ uU1-xx	uP0-00	☆	B11D
B1-30	Custom function code 30	uP0-00 ~ uU1-xx	uP0-00	☆	B11E
B1-31	Custom function code 31	uP0-00 ~ uU1-xx	uP0-00	☆	B11F
Group B2 - Optimize control parameters					
B2-00	Dead zone compensation enable selection	0: No compensation 1: Compensation	1	☆	B200
B2-01	PWM method	0: Asynchronous modulation 1: Synchronous Modulation	0	☆	B201
B2-02	PWM 7-band/5-band selection	0: Seven sections in total 1: Automatic switching between seven and five segments	0	☆	B202
B2-03	CBC Current Limiting Enable Selection	0: Prohibited 1: Enable	1	☆	B203
B2-04	Braking point	330.0V ~ 800.0V	360.0V	☆	B204
			690.0V		
B2-05	undervoltage point	150.0V ~ 500.0V	200.0V	☆	B205
			350.0V		

Function code	name	content	Factory set up	Change	address
B2-06	Random PWM depth setting	0 ~ 6	0	☆	B206
B2-07	0Hz operating mode selection	0: No current output; 1: Normal operation; 2: Output the shutdown DC braking current P1-16;	0	☆	B207
B2-08	Low-frequency carrier limiting method selection	0: Restricted Mode 0 1: Restricted Mode 1 2: Unrestricted (carrier consistency across all frequency bands)	0	☆	B208
B2-11	Fast rate limiting mode	0: Disable fast rate limiting 1: Enable fast rate limiting	0	☆	B20B
B2-14	Terminal UP/Down mode	0: Terminal connection is always active. 1: Terminal rise delay effective	0	☆	B20E
B2-15	Terminal UP/Down mode 1 delay time	0.00s ~ 120.00s	0.26s	☆	B20F
Group B3 - AIAO Correction Parameters					
B3-00	AI1 displays voltage 1	-9.999V ~ 10.000V	3.000V	☆	B300
B3-01	AI1 measured voltage 1	-9.999V ~ 10.000V	3.000V	☆	B301
B3-02	AI1 displays voltage 2	-9.999V ~ 10.000V	8.000V	☆	B302
B3-03	AI1 measured voltage 2	-9.999V ~ 10.000V	8.000V	☆	B303
B3-04	AI2 displays voltage 1	-9.999V ~ 10.000V	3.000V	☆	B304
B3-05	AI2 measured voltage 1	-9.999V ~ 10.000V	3.000V	☆	B305
B3-06	AI2 displays voltage 2	-9.999V ~ 10.000V	8.000V	☆	B306
B3-07	AI2 measured voltage 2	-9.999V ~ 10.000V	8.000V	☆	B307
B3-12	AO1 target voltage 1	-9.999V ~ 10.000V	3.000V	☆	B30C
B3-13	AO1 measured	-9.999V ~ 10.000V	3.000V	☆	B30D

Function code	name	content	Factory set up	Change	address
	voltage 1				
B3-14	AO1 target voltage 2	-9.999V ~ 10.000V	8.000V	☆	B30E
B3-15	AO1 measured voltage 2	-9.999V ~ 10.000V	8.000V	☆	B30F
B3-16	AO2 target voltage 1	-9.999V ~ 10.000V	3.000V	☆	B310
B3-17	AO2 measured voltage 1	-9.999V ~ 10.000V	3.000V	☆	B311
B3-18	AO2 target voltage 2	-9.999V ~ 10.000V	8.000V	☆	B312
B3-19	AO2 measured voltage 2	-9.999V ~ 10.000V	8.000V	☆	B313
Group B4 - Master-Slave Control Parameters					
B4-00	Master-Slave Control Enable Selection	0: Prohibited 1: Enable	0	★	B400
B4-01	Master/Slave Selection	0: Host 1: Slave	0	★	B401
B4-02	Host transmission frequency selection	0: Operating frequency 1: Target frequency	0	★	B402
B4-03	The slave device follows the master's command source selection.	0: Do not follow 1: Follow	0	★	B403
B4-04	Slave receives frequency coefficient	0.00% ~ 600.00%	100.00 %	☆	B404
B4-05	Slave receives torque coefficient	-10.00 ~ 10.00	1.00	☆	B405
B4-06	Slave receives torque bias	-50.00% ~ 50.00%	0.00%	☆	B406
B4-07	Frequency deviation threshold	0.20% ~ 10.00%	0.50%	☆	B407
B4-08	Master-slave communication disconnection detection time	0.00s ~ 10.0s	0.1s	☆	B408
B4-11	Main frequency	0.00 % ~ 300.00 %	100.0%	☆	B40B

Function code	name	content	Factory set up	Change	address
	gain				
B4-12	Master-Auxiliary Synthesis Gain	0.00 % ~ 300.00 %	100.0%	☆	B40C
Group B5 - Brake Function Parameters					
B5-00	Brake control enable selection	0: Prohibited 1: Enable	0	★	B500
B5-01	Brake release delay	0.0s ~ 20.0s	0.0 s	★	B501
B5-02	Brake closing delay	0.0s ~ 20.0s	0.3 s	★	B502
B5-03	Rising forward rotation brake opening frequency	0.00Hz ~ 20.00Hz	2.50Hz	★	B503
B5-04	Rising forward rotation brake closing frequency	0.00Hz ~ 20.00Hz	1.50Hz	★	B504
B5-05	Frequency of descent and reversal brake release	0.00Hz ~ 20.00Hz	2.50Hz	★	B505
B5-06	Frequency of descent and reversal brake closure	0.00Hz ~ 20.00Hz	1.50Hz	★	B506
B5-07	Brake opening current threshold	0 ~ 100.0	40.0	★	B507
B5-08	Frequency holding time after brake release	0 ~ 20.0s	0.5s	★	B508
B5-09	Frequency holding time after brake deactivation	0 ~ 20.0s	0.5s	★	B509
B5-10	Current limit during holding brake	50.0% ~ 200.0%	120.0%	★	B50A
B5-11	Stop mode after brake is closed	0: Free Stop 1: Deceleration and Stop	0	★	B50B
B5-12	Brake release mode	0: Open according to frequency 1: Open according to frequency and current	0	★	B50C

Function code	name	content	Factory set up	Change	address
B5-13	Civil elevator dedicated function enable	0: Off 1: Enable	0	★	B50D
B5-14	Elevator emergency operation frequency	0.00Hz ~ P0-14Hz	20.00Hz	☆	B50E
B5-15	Elevator maintenance and operation frequency	0.00Hz ~ P0-14Hz	20.00Hz	☆	B50F
B5-16	Elevator emergency signal processing mode	0: Elevator not working 1: UPS power supply operation	1	★	B510
B5-17	Elevator Ascent Correction Frequency	0.00Hz ~ 5.00Hz	0	★	B511
B5-18	Elevator descent correction frequency	0.00Hz ~ 5.00Hz	0	★	B512
B5-19	Elevator emergency signal validity period	0 ~ 3600.0	0	☆	B513
B5-20	Elevator emergency signal invalid time	0 ~ 3600.0	0	☆	B514
B5-21	Runtime feedback enable	0: Off 1: Enable	0	☆	B515
B5-22	Elevator start error feedback time	0 ~ 100s	0	☆	B516
Group B6 – Sleep/Wake Function Parameters					
B6-00	Hibernation Selection	0: Hibernation function is disabled. 1: Digital input terminal (DI) controls sleep function 2: Sleep function controlled by PID setpoint and feedback value 3: Control the hibernation function according to the operating frequency.	0	☆	B600
B6-01	Sleep frequency	0.00Hz ~ P0-14	0.00Hz	☆	B601
B6-02	Sleep delay	0.0s ~ 3600.0s	20.0s	☆	B602

Function code	name	content	Factory set up	Change	address
B6-03	wake-up difference	When B6-00=3 (0.0% ~ 100.0%), the unit becomes Hz .	10.0%	☆	B603
B6-04	Wake-up delay	0.0s ~ 3600.0s	0.5s	☆	B604
B6-05	Sleep delay frequency output selection	0: PID automatic adjustment 1: Sleep frequency B6-01	0	☆	B605
B6-07	wake-up frequency	0.0 Hz ~ P0-14	0.0Hz	☆	B607
BA Group - Virtual Terminal Function Parameters					
BA-00	Virtual VDI1 terminal function selection	Virtual VDI1~VDI5 can be used as multi-function digital inputs, with functions 0~71 set the same as ordinary DI (P5-00~P5-06).	0	☆	BA00
BA-01	Virtual VDI2 terminal function selection		0	☆	BA01
BA-02	Virtual VDI3 terminal function selection		0	☆	BA02
BA-03	Virtual VDI4 terminal function selection		0	☆	BA03
BA-04	Virtual VDI5 terminal function selection		0	☆	BA04
BA-05	Virtual VDI terminal valid status setting mode	0: The validity of VDI is determined by the state of the virtual VDOx. 1: VDI is enabled or disabled by setting parameter BA-06. Units: Virtual VDI1 Tens: Virtual VDI2 Hundreds: Virtual VDI3 Thousands: Virtual VDI4 Ten thousandths place: Virtual VDI5	00000	☆	BA05
BA-06	Virtual VDI terminal status settings	0: Invalid 1: Effective Units digit: Virtual VDI1	00000	☆	BA06

Function code	name	content	Factory set up	Change	address
		Tens: Virtual VDI2 Hundreds: Virtual VDI3 Thousands: Virtual VDI4 Ten thousandths place: Virtual VDI5			
BA-07	When AI1 terminal is used as a DI terminal, the function selection is as follows:	When AI is used as DI, the function settings for functions 0-71 are the same as those for ordinary DI (P5-00~P5-06).	0	☆	BA07
BA-08	When AI2 terminal is used as a DI, the function selection is as follows:		0	☆	BA08
BA-09	When the AI3 terminal is used as a DI, the function selection is as follows:		0	☆	BA09
BA-10	AI as an effective mode selection for DI	0: High level is active 1: Active low Units digit: AI1 Tenth place: AI2 Hundreds: AI3	000	☆	BA0A
BA-11	Virtual VDO1 output function selection	When the virtual VDOx output function is selected as 0, the output status of VDO1~VDO5 is determined by the input status of DI1~DI5 on the control board. At this time, VDOx and DIx correspond one-to-one. When the virtual VDOx output function is selected as a non-zero value, the VDOx function settings and usage are the same as the relevant parameters for the P6 group DO output.	0	☆	BA0B
BA-12	Virtual VDO2 output function selection		0	☆	BA0C
BA-13	Virtual VDO3 output function selection		0	☆	BA0D
BA-14	Virtual VDO4 output function selection		0	☆	BA0E
BA-15	Virtual VDO5 output function selection		0	☆	BA0F

Function code	name	content	Factory set up	Change	address
BA-16	VDO1 output delay time	0.0s ~ 3600.0s	0.0s	☆	BA10
BA-17	VDO2 output delay time	0.0s ~ 3600.0s	0.0s	☆	BA11
BA-18	VDO3 output delay time	0.0s ~ 3600.0s	0.0s	☆	BA12
BA-19	VDO4 output delay time	0.0s ~ 3600.0s	0.0s	☆	BA13
BA-20	VDO5 output delay time	0.0s ~ 3600.0s	0.0s	☆	BA14
BA-21	VDO output terminal valid status selection	0: Positive logic 1: Anti-logic Units digit: VDO1 Tens: VDO2 Hundreds: VDO3 Thousands: VDO4 Ten thousandths place: VDO5	00000	☆	BA15
Group C1 - Tension Control Function Parameters					
C1-00	Tension control mode	0: Invalid 1: Open-loop torque control 2: Closed-loop speed control	0	★	C100
C1-01	Curling direction	0: Receiving the Paper 1: Unrolling the roll	0	☆	C101
C1-02	Maximum frequency of roll-up	0.00Hz to maximum frequency	30.00Hz	☆	C102
C1-03	Unwinding upper limit frequency	0.00Hz to maximum frequency	10.00Hz	☆	C103
C1-04	Mechanical transmission ratio	0.01 ~ 600.00	1.85	☆	C104
C1-05	Tension setting source	0: Function code setting (C1-06) 1: AI1 2: AI2 3: AI3 (Expansion Card) 4: PULSE Input Pulse Setting 5: Communication given	0	★	C105
C1-06	Tension setting	0 ~ 30000N	1200 N	☆	C106
C1-07	Maximum tension	0 ~ 30000N	2100 N	★	C107

Function code	name	content	Factory set up	Change	address
C1-08	Roll diameter calculation method	0: Function code setting (C1-10) 1: Linear velocity calculation 2: Cumulative Thickness Calculation 3: AI1 4: AI2 5: AI3 (Expansion Card) 6: PULSE pulse input	1	★	C108
C1-09	Maximum roll diameter	1~10000mm	1100 mm	★	C109
C1-10	Scroll diameter	1~10000mm	320 mm	★	C10A
C1-11	Initial roll diameter selection	0: DI terminal setting 1: AI1 2: AI2 3: AI3 (Expansion Card)	0	☆	C10B
C1-12	Initial roll diameter 1	1~10000mm	600 mm	☆	C10C
C1-13	Initial roll diameter 2	1~10000mm	50 mm	☆	C10E
C1-14	Initial roll diameter 3	1~10000mm	50 mm	☆	C10F
C1-15	Initial roll diameter 4	1~10000mm	50 mm	☆	C10F
C1-16	Convex diameter filtering time	0.1~60.0s	1.0s	☆	C110
C1-17	Roll diameter variation limit 1	1~10000mm	0 mm	○	C111
C1-18	Roll diameter variation limit 2	1~10000mm	0 mm	○	C112
C1-19	Roll diameter reset selection	0: Resetting the roll diameter is prohibited during operation. 1: Roll diameter reset is allowed during operation.	0	☆	C113
C1-20	Roll diameter reaches set value	1~10000mm	0 mm	☆	C114
C1-21	Material thickness selection	0: DI terminal setting 1: AI1	0	☆	C115

Function code	name	content	Factory set up	Change	address
		2: AI2 3: AI3 (Expansion Card) 4: Communication Settings			
C1-22	Maximum thickness	0.01~100.00mm	0.01mm	☆	C116
C1-23	Material thickness 1	0.01~100.00mm	0.01mm	☆	C117
C1-24	Material thickness 2	0.01~100.00mm	0.01mm	☆	C118
C1-25	Material thickness 3	0.01~100.00mm	0.01mm	☆	C119
C1-26	Material thickness 4	0.01~100.00mm	0.01mm	☆	C11A
C1-27	Reference point selection	0: Frequency 1: Switch quantity 2: Encoder	0	★	C11B
C1-28	Number of pulses per revolution	1~10000	1	○	C11C
C1-29	Number of rings per layer	1~10000	1	☆	C11D
C1-30	Linear velocity input source	0: Function code setting (C1-31) 1: AI1 2: AI2 3: AI3 (Expansion Card) 4: PULSE Input Pulse Setting 5: Communication given	0	★	C11E
C1-31	Maximum linear velocity	0.1~6000.0 m/min	1000.0 m/min	☆	C11F
C1-32	Actual value of linear velocity	0.1~6000.0 m/min	0	○	C120
C1-33	Lower limit of frequency for roll diameter calculation	0.00Hz ~ Maximum frequency	1.5 0Hz	☆	C121
C1-34	Roll diameter calculation delay	0.0~100.0s	6.0s	☆	C122
C1-35	Mechanical inertia coefficient identification	0: No operation 1: Automatic identification	0	★	C123

Function code	name	content	Factory set up	Change	address
C1-36	Torque identification based on mechanical inertia coefficient	0~50.0% (motor rated torque)	50.0 %	★	C124
C1-37	Mechanical inertia compensation coefficient	0-10000	124	☆	C125
C1-38	Material density	0~60000kg/m ³	0kg/m ³	☆	C126
C1-39	Material width	0~60000mm	0 mm	☆	C127
C1-40	Upper limit of moment of inertia compensation torque	0.0~50.0%	5.0 %	☆	C128
C1-41	static friction compensation coefficient	0.0~50.0%	0.0 %	☆	C129
C1-42	Dynamic friction compensation coefficient	0.0~50.0%	0.0 %	☆	C12A
C1-43	Zero speed threshold	0.00Hz to maximum frequency	1.00Hz	☆	C12B
C1-44	High-speed torque compensation coefficient	0.0~50.0%	0.0 %	☆	C12C
C1-45	High-speed torque compensation basis	0: Frequency 1: Linear velocity	0	☆	C12D
C1-46	High-speed torque compensation speed limit	10.0~100.0%	100.0 %	☆	C12E
C1-47	reserve		0	○	C12F
C1-48	Taper mode	0: Curve taper 1: Straight taper	0	★	C130
C1-49	Taper setting source	0: Function code setting (C1-50) 1: AI1 2: AI2 3: AI3 (Expansion Card)	0	★	C131
C1-50	Taper setting	0.000~1.000	0.000	☆	C132

Function code	name	content	Factory set up	Change	address
C1-51	Taper correction amount	1~10000mm	100 mm	☆	C133
C1-52	Taper inflection point 1	1~10000mm	100 mm	☆	C134
C1-53	Taper setting 1	0.000~1.000	0.000	☆	C135
C1-54	Taper inflection point 2	1~10000mm	200 mm	☆	C136
C1-55	Taper setting 2	0.000~1.000	0.000	☆	C137
C1-56	Disconnection detection selection	0: Invalid 1: Effective	0	☆	C138
C1-57	Lower limit of disconnection detection frequency	0.00Hz to maximum frequency	10.00Hz	☆	C139
C1-58	Wire breakage detection error	1~1000mm	10 mm	☆	C13A
C1-59	Disconnection detection time	0.1~60.0s	1.0s	☆	C13B
C1-60	Pre-drive speed gain	-50.0%~50.0%	0.0 %	☆	C13C
C1-61	Pre-drive torque limiting selection	0: PD-02 settings 1: Set the amplitude limit according to the tension.	1	☆	C13D
C1-62	Pre-drive torque gain	-50.0%~50.0%	0.0 %	☆	C13E
C1-63	Pre-drive roll diameter calculation selection	0: Calculation 1: Stop calculation	1	☆	C13F
C1-64	Delay for roll diameter calculation after pre-drive ends	0.0s~10.0s	3.0s	☆	C140
C1-65	Torque adaptive selection	0: Energy Forbidden 1: Enable	0	★	C141
C1-66	Initial torque setting source selection	0: Function code setting (C1-67) 1: AI1 2: AI2 3: AI3 (Expansion Card) 4: PULSE Input Pulse Setting 5: Communication given	0	★	C142

Function code	name	content	Factory set up	Change	address
C1-67	Initial torque setting	0.0%~200.0%	0.0 %	☆	C143
C3 Group - Photovoltaic Functional Parameters					
C3-00	Photovoltaic water pump enabling	0: Invalid 1: Enable	0	★	C300
C3-01	Vmppt voltage given mode	0: Manually specified 1: Automatic tracking	1	★	C301
C3-02	Vmppt voltage start voltage	0.0~800.0V	600.0V	☆	C302
C3-03	PV open circuit voltage setting	0.0~800.0V	750.0V	★	C303
C3-04	Power supply selection	0: Automatic switching 1: Photovoltaic power supply 2: Power grid supply	1	★	C304
C3-05	Vmppt interval	0.0~100.0S The Vmppt voltage is automatically adjusted at intervals set by C3-05.	1.0s	☆	C305
C3-06	Vmppt hysteresis	0.0~50.0V When the deviation value is less than this value, Vmppt will no longer be adjusted, which is used to reduce the jitter of the output frequency.	2.0V	☆	C306
C3-07	Vmppt step size	0.0~100.0V Adjustment of upper and lower range amplitude when automatically adjusting Vmmpt voltage	10.0V	☆	C307
C3-08	Vmppt voltage limit	230.0~750.0V	650.0V	☆	C308
C3-09	Vmppt lower voltage limit	230.0~750.0V	300.0V	☆	C309
C3-10	CVT proportional gain	0.0~100.0 Target frequency scaling factor 1 The larger the value, the greater the effect and the faster the adjustment.	1.0	☆	C30A

Function code	name	content	Factory set up	Change	address
C3-11	CVT integral coefficient	0.0~100.0 Integral coefficient of target frequency 1 The larger the value, the greater the effect and the faster the adjustment.	1.0	☆	C30B
C3-12	CVT proportional gain 1	0.0~100.0 Target frequency scaling factor 2 The larger the value, the greater the effect and the faster the adjustment.	1.0	☆	C30C
C3-13	CVT integral coefficient 1	0.0~100.0 Integral coefficient 2 of the target frequency The larger the value, the greater the effect and the faster the adjustment.	1.0	☆	C30D
C3-14	CVT switching point	0.0~1000.0V When the absolute value of the difference between the PV voltage and the reference voltage is greater than the set value of C3-14, switch to proportional coefficient 2 of C3-12 and integral coefficient of C3-13; otherwise, use proportional coefficient 1 of C3-10 and proportional coefficient 1 of C3-11.	2.0V	☆	C30E
C3-15	Light Weak Detection Frequency	0~Running frequency setting	20.00Hz	☆	C30F
C3-16	Light-weak sleep delay	5.0~6553.5s	600.0s	☆	C310
C3-17	Light-weak wake-up time	0.0~6553.5s	200.0s	☆	C311
C3-18	Water tank full water dormancy delay	0.0~6553.5s	60.0s	☆	C312

Function code	name	content	Factory set up	Change	address
C3-19	Water storage tank low water start-up delay	0.0~6553.5s	600.0s	☆	C313
C3-20	Well hibernation delay due to water shortage	0.0~6553.5s	600.0s	☆	C314
C3-21	Well start-up hibernation delay	0.0~6553.5s	600.0s	☆	C315
C3-22	Automatic switching mode grid power supply operation time	0~65535min	60.0min	☆	C316
C3-48	Pulse-type multi-speed enable	0: Invalid 1: Enable	0	☆	C330
C3-53	Virtual communication enablement	0: Invalid 1: Enable	0	☆	C335
C3-54	Control commands	0x0000 ~ 0x9FFF	0x000	☆	C336
C3-55	Set frequency	0x0000 ~ 0x9FFF	0x000	☆	C337
C3-56	Running status	0x0000 ~ 0x9FFF	0x000	☆	C338
C3-57	Read running frequency	0x0000 ~ 0x9FFF	0x000	☆	C339
C3-58	Read output voltage	0x0000 ~ 0x9FFF	0x000	☆	C33A
C3-59	Read output current	0x0000 ~ 0x9FFF	0x000	☆	C33B
C3-60	Read output power	0x0000 ~ 0x9FFF	0x000	☆	C33C
C3-61	Read fault	0x0000 ~ 0x9FFF	0x000	☆	C33D
C3-62	control command word low bit	0x0000 ~ 0x9FFF	0x000	☆	C33E
C3-63	control command word high bit	0x0000 ~ 0x9FFF	0x000	☆	C33F
C3-65	Positioning control acceleration time	0.0 ~ 3000.0s	21.0s	☆	C341
C3-66	Positioning control deceleration time	0.0 ~ 3000.0s	21.0s	☆	C342
C3-67	Machine tool AI low voltage value	0 ~ C3-68	0.00v	☆	C343

Function code	name	content	Factory set up	Change	address
C3-68	AI medium voltage value for machine tools	C3-67 ~ C3-69	0.00v	☆	C344
C3-69	High-end voltage values for machine tools (AI)	C3-68 ~ 10.00V	0.00v	☆	C345
C3-70	Machine tool control set origin deviation value	-1000 ~ 1000	100	☆	C346
C3-71	Control ratio coefficient 1	0 ~ 10.000	1.000	☆	C347
C3-72	Control ratio coefficient 2	0 ~ 10.000	1.000	☆	C348
C3-73	Control ratio coefficient 3	0 ~ 10.000	1.000	☆	C349
C3-74	Position control adaptive coefficient function	0 ~ 1	0	☆	C34A
C 4 Group - Position Control Parameters					
C4-00	Positioning control is effective	0: Invalid 1: Enable	0	☆	C400
C4-01	Location mode selection	0: Incremental 1: Absolute form 2: Indexing type	2	★	C401
C4-02	Positioning encoder selection	0: Motor closed-loop control encoder 1: Dedicated encoder for spindle positioning	0	★	C402
C4-03	spindle encoder line count	1 ~ 65535	1024	★	C403
C4-04	Main shaft transmission ratio numerator	1 ~ 10000	1	★	C404
C4-05	Main shaft drive ratio denominator	1 ~ 10000	1	★	C405
C4-06	Origin selection	0: Encoder signal 1: DI terminal signal	0	★	C406
C4-07	Locating the zero-point search direction	0: Same direction as F0-13 1: The direction is opposite to that set by F0-13.	2	★	C407

Function code	name	content	Factory set up	Change	address
		2: Consistent with the currently set frequency direction			
C4-08	Positioning zero-point retrieval frequency	0 ~ P0-16	10.00h _z	☆	C408
C4-09	Positioning control start frequency	0 ~ P0-14	20.00h _z	☆	C409
C4-10	Acceleration time (positioning control)	1 ~ 655.35	3.00	☆	C40A
C4-11	Deceleration time (positioning control)	1 ~ 655.35	3.00	☆	C40B
C4-12	Proportional Gain 1	0 ~ 100.00	1.00	☆	C40C
C4-13	Terminal zero-point signal filtering time	0 ~ 200	10	☆	C40D
C4-14	Positioning completion deviation range	0 ~ 1000	10	☆	C40E
C4-15	Deviation limit after positioning	0 ~ 1000	2	☆	C40F
C4-16	Proportional gain switching selection (position synchronization)	0: Do not switch 1: Automatic switching based on deviation	0	☆	C410
C4-17	Proportional Gain 2	0 ~ 100.00	10.00	☆	C411
C4-18	Proportional gain switching position deviation level 1	0 ~ 30000	5	☆	C412
C4-19	Proportional gain switching position deviation level 2	0 ~ 30000	50	☆	C413
C4-20	Indexing and positioning position	0 ~ 65535	0	☆	C414
C4-46	Remember current position	0 ~ 2	0	☆	C42E
C4-47	Encoder line count ratio factor	0 ~ 10.000	1.000	☆	C42F
C4-48	Manually set the origin record value	0 ~ 65535	0	☆	C430

Function code	name	content	Factory set up	Change	address
C4-49	Positioning completion and holding time	0 ~ 1000.0	2.0	☆	C431
C 5 Group - Temperature Monitoring Function					
C5-00	Temperature inspection card selection	0: Enable 1: Close	0	☆	C500
C5-01	First channel temperature value	-50°C ~ 200°C	0°C	●	C501
C5-02	Second channel temperature value	-50°C ~ 200°C	0°C	●	C502
C5-03	Third channel temperature value	-50°C ~ 200°C	0°C	●	C503
C5-04	Fourth channel temperature value	-50°C ~ 200°C	0°C	●	C504
C5-05	Fifth channel temperature value	-50°C ~ 200°C	0°C	●	C505
C5-06	Sixth channel temperature value	-50°C ~ 200°C	0°C	●	C506
C5-07	Seventh channel temperature value	-50°C ~ 200°C	0°C	●	C507
C5-08	Eighth channel temperature value	-50°C ~ 200°C	0°C	●	C508
C5-09	First-channel temperature sensor type	0: Invalid 1: PT100 2: PT1000	0	☆	C509
C5-10	Second-channel temperature sensor type	0: Invalid 1: PT100 2: PT1000	0	☆	C50A
C5-11	Third-channel temperature sensor type	0: Invalid 1: PT100 2: PT1000	0	☆	C50B
C5-12	Fourth temperature sensor type	0: Invalid 1: PT100 2: PT1000	0	☆	C50C
C5-13	Fifth temperature sensor type	0: Invalid 1: PT100 2: PT1000	0	☆	C50D
C5-14	Sixth-channel	0: Invalid	0	☆	C50E

Function code	name	content	Factory set up	Change	address
	temperature sensor type	1: PT100 2: PT1000			
C5-15	Seventh-channel temperature sensor type	0: Invalid 1: PT100 2: PT1000	0	☆	C50F
C5-16	Eighth-channel temperature sensor type	0: Invalid 1: PT100 2: PT1000	0	☆	C510
C5-17	First-channel temperature alarm threshold	0°C ~ 200°C	80°C	☆	C511
C5-18	Second temperature alarm threshold	0°C ~ 200°C	80°C	☆	C512
C5-19	Third-channel temperature alarm threshold	0°C ~ 200°C	80°C	☆	C513
C5-20	Fourth-channel temperature alarm threshold	0°C ~ 200°C	80°C	☆	C514
C5-21	Fifth temperature alarm threshold	0°C ~ 200°C	80°C	☆	C515
C5-22	Sixth temperature alarm threshold	0°C ~ 200°C	80°C	☆	C516
C5-23	Seventh-channel temperature alarm threshold	0°C ~ 200°C	80°C	☆	C517
C5-24	Eighth-channel temperature alarm threshold	0°C ~ 200°C	80°C	☆	C518
C5-25	First-path temperature bias	-10°C ~ 10°C	0°C	☆	C519
C5-26	Second-path temperature bias	-10°C ~ 10°C	0°C	☆	C51A
C5-27	Third-path temperature bias	-10°C ~ 10°C	0°C	☆	C51B
C5-28	Fourth-channel temperature bias	-10°C ~ 10°C	0°C	☆	C51C
C5-29	Fifth-channel temperature bias	-10°C ~ 10°C	0°C	☆	C51D

Function code	name	content	Factory set up	Change	address
C5-30	Sixth-channel temperature bias	-10°C ~ 10°C	0°C	☆	C51E
C5-31	Seventh-channel temperature bias	-10°C ~ 10°C	0°C	☆	C51F
C5-32	Eighth-way temperature bias	-10°C ~ 10°C	0°C	☆	C520
C5-35	Collection cycle	1s ~ 99s	5s	☆	C521
C5-36	Temperature error message for the first 4 channels	0x0000 ~ 0x1111	0x0000	●	C522
C5-37	Rear 4-channel temperature error message	0x0000 ~ 0x1111	0x0000	●	C523

17.2. Monitoring group parameters

Function code	Name		Minimum unit	Change	address
U0 Group – Fault Recording Parameters					
U0-00	Most recent fault type	00: No fault Err01: Inverter module protection	1	●	7000
U0-01	Previous fault type	Err04: Overcurrent during acceleration	1	●	7001
U0-02	First and second fault types	Err05: Overcurrent during deceleration Err06: Overcurrent during constant speed operation Err08: Overvoltage during acceleration Err09: Overvoltage during deceleration Err10: Overvoltage during constant speed operation Err12: Undervoltage fault Err13: Driver overload fault Err14: Motor overload fault Err15: Driver overheating Err17: Current detection fault Err20: Short circuit to ground fault Err23: Input phase loss fault Err24: Output phase loss fault Err25: Eeprom malfunction Err27: Communication failure Err28: External Fault Err29: Speed deviation is too large Err30: User-defined fault 1 Err33: Fast Rate Limiting Err31: User-defined fault 2 Err32: Runtime PID feedback lost Err34: Loading failure Err35: Input power failure Err37: Parameter storage error Err39: This run has reached its end. Err40: Cumulative running time has reached... Err42: Switching motors during	1	●	7002

Function code	Name		Minimum unit	Change	Address
		operation Err46: Master-slave control communication disconnected.			
U0-03	The frequency during the most recent fault		0.01Hz	●	7003
U0-04	The current during the most recent fault		0.01A	●	7004
U0-05	During the most recent fault, the bus voltage		0.1V	●	7005
U0-06	Input terminal status during the most recent fault		1	●	7006
U0-07	Output terminal status during the most recent fault		1	●	7007
U0-08	Recent status of the faulty frequency converter		1	●	7008
U0-09	Runtime during the most recent fault (time started from power-on, in minutes)		1min	●	7009
U0-10	Runtime during the most recent failure (in minutes, starting from runtime).		1min	●	700A
U0-13	Frequency during the previous fault		0.01Hz	●	700D
U0-14	Current during the previous fault		0.01A	●	700E
U0-15	Bus voltage during the previous fault		0.1V	●	700F
U0-16	The input terminal during the previous fault		1	●	7010
U0-17	The output terminal during the previous fault		1	●	7011
U0-18	Previous fault inverter status		1	●	7012
U0-19	Running time during the previous fault (time started from power-on, in minutes).		1min	●	7013
U0-20	The time of the previous failure (in minutes, starting from the start of runtime).		1min	●	7014
U0-21	Reserved variables			●	7015
U0-22	Reserved variables			●	7016
U0-23	Frequency during the first two faults		0.01Hz	●	7017
U0-24	Current during the first two faults		0.01A	●	7018
U0-25	Bus voltage during the first two faults		0.1V	●	7019
U0-26	Input terminals during the first two faults		1	●	701A
U0-27	Output terminals during the first two faults		1	●	701B
U0-28	Inverter status before and after secondary faults		1	●	701C

Function code	Name	Minimum unit	Change	Address
U0-29	Running time during the first two faults (time started from power-on, in minutes).	1min	●	701D
U0-30	The time of the first two failures (in minutes, starting from the start of operation).	1min	●	701E
U1 Group - Application Monitoring Parameters				
U1-00	Operating frequency (Hz)	0.01Hz	●	7100
U1-01	Set frequency (Hz)	0.01Hz	●	7101
U1-02	Bus voltage (V)	0.1V	●	7102
U1-03	Output voltage (V)	1V	●	7103
U1-04	Output current (A)	0.1A	●	7104
U1-05	Output power (KW)	0.1kW	●	7105
U1-06	DI Input status, hexadecimal number	1	●	7106
U1-07	DO Output status, in hexadecimal.	1	●	7107
U1-08	A I1 corrected voltage	0.01V	●	7108
U1-09	A I2 corrected voltage	0.01V	●	7109
U1-10	PID setpoint, PID setpoint (percentage) * PA-05	1	●	710A
U1-11	PID feedback, PID feedback value (percentage) * PA-05	1	●	710B
U1-12	Count value	1	●	710C
U1-13	Length value	1	●	710D
U1-14	motor speed	rpm	●	710E
U1-15	During the PLC phase, when running at multiple speeds, the current segment...	1	●	710F
U1-16	PULSE pulse input frequency	0.01kHz	●	7110
U1-17	Feedback speed, actual operating frequency of the motor	0.1Hz	●	7111
U1-18	P7-38 Remaining Time of the Timer	0.1 Min	●	7112
U1-19	A I1 Voltage before correction	0.001V	●	7113
U1-20	I2 voltage before correction	0.001V	●	7114
U1-21	DI5 High-speed pulse sampling line speed, refer to page 7-71 for usage.	1m/min	●	7115

Function code	Name	Minimum unit	Change	address
U1-22	Load speed display (set load speed when the machine is stopped), refer to page 7-31 for usage.	Custom	●	7116
U1-23	Power-on time	1 Min	●	7117
U1-24	Runtime	0.1 Min	●	7118
U1-25	PULSE is the pulse input frequency, and it differs from U1-16 only in the unit.	1Hz	●	7119
U1-26	Communication setting frequency value	0.01%	●	711A
U1-27	Main frequency display	0.01Hz	●	711B
U1-28	Auxiliary frequency display	0.01Hz	●	711C
U1-29	The target torque is 100% of the motor's rated torque.	0.1%	●	711D
U1-30	Output torque, based on 100% of the motor's rated torque.	0.1%	●	711E
U1-31	Output torque, based on 100% of the inverter's rated current.	0.1%	●	711F
U1-32	The upper limit of torque is based on 100% of the inverter's rated current.	0.1%	●	7120
U1-33	VF Separation Target Voltage	1V	●	7121
U1-34	VF Separate Output Voltage	1V	●	7122
U1-35	Fault information (1: STO1, 2: STO2, 3: STO1 and STO2)	0	●	7123
U1-36	Current motor serial number	1	●	7124
U1-37	AO1 target voltage	0.01V	●	7125
U1-38	AO2 target voltage	0.01V	●	7126
U1-39	Inverter operating status (0: Stop, 1: Forward rotation, 2: Reverse rotation, 3: Fault)	1	●	7127
U1-40	Current fault of frequency converter	1	●	7128
U1-41	Distributor's limited-time offer ends in time.	1h	●	7129
U1-42	AC incoming current	0.1A	●	712A
U1-43	PLC remaining time in current stage	0.1	●	712B
U1-45	AI3 Target Voltage	0.01V	●	712D
U1-46	Encoder feedback frequency	0.1Hz	●	712E

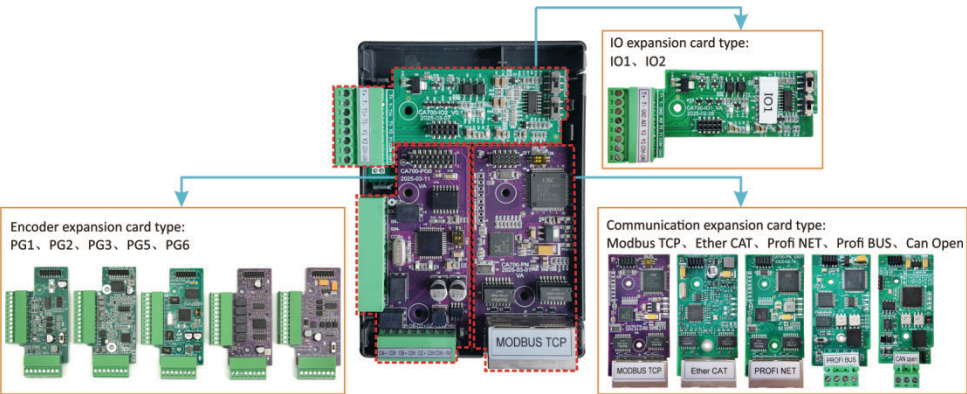
Function code	Name	Minimum unit	Change	address
U1-47	Cumulative running time 1 (Cumulative running time = U1-47 + U1-48)	1h	●	712F
U1-48	Cumulative running time 2 (Cumulative running time = U1-47 + U1-48)	1min	●	7130
U1-50	Motor temperature 1	1°C	●	7132
U1-51	Encoder position	1	●	7133
U1-54	UPS 220V markings (0: not connected, 1: connected)	0	●	7136
U1-55	Proportional adjustment of actual speed	0.01Hz	●	7137
U1-57	Motor temperature 2	1°C	●	7139

Chapter 18 Expansion Card Function Introduction

18.1. Expansion Card Selection

This manual mainly introduces information related to commonly used communication expansion cards, encoder expansion cards, and IO expansion cards in this series of general-purpose frequency converters, including expansion card installation, electrical specifications, interface definitions, etc.

600U expansion box can simultaneously accommodate IO cards, PG cards, and communication cards. The diagram below illustrates the installation locations of each 600U expansion card within the expansion box .



Quick Selection Overview

Expansion card type	Expansion card model	Function Description	use
I/O Expansion Card 1	IO1	One AI (AI3) terminal, two Y (Y1, Y2) terminals, and one (PT100/PT1000) temperature detection terminal.	Installed on the 10-pin header above the 16-pin header of the expansion box.
I/O Expansion Card 2	IO2	2-channel (PT100/PT1000) temperature detection, 2-channel Y (Y1, Y2) terminals.	
Canopen Communication Expansion Card	CANOPEN	CANOPEN communication adapter card	It is installed on the expansion box and connected to the motherboard via the right 10-
ProFinet	PN	It conforms to the internationally	

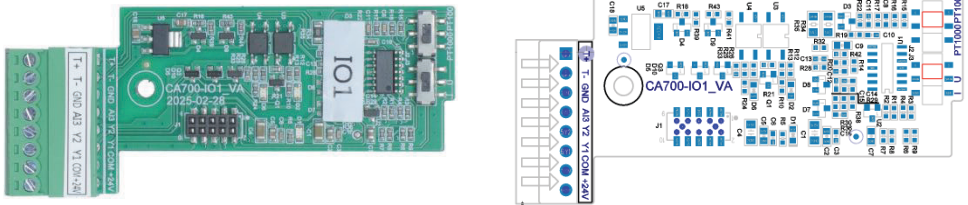
Expansion card type	Expansion card model	Function Description	use
communicati on card		recognized Profinet Ethernet standard. Installed on the frequency converter, this card improves communication efficiency, facilitates frequency converter networking, and enables the frequency converter to become a slave station of the fieldbus, receiving control from the fieldbus master station.	pin header on the 16-pin header.
Profibus-DP communicati on card	DP	The Profibus-DP fieldbus adapter card conforms to the internationally recognized Profibus fieldbus standard. It improves communication efficiency on frequency converters, enables networking, and allows the frequency converter to become a fieldbus slave, receiving control from the fieldbus master. This DP expansion card supports Profibus-DP communication.	
Ethercat communicati on card	Ethercat	EtherCAT fieldbus adapter cards can be used for ultra-high speed I/O networks.	
ABZ encoder card with open collector	PG1	Open collector PG card (PG1 card is only applicable to asynchronous encoders; compatible with complementary outputs; encoder card output DC power supply optional +12V).	Install it in the expansion box's 16-pin header interface and then connect it to the motherboard.
Serial communicati on encoder card	PG2	Serial communication encoder interface card	
Differential Input ABZ Encoder Card	PG3	ABZ differential signal input PG card; 1:1 differential frequency divider output; suitable for closed-loop vector control (VC) of asynchronous traction machines.	
Sine and	PG5	Supports sine and cosine signal	

Expansion card type	Expansion card model	Function Description	use
cosine encoder cards		input; supports differential frequency division output; suitable for closed-loop vector control (VC) of synchronous traction machines.	
Resolver Transformer Card	PG6	Suitable for rotary transformers; suitable for closed-loop vector control (VC) of synchronous traction machines.	

18.2. IO1 expansion card

18.2.1. Introduction to IO1 Products

The IO1 expansion card is a multi-functional IO expansion card for 600U series frequency converters. It can expand 1 AI (AI3) terminal, 2 Y (Y1, Y2) terminals, and 1 (PT100/PT1000) temperature detection terminal.



IO1 Expansion Card

Terminal markings	Terminal name	Function Description
T+	Temperature is positive	PT100 temperature sensor, PT1000, KTY, and PTC type temperature sensors (J2 jumper selection, default PT100) 1. Resolution 1°C 2. Temperature range: -20°C to 150°C 3. Detection accuracy: 3°C 4. Supports disconnection protection
T-	Temperature negative	
AI3-GND	Analog input	Input voltage range: 0 ~ 10V (input impedance: 30kΩ); Input current range: 0 ~ 20mA (Input impedance: 500Ω)
+24V-COM	DC24V power supply common terminal	It provides +24V power and is generally used as a power supply for digital input/output terminals and external sensors. Maximum output current: 200mA

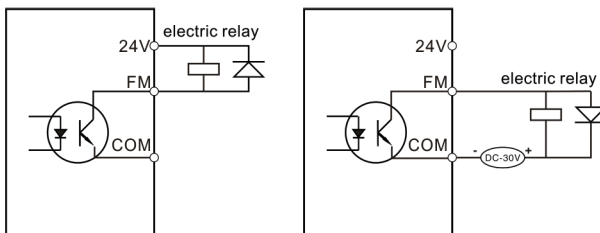
Terminal markings	Terminal name	Function Description
+24V-Y1	Digital output 1	Optocoupler isolation, bipolar open collector output Output voltage range: 0 ~ 24V Output current range: 0 ~ 50mA Y1 output setting is P6-02, Y2 output setting is P6-03
+24V-Y2	Digital output 2	
J1	IO expansion connection terminals	10-pin connector connects to expansion card transfer board
J2	Temperature selection DIP switch	PT100 jumper (facing upwards). Select parameter (P9-38=1) PT1000/KTY/PTC (facing down) Select parameter (P9-38=2) Note: When using temperature probes such as KTY and PTC, they can only be used for motor over-temperature protection.
J3	Analog input type selection DIP switch	DIP switch direction U: Voltage type DIP switch direction I: Current type 0-20mA (4-20mA requires setting P5-25=2)

18.2.2. IO1 Expansion Card Terminal Function Description

Y-digital output terminal:

When a digital output terminal needs to drive a relay, absorption diodes should be installed on both sides of the relay coil, and the driving capability should not exceed 50mA. Otherwise, it may easily damage the 24V DC power supply.

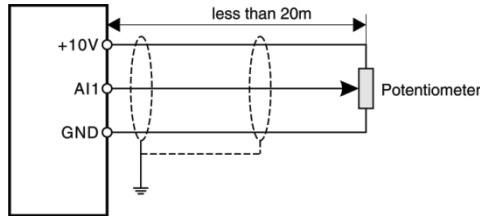
Note: Make sure to install the absorption diode with the correct polarity, as shown in the figure below. Otherwise, when there is output at the digital output terminal, it will immediately burn out the DC 24V power supply.



Schematic diagram of Y-connection of digital output terminal

AI analog input terminal: (When selecting voltage signal input, +10V comes from the main control board terminal 10V)

Because weak analog voltage signals are particularly susceptible to external interference, shielded cables are generally required, and the wiring distance should be as short as possible, not exceeding 20m, as shown in the figure below. In situations where analog signals are severely interfered with, filter capacitors or ferrite cores need to be added to the analog signal source side.

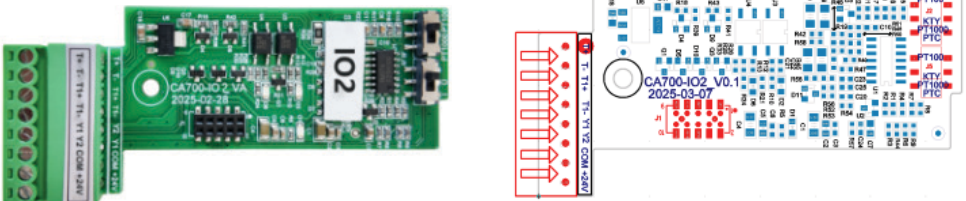


Schematic diagram of analog input terminal (AI) wiring

18.3. IO2 expansion card

18.3.1. Introduction to IO2 Products

The IO2 expansion card is a multi-functional IO expansion card suitable for 600U series frequency converters, with 2-channel (PT100/PT1000) temperature detection and 2-channel Y (Y1, Y2) terminals.



IO2 Expansion Card

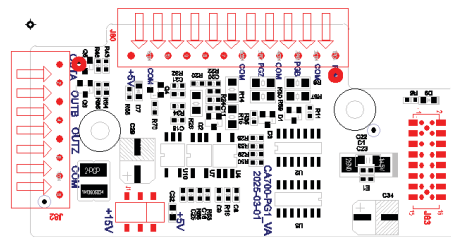
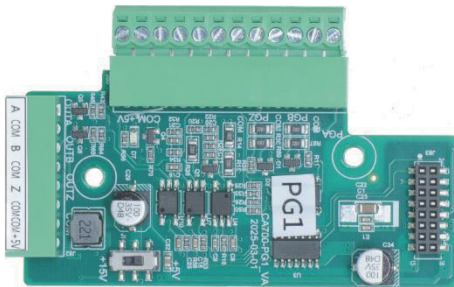
Terminal markings	Terminal name	Function Description
T+	Temperature 1 positive	PT100 and PT1000 temperature sensors PTC and KTY type temperature sensors (J2 jumper selection, default PT100)
T-	Temperature 1 negative	
T1+	Temperature 2 positive	PT100 temperature sensor: PT1000 PTC and KTY type temperature sensors (J2 jumper selection, default PT100)
T1-	Temperature 2 negative	

Terminal markings	Terminal name	Function Description
+24V-COM	DC24V power supply Public terminal	It provides +24V power and is generally used as a power supply for digital input/output terminals and external sensors. Maximum output current: 200mA
+24V-Y1	Digital output 1	Optocoupler isolation, bipolar open collector output Output voltage range: 0 ~ 24V Output current range: 0 ~ 50mA Y1 output setting is P6-02, Y2 output setting is P6-03
+24V-Y2	Digital output 2	
J1	IO expansion connection terminals	10-pin connector connects to expansion card transfer board
J2	Temperature 1 selection DIP switch	PT100 jumper (facing upwards). Select parameter (P9-38=1) PT1000/KTY/PTC (facing down) Select parameter (P9-38=2) Note: When using temperature probes such as KTY and PTC, they can only be used for motor over-temperature protection and will not be displayed.
J5	Temperature 2 selection DIP switch	PT100 jumper (facing upwards). Select parameter (P9-38=1) PT1000/KTY/PTC (facing down) Select parameter (P9-38=2)

18.4. PG1 expansion card

18.4.1. PG1 Product Introduction

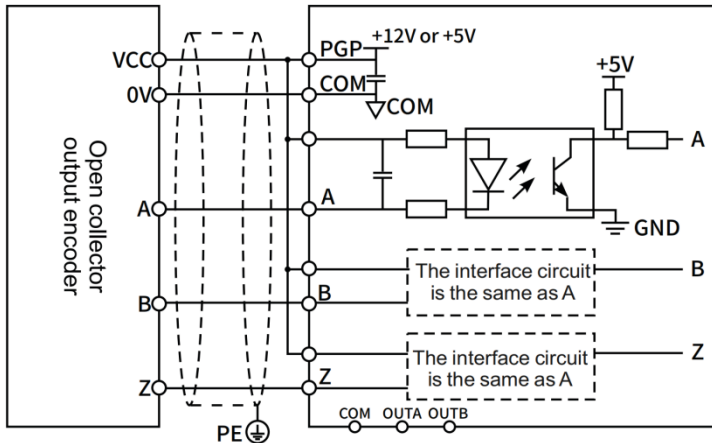
The PG1 is an open-collector ABZ encoder card with ABZ open-collector signal input and 1:1 frequency division open-collector signal output.



PG1 Expansion Card

18.4.2. PG1 Open Collector ABZ Encoder Card Terminal Function Description

Terminal markings	Terminal name	Function Description
J83	16-position female connector	16-pin connector to expansion card transfer board
J80	Encoder A/B/Z input terminals	PGA, PGB, PGZ: Encoder ABZ signal input interface
J1	PGP (+5V, +15V), +15V or +5V power output	Default: +5 V output. J1 jumper selects +5V or +15V power supply.
J82	COM	power ground
	OUTA	Frequency division output A signal, NPN type OC output
	OUTB	Frequency division output B signal, NPN type OC output
	OUTZ	Frequency division output Z signal, NPN type OC output

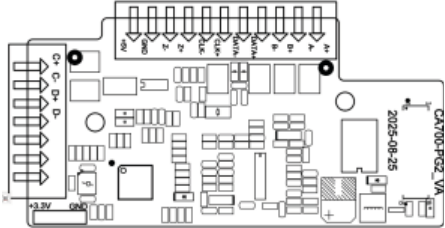
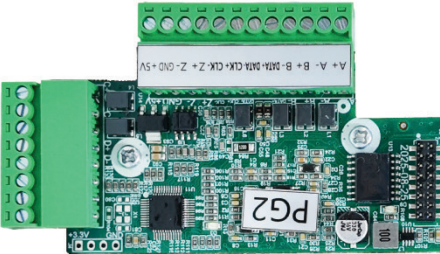


Wiring diagram of ABZ encoder card with open collector

18.5. PG2 expansion card

18.5.1. PG3 Product Introduction

The PG2 is a serial communication encoder interface .



PG2 Expansion Card

18.5.2. PG2 Serial Communication Encoder Interface Card Terminal Description

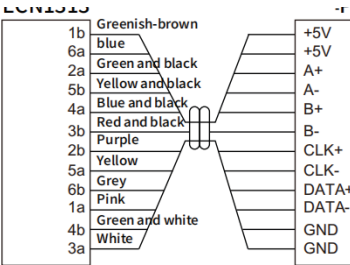
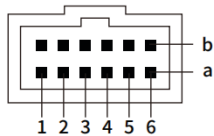
· / A- · / B-	e and cosine alog signals	Encoder differential signals A+ / A- / B+ / B-

18.5.3. Wiring of the PG2 encoder expansion card

Taking the Heidenhain 1313 and 413 encoders as examples, the pin numbers and wiring diagrams for the encoder side connectors are shown in the figure (the order of each pin is determined by observing the wiring side). The color of each signal in the figure represents the encoder cable supplied with the Heidenhain 1313 encoder. If the customer makes their own encoder cable, the colors of the encoder signal cables in the wiring diagram are meaningless.

PG2 and Heidenhain 1313 encoder; where inverter parameter group P4-30=5 (PG2 serial communication interface card).

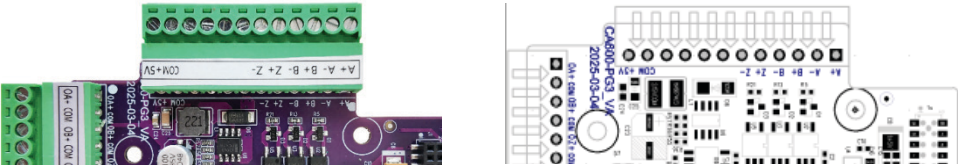
1313 Encoder plug-in pin



18.6. PG3 expansion card

18.6.1. PG3 Product Introduction

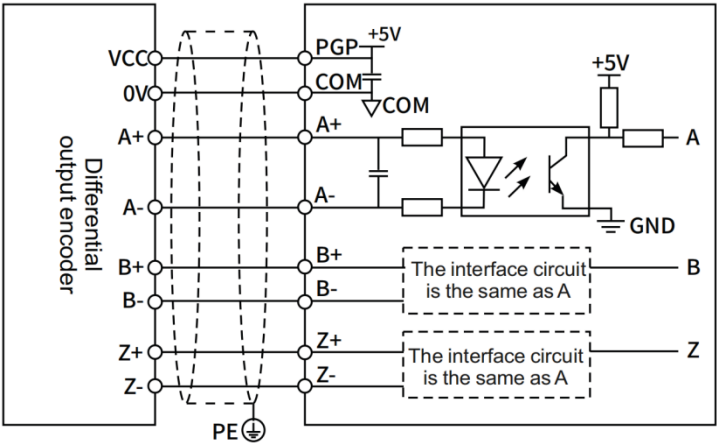
The PG3 is a differential input ABZ encoder card . The PG3 encoder card supports differential, OC, and push-pull signal inputs; supports pulse output; has 1:1 frequency division differential signal output; and is suitable for closed-loop vector control (VC) of asynchronous traction machines.



PG3 Expansion Card

18.6.2. PG3 Differential Input ABZ Encoder Card Terminal Function Description

Termin: marking	Terminal name	Function Description
	B+, B-	ncoder B+ / B- signals
	OUTA	requency division output A signal, NPN type OC utput

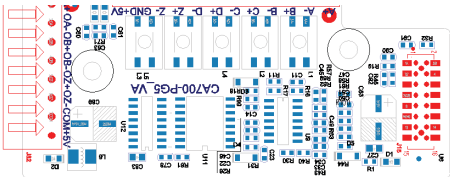
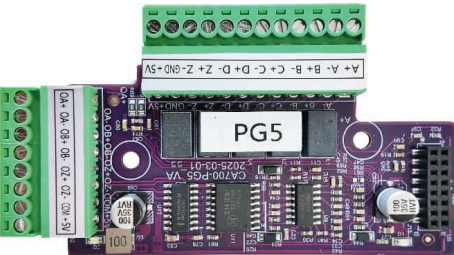


Wiring diagram of differential output ABZ encoder card

18.7. PG5 expansion card

18.7.1. PG5 Card Product Introduction

The PG5 is a sine/cosine encoder interface card with frequency division output.



PG5 Expansion Card

18.7.2. PG5 Sine/Cosine Encoder Interface Card Terminal Function Description

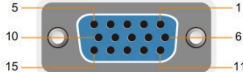
Terminal markings	Terminal name	Function Description
1/8	B-/B+	Encoder differential signal B-/B+
3/4	R+/R-	Encoder differential signal R-/R+
5/6	A+/A-	Encoder differential signal A-/A+
7	PG GND	power ground
9	PG VCC	+5V power supply

Terminal markings	Terminal name	Function Description
10/11	C+/C-	Encoder differential signal C+/C-
12/13	D+/D-	Encoder differential signal D+/D-
14/15	NA	
	OA+, OA-	1-division output differential A signal
	OB+, OB-	1-division output differential B signal
	OZ+, OZ-	1-division output differential Z signal

18.7.3. PG5 encoder card wiring

The Heidenhain ERN1387 encoder is recommended. The correspondence between the 1387's double-row socket and the DB15 terminal block is shown in the table.

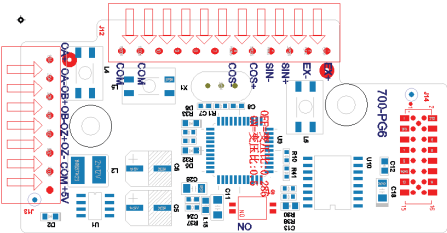
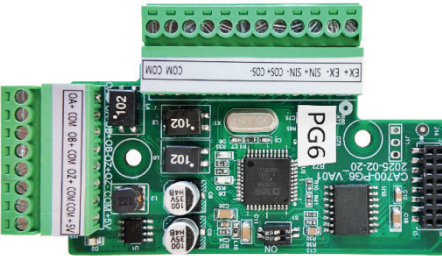
1387 Double-row socket		DB15 terminal block		PG5 terminal	
5a	B-	1	B-	4	B-
4b	R+(Z+)	3	R+	9	Z+
4a	R-(Z-)	4	R-	10	Z-
6b	A+	5	A+	1	A+
2a	A-	6	A-	2	A-
3a+5b	0V	7	PGGND	11	PGGND
3B	B+	8	B+	3	B+
7b+1b	+5V	9	PGVCC	12	PGVCC
7b	C+(SIN-)	10	C+	5	C+
1a	C-(SIN+)	11	C-	6	C-
2b	D+(COS+)	12	D+	7	D+
6a	D-(COS-)	13	D-	8	D-

1387 Double-row socket							DB15 terminal block
1b	2b	3b	4b	5b	6b	7b	
1a	2a	3a	4a	5a	6a	7a	

18.8. PG6 expansion card

18.8.1. PG6 Product Introduction

interface card.



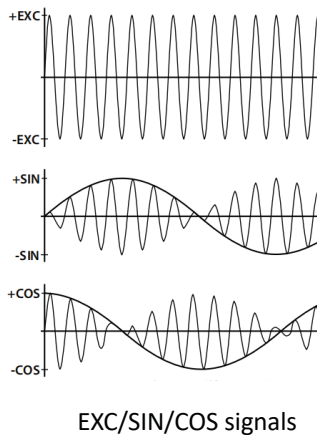
PG6 Expansion Card

18.8.2. Functional Description of Terminals on Rotary Transformer Interface Card

J12		
	EXC-, EXC+	Encoder excitation output signal, 4Vrms/10kHz sine wave
SI	ON	Rotary transformer encoder turns ratio: 0.286
J14	Control signal line interface	Connect to motherboard encoder interface
J13		1:1, ABZ differential signal output (0-500kHz)
	OZ+, OZ-	

EXC/SIN/COS Signal Description

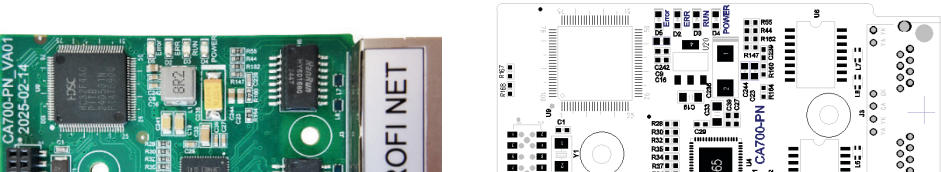
The waveforms of the excitation signal (EXC) and feedback signal (SIN/COS) of the rotary transformer encoder card are shown in the figure below.



18.9. ProFinet-PN Communication Card

18.9.1. ProFinet-PN Product Introduction

The PN card is a Profinet fieldbus adapter card that conforms to the internationally recognized Profinet Ethernet standard. Installed on frequency converters, this card improves communication efficiency, facilitates network functionality, and enables the frequency converter to become a fieldbus slave, receiving control from the fieldbus



PN Expansion Card

18.9.2. ProFinet-PN Communication Card Terminal Function Description

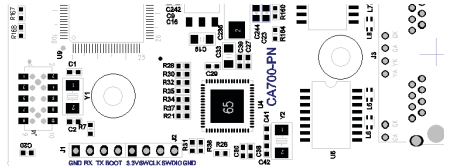
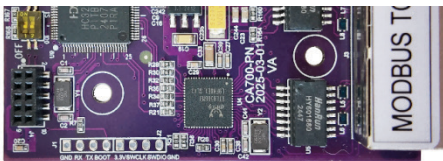
Termin markin	Terminal name	Function Description
J3	RJ45 input or output port	ure operational stability, please use Category elded twisted-pair network cable.
led	indicator lights	R indicator; RUN indicator;

Termin markin	Terminal name	Function Description

18.10. MODBUS-TCP Communication Card

18.10.1. Modbus-TCP Product Introduction

The TCP card is an Ethernet-based communication protocol card used for communication between devices in industrial automation and control systems.



Modbus-TCP Expansion Card

18.10.2. Modbus-TCP Communication Card Terminal Function Description

J3	RJ45 input or output port	ure operational stability, please use Category 5e shielded twisted-pair network cable .
J4	10-position female connector	l-pin connector is connected to the expansion transfer board .

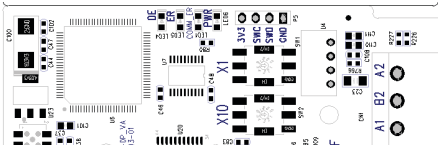
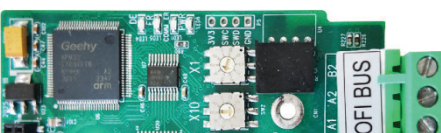
18.11. Profibus-DP communication card

18.11.1. Introduction to Profbus-DP Products

The Profibus-DP communication card is a Profibus-DP fieldbus adapter card that conforms to the internationally recognized Profibus fieldbus standard. It improves communication efficiency on frequency converters, enables networking, and allows the frequency converter to become a slave station on the fieldbus, receiving control from the

fieldbus master station. The DP expansion card enables Profibus-DP communication.

DPV1 supports	support
tation number setting dial code	Setting 1 to 125
Slave failure	The expansion card proactively informs the main site.



DP Expansion Card

18.11.2. Profbus-DP Communication Card Terminal Function Description

	Terminal name	Function Description
	10-position female connector	10-pin connector connects to the expansion card transfer board.

Terminal markings	Terminal name	Function Description
		ER: Fault Indicator COM_ER: Inverter communication indicator PWR: Power indicator

18.11.3. Profibus-DP communication card communication configuration

Configure inverter parameters

Function code	name	content	set up value	describe
P0-04	Source of execution instructions	0: Operation panel operation command channel (LED off) 1: Terminal command channel (LED lit) 2: Communication command channel (LED flashing)	2	Run commands issued via communication
P0-06	Main frequency source X selection	0: Up/Down frequency changes are not remembered during shutdowns. 1: Up/Down frequency modification for power-off memory 2: AI1 3: AI2 4: Multi-speed 5: Simple PLC 6: PID 7: Communication given 8: PULSE setting 9: Up/Down frequency modification, shutdown memory, power failure memory not remembered.	7	The given target frequency is communicated via
P8-11	Serial communication protocol	0: Modbus protocol 1: Communication Card Bridge Protocol	1	Select the special communication card for communication.

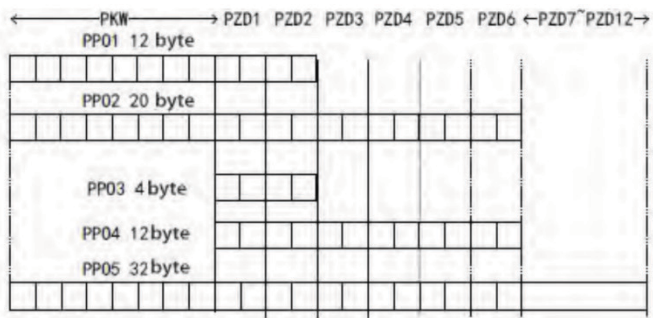
Profibus-DP data format

According to the ProfiDrive (transmission) protocol, the usage type is divided into five types: PPO1, PPO2, PPO3, PPO4, and PPO5. The functions that each data format can

	Inverter commands, frequency settings Inverter status, operating frequency reading		Inverter status, operating frequency reading Four functional parameters are written periodically. Four functional parameters are read periodically.
PPO2	Single-function parameter operation Inverter commands, frequency settings Inverter status, operating frequency reading Four functional parameters are written periodically. Four functional parameters are read periodically.	PPO5	Single-function parameter operation Inverter commands, frequency settings Inverter status, operating frequency reading 10 functional parameters are written periodically. 10 functional parameters are read periodically.
PPO3	Inverter commands, frequency settings Inverter status, operating frequency reading		

PPO type description

The PPO type data format contains data blocks divided into two areas: the PKW area (parameter area) and the PZD area (process data area). The type data format is shown in the figure below.



PPO type data format

PKW Data Description

PKW data primarily enables the master station to read and write individual parameters of the frequency converter. The communication address for the frequency converter parameter is directly provided by the communication data. The implemented functions are as follows:

- a) Reading inverter function parameters
- b) Change of inverter function parameters

Data format

The PKW data consists of three array areas: PKE, IND, and PWE. The PKE data is 2 bytes long, the IND data is 2 bytes long, and the PWE data is 4 bytes long.

The data format is shown in the table below:

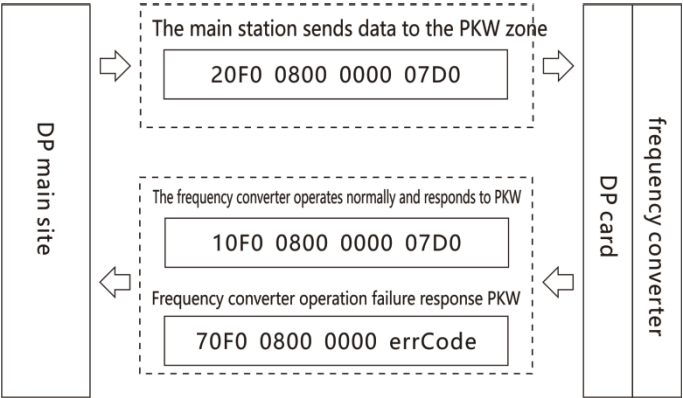
Main station sends data PKW							
Operation commands	Parameter address		reserve			Write operation: parameter value Read operation : empty	
Communication card response data PKW							
Operation commands	Parameter address		reserve			Success: Return value Failure: Error message	
PKE	PKE	IND	IND	PWE	PWE	PWE	PWE

PKW data description

Description of data sent by the main station (PKW)		Inverter response data PKW description
PKE	High 4 bits: Command code 0: No request 1: Read parameter data 2: Change parameter data (The above command codes are in decimal format) Low 4 bits: Reserved Low 8 bits: High bits of the parameter address	High 4 bits: Response code 0: No request 1: Parameter operation is correct. 7: Unable to execute Low 8 bits: Parameters, parameter address, high bits
IND	High 8 bits: Parameters, low bits of the parameter address Low 8 bits: Reserved	High 8 bits: Parameters, low bits of the parameter address Low 8 bits: Reserved
PWE	High 16 bits: Reserved The lower 16 bits: not used in read requests; represent parameter values in write requests.	When the request succeeds: parameter value When a request fails: Error code (consistent with standard MODBUS) 1: illegal command 2: illegal address 3: illegal data 4: Other errors

Application Examples

The following diagram shows the main station reading the transmit data PKW area and the inverter response data PKW area of inverter function parameter F0-08.



Example of main station reading inverter parameters and sending PKW data.

PZD area data description

The PZD zone data enables the master station to modify and read inverter data in real time, as well as periodically exchange data. The data communication address is changed by the variable frequency drive (VFD).

The frequency converter can be directly configured. This mainly includes the following:

- a) Inverter control commands and target frequency are given in real time.
- b) Real-time reading of inverter current status and operating frequency
- c) Real-time data exchange of functional and monitoring parameters between the frequency converter and the Profibus-DP master station.

The default mapping for PZD1 is U3-17, and the default mapping for PZD2 is U3-16. The default mapping for PZD1 is U1-39, and the default mapping for PZD2 is U1-00. The PZD process data mainly facilitates periodic data exchange between the master station and the frequency converter. The exchange data is shown in the table below:

Main station sends data to PZD area			Inverter response data PZD area		
PZD1	PZD2	PZD3~PZD12	PZD1	PZD2	PZD3~PZD12
control word (U3-16)	Frequency setting (U3-16)	Inverter function parameters can be changed in real time.	control word (U0-00)	Operating frequency (U0-00)	Real-time reading of inverter function parameters

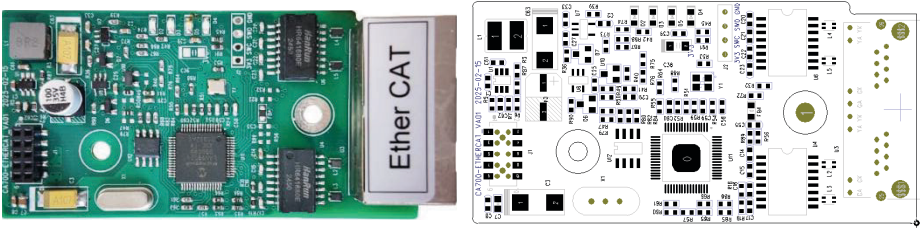
Main station sends data PZD description		Inverter response data PZD area	
PZD1	Inverter command words (The command source needs to be set to communication, i.e., P0 - 02 = 2) 0001: Forward Operation 0002: Reverse Operation 0003: Positive inching 0004: Reverse inching 0005: Free Stop	PZD1	Inverter operating status information interest 0001: Forward Operation 0002: Reverse Operation 0003: Shutdown

Main station sends data PZD description		Inverter response data PZD area	
	0006: Deceleration and Stop 0007: Fault Reset 0008: Fault Reset (Fault reset is only possible in communication control mode)		
PZD2	The AC drive target frequency (frequency source set to "communication") ranges from the upper limit of the reverse frequency (negative value) to the upper limit of the positive frequency (including the decimal point, e.g., 2000 corresponds to 20.00 Hz on the AC drive). When the given target frequency exceeds this range, the AC drive operates at the upper limit of that frequency. For example, if the frequency limit is set to 50.00 Hz and the communication is set to -6000, the AC driver will operate in the forward direction at 50.00 Hz. If the frequency limit is set to 50.00 Hz and the communication is set to -6000, the AC driver will operate in the reverse direction at 50.00 Hz.	PZD2	Inverter operating frequency (unit: 0.01Hz) Returns the current actual operating frequency of the frequency converter; the returned data value is a 16-bit signed data.
PZD3~PZD12	Real-time change of function parameter values Do not write to EEPROM	PZD3~PZD12	Real-time reading of function parameters

18.12. Ethercat communication card

18.12.1. Ethercat Product Introduction

The EtherCAT fieldbus adapter card is used for ultra-high-speed I/O networks. This protocol is applicable to the I/O layer. The card features high efficiency, flexible topology, and ease of operation. It is installed in frequency converters to increase communication efficiency and enable networking of AC drives controlled by a fieldbus master.



Ethercat Expansion Card

The Ethercat communication expansion card (SI-ECAT) uses a standard Ethernet RJ45 socket to connect to the Ethercat master station. Its pin signal definitions are consistent with standard Ethernet pins, and both crossover and straight-through cables are acceptable.

18.12.2. EtherCAT communication card terminal function description

Terminal markings	Terminal name	Function Description
U3	Input/Output Port	To ensure operational stability, please use Category 5e shielded twisted-pair network cable.
J1	10-position female connector	10-pin connector connects to expansion card transfer board
indicator lights	D2	Solid green light indicates the device is in OP (operated) mode.
		Green flashing indicates working/safe mode in PREOP.
		OFF state, disconnected or operating in initial mode.
	D3	Solid green light indicates normal operation.
		OFF state, communication with the driver is disconnected.
	D5	A solid red light indicates an internal ESC fault.
		OFF state, normal
	D4	Power indicator light: Solid green, normal.
		The communication board is in the OFF state and is not powered on.

The EtherCAT RJ45 interface uses a standard Ethernet connection to the EtherCAT master RJ45 socket. Its pin signal definitions are the same as standard Ethernet pins. They can be connected using either a crossover cable or a straight-through cable.

Terminal symbol	Terminal Name	describe
U1	ECAT IN	Network interface. The left side is for input, and the right side is for output.
	ECAT OUT	

1. After installing the card, ECAT IN is located on the left and ECAT OUT is located on the right when facing the RJ45 interface. The two interfaces must be connected correctly.
2. When facing an RJ45 interface, both interfaces must be correctly connected. Cat5e shielded twisted-pair (STP) network cable must be used to ensure stability.

18.12.3. Ethercat communication card function code configuration

Function code	name	content	set up value	describe
P0-04	Source of execution instructions	0: Operation panel operation command channel (LED off) 1: Terminal command channel (LED lit) 2: Communication command channel (LED flashing)	2	Run commands issued via communication
P0-06	Main frequency source X selection	0: Up/Down frequency changes are not remembered during shutdowns. 1: Up/Down frequency modification for power-off memory 2: AI1 3: AI2 4: Multi-speed 5: Simple PLC 6: PID 7: Communication given 8: PULSE setting 9: Up/Down frequency modification, shutdown memory, power failure memory not remembered.	7	The given target frequency is communicated via
P8-11	Serial communication protocol	0: Modbus protocol 1: Communication Card Bridge Protocol	1	Select the special communication card for communication.

18.12.4. EtherCAT parameters related to inverter communication and control

Name	content	Index	Sub-index
Control command	0001: Forward Operation 0002: Reverse Operation 0003: Positive inching 0004: Reverse inching 0005: Free Stop 0006: Deceleration and Stop 0007: Fault Reset 0008: Fault Reset Fault reset is only possible in communication control mode.	16#2073	16#02
DO	BIT0: RELAY1 Output Control BIT1: DO1 Output Control BIT2: RELAY2 Output Control	16#2073	16#03
AO1	0 ~ 7FFF represents 0% ~ 100%.	16#2073	16#04
AO2	0 ~ 7FFF represents 0% ~ 100%.	16#2073	16#05

AC drive parameters (common)

Function code	Name	content	Index	Sub-index
P0-14	Maximum output frequency	When P0-20=1, the adjustable range is 50.0Hz to 1200.0Hz; When P0-20=2, the adjustable range is 50.00Hz to 600.00Hz;	16#20F0	16#0A
P0-23	Acceleration time	0s ~ 30000s (P0-21=0) 0.0s ~ 3000.0s(P0-21=1) 0.00s ~ 300.00s(P0-21=2)	16#20F0	16#11
P0-24	deceleration time	0s ~ 30000s (P0-21=0) 0.0s ~ 3000.0s(P0-21=1) 0.00s ~ 300.00s(P0-21=2)	16#20F0	16#12
P0-21	acceleration/deceleration time unit	0:1 second 1:0.1 seconds 2:0.01 seconds	16#20F0	16#13
P7-00	Jog operation frequency	0.00Hz ~ Maximum frequency	16#20F7	16#01
P7-01	Inching acceleration time	0.0s ~ 3000.0s	16#20F7	16#02

Function code	Name	content	Index	Sub-index
P7-02	Inching deceleration time	0.0s ~ 3000.0s	16#20F7	16#03
PD-01	Torque digital setpoint	-200.0% ~ 200.0%	16#20FD	16#03
PD-03	Maximum frequency in the positive direction of torque control	0.00Hz ~ Maximum frequency (P0-14)	16#20FD	16#04
PD-04	Maximum frequency in the opposite direction of torque control	0.00Hz ~ Maximum frequency (P0-14)	16#20FD	16#05
U1-05	Output power (kW)	-	16#2070	16#06
U1-06	DI Input Status	-	16#2070	16#07
U1-07	DO output status	-	16#2070	16#08

The AC drive parameters are described as follows:

Each object in the dictionary should be uniquely addressed using an index and sub-indexes.

"Index": This field (hexadecimal) specifies the same type of object in the dictionary.

"Sub-index": This field specifies, in hexadecimal, the overall arrangement of offsets for each object within the same index.

The mapping between communication driver parameters and the object dictionary is as follows:

Object dictionary index = 0x2000 + parameter group number

Object dictionary sub-index = hexadecimal of the offset in the parameter group + 1

By default, when using a EtherCAT card, written PDO1 and PDO2 are mapped to U3-17 and U3-16 respectively. Therefore, the first entry in RPDO must be U3-17; otherwise, operation will fail. Furthermore, if any non-zero value is written to the eight high bits of U3-17, the AC drive will report a communication failure (Err27).

18.12.5. EtherCAT communication protocol

In DC mode, the DC synchronization mode period must be at least 1 ms but less than 100 ms. Otherwise, an EtherCAT communication failure will occur.

PDO Data Description

PDO data is used by the master station to modify and read AC-driven data in real time to perform periodic data exchanges. The data communication address is provided by the AC driver.

Mainly includes:

- a) Real-time setting of AC drive control commands and target frequency
- b) Real-time reading of AC drive current status and operating frequency
- c) Functional parameters and monitoring data in the AC drive and EtherCAT master PDO process data are used for periodic data exchange between the master station and AC, as shown in the table below.

Master sends PDO (0x1600)		
Fixed RPDO		Variable RPDO
AC drive target frequency	AC drive command	Modify the function parameters of the frequency converter
RPDO1	RPDO2	RPDO3 to RPDO10
The corresponding AC drive data PDO (0x1A00)		
AC drive state	AC drive operating frequency	Read the function parameters of the AC drive
TPDO1	TPDO2	TPDO3 to TPDO10

Note: A maximum of 10 RPDOs and 10 TPDOs can be configured.

Data sent by the main station

Master sends RPDO	
RPDO1	The AC drive target frequency (frequency source set to "communication") ranges from the upper limit of the reverse frequency (negative value) to the upper limit of the positive frequency (including the decimal point, e.g., 2000 corresponds to 20.00 Hz on the AC drive). When the given target frequency exceeds this range, the AC drive operates at the upper limit of that frequency. For example, if the frequency limit is set to 50.00 Hz and the communication is set to -6000, the AC driver will operate in the forward direction at 50.00 Hz. If the frequency limit is set to 50.00 Hz and the communication is set to -6000, the AC driver will operate in the reverse direction at 50.00 Hz.
RPDO2	AC drive command word (command source set to "communication")
	0001: Forward Operation 0002: Reverse Operation 0003: Positive inching

	0007: Fault Reset 0008: Fault Reset (Fault reset is only possible in communication control mode)
RPDO3 to RPDO10	Functional parameter values (groups F and A) can be modified in real time without being written to EEPROM (Electronic Read-Only Memory).

AC-driven response data

Corresponding AC drive data TPDO	
TPDO1	AC drive operating status
	0001: Forward Operation 0002: Reverse Operation 0003: Shutdown
	Operating frequency (unit: 0.01 Hz)
	Returns the current operating frequency of the AC drive. The returned data is 16-bit signed data, and the received data is 16-bit unsigned data. Variables must be mapped to 16-bit signed data.
TPDO3 to TPDO10	Read function parameter values (Groups F and A) and monitor parameter values (Group U).

For detailed information on the PDO definitions for other AC drives, please refer to the corresponding AC drive user guide.

Service Data Object (SDO)

EtherCAT SDO is used to transmit non-cyclic data, such as communication parameter configurations and servo drive operating parameter configurations. EtherCAT CoE service type.

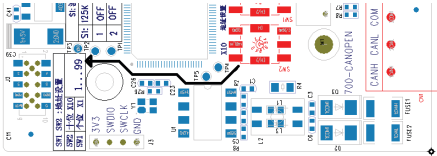
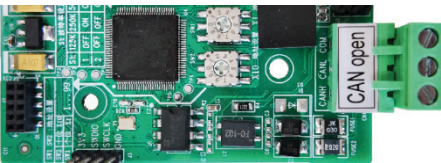
include:

- 1) Critical event messages
- 2) SDO Request
- 3) SDO Response
- 4) TxPDO
- 5) RxPDO
- 6) Send requests remotely via TxPDO
- 7) Sending requests remotely using RxPDO
- 8) SDO Information

18.13. Canopen expansion card

18.13.1. Canopen Product Introduction

The Canopen communication card is an intelligent communication interface module designed specifically for industrial automation, enabling high-speed data exchange between frequency converters and host computers (PLC/DCS/industrial control computers). This module conforms to the CANopen international standard protocol, supports real-time control, parameter configuration, and status monitoring, and is suitable for complex application scenarios such as multi-axis synchronization and distributed control.



Canopen Expansion Card

18.13.2. Canopen Communication Card Terminal Function Description

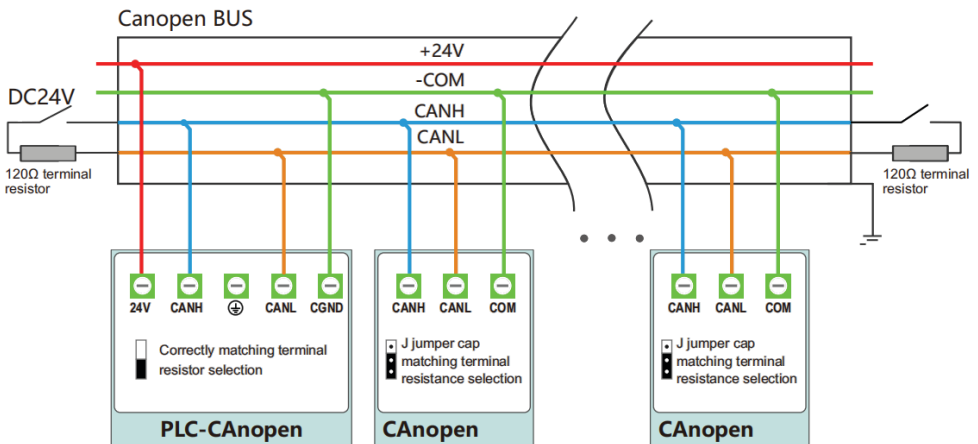
	CAN negative input	nect to the reverse end of the CAN bus
	CAN Termination Matching Resistor Setting Jumper	(downward) - No terminating resistor matching ormed.

18.13.3. Canopen Communication Card Address and Baud Rate DIP Switch Instructions

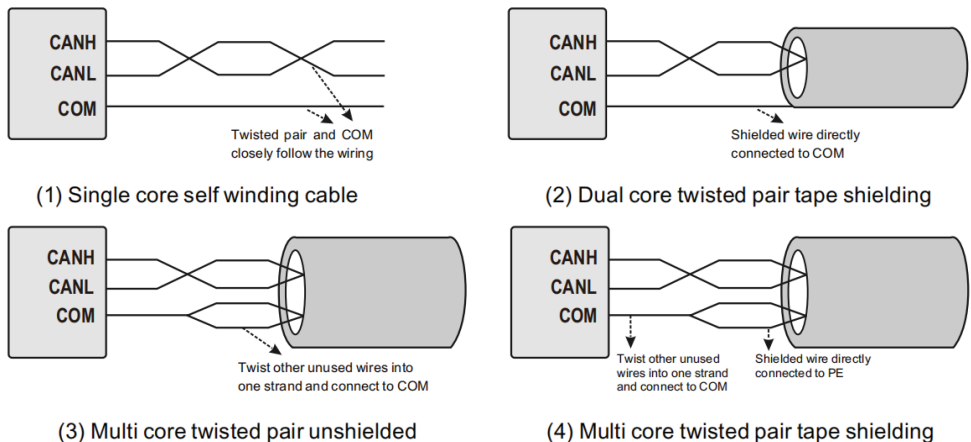
	Termina name	Function Description				

SW2/SW1	encoder Address settings	SW2, SW1 address settings:			
		SW2	Tens	0-9	01-99 address
		SW1	Units digit	0-9	
		For example: SW1=1, SW2=2, then the address is: 21			

CANOPEN connection method: Shielded twisted pair cable is recommended for CAN bus connection. CANH and CANL use twisted pair cable connection. Connect 120Ω terminating resistors at both ends of the bus to prevent signal reflection. Connect the reference ground of all node CAN signals together. A maximum of 64 nodes can be connected, and the distance between the branches of each node should be less than 0.3M.



Recommended usage methods for different cables on site:



18.13.4. Canopen communication related function codes

function code	name	Setting value
P0-04	Command source selection	0: Keyboard command channel 1: Terminal command channel 2: Communication command channel
P0-06	Frequency source selection	7: Communication given
P8-11	Communication type selection	0:485 Communications 1: Expansion Card Communication (CAN/DP)

18.13.5. Canopen Communication Protocol Description

Supports the Node Guard protocol, allowing the master station to query device status.

Supports the Heartbeat protocol, enabling slave stations to periodically report their current status to the master station. SDO only supports accelerated transmission mechanisms, transmitting one function code (2 bytes) per transmission.

Supports 3 TPDOs and 3 RPDOs; supports emergency objects;

Communication Object COBID

CANOPEN provides various communication objects, each with different characteristics (see the CANOPEN standard protocol for details), allowing for selection based on different application scenarios. This expansion card uses a predefined COB-ID, with the following specific rules:

1. NMT object: 0x000

2. SYNC object: 0x080

3. SDO objects

Send SD0-0x600+Node-Id

Receive SD0-0x580+Node-Id

4. PDO object:

RPDO1-0x200+Node-Id

RPDO2-0x300+Node-Id

RPDO3-0x400+Node-Id

TPDO1--0x180+Node-Id

TPDO2-0x280+Node-Id

TPDO3-0x380+Node-Id

non-function code parameter addresses. Please refer to the MODBUS communication protocol section - function code parameter address identification rules for details.

Mapping Description

The inverter function code group is mapped to the 0x2000~0x20FF range of the CANopen object dictionary. The function code number is mapped to the sub-index of the object dictionary by incrementing the function code number by 1. For inverter function code P0~04, the main index number of the mapped object dictionary is 0x20F0, and the sub-index number is 0x05.

Inverter function code parameter mapping description: Function codes are divided into three groups: P0~PF, A0~AF, and U0~UF.

When performing a read function code operation, the mapped address corresponds to the following:

Function code group	Can open index
P0~PF	0x20F0~0x20FF
A0~AF	0x20A0~0x20AF
U0~UF	0x2070~0x207F

When performing a write operation to EEPROM, the mapped addresses are as follows:

Function code group	Can open index
P0~PF	0x20F0~0x20FF
A0~AF	0x20A0~0x20AF

When performing a write operation to RAM, the mapped address corresponds to the following:

Function code group	Can open index
P0~PF	0x2000~0x200F
A0~AF	0x2040~0x204F

Taking function code P0-23 (acceleration time) as an example, when reading the P0-23 function code value, its object dictionary index number is 0x20F0, and its sub-index number is 0x18; when writing the P0-23 function code value and writing it to EEPROM, its object dictionary index number is 0x20F0, and its sub-index number is 0x18.

When writing function code P0-23 and only writing to RAM, its object dictionary index number is 0x2000 and its sub-index number is 0x18;

Motor tuning functionality cannot be achieved by changing function parameters via communication. The inverter function codes are stored in EEPROM and can be read repeatedly, but should not be repeatedly rewritten. When programming, pay attention to the function code rewriting instructions; the PLC program should not be unconditionally driven, causing cyclic communication write operations, which could damage the inverter's memory.

18.13.6.2. SDO Read/Write Operations

The inverter uses CANopen Service Data Object (SDO) for read operations. The data format sent by the master station is shown in the table below:

CAN	CANopen data	illustrate
11-digit ID	0x600+Node-ID	Node-ID device address DIP switch settings
RTR	0	Remote frame marker "0"
DATA0	Command code (0x40)	0x40 Read command
DATA1	Index low byte	Function code group (P0 group "0xF0")
DATA2	Index high byte	Mapped address
DATA3	Sub-index	Function code number + 1 ("0x03")
DATA4	Data 1	Keep "0"
DATA5	Data 2	Keep "0"
DATA6	Data 3	Keep "0"
DATA7	Data 4	Keep "0"

return:

CAN	CANopen data	illustrate
DATA0	Command code return	Correct: "0x4B" Error: "0x80"
DATA1	Index low byte	Function code group (P0 group "0xF0")
DATA2	Index high byte	Mapped address
DATA3	Sub-index	Function code number + 1 ("0x03")
DATA4	Data 1	Low byte of data
DATA5	Data 2	High byte of data
DATA6	Data 3	Correct: "0"

CAN	CANopen data	illustrate
DATA7	Data 4	Error: SDO operation failed error code

18.13.6.3. SDO Inverter Writing Operation

using Can Open Service Data Objects (SDOs), the data format sent by the master station is shown in the table.

CAN	CANopen data	illustrate
11-digit ID	0x600+Node-ID	Node-ID device address DIP switch settings
RTR	0	Remote frame marker "0"
DATA0	command code	0x2B
DATA1	Index low byte	Function code group (P0 group "0xF0")
DATA2	Index high byte	Mapped address
DATA3	Sub-index	Function code number + 1 ("0x03")
DATA4	Data 1	Low byte of data
DATA5	Data 2	High byte of data
DATA6	Data 3	Keep "0"
DATA7	Data 4	Keep "0"

The response data for writing to the inverter SDO slave station is shown in the table below. A successful operation returns a command code "0x60", with the index remaining unchanged, and data 4, 5, 6, and 7 returning "0". A failed operation returns a command code "0x80", with the index remaining unchanged, and data 4, 5, 6, and 7 returning an SDO failure error code.

CAN	CANopen data	illustrate
11-digit ID	0x580+Node-ID	Node-ID device address DIP switch settings
RTR	0	Remote frame marker "0"
DATA0	Command code (0x40)	Success: "0x60" Failure: "0x80"
DATA1	Index low byte	Function code group (P0 group "0xF0")
DATA2	Index high byte	Mapped address
DATA3	Sub-index	Function code number + 1 ("0x03")
DATA4	Data 1	Correct: "0"

CAN	CANopen data	illustrate
DATA5	Data 2	Error: SDO operation failed error code
DATA6	Data 3	
DATA7	Data 4	

The main communication control related function codes are shown in the table below.
The main index address is 0x2073. For other function codes, please refer to the user manual.

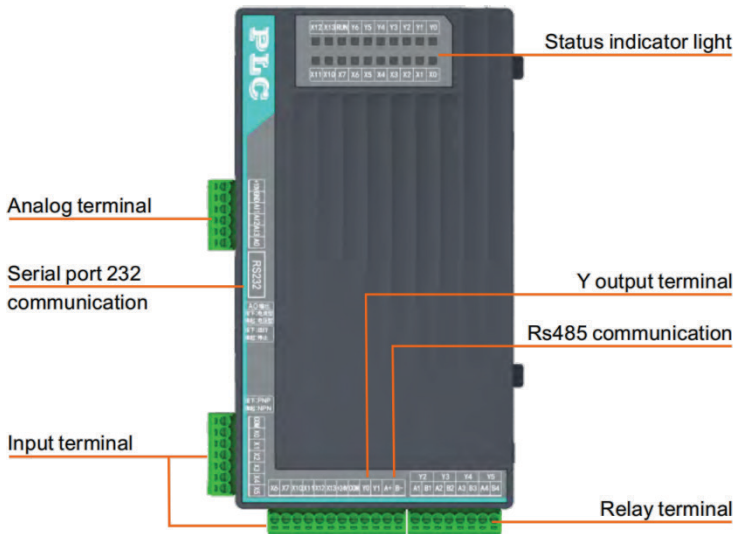
Name	CANopen sub-index	Set range	
Frequency setting	0x11	0~Maximum frequency, 0.01Hz	
Control commands	0x12	0001: Forward rotation 0002: Reverse operation 0003: Forward jogging 0004: Reverse Inching	0005: Free Stop 0006: Deceleration and Stop 0007: Fault Reset
DO control	0x13	BIT0: DO1 Output Control BIT1: DO2 output control BIT2: RELY1 Output Control BIT3: RELY2 Output Control BIT4: FMR Output Control	
AO1 control	0x14	0~7FFF represents 0%~100%.	
AO2 control	0x15	0~7FFF represents 0%~100%.	
FM control	0x16	0~7FFF represents 0%~100%.	

18.14. PLC expansion card

18.14.1. Introduction to PLC Card Software Products

The PLC is a PLC compatible with the Mitsubishi FX2N. Its instruction set is fully compatible. Therefore, application engineers can use Mitsubishi's programming software GX Developer or GX Works2 to develop PLC applications.

18.14.2. Appearance and Interface Introduction



18.14.3. Terminal Description

Analog terminal					
10V	GND	AI1	AI2	AI3	AO

Serial port communication
232



Input terminal						
COM	X0	X1	X2	X3	X4	X5



Input terminal					
X6	X7	X10	X11	X12	X13

Power terminal
24V COM

Terminal Y	
Y0	Y1

485 communication	
A+	B-



Relay Y2		Relay Y3		Relay Y4		Relay Y5	
A1	B1	A2	B2	A3	B3	A4	B4

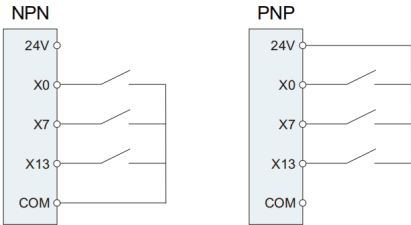


18.14.4. Hardware Resources

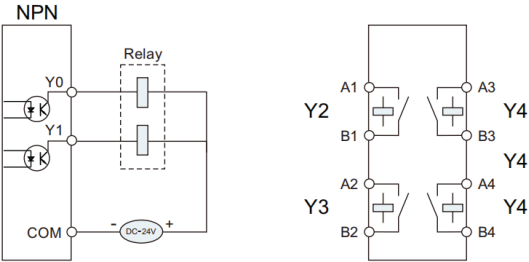
Hardware resources	Component type	parameter
Input point	X0~X7, X10~X13	12-CH/PNP-NPN/18-30V
Output point	Y0~Y1, Y2~Y5	Y0 Y1 Transistor type (open-drain output), Normally open relay outputs Y2(A1-B1), Y3(A2-B2), Y4(A3-B3), Y5(A4-B4).
Analog input	AI1 AI2 AI3	3-CH/Supports 0-10V
Analog output	A0	1-CH / Supports 0-10V / 0-20mA
Communication output	COM1	PLC program download port RS232
	COM2	PLC supports external communication via RS485 with baud rates of 300/600/1200/2400/4800/9600/19200/38400.
	COM3	Internal frequency converter usage: 300/600/1200/2400/4800/9600/19200/38400

18.14.5. Wiring Diagram

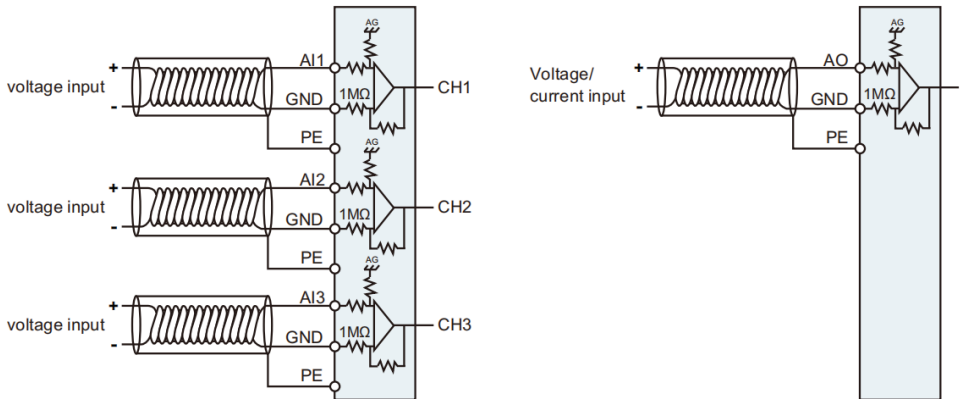
18.14.5.1. Input point wiring diagrams can use either PNP or NPN type .



18.14.5.2. Output Point Wiring Diagram



18.14.5.3. Analog Input/Output Wiring Diagram



18.14.6. Communication Instructions

18.14.6.1. Serial port communication format settings: i.e., setting the contents of the two registers COM2 to D8120 and COM3 to D8130 .

Position number	name	content	
		0 (bit is OFF)	0 (bit ON)
b0	Data bits	7 people	8-bit
b1 b2	Parity check	b2,b1 (0,0): None (N) (0,1): No Odd Parity (ODD) (1,0): Even parity (EVEN)	
b3	Stop bit	1 person	2 people
b4 b5 b6 b7	Baud rate (bps)	b7,b6,b5,b4 (0,0,1,1):300 (0,1,0,0):600 (0,1,0,1):1200 (0,0,1,1):2400	b7,b6,b5,b4 (0,1,1,0):4800 (1,0,0,0):9600 (1,0,0,1):19200 (1,0,1,0):38400
b8	masthead	none	Initial value of (D8124): STX(02H)
b9	End of report	none	Initial value of (D8125): EXT(03H)
b10 b11	control lines	Computer connection	b11,b10 (0,0): RS-485 half-duplex interface (1,0): RS-485 full-duplex interface
b12 b13 b14 b15		Unavailable	

Available protocol settings for COM2 communication port: (PLC to external 485 communication interface)

COM2 protocol	set up		Communication format	Protocol Application
	D8126	D8127		
Download Protocol / HMI Monitoring Protocol	none	00	fixed "19200, 7, E, 1"	The default power-on protocol is computer link protocol.
Parallel Protocol Master Station		01	Determined by D8120	M8072=1 Start Parallel Protocol M8070=1 Main Site
Parallel protocol from station				
Modbus-RTU slave station	00	02		M8072=1 Start Parallel Protocol M8070=1 Main Site
Modbus-ASCII slave station	01			
EXTR		03		Inverter Professional Instructions

Available protocol settings for COM3 communication port: (RS485 half-duplex communication fixed for communication with frequency converter)

COM3 protocol	D8039 settings	Communication format	Protocol Application
Download Protocol / HMI Monitoring Protocol	00	Fixed "19200, 7, E, 1"	The default power-on protocol is computer link protocol.
Modbus-RTU Main Station	01	Determined by D8130	D8132 Communication format code; D8133 Slave address; D8134 Data length; D8125 Master register;
Modbus-RTU slave station	02		D8130 sets communication parameters; D8131 station number is set to 1 by default.

18.14.6.2. Overview of Modbus

The PLC supports Modbus ASCII mode/RTU mode slave stations. The master station can access the PLC's internal software resources via COM2 and COM1 ports using the MODBUS protocol.

Supported function codes are:

Modbus function codes (hex)	describe
0x01	Read coil
0x03	Read register
0x05	Write a single coil
0x06	Write a single register
0x0f	Write multiple coils
0x10	Write multiple registers

Coil: A positional variable with only two states, 0 and 1. The RY1N series PLC includes variables such as M, S, T, C, X, and Y.

Registers: refer to 16-bit or 32-bit variables. In the RY1N series PLC, 16-bit variables include D, T, and C0~199; 32-bit variables are C200~254.

Communication interface

Variable name	hexadecimal address	Decimal address	Number of coils
S0-S999	0x0000-0x03E8	0-1000	1000
X0-X377	0x0400-0x04FF	1024-1279	256
Y0-Y377	0x0500-0x05FF	1280-1535	256
T0-T255	0x0600-0x06FF	1536-1791	256
M0-M1535	0x0800-0x0DFF	2048-3583	1536
M8000-M8255	0x0F00-0x0FFF	3840-4095	256
C0-C255	0x0E00-	3584-	256
D0-D2047	0x1000-	4096-	2048

18.14.6.3. Inverter-Specific Communication Commands (EXTR)

Instruction Description: EXTR Overview This is a dedicated instruction developed specifically for the 700-PLC extended frequency converter.

Command format EXTR S S1 S2 S

Function code S: 0X03 Reads data from the frequency converter to the PLC.

0X06 Writing data from PLC to frequency converter

S1: Inverter communication address: 0-31

S2: Inverter memory address

S3: The number of communication operand registers is stored in register S3+N;

Related registers

M8117	Using EXTR	D8117	EXTR timeout
M8118	Communication error or parameter error	D8118	EXTR instruction step encoding in use
M8119	Communication error lock	D8119	Error code

18.14.6.4. Types of soft components supported by the 700-PLC system

Serial Number	Component type	describe	
1	Input point	X000-X007 X010-X013	
2	Output point	Y000-Y001 Transistor Output Y002-Y005 Relay Output Y006 Main unit frequency converter occupancy	
3	Intermediate relay M	M0-M383 (Standard)	
		M384-M647 (Electrically Retaining)	
		M8000-M8255 (System Relay)	
4	Status relay S	S0-S9 (Initialization)	
		S10-S199	
		S200-S299 (Alarm Settings)	
5	Timer T	T0~T199 (100ms)	
		T200~T24 (10ms)	
		T246~T249 (1ms)	
		T250~T255 (100ms live hold)	
6	Counter C	16-bit	C0~C15
			C16~C199 (Electrically Retaining)
		32bit	C200~C219 (bidirectional)
			C220~C234 (Electrically held, bidirectional)
			C235~C240 (High-speed, both directions)
7	Register D	D0~D127	
		D128~D1072 (File Registers)	
		D8000~D8255 (System Registers)	
8	Pointers P and I (Note 2)	P0~P62 (jump pointers) Note (2)	

Serial Number	Component type	describe
		Pages 64-127 (Subroutine Pointers)
		Interrupt subroutine I includes high-speed input, timer, and counter interrupts.
9	Index registers V and Z	V0~V7,Z0~Z7
10	Analog input	D8200~D8202 (0~32768 corresponds to 0~10V)
11	Analog output	D8230 (0~32768 corresponds to 0~10V/0~20mA)

18.14.6.5. Basic Sequence Overview

instruction	mnemonic	Function	operand	Step length
General instructions	LD	Load normally open contacts	S, X, Y, M, T, C	1
	LDI	Load normally closed contacts	S, X, Y, M, T, C	1
	AND	Series normally open contact	S, X, Y, M, T, C	1
	ANI	Series normally closed contact	S, X, Y, M, T, C	1
	ANB	Series circuit block	none	1
	OR	Parallel normally open contacts	S, X, Y, M, T, C	1
	ORI	Parallel normally closed contacts	S, X, Y, M, T, C	1
	ORB	Parallel loop block	none	1
	MPS	Stored in the stack	none	1
	MRD	Read the stack (power flow pointer remains unchanged)	none	1
	MPP	Read the stack	none	1
Output instructions	OUT	drive coil	S, Y, M	1
	SET	Set action save coil instruction	S, Y, M	1
	RST	Contact or buffer clearing	S, Y, M, T, C, D	3
Master control	MC	Main control common serial	N0~N7	3

instruction	mnemonic	Function	operand	Step length
command		contact coil command		
	MCR	Main controller reset common serial contact release command	N0~N7	3
End command	END	Program ended	none	1
	FEND	Main program ends	none	1
Contact rising/falling edge detection command	LDP	Take the rising edge of the pulse	S, X, Y, M, T, C	2
	LDF	Take the falling edge of the pulse	S, X, Y, M, T, C	1
	ANDP	Serial connection with pulse rising edge detection	S, X, Y, M, T, C	2
	ANDF	Serial connection with pulse falling edge detection	S, X, Y, M, T, C	2
Pulse output command	ORP	Or pulse rising edge detection parallel connection	S, X, Y, M, T, C	2
	ORF	Or pulse falling edge detection parallel connection	S, X, Y, M, T, C	2
	PLS	Pulse rising edge detection coil command	Y, M	2
	PLF	Pulse (F) falling edge detection coil command	Y, M	2
Other instructions	NOP	No action	none	1
	INV	Invert the result of the operation	none	1
	P	pointer	0~127	1
	I	Interrupt Insert Pointer	I101/I201/301I401/I501	1

18.14.6.6. Application Order Overview

Classification	FUC NO	Instruction symbols	D instruction	P command	Function Description
Program Flow	00	CJ	—	√	Conditional redirection
	01	CALL	—	√	Subroutine call
	02	SRET	—	—	Subroutine return
	03	IRET	—	—	Interrupt return
	04	EI	—	—	Enable interrupts
	05	DI	—	—	Turn off interrupt
	06	FEND	—	—	Main program ends
	07	WDT	—	—	Monitor timer
	08	FOR	—	—	Loop range start
	09	NEXT	—	—	The loop ends
Transmission and Comparison	10	CMP	√	√	Compare
	11	ZCP	√	√	Regional comparison
	12	MOV	√	√	Teleport
	13	SMOV	—	√	Shift transfer
	14	CML	√	√	Reverse teleportation
	15	BMOV	—	√	Send together
	16	FMOV	√	√	Multi-point teleportation
	17	XCH	√	√	exchange
	18	BCD	√	√	BCD conversion
	19	BIN	√	√	BIN conversion
Four logical operations	20	ADD	√	√	BIN addition
	21	SUB	√	√	BIN Subtraction
	22	MUL	√	√	BIN Multiplication
	23	DIV	√	√	BIN division

Classification	FUC NO	Instruction symbols	D instruction	P command	Function Description
	24	INC	√	√	BIN plus 1
	25	DEC	√	√	BIN minus 1
	26	WAND	√	√	Logical AND
	27	WOR	√	√	Logical word OR
	28	WXOR	√	√	Logical word XOR
	29	NEG	√	√	Find the two's complement
Circular shift	30	ROR	√	√	Circular right shift
	31	ROL	√	√	Circular left shift
	32	RCR	√	√	Right shift with carry
	33	RCL	√	√	Left shift with carry
	34	SFTR	√	√	Right shift
	35	SFTL	-	√	Left shift
	36	WSFR		√	Shift the character to the right
	37	WSFL		√	Shift the character to the left
	38	SFWR	-	√	"First-in, first-out" is written into
	39	SFRD	-	√	"First-in, first-out"
Data processing	40	ZRST	-	√	Interval Reset
	41	DECO	-	√	decoding
	42	ENCO	-	√	coding
	43	SUM	√	√	ON number of bits
	44	BON	√	√	ON bit determination
	45	MEAN	√	√	average value
	46	ANS	-	-	Alarm set
	47	ANR	-	√	Alarm reset
	48	SOR	√	√	BIN square root
	49	FLT	√	√	Conversion

Classification	FUC NO	Instruction symbols	D instruction	P command	Function Description
					between floating-point numbers and decimal numbers
High-speed processing	50	REF	-	√	Input/output refresh
	52	MTR	-	-	Matrix input
	53	HSCS	√	-	Compare and set (high-speed counter)
	54	HSCR	√	-	Compare-reset (high-speed counter)
	55	HSZ	√	-	Interval Comparison (High-Speed Counter)
	56	SPD	-	-	Pulse density
	57	PLSY	√	-	Pulse output
	58	PWM	-	-	Pulse width modulation
	59	PLSR	√	-	Pulse output with acceleration and deceleration
Convenience instructions	60	IST	√	-	State initialization
	61	SER	√	√	Data Search
	62	ABSD	√	—	Absolute value cam sequence control
	63	INCD	—	—	Incremental cam sequential control
	66	ALT	—	—	Alternate output
	67	RAMP	—	—	ramp signal
	69	SORT	—	—	Sorting list data
peripheral devices	80	RS	-	-	Serial data transmission
	81	PRUN	√	√	Parallel operation
	82	ASCI	-	√	HEX to ASCII conversion

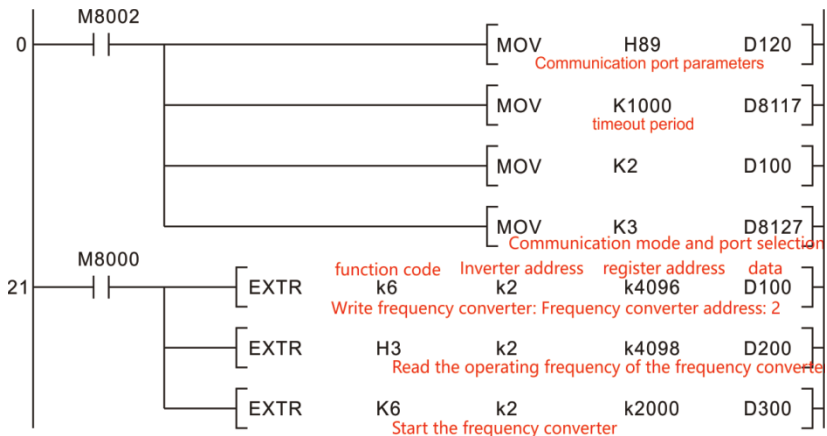
Classification	FUC NO	Instruction symbols	D instruction	P command	Function Description
	83	HEX	-	√	ASCII to HEX conversion
	84	CCD	-	√	Correction code
	88	PID	-	-	PID calculation
Convert floating-point numbers	110	ECMP	√	√	Binary floating-point number comparison
	111	EZCP	√	√	Binary floating-point number range comparison
	118	EBCD	√	√	Binary to Decimal Floating-Point Numbers
	119	EBIN	√	√	Decimal to Binary Floating-Point Numbers
	120	EADD	√	√	Binary floating-point addition
	121	ESUB	√	√	Binary floating-point number subtraction
	122	EMUL	√	√	Binary floating-point multiplication
	123	EDIV	√	√	Binary floating-point division
	127	ESOR	√	√	Square root of binary floating-point number
	129	INT	√	√	Binary floating-point number → BIN integer
	130	SIN	√	√	floating-point SIN operation
	131	COS	√	√	Floating-point COS operations
	132	TAN	√	√	Floating-point TAN operations
Positioning	156	ZRN	√	-	Return to origin

Classification	FUC NO	Instruction symbols	D instruction	P command	Function Description
instructions	157	PLSV	√	-	Variable pulse output
	158	DRVI	√	-	Relative position control
	159	DRVA	√	-	Absolute position control
Clock operation	160	TCMP	-	√	Comparison of clock data
	161	TZCP	-	√	Clock data area comparison
	162	TADD	-	√	Clock data addition
	163	TSUB	-	√	Clock data subtraction
	166	TRD	-	√	Clock data readout
	167	TWR	-	√	Clock data write
	169	HOUR	√	-	chronograph
Contact comparison	170	GRY	√	√	Gray code conversion
	224	LD=	√	—	(S1)=(S2)
	225	LD>	√	—	(S1)>(S2)
	226	LD<	√	—	(S1)<(S2)
	228	LD<>	√	—	(S1)<>(S2)
	229	LD<=	√	—	(S1)<=(S2)
	230	LD>=	√	—	(S1)>=(S2)
	232	AND=	√	—	(S1)=(S2)
	233	AND>	√	—	(S1)>(S2)
	234	AND<	√	—	(S1)<(S2)
	236	AND<>	√	—	(S1)<>(S2)
	237	AND<=	√	—	(S1)<=(S2)
	238	AND>=	√	—	(S1)>=(S2)
	240	OR=	√	—	(S1)=(S2)
	241	OR>	√	—	(S1)>(S2)
	242	OR<	√	—	(S1)<(S2)

Classification	FUC NO	Instruction symbols	D instruction	P command	Function Description
	244	OR<>	√	—	(S1)<>(S2)
	245	OR<=	√	—	(S1) <= (S2)
	246	OR>=	√	—	(S1)>=(S2)

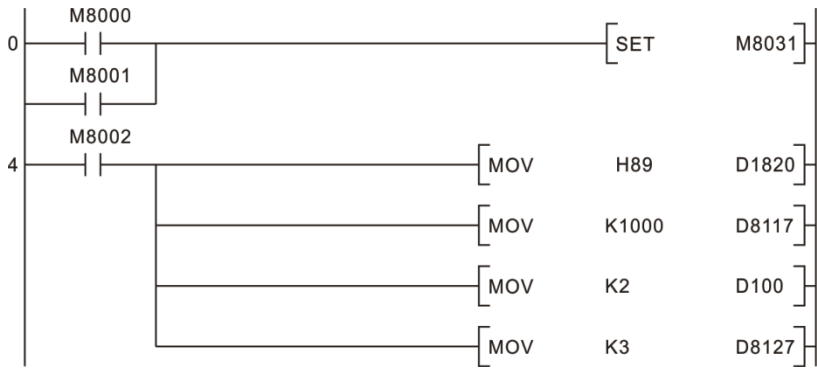
18.14.7. PLC Application Examples

18.14.7.1. Communication Examples

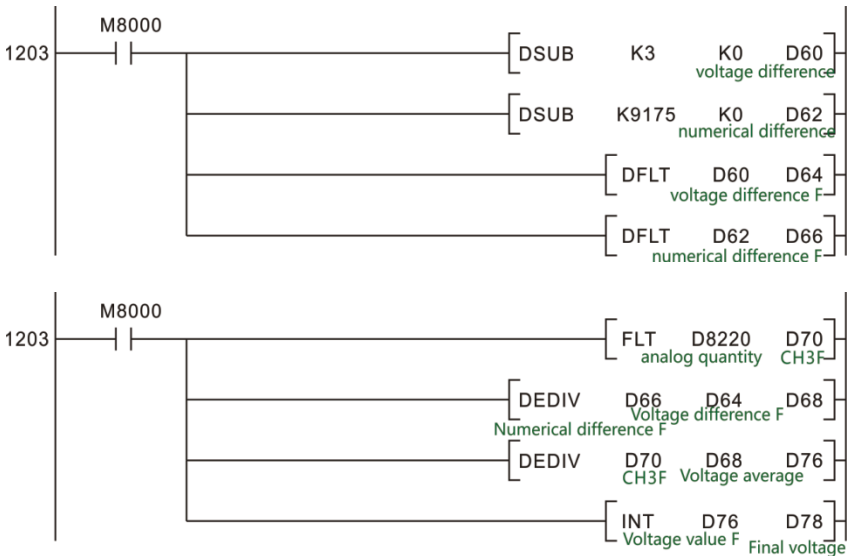


18.14.7.2. Application Protector Example

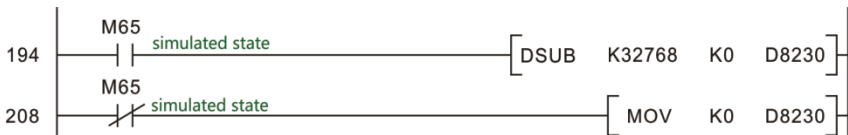
M8031 provides read protection for applications. Enabling M8031 in the application prevents it from reading the application. Alternatively, the application can be modified and re-downloaded using programming software. This can be achieved by using the M8000/M8001's lock value on M8031 within the program to protect the application from being read.



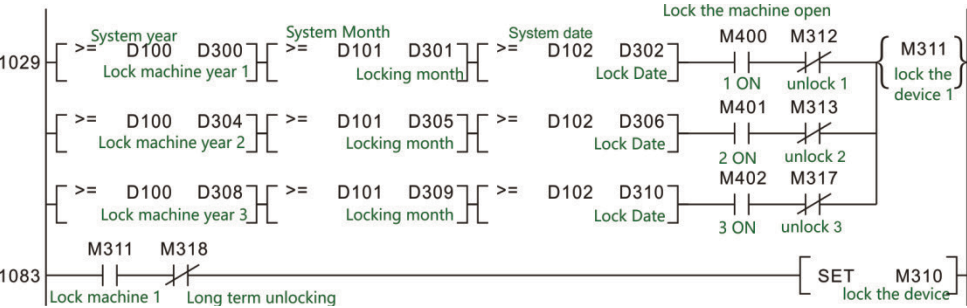
18.14.7.3. Example of Analog Input Value Programming



18.14.7.4. Analog Output Examples



18.14.7.5. Time Program Example



WARRANTY

1) The company solemnly promises that users will enjoy the following warranty services from the date of purchase of products from our company (hereinafter referred to as the manufacturer).

2) Since the product was purchased by the user from the manufacturer, enjoy the following three guarantee services:

- Return, replacement and repair within 30 days of delivery:
- Replacement and repair within 90 days of delivery:
- Repair within 18 months of delivery:
- Except when exporting abroad.

3) This product enjoys lifetime paid service from the date of purchase by the user from the manufacturer.

4) Disclaimer: Product failure caused by the following reasons is not covered by the manufacturer's free warranty service:

- Failure caused by the user's use and operation in accordance with the requirements of the «Instruction Manual»:
- Failure caused by the user to repair or modify the product without communicating with the manufacturer:
- Failure caused by abnormal aging of the product due to poor user environment.
- Failures caused by natural disasters such as earthquakes, fires, floods or abnormal voltages:
- Damage to the product during transportation (the transportation method is specified by the customer, and the company assists in handling the cargo consignment procedures)

5) Under the following conditions, manufacturers have the right not to provide warranty services:

- When the manufacturer's product logo, trademark, nameplate, etc. are damaged or unrecognizable:
- When the user fails to pay the purchase price in accordance with the signed contract:
- The user intentionally conceals the manufacturer's after-sales service unit when the product is installed, wired, operated, maintained or otherwise improperly used

6) For the service of return, replacement and repair, the company must return or return to the company, and it can only be returned or repaired after confirming the responsibility vested.

WARRANTY CARD

User information			
User name			
User address			
Postal code		Contact person	
Tel		Fax	
Machine type		Machine code	
Agent / Reseller Information			
Supplier			
Contact			
Tel		Delivery date	

CERTIFICATE OF QUALITY

QC test:_____

This product has been tested by our company's quality department, and its performance meets the standards, passes the inspection, and is approved to leave the factory.

