High-Protection Vector Control Inverter

700IP65 Series

User Manual

Preface

700IP65 series high-performance and high-protection vector control inverter can meet all market demands at the cheapest price, supports TCP/IP (Modbus) protocol, individually paired PLC, PROFIBUS, PROFINET, CANOPEN, CAN, ETHERCAD, etc., and at the same time a param-eter can automatically switch to photovoltaic water pump, elevator, synchronous machine, asynchronous machine, etc.

3-year warranty, LED and LCD display, 7 DI (of which DI5 can be used as high-speed pulse input), 2XAI input, 2XAO output, 2XRELAY, STO terminal built-in as standard. In addition, it supports the molding of I/O expansion cards, control boards, power boards, and keyboards, which greatly improves the customer's experience of use, and customers can replace accessories by themselves in the future.

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 sup-port 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.

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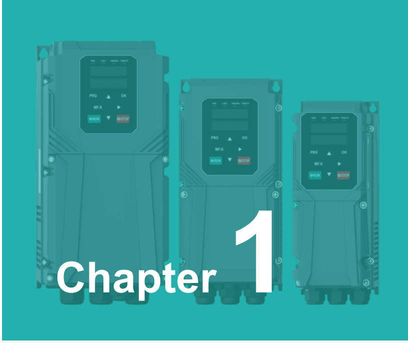


Chapter 1

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.

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

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; ✧ 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.
	DANGER	✧ 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;

Use Stage	Safety Grade	Precautions
Installation	DANGER	✧ 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 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 recommended 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,

Use Stage	Safety Grade	Precautions
Before Power-on	CAUTION	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. Rick of electrical hazard; ✧ Do not touches any input/output terminals of inverter with bare hands. Rick 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 Operation	DANGER	✧ Non-professionals shall not detect signals during 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.
Maintenance	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~1200Hz. 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 overcurrent 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.

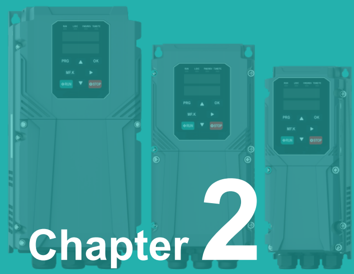
1.2.12 Adaptable Motor

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;

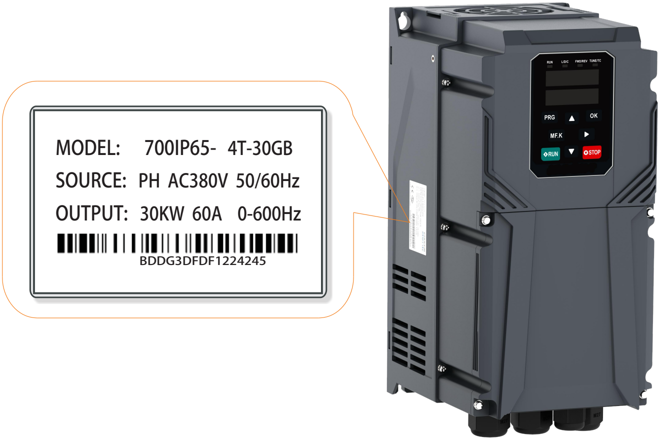
As short circuit existing inside cable or motor will cause inverter alarming, enen explosion. Therefore, please make insulation short- circuit test of initial installed motor and cable first. And the test also is necessary in routine maintenance.



Chapter 2

Product Brief Introduction

2.1 Position and content of nameplate



2.2 Nameplate model description and rated parameters

700IP65 - 4 T - 1.5 G B

① 700IP65 ② 4 ③ T ④ 1.5 ⑤ G ⑥ B

Code	No.	Content
Series Name	1	700IP65 Series
Voltage level	2	2 : 220V 4 : 380V 5 : 480V
Voltage Classification	3	S : Single-phase T : Three phase
Adapted motor power	4	0.4KW~400KW
Model	5	G : Universal type
Accessory type	6	B : Built in braking unit Empty: None

2.3 Specifications and models of AC drives

Models	Adaptive motor (KW)	Rated capacity (KVA)	Rated input current (A)	Rated output current(A)
Single-phase 220V range: -15%~20%				
700IP65-2S-0.4GB	0.4	1	5.4	2.1
700IP65-2S-0.75GB	0.75	1.5	8.2	4
700IP65-2S-1.5GB	1.5	2.8	14	7
700IP65-2S-2.2GB	2.2	3.8	23	9.6
700IP65-2S-4.0GB	4.0	5.9	40	17
700IP65-2S-5.5GB	5.5	8.5	60	25
700IP65-2S-7.5GB	7.5	10.5	75	32
Three-phase 220V range: -15%~20%				
700IP65-2T-0.4GB	0.4	1	2.7	2.1
700IP65-2T-0.75GB	0.75	1.5	4.2	3.8
700IP65-2T-1.5GB	1.5	2.8	7.7	7
700IP65-2T-2.2GB	2.2	3.8	12	9
700IP65-2T-4.0GB	4.0	5.9	19	17
700IP65-2T-5.5GB	5.5	8.5	28	25
700IP65-2T-7.5GB	7.5	10.5	35	32
700IP65-2T-11GB	11	14.5	47	45
700IP65-2T-15GB	15	19.5	65	60
700IP65-2T-18GB	18.5	24	80	75
700IP65-2T-22G(B)	22	28.5	97	90
700IP65-2T-30G(B)	30	39	115	110
700IP65-2T-37G(B)	37	48	166	152
700IP65-2T-45G(B)	45	58.5	190	176
700IP65-2T-55G(B)	55	71.5	214	210
700IP65-2T-75G	75	97.5	307	304
700IP65-2T-93G	93	121	389	377
700IP65-2T-110G	110	143	435	426
700IP65-2T-132G	132	171.5	468	465
700IP65-2T-160G	160	208	590	585

Models	Adaptive motor (KW)	Rated capacity (KVA)	Rated input current (A)	Rated output current(A)
700IP65-2T-200G	200	260	785	725
Three-phase 380V range: -15%~20%				
700IP65-4T-0.75GB	0.75/1.5	1.5/2.5	3.4/5	2.1/3.8
700IP65-4T-1.5GB	1.5/2.2	2.5/3.4	5/5.8	3.8/5.1
700IP65-4T-2.2GB	2.2/4	3.4/5.9	5.8/10.5	5.1/9
700IP65-4T-4.0GB	4/5.5	5.9/8.5	10.5/14.6	9/13
700IP65-4T-5.5GB	5.5/7.5	8.5/11	14.6/20.5	13/17
700IP65-4T-7.5GB	7.5/11	11/13.5	20.5/26	17/25
700IP65-4T-11GB	11/15	13.5/16	26/35	25/32
700IP65-4T-15GB	15/18.5	16/21	35/38.5	32/37
700IP65-4T-18GB	18.5/22	21/24	38.5/46.5	37/45
700IP65-4T-22GB	22/30	24/30	46.5/62	45/60
700IP65-4T-30GB	30/37	30/39	62/76	60/75
700IP65-4T-37GB	37/45	39/49	76/92	75/90
700IP65-4T-45G(B)	45/55	49/59	92/113	90/110
700IP65-4T-55G(B)	55/75	59/72	113/157	110/152
700IP65-4T-75G(B)	75/93	72/100	157/180	152/176
700IP65-4T-93G(B)	93/110	100/116	180/214	176/210
700IP65-4T-110G(B)	110/132	116/138	214/256	210/253
700IP65-4T-132G(B)	132/160	138/167	256/307	253/304
700IP65-4T-160G	160/185	167/200	307/345	304/340
700IP65-4T-185G	185/200	200/225	345/385	340/377
700IP65-4T-200G	200/220	225/280	385/430	377/426
700IP65-4T-220G	220/250	280/309	430/468	426/465
700IP65-4T-250G	250/280	309/349	468/525	465/520
700IP65-4T-280G	280/315	349/398	525/590	520/585
700IP65-4T-315G	315/350	398/434	590/665	585/650
700IP65-4T-355G	355/400	434/494	665/785	650/725
700IP65-4T-400G	400/450	494/560	785/883	725/820

Attention:

B has an internal brake unit;

(B) is equipped with an internal brake unit, and;

Empty: an external brake unit is optional.

2.4 Technical Features

Project		Description
Control characteristics	Highest frequency	Vector control: 0～600Hz VF control: 0～1200Hz
	Carrier frequency	1K～16kHz; 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)
	Motor type	Asynchronous motor, permanent magnet synchronous motor
	Starting torque	G type machine: 0.5Hz/180% (Open-loop/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);
	Textile swing frequency control	Multiple 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
	Timed control	Timer control function: Set time range from 0h to 65535h
	Standardization of keyboard extension cords	Customers can extend the keyboard using standard Ethernet cables on their own.
	Run Command Channel	Three channels: operation panel given, control terminal given, and serial communication port given. Can be switched in multiple ways

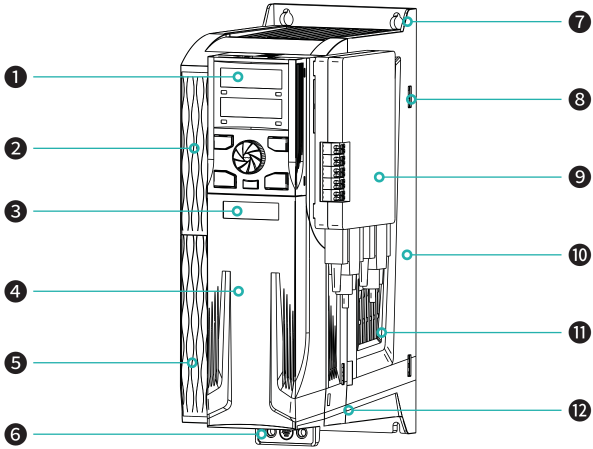
Project		Description
Control characteristics	Frequency source	There are a total of 10 frequency sources: digital given, analog voltage given, analog current given, pulse given, and serial port given. Can be switched in multiple ways
	Auxiliary frequency source	Synchronous and asynchronous integration, combining heavy and light loads
	Functional characteristics	Synchronous and asynchronous integration, combining heavy and light loads Quick settings for application macros such as fire mode, elevator mode, tension control mode, etc
Input and output	External analog power supply	+10V, load capacity 100mA
	External digital power supply	+24V, load capacity 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 outputs, voltage 0-10V or current 0/4-20mA selectable
	Programmable relay output	Two relay outputs, contact capacity: 250VAC/3A or 30DC/1A
	Fire fighting mode	STO1 - +24V, STO2 - +24V
	Compatible with multiple encoders	Optional collector open circuit ABZ encoder card, 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, Probus, Ethercat, Can, Canopen, etc

Project		Description
Operation and Display	LED display	Dual digital display function parameter settings, status parameter viewing, and fault code viewing
	LCD display	Optional, language selection including Chinese/English /Russian
	Extended external display	Rj45 interface, LED or LCD selectable
	Parameter copying	Using LED 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
	Brake fault protection	Brake detection and alarm function
	Process PID given, feedback, loss detection	Process PID automatic identification of whether the given and feedback are lost, and 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	Place of use	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 ℃ +50 ℃ (ambient temperature is between 40 ℃ 50 ℃, 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)

Project		Description
Environmental	Storage temperature	−20℃~+60℃
	Class of pollution	Level 2 (dry, non-conductive dust pollution)
	Protection level	IP20
Standards	Product compliance with safety standards	IEC61800-5-1:2007
	The product complies with EMC standards	IEC61800-3:2005

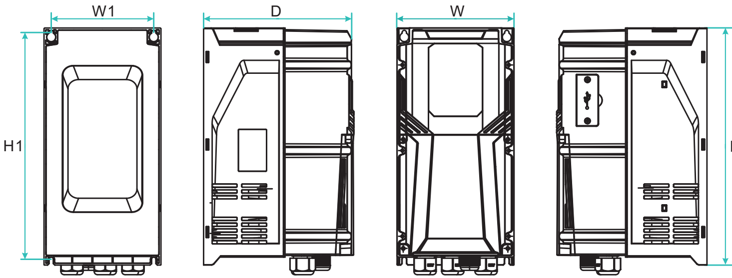
2.5 Product Outline Drawing

The following picture is all components and names of below 2.2KW plastic shell AC drive.

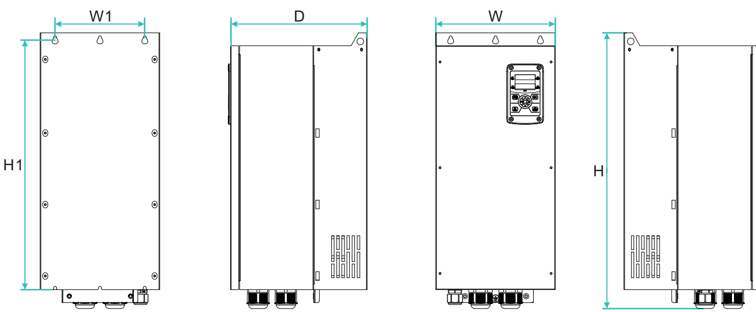


No.	Name	Description
❶	keyboard	LED and LCD operation panel
❷	Top cover	Protect internal components
❸	LOGO	Brand
❹	Terminal cover	Protect internal components
❺	Cover below	Protect internal components
❻	Grounding terminal	Connect the product to the external ground connection point
❼	Installation hole	Install fixed hole positions
❽	Floor	Protect internal components
❾	Expansion module	Extended functional components
❿	Bottom frame	Protect internal components
⓫	Nameplate	Product Information
⓬	Middle frame	Protect internal components

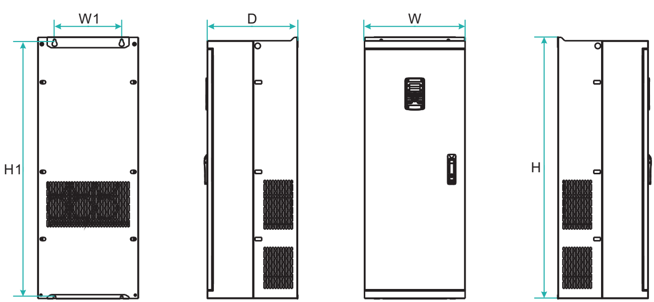
2.6 Appearance and installation dimensions



0.4kW~15kW plastic shell external dimensions and installation dimensions



18.5kW~110kW sheet metal chassis appearance, size and installation dimensions



132kW~400kW cabinet type chassis appearance and installation dimensions

AC Drive Model	Adapter motor (KW)	Installation size(mm)		Dimensions (mm)			Aperture
		W1	H1	W	H	D	d
Input voltage: single-phase 220V Range: -15%~20%							
700IP65-2S-0.4GB	0.4	93	263	110	272	150	5
700IP65-2S-0.75GB	0.75	93	263	110	272	150	5
700IP65-2S-1.5GB	1.5	93	263	110	272	150	5
700IP65-2S-2.2GB	2.2	93	263	110	272	150	5
700IP65-2S-4.0GB	4.0	128	289	146	300	166	6
700IP65-2S-5.5GB	5.5	149	330	170	345	215	6
700IP65-2S-7.5GB	7.5	149	330	170	345	215	6
Input voltage: three-phase 220V Range: -15%~20%							
700IP65-2T-0.4GB	0.4	93	263	110	272	150	5
700IP65-2T-0.75GB	0.75	93	263	110	272	150	5
700IP65-2T-1.5GB	1.5	93	263	110	272	150	5
700IP65-2T-2.2GB	2.2	93	263	110	272	150	5
700IP65-2T-4.0GB	4.0	128	289	146	300	166	6
700IP65-2T-5.5GB	5.5	149	330	170	345	215	6
700IP65-2T-7.5GB	7.5	149	330	170	345	215	6
700IP65-2T-11GB	11	210	420	255	465	240	7
700IP65-2T-15GB	15	210	478	270	490	250	7
700IP65-2T-18.5GB	18.5	210	478	270	490	250	7
700IP65-2T-22G(B)	22	210	587	280	600	320	7
700IP65-2T-30G(B)	30	160	655	285	675	330	10
700IP65-2T-37G(B)	37	160	655	285	675	330	10
700IP65-2T-45G(B)	45	200	785	315	805	340	10
700IP65-2T-55G(B)	55	200	785	315	805	340	10
700IP65-2T-75G	75	250	1085	390	1105	375	12
700IP65-2T-93G	93	300	1145	450	1165	505	12
700IP65-2T-110G	110	300	1145	450	1165	505	12

Chapter 2

AC Drive Model	Adapter motor (KW)	Installation size(mm)		Dimensions (mm)			Aperture
		W1	H1	W	H	D	d
700IP65-2T-132G	132	400	1345	515	1365	415	12
700IP65-2T-160G	160	590	1380	685	1400	430	12
700IP65-2T-200G	200						
Input voltage: three-phase 380V Range: -15%~20%							
700IP65-4T-0.7GB	0.7	93	263	110	272	150	5
700IP65-4T-1.5GB	1.5						
700IP65-4T-2.2GB	2.2						
700IP65-4T-4.0GB	4.0						
700IP65-4T-5.5GB	5.5	128	289	146	300	166	6
700IP65-4T-7.5GB	7.5						
700IP65-4T-11GB	11	149	330	170	345	215	6
700IP65-4T-15GB	15						
700IP65-4T-18.5GB	18.5	210	420	255	465	240	7
700IP65-4T-22GB	22						
700IP65-4T-30GB	30	210	478	270	490	250	7
700IP65-4T-37GB	37						
700IP65-4T-45G(B)	45	210	587	280	600	320	7
700IP65-4T-55G(B)	55	160	655	285	675	330	• 10
700IP65-4T-75G(B)	75						
700IP65-4T-93G(B)	90	200	785	315	805	340	10
700IP65-4T-110G(B)	110						
700IP65-4T-132G(B)	132	250	1085	390	1105	375	12
700IP65-4T-160G	160						
700IP65-4T-185G	185	300	1145	450	1165	505	12
700IP65-4T-200G	200						
700IP65-4T-220G	220						

AC Drive Model	Adapter motor (KW)	Installation size(mm)		Dimensions (mm)			Aperture
		W1	H1	W	H	D	d
700IP65-4T-250G	250	400	1345	515	1365	415	12
700IP65-4T-280G	280						
700IP65-4T-315G	315	590	1380	685	1400	430	12
700IP65-4T-355G	350						
700IP65-4T-400G	400						

2.7 External keyboard with tray installation dimension drawing

⌑ The LED keyboard and LCD keyboard have the same external dimensions and installation dimensions, and use the same external bracket;

2.8 Optional accessories

For the detailed functions and usage instructions of the optional accessories, see the related optional accessories description.

If you need the above options, please specify when ordering.

Name	Model	Function
Built in braking unit	Model suffix "B”	'B' comes standard with a built-in energy consuming braking unit, while '(B)' comes with an optional built-in one
Feedback Unit	CI100	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	700-LED/LCD	LED dual display digital tube display and operation, LCD screen display and operation
Keyboard tray	700-JP-51-04	The external operation panel uses a perforated self fastening bracket
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

Name	Model	Function
Input reactor	ACR	Suppress surge voltage and surge current, reduce voltage fluctuations, improve power factor, and protect motors
Output choke	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

2.9 Expansion card

Name	Model	Function
IO expansion card	700-IO	Digital multifunctional input terminal, open collector switch terminal, temperature detection (PT100/PT1000)
Mains synchronous expansion card	700-EPS	Output voltage and power supply voltage detection, phase sequence detection
PLC expansion card	700-PLC	Multi channel programmable relay output
Internet of Things card	700-GPS	Internet of Things
Can bus expansion card	700-CAN	Bus module and communication protocol
Canopen bus expansion card	700-CANOPEN	Bus module and communication protocol
Ethercat bus expansion card	700-ETHERCAT	Bus module and communication protocol
Profinet bus expansion card	700-PN	Bus module and communication protocol
Profbus bus bus expansion card	700-DP	Bus module and communication protocol
Modbus TCP bus expansion card	700-TCP	Bus module and communication protocol
Open collector ABZ encoder card	700-PG1	Open collector PG card【PG1 can only be applied to asynchronous machines; Compatible with complementary output, the encoder card can output DC power with optional+12V or+5V (jumper selection)】

Name	Model	Function
Differential input ABZ encoder card	700-PG3	ABZ differential signal input PG card
Sine cosine encoder interface card	700-PG5	Pg5 is a sine and cosine encoder card with frequency division output.
Rotary encoder interface card	700-PG6	Suitable for rotary encoders, DB9 interface, optional shielded encoder cable.

2.10 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.

2.10.1 Choice of resistance value

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

$$U*U/R=Pb$$

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

2.10.2 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:

$$0.7*Pr=Pb*D$$

- Pr - 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%

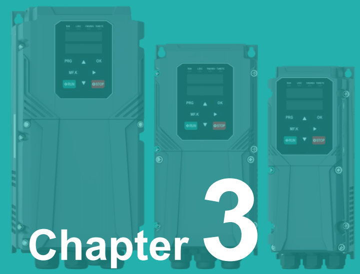
Recommended selection table for braking units and braking resistors

Model	Applicable motor	Braking resistor resistance value	Braking resistor powe	Brake unit
380V three-phase				
700IP65-4T-0.7GB	0.75KW	250~350Ω	0.1KW	Standard built-in
700IP65-4T-1.5GB	1.5KW	200~300Ω	0.2KW	
700IP65-4T-2.2GB	2.2KW	150~250Ω	0.25KW	
700IP65-4T-4.0GB	4KW	100~150Ω	0.3KW	
700IP65-4T-5.5GB	5.5KW	80~100Ω	0.5KW	
700IP65-4T-7.5GB	7.5KW	60~80Ω	0.7KW	
700IP65-4T-11GB	11KW	40~50Ω	1KW	
700IP65-4T-15GB	15KW	30~40Ω	1.5KW	
700IP65-4T-18.5GB	18.5KW	25~30Ω	2KW	
700IP65-4T-22GB	22KW	20~25Ω	2.5KW	
700IP65-4T-30GB	30KW	15~20Ω	3KW	
700IP65-4T-37GB	37KW	15~20Ω	3.5KW	
700IP65-4T-45G(B)	45KW	10~15Ω	4.5KW	Optional built-in
700IP65-4T-55G(B)	55KW	10~15Ω	5.5KW	
700IP65-4T-75G(B)	75KW	8~10Ω	7.5KW	
700IP65-4T-93G(B)	93KW	8~10Ω	9KW	
700IP65-4T-110G(B)	110KW	6~8Ω	11KW	
700IP65-4T-132G(B)	132KW	6~8Ω	13.5KW	
700IP65-4T-160G	160KW	4~6Ω	16KW	
700IP65-4T-185G	185KW	4~6Ω	18.5KW	CBR600-4T200

Model	Applicable motor	Braking resistor resistance value	Braking resistor powe	Brake unit
700IP65-4T-200G	200KW	4~6Ω	20KW	CBR600-4T315
700IP65-4T-220G	220KW	6 - 8Ω * 2	11KW* 2	CBR600-4T315
700IP65-4T-250G	250KW	6 - 8Ω * 2	12.5KW*2	CBR600-4T315
700IP65-4T-280G	280KW	4 - 6Ω * 2	14KW*2	CBR600-4T315
700IP65-4T-315G	315KW	4 - 6Ω * 2	16KW*2	CBR600-4T450
700IP65-4T-355G	355KW	4 - 6Ω * 3	11KW*3	CBR600-4T450
700IP65-4T-400G	400KW	4 - 6Ω * 3	14KW*3	CBR600-4T450

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

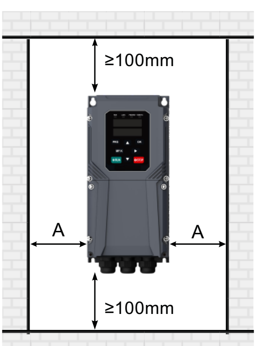
Installation

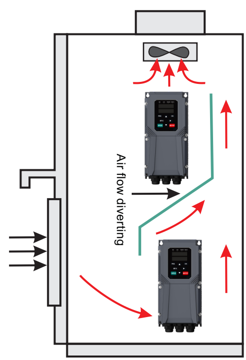
3.1 Mechanical Installation

3.1.1 Installation Environment

- Environment temperature: Surrounding environment temperature has a great impact on lifetime of AC drive, and the operation environment temperature of AC drive shall not exceed allowable temperature range (- 10℃ ~ 40℃).
- While AC drive is installed on the surface of inflaming retardants, and enough space around is necessary for heat dissipation. When AC drive works, it will produce plenty of heats. And make vertical installation onto supporting holder with screw.
- Please install it in some places that are not easy to vibrate. And the vibration shall not be larger than 0. 6G. Especially pay attention to keep away from punching machine and other equipments.
- Avoid to be installed where there are direct sunlights, moist surroundings and water drops.
- Avoid to be installed where there are corrosivity, inflammability and explosive gas.
- Avoid to be installed where there are oil contamination, dirts and metal dusts.

3.1.2 Reminder of installation site





Explanation: When power of AC drive≤ 22kw it means taking no account of size A is permissible. When the power > 22KW, A shall be larger than 50mm.

Explanation: When AC drive is installed upside and underside, please install thermal insulation guide plate as picture shows.

Figure 3-1 Installation diagram of AC drive

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

- Please install the inverter vertically so that the heat can be dissipated upwards. But not upside down. If there are many inverters in the cabinet, it is better to install them side by side. In the occasions that need to be installed up and down, please refer to Figure 3-1 to install the heat insulation deflector.
- The installation space is as shown in Figure 3-1 to ensure the cooling space of the inverter. However, please consider the heat dissipation of other components in the cabinet when arranging.
- The mounting bracket must be made of flame retardant material.
- For applications with metal dust, it is recommended to install the radiator outside the cabinet. At this time, the space in the fully sealed cabinet should be as large as possible.

3.2 Electrical Installation

3.2.1 Model Selection of Main Circuit Peripheral Devices

Models	MCCB (A)	Contactor (A)	Cable of Input Side Main Circuit (mm^2)	Cable of Output Side Main Circuit (mm^2)	Cable of Control Circuit (mm^2)
Single phase 380V range: -15%~+20%					
700IP65-2S-0.4GB	16	10	2.5	2.5	1.0
700IP65-2S-0.75GB	16	10	2.5	2.5	1.0
700IP65-2S-1.5GB	20	16	4	2.5	1.0
700IP65-2S-2.2GB	32	20	6	4	1.0
700IP65-2S-3.7GB	40	32	6	4	1.0
700IP65-2S-5.5GB	63	40	10	4	1.0
700IP65-2S-7.5GB	63	40	10	6	1.0
Three phase 380V range: -15%~+20%					
700IP65-4T-0.75GB	10	10	2.5	2.5	1.0
700IP65-4T-1.5GB	16	10	2.5	2.5	1.0
700IP65-4T-2.2GB	16	10	2.5	2.5	1.0
700IP65-4T-4.0GB	25	16	4	4	1.0

Models	MCCB (A)	Contactor (A)	Cable of Input Side Main Circuit (mm^2)	Cable of Output Side Main Circuit (mm^2)	Cable of Control Circuit (mm^2)
700IP65-4T-5.5GB	32	25	4	4	1.0
700IP65-4T-7.5GB	40	32	4	4	1.0
700IP65-4T-11GB	63	40	4	4	1.0
700IP65-4T-15GB	63	40	6	6	1.0
700IP65-4T-18.5GB	100	63	6	6	1.0
700IP65-4T-22GB	100	63	10	10	1.0
700IP65-4T-30GB	125	100	16	10	1.0
700IP65-4T-37GB	160	100	16	16	1.0
700IP65-4T-45G(B)	200	125	25	25	1.0
700IP65-4T-55G(B)	250	125	35	25	1.0
700IP65-4T-75G(B)	250	160	50	35	1.0
700IP65-4T-93G(B)	350	160	70	35	1.0
700IP65-4T-110G(B)	350	350	120	120	1.0
700IP65-4T-132G(B)	400	400	150	150	1.0
700IP65-4T-160G	500	400	185	185	1.0
700IP65-4T-185G	500	400	185	185	1.0
700IP65-4T-200G	630	600	150*2	150*2	1.0
700IP65-4T-220G	630	600	150*2	150*2	1.0
700IP65-4T-250G	800	600	150*2	150*2	1.0
700IP65-4T-280G	800	800	150*2	150*2	1.0
700IP65-4T-315G	1000	800	150*3	150*3	1.0
700IP65-4T-355G	1000	800	150*4	150*4	1.0
700IP65-4T-400G	1250	1000	150*4	150*4	1.0

3.2.2 Peripheral device wiring diagram

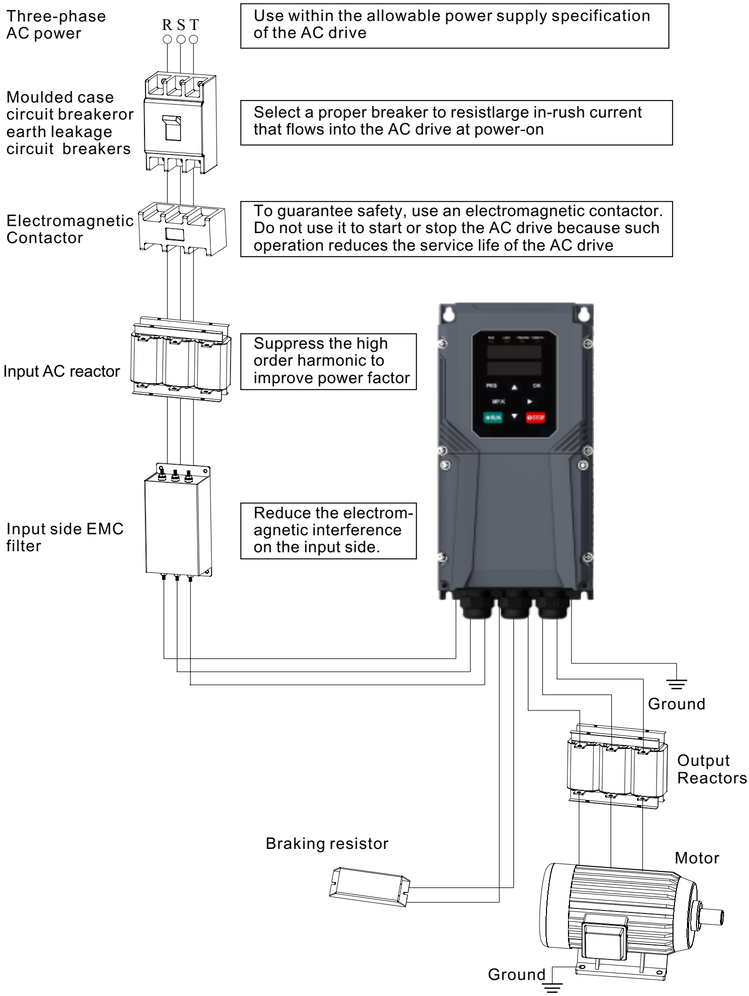
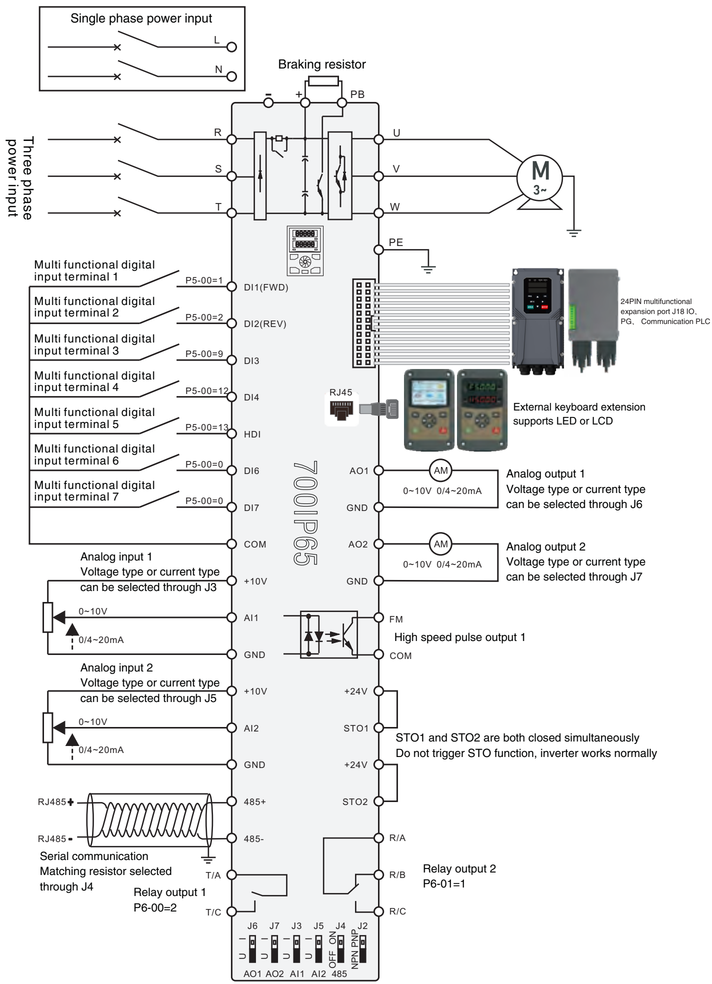


Figure 3-2 Peripheral device wiring diagram

3.3 Wiring method

3.3.1 Terminal Wiring Diagram



3.3.2 Main circuit terminals and wiring

Terminal	Name	Function description
L、N	Single-phase power input terminal	Single-phase 220V AC power connection point
R、S、T	Three-phase power input terminal	AC input three-phase power connection point
P(+)、(-)	DC bus positive and negative terminals	Common DC bus input point
P(+)、PB	Braking resistor connection terminal	Connect the braking resistor
U、V、W	Inverter output terminal	Connecting a three-phase motor
PE	Ground terminal	Ground terminal

3.3.3 Attentions of wiring

Input power supply L, N or R S、T： The input side wiring of the inverter has no phase sequence requirements.

- ➢ DC bus P (+), (-): Note that there is residual voltage at the P (+), (-) terminals of the DC bus after a power outage. Wait for the power indicator light on the drive board to turn off and confirm the power outage for 10 minutes before proceeding with wiring operations, otherwise there is a risk of electric shock;
- ➢ The wiring length of the braking unit should not exceed 10m. Twisted pair or tight double parallel wiring should be used;
- ➢ Do not directly connect the braking resistor to the DC bus, as it may cause damage to the frequency converter or even fire.

Braking resistor connection terminals P (+), PB:

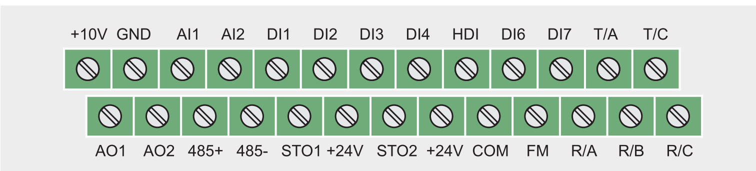
- ➢ The recommended values for selecting braking resistors should be referenced, and the wiring distance should be less than 5m. Otherwise, it may cause damage to the frequency converter.

Inverter output side U、 V、 W：

- ➢ The output side of the frequency converter cannot be connected to capacitors or surge absorbers, otherwise it will cause frequent protection or even damage to the frequency converter;

- When the motor cable is too long, due to the influence of distributed capacitance, it is easy to generate electrical resonance, which can cause insulation damage to the motor or generate large leakage current, resulting in overcurrent protection of the frequency converter. When the length of the motor cable is greater than 100m, an AC output reactor must be installed near the iverter;
- Grounding terminal PE: The terminal must be reliably grounded, and the resistance of the grounding wire must be less than 0.1 Ω. Otherwise, it may cause abnormal operation or even damage to the equipment. The grounding terminal and the power neutral wire N terminal cannot be shared.

3.3.4 Programmable multifunctional control terminal



3.3.5 Function Description of Control Terminals

Sort	Terminal	Name	Function Description
Power supply	+10V-GND	External +10V power supply	Provide +10V power supply to the outside, the maximum output current: 10mA Generally used as working power supply of external potentiometer, potentiometer resistance range: 1~5kΩ
	24V-COM	External +24V power supply	Provide +24V power supply to the outside, generally used as the working power supply of digital input and output terminals and external sensor power supply, Maximum output current: 200mA
Analog input	AI1-GND	Analog input terminal 1	Input range: DC0-10V or 0-20mA, AI1 is determined by the J3 selection on the control board and is shipped in voltage mode. AI2 is determined by the J4 selection on the control board and is shipped in voltage mode. Input impedance: 100K Ω for voltage input, 500 Ω for current input
	AI2-GND	Analog input terminal 2	

Sort	Terminal	Name	Function Description
Digital input	DI1-COM	Digital input 1	Optocoupler isolation, compatible with bipolar input, switches NPN or PNP mode through J2 switch, factory set to NPN mode; Input impedance: 3.3kΩ; Voltage range for level input: 9-30V; Among them, HDI5 can be used as a high-speed input port, with a maximum input frequency of 50KHz
	DI2-COM	Digital input 2	
	DI3-COM	Digital input 3	
	DI4-COM	Digital input 4	
	HDI5-COM	Digital input 5	
	DI6-COM	Digital input 6	
	DI7-COM	Digital input 7	
Analog output	AO1-GND	Analog output 1	Output range: DC0-10V or 0-20mA; AO1 is determined by the J6 selection on the control board and is shipped in voltage mode; AO2 is determined by the J7 selection on the control board and is shipped in voltage mode.
	AO2-GND	Analog output 2	
Digital output	FM-COM	High-speed pulse output	Programmable optocoupler isolation, open collector output, maximum frequency: 50KHz; When the collector is open for output, it is consistent with the Y1 specification; Output voltage range: 0/24VDC, output current range: 50mA
	+24V-STO1	Fire mode output	Triggering Err48 fault, the fault type can be distinguished by checking the U1-35 values. 1: STO1 disconnected; 2: STO2 disconnected; 3: STO1 and STO2 are both disconnected
	+24V-STO2		
Communication Interface	485+，485-	Modbus communication interface	Modbus communication interface, can be selected through J4 whether to match resistors
Relay output 1	T/A-T/C	T/A-T/C normally open terminal; R/A-R/C normally open terminal, R/A-R/B normally closed terminal; Contact driving capability: AC250V, 3A, COSφ=0.4, DC30V, 1A.	
Relay output 2	R/A-R/B-R/C		
Relay output 2	RA-RB	Normally closed terminal	Contact drive capability:(Optional accessories: IO1, IO2 support function) AC250V, 3A, COSφ=0.4. DC30V, 1A
	RA-RC	Normally open terminal	
External keyboard interface	Rj45 interface	External keyboard interface	External LED and LCD keyboard interfaces can be extended using standard Ethernet cables

Chapter 3

3.3.6 Wiring instructions for signal input terminals

A. 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 following figure. In some occasions where the analog signal is severely interfered, a filter capacitor or a ferrite core should be added on the analog signal source side.

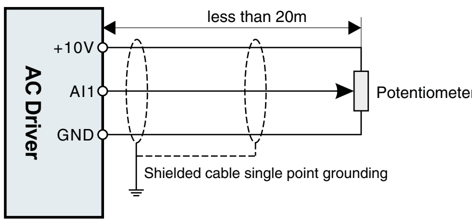
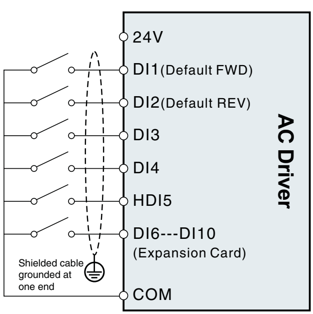


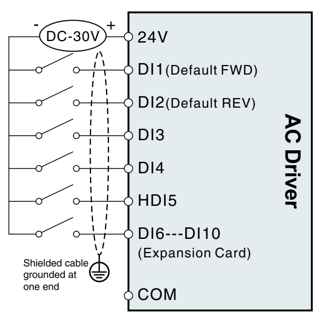
Figure 3-3 Wiring diagram of analog input terminal

B. Digital input terminal:

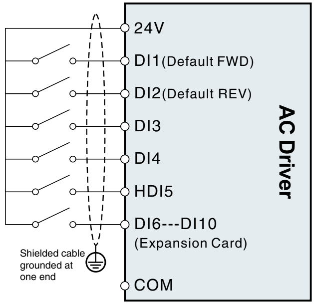
DI wiring mode 1 (factory default wiring mode): When the DI DIP switch is in NPN mode, no external power supply is used



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



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

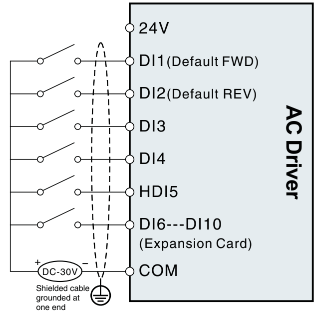
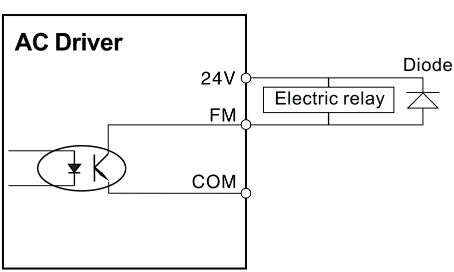


Figure 3-4 Wiring diagram of digital input terminals in four different modes

C. FM digital output terminal:

When the digital output terminal needs to drive the relay, an absorption diode should be installed on both sides of the relay coil, and the driving capacity is not more than 50mA. Otherwise, it is easy to cause damage to the DC 24V power supply.

Note: The polarity of the absorption diode must be installed correctly, As shown in the following figure, otherwise when the digital output terminal has output, the DC 24V power supply will be burned out immediately.



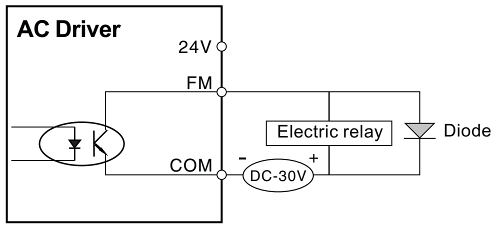
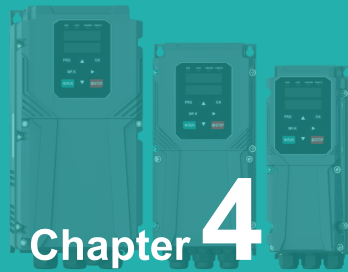


Figure 3-5 Wiring diagram of digital output terminal FM



Chapter 4

Operation and Display

4.1 Keypad description

4.1.1 Keypad explanation and function

Using the operation panel, you can modify the function parameters of the inverter, monitor the working status of the inverter, and control the operation of the inverter (start, stop). Its appearance and functions are shown in the following figure.

LED display operation surface   LCD display operation surface

4.1.2 Function indicator description

Indicator sign	Name	Meaning	Color
RUN	Operating status indicator	On - the inverter is running Off - Inverter is in stop state Flashing - the inverter is in sleep state	Green
L/D/C	Control mode indicator	Off - Inverter is in keypad control mode On - the inverter is in terminal control mode Flashing-Inverter is in remote communication control mode	Red
FWD/REV	Running direction indication	Off - Forward state On - inversion state Flashing - the target frequency is opposite to the actual frequency or is in the reverse running prohibited state	Red
TUNE/TC	Tuning/Torque Control/Fault Indicator	On - torque control Flashing - Tuning\Fault status	Red

4.1.3 Digital display area

5-digit LED display can display the set frequency, output frequency, various monitoring data and alarm codes. The function code is usually displayed as a decimal number. For example, the value of the P0-11 function code is displayed as "50.00", which means the decimal number "50.00". When the function code value is displayed in hexadecimal, the highest digit of the nixie tube displays "H.", indicating that the current function code value is displayed in hexadecimal. For example, the value of the P7-29 function code is displayed as "H. At this time, the value of P7-29 is the hexadecimal number "0x3f".

The user can freely set the monitoring data of stop and running status according to function code P7-29/P7-30, see function code P7-29/P7-30 for details.

4.1.4 Description of keyboard buttons

Button	Name	Function Description
PRG	Program / Escape key	Enter or exit the first-level menu, return to the upper-level menu
OK	Enter	Enter the menu screen step by step, set parameters to confirm
	Increment key (+)	Increment of data or function code
	Decrement key (-)	Decrement of data or function code
	Shift key	In the stop display interface and the running display interface, the display parameters can be selected cyclically. For the specific display meaning, please refer to P7-29 and P7-30; when modifying the parameters, you can select the modification bit of the parameter
RUN	Run key	In keyboard operation mode, used to run operation
STOP	Stop/Reset key	In the running state, pressing this key can be used to stop the running operation; in the fault alarm state, it can be used to reset the operation. The characteristics of this key are restricted by the function code P7-27.
MF.K	Jog run/Direction keys	When P7-28 is set to 0, it is the jog running button, and when P7-28 is set to 1, it is the direction button. Press this button to reverse the direction.

4.2 Organization of Inverter Function Codes

Function code group	Function description	Illustrate
P0 ~ PF	Basic function parameter group	Compatible with 700IP65 series function codes
A0 ~ A3	Second motor parameter group	The second motor parameters, acceleration and deceleration time, control mode, etc. can be set independently
B0 ~ B6	Enhanced function parameter group	System parameter setting, user function code customization, optimization control, AI/AO correction, master-slave control, brake function and sleep function;
C0 ~ CF	Special plane function selection group	Choose to use different professional inverter functions;
U0 ~ U1	Monitoring parameter group	U0 is the fault record parameter group, and U1 is the user monitoring parameter, which is convenient to check the relevant output status;

4.3 Function code viewing and modification method description

AC drives adopts three-level menu structure for parameter setting and other operations. The three-level menus respectively are: functional parameter group(first-level menu)→function code (second- level menu)-function code setting value (third-level menu). Operational process is shown in Figure 4-2:

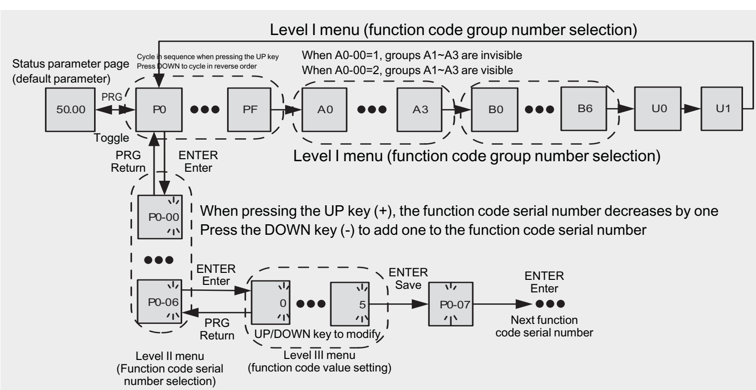


Figure 4-2 Three-level menu operation flow chart

Note:

When operating in the third-level menu, you can press PRG key or ENTER key to return to the second-level menu. But pressing the ENTER key will save the current parameter modification value and transfer to the next function code; while pressing the PRG key will abandon the current parameter modification.

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

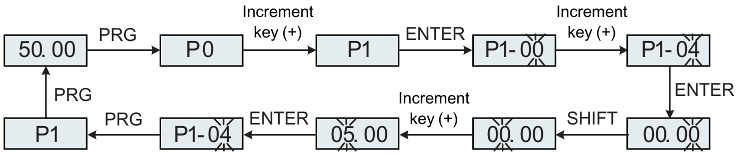


Figure 4-3 Parameter setting operation flow chart

In the third-level menu state, if the parameter has no flashing bit, it means that the parameter value of the function code cannot be modified. For the specific reason, please refer to the description of the function code attribute.

Chapter 5

Synchronous motor open loop vector (SVC) debugging

5.1 Set synchronization type, control mode, and motor parameters

① The motor type is set to synchronous motor and the control mode is SVC, i.e. P0-03=11.

Note: P0-03 has ten digits for motor type selection and one digit for control mode;

Ten digits: 1: synchronous motor, 0: asynchronous motor;

Position: 1: SVC， 2：VVC， 3：FVC

② Set P4-01~P4-06 according to the actual motor parameters.

5.2 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 and the digital display will show TUNE. To ensure control effectiveness, it is best to set the motor to empty load and P4-00 to 2.

② Press the RUN key to perform parameter identification, wait for TUNE to disappear, and the parameter identification will end.

③ The identification process lasts for about 1 minute and can be exited by pressing the STOP button midway. During this period, a current will be sent to operate the motor at the set acceleration and deceleration time to 60% of the rated frequency of the motor. Observe whether the motor runs smoothly. If it is not stable, press STOP to exit and reach 60% of the rated frequency of the motor. After a period of time, slow down and stop the motor.

④ After the parameter identification is completed, check if the P4-17~P4-20 parameters are normal.

5.3 No load trial operation

① Set the speed to a smaller range, such as P0-11=20Hz.

② Press the run button to 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 small, then the frequency converter is basically normal. Set the frequency to the rated frequency of the motor and check if the motor can accelerate to the set frequency.

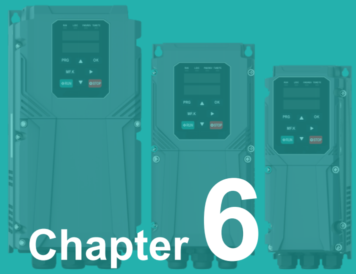
5.4 Quick Start Trial Run

Set up in situations where quick start stop is required, otherwise skip this step. Reduce the motor acceleration time (e.g. set to 1 second), change the PI parameter settings of the speed loop and current loop, press the run button, and check if the motor can accelerate quickly to the set frequency.

5.5 Loading and Running

After the above 5 steps, the motor can be operated with load and the frequency converter can be used normally.

Note: If the system response does not achieve the expected effect when loading or changing the system's moment of inertia, it is necessary to adjust the parameters P3-04 and P3-06 appropriately. If replacing with another type of motor, it is generally necessary to set the rated frequency and rated current of the motor, and then perform parameter identification.

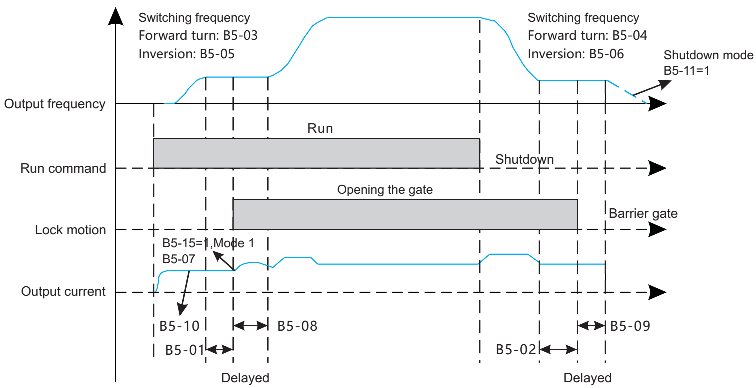


Chapter 6

Guidance on Braking Logic

6.1 Schematic diagram of brake logic

Set up in situations where quick start stop is required, otherwise skip this step. Reduce the motor acceleration time (e.g. set to 1 second), change the PI parameter settings of the speed loop and current loop, press the run button, and check if the motor can accelerate quickly to the set frequency.



6.2 Braking Logic Process

① After receiving the operation command, the frequency converter accelerates to the opening frequency set for B5-03 forward rotation or B5-05 reverse rotation.

② After the frequency reaches the opening frequency, after setting the delay time B5-01 before opening the brake, maintain the operation at the opening frequency.

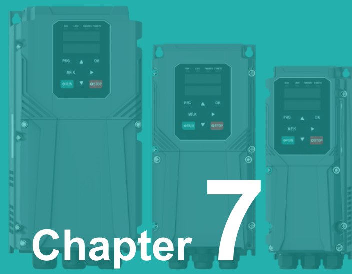
③ If B5-12=1 is set, the current condition needs to be determined when opening the brake, and the output current needs to reach the current threshold set by B5-07. Default to 0 does not determine current.

④ During the period when the brake is not opened, the output can be restricted by setting B5-10. The 32nd function of DO has been set to "brake control output". After the set brake is opened, the B5-08 relay outputs a valid signal to control the brake to open and start accelerating to the set frequency.

⑤ After receiving the shutdown command, the frequency converter slows down to the B5-04 forward rotation or B5-06 reverse rotation closing frequency.

⑥ After reaching the set closing frequency, after a delay time of B5-02 before closing, the relay outputs a closing signal to control the closing of the brake. After setting a delay time of B5-09 after closing, the frequency converter starts to stop and can choose between free stop or deceleration stop modes.

⑦ By default, B5-11 is set to 0, and the shutdown mode is free shutdown. It can be set to 1 through B5-11 and changed to execute deceleration shutdown after the delay ends after closing the brake.

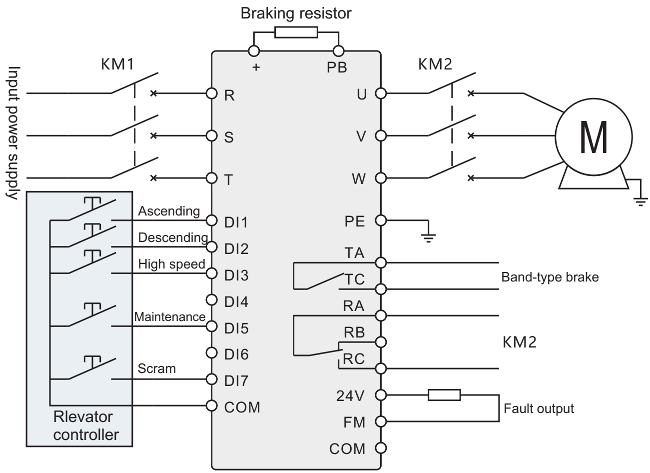


Chapter 7

Application Guidance for Civil Elevators

7.1 Single and Multi speed Terminal Elevator Controller

For elevator controllers with only one multi-stage speed conversion terminal, the high-speed and flat speed segments are controlled by the on/off of the high-speed terminal. The wiring diagram between this type of elevator controller and the frequency converter is as follows:



Wiring diagram of single and multi speed terminal elevator controller and frequency converter

According to the wiring between the controller, frequency converter, and motor on site, for elevators without a running contactor (Km2), The wiring of R2 can be omitted. Similarly, for elevator controllers that do not receive fault signals, The FM wiring can also be disconnected. Complete the wiring and debug according to the following steps.

① Set the high-speed and leveling speeds, and the elevator controller uses a high-speed terminal to switch between high-speed and leveling speeds. The corresponding parameters for setting multiple speed levels are: PC-00=level ing speed, PC-01=high-speed.

② Maintenance speed setting, some elevator controllers share maintenance speed with leveling speed, and there is no maintenance signal output. In this case, the maintenance signal line can be skipped and this step can be skipped; If there is a maintenance signal output, the maintenance speed can be set through the function code, and the corresponding parameter for setting the maintenance speed is B5-15=maintenance speed.

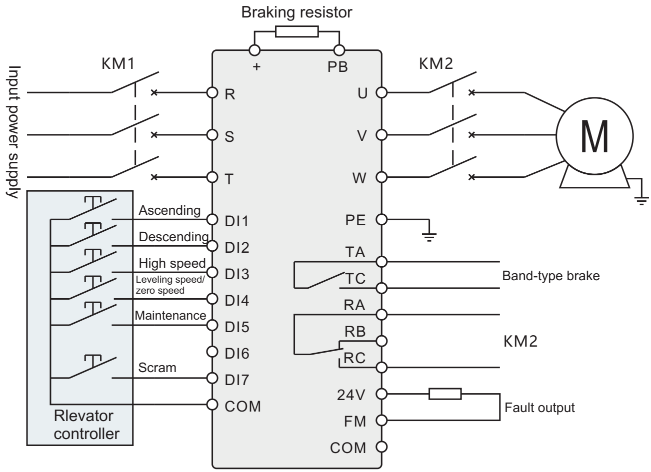
③ Emergency stop signal. If some elevator controllers do not have an emergency stop signal, the emergency stop signal line can be skipped and this step can be skipped; There is an emergency stop signal, set DI7 to emergency stop signal P5-06=54.

④ Maintenance operation test: Switch the elevator controller to maintenance operation mode and test it in the up or down direction to see if the operation direction is consistent. If not, swap the up and down signal lines, namely DI1 and DI2 signal lines, or swap any two phases 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 time according to the site.

7.2 Dual multi speed terminal elevator controller

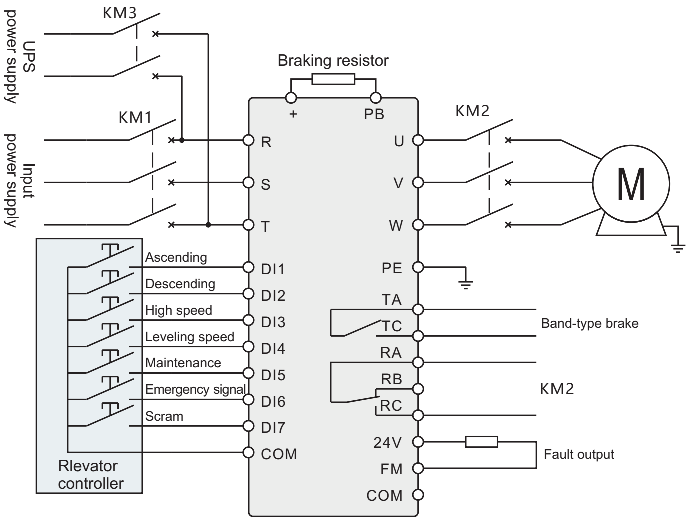
For elevator controllers with two multi-stage speed conversion terminals, the high speed is controlled by the on/off of one terminal, while the other terminal controls the leveling speed or zero speed according to different controllers. The wiring diagram of the elevator controller and frequency converter with two multi-stage speed terminals is as follows:



Wiring diagram of dual multi speed terminal elevator controller and frequency converter

7.3 Emergency operation mode

During the use of the elevator, if the power supply of the system suddenly loses power, it may cause passengers to be trapped in the car. This series of elevator applications can support emergency UPS power supply operation for power outage emergency operation. The emergency signal can be received by the frequency converter terminal DI6, and its wiring diagram is shown in the figure:

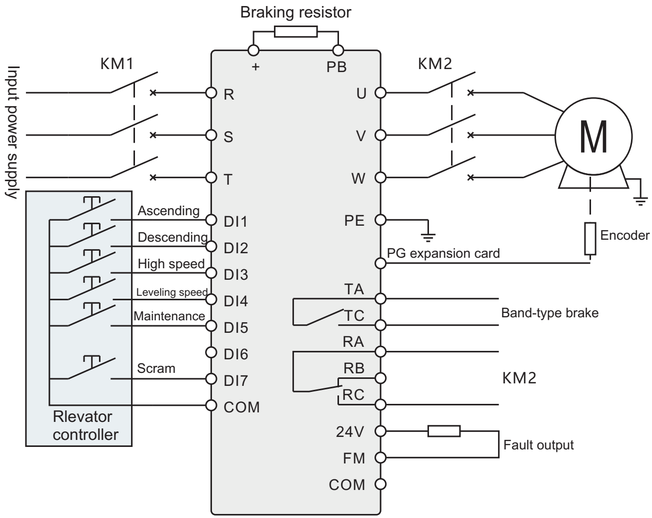


Emergency mode wiring diagram

When the power grid voltage is cut off, the elevator controller switches to UPS power supply and sends an emergency signal to the frequency converter. When the frequency converter receives the emergency signal, it automatically switches to emergency mode operation. Choosing the appropriate voltage level of the frequency converter can support single-phase 220V and three-phase 380V UPS power supply,. 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 by B5-14, and its acceleration and deceleration time will be adjusted according to the time set by P7-07 and P7-08.

7.4 Closed loop elevator control

This series of frequency converter elevator applications can support closed-loop control and provide multiple PG cards to be used with different encoders. Please refer to Chapter 5 for PG card information. The wiring diagram between the elevator controller and the frequency converter during closed-loop elevator control is shown in the following figure:



Closed loop elevator control wiring diagram

According to the wiring between the controller, frequency converter, and motor on site, and the wiring between the PG card and encoder, for elevators without a running contactor (KM2), The wiring of R2 can be omitted. Similarly, for elevator controllers that do not receive fault signals, The FM wiring can also be disconnected. Complete the wiring and debug according to the following steps:

① Set the high-speed and leveling speed according to the wiring method in the diagram, and set the parameters for multi-stage speed as follows: PC-00=0, PC-01=leveling speed, PC-02=high-speed.

② Maintenance speed setting, some elevator controllers share maintenance speed with leveling speed, and there is no maintenance signal output. In this case, the maintenance signal line can be skipped and this step can be skipped; If there is a maintenance signal output, the maintenance speed can be set through the function code. Set maintenance DI5, P5-04=55, and the corresponding parameter for setting maintenance speed is B5-15=maintenance speed.

③ Emergency stop signal. If some elevator controllers do not have an emergency stop signal, the emergency stop signal line can be skipped and this step can be skipped; There is an emergency stop signal, set DI7 to emergency stop signal P5-06=54.

④ Maintenance operation test: Switch the elevator controller to maintenance operation mode and test it in the up or down direction to see if the operation direction is consistent. If not, swap the up and down signal lines, namely DI1 and DI2 signal lines, or swap any two phases of the motor output lines U, V, and W.

⑤ Check the direction of the encoder, switch the elevator controller to maintenance operation mode, test it up or down, and check that the output frequency is consistent with the positive or negative feedback speed of the U1-46 encoder. That is, if the output frequency is positive, the feedback speed of U1-46 also needs to be positive; If the output frequency is negative, the feedback speed of U1-46 also needs to be negative. If the directions are not consistent, P4-29 can be set to 1 or the A and B phase pulses of the encoder can be swapped. After completion, recheck whether the output frequency is consistent with the U1-46 direction.

⑥ Operating in closed-loop control mode, according to the encoder setting of the encoding large line number P4-28, switch P0-03=3 (asynchronous machine FVC) or 13 (synchronous machine FVC) to closed-loop control mode, switch the elevator controller to maintenance operation mode, and test whether the elevator is running normally by pressing up or down.

⑦ Normal mode trial operation, switch the elevator controller to normal operation mode for testing, and adjust the acceleration and deceleration time according to the site.

7.5 Multi speed setting method

For different elevator controllers, the combination of signals output from multiple speed terminals can result in different parameter positions for setting leveling speed and high speed. The speed parameters for the PC group will be set as a percentage, with 100.0% corresponding to the maximum frequency (P0-14 value). The corresponding speed setting parameters for its combination are shown in the following table:

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

This product supports 4 sets of acceleration and deceleration times, with a time selection parameter range of 0-3. The corresponding acceleration and deceleration time setting parameters 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

7.6 Introduction to B5 Group Civil Elevator Application Function Codes

Need to set B5-13=1 and enable the function associated with civilian elevators.

Function code	Name	Description (setting range)	Factory Default
B5-13	Special function enablement for civilian elevators	0: Close 1: Enable	0

Application of elevator usage combined with B5 group brake logic.

Function code	Name	Description (setting range)	Factory Default
B5-00	Brake control enable selection:	0: Prohibited 1: Enable	0
B5-01	Delay before opening the brake	0 ~ 20.0s	0s
B5-02	Delay before closing the brake	0 ~ 20.0s	0.3
B5-03	Rising positive rotation brake opening frequency	0.00Hz ~ 20.00Hz	2.50Hz
B5-04	Rising positive rotation brake closing frequency	0.00Hz ~ 20.00Hz	1.50Hz

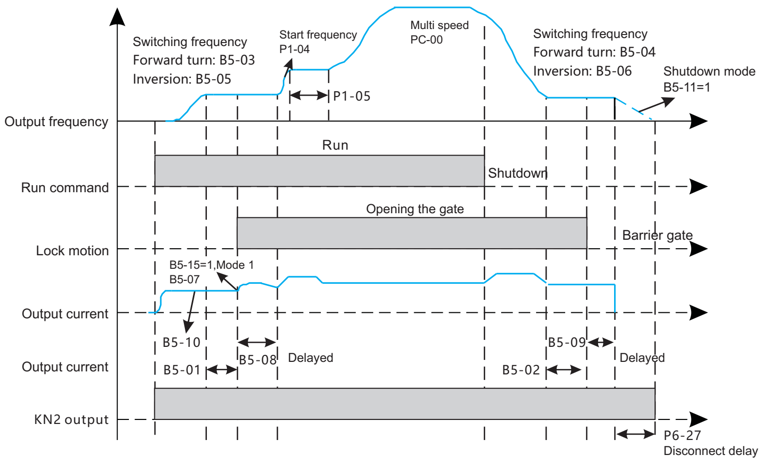
Function code	Name	Description (setting range)	Factory Default
B5-05	Falling reverse brake opening frequency	0.00Hz ~ 20.00Hz	0
B5-06	Falling reverse brake closing frequency	0.00Hz ~ 20.00Hz	0s
B5-07	Brake opening current threshold	0 ~ 100.0	0.3
B5-08	Frequency holding time after opening the brake	0 ~ 20.0s	2.50Hz
B5-09	Frequency holding time after closing the brake	0 ~ 20.0s	1.50Hz
B5-10	Current limit during brake holding period	50.0% ~ 200.0%	2.50Hz
B5-11	Shutdown mode after closing the brake	0: Free shutdown 1: Slow down and stop the machine	1.50Hz

By setting the function codes B5-01~B5-12, the starting and parking comfort of the elevator can be well adjusted, similar to the brake logic usage diagram in the above figure. The accurate meanings of each function code are shown in the following figure, and the selection of starting frequency and starting frequency holding time has been added.

Function code	Name	Description (setting range)	Factory Default
P1-04	Start frequency	0.00 ~ 10.00Hz	5.00Hz
P1-05	Start frequency holding time	0.00 ~ 10.00s	0.00s
P6-00	Relay 1 output	0 ~ 46	32 brake output
P6-01	Relay 2 output	0 ~ 46	1 Run
P6-27	Relay 2 disconnection delay	0 ~ 3600.0s	0

If there is a need to select the starting buffer frequency for the elevator, P1-04 starting frequency and P1-05 starting frequency delay can be set for control.

Applying relay 1 for brake control requires setting P6-00=32 to set the brake output function. If KM2 is connected, the function of relay 2 should be set to run output P6-01=1, and the delay of relay R2 output should be set. It is recommended to use the disconnection delay P6-27 of the relay for setting selection.



B5-03 (frequency of opening the upward positive rotation brake), B5-04 (frequency of closing the upward positive rotation brake), B5-05 (frequency of opening the downward reverse rotation brake), B5-06 (frequency of closing the downward reverse rotation brake), the upward group of the elevator is used for frequency judgment when the frequency converter rotates forward, and the downward group is used for frequency judgment when the frequency converter rotates backward.

Function code	Name	Description (setting range)	Factory Default
B5-11	Shutdown mode after closing the brake	0: Free shutdown 1: Slow down and stop the machine	1.50Hz

This parameter can be used to select whether the shutdown mode after the brake is closed is direct free shutdown or deceleration to 0 shutdown.

Function code	Name	Description (setting range)	Factory Default
B5-12	Brake open mode	0: Open according to frequency 1: Open according to frequency and current	0

0: Open according to frequency

The condition for determining the opening of the brake is that the frequency converter outputs to the frequency set at B5-03 (rising) and B5-05 (falling), and then opens the brake after the time set at B5-01 (brake opening delay).

1: Open according to frequency and current

The judgment condition for opening the brake is not only that the output of the frequency converter should reach the frequency set by B5-03 (rising) and B5-05 (falling), but also that the current of the frequency converter should reach the value set by B5-07 (brake opening current).

Function code	Name	Description (setting range)	Factory Default
B5-14	Emergency operating frequency of elevators	0.00Hz ~ P0-14Hz	20.00Hz

When an emergency signal is input, the frequency converter will enter the emergency operation state, with the operating frequency set by the function code. In the emergency operation state, the frequency converter will select acceleration and deceleration time 4 as the current acceleration and deceleration time.

Function code	Name	Description (setting range)	Factory Default
B5-15	Elevator maintenance operation frequency	0.00Hz ~ P0-14Hz	20.00Hz

When the maintenance signal is input, the operating frequency of the frequency converter will run according to the maintenance operating frequency.

Function code	Name	Description (setting range)	Factory Default
B5-16	Elevator emergency signal processing mode	0: The elevator is not running 1: UPS power supply operation	1

Chapter 7

0: The elevator is not running

When there is an emergency signal input, the frequency converter does not output.

1: UPS power supply operation

When there is an emergency signal input, the frequency converter is powered by UPS and can operate and output at the emergency frequency.

Function code	Name	Description (setting range)	Factory Default
B5-17	Elevator ascent correction frequency	0.00Hz ~ 5.00Hz	0

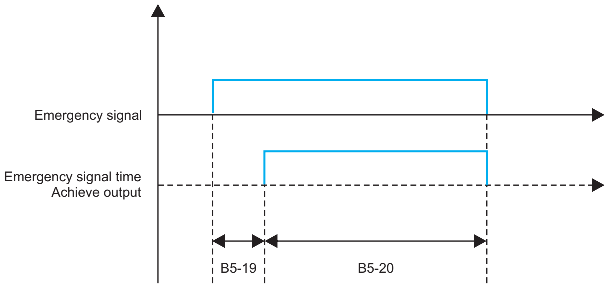
This parameter is used to correct the leveling accuracy of the elevator in power generation mode. For example, when the elevator rises at half load, it will just be at the leveling position, but when it rises at no load, it will exceed the leveling position. Increasing this value can correct the leveling accuracy.

Function code	Name	Description (setting range)	Factory Default
B5-18	Elevator descent correction frequency	0.00Hz ~ 5.00Hz	0

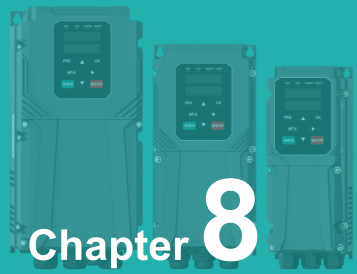
This parameter is used to correct the leveling accuracy of the elevator in electric mode. For example, when the elevator descends at half load, it will just be at the leveling position, but when it descends at no load, it will not reach the leveling position. Increasing this value can correct the leveling accuracy.

Function code	Name	Description (setting range)	Factory Default
B5-19	Effective time of elevator emergency signal	0 ~ 3600.0	0
B5-20	Elevator emergency signal invalid time	0 ~ 3600.0	0

These two parameters are used to set the valid and invalid time of emergency signal output. When the emergency signal is valid, the frequency converter starts timing. When the time exceeds the value set by B5-19, and 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 the time set by B5-20. After the time exceeds B5-20, the terminal outputs an invalid signal.



The emergency signal output indicates that civilian elevators are sensitive to the noise of the cooling fan. The elevator fan is silent at P7-26=2, and the cooling fan starts with temperature.



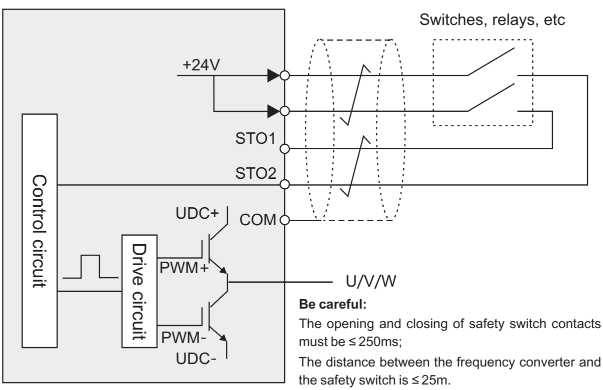
Chapter 8

Overview of STO Function

8.1 Overview of STO Function

Reference standards:

IEC 61508-1、IEC 61508-2、IEC 61508-3、IEC 61508-4、IEC 62061、ISO 13849-1、IEC 61800-5-2.The STO function of this series of frequency converters automatically shuts down when stopped. There is a stop signal set inside the frequency converter, and when this signal is triggered, the frequency converter will automatically stop working. By inputting specific control commands or using external sensors to trigger a stop signal, the frequency converter stops outputting current. This function has high safety and reliability, and can effectively avoid unnecessary equipment damage and personnel injury. When using a frequency converter, please set the parameters of the STO function reasonably to ensure its normal operation and achieve the best results.



8.2 STO Function Logic

Input status and corresponding faults of STO function:

STO input status	Corresponding to STO malfunction
Simultaneously open STO1 and STO2	Trigger STO function, the frequency converter cannot work properly
STO1 and STO2 are both closed simultaneously	The frequency converter can work normally without triggering the STO function

STO input status	Corresponding to STO malfunction
Either STO1 or STO2 is open	Triggering Err48 fault, the fault type can be distinguished by checking the U1-35 values. 1: STO1 disconnected; 2: STO2 disconnected; 3: STO1 and STO2 are both 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 valid.

No.	Project
1	Ensure that the frequency converter can run and stop freely during debugging.
2	Stop the frequency converter (if it is running), cut off the input power and isolate the frequency converter from the power supply through a switch.
3	Connect the circuit correctly according to the STO circuit diagram.
4	Check if the STO input cable is properly connected to+24V and the shielding layer is properly connected to GND 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 be in a stopped state; Activate the STO function and issue 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	When the motor is running, test the STO method: Start the frequency converter to ensure the normal operation of the motor; Activate the STO circuit; The frequency converter triggers the STO fault Err48 (U1-35 check the fault type and handling), ensuring that the motor stops; Stop activating the STO circuit.
9	Restart the frequency converter and check if the motor is running normally

8.4 Fire Protection Mode Association Function Code

Function code	Name	Description (setting range)	Factory Default
P7-80	Fire mode selection	0: Not enabled; 1: Enable mode 1, allowing 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	0~53	42
P4-03	Di4 terminal function selection	0~53	45

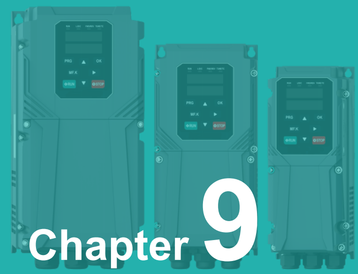
8.5 Introduction to Fire Protection Mode Functions

① When P7-80 is set to 0: Fire fighting mode does not turn on

② When P7-80 is set to 1 (fire mode one): At this time, the digital input terminals (DI1-DI5) are set to function 42, which is the fire mode enable terminal (triggered by rising edge). When this function is effective, the frequency converter operates at the P7.81 set frequency. If a fault is reported during the operation of the frequency converter, it will continue to run without stopping. When this function is effective, the frequency converter will automatically run. When this function is ineffective, the command source needs to give a shutdown command to stop it.

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

③ When P7-80 is set to 2 (fire mode 2): At this time, the digital input terminals (DI1-DI5) are set to function 42, which is the fire mode enable terminal (triggered by rising edge). When this function is effective, the frequency converter operates at the set frequency of P7-81. If a fault is reported during the operation of the frequency converter, it will continue to operate without stopping. When this function is effective, the frequency converter will automatically operate and cannot be stopped until it loses power or the machine explodes.



Chapter 9

Tension Control

9.1 Tension control related function codes

Refer to the C1 group function code in the functional parameter table.

9.2 Introduction to Tension Control Scheme

There are two ways to control tension.

1: Can 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 refers to the absence of tension feedback signals, and the frequency converter can achieve control objectives solely by controlling the output frequency or torque, regardless of the open-loop vector or closed-loop vector. The torque control mode refers to the frequency converter controlling the torque of the motor, not the frequency, and the output frequency automatically changes according to the speed of the material. According to the formula F=T/R (where F is the material tension, T is the torque of the winding shaft, and R is the radius of the winding shaft), it can be seen that if the torque of the winding shaft can be adjusted according to the change of the winding diameter, the tension on the material can be controlled. This is the basis for controlling tension in open-loop torque mode. Another reason for its feasibility is that the tension on the material only comes from the torque of the winding shaft, which mainly acts on the material.

9.3.2 Closed loop speed control mode

Closed loop refers to the need for tension (position) detection feedback signals to form closed-loop regulation. Speed control mode refers to the frequency converter adjusting the output frequency based on the feedback signal to achieve control objectives. Speed mode frequency converters can operate in any of three ways: sensorless vector control, sensorless vector control, and V/F control. The principle of this control mode is to calculate a matching frequency setting value f1 by comparing the material line speed with the actual roll diameter, and then perform PID operation on the tension (position) feedback signal to generate a frequency adjustment value f2. The final frequency output is f=f1+f2. F1 can basically match the linear speed of the winding (unwinding) roller with the linear speed of the material, and then the F2 part only needs to be slightly adjusted to meet the control requirements, effectively solving the contradiction between response speed and control stability in closed-loop control. In this mode, the tension setting part is invalid. The target value for system control is set in the FA-00PID given source, and the control result is to stabilize the feedback signal of tension (position) at the given value of PID. Please note that when using position signals (such as tension swing rods or floating rollers) for feedback, changing the set value (given by PID) may not necessarily change the actual tension magnitude. Changing the tension magnitude requires modifying the mechanical configuration such as the counterweight of the tension swing rod or floating roller.

9.4 Control mode selection section

Function code	Name	Description (setting range)	Factory Default
C1-00	Tension control mode	0: Invalid 1: Open loop torque mode 2: Closed loop speed mode	0

Select the mode for tension control using this parameter

① Tension control ineffective;

② Open loop torque control mode: without tension detection and feedback, the frequency converter controls the output torque to control the tension on the material. The control of output torque by a frequency converter requires vector control with speed sensors to achieve better control effects.

③ Closed loop speed mode: requires tension detection and feedback, and the frequency converter outputs the frequency through PID closed-loop control to achieve the set tension. The frequency converter controls the output frequency, and its control method can be either sensorless vector control, V/F control, or closed-loop vector control.

Function code	Name	Description (setting range)	Factory Default
C1-01	Retract and retract mode	0: Volume collection 1: Drop the volume	0

Selecting the roll up/down mode can be used with the roll up/down switch terminal. When the roll up/down switch terminal is invalid, the actual roll up/down mode is set the same as this function code. When the winding switch terminal is valid, the actual winding mode is opposite to the setting of this function code.

The relationship between tension direction and winding:

The tension direction is fixed to the direction of the winding tension, which is consistent with the operating direction during non tension control. When switching between winding and unwinding, only change the C1-01 or use the winding and unwinding switching terminal to switch, without changing the forward and reverse operation instructions at the same time.

Function code	Name	Description (setting range)	Factory Default
C1-02	Maximum frequency of roll up	0.00Hz to maximum frequency	30
C1-03	Upper limit frequency for unwinding	0.00Hz to maximum frequency	10

When the tension control is effective, the upper limit frequency for the winding mode and unwinding mode is determined by C1-02 and C1-03.

Function code	Name	Description (setting range)	Factory Default
C1-04	Gear ratio	0.01~600.00	1.85

Mechanical transmission ratio=motor speed/spool speed. The mechanical transmission ratio must be set correctly during tension control

9.5 Tension setting section

Function code	Name	Description (setting range)	Factory Default
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

This parameter determines the control source of tension:

① 0: The tension is set as a number, and the specific value is set in C1-06.

② 1: AI1, 2: AI2, 3: AI3 Tension is set through analog signals, such as using potentiometers to set tension. When selecting analog tension settings, be sure to set the maximum tension. The maximum value set by the analog quantity usually corresponds to the maximum tension.

③ 4: The tension setting is set through pulse input. The pulse input terminal must be a DI5 terminal. When selecting the pulse setting tension, be sure to set the maximum tension. The maximum value set for the maximum pulse usually corresponds to the maximum tension.

④ 5: Communication settings. When controlling with an upper computer, tension can be set using communication methods.

Function code	Name	Description (setting range)	Factory Default
C1-06	Tension setting	0~30000N	1.85

When C1-05 is set to 0, the tension controlled by the frequency converter is determined by this parameter.

Function code	Name	Description (setting range)	Factory Default
C1-07	Maximum tension	0~30000N	1.85

When selecting the tension source as analog or pulse control for C1-05, this parameter determines the maximum value of the analog or pulse.

9.6 Calculation parameters for roll diameter

Function code	Name	Description (setting range)	Factory Default
C1-08	Calculation method for roll diameter	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

① 0: Set through function code;

② 1: Calculate the roll diameter through linear velocity;

③ 2: Thickness accumulation method for calculating roll diameter;

④ 3, 4, 5: Calculate the roll diameter through analog AI terminals;

⑤ Calculate roll diameter through PILSE pulse input.

Function code	Name	Description (setting range)	Factory Default
C1-09	Maximum roll diameter	1~10000mm	1100
C1-10	Roll diameter	1~10000mm	320

When selecting 3, 4, 5, and 6 as the calculation methods for the roll diameter of C1-08, the maximum input quantity should correspond to the maximum roll diameter. At the same time, when the frequency converter calculates the roll diameter itself, the calculated roll diameter is limited by this parameter.

The diameter of the coil set by C1-09 is limited by this parameter if the frequency converter calculates a coil diameter lower than this value due to improper parameter settings.

Function code	Name	Description (setting range)	Factory Default
C1-11	Initial roll diameter source	0: DI terminal setting 1: Ai1 2: Ai2 3: AI3 (expansion card)	320

Select the input channel for the initial roll diameter.

0: Use DI terminal logic to set 4 initial coil diameters from C1-12 to 15 as numbers

1: AI1, 2: AI2, 3: AI3 The initial roll diameter is determined by analog input, and different ports for analog input are selected

Function code	Name	Description (setting range)	Factory Default
C1-16	Roll diameter filtering time	0.0s~100.0s	1.0s

Filter time for calculating roll diameter to prevent rapid changes in roll diameter

Function code	Name	Description (setting range)	Factory Default
C1-19	Roll diameter reset selection	0: During operation, it is prohibited to reset the roll diameter 1: Allow roll diameter reset during operation	1.0s

The selection of roll diameter reset conditions, the roll diameter reset operation is initiated by the DI terminal function, and the roll diameter is set from C1 to 19 before running to determine whether the reset operation is possible.

Function code	Name	Description (setting range)	Factory Default
C1-20	The roll diameter has reached the set value	1~10000mm	0

When the roll diameter value reaches C1-20, the DO terminal's set roll diameter reaching function is effective.

9.7 Cumulative calculation of roll diameter parameters for thickness

Function code	Name	Description (setting range)	Factory Default
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

When parameter 0 is selected for C1-21, the material thickness is set by the DI terminal, and four initial material thicknesses can be digitally set for C1-22~C1-26, which are determined by the DI terminal level logic.

When selecting parameters 1, 2, and 3 for C1-21, the maximum analog input sho-uld correspond to the maximum thickness of C1-22.

9.8 Calculation of Roll Diameter Parameters for Linear Velocity

Function code	Name	Description (setting range)	Factory Default
C1-30	Linear velocity input source	0: Function code setting (C1-31) 1: Ai1 2: Ai2 3: AI3 (expansion card) 4: PULSE input pulse given 5: Communication given	0
C1-31	Maximum linear velocity	0.1~6000.0m/min	1000

C1-30: When the input source of linear velocity is 0, the linear velocity is set to the value of C1-31.

After using 1, 2, and 3 analog signals AI as input sources for linear velocity, the correct maximum linear velocity of C1-31 needs to be set for the maximum analog signal.

When the input source of linear velocity is 4, the linear velocity is given by the PULSE input pulse.

When the input source of linear velocity is 5, the linear velocity is given through communication.

Function code	Name	Description (setting range)	Factory Default
C1-32	Actual value of linear velocity	Actual value	Actual value

C1-32: This parameter displays the real-time value of linear velocity.

Function code	Name	Description (setting range)	Factory Default
C1-33	Lower limit of roll diameter calculation frequency	0.00Hz~maximum frequency	1.5
C1-34	Roll diameter calculation delay	0.0~100.0s	6

The parameter C1-33 indicates that when the operating frequency of the frequency converter is lower than the frequency set by this parameter, the roll diameter will no longer participate in the calculation change.

Delay time for calculating the roll diameter of C1-34.

9.9 Tension compensation parameters

Function code	Name	Description (setting range)	Factory Default
C1-40	Upper limit of compensating torque for moment of inertia	0.0~50.0%	5
C1-41	Static friction compensation coefficient	0.0~50.0%	0
C1-42	Dynamic friction compensation coefficient	0.0~50.0%	0

C1-40: Used to compensate for the rotational inertia of the system itself, includ-ing the inertia of motors, transmission systems, reels, etc. This inertia is fixed and independent of the roll diameter. This parameter can be automatically obtained through self-learning with compensation coefficients (this feature is currently retained in the current version), or it can be manually set. When there is an empty or small roll, if the material tension decreases during the acceleration process, increase the coefficient; otherwise, decrease the coefficient.

C1-41~42: Taking winding as an example: due to frictional resistance, the tension of the material decreases, which has a more significant impact on small rolls, and also makes the tension non-linear. By setting this parameter, it can be improved.

Function code	Name	Description (setting range)	Factory Default
C1-44	High speed torque compensation coefficient	0.0~50.0%	0
C1-45	Basis for high-speed torque compensation	0: Frequency 1: Linear velocity	0
C1-46	High speed torque compensation speed upper limit	10.0~100.0%	100

Compensation for regulating high-speed torque with C1-44.

When adjusting the compensation of high-speed torque for C1-45, the high-speed is based on frequency or linear velocity.

The upper limit of high-speed compensation adjustment for C1-46.

Chapter 10

Fault Diagnosis and Countermeasures

10.1 Fault alarm and countermeasures

If a fault occurs during the system operation, the inverter will immediately protect the motor to stop the output, and the corresponding inverter fault relay contact will act. The inverter panel displays the fault code. The fault type and common soluti-on corresponding to the fault code are shown in the following table. The list in the table is for reference only, please do not repair or modify it without authorization. If the fault cannot be eliminated, please seek technical support from our company or the product agent.

Table 10-1 Fault alarm and countermeasures

Fault name	Panel display	Troubleshooting	Troubleshooting Countermeasures
Inverter module protectio n	Err01	◆ Whether the motor connection terminals U, V and W are short-circuited between phases or to ground ◆ Is the module overheated? ◆ Whether the internal wiring of the inverter is loose ◆ Whether the main control board, driver board or module is normal	◆ Contact short circuit ◆ Are the fans and air ducts normal? ◆ Connect all loose wires ◆ Seek technical support
Overcurr ent during accelera tion	Err04	◆ There is grounding or short circuit in the output circuit of the inverter ◆ The motor parameters are incorrect ◆ The acceleration time is too short ◆ V/F torque boost or inappropriate curve ◆ The input voltage is low ◆ Start the rotating motor ◆ Sudden load during acceleration ◆ Inverter selection is too small	◆ Eliminate peripheral faults ◆ Check parameters and parameter identification ◆ Increase the acceleration time ◆ Adjust the V/F boost torque or curve ◆ Adjust the voltage to the normal range ◆ Select the speed tracking start or wait for the motor to stop before starting ◆ Cancel sudden load ◆ Use inverters with larger power levels

Fault name	Panel display	Troubleshooting	Troubleshooting Countermeasures
Overcurrent during deceleration	Err05	◆ There is grounding or short circuit in the output circuit of the inverter ◆ The motor parameters are incorrect ◆ The deceleration time is too short ◆ The input voltage is low ◆ Sudden load during deceleration ◆ No braking unit and braking resistor ◆ The magnetic flux braking gain is too large	◆ Eliminate peripheral faults ◆ Perform motor parameter identification ◆ Increase the deceleration time ◆ Adjust the voltage to the normal range ◆ Cancel sudden load ◆ Install braking unit and resistance ◆ Reduce the magnetic flux braking gain
Overcurrent in constant speed operation	Err06	◆ There is grounding or short circuit in the output circuit of the inverter ◆ The motor parameters are incorrect ◆ The input voltage is low ◆ Is there a sudden load during operation? ◆ Inverter selection is too small	◆ Eliminate peripheral faults ◆ Check parameters and parameter identification ◆ Adjust the voltage to the normal range ◆ Cancel sudden load ◆ Select the inverter with a larger power level
Overvoltage during acceleration	Err08	◆ The input voltage is too high ◆ There is an external force driving the motor to run during the acceleration process ◆ The acceleration time is too short ◆ No braking unit and braking resistor ◆ The motor parameters are incorrect	◆ Adjust the voltage to the normal range ◆ Cancel external power or install braking resistor ◆ Increase the acceleration time ◆ Install braking unit and resistor ◆ Check parameters and parameter identification
Overvoltage during deceleration	Err09	◆ The input voltage is too high ◆ There is an external force driving the motor to run during the deceleration process ◆ The deceleration time is too short ◆ No braking unit and braking resistor	◆ Adjust the voltage to the normal range ◆ Cancel external power or install braking resistor ◆ Increase the deceleration time ◆ Install braking unit and resistor

Fault name	Panel display	Troubleshooting	Troubleshooting Countermeasures
Overvoltage during constant speed operation	Err10	◆ The input voltage is too high ◆ There is an external force driving the motor to run during the acceleration process	◆ Adjust the voltage to the normal range ◆ Cancel external power or install braking resistor
Undervoltage fault	Err12	◆ Instantaneous power failure ◆ The input voltage of the inverter is not within the range required by the specification ◆ The bus voltage is abnormal ◆ The rectifier bridge and buffer resistance are abnormal ◆ Abnormal drive board ◆ The control panel is abnormal	◆ Reset fault ◆ Adjust the voltage to the normal range ◆ Seek technical support
Drive overload fault	Err13	◆ Whether the load is too large or the motor is blocked ◆ Inverter selection is too small	◆ Reduce the load and check the motor and mechanical conditions ◆ Select the inverter with a larger power level
Motor overload fault	Err14	◆ Whether the setting of motor protection parameter P9-01 is appropriate ◆ Whether the load is too large or the motor is blocked ◆ Inverter selection is too small	◆ Correctly set this parameter ◆ Reduce the load and check the motor and mechanical condition ◆ Select the inverter with a larger power level
drive overheating	Err15	◆ The ambient temperature is too high ◆ The air duct is blocked ◆ The fan is damaged ◆ The module thermistor is damaged ◆ The inverter module is damaged	◆ Lower the ambient temperature ◆ Clean the air duct ◆ Replace the fan ◆ Replace the thermistor ◆ Replace the inverter module

Fault name	Panel display	Troubleshooting	Troubleshooting Countermeasures
Current detection failure	Err17	◆ Whether the internal wiring of the inverter is loose ◆ Is the current detection device normal? ◆ Whether the main control board or driver board is normal	◆ Check the wiring ◆ Seek technical support
Short to ground fault	Err20	◆ Motor short circuit to ground	◆ Replace the cable or motor
Input phase loss fault	Err23	◆ The three-phase input power supply is abnormal ◆ The driver board is abnormal ◆ The lightning protection board is abnormal ◆ The main control board is abnormal	◆ Check and eliminate problems in peripheral circuits ◆ Seek technical support
Output phase loss fault	Err24	◆ The lead wire from the inverter to the motor is abnormal ◆ The three-phase output of the inverter is unbalanced when the motor is running ◆ The driver board is abnormal ◆ Module exception	◆ Eliminate peripheral faults ◆ Check whether the three-phase windings of the motor are normal and troubleshoot ◆ Seek technical support
read and write failure	Err25	◆ EEPROM chip damaged	◆ Replace the main control board
Parameter	Err27	◆ Is the host computer working? ◆ Is the communication connection normal? ◆ Whether the communication parameter P8 group is correct	◆ Check the wiring of the host computer, etc. ◆ Check the communication wiring ◆ Check the parameters of P8 group
Parameter	Err28	◆ Input external normally open or normally closed fault signal through multi-function DI terminal	◆ Fault reset
Excessive speed deviation	Err29	◆ The load is too heavy and the set acceleration time is too short ◆ The setting of fault detection parameters P9-31 and P9-32 is unreasonable	◆ Extend the set acceleration and deceleration time ◆ Reset P9-31 and P9-32

Fault name	Panel display	Troubleshooting	Troubleshooting Countermeasures
User-defined fault 1	Err30	◆ User-defined fault 1 signal input through multi-function terminal DI	◆ Reset
User-defined fault 2	Err31	◆ User-defined fault 2 signal input through multi-function terminal DI	◆ Reset
PID feedback lost at runtime	Err32	◆ PID feedback value is less than the set value of PA-13	◆ Check the feedback signal or reset the PA-13
Fast current limiting	Err33	◆ The load is too large or the stall occurs ◆ The set acceleration time is too short	◆ Reduce the load or replace the inverter with a higher power ◆ Properly extend the acceleration time
load drop failure	Err34	◆ When the load drop detection condition is reached, please refer to P9-28-P9-30 for specific use.	◆ Reset or reset detection conditions
input power failure	Err35	◆ The input voltage is not within the specified range ◆ Power on and off too frequently	◆ Adjust the input voltage ◆ Extend the power cycle
parameter storage exception	Err37	◆ Abnormal communication between DSP and EEPROM chip	◆ Replace the main control board ◆ Seek manufacturer service
The running time has arrived	Err39	◆ The current running time of the inverter > the set value of P7-38	◆ Reset
Accumulated running time reached	Err40	◆ The accumulated running time reaches the set value P7-20	◆ Use parameter initialization function 2 to clear the recording time or reset the accumulated running time
Switching motors during operation	Err42	◆ Switch the motor through the terminals during operation	◆ Motor switch after shutdown

Fault name	Panel display	Troubleshooting	Troubleshooting Countermeasures
Master-slave control communication dropped	Err46	◆ The master is not set but the slave is set ◆ The communication line is abnormal or the communication parameters are incorrect	◆ Set the host and reset the fault ◆ Check the communication line and communication parameter P8 group
SVC shutdown speed feedback abnormal fault	Err47	◆ It is possible that the motor parameters are not self-learning, and there is no protection for abnormal situations such as not connecting the motor	◆ The default setting time for P9-09 is 5 seconds, and the setting time is 0 seconds. This fault can be turned off within the range of 0 to 100.0 seconds.
STO malfunction	Err48	◆ STO-24V disconnected	◆ +24V-STO1 ，+24V-STO2 are all closed

10.2 Common faults and their solutions

The following fault conditions may be encountered during the use of the inverter, please refer to the following methods for simple fault analysis.

Table 10-2 Common faults and their solutions

Serial number	Fault phenomenon	Possible reason	Solution
1	No display when power on	◆ The grid voltage is not available or too low ◆ The switching power supply on the drive board of the inverter is faulty ◆ The rectifier bridge is damaged ◆ The buffer resistance of the inverter is damaged ◆ Control panel and keyboard failure ◆ The connection between the control board, the driver board and the keyboard is broken	◆ Check the input power ◆ Check the bus voltage ◆ Re-plug the keyboard and the 30-pin cable ◆ Seek manufacturer service

Serial number	Fault phenomenon	Possible reason	Solution
2	Display "Err20" alarm when power on	◆ The motor or output line is short-circuited to ground ◆ The inverter is damaged	◆ Use a shaker to measure the insulation of the motor and output line ◆ Seek manufacturer service
3	Err15 (module overheating) fault is reported frequently	◆ The carrier frequency setting is too high ◆ The fan is damaged or the air duct is blocked ◆ The internal components of the inverter are damaged (thermocouple or other)	◆ Reduce the carrier frequency (P0-26) ◆ Replace the fan and clean the air duct ◆ Seek manufacturer service
4	The motor does not rotate after the inverter is running	◆ Motor and motor wire ◆ Incorrect setting of inverter parameters (motor parameters) ◆ Poor connection between the drive board and the control board ◆ Drive board failure	◆ Reconfirm the connection between the inverter and the motor ◆ Replace the motor or clear the mechanical fault ◆ Check and reset the motor parameters
5	DI terminal failure	◆ Parameter setting error ◆ External signal error ◆ The position of the DI DIP switch is wrong ◆ Control board failure	◆ Check and reset the relevant parameters of the P5 group ◆ Reconnect the external signal line ◆ Re-confirm whether the position of the DI DIP switch is consistent with the wiring method ◆ Seek manufacturer service
6	The inverter frequently reports overcurrent and overvoltage faults	◆ The motor parameters are set incorrectly ◆ Inappropriate acceleration and deceleration time ◆ Load fluctuation	◆ Reset the motor parameters or perform motor tuning ◆ Set the appropriate acceleration and deceleration time ◆ Seek manufacturer service

10.3 Common faults of synchronous motors and their solutions

10.3.1 Motor starts with heavy load

If the motor does not start normally with load, you can try the following operations:

❶ Increase the upper limit of torque current (P3-21)

When the load is greater than the torque output of the inverter, the inverter will be in a locked-rotor state, and P3-21 can be appropriately increased at this time.

❷ Increase the speed PI adjustment parameter, modify the resistance value or static identification to correct the motor resistance.

The motor resistance parameter (P4-17) will significantly affect the load carrying capacity of the motor at low speed. When the resistance parameter (P4-17) exceeds the actual resistance value by too much (for example, 200% of the actual resistance value), it may cause the motor to reverse at low speed at the upper torque limit current. When the resistance parameter (P4-17) is too much lower than the actual resistance value (for example, 50% of the actual resistance value), it may cause the motor to run in a step-by-step manner, or rotate for a period of time and stop for a period of time. Increasing the speed P value P3-04 at low speed and reducing the speed loop integral time P3-05 may improve the problem caused by too small resistance parameters.

10.3.2 Adjust the speed loop PI parameters (under normal circumstances do not need to adjust)

❶ In general, if the proportional coefficient of speed PI adjustment is too large, it will cause high-frequency vibration of the speed, and the mechanical vibration or electromagnetic noise will increase significantly; if the proportional coefficient is too small and the integration time is too small or the load inertia is too large, it will cause low-frequency vibration of the speed and overshoot of the speed. Obviously, if there is no discharge measures, there may be overvoltage.

❷ If you need to adjust the speed PI parameter, first increase the integral time, increase the ratio if the speed does not oscillate, and then decrease the integral time if the effect is not satisfactory. Generally, the larger the inertia of the system, the smaller the integral time and the larger the proportional coefficient. If the speed filter coefficient is increased, the integral time should be increased, and the proportion can be increased appropriately.

Note:

The inertia of the drive system is equal to the motor inertia plus the load inertia. The inertia of the motor is proportional to the mass of the motor and the square of the diameter of the motor; the inertia of the transmission load is proportional to the mass of the load and the square of the diameter of the transmission wheel; if there is a deceleration or speed-up device, the inertia is proportional to the speed-up ratio and inversely proportional to the deceleration ratio .

For loads with large inertia, if fast speed response is required, the integration time needs to be reduced, but it is easy to cause speed overshoot, resulting in overvoltage of the inverter, and a discharge device is required to discharge. If there is no discharge device, the integration time can be increased.

10.3.3 Adjust the PI parameters of the current loop (under normal circumstances, do not need to adjust)

Under normal circumstances, increasing the proportional coefficient and the integral coefficient will speed up the current response speed, but if too large, it will cause speed shock (specifically, the motor does not rotate, or rotates in random directions, and emits high-frequency electromagnetic noise at the same time). If you need to adjust it, first Adjust the proportional coefficient, and adjust the integral coefficient if the effect is not satisfactory. The PI parameters of the current loop are related to the motor stator resistance, inductance, carrier frequency of the system, and current sampling filter time. When the carrier frequency of the system remains unchanged, the proportional coefficient is proportional to the inductance, and the integral coefficient is proportional to the resistance. Therefore, by identifying The output parameter can roughly determine the adjustment direction of this parameter.

Chapter 11

Modbus communication protocol

11.1 Modbus communication protocol

700IP65 series inverter provides RS232/RS485 communication interface and supports Modbus communication protocol. Users can realize centralized control through computer or PLC, set inverter running commands, modify or read function code parameters, and read inverter wor-king status and fault information through this communication protocol.

1.Agreement

The serial communication protocol defines the content and format of information transmitted in serial communication. It includes: host polling (or broadcast) format; host encoding meth-od, including: function code required for action, transmission data and error checking, etc. The response of the slave also adopts the same structure, including: action confirmation, return data and error checking, etc. If the slave has an error in receiving the information, or cannot complete the action required by the master, it will organize a fault message as a resp-onse and feed it back to the master.

2.Application method

The inverter is connected to the "single master and multiple slave" PC/PLC control network with RS232/RS485 bus.

3.Bus structure

(1) The interface way RS232/RS485 hardware interface

(2) Transfer method

Asynchronous serial, half-duplex transmission mode. At the same time, only one of the mast-er and slave can send data and the other can only receive data. In the process of serial asy-nchronous communication, data is sent frame by frame in the form of messages.

(3) Topology

Single master multi-slave system. The setting range of the slave address is 1 to 247, and 0 is the broadcast communication address. Slave addresses in the network must be unique.

4.Protocol description

700IP65 series inverter communication protocol is an asynchronous serial master-slave Mod-bus communication protocol. Only one device (host) in the network can establish a protocol (called "query/command"), other devices (slave) can only provide The data responds to the "query/command" of the host, or makes corresponding actions according to the "query/com-mand" of the host. The host here refers to personal computer (PC), industrial control equip-ment or programmable logic controller (PLC), etc., and the slave refers to the 700IP65 inverter. The master can not only communicate with a certain slave, but also publish broadcast infor-mation to all the lower slaves. For the "inquiry/command" of the host that is accessed indivi-dually, the slave must return a message (called a response). For the broadcast information sent by the host, the slave does not need to respond to the host.

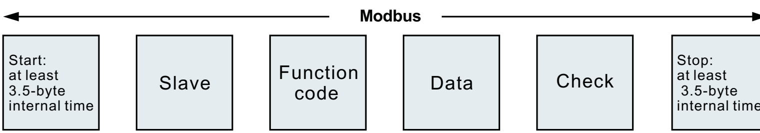
5.Communication frame structure

The Modbus protocol communication data format of 700IP65 series inverter is as follows.

Using RTU mode, message transmission starts with a pause interval of at least 3.5 character times. This is the easiest to implement with various character times at the network baud rate (as shown in T1-T2-T3-T4 in the figure below). The first field of the transfer is the device address. The transfer characters that can be used are 0...9,A...F in hexadecimal. The network device continuously detects the network bus, including the pause interval. When the first field (address field) is received, each device decodes it to determine whether it is destined for its own. After the last transmitted character, a pause of at least 3.5 character times marks the end of the message. A new message can start after this pause.

The entire message frame must be transmitted as a continuous stream. If there is a pause of more than 1.5 character times before the frame is complete, the receiving device will flush the incomplete message and assume the next byte is the address field of a new message. Likewise, if a new message follows the previous message in less than 3.5 characters, the receiving device will consider it a continuation of the previous message. This will cause an error because the value in the final CRC field cannot be correct.

RTU Data Frame Format



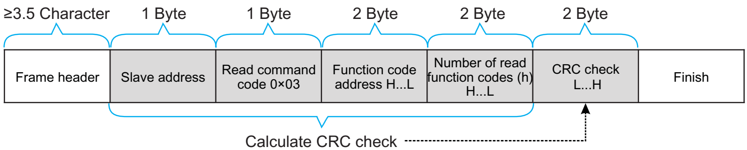
RTU frame format:

Frame header START	3.5 character time
Slave address ADR	Communication address: 1 ~ 247 (set by P8-02)
Command code CMD	03: Read slave parameters; 06: Write slave parameters
Data content DATA (N-1)	Data content: Function code parameter address, function code parameter number, function code parameter value, etc.
Data content DATA (N-2)	
...	
Data content DATA0	
CRC CHK low order	Detection value: CRC16 check value. When transmitting, the low byte comes first and the high byte follows. For the calculation method, please refer to the description of CRC check in this section.
CRC CHK high bits	
END	3.5 character time

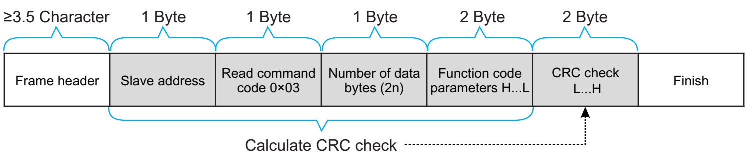
Command command (CMD) and data description (DATA)

Command code: 03H, read N words (Word), can read up to 12 words and N=1~ 12. The specific format is as follows:

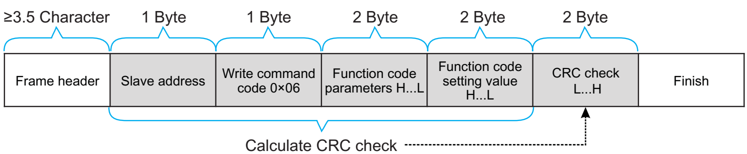
Host read command frame



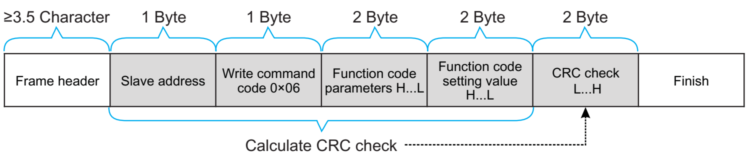
Slave read response frame



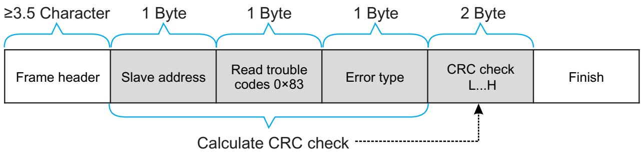
Host write command frame



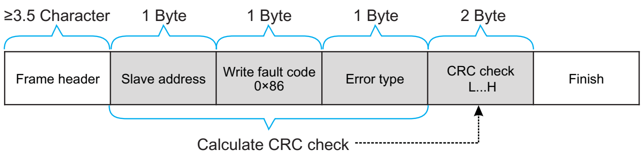
Slave write response frame



If the slave detects a communication frame error, or fails to read and write due to other reasons, it will reply with an error frame. Slave read response error frame:



Slave write response error frame



Example: read the contents of two consecutive parameters starting from P0-03 of the inverter whose slave address P8-02 is 01.

The frame sent by the host is 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 reply frame is as 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.

6.Check method (CRC check method)

CRC (Cyclical Redundancy Check) uses the RTU frame format, and the message includes an error detection field based on the CRC method. The CRC field detects the content of the entire message. The CRC field is two bytes containing a 16-bit binary value. It is calculated by the transmitting device and added to the message. The receiving device recalculates the CRC of the received message and compares it with the value in the received CRC field. If the two CRC values are not equal, it means that there is an error in the transmission.

The CRC is stored in 0xPFPF first, and then a process is called to process the consecutive 8-bit bytes in the message with the value in the current register. Only the 8Bit data in each character is valid for CRC, and the start and stop bits and parity bits are invalid.

In the process of CRC generation, each 8-bit character is XORed with the contents of the register independently, and the result is moved to the direction of the least significant bit, and the most significant bit is filled with 0. The LSB is extracted and detected. If the LSB is 1, the register is individually ORed with the preset value. If the LSB is 0, it is not performed. The whole process is repeated 8 times. After the last bit (8th bit) is completed, the next 8-bit byte is XORed with the current value of the register independently. The value in the final register is the CRC value after all bytes in the message are executed.

When the CRC is added to the message, the low byte is added first, then the high byte. The CRC simple function is as follows:

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

7. Address Definition of Communication Parameters

This part is the content of communication, which is used to control the operation of the inverter, the status of the inverter and the setting of related parameters.

Read and write function code parameters (some function codes cannot be changed, and are only used by manufacturers or monitored):

Function code parameter address marking rules:

The rules are represented by the function code group number and label as the parameter address:

High-order byte: P0~PF (group P), A0~AF (group A), B0~BF (group B), C0~CF (group C), D0~DF (group D), 70~7F (group U) low byte: 00~PF

Such as: P0-11, the address is expressed as F00B;

Notice:

PF group: parameters can neither be read nor changed;

Group U: can only be read, parameters cannot be changed.

Some parameters cannot be changed when the inverter is running; some parameters cannot be changed no matter what state the inverter is in; when changing the function code parameters, pay attention to the range, unit, and related descriptions of the parameters.

Function code group	Communication visit address	Function code address of communication change RAM
P0 ~ PE	0xF000 ~ 0xPEPF	0x0000 ~ 0x0EPF
A0 ~ AF	0xA000 ~ 0xAPFF	0x4000 ~ 0x4PFF
B0 ~ BF	0xB000 ~ 0xBPFF	0x5000 ~ 0x5PFF
C0 ~ CF	0xC000 ~ 0xCPFF	0x6000 ~ 0x6PFF
U0、U1	0x70xx、0x71xx	

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

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

If it is a group A parameter, to realize this function, just change the high-order A of the function code address to 4 to realize it.

The corresponding function code addresses are expressed as follows: high byte: 00~0F (group P), 40~4F (group A) low byte: 00~PF

For example, the function code P0-11 is not stored in the EEPROM, and the address is expressed as 000B; this address indicates that it can only be written to RAM, but cannot be read. When reading, it is an invalid address.

Stop/Run parameter section:

Address	Parameter Description
0X1000/ 0X9000	1000:*communication setting value (-10000~10000) (decimal) (unit: 0.01%), readable and writable
	9000: Communication setting frequency: 0HZ~P0-14 (minimum unit: 0.01HZ), readable and writable
0x1001	Set frequency (unit: 0.01Hz), read only
0x1002	Running frequency (unit: 0.01Hz), read only
0x1003	Bus voltage (unit: 0.1V), read only
0x1004	Output voltage (unit: 0.1V), read only
0x1005	Output current (unit: 0.1A), read only
0x1006	Output power (unit: 0.1kW), read only
0x1007	DI input flag (unit: 1), read only
0x1008	DO output flag (unit: 1), read only
0x1009	PID setting (unit: 1), read only
0x100A	PID feedback (unit: 1), read only
0x100B	Ai1 voltage (unit: 0.01V), read only
0x100C	Ai2 voltage (unit: 0.01V), read only
0x100D	Ao1 output voltage (unit: 0.01V) read only
0x100E	PLC step (unit: 1), read only
0x100F	Speed (unit: 1rpm), read only
0x1010	Count value input (unit: 1), read only
0x1011	Input pulse frequency (unit: 0.01kHz), read only
0x1012	Feedback speed (unit: 0.1Hz), read only
0x1013	Remaining running time (unit: 0.1min), read only
0x1014	AI1 voltage before calibration (unit: 0.001V), read only
0x1015	AI2 voltage before calibration (unit: 0.001V), read only
0x1016	Actual linear speed (unit: 1m/min), read only
0x1017	Load speed (unit: user-defined, refer to P7-31), read only
0x1018	Current power-on time (unit: 1min), read only
0x1019	Current running time (unit: 0.1min) read only
0x101A	Input pulse frequency (unit: 1Hz), read only

Address	Parameter Description
0x101B	Main frequency X display (unit: 0.01Hz), read only
0x101C	Auxiliary frequency Y display (unit: 0.01Hz), read only
0x101D	Target torque (unit: 0.1%), Take the motor rated torque as 100%, read only
0x101E	Output torque (unit: 0.1%), Take the motor rated torque as 100%, read only
0x101F	Output torque (unit: 0.1%), Take the inverter rated current as 100%, read only
0x1020	Torque upper limit (unit: 0.1%, Take the inverter rated current as 100%, read only
0x1021	VF separation target voltage (unit: 1V), read only
0x1022	VF separate output voltage (unit: 1V), read only
0x1023	Reserved, read only
0x1024	Motor 1\2 indication (unit: 1), read only
0x1025	Length value input (unit: 1) read only
0x1026	AO2 output voltage (unit: 0.01V), read only
0x1027	Inverter status (unit: 1), read only
0x1028	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) operating frequency address, 0x00 0x01 (0001) a data

0x21 0x0A (210A) CRC check value

Example 2: Read the bus voltage, output voltage and output current of the first devic-e at the same time: 0x01 0x03 0x10 0x03 0x00 0x03 CRC check value, the meaning of the data is similar to that of example 1.

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

For frequency dimension data, the percentage is relative to the maximum frequency (P0-14); for torque dimension data, the percentage is P3-21, P3-23, A3-21, A3-23.

Note: D0 output terminal needs to select 16 (communication control) function.

AO output needs to select 7 (communication control output) function.

Type	Command address	Command content
Control command input (write only)	0x2000	0001: Forward run 0002: Reverse run 0003: Forward jog 0004: Reverse jog 0005: Coast to stop 0006: Decelerate to stop 0007: Fault reset 0008: Fault reset (only in communication control mode can fault reset)
Status read (read only)	0x3000	0001: Forward running 0002: Reverse running 0003: Stop
Digital output terminal control (write only)	0x2001	BIT0: RELAY1 output control BIT1: DO1 output control BIT2: RELAY2 output control
Analog output AO1 control (write only)	0x2002	0 ~ 7PFF means 0% ~ 100%
Analog output AO2 control (write only)	0x2003	0 ~ 7PFF means 0% ~ 100%
Inverter fault address	0x8000	0000: No fault 0001: Reserved 0002: Reserved 0003: Reserved 0004: Acceleration overcurrent 0005: Deceleration overcurrent 0006: Constant speed overcurrent 0007: Stop overcurrent 0008: Acceleration overvoltage 0009: Deceleration overvoltage 000A: Constant speed overvoltage 000B: Stop overvoltage 000C: Undervoltage fault 000D: Inverter overload 000E: Motor overload 000F: Module overheat 0010: Reserved 0011: Current detection fault 0012: Reserved 0013: Reserved 0014: Motor short circuit fault to ground 0015: Motor tuning fault 0016: Reserved

Type	Command address	Command content
Inverter fault address	0x8000	0017: Input phase loss 0018: Output phase loss 0019: EEPROM read and write abnormality 001A: Password input exceeded times 001B: Communication abnormal 001C: External fault 001D: Excessive speed deviation 001E: User-defined fault 1 001F: User-defined fault 2 0020: Loss of PID feedback during runtime 0021: Hardware current limit fault 0022: Loss of load 0023: Overload fault of buffer resistor 0024: The contactor is abnormal 0025: The agent running time has arrived 0026: Motor over temperature (reserved) 0027: Current running time reached 0028: Cumulative running time reached 0029: Power-on time reached 002A: Switching motor failure during operation 002B: Motor overspeed 002C: Reserved 002D: Reserved 002E: reserved 002F: point-to-slave fault

The return address when communication fails: read fault 83XX, write fault 86XX.

Chapter 12

Function & Parameter Table

The function code symbols are explained as follows:

Icons	Content
☆	Indicates that the inverter parameters can be modified during stop and running (0)
★	Indicates that the inverter is in a running state and cannot be modified (1)
○	Indicates that this parameter is a manufacturer's parameter and cannot be changed by the user (3)
●	Indicates the actual detection value of the inverter or the manufacturer's fixed value, which cannot be changed (2)

The communication address in the function parameter table is written in hexade-cimal.

Enhanced function codes: Group A0~Group A3, Group B0~Group B6, opened by function parameter P7-75.

The function code address can be found in Appendix E (P332) of this manual.

Function code	Name	Description (setting range)	Factory Default	Change
Group P0: Basic function group				
P0-00	Product number	Product model: 5 digits display, 2 decimal places	60#.##	●
P0-01	Inverter GP type display	0: G type 1: P type	0	★
P0-02	Rated current	0.1A ~ 3000.0A	Model is determined	●
P0-03	Motor control method	Ones place: motor control mode selection 1: Open loop vector control (speed sensorless vector) 2: VF Control 3: Closed loop vector (with speed sensor vector) Tens place: motor type selection 0: Asynchronous motor 1: Synchronous motor	2	★
P0-04	Run command source	0: Operation panel running command channel (LED off) 1: Terminal command channel (LED on) 2: Communication command channel (LED flashes)	0	★

Function code	Name	Description (setting range)	Factory Default	Change
P0-05	Up\Down to modify the frequency command reference during runtime	0: Running frequency 1: Setting frequency	1	★
P0-06	Main frequency source X selection	0: Up/Down modification frequency, no memory after shutdown 1: Up/Down modification frequency power-off memory 2: AI1 3: AI2 4: Multi-speed 5: Simple PLC 6: PID 7: Communication given 8: PULSE pulse setting 9: Up/Down modifies the frequency, and the memory is stopped when the power is turned off.	1	★
P0-07	Auxiliary frequency source Y selection	0: Up/Down modification frequency, no memory after shutdown 1: Up/Down modification frequency power-off memory 2: AI1 3: AI2 4: Multi-speed 5: Simple PLC 6: PID 7: Communication given 8: PULSE pulse setting 9: Up/Down modifies the frequency, and the memory is stopped when the power is turned off.	0	★
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 have no negative frequency output	0	☆

Function code	Name	Description (setting range)	Factory Default	Change
P0-09	Auxiliary frequency source Y range	0% to 100%	100%	☆
P0-10	Frequency source selection	Ones place: frequency source selection 0: Main frequency source X 1: Main and auxiliary operation results (the operation relationship is determined by ten digits) 2: Switch between main frequency source X and auxiliary frequency source Y 3: Switch between the main frequency source X and the main and auxiliary operation results 4: Switch between auxiliary frequency source Y and main and auxiliary operation results Tens place: main and auxiliary operation relationship of frequency source 0: main + auxiliary 1: Primary-Secondary 2: the maximum value of the two 3: the minimum value 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: Inversion is prohibited	0	☆
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	★
P0-15	Upper limit frequency source	0: Digital given (P0-16) 1: AI1 2: AI2 3: Communication given 4: PULSE setting	0	★

Function code	Name	Description (setting range)	Factory Default	Change
P0-16	Upper limit frequency	Lower limit frequency P0-18 ~ maximum frequency P0-14	50.00Hz	☆
P0-17	Upper limit frequency offset	0.00 ~ Maximum frequency P0-14	0.00Hz	☆
P0-18	Lower frequency	0.00Hz ~ upper limit frequency P0-16	0.00Hz	☆
P0-19	Command source binding selection	Units digit: selection of frequency sourc-e bound by operation panel command 0: no binding 1: Digital setting frequency 2: AI1 3: AI2 4: Multi-speed 5: Simple PLC 6: PID 7: Communication given 8: PULSE pulse setting (DI5) Tens place: Terminal command binding frequency source selection Hundreds place: Communication command binding frequency source selection Thousands: reserved	000	☆
P0-20	Frequency Decimal Selection	1: 1 decimal point 2: 2 decimal places	2	★
P0-21	Acceleration and deceleration time unit	0: 1 second 1: 0.1 seconds 2: 0.01 seconds	1	★
P0-22	Acceleration and deceleration time reference frequency	0: Maximum frequency (P0-14) 1: Preset frequency (P0-11) 2: Motor rated frequency (P4-05 or A1-05)	0	★
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	☆
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	☆

Function code	Name	Description (setting range)	Factory Default	Change
P0-25	Overmodulation voltage boost value	0% ~ 10%	3%	★
P0-26	Carrier frequency	0.5kHz ~ 16.0kHz	Model is determined	☆
P0-27	The carrier frequency is adjusted with temperature	0: Invalid; 1: Valid;	1	☆
P0-28	Parameter initialization	0: No operation 1:Restore factory parameters,excluding motorparameters,P8.00， P8-05recordinformation andfrequency decimal point P0-20 2:Clearrecord information 3:Backup current user parameters 4:Restore user backup parameters 5:Restore all parameters	0	★
P0-29	LCD upload and download parameter selection	0: No functionality 1: Upload parameters 2: Download P4/A1 group parameters 3: Download parameters except for P4/A1 group 4: Download all parameters 5: Download P4/A1 group modification parameters 6: Download modification parameters except for P4/A1 group 7: Download all modification parameters	0	★
Group P1: Start-stop control				
P1-00	Start method	0: Direct start 1: Speed Tracking 2: Asynchronous motor pre-excitation start	0	☆
P1-01	Speed tracking method	0: Start from stop frequency 1: Start with target frequency 2: Start from maximum frequency	0	★
P1-02	Maximum speed tracking current	30% ~ 150%	100%	★
P1-03	Speed tracking speed	1 ~ 100	20	☆

Function code	Name	Description (setting range)	Factory Default	Change
P1-04	Start frequency	0.00Hz ~ 10.00Hz	0.00Hz	☆
P1-05	Start frequency hold time	0.0s ~ 100.0s	0.0s	★
P1-06	Start DC braking current	0% ~ 100%	0%	★
P1-07	Start DC braking time	0.0s ~ 100.0s	0.0s	★
P1-08	Selection of acceleration and deceleration frequency curve mode	0: Straight line 1: S curve A 2: S curve B (P1-09 ~ P1-12 unit is 0.01s)	0	★
P1-09	S-curve acceleration start time	0.0% ~ 100.0%	20.0%	★
P1-10	S-curve acceleration end time	0.0% ~ 100.0%	20.0%	★
P1-11	S-curve deceleration start time	0.0% ~ 100.0%	20.0%	★
P1-12	S-curve deceleration end time	0.0% ~ 100.0%	20.0%	★
P1-13	Stop mode	0: Decelerate to stop 1: Free stop	0	☆
P1-14	DC braking start frequency at stop	0.00Hz ~ P0-14	0.00Hz	☆
P1-15	DC braking waiting time at stop	0.0s ~ 100.0s	0.0s	☆
P1-16	Stop braking DC current	0% ~ 100%	0%	☆
P1-17	DC braking time at stop	0.0s ~ 36.0s	0.0s	☆
P1-21	Demagnetization time	0.01s ~ 3.00s	0.50s	★
P1-23	Instantaneous stop and non-stop mode selection	0: invalid 1: Automatically adjust the deceleration rate 2: Decelerate to stop	0	★
P1-24	The deceleration time of the momentary stop and non-stop deceleration stop	0.0s ~ 100.0s	10.0s	★
P1-25	Instantaneous power failure and non-stop effective voltage	60% ~ 85%	80%	★
P1-26	Instantaneous power failure and non-stop recovery of voltage	85% ~ 100%	90%	★
P1-27	Instantaneous power failure and non-stop recovery voltage judgment	0.0s ~ 300.0s	0.3s	★

Function code	Name	Description (setting range)	Factory Default	Change
P1-28	Instantaneous stop and non-stop automatic gain adjustment	0 ~ 100	40	☆
P1-29	Instantaneous stop and non-stop automatic adjustment of integral	1 ~ 100	20	☆
P1-30	Speed tracking current Kp	0 ~ 1000	300	☆
P1-31	Speed tracking current Ki	0 ~ 1000	600	☆
Group P2: V/F control parameters				
P2-00	V/F curve setting	0: Straight line VF curve 1: Multi-point VF curve 2: Square VF curve 3: 1.7th power curve 4: 1.5 power curve 5: 1.3 power curve 6: VF full separation mode 7: V/F half separation mode	0	★
P2-01	Torque boost	0.0% ~ 30.0%	0.0%	☆
P2-02	Torque boost cut-off frequency	0.00Hz ~ Maximum frequency	25.00Hz	★
P2-03	V/F frequency point P1	0.00Hz ~ P2-05	1.30Hz	★
P2-04	V/F voltage point V1	0.0% ~ 100.0%	5.2%	★
P2-05	V/F frequency point P2	P2-03 ~ P2-07	2.50Hz	★
P2-06	V/F voltage point V2	0.0% ~ 100.0%	8.8%	★
P2-07	V/F frequency point P3	0.00Hz ~ 50.00 Hz	15.00Hz	★
P2-08	V/F voltage point V3	0.0% ~ 100.0%	35.0%	★
P2-09	Slip Compensation Coefficient	0.0% ~ 200.0%	50.0%	☆
P2-10	Flux Brake Gain	0 ~ 200	100	☆
P2-11	Oscillation suppression gain	0 ~ 100	Model is determined	☆
P2-13	VF slip compensation time constant	0.02s ~ 1.00s	0.30s	☆
P2-15	Output voltage source selection when VF is separated	0: Digital setting (P2-16) 1: AI1 2: AI2	0	☆

Function code	Name	Description (setting range)	Factory Default	Change
		3: Multi-segment instruction 4: Simple PLC 5: PID 6: Communication given 7: PULSE pulse setting (Di5) 100.0% corresponds to the rated voltage of the motor		
P2-16	V/F separation output voltage digital setting	0V ~ Motor rated voltage	0V	☆
P2-17	V/F separation output voltage acceleration time	0.0 ~ 3000.0s	1.0s	☆
P2-18	V/F separation output voltage deceleration time	0.0 ~ 3000.0s	1.0s	☆
P2-19	V/F separation and stop mode selection	0: Frequency and output voltage deceleration time are independent 1: After the voltage is reduced to 0, the frequency is reduced again	0	☆
P2-20	VF overcurrent stall enable	0: Close 1: Enable	1	★
P2-21	VF overvoltage stall enable	0: Close 1: Enable	1	★
P2-22	VF overvoltage stall suppression frequency gain	0 ~ 100	30	☆
P2-23	Maximum rise limit frequency for overvoltage stall	0 ~ 50Hz	5	☆
Group P3: Vector control parameters				
P3-00	Switching frequency P1	0.00 ~ P3-02	5.00 Hz	☆
P3-02	Switching frequency P2	P3-00 ~ P0-14	10.00 Hz	☆
P3-04	Low frequency speed proportional gain	0.1 ~ 10.0	4.0	☆
P3-05	Low frequency speed integration time	0.01s ~ 10.00s	0.50s	☆
P3-06	High frequency speed proportional gain	0.1 ~ 10.0	2.0	☆
P3-07	High frequency speed integration time	0.01 ~ 10.00s	1.00s	☆

Function code	Name	Description (setting range)	Factory Default	Change
P3-08	Speed loop integral attribute selection	0: Points take effect 1: Integral separation	0	★
P3-11	Torque current regulator Kp	0 ~ 30000	2200	☆
P3-12	Torque current regulator Ki	0 ~ 30000	1500	☆
P3-13	Excitation current regulator Kp	0 ~ 30000	2200	☆
P3-14	Excitation current regulator Ki	0 ~ 30000	1500	☆
P3-15	Flux Brake Gain	0 ~ 200	0	☆
P3-16	Field weakening torque correction factor	50% ~ 200%	100%	☆
P3-17	Slip compensation gain	50% ~ 200%	100%	☆
P3-18	Speed loop feedback filter time constant	0.000 ~ 1.000s	0.015s	☆
P3-19	Speed loop output filter time constant	0.000 ~ 1.000s	0.000s	☆
P3-20	Electric torque upper limit source	0: P3-21 1: AI1 2: AI2 3: Communication given 4: PLUSE given (The analog range corresponds to P3-21)	0	☆
P3-21	Electric torque upper limit	0.0% ~ 200.0%	150.0%	☆
P3-22	Braking torque upper limit source	0: P3-23 1: AI1 2: AI2 3: Communication given 4: PLUSE given (The analog range corresponds to P3-23)	0	☆
P3-23	Braking torque upper limit	0.0 ~ 200.0%	150.0%	☆
P3-24	Low-speed magnetizing current of synchronous motor	0.0% ~ 50.0%	25.0%	★
P3-25	Magnetizing cut-off frequency of synchronous motor	0% ~ 100%	10%	★
P3-26	Pre-excitation time	0s ~ 5s	0.1s	★

Function code	Name	Description (setting range)	Factory Default	Change
P3-27	Synchronous motor initial position identification enable selection	0: Disable 1: Identification method one 2: Identification method 2	1	★
P3-28	Initial position identification voltage given percentage	30% ~ 130%	80%	★
P3-29	Syn starting minimum carrier frequency	0.8~P0-26 Set the carrier frequency	2.0	☆
P3-40	VVC high-pass filtering coefficient	0~65535	100	★
P3-41	VVC oscillation suppression gain factor	0~65535	100	★
P3-42	Damping coefficient of VVC oscillation suppression	0~500	100	★
Group P4: First motor parameter				
P4-00	Motor parameter tuning	0: No function 1: Static tuning 2: Rotary tuning	0	★
P4-01	Motor 1 rated power	0.1kw ~ 1000.0kw	Model is determined	★
P4-02	Motor 1 rated voltage	1V ~ 1500V	380V	★
P4-03	Motor 1 Number of motor poles	2 to 64	Model is determined	○
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 OK	★
P4-05	Motor 1 rated frequency	0.01Hz ~ P0-14	50.00 Hz	★
P4-06	Motor 1 rated speed	0rpm ~ 60000rpm	P4-01 OK	★
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 is determined	★
P4-08	Motor 1 stator resistance	0.001Ω ~ 65.535Ω	Model is determined	★
P4-09	Motor 1 rotor resistance	0.001Ω ~ 65.535Ω	Model is determined	★

Function code	Name	Description (setting range)	Factory Default	Change
P4-10	Motor 1 mutual inductance	0.1Mh ~ 6553.5Mh	Model is determined	★
P4-11	Motor 1 leakage inductance	0.01Mh ~ 655.35Mh	Model is determined	★
P4-12	Acceleration at Dynamic Full Tuning	1.0s ~ 6000.0s	10.0s	☆
P4-13	Deceleration at dynamic full tuning	1.0s ~ 6000.0s	10.0s	☆
P4-17	Synchronous motor stator resistance	0.001Ω ~ 65.535Ω	Model is determined	★
P4-18	Synchronous motor D-axis inductance	0.01Mh ~ 655.35Mh	Model is determined	★
P4-19	Synchronous motor Q-axis inductance	0.01Mh ~ 655.35Mh	Model is determined	★
P4-20	Synchronous motor back EMF	1V ~ 65535V	Model is determined	★
P4-21	No-load current of synchronous motor	0.0% ~ 50.0%	10.0%	★
P4-28	Number of encoder pulse lines (before frequency multiplication 4)	1-65535	1024	☆
P4-29	Encoder phase sequence selection	0: Forward 1: Reverse	0	☆
P4-30	Encoder type	0: ABZ encoder 1: UVW encoder 2: Line-saving encoder 3: Rotary encoder 4: Sincosine encoder	0	★
P4-31	Number of pole pairs of rotary encoder	1-65535	1	★
P4-32	Encoder installation position angle	0.0° - 359.9°	0.0°	★

<table>
<tr><th>Function code</th><th>Name</th><th>Description (setting range)</th><th>Factory Default</th><th>Change</th></tr>
<tr><td colspan="5">Group P5: Input terminal</td></tr>
<tr><td>P5-00</td><td>DI1 terminal function</td><td rowspan="10">0: No function
1: Forward running (FWD)
2: Reverse Run (REV)
3: Three-wire operation control
4: Forward rotation (FJOG)
5: Reverse motion (RJOG)
6: The terminal is UP
7: Indicates that the terminal is DOWN
8: Free parking
9: Fault RESET
10: The running stops
11: The external fault is normally turned on
12: Multi-segment command terminal 1
13: Multi-segment command terminal 2
14: Multi-segment command terminal 3
15: Multi-segment command terminal 4
16: Acceleration and deceleration time select terminal 1
17: Acceleration and deceleration time select terminal 2
18: Frequency source switching
19: Reset the UP/DOWN setting
20: Run commands to switch terminals
21: Acceleration and deceleration prohibited
22: PID failure (pause)
23: The PLC status is reset
24: Pendulum pause
25: Indicates that the DI input starts periodically
26: Immediate DC braking
27: The external fault is normally closed
28: The volume diameter is reset
29: Counter input
30: The counter resets
31: STO1 Input
32: Torque control disabled
33: Pulse input
34: Frequency setting active terminal
35: The direction of PID action is reversed
36: External parking terminal
37: Control command switch terminal 2
38: PID integration pause terminal
39: Frequency source X and preset frequency switching terminal
40: Frequency source Y and preset frequency switching terminal
41: Motor select terminal
42: The fire mode is triggered
43: PID parameter switching terminal
44: Speed control/torque control switch
45: Emergency stop</td><td>1</td><td>★</td></tr>
<tr><td>P5-01</td><td>DI2 terminal function</td><td>2</td><td>★</td></tr>
<tr><td>P5-02</td><td>DI3 terminal function</td><td>9</td><td>★</td></tr>
<tr><td>P5-03</td><td>DI4 terminal function</td><td>12</td><td>★</td></tr>
<tr><td>P5-04</td><td>DI5 terminal function</td><td>13</td><td>★</td></tr>
<tr><td>P5-05</td><td>DI6 terminal function</td><td>13</td><td>★</td></tr>
<tr><td>P5-06</td><td>DI7 terminal function</td><td>13</td><td>★</td></tr>
<tr><td>P5-07</td><td>Reserve</td><td>--</td><td>--</td></tr>
<tr><td>P5-08</td><td>Reserve</td><td>--</td><td>--</td></tr>
<tr><td>P5-09</td><td>Reserve</td><td>--</td><td>--</td></tr>
</table>

Function code	Name	Description (setting range)	Factory Default	Change
		46: Stop the external terminal 47: Decelerate DC braking 48: The running time is cleared 49: Two-wire/three-wire switch 50: Reverse is prohibited 51: User-defined fault 1 52: User-defined fault 2 53: Sleep input 54: Civil elevator emergency signal 55: Civil elevator maintenance signal 56: Initial volume diameter Select terminal 1 57: Initial volume diameter Select terminal 2 58: Volume diameter calculation stops 59: Loop input 60: Volume switchover 61: STO2 Input 62: Tension control material thickness 1 63: Tension control material thickness 2 (Some DI terminals are supported by the expansion card)		
P5-10	DI terminal filter time	0.000 ~ 1.000s	0.010s	☆
P5-11	Terminal command method	0: Two-wire type 1 1: Two-wire type 2 2: Three-wire type 1 3: Three-wire type 2	0	★
P5-12	Terminal UP/ DOWN change rate	0.01Hz/s ~ 100.00Hz/s	1.00Hz/s	☆
P5-13	Terminal valid logic 1	0: High level 1: Low level Ones place: DI1; Tens place: DI2; Hundreds: DI3; Thousands: DI4; Ten thousand: DI5	00000	★
P5-15	AI1 minimum input value	0.00~P5-17	0.00V	☆
P5-16	AI1 minimum input corresponding setting	-100.0% ~ 100.0%	0.0%	☆
P5-17	AI1 maximum input value	P5-15~10.00V	10.00V	☆
P5-18	AI1 maximum input corresponding setting	-100.0% ~ 100.0%	100.0%	☆

Function code	Name	Description (setting range)	Factory Default	Change
P5-19	AI1 input filter time	0.00s ~ 10.00s	0.10s	☆
P5-20	AI2 minimum input value	0.00~P5-22	0.00V	☆
P5-21	AI2minimum input corresponding setting	-100.0% ~ 100.0%	0.0%	☆
P5-22	AI2 maximum input value	P5-20~10.00V	10.00V	☆
P5-23	AI2 maximum input corresponding setting	-100.0% ~ 100.0%	100.0%	☆
P5-24	AI2 input filter time	0.00s ~ 10.00s	0.10s	☆
P5-25	AI3 minimum input value	0.00V ~ 10.00V	0.00V	☆
P5-26	AI3 minimum input corresponding setting	-100.0% ~ 100.0%	0.0%	☆
P5-27	AI3 maximum input value	0.00V ~ 10.00V	10.00V	☆
P5-28	AI3 maximum input corresponding setting	-100.0% ~ 100.0%	100.0%	☆
P5-29	AI3 input filter time	0.00s ~ 10.00s	0.10s	☆
P5-30	PULSE (pulse) input minimum frequency	0.00KHz~P5-32	0.00KHz	☆
P5-31	PULSE (pulse) input minimum frequency corresponding setting	-100.0% ~ 100.0%	0.0%	☆
P5-32	PULSE (pulse) input maximum frequency	P5-30~50.00KHz	50.00KHz	☆
P5-33	PULSE (pulse) input maximum frequency corresponding setting	-100.0% ~ 100.0%	100.0%	☆
P5-34	PULSE input filter time	0.00s ~ 10.00s	0.10s	☆
P5-35	DI1 turn-on delay time	0.0s ~ 3600.0s	0.0s	☆
P5-36	DI1 off delay time	0.0s ~ 3600.0s	0.0s	☆
P5-37	DI2 turn-on delay time	0.0s ~ 3600.0s	0.0s	☆
P5-38	DI2 off delay time	0.0s ~ 3600.0s	0.0s	☆
P5-39	DI3 turn-on delay time	0.0s ~ 3600.0s	0.0s	☆
P5-40	DI3 off delay time	0.0s ~ 3600.0s	0.0s	☆
P5-41	AI1 is selected as DI terminal function	0 ~ 53, the function is the same as the common DI terminal	0	★

<table>
<tr><th>Function code</th><th>Name</th><th>Description (setting range)</th><th>Factory Default</th><th>Change</th></tr>
<tr><td>P5-42</td><td>AI2 is selected as DI terminal function</td><td>0 ~ 53, the function is the same as the common DI terminal</td><td>0</td><td>★</td></tr>
<tr><td>P5-44</td><td>Valid mode selection when AI is used as DI terminal</td><td>Ones place, AI1:
0: Active high;   1: Active low
Ten, AI2:
0: Active high;   1: Active low
Hundreds: reserved</td><td>0x00</td><td>☆</td></tr>
<tr><td>P5-45</td><td>AI curve selection</td><td>AI multi-point curve selection:
Ones place: AI1
0: 2-point straight 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-point straight 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</td><td>0x00</td><td>☆</td></tr>
<tr><td colspan="5">Group P6: Output terminal</td></tr>
<tr><td>P6-00</td><td>Control board relay RELAY1 output (TA/TB/TC) selection</td><td rowspan="4">0: No output
1: Inverter running signal (RUN)
2: fault output
3: Frequency level detection PDT1 arrival
4: Frequency Arrival (PAR)
5: Running at zero speed
6: Motor overload pre-alarm
7: Inverter overload pre-alarm
8: PLC cycle completed
9: Cumulative running time arrives
10: Frequency limited
11: Ready to run
12: AI1>AI2
13: The upper limit frequency is reached
14: The lower limit frequency is reached
15: Undervoltage status output
16: Communication settings
17: Timer output
18: Reverse running
19: Reserved
20: Set length reached
21: Torque limited</td><td>1</td><td>☆</td></tr>
<tr><td>P6-01</td><td>Control board relay RELAY2 output (RA/RB/RC) selection</td><td>1</td><td>☆</td></tr>
<tr><td>P6-02</td><td>Y1 output selection</td><td>1</td><td>☆</td></tr>
<tr><td>P6-03</td><td>Y2 output selection (optional accessory IO1 support function)</td><td>1</td><td>☆</td></tr>
</table>

Function code	Name	Description (setting range)	Factory Default	Change
		22: Current 1 arrives 23: Frequency 1 arrives 24: Module temperature reached 25: Dropping 26: Cumulative power-on time arrives 27: Timed arrival output 28: The running time has arrived 29: Set count value reached 30: The specified count value arrives 31: Motor 1, Motor 2 indication 32: Brake control output 33: Running at zero speed 2 34: Frequency level detection PDT2 arrival 35: Zero current state 36: Software current overrun 37: The lower limit frequency is reached, and the output is also output when stopped 38: Alarm output 39: Reserved 40: AI1 input overrun 41: Reserved 42: reserved 43: Frequency reached 2 44: Current reaches 2 45: Fault output		
P6-04	FM terminal output mode selection	0: Pulse output (FMP) 1: Open collector switch output (FMR)	0	☆
P6-05	FMR output selection	Same as Y1 output selection	0	☆
P6-09	AO1 output selection	0: Running frequency 1: Set frequency 2: Output current (100% corresponds to twice the rated current of the motor) 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 inverter)	0	☆
P6-10	AO2 output selection		0	☆
P6-11	FMP output selection		0	☆

Function code	Name	Description (setting range)	Factory Default	Change
		5: Analog AI1 input value 6: Analog AI2 input value 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 inverter) 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 to 2 times rated)	0	☆
P6-12	FMP output maximum frequency	0.01KHz ~ 100.00KHz	50.00	☆
P6-13	AO1 output lower limit	-100.0% ~ P6-15	0.0%	☆
P6-14	The lower limit corresponds to AO1 output	0.00V ~ 10.00V	0.00V	☆
P6-15	AO1 output upper limit	P6-13 ~ 100.0%	100.0%	☆
P6-16	The upper limit corresponds to AO1 output	0.00 ~ 10.00V	10.00V	☆
P6-17	AO2 output lower limit	-100.0% ~ P6-19	0.0%	☆
P6-18	The lower limit corre-sponds to the AO2 output	0.00V ~ 10.00V	0.00V	☆
P6-19	Ao2 output upper limit	P6-17 ~ 100.0%	100.0%	☆
P6-20	The upper limit corresponds to AO2 output	0.00 ~ 10.00V	10.00V	☆
P6-21	Main relay T pick-up delay	0.0s ~ 3600.0s	0.0s	☆
P6-22	Main relay R pick-up delay	0.0s ~ 3600.0s	0.0s	☆
P6-23	Y1 high level output delay	0.0s ~ 3600.0s	0.0s	☆
P6-26	Main relay T off delay	0.0s ~ 3600.0s	0.0s	☆

Function code	Name	Description (setting range)	Factory Default	Change
P6-27	Main relay R off delay	0.0s ~ 3600.0s	0.0s	☆
P6-28	Y1 low level output delay	0.0s ~ 3600.0s	0.0s	☆
P6-29	Y2 low-level output delay	0.0s ~ 3600.0s	0.0s	☆
Group P7: Accessibility and keyboard display				
P7-00	Jog running frequency	0.00Hz ~ Maximum frequency	6.00Hz	☆
P7-01	Jog acceleration time	0.0s ~ 3000.0s	10.0s	☆
P7-02	Jog deceleration time	0.0s ~ 3000.0s	10.0s	☆
P7-03	Acceleration time 2	0.0s ~ 3000.0s	10.0s	☆
P7-04	Deceleration time 2	0.0s ~ 3000.0s	10.0s	☆
P7-05	Acceleration time 3	0.0s ~ 3000.0s	10.0s	☆
P7-06	Deceleration time 3	0.0s ~ 3000.0s	10.0s	☆
P7-07	Acceleration time 4	0.0s ~ 3000.0s	10.0s	☆
P7-08	Deceleration time 4	0.0s ~ 3000.0s	10.0s	☆
P7-09	Hop Frequency 1	0.00Hz ~ Maximum frequency	0.00Hz	☆
P7-10	Hop Frequency 1 Amplitude	0.00Hz ~ Maximum frequency	0.00Hz	☆
P7-11	Hop Frequency 2	0.00Hz ~ Maximum frequency	0.00Hz	☆
P7-12	Hop Frequency 2 Amplitude	0.00Hz ~ Maximum frequency	0.00Hz	☆
P7-15	Forward and reverse dead time	0.0s ~ 3000.0s	0.0s	☆
P7-16	Keyboard Knob Accuracy	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	2	☆

Function code	Name	Description (setting range)	Factory Default	Change
P7-17	The frequency is lower than the lower limit frequency processing	0: run at the lower frequency limit 1: shutdown 2: Running at zero speed	0	☆
P7-18	Sag rate	0.0% ~ 100.0%	0.0%	☆
P7-19	Delay time for frequency lower than lower limit shutdown	0.0s ~ 600.0s	0.0s	☆
P7-20	Set cumulative operating time	0h ~ 65000h	0h	☆
P7-21	Jog priority	0: Invalid 1: Jog priority mode 1 2: Jog priority mode 2 1) When the user fails or the PID is lost, the jog is still valid 2) Stop mode and DC braking can be set	1	☆
P7-22	Frequency detection value (PDT1 level)	0.00Hz ~ Maximum frequency	50.00Hz	☆
P7-23	Frequency check hysteresis value (PDT1 hysteresis)	0.0% ~ 100.0%	5.0%	☆
P7-24	Frequency arrival detection width	0.0% ~ 100.0%	0.0%	☆
P7-25	Reserve	--	0	●
P7-26	Fan control	0: The fan keeps running 1: The fan runs when the inverter is running (When the temperature is higher than 40°, the fan will also run under shutdown)	1	★
P7-27	STOP/RESET function	0: Only valid in keyboard control 1: The stop or reset function is valid in all control modes	0	☆
P7-28	Quick /JOG key function selection	0: Forward jog 1: Forward and reverse switching 2: Reverse jog	0	★

Function code	Name	Description (setting range)	Factory Default	Change
		3: Switch between panel and remote control 4: Panel frequency source switching (press the Quick key to change)		
P7-29	LED running display	0000 ~ 0xPFPF (hexadecimal number) 0000 to 0xPFPF Bit00: Running 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 setting value 0400 Bit11: PID feedback value 0800 Bit12: Count value 1000 Bit13: Length value 2000 Bit14: Load speed display 4000 Bit15: PLC stage 8000	H.441F	☆
P7-30	LED stop display	1 ~ 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 setting value 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 Bit13 ~ Bit15: Reserved	H.0043	☆
P7-31	Load speed display factor	0.001 ~ 655.00	1.000	☆

Function code	Name	Description (setting range)	Factory Default	Change
P7-32	Radiator temperature	12℃ ~ 100℃	Measured value	●
P7-33	Cumulative power-on time	0h ~ 65535h	Measured value	●
P7-34	Cumulative running time	0h ~ 65535h	Measured value	●
P7-36	Current running timing enable selection	0:Disable 1: Enable, When the time is up, a fault is reported 2: Enable, When the time is up, a fault is not reported	0	★
P7-37	Selection of timing source for the current run	0: Digital setting P7-38 1: AI1 2: AI2 (AI takes P7-38 as 100%)	0	★
P7-38	Current running time set value	0.0min ~ 6500.0min	0.0min	☆
P7-39	High level timing	0.0s ~ 6000.0s	2.0s	☆
P7-40	low level timing	0.0s ~ 6000.0s	2.0s	☆
P7-41	Activate the protection function	0: Invalid (start terminal command is valid and start directly) 1: Valid	1	☆
P7-43	Frequency reaches detection value 1	0.00Hz ~ P0-14	50.00Hz	☆
P7-44	Frequency detection value 1 arrival width	0.0% ~ 100.0%	0.0%	☆
P7-45	Current reaches detection value 1	0.0% ~ 300.0%	100.0%	☆
P7-46	Current detection value 1 arrival width	0.0% ~ 300.0%	0.0%	☆
P7-49	user password	0 ~ 65535	0	☆
P7-50	Whether the jump frequency is valid during acceleration and deceleration	0: invalid 1: Valid	0	☆
P7-51	Set the power-on arrival time	0h ~ 65530h	0h	☆

Function code	Name	Description (setting range)	Factory Default	Change
P7-53	Acceleration time 1/2 switching frequency point	0.00Hz ~ Maximum frequency (P0-14)	0.00Hz	☆
P7-54	Deceleration time 1/2 switching frequency point	0.00Hz ~ Maximum frequency (P0-14)	0.00Hz	☆
P7-55	Frequency detection value (PDT2 level)	0.00Hz ~ Maximum frequency (P0-14)	50.00Hz	☆
P7-56	Frequency detection PDT2 hysteresis value	0.0% ~ 100.0%	5.0%	☆
P7-57	Frequency reaches detection value 2	0.00Hz ~ Maximum frequency (P0-14)	50.00Hz	☆
P7-58	Frequency arrival detection 2 amplitude	0.0% ~ 100.0%	0.0%	☆
P7-59	Zero current detection value	0.0% ~ 300.0%	10.0%	☆
P7-60	Zero current detection delay time	0.01s ~ 300.00s	1.00s	☆
P7-61	Output current amplitude detection	20.0% ~ 400.0%	200.0%	☆
P7-62	Software overcurrent maximum allowable time	0s~6500.0s	0s	☆
P7-63	Current reaches detection value 2	20.0% ~ 300.0%	100.0%	☆
P7-64	Current arrival detection 2 amplitude	0.0% ~ 300.0%	0.0%	☆
P7-65	LED running display parameter 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 speed (m/min) 0008 Bit04: Motor speed (rmp) 0010 Bit05: AC incoming line current (A) 0020 Bit06: Cumulative running time (h) 0040 Bit07: Current running time (min) 0080		

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Function code	Name	Description (setting range)	Factory Default	Change
		Bit08: Cumulative power consumption (kWh) 0100 Bit09 ~ Bit15: Reserved		
P7-67	AI1 input voltage lower limit	0.00V ~ P7-68	2.00V	☆
P7-68	AI1 input voltage upper limit	P7-67 ~ 11.00V	8.00V	☆
P7-69	Module temperature reached	0℃ ~ 90℃	70℃	☆
P7-70	Output power display correction factor	0.001 ~ 3.000	1.000	☆
P7-71	Linear velocity display correction factor	Linear speed=P7-71*Number of HDI pulses sampled per second/PB-07	1.000	☆
P7-72	Cumulative power consumption (kWh)	0 ~ 65535	Measured value	●
P7-73	Performance software version	Performance software version number	#.#	●
P7-74	Functional software version	Function software version number	#.#	●
P7-75	Enhanced function parameter display selection	0: Hide enhanced function parameter group: A0 ~ A3, B0 ~ B5 1: Display enhanced function parameter group: A0 ~ A3, B0 ~ B5	0	☆
P7-76	Motor speed display correction factor	0.0010 ~ 3.0000	1.0000	☆
P7-80	The fire mode was enabled	0: Off 1: Enables the function	0	☆
P7-81	Set frequency in fire mode	0Hz ~ P0-14	50.00Hz	☆
Group P8: Communication parameters				
P8-00	Baud rate setting	0: 300BPS 1: 600BPS 2: 1200BPS 3: 2400BPS 4: 4800BPS	2	☆

Function code	Name	Description (setting range)	Factory Default	Change
		5: 9600BPS 6: 19200BPS 7: 38400BPS		
P8-01	Data Format	0: No parity <8,N,2> 1: Even parity <8,E,1> 2: odd parity <8,O,1> 3: No parity 1<8,N,1>	0	☆
P8-02	Comunication address	0 ~ 247 (0 is the broadcast address)	1	☆
P8-03	Response time	0ms ~ 30ms	2ms	☆
P8-04	Communication timeout	0ms ~ 30ms	0.0s	☆
P8-05	Communication format selection	0: Standard ModbusRTU protocol 1: Non-standard ModBusRTU protocol	0	☆
P8-06	Background software monitoring function	0: Disable, default 485 communication function 1: On, the background software monitoring function, the 485 communication function cannot be used at this time	0	☆
P8-11	Communication protocol selection	0: Modbus protocol 1: Communication expansion card	0	☆
Group P9: Fault and Protection				
P9-00	Motor overload protection selection	0: Disable 1: Allow	1	☆
P9-01	Motor overload protection gain	0.10~10.00	1.00	☆
P9-02	Motor overload warning coefficient (%)	50% ~ 100%	80%	☆
P9-03	Overvoltage Stall Protection Gain	000 ~ 100	030	☆
P9-04	Overvoltage stall protection voltage	200.0 ~ 1200.0V	760.0V	★
P9-05	VF Overcurrent Stall Protection Gain	0 ~ 100	20	☆

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Function code	Name	Description (setting range)	Factory Default	Change
P9-06	VF Overcurrent Stall Protection Current	50% ~ 200%	150%	★
P9-07	VF field weakening area current stall protection factor	50% ~ 200%	100%	★
P9-08	Overvoltage stall allowable rise limit value	0.0% ~ 50.0%	10.0%	☆
P9-11	Fault automatic reset times	0 ~ 20	0	☆
P9-12	Fault relay action selection during automatic fault reset	0: no action 1: Action	0	☆
P9-13	Fault automatic reset interval time	0.1s ~ 100.0s	1.0s	☆
P9-14	Input phase loss enable selection	0: invalid 1: Valid	1	☆
P9-15	Output phase loss enable selection	0: invalid 1: Valid	1	☆
P9-16	Power-on to ground short-circuit protection selection	0: invalid 1: Valid	1	☆
P9-17	Undervoltage fault automatic reset selection	0: Manual reset is required after undervoltage fault 1: After the undervoltage fault, the fault will be reset by itself according to the bus voltage	0	☆
P9-18	Overvoltage suppression mode selection	0: invalid 1: Overvoltage suppression mode 1 2: Overvoltage suppression mode 2	1	★
P9-19	Overexcitation active state selection	0: invalid 1: Only the deceleration process is valid 2: The constant speed and deceleration process is valid during running	2	★

Function code	Name	Description (setting range)	Factory Default	Change
P9-20	Overvoltage suppression mode 2 limit value	1.0% ~ 150.0%	10.00%	★
P9-22	Fault protection action 1	0 ~ 22202; Units place: Motor overload - Err14 0: Free parking 1: stop according to the stop mode 2: keep running Ten: reserved Hundreds place: input phase loss-Err23 Thousands place: output phase loss-Err24 Ten thousand: parameter read and write exception - Err25	00000	☆
P9-23	Fault protection action 2	0 ~ 22222; Ones place: Communication failure - Err27 0: Free parking 1: stop according to the stop mode 2: keep running Tens place: External fault - Err28 Hundreds place: excessive speed deviation fault - Err29 Thousands: User-defined fault 1-Err30 Ten thousand: user-defined fault 2-Err31	00000	☆
P9-24	Fault protection action 3	0 ~ 22222; Ones place: PID feedback lost during runtime - Err32 0: Free parking 1: stop according to the stop mode 2: keep running Tens place: load loss fault - Err34 Hundreds place: software overcurrent - Err16 Thousands place: The current continuous running time reaches -Err39 Ten thousand: the running time reaches - Err40	00000	☆

Function code	Name	Description (setting range)	Factory Default	Change
P9-26	Continue to run frequency selection in case of failure	0: run at the current operating frequency 1: run at the set frequency 2: run at the upper limit frequency 3: Run at the lower frequency limit 4: Run at the standby frequency setting value P9-27	1	☆
P9-27	Abnormal standby frequency set value	0.0% ~ 100.0%	100%	☆
P9-28	Drop load protection option	0: invalid 1: Valid	0	☆
P9-29	Drop load detection level	0.0% ~ 80.0%	20.0%	★
P9-30	Load drop detection time	0.0s ~ 100.0s	5.0s	☆
P9-31	Excessive speed deviation detection value	0.0% ~ 100.0%	20.0%	☆
P9-32	Excessive speed deviation detection time	0.0s ~ 100.0s	0.0s	☆
P9-33	Overspeed detection value	0.0% ~ 100.0%	20.0%	☆
P9-34	Overspeed detection time	0.0s ~ 100.0s	2.0s	☆
P9-35	Motor overload protection current coefficient	100% ~ 200%	100%	☆
P9-36	Motor overheating pre-alarm threshold	0~200℃	80℃	☆
P9-37	Motor overheating protection value	0~200℃	100℃	☆
P9-38	Temperature sensor type selection	0: No temperature sensor 1: PT100 2: PT1000	0	☆
Group PA: PID function				
PA-00	PID setting source	0: Keypad (F10.01) 1: Analog AI1 2: Analog AI2 3: Analog AI3	0	☆

Function code	Name	Description (setting range)	Factory Default	Change
		4: Pulse setting (HDI) 5: Rs485 communication setting 6: Multi-speed command		
PA-01	PID digital setting	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	0	☆
PA-04	PID action direction	0: Forward action	0	☆
PA-05	PID setting feedback range	0 ~ 65535	1000	☆
PA-06	Proportional gain P	0.0 ~ 100.0	20.0	☆
PA-07	Integral time I	0.01s ~ 10.00s	2.00s	☆
PA-08	Differential time D	0.000s ~ 10.000s	0.000s	☆
PA-09	PID reverse cutoff frequency	0.00 ~ Maximum frequency (P0-14)	0.00Hz	☆
PA-10	Deviation limit	0.0% ~ 100.0%	0.0%	☆
PA-11	Differential clipping	0.00% ~ 100.00%	0.0%	☆
PA-12	PID feedback filter time	0.00 ~ 60.00s	0.00s	☆
PA-13	PID feedback loss detection value	0.0% ~ 100.0%	0.0%	☆
PA-14	PID feedback loss detection time	0.0s ~ 3600.0s	0s	☆
PA-18	Proportional gain P2	0.0 ~ 100.0	20.0	☆
PA-19	Integration time I2	0.01s ~ 10.00s	2.00s	☆
PA-20	Differential time D2	0.000s ~ 10.000s	0.000s	☆
PA-21	PID parameter switching conditions	0: Do not switch 1: DI terminal 2: Automatically switch according to the deviation	0	☆

Function code	Name	Description (setting range)	Factory Default	Change
PA-22	PID parameter switching deviation 1	0.0% ~ PA-23	20.0%	☆
PA-23	PID parameter switching deviation 2	PA-22 ~ 100.0%	80.0%	☆
PA-24	PID initial value	0.0% ~ 100.0%	0.0%	☆
PA-25	PID initial value hold time	0.00s ~ 650.00s	0.00s	☆
PA-26	Twice output deviation positive maximum value	0.00% ~ 100.00%	1.00%	☆
PA-27	Twice output deviation reverse maximum value	0.00% ~ 100.00%	1.00%	☆
PA-28	PID integral properties	Units: Integral separation 0: invalid; 1: Valid Tens place: output to the limit value, whether to stop integration 0: Continue points; 1: Stop integration	00	☆
PA-29	PID shutdown operation	0: stop and do not operate 1: Compute at stop	0	☆
Group Pb: Swing Frequency, Fixed Length and Count				
Pb-00	Swing setting method	0: Relative to the central frequency 1: Relative to the maximum frequency	0	☆
Pb-01	Swing frequency amplitude	0.0% ~ 100.0%	0.0%	☆
Pb-02	Jump frequency amplitude	0.0% ~ 50.0%	0.0%	☆
Pb-03	Swing frequency cycle	0.1s ~ 3000.0s	10.0s	☆
Pb-04	Triangular wave rising time coefficient	0.1% ~ 100.0%	50.0%	☆
Pb-05	Set length	0m ~ 65535m	1000m	☆
Pb-06	Actual length	0m ~ 65535m	0m	☆
Pb-07	Number of pulses per meter	0.1 ~ 6553.5	100.0	☆
Pb-08	Set count value	1 ~ 65535	1000	☆

Function code	Name	Description (setting range)	Factory Default	Change
Pb-09	Designated count value	1 ~ 65535	1000	☆
Group PC: Multi-segment instruction and simple PLC function				
PC-00	Multi-speed 0	-100.0% ~ 100.0%	0.0%	☆
PC-01	Multi-speed 1	-100.0% ~ 100.0%	0.0%	☆
PC-02	Multi-speed 2	-100.0% ~ 100.0%	0.0%	☆
PC-03	Multi-speed 3	-100.0% ~ 100.0%	0.0%	☆
PC-04	Multi-speed 4	-100.0% ~ 100.0%	0.0%	☆
PC-05	Multi-speed 5	-100.0% ~ 100.0%	0.0%	☆
PC-06	Multi-speed 6	-100.0% ~ 100.0%	0.0%	☆
PC-07	Multi-speed 7	-100.0% ~ 100.0%	0.0%	☆
PC-08	Multi-speed 8	-100.0% ~ 100.0%	0.0%	☆
PC-09	Multi-speed 9	-100.0% ~ 100.0%	0.0%	☆
PC-10	Multi-speed 10	-100.0% ~ 100.0%	0.0%	☆
PC-11	Multi-speed 11	-100.0% ~ 100.0%	0.0%	☆
PC-12	Multi-speed 12	-100.0% ~ 100.0%	0.0%	☆
PC-13	Multi-speed 13	-100.0% ~ 100.0%	0.0%	☆
PC-14	Multi-speed 14	-100.0% ~ 100.0%	0.0%	☆
PC-15	Multi-speed 15	-100.0% ~ 100.0%	0.0%	☆
PC-16	PLC operation mode	0: Stop at the end of a single operation 1: Hold the final value for a single run 2: keep looping	0	☆
PC-17	PLC power-down memory selection	0: No memory when power off and no memory when stopped 1: Memory when power off and no memory when stopped 2: No memory when power off and memory when shut down 3: Power-down memory and shutdown memory	0	☆

Function code	Name	Description (setting range)	Factory Default	Change
PC-18	Running time of simple PLC multi-speed 0	0.0s(h) ~ 6500.0s(h)	0.0s(h)	☆
PC-19	Acceleration/deceleration time of simple PLC multi-speed 0	0 ~ 3	0	☆
PC-20	Running time of simple PLC multi-speed 1	0.0s(h) ~ 6500.0s(h)	0.0s(h)	☆
PC-21	Acceleration/deceleration time of simple PLC multi-speed 1	0 ~ 3	0	☆
PC-22	Running time of simple PLC multi-speed 2	0.0s(h) ~ 6500.0s(h)	0.0s(h)	☆
PC-23	Acceleration/deceleration time of simple PLC multi-speed 2	0 ~ 3	0	☆
PC-24	Running time of simple PLC multi-speed 3	0.0s(h) ~ 6500.0s(h)	0.0s(h)	☆
PC-25	Acceleration/deceleration time of simple PLC multi-speed 3	0 ~ 3	0	☆
PC-26	Running time of simple PLC multi-speed 4	0.0s(h) ~ 6500.0s(h)	0.0s(h)	☆
PC-27	Acceleration/deceleration time of simple PLC multi-speed 4	0 ~ 3	0	☆
PC-28	Running time of simple PLC multi-speed 5	0.0s(h) ~ 6500.0s(h)	0.0s(h)	☆
PC-29	Acceleration/deceleration time of simple PLC multi-speed 5	0 ~ 3	0	☆
PC-30	Running time of simple PLC multi-speed 6	0.0s(h) ~ 6500.0s(h)	0.0s(h)	☆
PC-31	Acceleration/deceleration time of simple PLC multi-speed 6	0 ~ 3	0	☆

Function code	Name	Description (setting range)	Factory Default	Change
PC-32	Running time of simple PLC multi-speed 7	0.0s(h) ~ 6500.0s(h)	0.0s(h)	☆
PC-33	Acceleration/deceleration time of simple PLC multi-speed 7	0 ~ 3	0	☆
PC-34	Running time of simple PLC multi-speed 8	0.0s(h) ~ 6500.0s(h)	0.0s(h)	☆
PC-35	Acceleration/deceleration time of simple PLC multi-speed 8	0 ~ 3	0	☆
PC-36	Running time of simple PLC multi-speed 9	0.0s(h) ~ 6500.0s(h)	0.0s(h)	☆
PC-37	Acceleration/deceleration time of simple PLC multi-speed 9	0 ~ 3	0	☆
PC-38	Running time of simple PLC multi-speed 10	0.0s(h) ~ 6500.0s(h)	0.0s(h)	☆
PC-39	Acceleration/deceleration time of simple PLC multi-speed 10	0 ~ 3	0	☆
PC-40	Running time of simple PLC multi-speed 11	0.0s(h) ~ 6500.0s(h)	0.0s(h)	☆
PC-41	Acceleration/deceleration time of simple PLC multi-speed 11	0 ~ 3	0	☆
PC-42	Running time of simple PLC multi-speed 12	0.0s(h) ~ 6500.0s(h)	0.0s(h)	☆
PC-43	Acceleration/deceleration time of simple PLC multi-speed 12	0 ~ 3	0	☆
PC-44	Acceleration/deceleration time of simple PLC multi-speed 13	0.0 ~ 6500.0	0	☆
PC-45	Running time of simple PLC multi-speed 14	0~3 (respectively representing acceleration and deceleration time 1~4)	0.0s(h)	☆

Function code	Name	Description (setting range)	Factory Default	Change
PC-46	Acceleration/deceleration time of simple PLC multi-speed 14	0.0 ~ 6500.0	0	☆
PC-47	Running time of simple PLC multi-speed 15	0~3 (respectively representing acceleration and deceleration time 1~4)	0.0s(h)	☆
PC-48	Acceleration/deceleration time of simple PLC multi-speed 15	0.0 ~ 6500.0	0	☆
PC-49	Running time of simple PLC multi-speed 15	0~3 (respectively representing acceleration and deceleration time 1~4)	0.0s(h)	☆
PC-50	Time unit of multi-speed	0: s (second) 1:h (hour)	0	☆
PC-51	Multi-speed priority mode selection	0: Multi-speed does not have priority 1: Multi-speed priority	1	☆
PC-52	Multi-speed priority acceleration and deceleration time selection	0: Acceleration and deceleration time 1 1: Acceleration and deceleration time 2 2: Acceleration and deceleration time 3 3: Acceleration and deceleration time 4	0	☆
PC-53	Multi-speed PC-00 ~ PC-15 unit selection	0: % 1: Hz	0	☆
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 given (P0-11), UP/DOWN can be modified	0	☆

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Function code	Name	Description (setting range)	Factory Default	Change
Group PD: 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) (1-6 option full scale corresponds to PD-01)	0	★
PD-01	Torque digital given	-200.0% ~ 200.0%	150.0%	☆
PD-03	Torque control positive direction maximum frequency	0.00Hz ~ Maximum frequency (P0-14)	50.00Hz	☆
PD-04	Torque control reverse direction maximum frequency	0.00Hz ~ Maximum frequency (P0-14)	50.00Hz	☆
PD-06	Torque command filter time	0.00s ~ 10.00s	0.00s	☆
PD-07	Torque mode frequency acceleration time	0.0s ~ 1000.0s	10.0s	☆
PD-08	Torque mode frequency deceleration time	0.0s ~ 1000.0s	10.0s	☆
PD-10	Speed/torque mode selection	0: Speed mode 1: Torque mode	0	★
Group PE: AI multi-point curve setting				
PE-00	Curve 1 minimum input	-10.00V ~ PE-02	0.00V	☆
PE-01	Curve 1 minimum input corresponding setting	-100.0% ~ 100.0%	0.0%	☆
PE-02	Curve 1 Knee 1 Input	PE-00 ~ PE-04	3.00V	☆
PE-03	Curve 1 inflection point 1 input corresponding setting	-100.0% ~ 100.0%	30.0%	☆
PE-04	Curve 1 Knee 2 Input	PE-02 ~ PE-06	6.00V	☆
PE-05	Curve 1 inflection point 2 input corresponding setting	-100.0% ~ 100.0%	60.0%	☆
PE-06	Curve 1 maximum input	PE-04 ~ 10.00	10.00V	☆

Function code	Name	Description (setting range)	Factory Default	Change
PE-07	Curve 1 maximum input corresponding setting	-100.0% ~ 100.0%	100.0%	☆
PE-08	Curve 2 minimum input	-10.00 ~ PE-10	0.00V	☆
PE-09	Curve 2 minimum input corresponding setting	-100.0% ~ 100.0%	0.0%	☆
PE-10	Curve 2 Knee 1 Input	PE-08 ~ PE-12	3.00V	☆
PE-11	Curve 2 inflection point 1 input corresponding setting	-100.0% ~ 100.0%	30.0%	☆
PE-12	Curve 2 Knee 2 Input	PE-10 ~ PE-14	6.00V	☆
PE-13	Curve 2 inflection point 2 input corresponding setting	-100.0% ~ 100.0%	60.0%	☆
PE-14	Curve 2 maximum input	PE-12 ~ 10.00V	10.00V	☆
PE-15	Curve 2 maximum input corresponding setting	-100.0% ~ 100.0%	100.0%	☆
PE-24	AI1 set jump point	-100.0% ~ 100.0%	0.0%	☆
PE-25	AI1 sets the jump range	0.0% ~ 100.0%	0.5%	☆
PE-26	AI2 set jump point	-100.0% ~ 100.0%	0.0%	☆
PE-27	AI2 set jump range	0.0% ~ 100.0%	0.5%	☆
Group PF: Manufacturer parameters				
PF.00	Factory password	0 ~ 65535	*****	☆
Group A0: Second motor parameter setting				
A0-00	Motor selection	1: Motor No. 1 2: Motor No. 2	1	★
A0-01	The second motor control mode	1: Open loop vector control (speed sensorless vector) 2: VF Control	2	★
A0-02	Second motor acceleration and deceleration time selection	0: Consistent with the first motor 1: Acceleration and deceleration time 1 2: Acceleration and deceleration time 2 3: Acceleration and deceleration time 3	0	☆

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Function code	Name	Description (setting range)	Factory Default	Change
		4: Acceleration and deceleration time 4		
Group A1: Second Motor Parameters				
A1-00	Motor parameter tuning	0: no function 1: Static tuning 2: Dynamic full tuning	0	★
A1-01	Motor 2 rated power	0.1Kw ~ 1000.0Kw	Model is determined	★
A1-02	Motor 2 rated voltage	1V ~ 1500V	380V	★
A1-03	Motor 2 Number of motor poles	2 to 64	Model is determined	●
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 OK	★
A1-05	Motor 2 rated frequency	0.01Hz ~ Maximum frequency (P0-14)	50.00Hz	★
A1-06	Motor 2 rated speed	1rpm ~ 65535rpm	A1-01 OK	★
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 OK	★
A1-08	Motor 2 stator resistance	0.001ohm ~ 65.535ohm	Model is determined	★
A1-09	Motor 2 rotor resistance	0.001ohm ~ 65.535ohm	Model is determined	★
A1-10	Motor 2 mutual inductance	0.1mH ~ 6553.5mH	Model is determined	★
A1-11	Motor 2 leakage inductance	0.01mH ~ 655.35mH	Model is determined	★
A1-12	Acceleration at Dynamic Full Tuning	1.0s ~ 6000.0s	10.0s	☆
A1-13	Deceleration at dynamic full tuning	1.0s ~ 6000.0s	10.0s	☆
Group A2: Second motor VF parameter setting				
A2-00	Torque boost	0.0% ~ 30.0%	0.0%	☆

Function code	Name	Description (setting range)	Factory Default	Change
A2-01	Oscillation suppression gain	0 ~ 100	Model is determined	☆
Group A3: Second motor vector control parameters				
A3-00	Switching frequency P1	0.00Hz ~ A3-02	5.00Hz	☆
A3-02	Switching frequency P2	A3-00 ~ P0-14	10.00Hz	☆
A3-04	Low frequency speed proportional gain	0.1 ~ 10.0	4.0	☆
A3-05	Low frequency speed integration time	0.01s ~ 10.00s	0.50s	☆
A3-06	High frequency speed proportional gain	0.1 ~ 10.0	2.0	☆
A3-07	High frequency speed integration time	0.01s ~ 10.00s	1.00s	☆
A3-08	Speed loop integral attribute selection	0: Points take effect 1: Integral separation	0	★
A3-11	Torque current regulator Kp	0 ~ 30000	2000	☆
A3-12	Torque current regulator Ki	0 ~ 30000	1300	☆
A3-13	Excitation current regulator Kp	0 ~ 30000	2000	☆
A3-14	Excitation current regulator Ki	0 ~ 30000	1300	☆
A3-15	Flux Brake Gain	0~200	0	☆
A3-16	Field weakening torque correction factor	50%~200%	100%	☆
A3-17	Slip Compensation Coefficient	50% ~ 200%	100%	☆
A3-18	Speed loop feedback filter time constant	0.000s ~ 1.000s	0.015s	☆
A3-19	Speed loop output filter time constant	0.000s ~ 1.000s	0.000s	☆
A3-20	Electric torque upper limit source	0: P3-21 2: AI2 1: AI1 (analog range corresponds to P3-21) 3: Communication given 4: PLUSE given	0	☆

Function code	Name	Description (setting range)	Factory Default	Change
A3-21	Electric torque upper limit	0.0% ~ 200.0%	150.0%	☆
A3-22	Braking torque upper limit source	0: P3-23 2: AI2 1: AI1 (analog range corresponds to P3-23) 3: Communication given 4: PLUSE given	0	☆
A3-23	Braking torque upper limit	0.0% ~ 200.0%	150%	☆
Group B0: System parameters				
B0-00	Function code read-only selection	0: invalid 1: read only	0	☆
B0-01	Reserve	—	—	—
B0-02	Reserve	—	—	—
B0-03	Reserve	—	—	—
B0-04	Vector operating frequency display selection	0: real-time frequency 1: set frequency	0	☆
B0-05	Display selection during UP/Down adjustment	0: Display the set value 1: Display the current variable value	0	☆
Group B1: User function code customization				
B1-00	Clear custom function code selection	0: invalid 1: Valid	0	☆
B1-01	Custom function code 1	uP0-00 ~ uU1-xx	uP0-03	☆
B1-02	Custom function code 2	uP0-00 ~ uU1-xx	uP0-04	☆
B1-03	Custom function code 3	uP0-00 ~ uU1-xx	uP0-06	☆
B1-04	Custom function code 4	uP0-00 ~ uU1-xx	uP0-23	☆
B1-05	Custom function code 5	uP0-00 ~ uU1-xx	uP0-24	☆
B1-06	Custom function code 6	uP0-00 ~ uU1-xx	uP4-00	☆

Function code	Name	Description (setting range)	Factory Default	Change
B1-07	Custom function code 7	uP0-00 ~ uU1-xx	uP4-01	☆
B1-08	Custom function code 8	uP0-00 ~ uU1-xx	uP4-02	☆
B1-09	Custom function code 9	uP0-00 ~ uU1-xx	uP4-04	☆
B1-10	Custom function code 10	uP0-00 ~ uU1-xx	uP4-05	☆
B1-11	Custom function code 11	uP0-00 ~ uU1-xx	uP4-06	☆
B1-12	Custom function code 12	uP0-00 ~ uU1-xx	uP4-12	☆
B1-13	Custom function code 13	uP0-00 ~ uU1-xx	uP4-13	☆
B1-14	Custom function code 14	uP0-00 ~ uU1-xx	uP5-00	☆
B1-15	Custom function code 15	uP0-00 ~ uU1-xx	uP5-01	☆
B1-16	Custom function code 16	uP0-00 ~ uU1-xx	uP5-02	☆
B1-17	Custom function code 17	uP0-00 ~ uU1-xx	uP6-00	☆
B1-18	Custom function code 18	uP0-00 ~ uU1-xx	uP6-01	☆
B1-19	Custom function code 19	uP0-00 ~ uU1-xx	uP0-00	☆
B1-20	Custom function code 20	uP0-00 ~ uU1-xx	uP0-00	☆
B1-21	Custom function code 21	uP0-00 ~ uU1-xx	uP0-00	☆
B1-22	Custom function code 22	uP0-00 ~ uU1-xx	uP0-00	☆
B1-23	Custom function code 23	uP0-00 ~ uU1-xx	uP0-00	☆
B1-24	Custom function code 24	uP0-00 ~ uU1-xx	uP0-00	☆
B1-25	Custom function code 25	uP0-00 ~ uU1-xx	uP0-00	☆
B1-26	Custom function code 26	uP0-00 ~ uU1-xx	uP0-00	☆
B1-27	Custom function code 27	uP0-00 ~ uU1-xx	uP0-00	☆
B1-28	Custom function code 28	uP0-00 ~ uU1-xx	uP0-00	☆
B1-29	Custom function code 29	uP0-00 ~ uU1-xx	uP0-00	☆
B1-30	Custom function code 30	uP0-00 ~ uU1-xx	uP0-00	☆
B1-31	Custom function code 31	uP0-00 ~ uU1-xx	uP0-00	☆

Function code	Name	Description (setting range)	Factory Default	Change
Group B2: Optimize control parameters				
B2-00	Dead Time Compensation Enable Selection	0: no compensation 1: Compensation	1	☆
B2-01	PWM method	0: Asynchronous modulation 1: Synchronous modulation	0	☆
B2-02	PWM seven-segment/five-segment selection	0: 7 segments in the whole process 1: Seven-segment/five-segment automatic switching	0	☆
B2-03	CBC current limit enable selection	0: Disable 1: enable	1	☆
B2-04	Braking point	330.0V ~ 1200.0V	360.0V 690.0V	☆
B2-05	Undervoltage point	150.0V ~ 500.0V	200.0V 350.0V	☆
B2-06	Random PWM depth setting	0 ~ 6	0	☆
B2-07	0Hz operating mode selection	0: No current output; 1: Normal operation; 2: Output with stop DC braking current P1-16;	0	☆
B2-08	Low frequency carrier limitation mode selection	0: limit mode 0 1: Restricted Mode 1 2: Unlimited (the carrier of all frequency bands is the same)	0	☆
Group B3: AIAO correction parameters				
B3-00	AI1 shows voltage 1	-9.999V ~ 10.000V	3.000V	☆
B3-01	AI1 measured voltage 1	-9.999V ~ 10.000V	3.000V	☆
B3-02	AI1 shows voltage 2	-9.999V ~ 10.000V	8.000V	☆
B3-03	AI1 measured voltage 2	-9.999V ~ 10.000V	8.000V	☆
B3-04	AI2 shows voltage 1	-9.999V ~ 10.000V	3.000V	☆
B3-05	AI2 measured voltage 1	-9.999V ~ 10.000V	3.000V	☆

Function code	Name	Description (setting range)	Factory Default	Change
B3-06	AI2 shows voltage 2	-9.999V ~ 10.000V	8.000V	☆
B3-07	AI2 measured voltage 2	-9.999V ~ 10.000V	8.000V	☆
B3-12	AO1 target voltage 1	-9.999V ~ 10.000V	3.000V	☆
B3-13	AO1 measured voltage 1	-9.999V ~ 10.000V	3.000V	☆
B3-14	AO1 target voltage 2	-9.999V ~ 10.000V	8.000V	☆
B3-15	AO1 measured voltage 2	-9.999V ~ 10.000V	8.000V	☆
B3-16	AO2 target voltage 1	-9.999V ~ 10.000V	3.000V	☆
B3-17	AO2 measured voltage 1	-9.999V ~ 10.000V	3.000V	☆
B3-18	AO2 target voltage 2	-9.999V ~ 10.000V	8.000V	☆
B3-19	AO2 measured voltage 2	-9.999V ~ 10.000V	8.000V	☆
Group B4: Master-slave control parameters				
B4-00	Master-slave control enable selection:	0: Disable 1: Enable	0	★
B4-01	Master-slave selection:	0: Host 1: Slave	0	★
B4-02	Host sending frequency selection:	0: Running frequency 1: Target frequency	0	★
B4-03	Slave follow master command source selection	0: Do not follow 1: Follow	0	★
B4-04	Slave receive frequency coefficient	0.00% ~ 600.00%	100.00%	☆
B4-05	Slave receives torque coefficient	-10.00 ~ 10.00	1.00	☆
B4-06	Slave receives torque bias	-50.00% ~ 50.00%	0.00%	☆
B4-07	Frequency deviation threshold	0.20% ~ 10.00%	0.50%	☆
B4-08	Master-slave communication drop detection time	0.00s ~ 10.0s	0.1s	☆
Group B5: Brake function parameters				
B5-00	Brake control enable selection	0: Disable 1: Enable	0	★

Function code	Name	Description (setting range)	Factory Default	Change
B5-01	Delay before the lock opens	0 ~ 20.0s	0s	★
B5-02	Delay before closing the lock	0 ~ 20.0s	0.3	★
B5-03	Open frequency of ascending positive turn lock	0.00Hz ~ 20.00Hz	2.50Hz	★
B5-04	Closing frequency of rising positive turn lock	0.00Hz ~ 20.00Hz	1.50Hz	★
B5-05	Drop reverse lock opening frequency	0.00Hz ~ 20.00Hz	2.50Hz	★
B5-06	Drop reverse lock closing frequency	0.00Hz ~ 20.00Hz	1.50Hz	★
B5-07	Switch on current threshold	0 ~ 100.0	40.0	★
B5-08	Frequency holding time after the lock is opened	0 ~ 20.0s	0.5s	★
B5-09	Frequency holding time after the lock is closed	0 ~ 20.0s	0.5s	★
B5-10	Current limit during locking	50.0% ~ 200.0%	120.0%	★
B5-11	Shut down mode with lock closed	0: Free shutdown 1: Slow down and stop the machine	0	★
B5-12	Lock open mode	0: Open according to frequency 1: Open according to frequency and current	0	★
B5-13	Special functions for civil elevators were enabled	0: Close 1: Enable	0	★
B5-14	Elevator emergency operating frequency	0.00Hz ~ P0-14 Hz	20.00Hz	☆
B5-15	Elevator maintenance operation frequency	0.00Hz ~ P0-14 Hz	20.00Hz	☆
B5-16	Elevator emergency signal processing mode	0: The elevator is not running 1: UPS power supply operation	1	★
B5-17	Elevator rise correction frequency	0.00Hz ~ 5.00Hz	0	★

Function code	Name	Description (setting range)	Factory Default	Change
B5-18	Elevator descent correction frequency	0.00Hz ~ 5.00Hz	0	★
B5-19	Elevator emergency signal effective time	0 ~ 3600.0	0	☆
B5-20	Elevator emergency signal invalid time	0 ~ 3600.0	0	☆
Group B6: Sleep wakeup function parameters				
B6-00	Hibernate selection	0: The sleep function is invalid 1: Digital input terminal DI controls sleep function 2: The sleep function is controlled by the PID setting value and feedback value 3: Control the sleep function according to the operating frequency	0	☆
B6-01	Sleep frequency	0.00Hz ~ P0-14	0.00Hz	☆
B6-02	Sleep delay	0.0s ~ 3600.0s	20.0s	☆
B6-03	Wake-up difference	0.0% ~ 100.0% When B6-00=3, the unit becomes Hz	10.0%	☆
B6-04	Wake up delay	0.0s ~ 3600.0s	0.5s	☆
B6-05	Sleep delay frequency output selection	0: PID automatic adjustment 1: Sleep frequency B6-01	0	☆
B6-07	Wake-up frequency	0.0s ~ P0-14	0	☆
Group C1: Tension control function parameters				
C1-00	Tension control mode	0: Invalid 1: Open-loop torque control 2: Closed loop speed control	0	★
C1-01	Curling direction	0: Volume collection 1: Drop the volume	0	☆
C1-02	Maximum frequency of roll up	0.00Hz to maximum frequency	30	☆
C1-03	Upper limit frequency for unwinding	0.00Hz to maximum frequency	10	☆

Function code	Name	Description (setting range)	Factory Default	Change
C1-04	Mechanical transmission ratio	0.01 ~ 600.00	1.85	☆
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	★
C1-06	Tension setting	0 ~ 30000N	1200	☆
C1-07	Maximum tension	0 ~ 30000N	2100	★
C1-08	Calculation method for roll diameter	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	★
C1-09	Maximum roll diameter	1~10000mm	1100	★
C1-10	Roll diameter	1~10000mm	320	★
C1-11	Initial roll diameter selection	0: DI terminal setting 1: Ai1 2: Ai2 3: AI3 (expansion card)	0	☆
C1-12	Initial roll diameter 1	1~10000mm	600	☆
C1-13	Initial roll diameter 2	1~10000mm	50	☆
C1-14	Initial roll diameter 3	1~10000mm	50	☆
C1-15	Initial roll diameter 4	1~10000mm	50	☆
C1-16	Roll diameter filtering time	0.1~60.0s	1	☆
C1-17	Roll diameter variation limit 1	1~10000mm	0	○
C1-18	Roll diameter variation limit 2	1~10000mm	0	○

Function code	Name	Description (setting range)	Factory Default	Change
C1-19	Roll diameter reset selection	0: During operation, it is prohibited to reset the roll diameter 1: Allow roll diameter reset during operation	0	☆
C1-20	The roll diameter has reached the set value	1~10000mm	0	☆
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	☆
C1-23	Material thickness 1	0.01~100.00mm	0.01	☆
C1-24	Material thickness 2	0.01~100.00mm	0.01	☆
C1-25	Material thickness 3	0.01~100.00mm	0.01	☆
C1-26	Material thickness 4	0.01~100.00mm	0.01	☆
C1-27	Circle benchmark selection	0: Frequency 1: Switching quantity 2: Encoder	0	☆
C1-28	Number of pulses per cycle	1~10000	1	☆
C1-29	Number of laps per layer	1~10000	1	☆
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	☆
C1-31	Maximum linear velocity	0.1~6000.0m/min	1000	☆
C1-32	Actual value of linear velocity		0	○

Function code	Name	Description (setting range)	Factory Default	Change
C1-33	The lower limit of the frequency of coil diameter calculation	0.00Hz~maximum frequency	1.5	☆
C1-34	Roll diameter calculation delay	0.0~100.0s	6	☆
C1-35	Identification of mechanical inertia coefficient	0: No operation 1: Automatic identification	0	★
C1-36	Coefficient of mechanical inertia identifies torque	0~50.0% (rated torque of motor)	50	★
C1-37	Mechanical inertia compensation coefficient	0-10000	124	☆
C1-38	Material density	0~60000kg/m^3	0	☆
C1-39	Material width	0~60000m	0	☆
C1-40	Moment of inertia compensates the upper limit of torque	0.0~50.0%	5	☆
C1-41	Static friction compen-sation coefficient	0.0~50.0%	0	☆
C1-42	Dynamic friction compe-nsation coefficient	0.0~50.0%	0	☆
C1-43	Zero speed threshold	0.00Hz to maximum frequency	1	☆
C1-44	High speed torque compensation coefficient	0.0~50.0%	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	☆
C1-47	Reserve	Reserve	--	--
C1-48	Taper pattern	0: Curve taper 1: Linear taper	0	★

Function code	Name	Description (setting range)	Factory Default	Change
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	☆
C1-51	Taper correction amount	1~10000mm	100	☆
C1-52	Conical inflection point 1	1~10000mm	100	☆
C1-53	Cone setting 1	0.000~1.000	0	☆
C1-54	Conical inflection point 2	1~10000mm	200	☆
C1-55	Cone setting 2	0.000~1.000	0	☆
C1-56	Wire breakage detection selection	0: Invalid 1: Effective	0	☆
C1-57	Lower limit of wire breakage detection frequency	0.00Hz to maximum frequency	10	☆
C1-58	Wire breakage detection error	1~1000mm	10	☆
C1-59	Wire breakage detection time	0.1~60.0s	1	☆
C1-60	Pre drive speed gain	-50.0%~50.0%	0	☆
C1-61	Pre drive torque limit selection	0: PD-02 setting 1: Set limit according to tension	1	☆
C1-62	Pre drive torque gain	-50.0%~50.0%	0	☆
C1-63	Pre drive roll diameter calculation selection	0: Calculation 1: Stop calculation	1	☆
C1-64	Delay in calculating roll diameter after pre drive is completed	0.0s~10.0s	3	☆
C1-65	Adaptive torque selection	0: Forbidden 1: Enable	0	★

Function code	Name	Description (setting range)	Factory Default	Change
C1-66	Initial torque setting source selection	0: Function code setting (C1-67) 1: I1 2: AI2 3: AI3 (expansion card) 4: PULSE input pulse setting 5: Communication given	0	★
C1-67	Initial torque setting	0.0%~200.0%	0	☆
C1-68	Enable pulse discon-nection detection	0: Forbidden 1: Enable	0	★
C1-69	Starting frequency of pulse breakage detection	0.00Hz to maximum frequency	0	☆
C1-70	Broken pulse frequency value	0.00Hz~600Hz	0	☆
C1-71	Wire breakage detection delay	0.0s--60.0s	0	☆
Group C3: Photovoltaic functional parameters				
C3-00	Photovoltaic water pump activation	0: Invalid 1: Enable	0	★
C3-01	Vmppt voltage setting mode	0: Manually given 1: Automatic tracking	1	★
C3-02	Vmppt voltage starting voltage	0.0~800.0V	600.0V	☆
C3-03	PV open circuit voltage setting	0.0~800.0V	750.0V	★
C3-04	Operation time of power grid supply in automatic switching mode	0: Automatic switching 1: Photovoltaic power supply 2: Power grid supply	1	★
C3-05	Vmppt interval	0.0~100.0S Automatically adjust Vmppt voltage at intervals of A1-05 set time	1.0s	☆
C3-06	Vmppt hysteresis loop	0.0~50.0V. When the deviation value is less than this value, Vmppt will no longer be adjusted to reduce the jitter of the output frequency	2.0V	☆

Function code	Name	Description (setting range)	Factory Default	Change
C3-07	Vmppt step size	0.0~100.0V When automatically adjusting the Vmmpt voltage, adjust the amplitude of the upper and lower ranges	10.0V	☆
C3-08	Vmppt voltage upper limit	230.0~750.0V	650.0V	☆
C3-09	Vmppt voltage lower limit	230.0~750.0V	300.0V	☆
C3-10	CVT proportional gain	0.0~100.0 Proportional coefficient of target frequency 1 The larger the value, the greater the effect and the faster the adjustment	1.0	☆
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	☆
C3-12	CVT proportional gain 1	0.0~100.0 Proportional coefficient of target frequency 2 The larger the value, the greater the effect and the faster the adjustment	1.0	☆
C3-13	CVT integral coefficient 1	0.0~100.0 Integral coefficient of target frequency 2 The larger the value, the greater the effect and the faster the adjustment	1.0	☆
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 A1-14, switch to A1-12 proportional coefficient 2 and A1-13 integral coefficient. Otherwise, use A1-10 proportional coefficient 1 and A1-11 proportional coefficient 1	2.0V	☆

Function code	Name	Description (setting range)	Factory Default	Change
C3-15	Weak light detection frequency	0~Set operating frequency	20.00HZ	☆
C3-16	Weak light sleep delay	5.0~6553.5s	600.0s	☆
C3-17	Weak light wake-up time	0.0~6553.5s	200.0s	☆
C3-18	Reservoir full sleep delay	0.0~6553.5s	60.0s	☆
C3-19	Delay in starting due to insufficient water in the reservoir	0.0~6553.5s	600.0s	☆
C3-20	Water well insufficient sleep delay	0.0~6553.5s	600.0s	☆
C3-21	Water well startup sleep delay	0.0~6553.5s	600.0s	☆
C3-22	Operation time of power grid supply in automatic switching mode	0~65535min	60.0	☆

<table>
<tr><th>Function code</th><th>Name</th><th>Description (setting range)</th><th>Factory Default</th><th>Change</th></tr>
<tr><td colspan="5">Group U0: Fault logging parameters</td></tr>
<tr><td>U0-00</td><td>Last failure type</td><td rowspan="3">00: No fault
Err01: Inverter module protection
Err04: Overcurrent during acceleration
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: Drive overload fault
Err14: Motor overload fault
Err15: Drive overheated
Err17: Current detection failure
Err20: Short circuit fault to ground
Err23: Input phase loss fault
Err24: output phase loss fault
Err25: Eeprom operation failure
Err27: Communication failure
Err28: External fault
Err29: The speed deviation is too large
Err30: User-defined fault 1
Err31: User-defined fault 2
Err33: Fast current limiting
Err34: load drop fault
Err32: PID feedback lost during runtime
Err35: Input power failure
Err37: parameter storage exception
Err39: The running time has arrived
Err40: Cumulative running time reached
Err42: Switch the motor during operation
Err46: Master-slave control communication dropped</td><td>1</td><td>●</td></tr>
<tr><td>U0-01</td><td>Last failure type</td><td>1</td><td>●</td></tr>
<tr><td>U0-02</td><td>Types of first and second faults</td><td>1</td><td>●</td></tr>
<tr><td>U0-03</td><td colspan="2">Frequency of last failure</td><td>0.01Hz</td><td>●</td></tr>
<tr><td>U0-04</td><td colspan="2">Current at last fault</td><td>0.01A</td><td>●</td></tr>
</table>

Function code	Name	Smallest unit	Change
U0-05	Bus voltage at last fault	0.1V	●
U0-06	Input terminal status at the last fault	1	●
U0-07	Output terminal status at the last fault	1	●
U0-08	Last fault inverter status	1	●
U0-09	Running time at the last fault (starting time after power-on, minutes)	1min	●
U0-10	Running time at the last failure (time from running time, minutes)	1min	●
U0-13	Frequency at last failure	0.01Hz	●
U0-14	Current at previous fault	0.01A	●
U0-15	Bus voltage at previous fault	0.1V	●
U0-16	Input terminal at the previous fault	1	●
U0-17	Output terminal when the previous fault	1	●
U0-18	Last fault inverter status	1	●
U0-19	The running time of the previous fault (start timing after power-on, minutes)	1min	●
U0-20	Time of last failure (timed from runtime, minutes)	1min	●
U0-21	reserved variable	--	●
U0-22	reserved variable	–	●
U0-23	The frequency of the first and second faults	0.01Hz	●
U0-24	Current at the first and second faults	0.01A	●
U0-25	Bus voltage at the first and second faults	0.1V	●
U0-26	Input terminal for the first and second faults	1	●
U0-27	Output terminal when the first and second faults	1	●
U0-28	Inverter status of previous and second faults	1	●
U0-29	The running time of the first and second faults (start timing after power-on, minutes)	1min	●
U0-30	The time of the first and second failures (timed from the running time, minutes)	1min	●

Function code	Name	Smallest unit	Change
Group U1: Application Monitoring Parameters			
U1-00	Operating frequency (Hz)	0.01Hz	●
U1-01	Set frequency (Hz)	0.01Hz	●
U1-02	Bus voltage (V)	0.1V	●
U1-03	Output voltage (V)	1V	●
U1-04	Output current (A)	0.1A	●
U1-05	Output power (Kw)	0.1kW	●
U1-06	DI input status, hexadecimal number	1	●
U1-07	DO output status, hexadecimal number	1	●
U1-08	Voltage after AI1 correction	0.01V	●
U1-09	Voltage after AI2 correction	0.01V	●
U1-10	PID set value, PID set value (percentage)*PA-05	1	●
U1-11	PID feedback, PID feedback value (percentage)*PA-05	1	●
U1-12	Count value	1	●
U1-13	Length value	1	●
U1-14	Motor speed	rpm	●
U1-15	PLC stage, the current segment during multi-speed operation	1	●
U1-16	PULSE pulse input frequency	0.01kHz	●
U1-17	Feedback speed, the actual operating frequency of the motor	0.1Hz	●
U1-18	P7-38 Remaining time of timing time	0.1Min	●
U1-19	AI1 voltage before correction	0.001V	●
U1-20	Voltage before AI2 correction	0.001V	●
U1-21	DI5 high-speed pulse sampling line speed, refer to P7-71 for use	1m/min	●
U1-22	Load speed display (set load speed when stopped), refer to P7-31 for use	customize	●
U1-23	The power-on time	1Min	●

Function code	Name	Smallest unit	Change
U1-24	This running time	0.1Min	●
U1-25	PULSE pulse input frequency, different from U1-16 only in unit	1Hz	●
U1-26	Communication setting frequency value	0.01%	●
U1-27	Main frequency display	0.01Hz	●
U1-28	Auxiliary frequency display	0.01Hz	●
U1-29	Target torque, take the motor rated torque as 100%	0.1%	●
U1-30	Output torque, take the motor rated torque as 100%	0.1%	●
U1-31	Output torque, with the rated current of the inverter as 100%	0.1%	●
U1-32	Torque upper limit, the rated current of the inverter is 100%	0.1%	●
U1-33	VF separation target voltage	1V	●
U1-34	VF split output voltage	1V	●
U1-35	Reserve	—	●
U1-36	Motor serial number currently in use	1	●
U1-37	AO1 target voltage	0.01V	●
U1-38	AO2 target voltage	0.01V	●
U1-39	Inverter running status, 0: Stop, 1: Forward, 2: Reverse, 3: Fault	1	●
U1-40	Inverter current fault	1	●
U1-41	Agent time remaining	1h	●
U1-42	AC incoming line current	0.1A	●
U1-43	PLC current phase remaining time	0.1	●
U1-47	Cumulative running time 1 (cumulative running time = U1-47 + U1-48)	1h	●
U1-48	Cumulative running time 2 (cumulative running time = U1-47 + U1-48)	1min	●
U1-50	Motor temperature	1℃	●

Function code	Name	Smallest unit	Change
U1-41	Agent time remaining	1h	●
U1-42	AC incoming line current	0.1A	●
U1-43	PLC current phase remaining time	0.1	●
U1-47	Cumulative running time 1 (cumulative running time = U1-47 + U1-48)	1h	●
U1-48	Cumulative running time 2 (cumulative running time = U1-47 + U1-48)	1min	●
U1-50	Motor temperature	1℃	●

Chapter 13

Detailed parameter description

Group P0: Basic function group

Function code	Name	Description (setting range)	Factory Default	Change
P0-00	Product number	Product model: 5 digits display, 2 decimal places	60#.##	●

It can only be viewed by the user and cannot be modified.

Function code	Name	Description (setting range)	Factory Default	Change
P0-01	Inverter GP type display	0~1	0	★

0: G type, suitable for constant torque load with specified rated parameters.

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

Function code	Name	Description (setting range)	Factory Default	Change
P0-02	Rated current	0.1A ~ 3000.0A	Model is determined	●

It is only for users to check the rated current of the drive and cannot be modified.

Function code	Name	Description (setting range)	Factory Default	Change
P0-03	Motor control method	1 ~ 2	2	★

Ones place: motor control mode selection

1: Open loop vector control (speed sensorless vector)

2: VF Control

3: Closed loop vector (with speed sensor vector)

Tens place: motor type selection

0: Asynchronous motor

1: Synchronous motor

Function code	Name	Description (setting range)	Factory Default	Change
P0-04	Run command source	0 ~ 2	0	★

Select the input channel of the inverter control command.

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

0: Operation panel command channel ("L/D/C" light flashes);

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

1: Terminal command channel ("L/D/C" light flashes);

The running command is controlled by the multi-function input terminals FWD, REV, JOGF, JOGR, etc.

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

The running command is given by the upper computer through communication.

Function code	Name	Description (setting range)	Factory Default	Change
P0-05	Up\Down to modify the frequency command reference during runtime	0~1	1	★

0: Running frequency

1: set frequency

This parameter is only valid when the frequency source is digitally set. It is used to determine whether to modify the set frequency or the running frequency when the key up/Down or the terminal up/Down action is performed. The biggest difference is mainly reflected in the acceleration and deceleration process.

Function code	Name	Description (setting range)	Factory Default	Change
P0-06	Main frequency source X selection	0~9	1	★

Select the input channel of the main given frequency of the inverter. There are 9 main reference frequency channels:

0: Up/Down modification frequency will not be remembered when shutdown

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

The set frequency value of the inverter can be changed through the increase and decrease keys of the keyboard (or the UP and DOWN of the multi-function input terminal). No memory at stop means that after the inverter stops, it does not remember the changed frequency setting value of the inverter. After the inverter stops, the set frequency value returns to the value of P0-11 "digital setting preset frequency".

1: Up/Down modification frequency power-down memory

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

The set frequency value of the inverter can be changed through the increase and decrease keys of the keyboard (or the UP and DOWN of the multi-function input terminal).

Power-off means that when the inverter is powered on again after power-off, the set frequency is the set frequency before the last power-off.

2: AI1 3: AI2

It means that the frequency is determined by the analog input terminal. 700IP65 control board provides 2 analog input terminals (AI1, AI2)

Among them: AI1 is 0V~10V voltage input, AI2 can be 0V~10V voltage input, or 0mA~20mA current input, which is selected by the dial switch on the control board.

The input voltage value of AI1, AI2, and the corresponding relationship curve of the target frequency, the user can freely choose through P5-45.

700IP65 provides 4 sets of corresponding relationship curves, of which 2 sets of curves are straight-line relationships (2-point correspondence), and 2 sets of curves are arbitrary curves with 4-point correspondence. Users can use P5-15~P5-24 function codes and PE group code to set.

Function code P5-45 is used to set the two analog inputs of AI1~AI2, and select which group of the 4 groups of curves respectively.

When AI is used as a given frequency, the voltage/current input corresponds to 100.0% of the set value, which refers to the percentage relative to the maximum output frequency P0-14.

4: Multi-speed

Select the multi-speed running mode. It is necessary to set the P5 group "input terminal" and PC group "multi-speed and PLC" parameters to determine the corresponding relationship between the given signal and the given frequency.

5: Simple PLC

Select Simple PLC mode. When the frequency source is a simple PLC, it is necessary to set the PC group "multi-speed and PLC" parameters to determine the given frequency.

6: PID

Select Process PID Control. At this time, it is necessary to set the PA group "PID function". The operating frequency of the inverter is the frequency value after PID action. For the meaning of PID reference source, reference value, feedback source, etc., please refer to the introduction of "PID function" in group PA-

7: Communication given

It means that the main frequency source is given by the host computer through communication (see Appendix A 700IP65 MODBUS Communication Protocol for details).

8: PULSE pulse frequency given

The given pulse frequency of PULSE is input from the HDI terminal of the control board, and the given pulse ramp can be determined by the settings of P5-30~P5-34.

9: Up/Down modifies the frequency, and the memory is stopped when the power is turned off

Function code	Name	Description (setting range)	Factory Default	Change
P0-07	Auxiliary frequency source Y selection	0~9	0	★

When the auxiliary frequency source is used as an independent frequency reference chann-el, its usage is the same as that of the main frequency source X.

When the auxiliary frequency source is used as the superposition reference (the one digit of P0-10 is 1, 2, 3, 4), it has the following special features:

1. When the auxiliary frequency source is a digital reference, the preset frequency (P0-11) does not work. It can be performed on the basis of the main reference frequency through the increase and decrease keys of the keyboard (or UP and DOWN of the multi-function input terminal). Adjust up and down.

2. When the auxiliary frequency source is given by analog input (AI1, Ai2), 100% of the input setting corresponds to the range of auxiliary frequency source (see the description of P0-08 and P0-09). If you need to adjust up and down on the basis of the main given frequency, ple-ase set the corresponding setting range of the analog input to -n% to +n% (refer to the description of P5-15 to P5-24).

Tip: The auxiliary frequency source Y selection cannot be the same as the main frequency source X setting value, that is, the main and auxiliary frequency sources cannot use the same frequency given channel.

Function code	Name	Description (setting range)	Factory Default	Change
P0-08	Auxiliary frequency source Y range selection	0~1	0	☆

0: relative to the maximum frequency;

1: relative to frequency source X;

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

Function code	Name	Description (setting range)	Factory Default	Change
P0-09	Auxiliary frequency source Y range	0% to 100%	100%	☆

When the frequency source is selected as frequency superposition given (refer to P0-10 sett-ing), it is used to determine the adjustment range of the auxiliary frequency source.

Function code	Name	Description (setting range)	Factory Default	Change
P0-10	Frequency source selection	Ones place: 0~4 Tens place: 0~3	00	☆

Use this parameter to select the frequency given channel. The frequency setting is realized by the combination of the main frequency source X and the auxiliary frequency source Y.

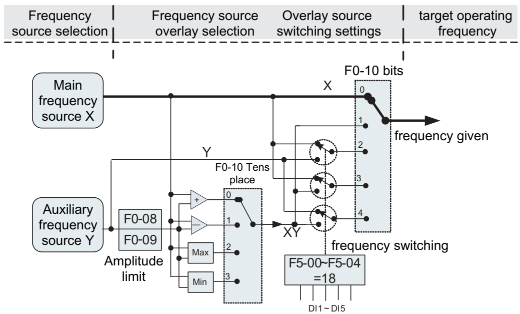


Figure 13-1. Schematic diagram of frequency source superposition

Ones place: Frequency source selection:

0: Main frequency source X

The main frequency X is used as the target frequency.

1: Main and auxiliary operation results

The main and auxiliary operation results are used as the target frequency, and the relationship between the main and auxiliary operations is shown in the "tens" description of this function code.

2: Switch between main frequency source X and auxiliary frequency sourceY

When the multi-function input terminal function 18 (frequency switching) is invalid, the main frequency X is used as the target frequency.

When the multi-function input terminal function 18 (frequency source switching) is valid, the auxiliary frequency Y is used as the target frequency.

3: Switch between the main frequency source X and the main and auxiliary operation results

When the multi-function input terminal function 18 (frequency switching) is invalid, the main frequency X is used as the target frequency.

When the multi-function input terminal function 18 (frequency switching) is valid, the main and auxiliary operation results are used as the target frequency.

4: Switch between auxiliary frequency source Y and main and auxiliary operation 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 valid, the main and auxiliary operation results are used as the target frequency.

Tens place: Frequency source main and auxiliary operation relationship:

0: Main frequency source X+Auxiliary frequency source Y

The sum of the main frequency X and the auxiliary frequency Y is used as the target frequency. Realize the frequency superposition given function.

1: Main frequency source X-Auxiliary frequency source Y

The main frequency X minus the auxiliary frequency Y is the target frequency.

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

Take the maximum absolute value of the main frequency X and the auxiliary frequency Y as the target frequency.

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

Take the smallest absolute value of the main frequency X and the auxiliary frequency Y as the target frequency.

Function code	Name	Description (setting range)	Factory Default	Change
P0-11	Preset frequency	0.00Hz ~ Maximum frequency P0-14	50.00Hz	☆

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 inverter.

Function code	Name	Description (setting range)	Factory Default	Change
P0-13	Motor running direction selection	0 ~ 2	0	☆

0: The direction is the same, which is the same as the current running direction of the motor

1: Opposite direction, opposite to the current motor running direction;

2: Reverse rotation is prohibited, when there is a reverse rotation command, the inverter will decelerate to 0Hz and enter the stop state;

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

Tip: After the parameters are initialized, the running direction of the motor will return to the original state. Use with caution in situations where it is strictly forbidden to change the direction of the motor after the system is debugged.

Function code	Name	Description (setting range)	Factory Default	Change
P0-14	Maximum output frequency	50.00Hz ~ 600.00Hz<1>	50.00Hz	★

<1> is the range of frequency decimal point P0-20=2, when P0-20=1, the range is: 50.0Hz ~ 1200.0Hz.

Function code	Name	Description (setting range)	Factory Default	Change
P0-15	Upper limit frequency source	0 ~ 4	0	★

This function code is used to define the source of the upper limit frequency.

0: Digital setting P0-16

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

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

3: Communication setting, the upper computer is given by the communication method (refer to Appendix A 700IP65 MODBUS Communication Protocol for details)

4: PULSE pulse setting, the pulse given ramp can be set by P5-30~P5-34

In order to avoid the "speeding" of material disconnection, the upper limit frequency can be set by analog quantity. When the inverter runs to the upper limit frequency value, the torque control is invalid, and the inverter continues to run at the upper limit frequency.

Function code	Name	Description (setting range)	Factory Default	Change
P0-16	Upper limit frequency	P0-18 ~ P0-14	50.00Hz	☆
P0-17	Upper limit frequency offset	0.00Hz ~ P0-14	0.00Hz	☆

When the upper limit frequency is given by analog or Pulse, this parameter is used as the offset of the analog. The function is to add the bias frequency to the set value of the analog upper limit frequency as the set value of the final upper limit frequency.

Function code	Name	Description (setting range)	Factory Default	Change
P0-18	lower frequency	0.00Hz ~ P0-16	0.00Hz	☆

When the inverter starts to run, it starts from the starting frequency. If the given frequency is lower than the lower limit frequency during the running process, the inverter will always run at the lower limit frequency until the inverter stops or the given frequency is greater than the lower limit frequency.

Function code	Name	Description (setting range)	Factory Default	Change
P0-19	Command source binding selection	000 ~ 888	000	☆

Define the binding combination between 3 running command channels and 9 given frequency channels to facilitate switching of frequency sources.

0: no binding

1: Digital setting frequency

2: Ai1

3: Ai2

4: Multi-speed

5: Simple PLC

6: PID

7: Communication given

8: PULSE pulse setting (HDI)

Units digit: selection of frequency source bound by operation panel command

Tens place: Terminal command binding frequency source selection

Hundreds place: Communication command binding frequency source selection

Thousands: reserved

The meaning of the above frequency given channel is the same as the main frequency X selection P0-06, please refer to the description of the function code of P0-06.

Different running command channels can be bundled with the same frequency given channel. When the command source has a bundled frequency source, the frequency source set by P0-06~P0-10 will no longer work when the command source is valid.

Function code	Name	Description (setting range)	Factory Default	Change
P0-20	Frequency Decimal Selection	1 ~ 2	2	★

This parameter is used to determine the resolution of all frequency-related function codes.

1: 1 decimal point;

2: 2 decimal places.

Function code	Name	Description (setting range)	Factory Default	Change
P0-21	Acceleration and deceleration time unit	0 ~ 2	1	★

In order to meet the needs of various fields, 700IP65 provides 3 kinds of acceleration and dec-eleration time units, namely 1 second, 0.1 second and 0.01 second.

0:1 second

1:0.1 second

2: 0.01 seconds

Note: When modifying this function parameter, the number of decimal points displayed by the 4 groups of acceleration and deceleration time will change, and the corresponding accelera-tion and deceleration time will also change. Special attention should be paid during the applic-ation process.

Function code	Name	Description (setting range)	Factory Default	Change
P0-22	Acceleration and deceleration time reference frequency	0 ~ 2	0	★

This parameter is used to define the reference frequency of acceleration and deceleration time, and its meaning is shown in Figure 5-2:

0: maximum frequency (P0-14);

1: Preset frequency (P0-11);

2: Motor rated frequency (P4-05 or A1-05).

Function code	Name	Description (setting range)	Factory Default	Change
P0-23	Acceleration time 1	0.0s ~ 3000.0s<1>	10.0s	☆
P0-24	Deceleration time 1	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 inverter to accelerate from zero frequency to the reference frequency of acceleration and deceleration (determined by P0-22), see t1 in Figure 13-2.

Deceleration time refers to the time required for the inverter to decelerate from the reference frequency of acceleration and deceleration (determined by P0-22) to the zero frequency, as shown in t2 in Figure 13-2.

 700 provides 4 groups of acceleration and deceleration time, users can use the digital inp-ut terminal DI to switch and select, and the four groups of acceleration and deceleration time can be set by 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.

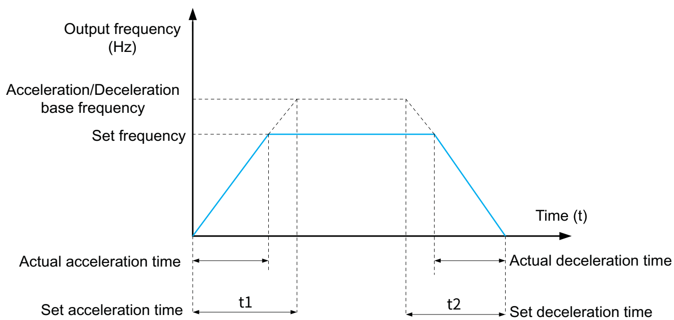


Fig.13-2 Schematic diagram of acceleration and deceleration time

Function code	Name	Description (setting range)	Factory Default	Change
P0-25	Overmodulation voltage boost value	0% ~ 10%	3%	★

This parameter is used to improve the output voltage capability of the inverter in the constant power area, and the rated voltage of the motor is 100%. The larger the value, the higher the voltage boosting ability, but the larger the current ripple content, so attention should be paid during use. Usually no modification is required.

Function code	Name	Description (setting range)	Factory Default	Change
P0-26	Carrier frequency	0.5kHz ~ 16.0kHz	Model is determined	☆

This function adjusts the carrier frequency of the inverter. By adjusting the carrier frequency, the motor noise can be reduced, the resonance point of the mechanical system can be avoided, the line-to-ground leakage current can be reduced, and the interference generated by the inverter can be reduced.

When the carrier frequency is low, the higher harmonic components of the output current increase, the loss of the motor increases, and the temperature rise of the motor 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 affects the following performance:

Motor noise	Leakage current
Carrier frequency	Low → High
Motor noise	Big → 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

The factory setting of carrier frequency is different for inverters of different power. Although the user can modify it according to the needs, it should be noted that if the carrier frequency is set higher than the factory value, the temperature rise of the inverter radiator will increase. At this time, the user needs to derate the inverter, otherwise the inverter will be in danger of overheating alarm .

Inverter power	Carrier frequency range	Factory default carrier frequency
0.75kW ~ 5.5kW	0.5kHz ~ 16.0kHz	6.0kHz
7.5kW ~ 75kW	0.5kHz ~ 16.0kHz	4.0kHz
90kW ~ 450kW	0.5kHz ~ 16.0kHz	2.0kHz

Function code	Name	Description (setting range)	Factory Default	Change
P0-27	The carrier frequency is adjusted with temperature	0 ~ 1	1	☆

0: invalid

1: Valid

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

Function code	Name	Description (setting range)	Factory Default	Change
P0-28	Parameter initialization	0 ~ 5	0	☆

0: No operation;

1: Restore factory parameters, excluding motor parameters, record information and P0-20

2: Clear record information, including fault record U0 group, accumulated power-on time P7-33, accumulated running time P7-34 and power consumption P7-72;

3: Backup current user parameters;

4: Restore user backup parameters;

5:Restore all parameters.

Function code	Name	Description (setting range)	Factory Default	Change
P0-29	LCD upload and download parameter selection	0 ~ 7	0	☆

Download means that the inverter stores the function code parameter value to the LCD.

Upload means that the LCD writes the stored inverter parameter values into the inverter, so the LCD needs to download the parameters before uploading the parameters.

0: No function;

1: Download parameters to LCD;

2: Only upload P4 group parameters;

3: Upload parameters other than group P4;

4: Upload all parameters;

5: Download the modification parameters of group P4/A1;

6: Download modified parameters except P4/A1 group;

7: Download all modification parameters.

Group P1: Start-stop control

Function code	Name	Description (setting range)	Factory Default	Change
P1-00	Start method	0~2	0	☆

0: Direct start

When the start DC braking time is not set to 0, the DC braking is performed first before starti-ng. It is suitable for occasions where small inertia loads may reverse during startup.

1: Restart after speed tracking

The inverter first judges the speed and direction of the motor, and then starts at the frequency corresponding to the tracked motor speed, and implements a smooth and shock-free start for the rotating motor, which is suitable for instantaneous power failure of large inertial loads. start up.

2: The asynchronous motor is pre-excited to start

Which is used to establish a magnetic field before the operation of the asynchronous motor to reduce the current impact during rapid start.

Function code	Name	Description (setting range)	Factory Default	Change
P1-01	Speed tracking method	1 ~ 2	0	★

In order to complete the speed tracking process in the shortest time, select the way that the inverter tracks the motor speed:

0: Track down from the frequency at the time of power failure, this method is usually selected;

1: Start tracking from the target frequency, and use it when the power failure time is longer and restart;

2: Start tracking from the current speed, generally used for power generation loads.

Function code	Name	Description (setting range)	Factory Default	Change
P1-02	Maximum speed tracking current	30% ~ 150%	100%	★
P1-03	Speed tracking speed	1 ~ 100	20	☆

In the speed tracking restart mode, select the current and speed of the speed tracking. The lar ger the parameter, the faster the tracking speed. But too large may cause unreliable tracking.

Function code	Name	Description (setting range)	Factory Default	Change
P1-04	Start frequency	0.00Hz ~ 10.00Hz	0.00Hz	☆
P1-05	Start frequency hold time	0.0s ~ 100.0s	0.0s	★
P1-06	Start DC braking current	0% ~ 100%	0%	★
P1-07	Start DC braking time	0.0s ~ 100.0s	0.0s	★

Start DC braking is generally used to stop the motor first and then start it.

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

The starting DC braking current refers to the percentage relative to the rated current of the inverter.

Function code	Name	Description (setting range)	Factory Default	Change
P1-08	Selection of acceleration and deceleration frequency curve mode	0 ~ 2	0	★

0: Linear acceleration and deceleration;

1: S curve acceleration and deceleration A;

2: S curve acceleration and deceleration B.

Function code	Name	Description (setting range)	Factory Default	Change
P1-09	S-curve acceleration start time	0.0% ~ 100.0%	20.0%	★
P1-10	S-curve acceleration end time	0.0% ~ 100.0%	20.0%	★
P1-11	S-curve deceleration start time	0.0% ~ 100.0%	20.0%	★
P1-12	S-curve deceleration end time	0.0% ~ 100.0%	20.0%	★

The above parameters can be used to set the slow start without impact when the drive starts to accelerate, and the acceleration and deceleration curves are adjusted to different degrees of S acceleration and deceleration curves by the set value. Start S-curve acceleration and deceleration, the drive will make acceleration and deceleration curves at different rates acco rding to the original acceleration and deceleration time.

Note: Acceleration and deceleration time = 0, the S curve function is invalid.

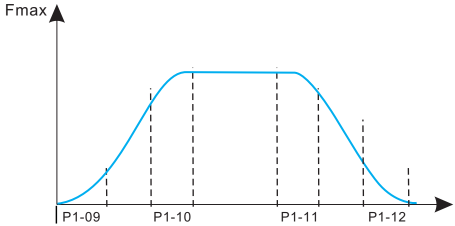


Figure 13-3. S-curve acceleration and deceleration diagram

Function code	Name	Description (setting range)	Factory Default	Change
P1-13	Stop mode	0~1	0	☆

0: Decelerate to stop, after the stop command is valid, the inverter reduces the output frequency according to the deceleration mode and the defined acceleration and deceleration time, and stops after the frequency drops to 0.

1: Free stop, after the stop command is valid, the inverter immediately stops output. The load coasts to a stop according to the mechanical inertia.

Function code	Name	Description (setting range)	Factory Default	Change
P1-14	DC braking start frequency at stop	0.00Hz ~ P0-14	0.00Hz	☆

In the process of deceleration and stop, when this frequency is reached, the DC braking process of stop starts. Setting this value too large may cause overvoltage.

Function code	Name	Description (setting range)	Factory Default	Change
P1-15	DC braking waiting time at stop	0.0s ~ 100.0s	0.0s	☆

After the running frequency is reduced to the starting frequency of DC braking at stop, the inverter stops outputting for a period of time, and then starts the DC braking process. It is used to prevent faults such as overcurrent that may be caused by starting DC braking at higher speeds.

Function code	Name	Description (setting range)	Factory Default	Change
P1-16	Stop braking DC current	0% ~ 100%	0%	☆

This parameter is used to set the percentage of DC braking current, and the rated current of the inverter is 100%. The larger the braking current is, the more obvious the braking effect is, but when the braking current is too large, the braking time P1-17 should not be set too large.

Function code	Name	Description (setting range)	Factory Default	Change
P1-17	DC braking time at stop	0.0s ~ 36.0s	0.0s	☆

This parameter is used to set the DC braking holding time. When it is 0, there is no DC braking process.

Function code	Name	Description (setting range)	Factory Default	Change
P1-21	Demagnetization time	0.01s ~ 3.00s	0.50s	★

This parameter is used to set the waiting time of the inverter from coasting to restart, so as to reduce the influence of motor residual magnetism on startup.

Function code	Name	Description (setting range)	Factory Default	Change
P1-23	Instantaneous stop and non-stop mode selection	0 ~ 2	0	★

This parameter is used to set the method to prevent the shutdown due to the bus voltage undervoltage caused by the grid voltage drop, and is often used in fan and other occasions.

0: Invalid, it will still run at the given frequency when the grid voltage is momentarily cut off. At this time, an undervoltage fault may occur and the machine will shut down;

1: Automatically adjust the deceleration rate, and automatically adjust the deceleration rate when the grid voltage is momentarily cut off to keep the inverter running. After the grid voltage recovers, it will automatically accelerate to the target frequency. If the power grid is out of power for a long time, there will still be an undervoltage fault and shutdown;

2: Decelerate to stop. In case of instantaneous power failure or sudden voltage drop, the inverter will decelerate and stop according to P1-24. If you need to start again after stopping, you need to give the start signal again.

Function code	Name	Description (setting range)	Factory Default	Change
P1-24	The deceleration time of the momentary stop and non-stop deceleration stop	0.0s ~ 100.0s	10.0s	★
P1-25	Instantaneous power failure and non-stop effective voltage	60% ~ 85%	80%	★

This parameter is used to judge whether the grid voltage is the threshold for instantaneous power failure. When the bus voltage is less than P1-25, the inverter will decelerate according to the method set by P1-23 to maintain the bus voltage constant. 100% corresponds to the voltage level of the inverter.

Function code	Name	Description (setting range)	Factory Default	Change
P1-26	Instantaneous power failure and non-stop recovery of voltage	85% ~ 100%	90%	★

This parameter is used to judge whether the grid voltage returns to the normal threshold. When the bus voltage is greater than P1-26, the inverter will no longer decelerate. When the duration is greater than P1-27, the inverter will accelerate until it reaches the set frequency. 100% corresponds to the voltage level of the inverter.

Function code	Name	Description (setting range)	Factory Default	Change
P1-27	Instantaneous power failure and non-stop recovery voltage judgment	0.0s ~ 300.0s	0.3s	★

This parameter is used for the time judgment of grid voltage recovery. When the grid voltage is higher than P1-26, the timing starts, otherwise it is cleared to 0.

Function code	Name	Description (setting range)	Factory Default	Change
P1-28	Instantaneous stop and non-stop automatic gain adjustment	0 ~ 100	40	☆
P1-29	Instantaneous stop and non-stop automatic adjustment of integral	1 ~ 100	20	☆

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

Group P2: V/F control parameters

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

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

Function code	Name	Description (setting range)	Factory Default	Change
P2-00	V/F curve setting	0 ~ 7	0	★

For fan and water pump loads, square V/F control can be selected:

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

1: Multi-point V/F curve. Suitable for special loads such as dehydrators and centrifuges;

2: Square V/F curve. Suitable for centrifugal loads such as fans and pumps;

3 to 5: Corresponding to the 1.7th, 1.5th and 1.3rd degree V/F curves, which are between the straight line and the square curve.

6: VP fully separated mode. At this time, the output frequency and output voltage of the inverter are independent of each other, the output frequency is determined by the frequency source, and the output voltage is determined by P2-15 (VP separation voltage source).

VP complete separation mode is generally used in induction heating, inverter power supply, torque motor control and other occasions.

7: VP semi-separation mode.

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

Assuming that the voltage source input is X (X is a value between 0 and 100%), the relationship between the output voltage V of the inverter and the frequency P is:

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

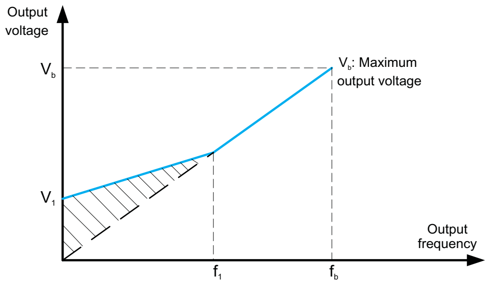
Function code	Name	Description (setting range)	Factory Default	Change
P2-01	Torque boost	0.0% ~ 30.0%	0.0%	☆
P2-02	Torque boost cut-off frequency	0.00Hz ~ Maximum frequency	25.00Hz	★

In order to compensate the low frequency torque characteristic of V/F control, some boost compensation is made to the output voltage of the inverter at low frequency.

If the torque boost setting is too large, the motor is easily overheated, and the inverter is prone to overcurrent. Generally, the torque boost should not exceed 8.0%.

Effective adjustment of this parameter can effectively avoid overcurrent during startup. For larger loads, it is recommended to increase this parameter, and when the load is light, this parameter setting can be reduced. When the torque boost is set to 0.0, the inverter is automatic torque boost.

Torque boost torque cut-off frequency: Below this frequency, the torque boost torque is valid, and if it exceeds this set frequency, the torque boost becomes invalid. See Figure 5-4 for details.



V_1: Manual torque boost voltage V_b: Maximum output voltage

f_1: Cutoff frequency of manual torque boost f_b: Rated running frequency

Fig.13-4 Manual torque boost

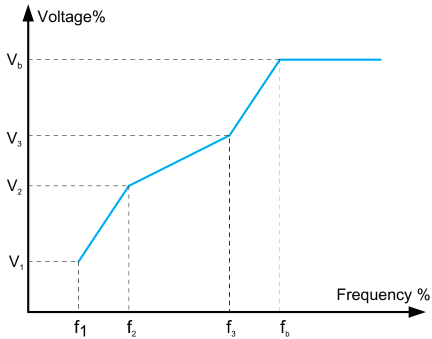
Function code	Name	Description (setting range)	Factory Default	Change
P2-03	V/F frequency point P1	0.00Hz ~ P2-05	1.30Hz	★
P2-04	V/F voltage point V1	0.0% ~ 100.0%	5.2%	★
P2-05	V/F frequency point P2	P2-03 ~ P2-07	2.50Hz	★
P2-06	V/F voltage point V2	0.0% ~ 100.0%	8.8%	★
P2-07	V/F frequency point P3	0.00Hz ~ 50.00 Hz	15.00Hz	★
P2-08	V/F voltage point V3	0.0% ~ 100.0%	35.0%	★

These six parameters are used to define the multi-point V/F curve.

The multi-point V/F curve is set based on the motor's load characteristic. The relationship between voltages and frequencies is:

V1<V2<V3，P1<P2<P3

At low frequency, higher voltage may cause overheat or even burnt out of the motor and overcurrent stall or overcurrent protection of the AC drive.



V_1-V_3: The percentage of the voltage of the 1st-3rd stage of the multi-speed V/F

f_1-f_3: Frequency percentage of 1st-3rd stage of multi-speed V/F

V_b: Rated motor voltage

f_b: Rated motor running frequency

Fig.13-5 V/F curve setting diagram

Function code	Name	Description (setting range)	Factory Default	Change
P2-09	Slip Compensation Coefficient	0.0% ~ 200.0%	50.0%	☆

Setting this parameter can compensate the slip generated by the load during V/F control, and reduce the variation of the motor speed with the load during V/F control. Generally, 100.0% corresponds to the rated slip of the motor with rated load.

When the speed of the motor with load is lower than the given speed, this value can be appropriately increased, and vice versa. Usually no adjustment is required.

Function code	Name	Description (setting range)	Factory Default	Change
P2-10	Flux Brake Gain	0 ~ 200	100	☆

This parameter can suppress the bus voltage rise during the deceleration process of the inverter. The larger the value, the better the suppression effect.

The magnetic flux braking is to increase the motor terminal current by increasing the output voltage of the inverter, thereby improving the consumption capacity of the feedback energy and suppressing the rise of the bus voltage. The greater the gain, the greater the motor current, so please pay attention in the application. It is recommended to set this value to 0 when there is a braking resistor at the same time, otherwise an abnormality may occur due to the large deceleration current during deceleration.

Function code	Name	Description (setting range)	Factory Default	Change
P2-11	Oscillation suppression gain	0 ~ 100	Model is determined	☆

This parameter is used to suppress motor vibration. When the motor oscillates, please increase the value appropriately, but try to set it as small as possible when the motor does not oscillate, so as not to have too much influence on the V/F operation. Under normal circumstances, no modification is required.

Function code	Name	Description (setting range)	Factory Default	Change
P2-13	VF slip compensation time constant	0.02s ~ 1.00s	0.30s	☆

This parameter is used to set the slip compensation time constant. Decreasing this value can enhance the response speed, but the speed fluctuation may increase. Increasing this value increases speed stability, but reduces responsiveness. Under normal circumstances, no modification is required.

Function code	Name	Description (setting range)	Factory Default	Change
P2-15	Output voltage source selection when VF is separated	0 ~ 7	0	☆

0: Digital setting (P2-16);

1: AI1;

2: AI2;

3: Multi-segment instruction;
4: Simple PLC;
5: PID;
6: Communication given;
7: PULSE pulse setting (Di5);
100.0% corresponds to the rated voltage of the motor.

Function code	Name	Description (setting range)	Factory Default	Change
P2-16	V/F separation output voltage digital setting	0V ~ Motor rated voltage	0V	☆

This parameter is used to set the voltage output value when the V/F separation voltage is set and the voltage source is the digital setting value.

Function code	Name	Description (setting range)	Factory Default	Change
P2-17	V/F separation output voltage acceleration time	0.0 ~ 3000.0s	1.0s	☆

This parameter is used to set the acceleration time of voltage output from 0 to rated voltage when V/F is separated.

Function code	Name	Description (setting range)	Factory Default	Change
P2-18	V/F separation output voltage deceleration time	0.0 ~ 3000.0s	1.0s	☆

This parameter is used to set the deceleration time of voltage output from rated voltage to 0 when V/F is separated.

Function code	Name	Description (setting range)	Factory Default	Change
P2-19	V/F separation and stop mode selection	0 ~ 1	0	☆

0: Frequency and output voltage deceleration time are independent;

1: After the voltage is reduced to 0, the frequency is reduced again

Function code	Name	Description (setting range)	Factory Default	Change
P2-20	VF overcurrent stall enable	0~1	1	★

The default overcurrent stall gain is valid, and the P9-05 VF overcurrent stall protection gain is 0-100, with a factory value of 20; P9-06 VF overcurrent stall protection current 50%~200%, factory value 150%.

Function code	Name	Description (setting range)	Factory Default	Change
P2-21	VF overvoltage stall enable	0~1	1	★

Default overvoltage stall gain is valid, P9-03 overvoltage stall protection gain is 0-100, factory value is 30; P9-04 overvoltage stall protection voltage is 200~850V, with a factory value of 760V.

Function code	Name	Description (setting range)	Factory Default	Change
P2-22	VF overvoltage stall suppression frequency gain	0 ~ 100	30	☆

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 greatly, P2-22 can be appropriately reduced. The functional role of P2-22 is equivalent to P9-03.

Function code	Name	Description (setting range)	Factory Default	Change
P2-23	Maximum rise limit frequency for overvoltage stall	0 ~ 50Hz	5	☆

Maximum rise frequency limit for overvoltage suppression.

Group P3: Vector control parameters

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

Function code	Name	Description (setting range)	Factory Default	Change
P3-00	Switching frequency P1	0.00 ~ P3-02	5.00 Hz	☆
P3-02	Switching frequency P2	P3-00 ~ P0-14	10.00 Hz	☆
P3-04	Low frequency speed proportional gain	0.1 ~ 10.0	4.0	☆
P3-05	Low frequency speed integration time	0.01s ~ 10.00s	0.50s	☆
P3-06	High frequency speed proportional gain	0.1 ~ 10.0	2.0	☆

P3-00 switching frequency 1 and P3-02 switching frequency 2, P3-04/P3-05, P3-06/P3-07 are the PI regulator parameters at low speed and high speed respectively, and the switching relationship is shown in Figure 5-6. By setting the proportional coefficient and integral time of the speed regulator, the speed dynamic response characteristics of the vector control can be adjusted. Increasing the proportional gain and decreasing the integral time can speed up the dynamic response of the speed loop. If the proportional gain is too large or the integral time is too small, the system may oscillate.

Suggested adjustment method:

If the factory parameters can not meet the requirements, fine-tune on the basis of the factory default parameters, first increase the proportional gain to ensure that the system does not oscillate; then reduce the integral time, so that the system has faster response characteristics and less overshoot.

Note: If the PI parameter is not set properly, it may cause the speed overshoot to be too larg-e, and even cause an overvoltage fault when the overshoot falls back.

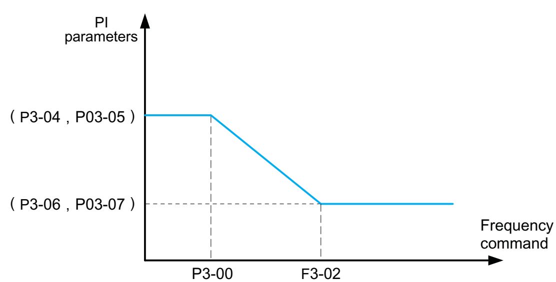


Fig.13-6 Schematic diagram of speed loop PI parameter switching

Function code	Name	Description (setting range)	Factory Default	Change
P3-08	Speed loop integral attribute selection	0~1	0	★

0: The integral takes effect during the acceleration and deceleration process, and the response is fast in the case of rapid acceleration, but it may cause speed overshoot;

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

Function code	Name	Description (setting range)	Factory Default	Change
P3-11	Torque current regulator Kp	0 ~ 30000	2200	☆
P3-12	Torque current regulator Ki	0 ~ 30000	1500	☆
P3-13	Excitation current regulator Kp	0 ~ 30000	2200	☆
P3-14	Excitation current regulator Ki	0 ~ 30000	1500	☆

The vector control current loop PI adjustment parameter, this parameter will be automatically obtained after the asynchronous machine is completely tuned, and generally does not need to be modified. The integral regulator of the current loop does not use the integral time as the dimension, but directly sets the integral gain. If the current loop PI gain is set too large, it may cause the entire control loop to oscillate. Therefore, when the current oscillation or torque fluctuation is large, the PI proportional gain or integral gain here can be manually reduced.

Function code	Name	Description (setting range)	Factory Default	Change
P3-15	Flux Brake Gain	0 ~ 200	0	☆

This parameter can suppress the bus voltage rise during the deceleration process of the inverter. The larger the value, the better the suppression effect.

The magnetic flux braking is to increase the motor terminal current by increasing the output voltage of the inverter, thereby improving the consumption capacity of the feedback energy and suppressing the rise of the bus voltage. The greater the gain, the greater the motor current, so please pay attention in the application. It is recommended to set this value to 0 when there is a braking resistor at the same time, otherwise an abnormality may occur due to the large deceleration current during deceleration.

Function code	Name	Description (setting range)	Factory Default	Change
P3-16	Field weakening torque correction factor	50% ~ 200%	100%	☆

This parameter is used to correct the motor torque value in the constant power area, and generally does not need to be modified.

Function code	Name	Description (setting range)	Factory Default	Change
P3-17	Slip compensation gain	50% ~ 200%	100%	☆

This parameter is used to adjust the steady speed accuracy of the motor. When the speed is too high, the parameter should be adjusted to a smaller value, and vice versa.

Function code	Name	Description (setting range)	Factory Default	Change
P3-18	Speed loop feedback filter time constant	0.000 ~ 1.000s	0.015s	☆

This parameter is used to set the filter time constant of the speed feedback value. Increasing the value can improve the speed stability, but will reduce the system response speed; decreasing the value can improve the system response speed, but will reduce the speed stability. Usually no modification is required.

Function code	Name	Description (setting range)	Factory Default	Change
P3-19	Speed loop output filter time constant	0.000 ~ 1.000s	0.000s	☆

This parameter is used to set the filter time constant of the torque given value, which is beneficial to improve the speed stability. Generally, no setting is required.

Function code	Name	Description (setting range)	Factory Default	Change
P3-20	Electric torque upper limit source	0 ~ 4	0	☆

0: P3-21

1: AI1, AI linear setting refer to P5-15~P5-19, multi-point curve setting refer to P5-45 and PE group;

2: AI2, AI linear setting refer to P5-20 ~ P5-24, multi-point curve setting refer to P5-45 and PE group;

3: Communication given, directly written by the host computer through the communication address, 100% corresponding to P3-21, please refer to Appendix A 700IP65 Modbus comm-unication protocol for details;

4: PULSE setting, refer to the setting instructions of function codes P5-30~P5-33.100% corr-esponding to P3-21.

Function code	Name	Description (setting range)	Factory Default	Change
P3-21	Electric torque upper limit	0.0% ~ 200.0%	150.0%	☆

This parameter is used to set the upper limit value of the motor torque of the inverter. When the actual direction of the motor is the same as the direction of the torque, it is electric, other-wise it is braking.

When the electric torque and braking torque need different setting values, they can be set se-parately through P3-21 and P3-23.

For example, in the case of cam load, due to the periodic change of the electric and braking states, at this time, by appropriately reducing the upper limit of the braking torque P3-23, the rise of the inverter bus voltage can be effectively reduced without affecting the normal opera-tion of the driving load.

Function code	Name	Description (setting range)	Factory Default	Change
P3-22	Braking torque upper limit source	0 ~ 4	0	☆

0: P3-23;

1: AI1, AI linear setting refer to P5-15~P5-19, multi-point curve setting refer to P5-45 and PE group;

2: AI2, AI linear setting refer to P5-20~ P5-24, multi-point curve setting refer to P5-45 and PE group;

3: Communication given, directly written by the host computer through the communication address, 100% corresponding to P3-21, please refer to Appendix A 700IP65 Modbus commun-ication protocol for details;

4: PULSE setting, refer to the setting instructions of function codes P5-30~P5-33;

100% corresponding to P3-23.

Function code	Name	Description (setting range)	Factory Default	Change
P3-23	Braking torque upper limit	0.0 ~ 200.0%	150.0%	☆

This parameter is used to set the upper limit of braking torque of the inverter. This parameter is used to set the upper limit value of the motor torque of the inverter. When the actual direction of the motor is the same as the direction of the torque, it is electric, otherwise it is braking.

When the electric torque and braking torque need different setting values, they can be set separately through P3-21 and P3-23.

For example, in the case of cam load, due to the periodic change of the electric and braking states, at this time, by appropriately reducing the upper limit of the braking torque P3-23, the rise of the inverter bus voltage can be effectively reduced without affecting the normal operation of the driving load.

Group P4: First motor parameter

Function code	Name	Description (setting range)	Factory Default	Change
P4-00	Motor parameter tuning	0 ~ 2	0	☆

Tip: Before tuning, you must set the correct motor rated parameters (P4-01~ P4-06)

0: No operation, that is, tuning is prohibited.

1: Static tuning, suitable for occasions where the motor and the load are not easily disconnected and cannot be rotated for tuning.

Action description: Set the function code to 1 and press the RUN key to confirm, the inverter will perform static tuning.

2: Rotary tuning

In order to ensure the dynamic control performance of the inverter, please select rotary tuning. During rotary tuning, the motor must be disconnected from the load (no load).

After selecting rotary tuning, the inverter will perform static tuning first. After the static tuning is completed, the motor will follow the acceleration set by P4-12.

Accelerate to 80% of the rated frequency of the motor, keep it for a period of time, and then decelerate to zero speed according to the deceleration set by P4-13, and the rotation tuning is over.

Action description: Set the function code to 2, and press the RUN key to confirm, the inverter will perform rotary tuning.

Tuning operation instructions:

When P4-00 is set to 1 or 2 and then press the ENTER key, “TUNE” will be displayed and flashing at this time, then press the RUN key to start parameter tuning, and the displayed “TUNE” will stop flashing. When the tuning is completed, the display returns to the stop state interface. During the tuning process, you can press the STOP key to abort the tuning.

When the tuning is completed, the value of P4-00 automatically returns to 0.

Function code	Name	Description (setting range)	Factory Default	Change
P4-01	Motor 1 rated power	0.1kw ~ 1000.0kw	Model is determined	★
P4-02	Motor 1 rated voltage	1V ~ 1500V	380V	★
P4-03	Motor 1 Number of motor poles	2 to 64	Model is determined	○
P4-04	Motor 1 rated current	0.1A ~ 6000.0A<1>	P4-01 OK	★

Function code	Name	Description (setting range)	Factory Default	Change
P4-05	Motor 1 rated frequency	0.01Hz ~ P0-14	50.00 Hz	★
P4-06	Motor 1 rated speed	0rpm ~ 60000rpm	P4-01 OK	★

<1> When the rated power of the motor P4-01<=30KW, P4-4 is 2 decimal points, and when P4-01>30KW, it is 1 decimal point.

The above function codes are the parameters on the motor nameplate. Whether V/F or vector control is used, the relevant parameters need to be set accurately according to the motor nameplate.

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

Function code	Name	Description (setting range)	Factory Default	Change
P4-07	Motor 1 no-load current	0.01A ~ P4-04<1>	Model is determined	★
P4-08	Motor 1 stator resistance	0.001Ω ~ 65.535Ω	Model is determined	★
P4-09	Motor 1 rotor resistance	0.001Ω ~ 65.535Ω	Model is determined	★
P4-10	Motor 1 mutual inductance	0.1Mh ~ 6553.5Mh	Model is determined	★
P4-11	Motor 1 leakage inductance	0.01Mh ~ 655.35Mh	Model is determined	★

<1> When the rated power of the motor P4-01>30KW, P4-4 is 1 decimal point, and when P4-01<=30KW, it is 2 decimal points

<2>When the rated power of the motor P4-01>30KW, add 1 decimal point, and when P4-01< =30KW, the decimal point is shown in the table

P4-07~P4-11 function code parameters are generally not on the motor nameplate and need to be obtained through inverter tuning. Among them, "static tuning" can only obtain three parameters of P4-07~P4-09, and "rotary tuning" can obtain all 5 parameters. value of a function code.

Note:

After modifying P4-01, the values of motor parameters P4-02~P4-11 will change accordingly.

Function code	Name	Description (setting range)	Factory Default	Change
P4-12	Acceleration at Dynamic Full Tuning	1.0s ~ 6000.0s	10.0s	☆
P4-13	Deceleration at dynamic full tuning	1.0s ~ 6000.0s	10.0s	☆

The above function code is the acceleration and deceleration time when the motor is fully tuned, and the user can reasonably set this parameter according to the actual situation of the motor.

Function code	Name	Description (setting range)	Factory Default	Change
P4-17	Synchronous motor stator resistance	0.001Ω ~ 65.535Ω	Model is determined	★
P4-18	Synchronous motor D-axis inductance	0.01Mh ~ 655.35Mh	Model is determined	★
P4-19	Synchronous motor Q-axis inductance	0.01Mh ~ 655.35Mh	Model is determined	★
P4-20	Synchronous motor back EMF	1V ~ 65535V	Model is determined	★
P4-21	No-load current of synchronous motor	0.0% ~ 50.0%	10.0%	★

Group P5: Vector control parameters

700 series inverters come standard with 7 multi-function digital input terminals (among which HDI can be used as high-speed pulse input terminal) and 2 analog input terminals.

Function code	Name	Description (setting range)	Factory Default	Change
P5-00	DI1 terminal function	0 ~ 63	1	★
P5-01	DI2 terminal function	0 ~ 63	2	★
P5-02	DI3 terminal function	0 ~ 63	9	★
P5-03	DI4 terminal function	0 ~ 63	12	★
P5-04	DI5 terminal function	0 ~ 63	13	★
P5-05	DI6 terminal function	0 ~ 63	0	★
P5-06	DI7 terminal function	0 ~ 63	0	★

This parameter is used to set the function corresponding to the digital multi-function input terminal. The specific function is shown in the attached table 13-1.

Table 13-1 DI terminal function description

Value	Function	Description
0	No function	Set 0 for reserved terminals to avoid malfunction.
1	Forward RUN (FWD)	The terminal is used to control forward or reverse RUN of the AC drive.
2	Reverse RUN (REV)	
3	3-wire operation control	The terminal determines three-line control of the AC drive. For details, see the description of F06.13.
4	Forward jog	Forward jog indicates forward JOG running, while reverse jog indicates reverse JOG running. The JOG frequency, acceleration time and deceleration time are described respectively in F09.06, F09.07 and F09.08.
5	Reverse jog	
6	Terminal UP	When this function takes effect, the frequency increasing command and decreasing command will be modified when the frequency is given by the external terminal. When the frequency source is set to digital setting, the set frequency can be adjusted up and down. Up/Down change rate is set by P5-12
7	Terminal DOWN	

Value	Function	Description
8	Free parking	The inverter blocks the output, and the motor stopping process is not controlled by the inverter. It is often used when there is a large inertia load and there is no requirement for stopping time.
9	Fault reset (RESET)	External fault reset function. Same function as the RESET key on the keyboard.
10	Run pause	The inverter decelerates to stop, but all running parameters are in the memory state. Such as PLC parameters, swing frequency parameters, PID parameters. After this signal disappears, the inverter resumes running to the state before stopping.
11	External fault normally open input	When the external fault signal is sent to the inverter, the inverter reports a fault and stops.
12	Multi-speed terminal 1	A total of 16-segment settings can be achieved through the digital state combination of the four terminals. The detailed combination is shown in Table 5-2.
13	Multi-speed terminal 2	
14	Multi-speed terminal 3	
15	Multi-speed terminal 4	
16	Acc/ Dec time selection 1	Four kinds of acceleration and deceleration time settings can be selected through the combination of the digital states of the two terminals. The detailed combination is shown in Table 5-3.
17	Acc/ Dec time selection 2	
18	Frequency source switchover	The main frequency source X and the switching frequency source set by P0-10 are switched through this terminal.
19	UP/DOWN setting clear (terminal, keyboard)	Use this terminal to clear the frequency value changed by UP/DOWN and restore the given frequency to the value set by P0-11.
20	Run command switchover terminal	When the command source is not the keyboard, the terminal control and keyboard control can be switched through this terminal. When it is communication, communication and keyboard control can be carried out through this terminal.
21	Acceleration/Deceleration prohibited	Ensure that the inverter is not affected by external signals (except stop command) and maintain the current output frequency.

Value	Function	Description
22	PID invalidation (pause)	When the frequency source P0-06 is PID, the PID failure will make the inverter maintain the current frequency output.
23	PLC status reset	The PLC is suspended during the execution process, and can be restored to the initial state of the simple PLC through this terminal being valid when it is running again.
24	Swing pause	Pause the swing frequency, and the inverter outputs at the center frequency.
25	Timer trigger input	Timer input signal, when the valid time of this signal reaches the set closing and opening time, the timing output function is valid. It needs to be used with Y1 output No. 17 function and P7-39, P7-40.
26	Immediate DC braking	When this terminal is valid, the inverter will DC brake immediately, and the braking current P1-16 will be set
27	External fault normally closed input	When the external fault signal is sent to the inverter, the inverter will report Err28 fault and stop according to the stop mode set by P9-23.
28	Counter input	The terminal of counting pulse input, cooperate with Pb-08 to realize the function of setting count value
29	Counter reset	This terminal is used to clear the counter status.
30	Length count input	This terminal is used to count the length.
31	Length reset	This terminal is used to clear the length.
32	Torque control prohibited	The AC drive is prohibited from torque control and enters the speed control mode.
33	Pulse input (enabled only for HDI)	It is the pulse input terminal (only valid for HDI)
34	Frequency modification prohibited	When the terminal is active, the inverter does not respond to frequency changes.
35	PID action direction is reversed	When this terminal is valid, the PID action direction is opposite to the direction set by PA-04.
36	External STOP terminal 1	When the command source P0-04 is the operation panel, this terminal can be used to stop the inverter, which is equivalent to the function of the STOP key on the keyboard.

Value	Function	Description
37	Control command switching terminal 2	Used to switch between terminal control and communication control.
38	PID integral pause	This terminal is valid, the PID integral adjustment is suspended, but the PID proportional adjustment and differential adjustment functions are still valid.
39	Frequency source X and preset frequency switching terminal	If this terminal is valid, the frequency source X is replaced by the preset frequency (P0-11).
40	Frequency source Y and preset frequency switching terminal	If this terminal is valid, the frequency source Y will be replaced by the preset frequency (P0-11).
41	Switch between motor 1 and motor 2	Realize the switching of two sets of motor parameters of motor 1 and motor 2
42	Reserved	reserved
43	PID parameter switchover	When this terminal is invalid, the first group of PID parameters is used, and when it is valid, the second group of PID parameters is used, see the description of PA group for details.
44	Speed control/torque control switching	Switches the drive between torque control and speed control modes. When this terminal is invalid, the inverter runs in the mode defined by Pd-10 (speed/torque control mode), and when this terminal is valid, it switches to another mode.
45	Emergency pull over	When this terminal is valid, the inverter stops at the fastest speed, and the current is at the set current upper limit during the stop process. This function is used to meet the requirement that the inverter needs to stop as soon as possible when the system is in an emergency state.
46	External parking terminal 2	In any control mode (panel control, terminal control, communication control), this terminal can be used to decelerate the inverter to stop, and the deceleration time is fixed at deceleration time 2 (P7-04).
47	Deceleration DC braking	When this terminal is valid, the inverter first decelerates to the starting frequency of DC braking at stop, and then switches to DC braking state.

Value	Function	Description
48	The running time is cleared	When this terminal is valid, the timing time of the current running of the inverter will be cleared. This function needs to be used in conjunction with the timing running (P7-36) and the current running time setting value (P7-38).
49	Two-wire/three-wire switching	Used to switch between two-wire control mode and three-wire mode.
50	Inversion prohibited	This terminal is valid, and the inverter is prohibited from reverse rotation
51	User-defined fault 1	When the fault setting terminal is valid, the inverter outputs Err30 fault
52	User-defined fault 2	When the fault setting terminal is valid, the inverter outputs Err31 fault
53	Sleep input	The sleep function is controlled by external terminals to be valid or invalid, that is, when the switch is closed, the sleep function is forced to be valid, and when the switch is open, the inverter is forced to exit the sleep state and enter the wake-up operation state (not related to the PID operation).
54	Civil elevator emergency signal	Elevator application emergency stop enable digital signal selection
55	Civil elevator maintenance signal	Elevator application maintenance signal enables digital signal selection, B5-15=maintenance speed
56	Initial volume diameter Select terminal 1	When the initial roll diameter source of tension control is C1-11=0, the DI terminal is set
57	Initial volume diameter Select terminal 2	When the initial roll diameter source of tension control is C1-11=0, the DI terminal is set
58	Volume diameter calculation stops	When the tension control coil diameter value reaches C1-20, the DO terminal setting coil diameter reaching function is effective
59	Loop input	The tension control DI terminal should receive a digital input signal for the number of turns in the coil diameter
60	Volume switchover	Tension control winding and unwinding status selection
61	STO2 Input	When the DI terminal is used for setting the fire mode, it will report Err48 fault when disconnected, and reset when this fault is closed

Value	Function	Description
62	Tension control material thickness 1	When parameter 0 is selected for C1-21, the material thickness is set by the DI terminal, and four initial material thicknesses can be digitally set for C1-22~C1-26, which are determined by the logic of the DI terminal level
63	Tension control material thickness 2(Some DI terminals are supported by the expansion card)	When parameter 0 is selected for C1-21, the material thickness is set by the DI terminal, and four initial material thicknesses can be digitally set for C1-22~C1-26, which are determined by the logic of the DI terminal level

Table 13-2 Multi-segment instruction function description

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

The 4 multi-segment command terminals can be combined into 16 states, each of which corresponds to 16 command setting values, as shown in Table 13-2.

Table 13-3 Function description of acceleration and deceleration time selection terminal

Terminal 2	Terminal 1	Acceleration Time selection	Corresponding Parameters
OFF	OFF	Acceleration time 1	P0-23、P0-24
OFF	ON	Acceleration time 2	P7-03、P7-04
ON	OFF	Acceleration time 3	P7-05、P7-06
ON	ON	Acceleration time 4	P7-07、P7-08

Function code	Name	Description (setting range)	Factory Default	Change
P5-10	DI terminal filter time	0.000 ~ 1.000s	0.010s	☆

Set the sensitivity of the DI terminal. If the digital input terminal is susceptible to interference and causes malfunction, this parameter can be increased, the anti-interference ability will be enhanced, but the sensitivity of the DI terminal will be reduced.

Function code	Name	Description (setting range)	Factory Default	Change
P5-11	Terminal command method	0 ~ 3	0	★

This parameter defines four different ways to control the operation of the inverter through external terminals.

0: Two-wire operation mode 1

This mode is the most commonly used two-wire mode. The forward and reverse rotation of the motor is determined by the FWD and REV terminal commands.

K1	K2	RUN command
0	0	STOP
1	0	Forward RUN
0	1	Reverse RUN
1	1	STOP

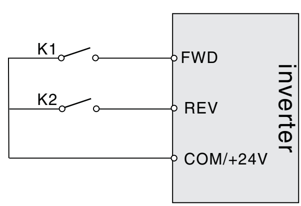


Fig.13-7 Two-wire operation mode 1

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 RUN
1	1	Reverse RUN

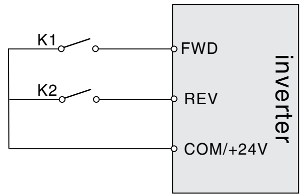


Fig.13-8 Two-wire operation mode 2

2: Three-wire operation mode 1

Din is the enable terminal in this mode, and the directions are controlled by FWD and REV respectively. But the pulse is valid, it must be done by disconnecting the Din terminal signal when stopping.

SB1: Stop button

SB2: Forward button

SB3: Invert button

Din is the multi-function input terminal of DI1~HDI, at this time, its corresponding terminal function should be defined as the No. 3 function "three-wire operation control".

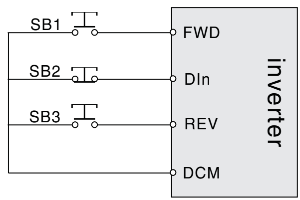


Fig.13-9 Three-wire operation mode 1

2: Three-wire operation mode

The enable terminal of this mode is Din, the running command is given by FWD, and the direction is determined by the state of REV.

The stop command is done by disconnecting the Din signal.

SB1: Stop button

SB2: Run button

Din is the multi-function input terminal of DI1~HDI, and its corresponding terminal function should be defined as the No. 3 function "three-wire operation control".

K	RUN command
0	Forward RUN
1	Reverse RUN

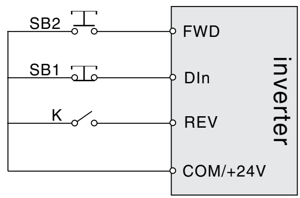


Fig.13-10 Three-wire operation mode 2

Function code	Name	Description (setting range)	Factory Default	Change
P5-12	Terminal UP/DOWN change rate	0.01Hz/s ~ 100.00Hz/s	1.00Hz/s	☆

Terminal UP/DOWN to adjust the rate of change of the set frequency.

Function code	Name	Description (setting range)	Factory Default	Change
P5-13	Terminal valid logic 1	00000 ~ 11111	00000	★

0: High level

1: low level

Ones place: DI1

Tens place: DI2

Hundreds: DI3

Thousands: DI4

Ten thousand: DI5

DI1~DI5 terminal valid level selection.

It is used to set the valid state mode of the digital input terminal.

When it is selected to be active at high level, it is valid when the corresponding DI terminal is connected to COM, and invalid when disconnected.

When it is selected to be active at low level, the corresponding DI terminal is invalid when connected with COM, and valid when disconnected.

Function code	Name	Description (setting range)	Factory Default	Change
P5-15	AI1 minimum input value	0.00~P5-17	0.00V	☆
P5-16	AI1 minimum input corresponding setting	-100.0% ~ 100.0%	0.0%	☆
P5-17	AI1 maximum input value	P5-15~10.00V	10.00V	☆
P5-18	AI1 maximum input corresponding setting	-100.0% ~ 100.0%	100.0%	☆
P5-19	AI1 input filter time	0.00s ~ 10.00s	0.10s	☆

The above function codes define 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 input or minimum input range, the other part will be calculated as the maximum input or minimum input.

When the analog input is current input, 1mA current is equivalent to 0.5V voltage. (AI2 settings are the same as AI1 settings). In different applications, the nominal value corresponding to 100% of the analog setting is different, please refer to the description of each application section for details. The following illustrations illustrate several settings:

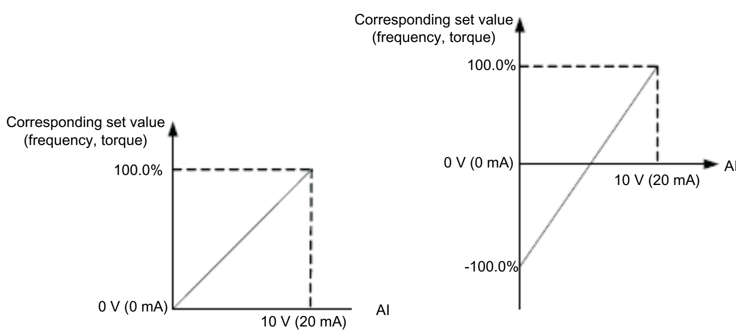


Fig.13-11 Corresponding relationship between analog given and set quantity

Function code	Name	Description (setting range)	Factory Default	Change
P5-20	AI2 minimum input value	0.00~P5-22	0.00V	☆
P5-21	AI2minimum input corresponding setting	-100.0% ~ 100.0%	0.0%	☆
P5-22	AI2 maximum input value	P5-20~10.00V	10.00V	☆
P5-23	AI2 maximum input corresponding setting	-100.0% ~ 100.0%	100.0%	☆
P5-24	AI2 input filter time	0.00s ~ 10.00s	0.10s	☆
P5-25	AI3 minimum input value	0.00V ~ 10.00V	0.00V	☆
P5-26	AI3 minimum input corresponding setting	-100.0% ~ 100.0%	0.0%	☆
P5-27	AI3 maximum input value	0.00V ~ 10.00V	10.00V	☆
P5-28	AI3 maximum input corresponding setting	-100.0% ~ 100.0%	100.0%	☆
P5-29	AI3 input filter time	0.00s ~ 10.00s	0.10s	☆

Same as AI1.

Function code	Name	Description (setting range)	Factory Default	Change
P5-30	PULSE (pulse) input minimum frequency	0.00KHz~P5-32	0.00KHz	☆
P5-31	PULSE (pulse) input minimum frequency corresponding setting	-100.0% ~ 100.0%	0.0%	☆
P5-32	PULSE (pulse) input maximum frequency	P5-30~50.00KHz	50.00KHz	☆
P5-33	PULSE (pulse) input maximum frequency corresponding setting	-100.0% ~ 100.0%	100.0%	☆

PULSE input quantization is similar to analog input quantization.

Function code	Name	Description (setting range)	Factory Default	Change
P5-35	DI1 turn-on delay time	0.0s ~ 3600.0s	0.0s	☆
P5-36	DI1 off delay time	0.0s ~ 3600.0s	0.0s	☆
P5-37	DI2 turn-on delay time	0.0s ~ 3600.0s	0.0s	☆

Function code	Name	Description (setting range)	Factory Default	Change
P5-38	DI2 off delay time	0.0s ~ 3600.0s	0.0s	☆
P5-39	DI3 turn-on delay time	0.0s ~ 3600.0s	0.0s	☆
P5-40	DI3 off delay time	0.0s ~ 3600.0s	0.0s	☆

It is used to set the delay time for the inverter to change the state of the DI terminal. Currently, only DI1, DI2, and DI3 have the function of setting the delay time.

Function code	Name	Description (setting range)	Factory Default	Change
P5-41	Function selection selection when AI1 is used as DI terminal	0 ~ 63	0	★
P5-42	Function selection selection when AI2 is used as DI terminal	0 ~ 63	0	★

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

Special attention is: the input range of AI is still unchanged from 0 to 10V. When the AI voltage is >6V, it is a high level, and when it is <4V, it is a low level. There is a 2V hysteresis in between. That is, when AI rises from 0V to >6V, it is a high level, and it is a low level when it decreases from >6V to 4V.

Function code	Name	Description (setting range)	Factory Default	Change
P5-44	Valid mode selection when AI is used as DI terminal	0X00 ~ 0X11	0X00	☆

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

0: Active high level, AI is high level when AI rises from 0V to >6V, and is low level when it decreases from >6V to 4V.

1: Low level is active, AI is low level when AI rises from 0V to <6V, and it is low level when it decreases from >6V to 4V.

Ones place, AI1:

Ten, AI2:

Function code	Name	Description (setting range)	Factory Default	Change
P5-45	AI curve selection	00 ~ 22	00	☆

This parameter is used for AI curve selection, 0 is a straight line, 1 and 2 are 4-point curves. And each curve has corresponding function code settings.

Ones place: AI1

0: 2-point straight 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-point straight 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

Function code	Name	Description (setting range)	Factory Default	Change
P5-46	AI signal input type selection	00 ~ 11	00	☆

This parameter is used to set the AI signal input type. The input signal type selection of AI needs to correspond one-to-one with the input type (voltage type, current type) of hardware AI, which is beneficial to improve the accuracy and linearity of AI signal sampling.

Ones place: AI1,

Tens place: AI2;

0: Voltage type

1: Current type

Group P6: Output terminal

700 series inverters come standard with 2 multi-function analog output terminals, 1 multi-function digital output terminal, and 2 multi-function relay output terminals.

Function code	Name	Description (setting range)	Factory Default	Change
P6-00	Control board relay RELAY1 output (TA/TB/TC) selection	0 ~ 45	2	★
P6-01	Control board relay RELAY2 output (RA/RB/RC) selection	0 ~ 45	1	★
P6-02	Y1 output selection	0 ~ 45	1	★

The function selection of multi-function output terminal is as follows:

Value	Function	Description
0	No output	The terminal has no function.
1	Inverter is running	Indicates that the inverter is running, and there is an output frequency (which can be zero), and the ON signal is output at this time.
2	Fault output (stop)	When the inverter fails, output ON signal.
3	Frequency-level detection FDT1 output	Please refer to the detailed description of function codes P7-22 and P7-23.
4	Frequency arrives	Frequency arrives, see P7-24 for details.
5	Running at zero speed	When the inverter is running and the output frequency is zero, the ON signal is output.
6	Motor overload pre-warning	The motor overload protection is judged according to the early warning threshold, and the ON signal is output after exceeding the forecast setting value. For details, please refer to P9-00 ~ P9-02.
7	AC drive overload pre-warning	10S before inverter overload protection occurs, output ON signal.
8	PLC cycle complete	When simple PLC completes one cycle, the terminal outputs a pulse signal with width of 250 ms.
9	Accumulative running time reached	If the accumulative running time of the AC drive exceeds the time set in F09.16, the terminal becomes ON.

Value	Function	Description
10	Frequency limited	When the set frequency exceeds the upper and lower frequency limits and the output frequency of the inverter reaches the upper and lower frequency limits, the ON signal is output.
11	Ready to run	The main circuit and control circuit power supply is established, the inverter protection function does not act, the inverter is in a running state, and the ON signal is output.
12	AI1> AI2	When the value of analog input AI1 is greater than the other input AI2, output ON signal.
13	upper limit frequency reached	When the running frequency reaches the upper limit frequency P0-16, the ON signal is output
14	Lower limit frequency reached	When the running frequency reaches the lower limit frequency P0-18, the ON signal is output
15	Brown-out status output	When the inverter is under voltage state, it outputs ON signal
16	Communication settings	For communication settings, please refer to Appendix A Communication Protocol
17	Timer output	When the timer can realize the time relay function, when the valid time of the timer input signal reaches the set closing and opening time, the timing output function is valid. It needs to be used in conjunction with No. 25 function of DI input and P7-39 and P7-40.
18	Running in reverse	When the inverter is running in reverse, it outputs ON signal.
19	Reserved	reserved
20	Set length reached	When the detected actual length exceeds the set length, the ON signal is output
21	Torque limit	When the torque limit function is used, the stall protection function will automatically act
22	Current 1 arrives	Please refer to the description of function codes P7-45 and P7-46.
23	Frequency 1 arrives	Please refer to the description of function codes P7-43 and P7-44.
24	Module temperature reached	When the inverter module radiator temperature (P7-32) reaches the set module temperature reaching value (P7-69), the ON signal is output

Value	Function	Description
25	Downloading	When the inverter is in the state of off-load, the ON signal is output.
26	The cumulative power-on time arrives	When the accumulative power-on time (P7-33) of the inverter exceeds the power-on arrival time set by P7-51, it will output ON signal.
27	The running time has arrived	When the timing function selection (P7-36) is valid, the inverter will output ON signal after the current running time reaches the set timing time (P7-38).
28	Reserved	Reserved
29	Set count value reached	When the count value reaches the value set by Pb-08, the ON signal is output.
30	The specified count value is reached	When the detected actual length count value reaches the length count value set by Pb-09, the ON signal is output.
31	Motor 1, Motor 2 indication	When the current motor is No. 2 motor, the ON signal is output.
32	Brake control output	When the holding brake is valid, the ON signal will be output. For details, please refer to the settings in Group B5.
33	Running at zero speed 2	When the output frequency of the inverter is 0, the ON signal is output. This signal is also ON in stop state.
34	Frequency level detection PDT2 arrival	Please refer to the description of function codes P7-55 and P7-56.
35	Zero current state	Please refer to the description of function codes P7-59 and P7-60.
36	Software current overrun	Please refer to the description of function codes P7-61 and P7-62.
37	When the lower limit frequency is reached, it will also output when it stops	When the running frequency reaches the lower limit frequency, the ON signal is output. This signal is also ON in the stop state.
38	Alarm output	When a fault occurs in the inverter, and the processing mode of the fault is to continue running, the inverter will output an alarm.
39	Reserved	Reserved
40	AI1 input overrun	When the value of analog input AI1 is less than P7-67 (AI1 input protection lower limit) or greater than P7-68 (AI1 input protection upper limit), the ON signal is output.

Value	Function	Description
41	Reserved	Reserved
42	Reserved	Reserved
43	Frequency reaches 2	Please refer to the description of function codes P7-57 and P7-58.
44	Current reaches 2	Please refer to the description of function codes P7-63 and P7-64.
45	Fault output (no output under voltage)	When the inverter fails and it is not an undervoltage fault, the ON signal is output.

Function code	Name	Description (setting range)	Factory Default	Change
P6-04	FM terminal output mode selection	0~1	0	☆
P6-05	FMR output selection	0~45	0	☆

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

Function code	Name	Description (setting range)	Factory Default	Change
P6-09	AO1 output selection	0~16	0	☆
P6-10	AO2 output selection		0	☆
P6-11	FMP output selection		0	☆

The output range of analog output AO1 and AO2 is 0V~10V, or 0mA~20mA.

The scale relationship between the range of analog output and the corresponding function is shown in the following table:

Value	Function	Description
0	Running frequency	0 ~ Maximum output frequency, that is, 100% corresponds to the maximum frequency
1	Setting frequency	0 ~ Maximum output frequency, that is, 100% corresponds to the maximum frequency

Value	Function	Description
2	Output current	0 to 2 times the rated current of the motor, that is, 100% corresponds to 2 times the rated current of the motor
3	Output voltage	0 to 2 times the rated power, that is, 100% corresponds to 2 times the rated power of the motor
4	Output power	0~1.2 times the rated voltage of the inverter, that is, 100% corresponds to 1.2 times the rated voltage of the inverter
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	0.0% ~ 100.0%, please refer to Appendix A "Modbus Communication Protocol" for use
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	0~2 times the set count value, that is, 100% corresponds to 2 times the set count value
11	Motor speed	0 to the speed corresponding to the maximum frequency P0-14, that is, 100% corresponds to the speed corresponding to P0-14
12	Bus voltage	0V ~ 1000V, that is, 100% corresponds to 1000V
13	PULSE pulse input	0.01kHz ~ 100.00kHz
14	Output current	100% corresponds to 1000.0A
15	The 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

Function code	Name	Description (setting range)	Factory Default	Change
P6-12	FMP output maximum frequency	0.01KHz ~ 100.00KHz	50.00	☆
P6-13	AO1 output lower limit	-100.0% ~ P6-15	0.0%	☆
P6-14	The lower limit corresponds to AO1 output	0.00V ~ 10.00V	0.00V	☆

Function code	Name	Description (setting range)	Factory Default	Change
P6-15	AO1 output upper limit	P6-13 ~ 100.0%	100.0%	☆
P6-16	The upper limit corresponds to AO1 output	0.00 ~ 10.00V	10.00V	☆
P6-17	AO2 output lower limit	-100.0% ~ P6-19	0.0%	☆
P6-18	The lower limit corresponds to the AO2 output	0.00V ~ 10.00V	0.00V	☆
P6-19	AO2 output upper limit	P6-17 ~ 100.0%	100.0%	☆
P6-20	The upper limit corresponds to AO2 output	0.00 ~ 10.00V	10.00V	☆

The above function codes define the corresponding relationship between the output value and the analog output. When the output value exceeds the set maximum output or minimum output range, it is calculated by the upper limit output or the lower limit output.

When the analog output is current type output, 1mA current corresponds to 0.5V voltage. In different applications, the analog output corresponding to 100% of the output value is differe-nt. As shown in Figure 13-12 below, there are two different linear graphs a and b.

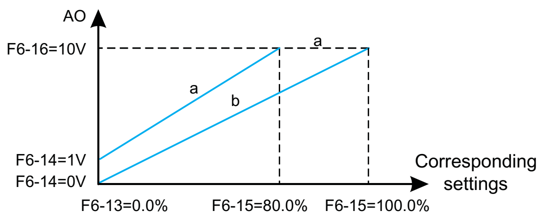


Figure 13-12. Corresponding relationship between the upper and lower limits of analog output

Function code	Name	Description (setting range)	Factory Default	Change
P6-26	Main relay T off delay	0.0s ~ 3600.0s	0.0s	☆
P6-27	Main relay R off delay	0.0s ~ 3600.0s	0.0s	☆
P6-28	Y1 low level output delay	0.0s ~ 3600.0s	0.0s	☆
P6-29	Y2 low level output delay	0.0s ~ 3600.0s	0.0s	☆

It is used to set the delay time of the inverter to different output state changes when the Y ter minal state changes or the relay output state changes.

Group P7: Accessibility and keyboard display

Function code	Name	Description (setting range)	Factory Default	Change
P7-00	Jog running frequency	0.00Hz ~ Maximum frequency	6.00Hz	☆
P7-01	Jog acceleration time	0.0s ~ 3000.0s	10.0s	☆
P7-02	Jog deceleration time	0.0s ~ 3000.0s	10.0s	☆

Define the given frequency and acceleration/deceleration time of the inverter when jogging. The jog process starts and stops according to start mode 0 (P1-00, direct start) and stop mod-e 0 (P1-13, deceleration stop).

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

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

Function code	Name	Description (setting range)	Factory Default	Change
P7-03	Acceleration time 2	0.0s ~ 3000.0s	10.0s	☆
P7-04	Deceleration time 2	0.0s ~ 3000.0s	10.0s	☆
P7-05	Acceleration time 3	0.0s ~ 3000.0s	10.0s	☆
P7-06	Deceleration time 3	0.0s ~ 3000.0s	10.0s	☆
P7-07	Acceleration time 4	0.0s ~ 3000.0s	10.0s	☆
P7-08	Deceleration time 4	0.0s ~ 3000.0s	10.0s	☆

The acceleration and deceleration time can be selected from P0-23 and P0-24 and the above three acceleration and deceleration times. Their meanings are the same, please refer to the related descriptions of P0-23 and P0-24.

The acceleration and deceleration time 1~4 during the operation of the inverter can be selected through different combinations of the multi-function digital input terminals DI. Please refer to function codes P5-00 ~ P5-04.

Function code	Name	Description (setting range)	Factory Default	Change
P7-09	Hop Frequency 1	0.00Hz ~ Maximum frequency	0.00Hz	☆
P7-10	Hop Frequency 1 Amplitude	0.00Hz ~ Maximum frequency	0.00Hz	☆

Function code	Name	Description (setting range)	Factory Default	Change
P7-11	Hop Frequency 2	0.00Hz ~ Maximum frequency	0.00Hz	☆
P7-12	Hop Frequency 2 Amplitude	0.00Hz ~ Maximum frequency	0.00Hz	☆

When the set frequency is within the jump frequency range, the actual operating frequency will run at the jump frequency boundary closer to the set frequency. By setting the jump frequency, the inverter can avoid the mechanical resonance point of the load. This inverter can set 2 jump frequency points. If two adjacent jump frequencies are set to the same value, this function will not work at that frequency.

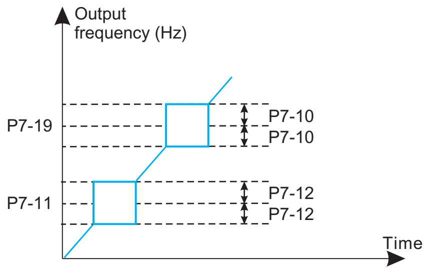


Fig.13-13 Schematic diagram of hopping frequency

Function code	Name	Description (setting range)	Factory Default	Change
P7-15	Forward and reverse dead time	0.0s ~ 3000.0s	0.0s	☆

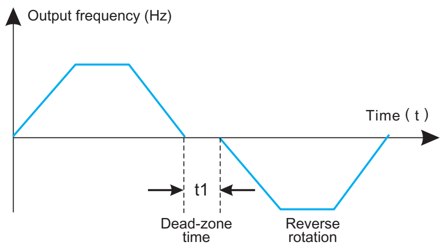


Fig.13-14 Schematic diagram of forward and reverse dead time

Function code	Name	Description (setting range)	Factory Default	Change
P7-16	Keyboard Knob Accuracy	0~10	2	☆

This parameter is used to define the resolution of the operation keyboard to adjust the set frequency in the monitoring menu mode. When the Up/Down button is operated, the frequency is added or subtracted with the set resolution.
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.

Function code	Name	Description (setting range)	Factory Default	Change
P7-17	The frequency is lower than the lower limit frequency processing	0~2	0	☆

0: Run at the lower frequency limit

1: Shutdown

2: Running at zero speed

Select the running state of the inverter when the set frequency is lower than the lower limit frequency. In order to avoid the motor running at low speed for a long time, this function can be used to select stop.

Function code	Name	Description (setting range)	Factory Default	Change
P7-18	Sag rate	0.0% ~ 100.0%	0.0%	☆

This function is generally used for load distribution when multiple motors drive the same load.

Droop control means that as the load increases, the output frequency of the inverter decreases, so that when multiple motors drive the same load, the output frequency of the motor in the load drops more, so that the load of the motor can be reduced and the multi-motor can be realized. Load evenly.

This parameter refers to the drop value of the output frequency when the inverter outputs the rated load.

Function code	Name	Description (setting range)	Factory Default	Change
P7-19	Delay time for frequency lower than lower limit shutdown	0.0s ~ 600.0s	0.0s	☆

When the set frequency is lower than the lower limit frequency and the action is selected as stop, the action of P7-19 will be delayed.

Function code	Name	Description (setting range)	Factory Default	Change
P7-20	Set cumulative operating time	0h ~ 65000h	0h	☆

Preset the running time of the inverter. When set to 0, this function has no effect.

When the accumulated running time (P7-34) reaches the set running time, the multi-function digital terminal of the inverter outputs the running time arrival signal (multi-function output No. 26) ON signal, and the inverter reports the accumulated time arrival fault Err40 at the same time.

Function code	Name	Description (setting range)	Factory Default	Change
P7-21	Jog priority	0~2	1	☆

0: invalid

1: Jog priority mode 1

2: Jog priority mode 2

1) When the user fails or the PID is lost, the jog is still valid;

2) The stop mode and DC braking can be set.

Function code	Name	Description (setting range)	Factory Default	Change
P7-22	Frequency detection value (PDT1 level)	0.00Hz ~ Maximum frequency	50.00Hz	☆
P7-23	Frequency check hysteresis value (PDT1 hysteresis)	0.0% ~ 100.0%	5.0%	☆

Set the detection value of the output frequency and the hysteresis value of the output action release.

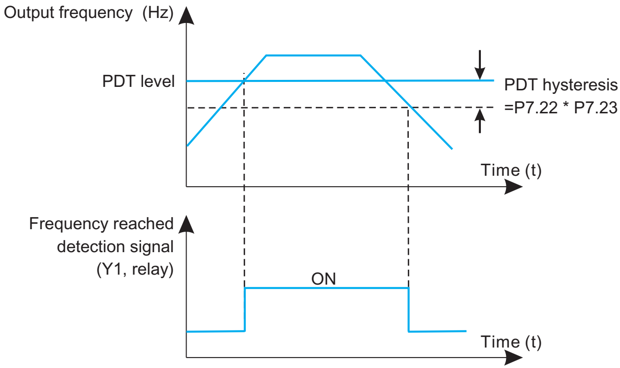


Fig.13-15 PDT level diagram

Function code	Name	Description (setting range)	Factory Default	Change
P7-24	Frequency arrival detection width	0.0% ~ 100.0%	0.0%	☆

When the output frequency of the inverter reaches the set frequency value, this function can adjust the detection amplitude. As shown below:

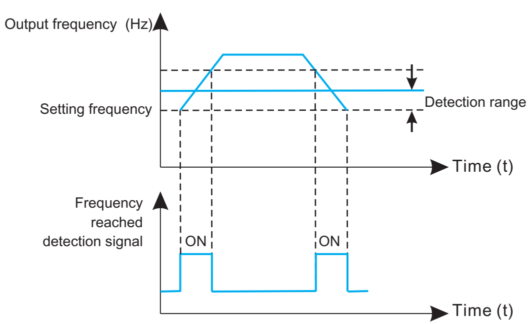


Fig.13-16 Schematic diagram of frequency arrival detection amplitude

Function code	Name	Description (setting range)	Factory Default	Change
P7-26	Fan control	0~1	0	★

0: The fan runs continuously;

1: The fan runs when the inverter is running;

It is used to select the action mode of the cooling fan. When it is selected as 1, the inverter will run the fan in the running state. If the radiator temperature is higher than 40 degrees in the stop state, the fan will run. In the stop state, the fan will not work when the radiator is lower than 40 degrees. run.

When 0 is selected, the fan keeps running after power-on.

Function code	Name	Description (setting range)	Factory Default	Change
P7-27	STOP/RESET function	0~1	0	☆

0: Only valid in keyboard control ;

1: The stop or reset function is valid in all control modes.

Function code	Name	Description (setting range)	Factory Default	Change
P7-28	Quick /JOG key function selection	0~3	0	★

The Quick/Jog key is a multi-function key, and the function of the Quick/Jog key can be set through this function code. This key can be used to switch between stop and running.

0: Forward jog

Forward jog (FJOG) is realized through the keyboard Quick/Jog key.

1: Forward and reverse switching

Use the Quick/Jog key to switch the direction of the frequency command. This function is only valid when the command source is the command channel of the operation panel.

2: Reverse jog

Reverse jog (RJOG) is realized through the keyboard Quick/Jog key.

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

Refers to the switching of the command source, that is, the switching between the current command source and keyboard control (local operation). If the current command source is keyboard control, the function of this key is invalid.

4: Panel frequency source switching (press the Quick key to change)

Function code	Name	Description (setting range)	Factory Default	Change
P7-29	LED running display	0000 ~ 0xPFPF	H.441F	☆

This function code sets the parameters displayed by the LED when the inverter is running. When the corresponding bit of this function code is set to 1, the monitoring parameter corresponding to this bit is displayed. When multiple function codes are selected for display, they can be switched by the SHIFT keys on the operation panel.

Note:

When the function code is set to H.0000, the running frequency is displayed by default.

Setting example:

The hexadecimal value corresponding to each quantity to be displayed has been calculated. As shown in Figure 5-7, the displayed quantities correspond to the set values one by one. For example, to display only the bus voltage, set the corresponding 0004 to P7-29 (H.0004). If multiple values need to be displayed, add the corresponding values one by one. For example, to display the bus For voltage and output current, set 0004+0010=0014, and set 0014 to P7-29 (H.0014). The numbers of the addition result exceeding 10 are represented by A B C D E F respectively, and the numbers represented are 10 11 12 13 14 15.

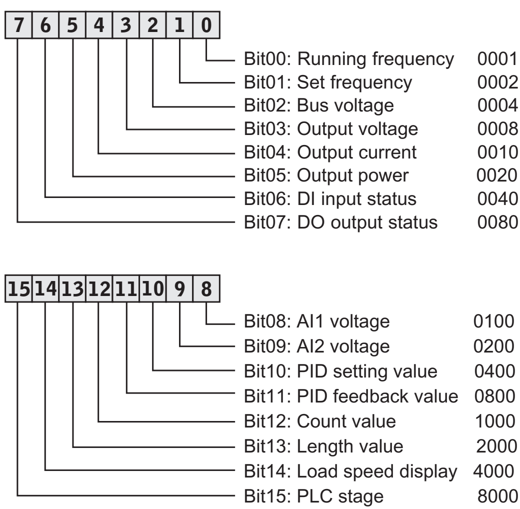


Figure 13-17. LED operation display bit map

Function code	Name	Description (setting range)	Factory Default	Change
P7-30	LED stop display	0001 ~ 0x1PFf	H.0043	☆

This function code sets the parameters displayed by LED when the inverter stops. When the corresponding bit of this function code is 1, the monitoring parameter corresponding to this bit is displayed. When multiple function codes are selected for display, they can be switched by the SHIFT keys on the operation panel.

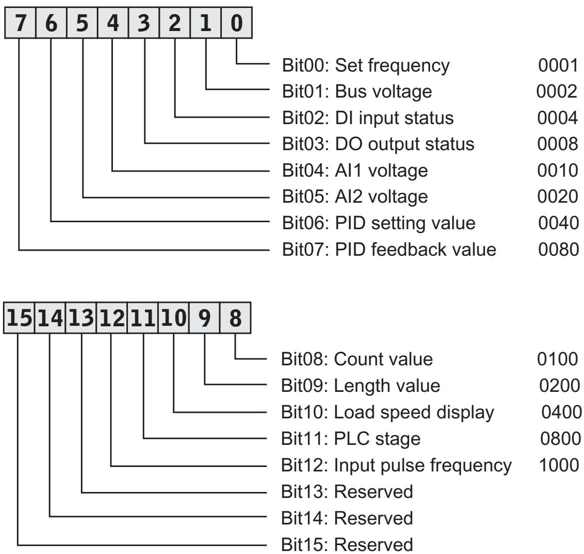


Figure 13-18. LED stop display corresponding map

Function code	Name	Description (setting range)	Factory Default	Change
P7-31	Load speed display factor	0.001 ~ 655.00	1.000	☆

Through this parameter, the output frequency of the inverter and the load speed are corresponded. It is used for setting when there is no high-speed pulse and the load speed needs to be displayed, the load speed (U1-22)=P7-31*running frequency. The unit can be speed or Hz, please set the specific parameter value according to the actual situation.

Function code	Name	Description (setting range)	Factory Default	Change
P7-32	Radiator temperature	12℃ ~ 100℃	Measured value	●

Displays the temperature of the IGBT of the inverter module. The over-temperature protection value of the IGBT of the inverter module of different models may be different.

Function code	Name	Description (setting range)	Factory Default	Change
P7-33	Cumulative power-on time	0h ~ 65535h	Measured value	●

Record the cumulative power-on time of the inverter, if the power-on time is less than 1 hour, it will not be recorded.

Function code	Name	Description (setting range)	Factory Default	Change
P7-34	Cumulative running time	0h ~ 65535h	Measured value	●

Record the accumulated running time of the inverter, if the running time is less than 1 hour, it will not be recorded.

Function code	Name	Description (setting range)	Factory Default	Change
P7-36	Current running timing enable selection	0~2	0	★

0:Disable

1: Enable, When the time is up, a fault is reported

2: Enable, When the time is up, a fault is not reported

Function code	Name	Description (setting range)	Factory Default	Change
P7-37	Selection of timing source for the current run	0~2	0	★

0: Digital setting P7-38;

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

2: AI2.

Function code	Name	Description (setting range)	Factory Default	Change
P7-38	Current running time set value	0.0min ~ 6500.0min	0.0min	☆

When the current running timing of P7-36 is valid, and the current running time source selects 0: P7-38 setting, and the switch output selects No. 27 function, the running time of the inverter reaches the set time, outputs the ON signal, and at the same time converts the frequency. The device reports that the running time has reached the fault Err39.

Function code	Name	Description (setting range)	Factory Default	Change
P7-39	High level timing	0.0s ~ 6000.0s	2.0s	☆
P7-40	Low level timing	0.0s ~ 6000.0s	2.0s	☆

When the timer input terminal "on" is longer than P7-39, the output of this timer function is turned on.

When the timer input terminal "disconnect" is longer than P7-40, the output of the timer function is disconnected.

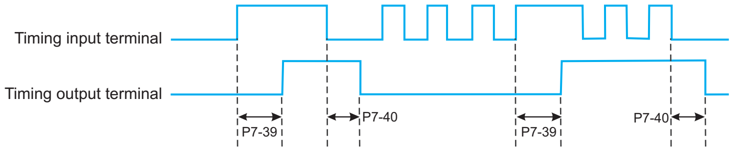


Fig.13-19 Schematic diagram of timer input and output operation

Function code	Name	Description (setting range)	Factory Default	Change
P7-41	Activate the protection function	0 ~ 1	1	☆

0: Invalid (start terminal command is valid and start directly)

1: Valid

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

1) The running command exists when the inverter is powered on, the running command must be removed before the running protection state can be eliminated.

2) If the running command still exists when the inverter is reset to fault, the running command must be removed to eliminate the running protection state.

This prevents the motor from running automatically without knowing it, creating a hazard.

If it is set to 0, and the running command exists when the inverter is powered on, the inverter will start directly.

Function code	Name	Description (setting range)	Factory Default	Change
P7-43	Frequency reaches detection value 1	0.00Hz ~ P0-14	50.00Hz	☆
P7-44	Frequency detection value 1 arrival width	0.0% ~ 100.0%	0.0%	☆

When the output frequency of the inverter is within the range of the positive and negative detection amplitudes of the detection value 1, the multi-function output terminal will output an ON signal. Please refer to Figure 13-16 for the DO output action.

Function code	Name	Description (setting range)	Factory Default	Change
P7-45	Current reaches detection value 1	0.0% ~ 300.0%	100.0%	☆
P7-46	Current detection value 1 arrival width	0.0% ~ 300.0%	0.0%	☆

When the output current of the inverter is within the positive and negative detection width of the detection value 1, the multi-function output terminal of the inverter outputs the ON signal.

Function code	Name	Description (setting range)	Factory Default	Change
P7-49	User password	0 ~ 65535	0	☆

If P7-49 is set to any non-zero number, the password protection function will take effect. The next time you enter the menu, you must enter the correct password, otherwise you cannot view and modify the function parameters, please keep in mind the set user password.

If P7-49 is set to 0, the set user password will be cleared and the password protection funct-ion will be invalid.

Function code	Name	Description (setting range)	Factory Default	Change
P7-50	Whether the jump frequency is valid during acceleration and deceleration	0~1	0	☆

0: invalid;

1: Valid.

Function code	Name	Description (setting range)	Factory Default	Change
P7-51	Set the power-on arrival time	0h ~ 65530h	0h	☆

When it is 0, the timing function is invalid.

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

Function code	Name	Description (setting range)	Factory Default	Change
P7-53	Acceleration time 1/2 switching frequency point	0.00Hz ~ P0-14	0.00Hz	☆
P7-54	Deceleration time 1/2 switching frequency point	0.00Hz ~ P0-14	0.00Hz	☆

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

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

Function code	Name	Description (setting range)	Factory Default	Change
P7-55	Frequency detection value (PDT2 level)	0.00Hz ~ P0-14	50.00Hz	☆
P7-56	Frequency detection PDT2 hysteresis value	0.0% ~ 100.0%	5.0%	☆

It has the same meaning as PDT1, please refer to P7-22, P7-23 and Figure 5-15 for details.

Function code	Name	Description (setting range)	Factory Default	Change
P7-57	Frequency reaches detection value 2	0.00Hz ~ P0-14	50.00Hz	☆
P7-58	Frequency arrival detection 2 amplitude	0.0% ~ 100.0%	0.0%	☆

The meaning is the same as that of frequency arrival detection value 1, please refer to P7-43, P7-44 and Fig. 5-16 for details.

Function code	Name	Description (setting range)	Factory Default	Change
P7-59	Zero current detection value	0.0% ~ 300.0%	10.0%	☆
P7-60	Zero current detection delay time	0.01s ~ 300.00s	1.00s	☆

When the output current of the inverter during operation is less than or equal to the zero current detection level, and the duration exceeds the zero current detection delay time, and the inverter multi-function terminal selects the No. 35 function, the ON signal is output.

Function code	Name	Description (setting range)	Factory Default	Change
P7-61	Output current amplitude detection	20.0% ~ 400.0%	200.0%	☆
P7-62	Software overcurrent maximum allowable time	0s~6500.0s	0s	☆

When the inverter 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, and the inverter multi-function output terminal selects 36, the ON signal is output.

Function code	Name	Description (setting range)	Factory Default	Change
P7-63	Current reaches detection value 2	20.0% ~ 300.0%	100.0%	☆
P7-64	Current arrival detection 2 amplitude	0.0% ~ 300.0%	0.0%	☆

The meaning is the same as that of current reaching detection 1, please refer to the description of P7-45 and P7-46 for details.

Function code	Name	Description (setting range)	Factory Default	Change
P7-65	LED running display parameter 2	0x0~0x1PF	H.010	

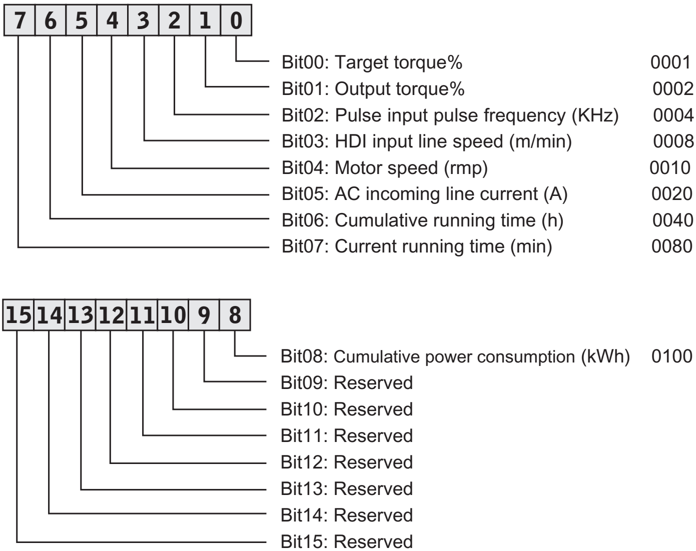


Figure 13-20. LED operation display bit map

Function code	Name	Description (setting range)	Factory Default	Change
P7-67	AI1 input voltage lower limit	0.00V ~ P7-68	2.00V	☆
P7-68	AI1 input voltage upper limit	P7-67 ~ 11.00V	8.00V	☆

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

Function code	Name	Description (setting range)	Factory Default	Change
P7-69	Module temperature reached	0℃ ~ 90℃	70℃	☆

When the module temperature of the inverter reaches the set value of P7-69, the multi-function output terminal outputs ON signal.

Function code	Name	Description (setting range)	Factory Default	Change
P7-70	Output power display correction factor	0.001 ~ 3.000	1.000	☆

Output power display = output power *P7-70, which can be viewed through monitoring code U1-05.

Function code	Name	Description (setting range)	Factory Default	Change
P7-71	Linear velocity display correction factor	0.000 ~ 60.000	1.000	☆

Linear speed=P7-71*Number of HDI pulses sampled per second/Pb-07, which can be viewed through monitoring parameter U1-14.

Function code	Name	Description (setting range)	Factory Default	Change
P7-72	Cumulative power consumption (kWh)	0 ~ 65535	Measured value	●

The accumulated power consumption of the inverter so far can only be viewed but not modified.

Function code	Name	Description (setting range)	Factory Default	Change
P7-73	Performance software version		#.#	●

Performance software version number.

Function code	Name	Description (setting range)	Factory Default	Change
P7-74	Functional software version		#.#	●

Function software version number.

Function code	Name	Description (setting range)	Factory Default	Change
P7-75	Enhanced function parameter display selection	0.00 ~ 655.35	0	☆

Function software version number.

Function code	Name	Description (setting range)	Factory Default	Change
P7-76	Motor speed display correction factor	0.0010 ~ 3.0000	1.0000	☆
P7-80	The fire mode was enabled	0~1	0	☆
P7-81	Set frequency in fire mode	0Hz ~ P0-14	50.00Hz	☆

Group P8: Communication parameters

Function code	Name	Description (setting range)	Factory Default	Change
P8-00	Baud rate setting	0~7	2	☆
P8-01	Data Format	0.0s ~ 3000.0s	0	☆

Baud rate settings:

0: 300BPS

1: 600BPS

2: 1200BPS

3: 2400BPS

4: 4800BPS

5: 9600BPS

6: 19200BPS

7: 38400BPS

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

Data Format:

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

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

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

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

Note that the baud rate and data format set by the host computer and the inverter must be consistent, otherwise, the communication cannot be carried out.

Function code	Name	Description (setting range)	Factory Default	Change
P8-02	Comunication address	0 ~ 247	1	☆

When the local address is set to 0, that is, the broadcast address, which realizes the broadcast function of the upper computer.

Note:

The address of this machine is unique (except for broadcasting), which is the basic condition for realizing point-to-point communication between the host computer and the inverter.

Function code	Name	Description (setting range)	Factory Default	Change
P8-03	Response time	0ms ~ 30ms	2ms	☆

The response delay refers to the interval time from the end of the inverter data reception to the time when the data is sent to the upper computer. If the response delay is less than the system processing time, the response delay is subject to the system processing time. If the response delay is longer than the system processing time, after the system has processed the data, it will wait until the response delay time is reached. send data.

Function code	Name	Description (setting range)	Factory Default	Change
P8-04	Communication timeout	0ms ~ 30ms	0.0s	☆

When the function code is set to 0.0s, the communication timeout parameter is invalid.

When the function code is set to non-zero, if the interval between one communication and the next communication exceeds the communication timeout time, the system will report a communication failure error (Err27), which is usually set to be invalid. If this parameter is set in a system with continuous communication, the communication status can be monitored.

Function code	Name	Description (setting range)	Factory Default	Change
P8-05	Communication format selection	0 ~ 1	0	☆

0: Standard Modbus protocol.

1: When the command is read, the number of bytes returned by the slave is one byte more than the standard Modbus protocol. Refer to Appendix A for the description of the communication protocol.

Function code	Name	Description (setting range)	Factory Default	Change
P8-06	Background software monitoring function	0 ~ 1	0	☆

0: Disable, default 485 communication function;

1: On, the background software monitoring function, the 485 communication function cannot be used at this time.

Function code	Name	Description (setting range)	Factory Default	Change
P8-11	Communication protocol selection	0!1	0	☆

Group P9: Fault and Protection

Function code	Name	Description (setting range)	Factory Default	Change
P9-00	Motor overload protection selection	0~1	1	☆

0: No motor overload protection function, there is a danger of motor overheating damage, it is recommended to heat the relay between the inverter and the motor;

1: There is a motor overload protection function, and the relationship between the protection time and the motor current is shown in Figure 13-20.

Function code	Name	Description (setting range)	Factory Default	Change
P9-01	Motor overload protection gain	0.10~10.00	1.00	☆

In order to effectively protect the overload of different motors, it is necessary to set P9-01 appropriately. For the usage method, refer to Figure 13-21 of the inverse time limit curve of motor overload protection. In the figure, L1 is the relationship between the motor protection time and the motor current when P9-01=1. When the user needs to change the protection time of a certain current of the motor, he only needs to change P9-01. The time relationship is:

Required protection time T = P9-01 × T(L1)

Example:

When the user needs to modify the protection time of 150% rated current to 3 minutes, first find in Figure 13-20 that the protection time of 150% motor current is 6.0 minutes, then P9-01 = required protection time T/T (L1)=3min/6min=0.5.

The maximum time of motor overload protection is 100 minutes, and the shortest overload time is 0.1 minutes. Please set it according to your needs. And when the motor is overloaded, the inverter will report Err14 to avoid damage to the motor due to continuous heating.

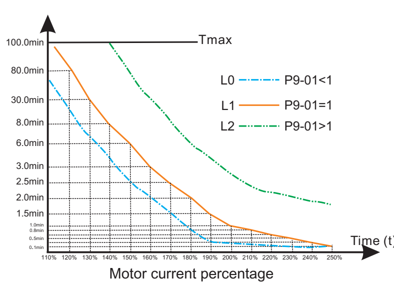


Figure 13-21. Motor overload protection curve

Note:

By default, there is no overload protection below 110% of the rated current of the motor. When you need to achieve overload protection below 110% of the rated current of the motor, please set the motor overload protection current coefficient P9-35 appropriately.

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

Example:

The user needs to set the protection time to 30.0min when the rated current is 90%, first find in Figure 13-20 that the current corresponding to 30.0min on L1 is 130%, P9-35=(130%/90%) ×100% =144%. Note: The minimum current protection value is 55%.

Function code	Name	Description (setting range)	Factory Default	Change
P9-02	Motor overload warning coefficient (%)	50% ~ 100%	80%	☆

This function is used to give an early warning signal to the control system before the motor overload fault protection, so as to pre-protect the motor overload.

The larger the value is, the smaller the early warning is.

When the cumulative output current of the inverter is greater than 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 the switch signal. The terminal function is 6, see P6-00~P6-02 function code setting instructions for details.

Function code	Name	Description (setting range)	Factory Default	Change
P9-03	Overvoltage Stall Protection Gain	000 ~ 100	030	☆
P9-04	Overvoltage stall protection voltage	200.0 ~ 1200.0V	760.0V	★

<1> This value is the factory value of 380V inverter, and the factory value of 200V inverter is 380V.

During the deceleration process of the inverter, when the DC bus voltage exceeds the overvoltage stall protection voltage, the inverter stops decelerating to maintain the current operating frequency, and continues to decelerate after the bus voltage drops.

Overvoltage stall gain, used to adjust the inverter's ability to suppress overvoltage during deceleration. The larger the value, the stronger the overvoltage suppression capability. Under the premise of no overvoltage, the smaller the gain setting, the better.

For loads with small inertia, the overvoltage stall gain should be small, otherwise the dynamic response of the system will be slowed down. For loads with large inertia, this value should be large, otherwise the suppression effect will not be good, and an overvoltage fault may occur.

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

Function code	Name	Description (setting range)	Factory Default	Change
P9-05	VF Overcurrent Stall Protection Gain	0 ~ 100	20	☆
P9-06	VF Overcurrent Stall Protection Current	50% ~ 200%	150%	★
P9-07	VF field weakening area current stall protection factor	50% ~ 200%	100%	★

Over-current stall: when the output current of the inverter reaches the set over-current stall protection current (P9-06), the inverter will stop accelerating when it is accelerating; when it is running at a constant speed, the output frequency will be reduced; Slow down the falling speed until the current is less than the overcurrent stall protection current (P9-06), the running frequency will return to normal. See Figure 5-21 for details.

Overcurrent Stall Protection Current: Select the current protection point of the overcurrent stall function. When this parameter value is exceeded, the inverter starts to execute the overcurrent stall protection function. The value is a percentage relative to the rated current of the drive.

Overcurrent stall gain: used to adjust the inverter's ability to suppress overcurrent during acceleration and deceleration. The larger the value, the stronger the overcurrent suppression capability. Under the premise of no overcurrent, the smaller the gain setting, the better.

For loads with small inertia, the over-current stall gain should be small, otherwise the dynamic response of the system will be slowed down. For loads with large inertia, this value should be large, otherwise the suppression effect will be poor and overcurrent faults may occur. In the case of very small inertia, it is recommended to set the overcurrent suppression gain to less than 20.

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

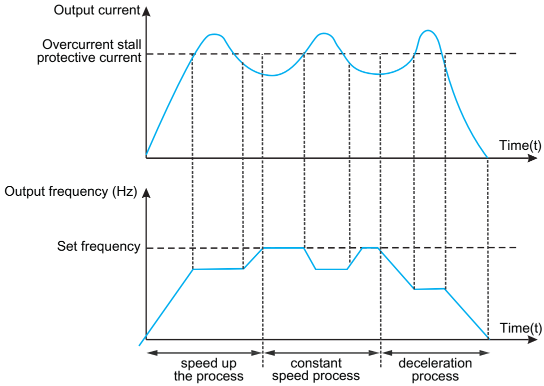


Fig.13-22 Schematic diagram of over-current stall protection

Function code	Name	Description (setting range)	Factory Default	Change
P9-08	Overvoltage stall allowable rise limit value	0.0% ~ 50.0%	10.0%	☆

The maximum allowable adjustment amount when adjusting the frequency when overvoltage stalls, generally does not need to be modified.

Function code	Name	Description (setting range)	Factory Default	Change
P9-11	Fault automatic reset times	0 ~ 20	0	☆
P9-12	Fault relay action selection during automatic fault reset	0 ~ 1	0	☆

After selecting the automatic fault reset function of the inverter, during the execution of fault reset, it can be determined whether the fault relay action is required to shield the fault alarm caused by this parameter setting, so that the equipment can continue to run.

Function code	Name	Description (setting range)	Factory Default	Change
P9-13	Fault automatic reset interval time	0.1s ~ 100.0s	1.0s	☆

The waiting time between the fault alarm and the automatic reset of the fault.

Function code	Name	Description (setting range)	Factory Default	Change
P9-14	Input phase loss enable selection	0~1	1	☆

0: Disable.

1: Enable, the fault code is Err23 when input phase loss occurs.

Function code	Name	Description (setting range)	Factory Default	Change
P9-15	Output phase loss enable selection	0~1	1	☆

0: Disable.

1: Enable, the fault code is Err24 when output phase loss occurs.

Function code	Name	Description (setting range)	Factory Default	Change
P9-16	Power-on to ground short-circuit protection selection	0~1	1	☆

0: Disable.

1: Enable, allow the inverter to detect whether the motor is short-circuited to ground when powered on, if this fault occurs, the fault code Err20.

Function code	Name	Description (setting range)	Factory Default	Change
P9-17	Undervoltage fault automatic reset selection	0~1	0	☆

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 Err12 needs to be cleared manually

1: Automatic reset, after an undervoltage fault occurs, the inverter will follow the current bus voltage to clear the undervoltage fault Err12 by itself.

Function code	Name	Description (setting range)	Factory Default	Change
P9-18	Overvoltage suppression mode selection	0～2	1	★

0: invalid

1: Overvoltage suppression mode 1, which is mainly used to prevent the overvoltage fault from being reported due to the rise of the bus voltage caused by the energy feedback when the motor decelerates;

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

Function code	Name	Description (setting range)	Factory Default	Change
P9-19	Overvoltage suppression mode 2 limit value	0～2	2	★

0: invalid

1: The constant speed and deceleration process are valid during running

2: Only the deceleration process is valid

Generally used in occasions where quick shutdown is required, magnetic flux braking consumes the feedback energy brought by deceleration at the motor end, thereby effectively preventing overvoltage faults. The strength of the suppression effect can be adjusted by adjusting the magnetic flux braking gain P2-10 (VF).

When the braking resistor is used as overvoltage suppression, please set P9-19 to 0 (invalid), otherwise an abnormality may occur during deceleration.

Function code	Name	Description (setting range)	Factory Default	Change
P9-20	Overvoltage suppression mode 2 limit value	1.0%～150.0%	10.00%	★

The maximum allowable adjustment when overvoltage suppression mode 2 is in effect. The smaller the value, the smaller the rise of the bus voltage, but the longer the deceleration time.

Function code	Name	Description (setting range)	Factory Default	Change
P9-22	Fault protection action 1	0～22202	00000	☆

The meaning of each setting is the same as that of the ones.

Units place: Motor overload - Err14 :

0: Free parking;

1: stop according to the stop mode;

2: keep running.

Ten: reserved :

Hundreds place: input phase loss - Err23;

Thousands place: output phase loss - Err24;

Ten thousand: Parameter read and write exception - Err25.

Function code	Name	Description (setting range)	Factory Default	Change
P9-23	Fault protection action 2	0 ~ 22222	00000	☆

For the meaning of each setting of fault protection action 2, refer to fault protection action 1.

Ones place: Communication failure - Err27;

0: Free parking;

1: stop according to the stop mode;

2: keep running.

Tens place: External fault - Err28;

Hundreds place: excessive speed deviation fault - Err29;

Thousands: User-defined fault 1- Err30;

Ten thousand: user-defined fault 2- Err31.

Function code	Name	Description (setting range)	Factory Default	Change
P9-24	Fault protection action 3	0 ~ 22222	00000	☆

For the meaning of each setting of fault protection action 3, refer to fault protection action 1.

Ones place: PID feedback lost during runtime - Err32;

0: Free parking;

1: stop according to the stop mode;

2: keep running;

Tens place: load loss fault - Err34;

Hundreds: reserved ;

Thousands place: The current time of continuous operation is reached - Err39;

Ten thousand: Cumulative running time reaches - Err40 ;

Note:

When the fault protection action 1~fault protection action 3 are selected as "free stop", the inverter will display Err** and stop directly.

When "stop by stop mode" is selected: the inverter displays Ala**, and stops by stop mode, and displays Err** after stop.

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

Function code	Name	Description (setting range)	Factory Default	Change
P9-26	Continue to run frequency selection in case of failure	0 ~ 4	1	☆

0: Run at the current operating frequency;
1: Run at the set frequency;
2: Run at the upper limit frequency;
3: Run at the lower frequency limit;
4: Run at the standby frequency setting value P9-27.

Function code	Name	Description (setting range)	Factory Default	Change
P9-27	Abnormal standby frequency set value	0.0% ~ 100.0%	100%	☆

This value is a percentage relative to the maximum frequency, which takes effect when P9-26 selects an abnormal backup frequency and a fault occurs.

Function code	Name	Description (setting range)	Factory Default	Change
P9-28	Drop load protection option	0~1	0	☆
P9-29	Drop load detection level	0.0% ~ 80.0%	20.0%	★
P9-30	Load drop detection time	0.0s ~ 100.0s	5.0s	☆

When the load loss protection is enabled, that is, P9-28=1, if the output current of the inverter is less than the load loss detection level set by P9-29 (P9-29*motor rated current), and the duration exceeds the limit of P9-30 When the load loss detection time is reached, the inverter outputs the load loss fault Err34. Of course, it is also possible to select the action state after the load is dropped through P9-24.

Function code	Name	Description (setting range)	Factory Default	Change
P9-31	Excessive speed deviation detection value	0.0% ~ 100.0%	20.0%	☆
P9-32	Excessive speed deviation detection time	0.0s ~ 100.0s	0.0s	☆

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

When the inverter detects that the actual speed of the motor deviates from the set speed, the speed deviation value is greater than the excessive speed deviation detection value P9-31, and the duration is longer than the excessive speed deviation detection time P9-32, the inverter reports Err29. P9-23 can also define the inverter action state after the fault.

Function code	Name	Description (setting range)	Factory Default	Change
P9-33	Overspeed detection value	0.0% ~ 100.0%	20.0%	☆
P9-34	Overspeed detection time	0.0s ~ 100.0s	2.0s	☆

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

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

When the over-speed detection time is 0.0s, the over-speed protection is invalid.

Function code	Name	Description (setting range)	Factory Default	Change
P9-35	Motor overload protection current coefficient	100% ~ 200%	100%	☆

This parameter is used to realize the overload protection below 110% of the rated current of the motor, and should be used in conjunction with P9-00~P9-02.

Function code	Name	Description (setting range)	Factory Default	Change
P9-36	Motor overheating pre-alarm threshold	0~200℃	80℃	☆
P9-37	Motor overheating protection value	0~200℃	100℃	☆
P9-38	Temperature sensor type selection	0~2	0	☆

IO1 expansion card supports 1-way temperature detection to protect the motor from overheating, P9-38 selects the temperature sensor type.

Group PA: PID function

PID control is a common method of process control. By performing proportional, integral and differential operations on the difference between the feedback signal of the controlled variable and the target signal, and by adjusting the output frequency of the inverter, a closed-loop system is formed, so that the controlled variable is stable at target value.

It is suitable for process control occasions such as flow control, pressure control and temperature control. Figure 13-26 is the control principle block diagram of process PID.

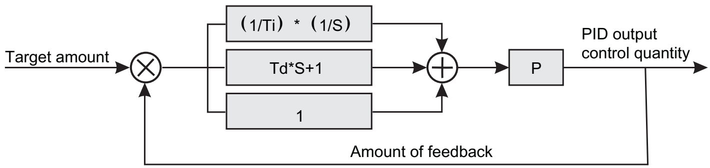


Fig.13-26 Process PID block diagram

Function code	Name	Description (setting range)	Factory Default	Change
PA-00	PID setting source	0~6	0	☆

0: PA-01 setting;

1: AI1;

2: AI2;

3: Communication given;

4: PULSE pulse given;

5: Multi-segment instructions;

6: Up/Down modify PA-01 (valid when P0-06=6).

When the frequency source selects PID, that is, P0-06 or P0-07 is selected as 6, this group of functions will work.

This parameter determines the target quantity given channel of the process PID.

The set target value of the process PID is a relative value, and the setting range is 0~100%.

The range of PID (PA-05) is not necessary, because no matter how much the range is set to, the system is based on the relative value (0~100%). However, if the PID range is set, the actual value of the signal corresponding to the PID given and feedback can be observed intuitively through the keyboard display parameters.

Function code	Name	Description (setting range)	Factory Default	Change
PA-01	PID digital setting	0.0 ~ 100.0%	50.0%	☆

When PA-00=0 is selected, the target source is given by the keyboard. This parameter needs to be set.

Function code	Name	Description (setting range)	Factory Default	Change
PA-02	PID given change time	0.00s ~ 650.00s	0.00s	☆

The PID given change time refers to the time required for the actual PID value to change from 0.0% to 100.0%.

When the PID given changes, the actual value of the PID given will not respond immediately. Instead, it changes linearly according to the given time, preventing the given mutation from occurring.

Function code	Name	Description (setting range)	Factory Default	Change
PA-03	PID feedback source	0 ~ 4	0	☆

0: AI1

1: AI2

2: AI1-AI2

3: Communication given

4: PULSE pulse given

This parameter is used to select the feedback signal channel for the process PID.

The feedback amount of the process PID is also a relative value, and the setting range is 0.0% to 100.0%.

Function code	Name	Description (setting range)	Factory Default	Change
PA-04	PID action direction	0	0	☆

0: Positive action, when the feedback signal of the PID is less than the given value, the output frequency of the inverter increases. Such as winding tension control occasions.

This function is affected by the reversal of the PID action direction of the multi-function terminal (function 35), and needs to be paid attention to during use.

Function code	Name	Description (setting range)	Factory Default	Change
PA-05	PID setting feedback range	0 ~ 65535	1000	☆

PID given feedback range is a dimensionless unit, used for PID given display U1-10 and PID feedback display U1-11.

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

Function code	Name	Description (setting range)	Factory Default	Change
PA-06	Proportional gain P	0.0 ~ 100.0	20.0	☆
PA-07	Integral time I	0.01s ~ 10.00s	2.00s	☆
PA-08	Differential time D	0.000s ~ 10.000s	0.000s	☆

Proportional gain Kp1:

Determines the adjustment strength of the entire PID regulator, the greater the Kp1, the greater the adjustment strength. The parameter 100.0 means that when the deviation between the PID feedback amount and the given amount is 100.0%, the adjustment range of the PID regulator to the output frequency command is the maximum frequency.

Integration time Ti1:

Determines the strength of the PID regulator integral adjustment. The shorter the integration time, the stronger the adjustment intensity. The integral time means that when the deviation between the PID feedback quantity and the given quantity is 100.0%, the integral regulator continuously adjusts after this time, and the adjustment quantity reaches the maximum frequency.

Differential time Td1:

Determines how strongly the PID regulator adjusts the deviation rate of change. The longer the differentiation time, the greater the adjustment intensity. Differential time means that when the feedback amount changes 100.0% within this time, the adjustment amount of the differen-tial regulator is the maximum frequency.

Function code	Name	Description (setting range)	Factory Default	Change
PA-09	PID reverse cutoff frequency	0.00 ~ Maximum frequency (P0-14)	0.00Hz	☆

In some cases, only when the PID output frequency is negative (that is, the inverter is reversed), can the PID control the given amount and the feedback amount to the same state, but too high reverse frequency is not allowed in some occasions Yes, PA-09 is used to determine the upper limit of the reverse frequency.

Function code	Name	Description (setting range)	Factory Default	Change
PA-10	Deviation limit	0.0% ~ 100.0%	0.0%	☆

When the deviation between the PID given amount and the feedback amount is less than PA-10, the PID will stop adjusting. In this way, when the deviation between the given and the feedback is small, the output frequency is stable and unchanged, which is very effective for some closed-loop control occasions.

Function code	Name	Description (setting range)	Factory Default	Change
PA-11	Differential clipping	0.00% ~ 100.00%	0.0%	☆

In the PID regulator, the role of differential is more sensitive, and it is easy to cause system oscillation. For this reason, the role of PID differential is generally limited to a small range. PA-11 is used to set the range of PID differential output.

Function code	Name	Description (setting range)	Factory Default	Change
PA-12	PID feedback filter time	0.00 ~ 60.00s	0.00s	☆

PA-12 is used to filter the PID feedback amount, which is beneficial to reduce the influence of the feedback amount by interference, but it will bring the response performance of the process closed-loop system.

Function code	Name	Description (setting range)	Factory Default	Change
PA-13	PID feedback loss detection value	0.0% ~ 100.0%	0.0%	☆
PA-14	PID feedback loss detection time	0.0s ~ 3600.0s	0s	☆

This function code is used to judge whether the PID feedback is lost.

When the PID feedback amount 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 one-digit selection of P9-24, and report ERR32 for faults and ALA32 for alarms.

Function code	Name	Description (setting range)	Factory Default	Change
PA-18	Proportional gain P2	0.0 ~ 100.0	20.0	☆
PA-19	Integration time I2	0.01s ~ 10.00s	2.00s	☆
PA-20	Differential time D2	0.000s ~ 10.000s	0.000s	☆
PA-21	PID parameter switching conditions	0 ~ 2	0	☆
PA-22	PID parameter switching deviation 1	0.0% ~ PA-23	20.0%	☆
PA-23	PID parameter switching deviation 2	PA-22 ~ 100.0%	80.0%	☆

In some applications, a set of PID parameters cannot meet the needs of the entire operation process, and different PID parameters need to be used in different situations. This group of function codes is used for switching between two groups of PID parameters. Among them, the setting method of the regulator parameters PA-18~PA-20 is similar to the parameters PA-06~PA-08. PA-21 is the PID parameter switching condition:

PA-21=0: do not switch, use the first group of PID parameters.

PA-21=1: DI terminal switching, multi-function terminal function selection 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 the parameter Group 2 (PA-18~PA-20).

PA-21=2 Automatically switch according to the deviation. When the absolute value of the deviation between the reference and the feedback is less than the PID parameter switching deviation 1 (PA-22), the PID parameter selects parameter group 1. When the absolute value of deviation between reference and feedback is greater than PID switching deviation 2 (PA-23), PID parameter selection selects parameter group 2. When the deviation between reference and feedback is between switching deviation 1 and switching deviation 2, the PID parameters are the linear interpolation values of two sets of PID parameters, as shown in Figure 13-24.

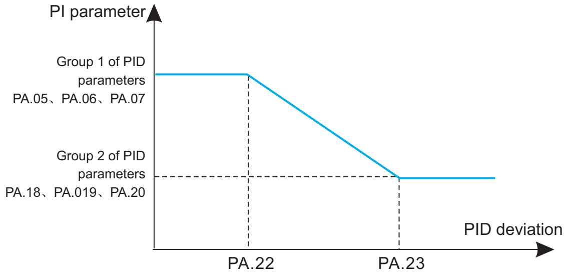


Fig.13-24 PID parameter switching

Function code	Name	Description (setting range)	Factory Default	Change
PA-24	PID initial value	0.0% ~ 100.0%	0.0%	☆
PA-25	PID initial value hold time	0.00s ~ 650.00s	0.00s	☆

When the inverter starts, the PID output is fixed at the PID initial value PA-24, and the PID starts the closed-loop adjustment operation after the PID initial value holding time PA-25. Figure 13-25 is a functional schematic diagram of PID initial value.

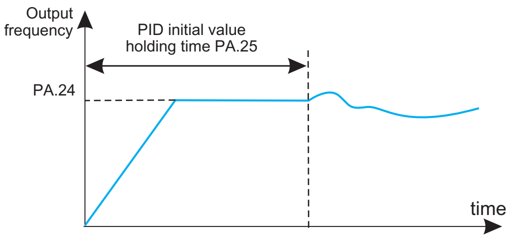


Fig.13-25 Schematic diagram of PID initial value function

Function code	Name	Description (setting range)	Factory Default	Change
PA-26	Twice output deviation positive maximum value	0.00% ~ 100.00%	1.00%	☆
PA-27	Twice output deviation reverse maximum value	0.00% ~ 100.00%	1.00%	☆

This function is used to limit the difference between the two outputs of the PID, so as to suppress the rapid change of the PID output and stabilize the operation of the inverter. PA-26 and PA-27 correspond respectively, the maximum value of the absolute value of the output deviation during forward rotation and reverse rotation.

Function code	Name	Description (setting range)	Factory Default	Change
PA-28	PID integral properties	00~11	00	☆

Ones place: integral separation selection

0: invalid

1: Valid

If the integral separation is set to be valid, when the multi-function digital DI integral pause (function 38) is valid, the integral PID integral of the PID stops the operation, and only the proportional and differential functions of the PID are valid at this time.

When the integral separation selection is invalid, regardless of whether the multi-function digital DI is valid or not, the integral separation is invalid.

Tens place: whether to stop the integration selection after the output reaches the limit value

0: Continue points

1: Stop integration

After the PID operation output reaches the maximum or minimum value, you can choose whether to stop the integral action. If you choose to stop integration, the PID integration will stop calculating at this time, which can reduce the overshoot of the PID.

Function code	Name	Description (setting range)	Factory Default	Change
PA-29	PID shutdown operation	0~1	0	☆

0: In stop state, PID does not operate.

1: In stop state, PID operation.

Group Pb: Swing Frequency, Fixed Length and Count

The swing frequency function is suitable for textile, chemical fiber and other industries, as well as occasions where traversing and winding functions are required.

The swing frequency function refers to the output frequency of the inverter, which swings up and down with the set frequency as the center. The trajectory of the running frequency on the time axis is shown in Figure 13-26. The swing amplitude is set by Pb-00 and Pb-01. When Pb-01 is set to 0, the swing is 0, and the swing frequency does not work.

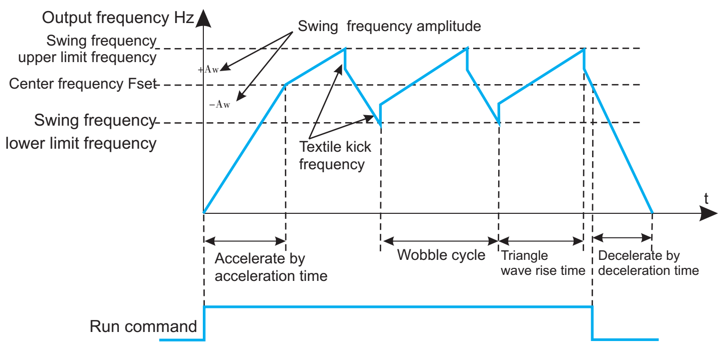


Figure 13-26. Schematic diagram of swing frequency operation

Function code	Name	Description (setting range)	Factory Default	Change
Pb-00	Swing setting method	0~1	0	☆

Use this parameter to determine the reference amount of the swing.

0: Relative center frequency (P0-06 frequency source), which is a variable swing system. The swing varies with the center frequency (set frequency).

1: Relative to the maximum frequency (P0-14), it is a fixed swing system, and the swing is fixed.

Function code	Name	Description (setting range)	Factory Default	Change
Pb-01	Swing frequency amplitude	0.0% ~ 100.0%	0.0%	☆
Pb-02	Jump frequency amplitude	0.0% ~ 50.0%	0.0%	☆

Use this parameter to determine the swing frequency amplitude and the value of the sudden jump frequency.

When setting the swing amplitude relative to the center frequency (Pb-00=0), swing amplitude AW = frequency source P0-07 × swing amplitude Pb-01. When setting the swing amplitude relative to the maximum frequency (Pb-00=1), the swing amplitude AW = the maximum frequency P0-14 × the swing amplitude Pb-01.

The kick frequency amplitude is the percentage of the kick frequency relative to the swing amplitude when the swing frequency is running, namely: kick frequency = swing amplitude AW × kick frequency amplitude Pb-02. If the swing is selected relative to the center frequency (Pb-00=0), the kick frequency is the change value. If the swing is selected relative to the maximum frequency (Pb-00=1), the kick frequency is a fixed value.

The wobble operating frequency is constrained by the upper limit frequency and the lower limit frequency.

Function code	Name	Description (setting range)	Factory Default	Change
Pb-03	Swing frequency cycle	0.1s ~ 3000.0s	10.0s	☆
Pb-04	Triangular wave rising time coefficient	0.1% ~ 100.0%	50.0%	☆

Wobble Period: The time value of a complete Wobble period.

The triangular wave rising time coefficient Pb-04 is the time percentage of the triangular wave rising time relative to the wobble frequency period Pb-03.

Triangular wave rise time = swing frequency period Pb-03 × triangular wave rise time coefficient Pb-04, the unit is second.

Triangular wave falling time = swing frequency period Pb-03 × (1-triangular wave rising time coefficient Pb-04), the unit is second.

Function code	Name	Description (setting range)	Factory Default	Change
Pb-05	Set length	0m ~ 65535m	1000m	☆
Pb-06	Actual length	0m ~ 65535m	0m	☆
Pb-07	Number of pulses per meter	0.1 ~ 6553.5	100.0	☆

The above function codes are used for fixed-length control.

The length information needs to be collected through the multi-function digital input terminal.

The number of pulses sampled by the terminal is divided by the number of pulses per meter Pb-07, and the actual length Pb-06 can be calculated. When the actual length is greater than or equal to the set length Pb-05, the multi-function digital terminal will output the "length reached" ON signal.

During the fixed-length control process, the length reset operation can be performed through the multi-function DI terminal (the DI function selection is 31). For details, please refer to the settings of P5-00~P5-04.

In the application, the corresponding input terminal function needs to be set to "length count input" (the DI function is selected as 30). When the pulse frequency is high, the HDI port must be used.

Function code	Name	Description (setting range)	Factory Default	Change
Pb-08	Set count value	1 ~ 65535	1000	☆
Pb-09	Designated count value	1 ~ 65535	1000	☆

The count value needs to be collected through the 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 "set count value reached" ON signal.

When the count value reaches the designated count value Pb-09, the multi-function digital output "designated count value reached" ON signal.

The specified count value Pb-09 should not be greater than the set count value Pb-08. Figure 13-27 is a schematic diagram of the function of setting count value arrival and specifying count value arrival.

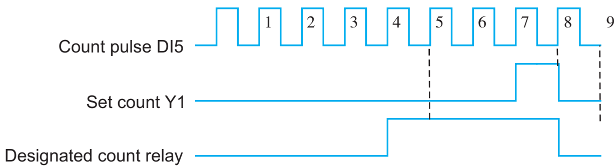


Fig.13-27 Reaching the set count value and designated count value

Group PC: Multi-segment instruction and simple PLC function

The simple PLC function is that the inverter has a built-in programmable logic controller (PLC) to complete the automatic control of multi-segment frequency logic. The running time, running direction and running frequency can be set to meet the requirements of the process.

700 series intelligent inverter can realize 16-stage speed change control, and there are 4 kinds of acceleration and deceleration time for selection.

When the set PLC completes a cycle, the multi-function digital output terminal Y1, multi-function relays RELAY1 and RELAY2 can output ON signal. For details, see P6-00~P6-02.

Function code	Name	Description (setting range)	Factory Default	Change
PC-00	Multi-speed 0	-100.0% ~ 100.0%	0.0%	☆
PC-01	Multi-speed 1	-100.0% ~ 100.0%	0.0%	☆
PC-02	Multi-speed 2	-100.0% ~ 100.0%	0.0%	☆
PC-03	Multi-speed 3	-100.0% ~ 100.0%	0.0%	☆
PC-04	Multi-speed 4	-100.0% ~ 100.0%	0.0%	☆
PC-05	Multi-speed 5	-100.0% ~ 100.0%	0.0%	☆
PC-06	Multi-speed 6	-100.0% ~ 100.0%	0.0%	☆
PC-07	Multi-speed 7	-100.0% ~ 100.0%	0.0%	☆
PC-08	Multi-speed 8	-100.0% ~ 100.0%	0.0%	☆
PC-09	Multi-speed 9	-100.0% ~ 100.0%	0.0%	☆
PC-10	Multi-speed 10	-100.0% ~ 100.0%	0.0%	☆
PC-11	Multi-speed 11	-100.0% ~ 100.0%	0.0%	☆
PC-12	Multi-speed 12	-100.0% ~ 100.0%	0.0%	☆
PC-13	Multi-speed 13	-100.0% ~ 100.0%	0.0%	☆
PC-14	Multi-speed 14	-100.0% ~ 100.0%	0.0%	☆
PC-15	Multi-speed 15	-100.0% ~ 100.0%	0.0%	☆

When the frequency source selection P0-06, P0-07, P0-10 is determined as the multi-speed running mode, it is necessary to set PC-00~PC-15 to determine its characteristics.

Description: The symbols of PC-00 ~ PC-15 determine the running direction of simple PLC. If it is a negative value, it means running in the opposite direction.

Simple PLC schematic diagram:

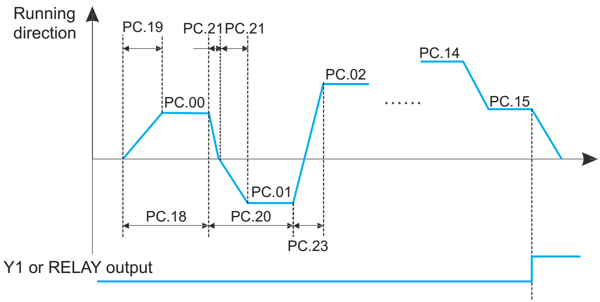


Fig.13-28 Simple PLC schematic diagram

Function code	Name	Description (setting range)	Factory Default	Change
PC-16	PLC operation mode	0~2	0	☆

The simple PLC function has two functions: as a frequency source or as a voltage for VF separation.

Figure 13-29 is a schematic diagram of a simple PLC as the frequency source. When the simple PLC is used as the frequency source, the positive and negative values of PC-00~PC-15 determine the running direction. If it is negative, it means that the inverter runs in the opposite direction.

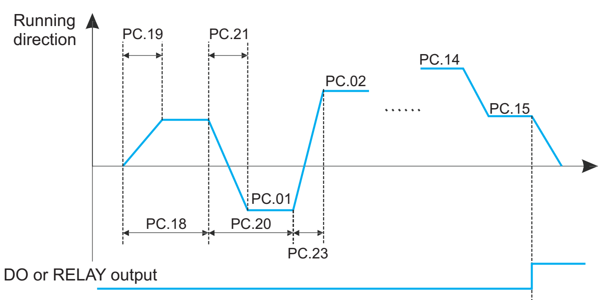


Fig.13-29 Simple PLC schematic diagram

When used as a frequency source, PLC has three operating modes, which are not available when used as a VF separation voltage source. in:

0: Stop at the end of a single operation

The inverter will automatically stop after completing a single cycle, and it needs to give the running command again to start.

1: Keep the final value at the end of a single run

After the inverter completes a single cycle, it automatically maintains the running frequency and direction of the last segment.

2: Keep looping

After the inverter completes one cycle, it will automatically start the next cycle until it stops when there is a stop command.

Function code	Name	Description (setting range)	Factory Default	Change
PC-17	PLC power-down memory selection	0~3	0	☆

This function code determines the memory mode of the inverter when the inverter is powered off when the PLC is running.

0: No memory when power off and no memory when stopped;

1: Memory when power off and no memory when stopped;

2: No memory when power off and memory when shut down;

3: Power-down memory and shutdown memory.

PLC power-off memory refers to the memory of the PLC's operating stage and operating frequency before power-off, and continues to run from the memory stage when the power is next turned on. If you choose not to remember, the PLC process will be restarted every time the power is turned on.

PLC shutdown memory is to record the previous PLC running stage and running frequency when it stops, and continue to run from the memory stage in the next running. If you choose not to remember, the PLC process will be restarted each time it is started.

Function code	Name	Description (setting range)	Factory Default	Change
PC-18	Running time of simple PLC multi-speed 0	0.0s(h) ~ 6500.0s(h)	0.0s(h)	☆

Function code	Name	Description (setting range)	Factory Default	Change
PC-19	Acceleration/deceleration time of simple PLC multi-speed 0	0 ~ 3	0	☆
PC-20	Running time of simple PLC multi-speed 1	0.0s(h) ~ 6500.0s(h)	0.0s(h)	☆
PC-21	Acceleration/deceleration time of simple PLC multi-speed 1	0 ~ 3	0	☆
PC-22	Running time of simple PLC multi-speed 2	0.0s(h) ~ 6500.0s(h)	0.0s(h)	☆
PC-23	Acceleration/deceleration time of simple PLC multi-speed 2	0 ~ 3	0	☆
PC-24	Running time of simple PLC multi-speed 3	0.0s(h) ~ 6500.0s(h)	0.0s(h)	☆
PC-25	Acceleration/deceleration time of simple PLC multi-speed 3	0 ~ 3	0	☆
PC-26	Running time of simple PLC multi-speed 4	0.0s(h) ~ 6500.0s(h)	0.0s(h)	☆
PC-27	Acceleration/deceleration time of simple PLC multi-speed 4	0 ~ 3	0	☆
PC-28	Running time of simple PLC multi-speed 5	0.0s(h) ~ 6500.0s(h)	0.0s(h)	☆
PC-29	Acceleration/deceleration time of simple PLC multi-speed 5	0 ~ 3	0	☆
PC-30	Running time of simple PLC multi-speed 6	0.0s(h) ~ 6500.0s(h)	0.0s(h)	☆
PC-31	Acceleration/deceleration time of simple PLC multi-speed 6	0 ~ 3	0	☆
PC-32	Running time of simple PLC multi-speed 7	0.0s(h) ~ 6500.0s(h)	0.0s(h)	☆
PC-33	Acceleration/deceleration time of simple PLC multi-speed 7	0 ~ 3	0	☆
PC-34	Running time of simple PLC multi-speed 8	0.0s(h) ~ 6500.0s(h)	0.0s(h)	☆
PC-35	Acceleration/deceleration time of simple PLC multi-speed 8	0 ~ 3	0	☆
PC-36	Running time of simple PLC multi-speed 9	0.0s(h) ~ 6500.0s(h)	0.0s(h)	☆
PC-37	Acceleration/deceleration time of simple PLC multi-speed 9	0 ~ 3	0	☆

Function code	Name	Description (setting range)	Factory Default	Change
PC-38	Running time of simple PLC multi-speed 10	0.0s(h) ~ 6500.0s(h)	0.0s(h)	☆
PC-39	Acceleration/deceleration time of simple PLC multi-speed 10	0 ~ 3	0	☆
PC-40	Running time of simple PLC multi-speed 11	0.0s(h) ~ 6500.0s(h)	0.0s(h)	☆
PC-41	Acceleration/deceleration time of simple PLC multi-speed 11	0 ~ 3	0	☆
PC-42	Running time of simple PLC multi-speed 12	0.0s(h) ~ 6500.0s(h)	0.0s(h)	☆
PC-43	Acceleration/deceleration time of simple PLC multi-speed 12	0 ~ 3	0	☆
PC-44	Acceleration/deceleration time of simple PLC multi-speed 13	0.0 ~ 6500.0	0	☆
PC-45	Running time of simple PLC multi-speed 14	0~3 (respectively representing acceleration and deceleration time 1~4)	0.0s(h)	☆
PC-46	Acceleration/deceleration time of simple PLC multi-speed 14	0.0 ~ 6500.0	0	☆
PC-47	Running time of simple PLC multi-speed 15	0~3 (respectively representing acceleration and deceleration time 1~4)	0.0s(h)	☆
PC-48	Acceleration/deceleration time of simple PLC multi-speed 15	0.0 ~ 6500.0	0	☆
PC-49	Running time of simple PLC multi-speed 15	0~3 (respectively representing acceleration and deceleration time 1~4)	0.0s(h)	☆
PC-50	Time unit of multi-speed	0 ~ 1	0	☆

Define the running time of each segment of the 16-segment program and the selection of acceleration speed of each segment. Among them, the selection of acceleration and deceleration time 0~3 respectively represents the acceleration and deceleration time 0: P0-23, P0-24; acceleration and deceleration time 1: P7-03, P7-04; Deceleration time 3: P7-07, P7-08.

PC-50 defines the unit of each run time of the PLC.

0: seconds;

1 hour.

Function code	Name	Description (setting range)	Factory Default	Change
PC-51	Multi-speed priority mode selection	0~1	1	☆

Multi-speed priority means that when the multi-speed terminals are not all 0, the multi-speed command value is given priority.

0: Multi-speed does not have priority;

1: Multi-speed priority.

Function code	Name	Description (setting range)	Factory Default	Change
PC-52	Multi-speed priority acceleration and deceleration time selection	0~3	0	☆

In the case of multi-speed priority, select the acceleration and deceleration mode when executing multi-speed.

0 to 3 respectively represent acceleration and deceleration time 1 to acceleration and deceleration time 4.

Function code	Name	Description (setting range)	Factory Default	Change
PC-53	Multi-speed PC-00 ~ PC-15 unit selection	0~1	0	☆

It is used to select the unit of multi-stage speed PC-00~PC-15 to meet the needs of multi-stage speed frequency unit in different occasions.

Function code	Name	Description (setting range)	Factory Default	Change
PC-55	Multi-segment instruction 0 given mode	0~5	0	☆

This parameter determines the given channel of multi-segment instruction 0. In addition to PC-00, there are many other options for multi-segment instruction 0, which is convenient to switch between multi-segment instruction and other given methods. When the multi-segment instruction is used as the frequency source or the simple PLC is used as the frequency source, the switching of the two frequency sources can be easily realized.

0: Function code PC-00 given;

1: AI1 given;

2: AI2 given;

3: PULSE pulse;

4: PID;

5: Preset frequency given (P0-11), UP/DOWN can be modified.

Group PD: Torque control

Torque control can be performed only when the control mode P0-03 is vector control, so that the output torque of the motor is controlled by the torque command. When using torque control, there are the following precautions:

Torque control takes effect

To make torque control effective, please set Pd-10 to 1, or set the multi-function DI terminal function to 44 before use.

In addition, the torque control prohibition (function 32) can be realized through the multi-function digital DI terminal. When the torque prohibition function is valid, the inverter is fixed in the speed control mode.

Setting of torque command and speed limit

The torque command can be set through Pd-00 and Pd-01. When the torque source is non-digital setting, 100% input corresponds to the setting value of Pd-01.

The speed limit can be set digitally through Pd-03 and Pd-04, or through the upper limit frequency P0-15, P0-16, P0-17.

Direction setting 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 following table:

Run command	Enter torque value (calculated percentage)	Torque command direction
Forward	>0	Forward direction
Forward	<0	Reverse direction
Reverse	>0	Forward direction
Reverse	<0	Reverse direction

Switching between speed and torque modes

When the multi-function digital DI terminal is set with speed control/torque control switching (function 44), when the speed control/torque control switching function of the corresponding terminal is valid, the control mode is equivalent to the inversion of the value of Pd-10; otherwise The control mode is determined by Pd-10.

Function code	Name	Description (setting range)	Factory Default	Change
PD-00	Torque command source selection	0~6	0	★

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 directly uses the setting value of Pd-01.

1: AI1

2: AI2

It means that the target torque is determined by the analog input terminal. The 700IP65 control board provides 2 analog input terminals (AI1, Ai2), of which AI1 is 0V~10V voltage input, AI2 can be 0V~10V voltage input, or 0mA~20mA current input, which is selected by the DIP swi-tch on the control board. The input voltage value of AI1, AI2, and the corresponding relation-ship curve of the target torque, the user can freely choose through P5-45.

700 provides 4 sets of corresponding relationship curves, of which 2 sets of curves are straight-line relationships (2-point correspondence), and 2 sets of curves are arbitrary curves with 4-point correspondences. code to set.

Function code P5-45 is used to set the two analog inputs of AI1~AI2, and select which group of the 4 groups of curves respectively.

When AI is used as torque reference, the voltage/current input corresponds to 100.0% of the setting, which refers to the percentage of the relative torque digital setting PD-01.

3: Communication given

It means that the target torque is given by the communication method. The data is given by the host computer through the communication address 0x1000, the data format is -100.00% ~ 100.00%, and 100.00% refers to the percentage of the relative torque digital setting PD-01.

4: PULSE pulse (HDI)

The target torque is given by the terminal HDI high-speed pulse.

Pulse given signal specifications: voltage range 9V ~ 30V, frequency range 0kHz ~ 50kHz. Pulse given can only be input from the multi-function input terminal HDI.

The relationship between the input pulse frequency of the HDI terminal and the correspond-ing setting is set through P5-30~P5-34. The corresponding relationship is a straight line co-rresponding relationship between 2 points. The 100.0% set corresponding to the pulse input refers to the relative torque figure. Set the percentage of PD-01.

5: MIN (AI1, AI2)

It means that the target torque is given by the minimum value of the analog quantities AI1

It means that the target torque is given by the maximum value of the analog quantities AI1 and AI2.

Options 1 to 6 correspond to full scale (Pd-01).

Function code	Name	Description (setting range)	Factory Default	Change
PD-01	Torque digital given	-200.0% ~ 200.0%	150.0%	☆

The torque setting adopts relative value, 100.0% corresponds to the rated torque of the motor. The setting range is -200% to 200%, indicating that the maximum torque of the inverter is twice the rated torque of the motor. When the motor power is greater than that of the inverter, it will be limited to the maximum torque of the inverter.

Function code	Name	Description (setting range)	Factory Default	Change
PD-03	Torque control positive direction maximum frequency	0.00Hz ~ Maximum frequency (P0-14)	50.00Hz	☆
PD-04	Torque control reverse direction maximum frequency	0.00Hz ~ Maximum frequency (P0-14)	50.00Hz	☆

It is used to set the forward or reverse maximum running frequency of the inverter in torque control mode.

During torque control of the inverter, if the load torque is less than the output torque of the motor, the motor speed will continue to rise. In order to prevent accidents such as flying in the mechanical system, the maximum speed of the motor during torque control must be limited.

Function code	Name	Description (setting range)	Factory Default	Change
PD-06	Torque command filter time	0.00s ~ 10.00s	0.00s	☆

Setting this parameter value can make the torque command smoother and the control more compliant, but the response will be slower accordingly.

Function code	Name	Description (setting range)	Factory Default	Change
PD-07	Torque mode frequency acceleration time	0.0s ~ 1000.0s	10.0s	☆

Function code	Name	Description (setting range)	Factory Default	Change
PD-08	Torque mode frequency deceleration time	0.0s ~ 1000.0s	10.0s	☆

This parameter is used to set the acceleration and deceleration time of the maximum freque-ncy during torque control to reduce the start-up impact.

Function code	Name	Description (setting range)	Factory Default	Change
PD-10	Speed/torque mode selection	0~1	0	★

0: Speed mode;

1: Torque mode.

Group PE: AI multi-point curve setting

Function code	Name	Description (setting range)	Factory Default	Change
PE-00	Curve 1 minimum input	-10.00V ~ PE-02	0.00V	☆
PE-01	Curve 1 minimum input corresponding setting	-100.0% ~ 100.0%	0.0%	☆
PE-02	Curve 1 Knee 1 Input	PE-00 ~ PE-04	3.00V	☆
PE-03	Curve 1 inflection point 1 input corresponding setting	-100.0% ~ 100.0%	30.0%	☆
PE-04	Curve 1 Knee 2 Input	PE-02 ~ PE-06	6.00V	☆
PE-05	Curve 1 inflection point 2 input corresponding setting	-100.0% ~ 100.0%	60.0%	☆
PE-06	Curve 1 maximum input	PE-04 ~ 10.00	10.00V	☆
PE-07	Curve 1 maximum input corresponding setting	-100.0% ~ 100.0%	100.0%	☆
PE-08	Curve 2 minimum input	-10.00 ~ PE-10	0.00V	☆
PE-09	Curve 2 minimum input corresponding setting	-100.0% ~ 100.0%	0.0%	☆
PE-10	Curve 2 Knee 1 Input	PE-08 ~ PE-12	3.00V	☆
PE-11	Curve 2 inflection point 1 input corresponding setting	-100.0% ~ 100.0%	30.0%	☆
PE-12	Curve 2 Knee 2 Input	PE-10 ~ PE-14	6.00V	☆
PE-13	Curve 2 inflection point 2 input corresponding setting	-100.0% ~ 100.0%	60.0%	☆
PE-14	Curve 2 maximum input	PE-12 ~ 10.00V	10.00V	☆
PE-15	Curve 2 maximum input corresponding setting	-100.0% ~ 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 maximum input or minimum input range, the other part will be calculated as the maximum input or minimum input.

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

The curve 1 and curve 2 are the same as the analog input quantization of the P5 group, but the analog quantization of the P5 group is linear and the PE group curve can be set to the curve type, so the analog input multi-point curve can be used more flexibly. The schematic diagram is shown in Figure 13-30.

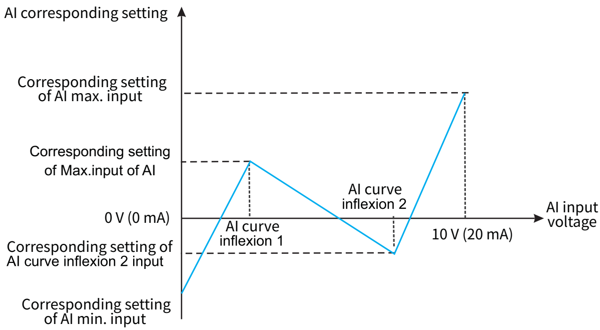


Figure 13-30. Multi-point curve corresponding diagram

Function code	Name	Description (setting range)	Factory Default	Change
PE-24	AI1 set jump point	-100.0% ~ 100.0%	0.0%	☆
PE-25	AI1 sets the jump range	0.0% ~ 100.0%	0.5%	☆

The analog input AI1 ~ AI2 of 700IP65 all have the function of setting value jumping.

The jump function means that when the corresponding setting of the analog quantity changes between the upper and lower intervals of the jump point, the corresponding setting value of the analog quantity is fixed to the value of the jump point.

For example: the voltage of the analog input AI1 fluctuates around 5.00V, the fluctuation range is 4.90V~5.10V, the minimum input of AI1 is 0.00V corresponds to 0.0%, and the maximum input of 10.00V corresponds to 100.%, then the detected AI1 corresponds to the setting It fluctuates between 49.0% and 51.0%. Set AI1 to set jump point PE-24 to 50.0%, set AI1 to set jump amplitude PE-25 to 1.0%, then when the above AI1 input is processed by the jump function, the corresponding setting of AI1 input is fixed to 50.0%. AI1 is transformed into a stable input, eliminating fluctuations.

Group PF: Manufacturer parameters

Manufacturer's parameter group, which cannot be changed by the user.

Group A0: Second motor parameter setting

When the user needs to switch between two motors, the motor switch can be realized through A0-00 or the No. 41 function of the multi-function digital DI terminal. In addition, the two motors can be set with motor nameplate parameters, motor parameter tuning, VF control or vector control control, and parameters related to VF control or vector control performance can 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. All parameters of group A, their content definitions and usage methods are consistent with the relevant parameters of the first motor. Here The description will not be repeated, and the user can refer to the description of the relevant parameters of the first motor.

Function code	Name	Description (setting range)	Factory Default	Change
A0-00	Motor selection	0~1	1	★

1: Motor No. 1

2: Motor No. 2

When the current motor is No. 1, the A1~A3 function groups are not visible.

Function code	Name	Description (setting range)	Factory Default	Change
A0-01	The second motor control mode	1~2	2	★

1: Open loop vector control (speed sensorless vector);

2: VF control.

Function code	Name	Description (setting range)	Factory Default	Change
A0-02	Second motor acceleration and deceleration time selection	1~4	0	☆

0: Consistent with the first motor;

1: Acceleration and deceleration time 1, P0-23, P0-24;

2: Acceleration and deceleration time 2, P7-03, P7-04;

3: Acceleration and deceleration time 3, P7-05, P7-06;

4: Acceleration and deceleration time 4, P7-07, P7-08.

Group A1: Second Motor Parameters

The detailed description of the function code parameters of this group is the same as that of the P4 group.

Function code	Name	Description (setting range)	Factory Default	Change
A1-00	Motor parameter tuning	0~2	0	★

0: no function;

1: Static tuning;

2: Dynamic full tuning.

Function code	Name	Description (setting range)	Factory Default	Change
A1-01	Motor 2 rated power	0.1Kw ~ 1000.0Kw	Model is determined	★
A1-02	Motor 2 rated voltage	1V ~ 1500V	380V	★
A1-03	Motor 2 Number of motor poles	2 to 64	Model is determined	●
A1-04	Motor 2 rated current	0.1A ~ 3000.0A	A1-01 OK	★
A1-05	Motor 2 rated frequency	0.01Hz ~ P0-14	50.00Hz	★
A1-06	Motor 2 rated speed	1rpm ~ 65535rpm	A1-01 OK	★
A1-07	Motor 2 no-load current	0.1A ~ 1500.0A	A1-01 OK	★
A1-08	Motor 2 stator resistance	0.001 ~ 65.535ohm	Model is determined	★
A1-09	Motor 2 rotor resistance	0.001 ~ 65.535ohm	Model is determined	★
A1-10	Motor 2 mutual inductance	0.1mH ~ 6553.5mH	Model is determined	★
A1-11	Motor 2 leakage inductance	0.01mH ~ 655.35mH	Model is determined	★
A1-12	Acceleration at Dynamic Full Tuning	1.0s ~ 6000.0s	10.0s	☆
A1-13	Deceleration at dynamic full tuning	1.0s ~ 6000.0s	10.0s	☆

Group A2: Second motor VF parameter setting

The detailed description of the function code parameters of this group is consistent with the P2 group. For the VF control function codes not listed in this group, the P2 group is directly used.

Function code	Name	Description (setting range)	Factory Default	Change
A2-00	Torque boost	0.0% ~ 30.0%	0.0%	☆

When the parameter is set to 0, it means automatic torque boost.

Function code	Name	Description (setting range)	Factory Default	Change
A2-01	Oscillation suppression gain	0 ~ 100	Model is determined	☆

Group A3: Second motor vector control parameters

The function of this group of parameters is similar to the parameters of group P3, which is valid when the motor is the second motor. For detailed function code description, please refer to the description of function code of group P3.

Function code	Name	Description (setting range)	Factory Default	Change
A3-00	Switching frequency P1	0.00Hz ~ A3-02	5.00Hz	☆
A3-02	Switching frequency P2	A3-00 ~ P0-14	10.00Hz	☆
A3-04	Low frequency speed proportional gain	0.1 ~ 10.0	4.0	☆
A3-05	Low frequency speed integration time	0.01s ~ 10.00s	0.50s	☆
A3-06	High frequency speed proportional gain	0.1 ~ 10.0	2.0	☆
A3-07	High frequency speed integration time	0.01s ~ 10.00s	1.00s	☆
A3-08	Speed loop integral attribute selection	0~1	0	★
A3-11	Torque current regulator Kp	0 ~ 30000	2000	☆

Function code	Name	Description (setting range)	Factory Default	Change
A3-12	Torque current regulator Ki	0 ~ 30000	1300	☆
A3-13	Excitation current regulator Kp	0 ~ 30000	2000	☆
A3-14	Excitation current regulator Ki	0 ~ 30000	1300	☆
A3-15	Flux Brake Gain	0~200	0	☆
A3-16	Field weakening torque correction factor	50%~200%	100%	☆
A3-17	Slip Compensation Coefficient	50% ~ 200%	100%	☆
A3-18	Speed loop feedback filter time constant	0.000s ~ 1.000s	0.015s	☆
A3-19	Speed loop output filter time constant	0.000s ~ 1.000s	0.000s	☆
A3-20	Electric torque upper limit source	0~4	0	☆
A3-21	Electric torque upper limit	0.0% ~ 200.0%	150.0%	☆
A3-22	Braking torque upper limit source	0~4	0	☆
A3-23	Braking torque upper limit	0.0% ~ 200.0%	150%	☆

Group B0: System parameters

B0 is used to manage the inverter function code group, which can be set by the user as req-uired.

Function code	Name	Description (setting range)	Factory Default	Change
B0-00	Function code read-only selection	0~1	0	☆

0: Invalid;

1: Except for B0-00, all function codes can only be viewed and cannot be modified, which can prevent the parameters from being misoperated.

Function code	Name	Description (setting range)	Factory Default	Change
B0-01	Reserve	—	—	—
B0-02	Reserve	—	—	—
B0-03	Reserve	—	—	—

Reserve.

Function code	Name	Description (setting range)	Factory Default	Change
B0-04	Vector operating frequency display selection	0~1	0	☆

0: real-time frequency;

1: set frequency.

Function code	Name	Description (setting range)	Factory Default	Change
B0-05	Display selection during UP/Down adjustment	0~1	0	☆

0: Display the set value;

1: Display the current variable value.

Group B1: User function code customization

700 inverter provides users with 31 freely definable user-customized function codes to fac-ilitate users to view, modify parameters and operate quickly. After the user customizes the function code through group B1, enter the user menu mode -USEr to view and modify the customized function code. For the entry and exit of the user menu mode, please refer to Chapter 4 <<4.4 Function Code Menu Mode and Switching Instructions>>.

Function code	Name	Description (setting range)	Factory Default	Change
B1-00	Clear custom function code selection	0~1	0	☆

0: invalid;

1: Clear user-defined function codes. After clearing, B1-01 ~ B1-31 are all uP0.00, and at the same time, the factory custom user function code can be restored through P0-28.

Function code	Name	Description (setting range)	Factory Default	Change
B1-01	Custom function code 1	uP0-00 ~ uU1-xx	uP0-03	☆
B1-02	Custom function code 2	uP0-00 ~ uU1-xx	uP0-04	☆
B1-03	Custom function code 3	uP0-00 ~ uU1-xx	uP0-06	☆
B1-04	Custom function code 4	uP0-00 ~ uU1-xx	uP0-23	☆
B1-05	Custom function code 5	uP0-00 ~ uU1-xx	uP0-24	☆
B1-06	Custom function code 6	uP0-00 ~ uU1-xx	uP4-00	☆
B1-07	Custom function code 7	uP0-00 ~ uU1-xx	uP4-01	☆
B1-08	Custom function code 8	uP0-00 ~ uU1-xx	uP4-02	☆
B1-09	Custom function code 9	uP0-00 ~ uU1-xx	uP4-04	☆
B1-10	Custom function code 10	uP0-00 ~ uU1-xx	uP4-05	☆
B1-11	Custom function code 11	uP0-00 ~ uU1-xx	uP4-06	☆
B1-12	Custom function code 12	uP0-00 ~ uU1-xx	uP4-12	☆
B1-13	Custom function code 13	uP0-00 ~ uU1-xx	uP4-13	☆
B1-14	Custom function code 14	uP0-00 ~ uU1-xx	uP5-00	☆
B1-15	Custom function code 15	uP0-00 ~ uU1-xx	uP5-01	☆

Function code	Name	Description (setting range)	Factory Default	Change
B1-16	Custom function code 16	uP0-00 ~ uU1-xx	uP5-02	☆
B1-17	Custom function code 17	uP0-00 ~ uU1-xx	uP6-00	☆
B1-18	Custom function code 18	uP0-00 ~ uU1-xx	uP6-01	☆
B1-19	Custom function code 19	uP0-00 ~ uU1-xx	uP0-00	☆
B1-20	Custom function code 20	uP0-00 ~ uU1-xx	uP0-00	☆
B1-21	Custom function code 21	uP0-00 ~ uU1-xx	uP0-00	☆
B1-22	Custom function code 22	uP0-00 ~ uU1-xx	uP0-00	☆
B1-23	Custom function code 23	uP0-00 ~ uU1-xx	uP0-00	☆
B1-24	Custom function code 24	uP0-00 ~ uU1-xx	uP0-00	☆
B1-25	Custom function code 25	uP0-00 ~ uU1-xx	uP0-00	☆
B1-26	Custom function code 26	uP0-00 ~ uU1-xx	uP0-00	☆
B1-27	Custom function code 27	uP0-00 ~ uU1-xx	uP0-00	☆
B1-28	Custom function code 28	uP0-00 ~ uU1-xx	uP0-00	☆
B1-29	Custom function code 29	uP0-00 ~ uU1-xx	uP0-00	☆
B1-30	Custom function code 30	uP0-00 ~ uU1-xx	uP0-00	☆
B1-31	Custom function code 31	uP0-00 ~ uU1-xx	uP0-00	☆

The small u in the first letter of the user-defined function code range indicates the user-defined function code, and the rest of the symbols indicate 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.

Group B2: Optimize control parameters

Function code	Name	Description (setting range)	Factory Default	Change
B2-00	Dead Time Compensation Enable Selection	0~1	1	☆

0: No compensation;

1: Compensation.

Function code	Name	Description (setting range)	Factory Default	Change
B2-01	PWM method	0~1	0	☆

0: Asynchronous modulation;

1: Synchronous modulation, only valid for VF control control mode, and the operating frequency is higher than 85Hz;

Synchronous modulation means that the carrier frequency of the inverter changes linearly with the output frequency, and is generally used at a higher frequency, which is beneficial to improve the quality of the output voltage. The asynchronous modulation is that the carrier frequency is constant, and the asynchronous modulation effect is better at low frequencies.

Function code	Name	Description (setting range)	Factory Default	Change
B2-02	PWM seven-segment/five-segment selection	0~1	0	☆

0: 7 segments in the whole process;

1: Seven-segment/five-segment automatic switching;

When the PWM seven-stage continuous modulation is used, the switching loss of the inverter is large, but the current ripple is small; in the 5-stage intermittent debugging mode, the switching loss is small, the current ripple is large, and the motor noise increases.

Function code	Name	Description (setting range)	Factory Default	Change
B2-03	CBC current limit enable selection	0~1	1	☆

0: Disable;

1: Enable, at this time, the overcurrent fault of the inverter can be reduced to a great extent, so as to realize uninterrupted operation. If the inverter will fault Err33 when the current is limited rapidly for a long time, it means that the inverter is overloaded and needs to stop.

Function code	Name	Description (setting range)	Factory Default	Change
B2-04	Braking point	330.0V ~ 1200.0V	360.0V 690.0V	☆

<1> is the value of the 380V class inverter, and the value is 360.0V at the 200V class;

This value is the voltage point at which the braking resistor turns on. When there is a braking resistor and the bus voltage is greater than B2-04, the inverter will release excess braking energy through the braking resistor to prevent overvoltage of the inverter.

Function code	Name	Description (setting range)	Factory Default	Change
B2-05	Undervoltage point	150.0V ~ 500.0V	200.0V 350.0V	☆

<1> is the value of 380V class inverter, and the value is 200.0V in 200V class;

This value is the judgment point of the inverter undervoltage fault. When the inverter bus voltage is lower than this value and it is running, it will output Err12 undervoltage fault. At the same time, the reset mode of the undervoltage fault can be selected through P9-17.

Function code	Name	Description (setting range)	Factory Default	Change
B2-06	Random PWM depth setting	0 ~ 6	0	☆

This function is only valid for VF. Random PWM can soften the monotonous harsh motor sound and reduce external electromagnetic interference. If the random PWM depth is different, the effect will not work, and 0 means invalid.

Function code	Name	Description (setting range)	Factory Default	Change
B2-07	0Hz operating mode selection	0 ~ 2	0	☆

0: no current output;

1: normal operation;

2: Output with stop DC braking current B1-16.

Function code	Name	Description (setting range)	Factory Default	Change
B2-08	Low frequency carrier limitation mode selection	0 ~ 2	0	☆

0: default limit mode;

1: The low frequency carrier frequency is not higher than ½ of the corresponding control mode;

2: Unlimited, all frequency bands have the same carrier frequency.

Group B3: AIAO correction parameters

Function code	Name	Description (setting range)	Factory Default	Change
B3-00	AI1 shows voltage 1	-9.999V ~ 10.000V	3.000V	☆
B3-01	AI1 measured voltage 1	-9.999V ~ 10.000V	3.000V	☆
B3-02	AI1 shows voltage 2	-9.999V ~ 10.000V	8.000V	☆
B3-03	AI1 measured voltage 2	-9.999V ~ 10.000V	8.000V	☆
B3-04	AI2 shows voltage 1	-9.999V ~ 10.000V	3.000V	☆
B3-05	AI2 measured voltage 1	-9.999V ~ 10.000V	3.000V	☆
B3-06	AI2 shows voltage 2	-9.999V ~ 10.000V	8.000V	☆
B3-07	AI2 measured voltage 2	-9.999V ~ 10.000V	8.000V	☆

Function codes B3-00 ~ B3-07 are used to correct the error between the actual input value of the AI analog quantity and the AI value displayed by the inverter, so as to eliminate the influence of the zero offset and linearity of the AI input port. This group of functional parameters has been calibrated before leaving the factory, and the user can calibrate it again according to the on-site usage, but the parameters will be restored together when restoring the factory defaults. Calibration is generally not required at the application site.

The measured voltage refers to the actual voltage measured by a multimeter and other measuring instruments, and the displayed voltage refers to the displayed voltage value sampled by the inverter. The displayed voltages of AI1 and AI2 correspond to function codes U1-19 and U1-20 respectively.

When calibrating, input two voltage values to each AI input port, and respectively input the value measured by the multimeter and the value read by the U0 group into the above function codes, then the inverter will automatically perform AI zero offset and calibration. Gain correction.

Function code	Name	Description (setting range)	Factory Default	Change
B3-12	AO1 target voltage 1	-9.999V ~ 10.000V	3.000V	☆
B3-13	AO1 measured voltage 1	-9.999V ~ 10.000V	3.000V	☆
B3-14	AO1 target voltage 2	-9.999V ~ 10.000V	8.000V	☆
B3-15	AO1 measured voltage 2	-9.999V ~ 10.000V	8.000V	☆
B3-16	AO2 target voltage 1	-9.999V ~ 10.000V	3.000V	☆
B3-17	AO2 measured voltage 1	-9.999V ~ 10.000V	3.000V	☆
B3-18	AO2 target voltage 2	-9.999V ~ 10.000V	8.000V	☆
B3-19	AO2 measured voltage 2	-9.999V ~ 10.000V	8.000V	☆

Function codes B3-12 ~ B3-19 are used to correct the error between the actual output value of AO analog quantity and the theoretical output value. It has been calibrated at the factory, and generally does not need to be calibrated at the application site. When restoring the factory value, it will be restored to the factory calibration value.

The target voltage refers to the theoretical output voltage value of the inverter. U1-37 and U1-38 correspond to the target voltages of AO1 and AO2 respectively. The 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 in the corresponding function code, the inverter will automatically correct the output value.

Group B4: Master-slave control parameters

Master-slave control refers to the data exchange between two or more inverters through point-to-point communication, so as to achieve the effect of speed synchronization or current balance between multiple inverters, and is often used in multi-drive occasions. For example, sand excavators, coal mine belt conveyors, etc. Please correctly set the inverter communication group P8 group before use.

When using 485 communication for master-slave control, the inverter can no longer communicate normally with the host computer using 485 communication, otherwise the system will work abnormally. There are the following precautions when using master-slave control:

Master and slave directions are determined

When master-slave control and speed synchronous control is required, make sure that the actual running directions of the master and slave motors are the same before running.

When the master and slave directions are inconsistent, the actual running direction of the motor can be changed by selecting P0-13 through the motor direction or changing the wiring sequence between the motor and the output terminal of the inverter.

Master and slave control parameter setting

When multiple inverters are used to drive the same load, there are two control methods for the master and slave:

1) The master control mode P0-03 is set to vector, and the slave is vector and torque control. This method is used in most cases.

2) The master control mode P0-03 is set to VF, and the slave P0-03 is also set to VF. At this time, please set the appropriate sag rate P7-18, please refer to P7-18 for the setting method. Otherwise, the current between master and slave will be unbalanced;

3) When the mechanical transmission ratios of the master and slave are the same, the maximum frequency P0-14 of the master and slave inverters must be the same;

4) When the host B4-02=0, the acceleration and deceleration time of the slave should be set to 0; when the host B4-02=1, the acceleration and deceleration time of the slave should be consistent with the host;

5) There can only be one master in a system, but there can be multiple slaves. At the same time, according to the communication method used, 700IP65 only supports 485 communicat-ion.

Function code	Name	Description (setting range)	Factory Default	Change
B4-00	Master-slave control enable selection:	0~1	0	★

0: Disable;

1: Enable, after enabling master-slave control

Function code	Name	Description (setting range)	Factory Default	Change
B4-01	Master-slave selection:	0~1	0	★

0: host;

1: Slave.

Function code	Name	Description (setting range)	Factory Default	Change
B4-07	Frequency deviation threshold	0.20% ~ 10.00%	0.50%	☆
B4-08	Master-slave communication drop detection time	0.00s ~ 10.0s	0.1s	☆

Set the master-slave communication interruption detection time, no detection when it is 0.

Note: <1> Only the slave takes effect, <2> Only the master takes effect.

Group B5: Brake function parameters

Function code	Name	Description (setting range)	Factory Default	Change
B5-00	Brake control enable selection:	0~1	0	★
B5-01	Delay before the lock opens	0 ~ 20.0s	0s	★
B5-02	Delay before closing the lock	0 ~ 20.0s	0.3	★
B5-03	Open frequency of ascending positive turn lock	0.00Hz ~ 20.00Hz	2.50Hz	★
B5-04	Closing frequency of rising positive turn lock	0.00Hz ~ 20.00Hz	1.50Hz	★
B5-05	Drop reverse lock opening frequency	0.00Hz ~ 20.00Hz	2.50Hz	★
B5-06	Drop reverse lock closing frequency	0.00Hz ~ 20.00Hz	1.50Hz	★
B5-07	Switch on current threshold	0 ~ 100.0	40.0	★
B5-08	Frequency holding time after the lock is opened	0 ~ 20.0s	0.5s	★
B5-09	Frequency holding time after the lock is closed	0 ~ 20.0s	0.5s	★
B5-10	Current limit during locking	50.0% ~ 200.0%	120.0%	★

By setting the function codes B5-01~B5-10, the starting and parking comfort of the elevator can be well adjusted, similar to the brake logic usage diagram in the above figure. The accurate meanings of each function code are shown in the following figure, and the selection of starting frequency and starting frequency holding time has been added.

Function code	Name	Description (setting range)	Factory Default	Change
B5-11	Shut down mode with lock closed	0.20% ~ 10.00%	0	★

This parameter can be used to select whether the shutdown mode after the brake is closed is direct free shutdown or deceleration to 0 shutdown.

Function code	Name	Description (setting range)	Factory Default	Change
B5-12	Lock open mode	0.20% ~ 10.00%	0	★

0: Open according to frequency

The condition for determining the opening of the brake is that the frequency converter outputs to the frequency set at B5-03 (rising) and B5-05 (falling), and then opens the brake after the time set at B5-01 (brake opening delay).

1: Open according to frequency and current

The judgment condition for opening the brake is not only that the output of the frequency converter should reach the frequency set by B5-03 (rising) and B5-05 (falling), but also that the current of the frequency converter should reach the value set by B5-07 (brake opening current).

Function code	Name	Description (setting range)	Factory Default	Change
B5-13	Special functions for civil elevators were enabled	0~1	0	★

0: Open according to frequency

The condition for determining the opening of the brake is that the frequency converter outputs to the frequency set at B5-03 (rising) and B5-05 (falling), and then opens the brake after the time set at B5-01 (brake opening delay).

1: Open according to frequency and current

The judgment condition for opening the brake is not only that the output of the frequency converter should reach the frequency set by B5-03 (rising) and B5-05 (falling), but also that the current of the frequency converter should reach the value set by B5-07 (brake opening current).

Function code	Name	Description (setting range)	Factory Default	Change
B5-14	Elevator emergency operating frequency	0.00Hz ~ P0-14 Hz	20.00Hz	☆

When an emergency signal is input, the frequency converter will enter the emergency operation state, with the operating frequency set by the function code. In the emergency operation state, the frequency converter will select acceleration and deceleration time 4 as the current acceleration and deceleration time.

Function code	Name	Description (setting range)	Factory Default	Change
B5-15	Elevator maintenance operation frequency	0.00Hz ~ P0-14 Hz	20.00Hz	☆

When the maintenance signal is input, the operating frequency of the frequency converter will run according to the maintenance operating frequency.

Function code	Name	Description (setting range)	Factory Default	Change
B5-16	Elevator emergency signal processing mode	0~1	1	★

0: The elevator is not running

When there is an emergency signal input, the frequency converter does not output.

1: UPS power supply operation

When there is an emergency signal input, the frequency converter is powered by UPS and can operate and output at the emergency frequency.

Function code	Name	Description (setting range)	Factory Default	Change
B5-17	Elevator rise correction frequency	0~1	0	★

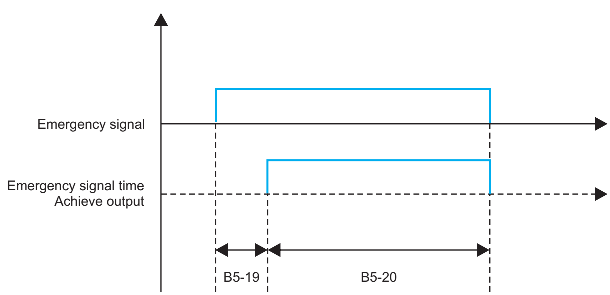
This parameter is used to correct the leveling accuracy of the elevator in power generation mode. For example, when the elevator rises at half load, it will just be at the leveling position, but when it rises at no load, it will exceed the leveling position. Increasing this value can correct the leveling accuracy.

Function code	Name	Description (setting range)	Factory Default	Change
B5-18	Elevator descent correction frequency	0.00Hz ~ 5.00Hz	0	★

This parameter is used to correct the leveling accuracy of the elevator in electric mode. For example, when the elevator descends at half load, it will just be at the leveling position, but when it descends at no load, it will not reach the leveling position. Increasing this value can correct the leveling accuracy.

Function code	Name	Description (setting range)	Factory Default	Change
B5-19	Elevator emergency signal effective time	0 ~ 3600.0	0	☆
B5-20	Elevator emergency signal invalid time	0 ~ 3600.0	0	☆

These two parameters are used to set the valid and invalid time of emergency signal output. When the emergency signal is valid, the frequency converter starts timing. When the time exceeds the value set by B5-19, and 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 the time set by B5-20. After the time exceeds B5-20, the terminal outputs an invalid signal.



The emergency signal output indicates that civilian elevators are sensitive to the noise of the cooling fan. The elevator fan is silent at P7-26=2, and the cooling fan starts with temperature.

Group B6: Sleep wakeup function parameters

This group of parameters is mainly used to realize the sleep and wake-up functions in constant pressure water supply applications. Please pay attention to the following matters when using:

❷ Please select the mode B6-00 to control the sleep function according to the application requirements;

❷ If the frequency source uses PID, the operation of PID in sleep state is affected by the function code PA-29. At this time, the operation when PID is stopped must be selected (PA-29=1);

❸ Under normal circumstances, please set the wake-up frequency ((100.0%-B6-03 wake-up difference)*P0-14 maximum output frequency) greater than the sleep frequency B6-01.

Function code	Name	Description (setting range)	Factory Default	Change
B6-00	Hibernate selection	0~3	0	☆

0: The sleep function is invalid

1: Digital input terminal DI controls sleep function

After the stator digital input DI terminal is defined as function No. 53, when DI is valid, it will go to sleep after delaying the time set in B6-02.

2: The sleep function is controlled by the PID setting value and feedback value. At this time, the frequency source P0-06 of the inverter must be PID, refer to Figure 5-28.

3: Control the sleep function according to the operating frequency

During the operation of the inverter, when the set frequency is less than or equal to the sleep frequency of B6-01, it will enter the sleep state, and vice versa.

If the set frequency of the inverter is greater than the wake-up frequency (B6-03 wake-up difference * P0-14 maximum output frequency), it will enter the wake-up state.

Function code	Name	Description (setting range)	Factory Default	Change
B6-01	Sleep frequency	0.00Hz ~ P0-14	0.00Hz	☆

When B6-00=1, this function is invalid;

When the sleep function is effective and the running frequency is lower than this value, after the sleep delay time B6-02, the inverter starts to sleep (stop).

See illustration: A=PID output; B=PID feedback value.

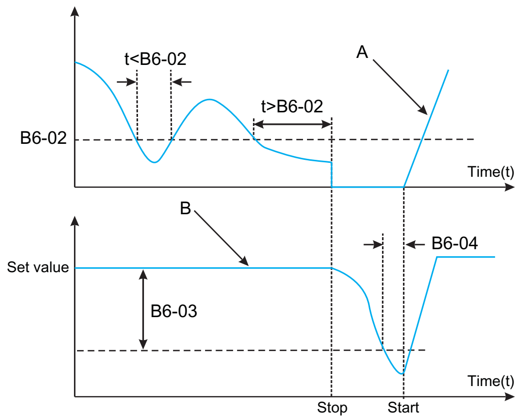


Fig.13-32 Frequency graph of sleep process

Function code	Name	Description (setting range)	Factory Default	Change
B6-02	Sleep delay	0.0s ~ 3600.0s	20.0s	☆

Set the sleep delay time. Refer to Figure 13-32 for its function.

Function code	Name	Description (setting range)	Factory Default	Change
B6-03	Wake-up difference	0.0% ~ 100.0%	10.0%	☆

When B6-00=2, this parameter takes the maximum pressure as the reference object, that is, the maximum pressure is 100%;

When B6-00=3, this parameter takes the maximum frequency P0-14 as the reference object, that is, the maximum frequency is 100%;

When the wake-up difference between the given value and the feedback value exceeds the value defined by this parameter, the PID regulator restarts after the wake-up delay B6-04.

PA-04=0 positive effect, wake-up value = set value - wake-up difference; PA-04=1 reverse effect, wake-up value = set value + wake-up difference.

See illustration:

- C = wake-up value, when parameter PA-04=1.
- D = wake-up value, when parameter PA-04=0.

• E = The feedback value is greater than the wake-up value, and the duration exceeds parameter B6-04 (wake-up delay), and the PID function restarts.

• F = The feedback value is less than the wake-up value, and the duration exceeds parameter B6-04 (wake-up delay), and the PID function restarts.

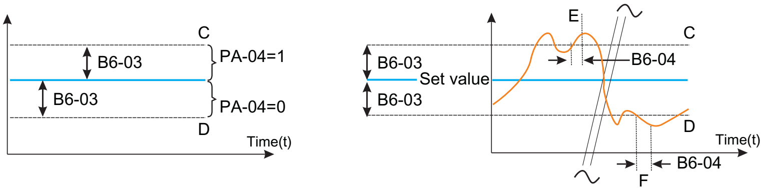


Figure 13-33. Wake up diagram

Function code	Name	Description (setting range)	Factory Default	Change
B6-04	Wake up delay	0.0s ~ 3600.0s	0.5s	☆

Set the wake-up delay time, refer to Figure 13-33 for the function.

Function code	Name	Description (setting range)	Factory Default	Change
B6-05	Sleep delay frequency output selection	0~1	0	☆

0: PID automatic adjustment;

1: Sleep frequency B6-01.

Function code	Name	Description (setting range)	Factory Default	Change
B6-07	Wake-up frequency	0.0s ~ P0-14	0	☆

Group C1: Tension control function parameters

Function code	Name	Description (setting range)	Factory Default	Change
C1-00	Tension control mode	0~2	0	★

① Tension control ineffective;

② Open loop torque control mode: without tension detection and feedback, the frequency converter controls the output torque to control the tension on the material. The control of output torque by a frequency converter requires vector control with speed sensors to achieve better control effects.

③ Closed loop speed mode: requires tension detection and feedback, and the frequency converter outputs the frequency through PID closed-loop control to achieve the set tension. The frequency converter controls the output frequency, and its control method can be either sensorless vector control, V/F control, or closed-loop vector control.

Function code	Name	Description (setting range)	Factory Default	Change
C1-01	Curling direction	0~2	0	☆

Selecting the roll up/down mode can be used with the roll up/down switch terminal. When the roll up/down switch terminal is invalid, the actual roll up/down mode is set the same as this function code. When the winding switch terminal is valid, the actual winding mode is opposite to the setting of this function code.

The relationship between tension direction and winding:

The tension direction is fixed to the direction of the winding tension, which is consistent with the operating direction during non tension control. When switching between winding and unwinding, only change the C1-01 or use the winding and unwinding switching terminal to switch, without changing the forward and reverse operation instructions at the same time.

Function code	Name	Description (setting range)	Factory Default	Change
C1-02	Maximum frequency of roll up	0.00Hz to maximum frequency	30	☆

Function code	Name	Description (setting range)	Factory Default	Change
C1-03	Upper limit frequency for unwinding	0.00Hz to maximum frequency	10	☆

When the tension control is effective, the upper limit frequency for the winding mode and unwinding mode is determined by C1-02 and C1-03.

Function code	Name	Description (setting range)	Factory Default	Change
C1-04	Mechanical transmission ratio	0.01 ~ 600.00	1.85	☆

Mechanical transmission ratio=motor speed/spool speed. The mechanical transmission ratio must be set correctly during tension control

Function code	Name	Description (setting range)	Factory Default	Change
C1-05	Tension setting source	0~5	0	★

This parameter determines the control source of tension:

① 0: The tension is set as a number, and the specific value is set in C1-06.

② 1: AI1, 2: AI2, 3: AI3 Tension is set through analog signals, such as using potentiometers to set tension. When selecting analog tension settings, be sure to set the maximum tension. The maximum value set by the analog quantity usually corresponds to the maximum tension.

③ 4: The tension setting is set through pulse input. The pulse input terminal must be a DI5 terminal. When selecting the pulse setting tension, be sure to set the maximum tension. The maximum value set for the maximum pulse usually corresponds to the maximum tension.

④ 5: Communication settings. When controlling with an upper computer, tension can be set using communication methods.

Function code	Name	Description (setting range)	Factory Default	Change
C1-06	Tension setting	0 ~ 30000N	1200	☆

When C1-05 is set to 0, the tension controlled by the frequency converter is determined by this parameter.

Function code	Name	Description (setting range)	Factory Default	Change
C1-07	Maximum tension	0 ~ 30000N	2100	★

When selecting the tension source as analog or pulse control for C1-05, this parameter determines the maximum value of the analog or pulse.

Function code	Name	Description (setting range)	Factory Default	Change
C1-08	Calculation method for roll diameter	0 ~ 6	1	★

① 0: Set through function code;

② 1: Calculate the roll diameter through linear velocity;

③ 2: Thickness accumulation method for calculating roll diameter;

④ 3, 4, 5: Calculate the roll diameter through analog AI terminals;

⑤ Calculate roll diameter through PILSE pulse input.

Function code	Name	Description (setting range)	Factory Default	Change
C1-09	Maximum roll diameter	1~10000mm	1100	★
C1-10	Roll diameter	1~10000mm	320	★

When selecting 3, 4, 5, and 6 as the calculation methods for the roll diameter of C1-08, the maximum input quantity should correspond to the maximum roll diameter. At the same time, when the frequency converter calculates the roll diameter itself, the calculated roll diameter is limited by this parameter.

The diameter of the coil set by C1-09 is limited by this parameter if the frequency converter calculates a coil diameter lower than this value due to improper parameter settings.

Function code	Name	Description (setting range)	Factory Default	Change
C1-11	Initial roll diameter selection	0～3	21000	☆

Select the input channel for the initial roll diameter.

0: Use DI terminal logic to set 4 initial coil diameters from C1-12 to 15 as numbers

1: AI1, 2: AI2, 3: AI3 The initial roll diameter is determined by analog input, and different ports for analog input are selected

Function code	Name	Description (setting range)	Factory Default	Change
C1-12	Initial roll diameter 1	1~10000mm	600	☆
C1-13	Initial roll diameter 2	1~10000mm	50	☆
C1-14	Initial roll diameter 3	1~10000mm	50	☆
C1-15	Initial roll diameter 4	1~10000mm	50	☆

Initial roll diameter.

Function code	Name	Description (setting range)	Factory Default	Change
C1-16	Roll diameter filtering time	0.1~60.0s	1	☆

Filter time for calculating roll diameter to prevent rapid changes in roll diameter.

Function code	Name	Description (setting range)	Factory Default	Change
C1-17	Roll diameter variation limit 1	1~10000mm	0	○
C1-18	Roll diameter variation limit 2	1~10000mm	0	○

Roll diameter variation limit.

Function code	Name	Description (setting range)	Factory Default	Change
C1-19	Roll diameter reset selection	0 ~ 1		☆

The selection of roll diameter reset conditions, the roll diameter reset operation is initiated by the DI terminal function, and the roll diameter is set from C1 to 19 before running to determine whether the reset operation is possible.

Function code	Name	Description (setting range)	Factory Default	Change
C1-20	The roll diameter has reached the set value	1~10000mm	0	☆

When the roll diameter value reaches C1-20, the DO terminal's set roll diameter reaching function is effective.

Function code	Name	Description (setting range)	Factory Default	Change
C1-21	Material thickness selection	0~4	0	☆
C1-22	Maximum thickness	0.01~100.00mm	0	☆

When parameter 0 is selected for C1-21, the material thickness is set by the DI terminal, and four initial material thicknesses can be digitally set for C1-22~C1-26, which are determined by the DI terminal level logic.

When selecting parameters 1, 2, and 3 for C1-21, the maximum analog input sho-uld correspond to the maximum thickness of C1-22.

Function code	Name	Description (setting range)	Factory Default	Change
C1-30	Linear velocity input source	0~5	0	☆
C1-31	Maximum linear velocity	0.1~6000.0m/min	1000	☆

C1-30: When the input source of linear velocity is 0, the linear velocity is set to the value of C1-31.

After using 1, 2, and 3 analog signals AI as input sources for linear velocity, the correct maximum linear velocity of C1-31 needs to be set for the maximum analog signal.

When the input source of linear velocity is 4, the linear velocity is given by the PULSE input pulse.

When the input source of linear velocity is 5, the linear velocity is given through communication.

Function code	Name	Description (setting range)	Factory Default	Change
C1-32	Actual value of linear velocity		0	○

C1-32: This parameter displays the real-time value of linear velocity.

Function code	Name	Description (setting range)	Factory Default	Change
C1-33	The lower limit of the frequency of coil diameter calculation	0.00Hz~maximum frequency	1.5	☆
C1-34	Roll diameter calculation delay	0.0~100.0s	6	☆

The parameter C1-33 indicates that when the operating frequency of the frequency converter is lower than the frequency set by this parameter, the roll diameter will no longer participate in the calculation change.

Delay time for calculating the roll diameter of C1-34.

Function code	Name	Description (setting range)	Factory Default	Change
C1-40	Moment of inertia compensates the upper limit of torque	0.0~50.0%	5	☆
C1-41	Static friction compensation coefficient	0.0~50.0%	0	☆
C1-42	Dynamic friction compensation coefficient	0.0~50.0%	0	☆

C1-40: Used to compensate for the rotational inertia of the system itself, includ-ing the inertia of motors, transmission systems, reels, etc. This inertia is fixed and independent of the roll diameter. This parameter can be automatically obtained through self-learning with compensation coefficients (this feature is currently retained in the current version), or it can be manually set. When there is an empty or small roll, if the material tension decreases during the acceleration process, increase the coefficient; otherwise, decrease the coefficient.

C1-41~42: Taking winding as an example: due to frictional resistance, the tension of the material decreases, which has a more significant impact on small rolls, and also makes the tension non-linear. By setting this parameter, it can be improved.

Function code	Name	Description (setting range)	Factory Default	Change
C1-44	High speed torque compensation coefficient	0.0~50.0%	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	☆

Compensation for regulating high-speed torque with C1-44.

When adjusting the compensation of high-speed torque for C1-45, the high-speed is based on frequency or linear velocity.

The upper limit of high-speed compensation adjustment for C1-46.

Function code	Name	Description (setting range)	Factory Default	Change
C1-48	Taper pattern	0~1	0	★

Select the taper mode.

Function code	Name	Description (setting range)	Factory Default	Change
C1-49	Taper setting source	0~3	0	★
C1-50	Taper setting	0.000~1.000	0	☆
C1-51	Taper correction amount	1~10000mm	100	☆
C1-52	Conical inflection point 1	1~10000mm	100	☆
C1-53	Cone setting 1	0.000~1.000	0	☆
C1-54	Conical inflection point 2	1~10000mm	200	☆
C1-55	Cone setting 2	0.000~1.000	0	☆

The functions of C1-48 to C1-55 are used to calculate the tension taper coefficient (Taper).

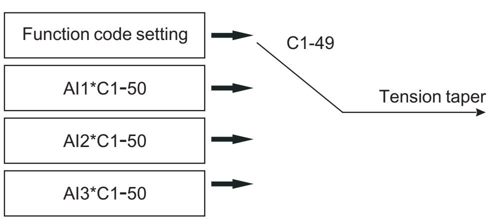
Actual tension setting: F=F0 × Tape; Among them, F0: Set tension, and the two calculation modes of Tape are described as follows.

(1) C1-48=0 Curve taper related parameters: C1-49, C1-50, C1-51, taper related calculation:

Cone coefficient: Tap=1-K × (1- (D0+D1)/(D+D1))=1-K (D-D0)/(D+D1);

Among them, D0: empty roll diameter, D: current roll diameter, D1: tension taper correction amount, K: tension taper, tension taper K input

As shown in the following figure.



(2) C1-48=1. Parameters related to linear taper: C1-50, C1-52, C1-53, C1-54, C1-55. Calculation related to taper:

①:D0 ≤ D ≤ C1-52,Taper=1-C1-52×(D-D0)/1000；

②:D=taper roll diameter 1 (C1-52), Taper1=C1-53/1000；

③: C1-52 ≤ D ≤ C1-54, Taper=Taper1-C1-53×(D-C1-52)/ 1000;

④:D=taper roll diameter 2 (C1-54), Taper2=Taper1-C1-53 × (C1-54-C1-52)/1000 ;

⑤:C1-54 ≤ D ≤ Dmax,Taper=Taper2-C1-55×(D-C1-54)/1000.

Function code	Name	Description (setting range)	Factory Default	Change
C1-56	Wire breakage detection selection	0~1	0	☆
C1-57	Lower limit of wire breakage detection frequency	0.00Hz to maximum frequency	10	☆
C1-58	Wire breakage detection error	1~1000mm	10	☆
C1-59	Wire breakage detection time	0.1~60.0s	1	☆

Automatically detect changes in roll diameter when C1-56=1.

The method only provides a basis for material breakage detection when calculating the roll diameter through linear velocity. By balancing sensitivity and accuracy by adjusting C1-57, C1-58, and C1-59, we can achieve results that meet 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.

Simultaneously meeting conditions ① and ②, the frequency converter reports a material breakage fault (Err30). The advantages of this method are: it does not increase hardware costs; Disadvantages: Difficult to debug, with many limitations. In tension (position) closed-loop applications, in addition to the two methods of detecting material breakage mentioned above, the PID wire breakage protection effect can be tested.

Function code	Name	Description (setting range)	Factory Default	Change
C1-60	Pre drive speed gain	-50.0%~50.0%	0	☆

When changing rolls during operation, in order to prevent excessive impact, it is necessary to rotate the winding shaft (unwinding shaft) in advance;

The line speed is consistent with the line speed of the material in operation, which is the pre drive function.

When the pre drive terminal is effective, the frequency converter will automatically calculate the output frequency based on the detected line speed and roll diameter, so as to increase the line speed Match. This parameter can adjust the relationship between linear velocity matching. When set to a negative value, the surface velocity of the pre driven roller will be lower than that of the running material Linear velocity.

When pre driving, it is generally necessary to pause the roll diameter calculation (controlled by the roll diameter calculation pause terminal), or set the function code C1-63 Set as 1.

Function code	Name	Description (setting range)	Factory Default	Change
C1-61	Pre drive torque limit selection	0~1	1	☆

When pre driving, select the torque limit setting method. If 1 is selected, the output torque can be limited based on the tension setting and the current roll diameter, and used in conjunction with C1-62.

Function code	Name	Description (setting range)	Factory Default	Change
C1-62	Pre drive torque gain	-50.0%~50.0%	0	☆

When selecting 1 for C1-61, the torque limit during pre drive can be adjusted using this parameter, and tension that is either too high or too low can be obtained according to system control requirements.

Function code	Name	Description (setting range)	Factory Default	Change
C1-63	Pre drive roll diameter calculation selection	0~1	1	☆

Does the calculation of roll diameter stop when selecting pre drive. In general, the calculation of roll diameter needs to be stopped.

Function code	Name	Description (setting range)	Factory Default	Change
C1-64	Delay in calculating roll diameter after pre drive is completed	0.0s~10.0s	3	☆

If the pre drive is selected to stop the calculation of the roll diameter, this function code determines that the roll diameter calculation will only start after the pre drive has ended, which can prevent the calculation of the roll diameter from fluctuating too much at the moment when the pre drive ends.

Function code	Name	Description (setting range)	Factory Default	Change
C1-65	Adaptive torque selection	0~1	0	★
C1-66	Initial torque setting source selection	0~5	0	★
C1-67	Initial torque setting	0.0%~200.0%	0	☆
C1-68	Enable pulse disconnection detection	0: Forbidden 1: Enable	0	★
C1-69	Starting frequency of pulse breakage detection	0.00Hz to maximum frequency	0	☆
C1-70	Broken pulse frequency value	0.00Hz~600Hz	0	☆
C1-71	Wire breakage detection delay	0.0s--60.0s	0	☆

Group C3: Photovoltaic functional parameters

Function code	Name	Description (setting range)	Factory Default	Change
C3-00	Photovoltaic water pump activation	0~1	0	★

0: Invalid, for standard model;

1: Effective, the photovoltaic water pump parameter group is in effect.

Function code	Name	Description (setting range)	Factory Default	Change
C3-01	Vmppt voltage setting mode	0~1	1	★

0: Manually set, run according to a fixed Vmppt;

1: Automatic tracking, tracking the maximum power point of Vmppt.

Function code	Name	Description (setting range)	Factory Default	Change
C3-02	Vmppt voltage starting voltage	0.0~800.0V	600.0V	☆

This parameter is the target voltage tracked first during the start-up phase of the frequency converter.

Function code	Name	Description (setting range)	Factory Default	Change
C3-03	PV open circuit voltage setting	0.0~800.0V	750.0V	★

This parameter is the open circuit voltage of the solar panel and needs to be set according to the panel parameters.

Function code	Name	Description (setting range)	Factory Default	Change
C3-04	Operation time of power grid supply in automatic switching mode	0~3	1	★

0: Automatic switching

When the system is powered on, the photovoltaic panel is given priority power supply by default, RA/RB is turned on, and the power is switched to the photovoltaic panel. After the bus voltage is stable and meets the starting conditions, it is allowed to operate. When the light is insufficient, the frequency converter determines weak light according to its own weak light algorithm, and automatically stops and cuts off RA/RB. RA/RC is turned on and switched to grid power supply and automatically runs. After the running time reaches C3-22, it automatically stops and switches to photovoltaic panel power supply, and this logic cycle determines the switching operation.

1: Photovoltaic panel power supply selection photovoltaic panel mode

The frequency converter operates using the MPPT algorithm to track the maximum power point. When weak light is detected, if the power supply of the frequency converter is changed from the peripheral circuit to the grid, DI4 can be used to switch to the grid function. If the power supply needs to be transferred to the photovoltaic panel, DI4 can be disconnected (set P5-03 function code to 69, DI4 power switch will take effect).

2: Power grid supply

At this time, the frequency converter is operating in grid power supply mode, and the MPPT algorithm is invalid.

Function code	Name	Description (setting range)	Factory Default	Change
C3-05	Vmppt interval	0.0~100.0S Automatically adjust Vmppt voltage at intervals of A1-05 set time	1.0s	☆
C3-06	Vmppt hysteresis loop	0.0~50.0V. When the deviation value is less than this value, Vmppt will no longer be adjusted to reduce the jitter of the output frequency	2.0V	☆
C3-07	Vmppt step size	0.0~100.0V When automatically adjusting the Vmmpt voltage, adjust the amplitude of the upper and lower ranges	10.0V	☆

The above three parameters are the response speed of MPPT tracking target voltage. The larger the value, the faster the response, but the system may be unstable.

Function code	Name	Description (setting range)	Factory Default	Change
C3-08	Vmppt voltage upper limit	230.0~750.0V	650.0V	☆
C3-09	Vmppt voltage lower limit	230.0~750.0V	300.0V	☆

The above two parameters define the upper and lower limits of MPPT tracking target voltage.

Function code	Name	Description (setting range)	Factory Default	Change
C3-10	CVT proportional gain	0.0~100.0 Proportional coefficient of target frequency 1 The larger the value, the greater the effect and the faster the adjustment	1.0	☆
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	☆
C3-12	CVT proportional gain 1	0.0~100.0 Proportional coefficient of target frequency 2 The larger the value, the greater the effect and the faster the adjustment	1.0	☆
C3-13	CVT integral coefficient 1	0.0~100.0 Integral coefficient of target frequency 2 The larger the value, the greater the effect and the faster the adjustment	1.0	☆
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 A1-14, switch to A1-12 proportional coefficient 2 and A1-13 integral coefficient. Otherwise, use A1-10 proportional coefficient 1 and A1-11 proportional coefficient 1	2.0V	☆

The above five parameters are speed adjustment parameters during MPPT tracking of target voltage, and this set of parameters will indirectly affect the MPPT tracking speed. The larger the value, the faster the response, but the system may be unstable.

Function code	Name	Description (setting range)	Factory Default	Change
C3-15	Weak light detection frequency	0~Set operating frequency	20.00HZ	☆
C3-16	Weak light sleep delay	5.0~6553.5s	600.0s	☆
C3-17	Weak light wake-up time	0.0~6553.5s	200.0s	☆

When the frequency converter operates in photovoltaic mode (C1-03 setting 1)

After the operating frequency is lower than C3-15 and the duration exceeds C3-16, the frequency converter will shut down and report a weak light warning err50. When the frequency converter enters a weak light state, after a delay time of C3-17, the frequency converter will automatically operate.

When the frequency converter is operating in automatic switching mode (set to 0 for C1-03)

When the operating frequency is lower than C3-15 and the duration exceeds C3-16, switch to grid power supply mode. After running for C3-22 time, automatically switch to photovoltaic mode to see if the lighting is restored, and use this logic cycle to switch operations.

When the frequency converter operates in grid mode (C3-03 setting 2)

This set of functions is invalid.

Note: When the light is too weak and the bus voltage is lower than the undervoltage point, the frequency converter directly reports undervoltage.

Function code	Name	Description (setting range)	Factory Default	Change
C3-18	Reservoir full sleep delay	0.0~6553.5s	60.0s	☆
C3-19	Delay in starting due to insufficient water in the reservoir	0.0~6553.5s	600.0s	☆

Set P5-01 function code to 67, DI2 water level detection takes effect;

When the DI2 water level detection detects that the reservoir is full, after a delay of C3-18, the frequency converter alarm err51 enters the full water sleep state. When the DI2 water level detection is not detected, after C3-19 time, the frequency converter exits the full water state and automatically runs according to the command before shutdown.

Function code	Name	Description (setting range)	Factory Default	Change
C3-20	Water well insufficient sleep delay	0.0~6553.5s	600.0s	☆
C3-21	Water well startup sleep delay	0.0~6553.5s	600.0s	☆

Set P5-02 function code to 68, DI3 water level detection takes effect;

When the DI3 water level detects that the well is in an empty water state, after a delay of C3-20, the frequency converter alarm err52 enters a water shortage sleep state. When no empty water state is detected, after C3-21, the frequency converter exits the water shortage state and automatically runs according to the command before shutdown.

Function code	Name	Description (setting range)	Factory Default	Change
C3-22	Operation time of power grid supply in automatic switching mode	0~65535min	60.0	☆

This parameter automatically switches to photovoltaic mode after running C3-22 time in grid mode.

Group U0: Fault logging parameters

The inverter provides 3 groups of fault record parameters, all of which are read-only parameters, which are convenient for users to view and troubleshoot inverter fault-related information. For details, please refer to Appendix B Function Code Parameter Table or Chapter 10 <<Fault Diagnosis and Countermeasures>>.

Group U1: Application Monitoring Parameters

The U1 parameter group is used to monitor the relevant variable information when the inverter is running. The customer can view it through the panel to facilitate on-site debugging, or read the parameter group value through communication for monitoring by the host computer. The communication address is 0x71xx.

Among them, U1-00 ~ U1-31 are the running and stop monitoring parameters defined in P7-29 and P7-30.

Function code	Name	Smallest unit	Change
U1-00	Operating frequency (Hz)	0.01Hz	●
U1-01	Set frequency (Hz)	0.01Hz	●
U1-02	Bus voltage (V)	0.1V	●
U1-03	Output voltage (V)	1V	●
U1-04	Output current (A)	0.1A	●
U1-05	Output power (Kw)	0.1kW	●
U1-06	DI input status, hexadecimal number	1	●

Displays the current DI terminal input status value. After conversion into binary data, each bit corresponds to a DI input signal, 1 indicates that the input is a high-level signal, and 0 indicates that the input is a low-level signal. The corresponding relationship 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

Function code	Name	Smallest unit	Change
U1-07	DO output status, hexadecimal number	1	●

Displays the current DO terminal output status value. After conversion into binary data, each bit corresponds to a DO signal, 1 means the output is high, and 0 means the output is low. The corresponding relationship between each bit and the output terminal is as follows:

Bit0	Bit1	Bit2	Bit3	Bit4	Bit5	Bit6	Bit7
RELAY 1	RELAY 2	Y1	reserve	reserve	reserve	reserve	reserve
Bit8	**Bit9**	**Bit10**	**Bit11**	**Bit12**	**Bit13**	**Bit14**	**Bit15**
reserve	reserve	reserve	reserve	reserve	reserve	reserve	reserve

Function code	Name	Smallest unit	Change
U1-08	Voltage after AI1 correction	0.01V	●
U1-09	Voltage after AI2 correction	0.01V	●
U1-10	PID set value, PID set value (percentage)*PA-05	1	●
U1-11	PID feedback, PID feedback value (percentage)*PA-05	1	●
U1-12	Count value	1	●
U1-13	Length value	1	●
U1-14	Motor speed	rpm	●
U1-15	PLC stage, the current segment during multi-speed operation	1	●
U1-16	PULSE pulse input frequency	0.01kHz	●
U1-17	Feedback speed, the actual operating frequency of the motor	0.1Hz	●
U1-18	P7-38 Remaining time of timing time	0.1Min	●
U1-19	AI1 voltage before correction	0.001V	●
U1-20	Voltage before AI2 correction	0.001V	●
U1-21	DI5 high-speed pulse sampling line speed, refer to P7-71 for use	1m/min	●
U1-22	Load speed display (set load speed when stopped), refer to P7-31 for use	customize	●

Function code	Name	Smallest unit	Change
U1-23	The power-on time	1Min	●
U1-24	This running time	0.1Min	●
U1-25	PULSE pulse input frequency, different from U1-16 only in unit	1Hz	●
U1-26	Communication setting frequency value	0.01%	●
U1-27	Main frequency display	0.01Hz	●
U1-28	Auxiliary frequency display	0.01Hz	●
U1-29	Target torque, take the motor rated torque as 100%	0.1%	●
U1-30	Output torque, take the motor rated torque as 100%	0.1%	●
U1-31	Output torque, with the rated current of the inverter as 100%	0.1%	●
U1-32	Torque upper limit, the rated current of the inverter is 100%	0.1%	●
U1-33	VF separation target voltage	1V	●
U1-34	VF split output voltage	1V	●
U1-35	Reserve	—	●
U1-36	Motor serial number currently in use	1	●
U1-37	AO1 target voltage	0.01V	●
U1-38	AO2 target voltage	0.01V	●
U1-39	0~3	1	●
U1-40	Inverter current fault	1	●
U1-41	Agent time remaining	1h	●
U1-42	AC incoming line current	0.1A	●
U1-43	PLC current phase remaining time	0.1	●
U1-47	Cumulative running time 1 (cumulative running time = U1-47 + U1-48)	1h	●
U1-48	Cumulative running time 2 (cumulative running time = U1-47 + U1-48)	1min	●
U1-50	Motor temperature	1℃	●

Note:

Cumulative running time = Cumulative running time 1 + Cumulative running time 2 = U1-47 + U1-48.

Chapter 14

Function code address query comparison table

14.1 Function code address query comparison table

Function code	Address	Function code	Address	Function code	Address
Group P0: Basic function group					
P0-00	F000	P0-01	F001	P0-02	F002
P0-03	F003	P0-04	F004	P0-05	F005
P0-06	F006	P0-07	F007	P0-08	F008
P0-09	F009	P0-10	F00A	P0-11	F00B
P0-13	F00D	P0-14	F00E	P0-15	F00F
P0-16	F010	P0-17	F011	P0-18	F012
P0-19	F013	P0-20	F014	P0-21	F015
P0-22	F016	P0-23	F017	P0-24	F018
P0-25	F019	P0-26	F01A	P0-27	F01B
P0-28	F01C	P0-29	F01D		
Group P1: Start-stop control					
P1-00	F100	P1-01	F101	P1-02	F102
P1-03	F103	P1-04	F104	P1-05	F105
P1-06	F106	P1-07	F107	P1-08	F108
P1-09	F109	P1-10	F10A	P1-11	F10B
P1-12	F10C	P1-13	F10D	P1-14	F10E
P1-15	F10F	P1-16	F110	P1-17	F111
P1-21	F115	P1-23	F117	P1-24	F118
P1-25	F119	P1-26	F11A	P1-27	F11B
P1-28	F11C	P1-29	F11D		
Group P2: V/F control parameters					
P2-00	F200	P2-01	F201	P2-02	F202
P2-03	F203	P2-04	F204	P2-05	F205
P2-06	F206	P2-07	F207	P2-08	F208

Function code	Address	Function code	Address	Function code	Address
P2-09	F209	P2-10	F00A	P2-11	F00B
P2-13	F00D	P2-15	F00F	P2-16	F210
P2-17	F211	P2-18	F212	P2-19	F213
Group P3: Vector control parameters					
P3-00	F300	P3-02	F302	P3-04	F304
P3-05	F305	P3-06	F306	P3-07	F307
P3-08	F308	P3-11	F30B	P3-12	F30C
P3-13	F30D	P3-14	F30E	P3-15	F30F
P3-16	F310	P3-17	F311	P3-18	F312
P3-19	F313	P3-20	F314	P3-21	F315
P3-22	F316	P3-23	F317	P3-24	F318
P3-25	F319	P3-26	F31A	P3-27	F31B
P3-28	F31C				
Group P4: First motor parameter					
P4-00	F400	P4-01	F401	P4-02	F402
P4-03	F403	P4-04	F404	P4-05	F405
P4-06	F406	P4-07	F407	P4-08	F408
P4-09	F409	P4-10	F40A	P4-11	F40B
P4-12	F40C	P4-13	F40D	P4-17	F411
P4-18	F412	P4-19	F413	P4-20	F414
P4-21	F415	P4-28	F41C	P4-29	F41D
P4-30	F41E	P4-31	F41F	P4-32	F420
Group P5: Input terminal					
P5-00	F500	P5-01	F501	P5-02	F502
P5-03	F503	P5-04	F504	P5-05	F505
P5-06	F506	P5-07	F507	P5-08	F508
P5-09	F509	P5-10	F50A	P5-11	F50B

Function code	Address	Function code	Address	Function code	Address
P5-12	F50C	P5-13	F50D	P5-15	F50F
P5-16	F510	P5-17	F511	P5-18	F512
P5-19	F513	P5-20	F514	P5-21	F515
P5-22	F516	P5-23	F517	P5-24	F518
P5-25	F519	P5-26	F51A	P5-27	F51B
P5-28	F51C	P5-29	F51D	P5-30	F51E
P5-31	F51F	P5-32	F520	P5-33	F521
P5-34	F522	P5-35	F523	P5-36	F524
P5-37	F525	P5-38	F526	P5-39	F527
P5-40	F528	P5-41	F529	P5-42	F52A
P5-44	F52C	P5-45	F52D		
Group P6: Output terminal					
P6-00	F600	P6-01	F601	P6-02	F602
P6-03	F603	P6-04	F604	P6-05	F605
P6-09	F609	P6-10	F60A	P6-11	F60B
P6-12	F60C	P6-13	F60D	P6-14	F60E
P6-15	F60F	P6-16	F610	P6-17	F611
P6-18	F612	P6-19	F613	P6-20	F614
P6-21	F615	P6-22	F616	P6-23	F617
P6-26	F61A	P6-27	F61B	P6-28	F61C
P6-29	F61D				
Group P7: Accessibility and keyboard display					
P7-00	F700	P7-01	F701	P7-02	F702
P7-03	F703	P7-04	F704	P7-05	F705
P7-06	F706	P7-07	F707	P7-08	F708
P7-09	F709	P7-10	F70A	P7-11	F70B
P7-12	F70C	P7-15	F70F	P7-16	F710

Function code	Address	Function code	Address	Function code	Address
P7-17	F711	P7-18	F712	P7-19	F713
P7-20	F714	P7-21	F715	P7-22	F716
P7-23	F717	P7-24	F718	P7-25	F719
P7-26	F71A	P7-27	F71B	P7-28	F71C
P7-29	F71D	P7-30	F71D	P7-31	F71F
P7-32	F720	P7-33	F721	P7-34	F722
P7-36	F724	P7-37	F725	P7-38	F726
P7-39	F727	P7-40	F728	P7-41	F729
P7-43	F72B	P7-44	F72C	P7-45	F72D
P7-46	F72E	P7-49	F731	P7-50	F732
P7-51	F733	P7-53	F735	P7-54	F736
P7-55	F737	P7-56	F738	P7-57	F739
P7-58	F73A	P7-59	F73B	P7-60	F73C
P7-61	F73D	P7-62	F73E	P7-63	F73F
P7-64	F740	P7-65	F741	P7-67	F743
P7-68	F744	P7-69	F745	P7-70	F746
P7-71	F747	P7-72	F748	P7-73	F749
P7-74	F74A	P7-75	F74B	P7-76	F74C
Group P8: Communication parameters					
P8-00	F800	P8-01	F801	P8-02	F802
P8-03	F803	P8-04	F804	P8-05	F805
P8-06	F806				
Group P9: Fault and Protection					
P9-00	F900	P9-01	F901	P9-02	F902
P9-03	F903	P9-04	F904	P9-05	F905
P9-06	F906	P9-07	F907	P9-08	F908
P9-11	F90B	P9-12	F90C	P9-13	F90D

Function code	Address	Function code	Address	Function code	Address
P9-14	F90E	P9-15	F90F	P9-16	F910
P9-17	F911	P9-18	F912	P9-19	F913
P9-20	F914	P9-22	F916	P9-23	F917
P9-24	F918	P9-26	F91A	P9-27	F91B
P9-28	F91C	P9-29	F91D	P9-30	F91E
P9-31	F91F	P9-32	F920	P9-33	F921
P9-34	F922	P9-35	F923	P9-36	F924
P9-37	F925	P9-38	F926		
Group PA: PID function					
PA-00	FA00	PA-01	FA01	PA-02	FA02
PA-03	FA03	PA-04	FA04	PA-05	FA05
PA-06	FA06	PA-07	FA07	PA-08	FA08
PA-09	FA09	PA-10	FA0A	PA-11	FA0B
PA-12	FA0C	PA-13	FA0D	PA-14	FA0E
PA-18	FA12	PA-19	FA13	PA-20	FA14
PA-21	FA15	PA-22	FA16	PA-23	FA17
PA-24	FA18	PA-25	FA19	PA-26	FA1A
PA-27	FA1B	PA-28	FA1C	PA-29	FA1D
Group PB: Swing Frequency, Fixed Length and Count					
PB-00	FB00	PB-01	FB01	PB-02	FB02
PB-03	FB03	PB-04	FB04	PB-05	FB05
PB-06	FB06	PB-07	FB07	PAB-08	FB08
PB-09	FB09				
Group PC: Multi-segment instruction and simple PLC function					
PC-00	FC00	PC-01	FC01	PC-02	FC02
PC-03	FC03	PC-04	FC04	PC-05	FC05
PC-06	FC06	PC-07	FC07	PC-08	FC08
PC-09	FC09	PC-10	FC0A	PC-11	FC0B

Function code	Address	Function code	Address	Function code	Address
PC-12	FC0C	PC-13	FC0D	PC-14	FC0E
PC-15	FC0F	PC-16	FC10	PC-17	FC11
PC-18	FC12	PC-19	FC13	PC-20	FC14
PC-21	FC15	PC-22	FC16	PC-23	FC17
PC-24	FC18	PC-25	FC19	PC-26	FC1A
PC-27	FC1B	PC-28	FC1C	PC-29	FC1D
PC-30	FC1E	PC-31	FC1F	PC-32	FC20
PC-33	FC21	PC-34	FC22	PC-35	FC23
PC-36	FC24	PC-37	FC25	PC-38	FC26
PC-39	FC27	PC-40	FC28	PC-41	FC29
PC-42	FC2A	PC-43	FC2B	PC-44	FC2C
PC-45	FC2D	PC-46	FC2E	PC-47	FC2F
PC-48	FC30	PC-49	FC31	PC-50	FC32
PC-51	FC33	PC-52	FC34	PC-53	FC35
PC-55	FC37				
Group PD: Torque control					
PD-00	FD00	PD-01	FD01	PD-03	FD03
PD-04	FD04	PD-06	FD06	PD-07	FD07
PD-08	FD08	PD-10	FD0A		
Group PE: AI multi-point curve setting					
PE-00	FE00	PE-01	FE01	PE-02	FE02
PE-03	FE03	PE-04	FE04	PE-05	FE05
PE-06	FE06	PE-07	FE07	PE-08	FE08
PE-09	FE09	PE-10	FE0A	PE-11	FE0B
PE-12	FE0C	PE-13	FE0D	PE-14	FE0E
PE-15	FE0F	PE-24	FE18	PE-25	FE19
PE-26	FE1A	PE-27	FE1B		

Function code	Address	Function code	Address	Function code	Address
Group PF: Manufacturer parameters					
PF-00	FF00				
Group A0: Second motor parameter setting					
A0-00	A000	A0-01	A001	A0-02	A002
Group A1: Second Motor Parameters					
A1-00	A100	A1-01	A101	A1-02	A102
A1-03	A103	A1-04	A104	A1-05	A105
A1-06	A106	A1-07	A107	A1-08	A108
A1-09	A109	A1-10	A10A	A1-11	A10B
A1-12	A10C	A1-13	A10D		
Group A2: Second motor VF parameter setting					
A2-00	A200	A2-02	A202		
Group A3: Second motor vector control parameters					
A3-00	A300	A3-02	A302	A3-04	A304
A3-05	A305	A3-06	A306	A3-07	A307
A3-08	A308	A3-11	A30B	A3-12	A30C
A3-13	A30D	A3-14	A30E	A3-15	A30F
A3-16	A310	A3-17	A311	A3-18	A312
A3-19	A313	A3-20	A314	A3-21	A315
A3-22	A316	A3-23	A317		
Group B0: System parameters					
B0-00	B000	B0-01	B001	B0-02	B002
B0-03	B003	B0-04	B004	B0-05	B005
Group B1: User function code customization					
B1-00	B100	B1-01	B101	B1-02	B102
B1-03	B103	B1-04	B104	B1-05	B105
B1-06	B106	B1-07	B107	B1-08	B108

Function code	Address	Function code	Address	Function code	Address
B1-09	B109	B1-10	B10A	B1-11	B10B
B1-12	B10C	B1-13	B10D	B1-14	B10E
B1-15	B10F	B1-16	B110	B1-17	B111
B1-18	B112	B1-19	B113	B1-20	B114
B1-21	B115	B1-22	B116	B1-23	B117
B1-24	B118	B1-25	B119	B1-26	B11A
B1-27	B11B	B1-28	B11C	B1-29	B11D
B1-30	B11E	B1-31	B11F		
Group B2: Optimize control parameters					
B2-00	B200	B2-01	B201	B2-02	B202
B2-03	B203	B2-04	B204	B2-05	B205
B2-06	B206	B2-07	B207	B2-08	B208
Group B3: AIAO correction parameters					
B3-00	B300	B3-01	B301	B3-02	B302
B3-03	B303	B3-04	B304	B3-05	B305
B3-06	B306	B3-07	B307	B3-12	B30C
B3-13	B30D	B3-14	B30E	B3-15	B30F
B3-16	B310	B3-17	B311	B3-18	B312
B3-19	B313				
Group B4: Master-slave control parameters					
B4-00	B400	B4-01	B401	B4-02	B402
B4-03	B403	B4-04	B404	B4-05	B405
B4-06	B406	B4-07	B407	B4-08	B408
Group B5: Brake function parameters					
B5-00	B500	B5-01	B501	B5-02	B502
B5-03	B503	B5-04	B504	B5-05	B505
B5-06	B506	B5-07	B507	B5-08	B508

Function code	Address	Function code	Address	Function code	Address
B5-09	B509	B5-10	B50A	B5-11	B50B
B5-12	B50C	B5-15	B50F	B5-16	B510
B5-17	B511	B5-18	B512	B5-19	B513
B5-20	B514				
Group B6: Sleep wakeup function parameters					
B6-00	B600	B6-01	B601	B6-02	B602
B6-03	B603	B6-04	B604	B6-05	B605
Group C1: Tension control function parameters					
C1-00	C100	C1-01	C101	C1-02	C102
C1-03	C103	C1-04	C104	C1-05	C105
C1-06	C106	C1-07	C107	C1-08	C108
C1-09	C109	C1-10	C10A	C1-11	C10B
C1-12	C10C	C1-13	C10D	C1-14	C10E
C1-15	C10F	C1-16	C110	C1-17	C111
C1-18	C112	C1-19	C113	C1-20	C114
C1-21	C115	C1-22	C116	C1-23	C117
C1-24	C118	C1-25	C119	C1-26	C11A
C1-27	C11B	C1-28	C11C	C1-29	C11D
C1-30	C11D	C1-31	C11F	C1-32	C120
C1-33	C121	C1-34	C122	C1-35	C123
C1-36	C124	C1-37	C125	C1-38	C126
C1-39	C127	C1-40	C128	C1-41	C129
C1-42	C12A	C1-43	C12B	C1-44	C12C
C1-45	C12D	C1-46	C12E	C1-47	C12F
C1-48	C130	C1-49	C131	C1-50	C132
C1-51	C133	C1-52	C134	C1-53	C135
C1-54	C136	C1-55	C137	C1-56	C138

Function code	Address	Function code	Address	Function code	Address
C1-57	C139	C1-58	C13A	C1-59	C13B
C1-60	C13C	C1-61	C13D	C1-62	C13E
C1-63	C13F	C1-64	C140	C1-65	C141
C1-66	C142	C1-67	C143	C1-68	C144
C1-69	C145	C1-70	C146	C1-71	C147
Group C3: Photovoltaic functional parameters					
C3-00	C300	C3-01	C301	C3-02	C302
C3-03	C303	C3-04	C304	C3-05	C305
C3-06	C306	C3-07	C307	C3-08	C308
C3-09	C309	C3-10	C30A	C3-11	C30B
C3-12	C30C	C3-13	C30D	C3-14	C30E
C3-15	C30F	C3-16	C310	C3-17	C311
C3-18	C312	C3-19	C313	C3-20	C314
C3-21	C315	C3-22	C316		
Group U0: Fault logging parameters					
U0-00	7000	U0-01	7001	U0-02	7002
U0-03	7003	U0-04	7004	U0-05	7005
U0-06	7006	U0-07	7007	U0-08	7008
U0-09	7009	U0-10	700A	U0-13	700D
U0-14	700E	U0-15	700F	U0-16	7010
U0-17	7011	U0-18	7012	U0-19	7013
U0-20	7014	U0-21	7015	U0-22	7016
U0-23	7017	U0-24	7018	U0-25	7019
U0-26	701A	U0-27	701B	U0-28	701C
U0-29	701D	U0-30	701E		
Group U1: Application Monitoring Parameters					
U1-00	7100	U1-01	7101	U1-02	7102

Function code	Address	Function code	Address	Function code	Address
U1-03	7103	U1-04	7104	U1-05	7105
U1-06	7106	U1-07	7107	U1-08	7108
U1-09	7109	U1-10	710A	U1-11	710B
U1-12	710C	U1-13	710D	U1-14	711E
U1-15	711F	U1-16	7110	U1-17	7111
U1-18	7112	U1-19	7113	U1-20	7114
U1-21	7115	U1-22	7116	U1-23	7117
U1-24	7118	U1-25	7119	U1-26	711A
U1-27	711B	U1-28	711C	U1-29	711D
U1-30	711E	U1-31	711F	U1-32	7120
U1-33	7121	U1-34	7122	U1-35	7123
U1-36	7124	U1-37	7125	U1-38	7126
U1-39	7127	U1-40	7128	U1-41	7129
U1-42	712A	U1-43	712B	U1-47	712F
U1-48	7130	U1-50	7132		

Chapter 15

Appendix

Appendix A:
Off Grid Solar Pumping Software Instruction

1 Electrical wiring

Please connect according to the figure below. Please pay attention to the following matters when connecting:

- The power output of the photovoltaic panel is connected to the " + "" - ” terminal, be careful not to connect the polarity in reverse.
- The grid input is connected to " R ” ” S ” ” T "Terminal, make sure the voltage level of the inverter is consistent with the grid voltage level before use.
- If the power grid is single-phase, it can be connected to " R ” “ S ” “ T " Any two terminals in ".

2 Debugging guidance

2.1 Photovoltaic panel power supply debugging steps:

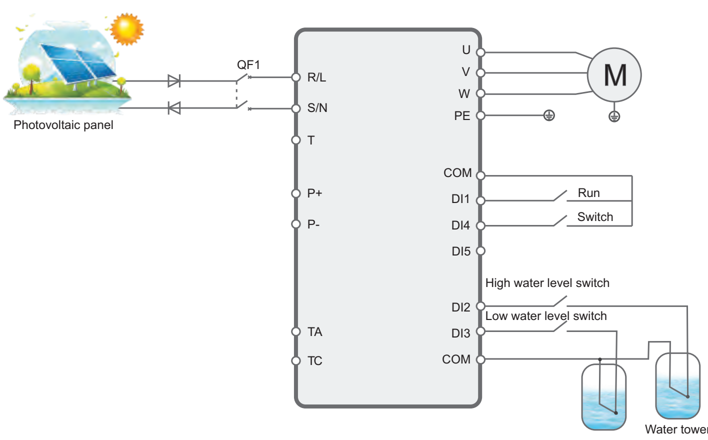


Figure 1 700IP65 Series

❶ Check the model and wiring of the frequency converter, confirm that there are no errors, and then close QF1 to power on;

❷ Set the motor parameters correctly and input P4-00~P4-06 according to the motor nameplate; Set command source P0-04 according to the requirements, set DI terminals P5-01=41 (effective for detecting full water in the reservoir), P5-02=42 (effective for detecting insufficient water in the well), P5-03=43 (effective for manually switching power supply mode), P6-00=31 (water pump control valve), 700IP65 frequency converter has made power-off memory for panel commands and communication commands, that is, it remembers the commands before power-off and still maintains the command after power on;

❸ Set A1-00=1 (photovoltaic effective), set A1-03=open circuit voltage, set A1-04=1 (photovoltaic power supply mode);

❹ Set the MPPT starting voltage (A1-02), which is generally set to around 80% of the open circuit voltage of the photovoltaic panel. If this value is set accurately, it will help the frequency converter track the maximum power point faster;

❺ Press“ RUN ”to run the frequency converter. Under normal lighting conditions, if the operating frequency is very low or the water output is very low, it is possible that the wiring of the water pump is reversed. Simply switch the wiring of the two phases of the water pump.

Note:

Other optimization related parameters can be set according to the requirements. Please refer to Part 12 Parameter List for detailed instructions.

2.2 Steps for grid power supply debugging:

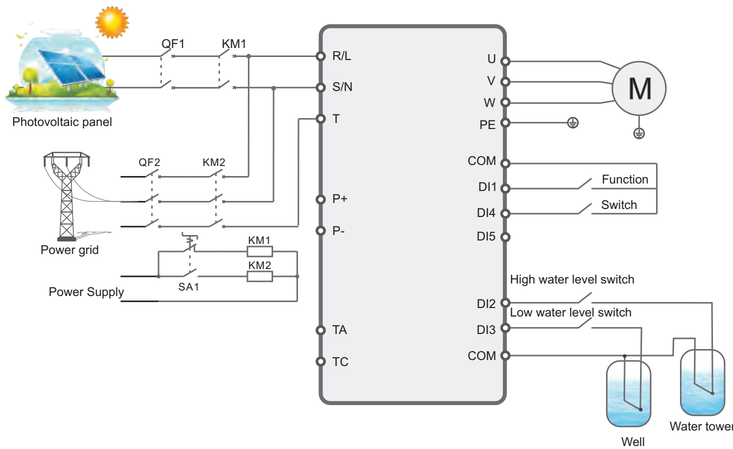


Figure 2 700IP65 Series

❶ Check if the wiring is correct. When no diode protection is installed at the input end of the DC bus, it is forbidden to close the photovoltaic panel switch QF1 and the grid input switch QF2 at the same time, otherwise it will damage the photovoltaic panel;

❷ First, disconnect the photovoltaic panel switch QF1, and then close the grid switch QF2;

❸ Set the motor parameters correctly and input P4-00~P4-06 according to the motor nameplate; Set command source P0-04 according to the requirements, set DI terminal P5-01=41 (effective for detecting full water in the reservoir), P5-02=42 (effective for detecting insufficient water in the well), P6-00=31 (for the water pump control valve). The 700IP65 frequency converter has made power-off memory for both the panel and communication commands, which means it remembers the command before power failure and still maintains the command after power on;

❹ Set A1-00=1 (photovoltaic invalid), set A1-04=2 (grid power supply mode);

❺ Press “ RUN ” to run the frequency converter. Under normal lighting, if the operating frequency is very low or the water output is very small, it is possible that the wiring of the water pump is reversed. Simply switch the wiring of the two phases of the water pump.

Note:

Other optimization related parameters can be set according to the requirements. Please refer to Part 12 Parameter List for detailed instructions.

2.3 Steps for automatic switching and debugging of photovoltaic panels and grid power supply:

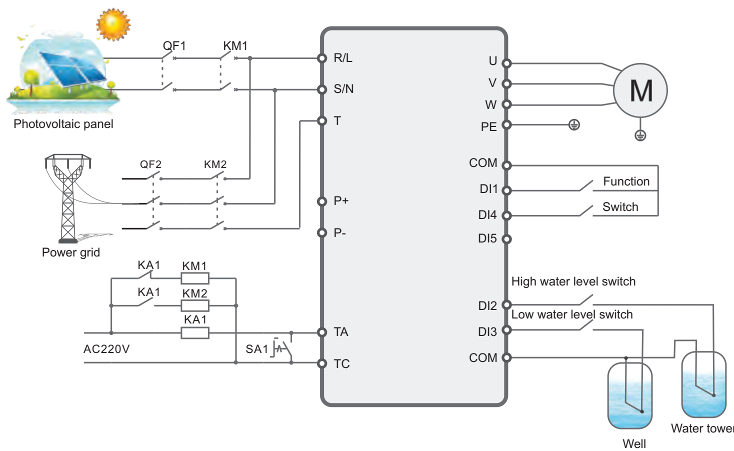


Figure 3 700IP65 Series

❶ Please connect the wires correctly according to the above diagram, ensure there are no errors, and then close QF1 and QF2 at the same time;

❷ Set the motor parameters correctly and input P4-00~P4-06 according to the motor nameplate; Set command source P0-04 according to the requirements, set DI terminals P5-01=41 (effective for detecting full water in the reservoir), P5-02=42 (effective for detecting insufficient water in the well), P5-03=43 (effective for manually switching power supply mode), P6-00=31 (water pump control valve). The 700IP65 frequency converter has power down memory for both the panel and communication commands, that is, it remembers the commands before power down and still maintains the command after power on;

❸ Set A1-00=1 (photovoltaic active), set A1-04=0 (automatic switching of power supply mode);

❹ Set the MPPT starting voltage (A1-02), which is generally set to around 80% of the open circuit voltage of the photovoltaic panel. If this value is set to. Accurate, helps the frequency converter track the maximum power point faster;

❺ When the system is powered on, the photovoltaic panel is given priority power supply by default. When Ta1/TB1 is activated, the power is switched to the photovoltaic panel. After the bus voltage is stable and meets the conditions, it is allowed to operate. When the light is insufficient, the frequency converter determines weak light according to its own weak light algorithm. The freque-ncy converter automatically stops and TA1/TB1 is activated, switches to the grid power supply and runs automatically. After the running time reaches A2-00, it switches to the photovoltaic panel power supply, and this logic cycle determines the switching operation.

❻ Special functions such as weak light warning and abnormal water level warn-ing can be set up for groups A1-15~A1-21 according to needs;

❼ Press " RUN "to run the frequency converter. Under normal lighting, if the oper-ating frequency is very low or the water output is very small, it is possible that the wiring of the water pump is reversed. Simply switch the wiring of the two phases of the water pump.

Note:

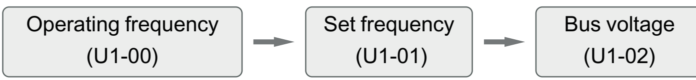
Other optimization related parameters can be set according to the requirements. Please refer to Part 12 Parameter List for detailed instructions.

3 Digital keyboard display

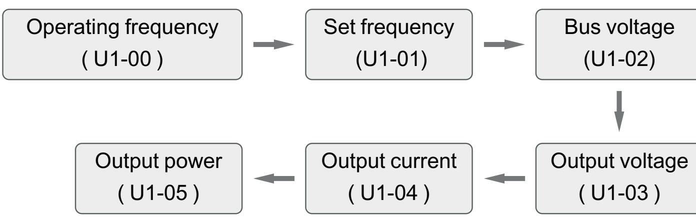
3.1 Monitoring display

According to the running status of the inverter, the digital tube displays different contents in turn. If no key is pressed, the current running frequency (U1-00) is displayed by default. Press " " It is also possible to switch to the next monitored quantity.

- When the inverter is in stop state, press " " and the digital tube will display cyclically:



- When the inverter is in operation, press the " " code tube to display cyclically:



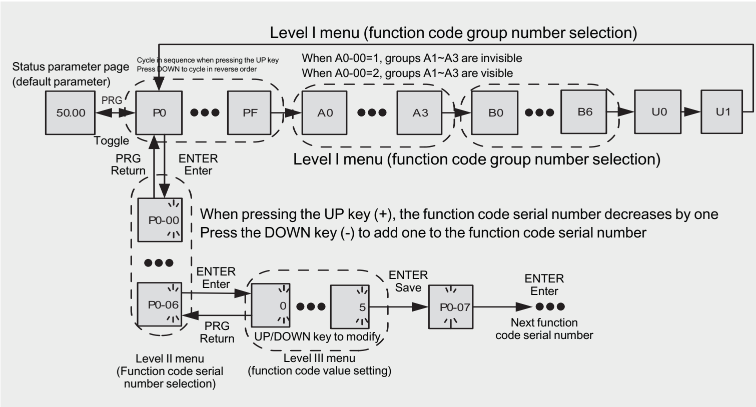
3.2 Menu Mode

The function code parameters of the inverter adopt a three-level menu struct-ure, and the parameters can be viewed and modified through the operation panel.

The menus are:

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. In the status parameter interface, you can use the " " key to view different status parameters.



Three-level menu operation flow chart

4 Electrical wiring

The function code symbols are explained as follows :

Icons	Content
☆	This parameter can be changed during both shutdown and operation.
★	Indicates that the parameter cannot be changed during runtime.
●	The value of this parameter is the actual test record value or the manufacturer's fixed value and cannot be changed

Function code	Name	Description (setting range)	Factory Default	Change
A1-00	Photovoltaic water pump activation	0: Invalid 1: Enable	0	★
A1-01	Vmppt voltage setting mode	0: Manually given 1: Automatic tracking	1	★
A1-02	Vmppt voltage starting voltage	0.0~800.0V	600.0V	☆
A1-03	PV open circuit voltage setting	0.0~800.0V	750.0V	★

Function code	Name	Description (setting range)	Factory Default	Change
A1-04	Operation time of power grid supply in automatic switching mode	0: Automatic switching 1: Photovoltaic power supply 2: Power grid supply	1	★
A1-05	Vmppt interval	0.0~100.0s Automatically adjust Vmppt voltage at intervals of A1-05 set time	1.0s	☆
A1-06	Vmppt hysteresis	0.0~50.0V When the deviation value is less than this value, Vmppt will no longer be adjusted to reduce the jitter of the output frequency.	2.0s	☆
A1-07	Vmppt step length	0.0~100.0V When automatically adjusting the Vmmpt voltage, adjust the amplitude of the upper and lower ranges	10.0V	☆
A1-08	Vmppt voltage upper limit	230.0~750.0V	650.0V	☆
A1-09	Vmppt voltage lower limit	230.0~750.0V	300.0V	☆
A1-10	CVT proportional gain	0.0~100.0 Proportional coefficient of target frequency 1 The larger the value, the greater the effect and the faster the adjustment	1.0	☆
A1-11	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	1.00	☆
A1-12	CVT proportional gain 1	0.0~100.0 Proportional coefficient of target frequency 2 The larger the value, the greater the effect and the faster the adjustment	1.00	☆

Function code	Name	Description (setting range)	Factory Default	Change
A1-13	CVT integral coefficient 1	0.0~100.0 Integral coefficient of target frequency 2 The larger the value, the greater the effect and the faster the adjustment	1.00	☆
A1-14	CVT switching point	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 A1-14, switch to A1-12 proportional coefficient 2 and A1-13 integral coefficient. Otherwise, use A1-10 proportional coefficient 1 and A1-11 proportional coefficient 1.	2.00V	☆
A1-15	Weak light detection frequency	0~Set operating frequency	20.00Hz	☆
A1-16	Weak light sleep delay	5.0~6553.5s	600.0s	☆
A1-17	Weak light wake-up time	0.0~6553.5s	200.0s	☆
A1-18	Reservoir full sleep delay	0.0~6553.5s	60.0s	☆
A1-19	Delay in starting due to insufficient water in the reservoir	0.0~6553.5s	600.0s	☆
A1-20	Water well insufficient sleep delay	0.0~6553.5s	600.0s	☆
A1-21	Water well startup sleep delay	0.0~6553.5s	600.0s	☆
A2-00	Operation time of power grid supply in automatic switching mode	0~65535min	60.0	☆

5 Detailed parameter description

Function code	Name	Description (setting range)	Factory Default	Change
A1-00	Photovoltaic water pump activation	0: Invalid 1: Enable	0	★

0: Invalid, for standard model;

1: Effective, the photovoltaic water pump parameter group is in effect.

Function code	Name	Description (setting range)	Factory Default	Change
A1-01	Vmppt voltage setting mode	0: Manually given 1: Automatic tracking	1	★

0: Manually set, run according to a fixed Vmppt;

1: Automatic tracking, tracking the maximum power point of Vmppt.

Function code	Name	Description (setting range)	Factory Default	Change
A1-02	Vmppt voltage starting voltage	0.0~800.0V	600.0V	☆

This parameter is the target voltage tracked first during the start-up phase of the frequency converter.

Function code	Name	Description (setting range)	Factory Default	Change
A1-03	PV open circuit voltage setting	0.0~800.0V	750.0V	★

This parameter is the open circuit voltage of the solar panel and needs to be set according to the panel parameters.

Function code	Name	Description (setting range)	Factory Default	Change
A1-04	Operation time of power grid supply in automatic switching mode	0: Automatic switching 1: Photovoltaic power supply 2: Power grid supply	1	★

0. Automatic switching

When the system is powered on, the photovoltaic panel is given priority power supply by default. TA1/TB1 is turned on, and the power is switched to the photovoltaic panel. After the bus voltage is stable and meets the starting conditions, it is allowed to operate. When the light is insufficient, the frequency converter determines weak light according to its own weak light algorithm, and automatically stops and TA1 \ TB1 is cut off. TA1 \ TC1 is turned on and switched to grid power supply and automatically runs. After the running time reaches A2-00, it automatically stops and switches to photovoltaic panel power supply. This logic cycle determines the switching operation.

1. Select the photovoltaic panel mode for power supply

The frequency converter operates using the MPPT algorithm to track the maximum power point. When weak light is detected, if the power supply of the frequency converter is changed from the peripheral circuit to the grid, DI4 can be used to switch to the grid function. If the power supply needs to be transferred to the photovoltaic panel, DI4 can be disconnected (set P5-03 function code to 43, and DI4 power switch will take effect).

2. Grid power supply

At this time, the frequency converter is operating in grid power supply mode, and the MPPT algorithm is invalid.

Function code	Name	Description (setting range)	Factory Default	Change
A1-05	Vmppt interval	0.0~100.0s Automatically adjust Vmppt voltage at intervals of A1-05 set time	1.0s	☆
A1-06	Vmppt hysteresis	0.0~50.0V When the deviation value is less than this value, Vmppt will no longer be adjusted to reduce the jitter of the output frequency.	2.0s	☆
A1-07	Vmppt step length	0.0~100.0V When automatically adjusting the Vmmpt voltage, adjust the amplitude of the upper and lower ranges	10.0V	☆

The above three parameters are the response speed of MPPT tracking target voltage. The larger the value, the faster the response, but the system may be unstable.

Function code	Name	Description (setting range)	Factory Default	Change
A1-08	Vmppt voltage upper limit	230.0~750.0V	650.0V	☆
A1-09	Vmppt voltage lower limit	230.0~750.0V	300.0V	☆

The above two parameters define the upper and lower limits of MPPT tracking target voltage.

Function code	Name	Description (setting range)	Factory Default	Change
A1-10	CVT proportional gain	0.0~100.0 Proportional coefficient of target frequency 1 The larger the value, the greater the effect and the faster the adjustment	1.0	☆
A1-11	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	1.00	☆
A1-12	CVT proportional gain 1	0.0~100.0 Proportional coefficient of target frequency 2 The larger the value, the greater the effect and the faster the adjustment	1.00	☆
A1-13	CVT integral coefficient 1	0.0~100.0 Integral coefficient of target frequency 2 The larger the value, the greater the effect and the faster the adjustment	1.00	☆
A1-14	CVT switching point	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 A1-14, switch to A1-12 proportional coefficient 2 and A1-13 integral coefficient. Otherwise, use A1-10 proportional coefficient 1 and A1-11 proportional coefficient 1.	2.00V	☆

The above five parameters are speed adjustment parameters during MPPT tracking of target voltage, and this set of parameters will indirectly affect the MPPT tracking speed. The larger the value, the faster the response, but the system may be unstable.

Function code	Name	Description (setting range)	Factory Default	Change
A1-15	Weak light detection frequency	0~Set operating frequency	20.00Hz	☆
A1-16	Weak light sleep delay	5.0~6553.5s	600.0s	☆
A1-17	Weak light wake-up time	0.0~6553.5s	200.0s	☆

When the frequency converter operates in photovoltaic mode (A1-03 setting 1)

After the operating frequency is lower than A1-15 and the duration exceeds A1-16, the frequency converter will shut down and report a weak light warning err50. When the frequency converter enters a weak light state, after a delay time of A1-17, the frequency converter will automatically operate.

When the frequency converter is operating in automatic switching mode (A1-03 set to 0)

After the operating frequency is lower than A1-15 and the duration exceeds A1-16, switch to grid power supply mode. After running for A2-00 time, automatically switch to photovoltaic mode to see if the lighting is restored, and use this logic to cycle the operation.

When the frequency converter operates in grid mode (A1-03 setting 2)

This set of functions is invalid.

Note: When the light is too weak and the bus voltage is lower than the undervoltage point, the frequency converter directly reports undervoltage.

Function code	Name	Description (setting range)	Factory Default	Change
A1-18	Reservoir full sleep delay	0.0~6553.5s	60.0s	☆
A1-19	Delay in starting due to insufficient water in the reservoir	0.0~6553.5s	600.0s	☆

Set P5-01 function code to 41, DI2 water level detection takes effect

When the DI2 water level detection detects that the reservoir is full, after A1-18 delay, the frequency converter alarm err51 enters the full water sleep state. When the DI2 water level detection is not detected, after A1-19 time, the frequency converter exits the full water state and automatically runs according to the command before shutdown.

Function code	Name	Description (setting range)	Factory Default	Change
A1-20	Water well insufficient sleep delay	0.0~6553.5s	600.0s	☆
A1-21	Water well startup sleep delay	0.0~6553.5s	600.0s	☆

Set P5-02 function code to 42, DI3 water level detection takes effect

When the DI3 water level detects that the well is in an empty water state, after a delay of A1-20, the frequency converter alarm err52 enters a water shortage sleep state. When no empty water state is detected, after A1-21, the frequency converter exits the water shortage state and automatically runs according to the command before shutdown.

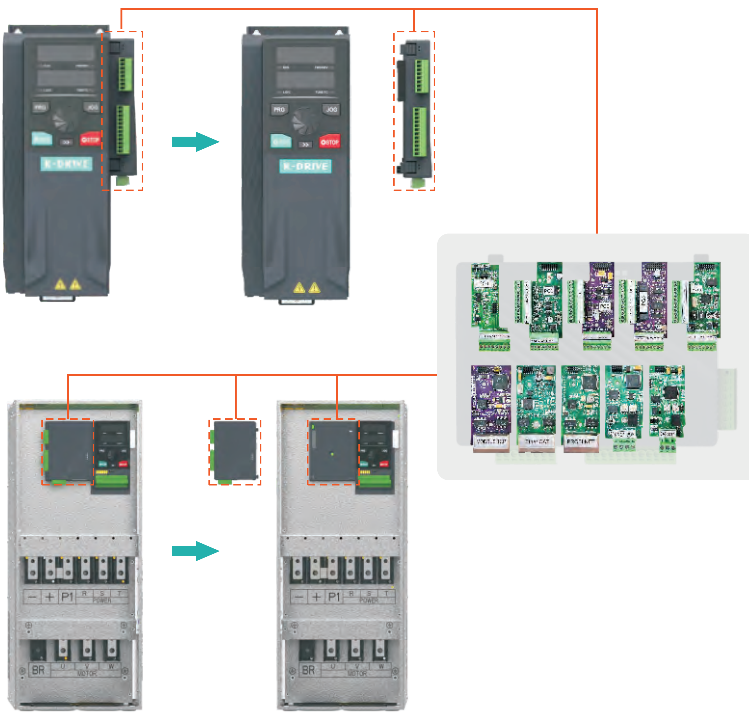
Function code	Name	Description (setting range)	Factory Default	Change
A2-00	Operation time of power grid supply in automatic switching mode	0~65535min	60.0	☆

This parameter automatically switches to photovoltaic mode after running A2-00 time while operating in grid mode.

Appendix B:
700ISeries Expansion Card Selection Manual

Introduction of data

This document describes the information about the communication expansion card, encoder expansion card, and IO expansion card commonly used in our common frequency converter, including the installation size, electrical specifications, interface layout, and terminal definition of the expansion card.

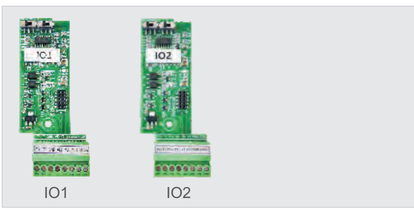


Quick selection List

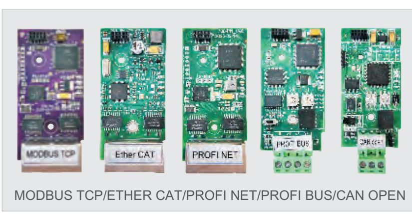
This manual mainly introduces the commonly used communication expansion cards, encoder expansion cards, and IO expansion cards for our company's 700 universal frequency converter, including expansion card installation, electrical specifications, interface definitions, and other related information.

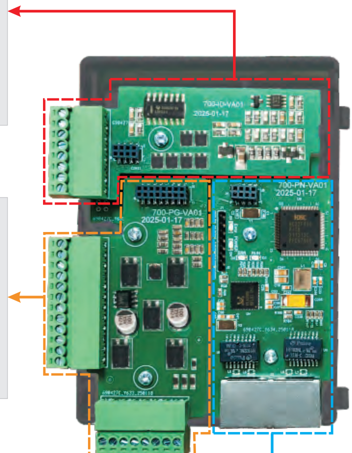
The 700 expansion box can accommodate IO cards, PG cards, and communication cards simultaneously. The following figure demonstrates the installation location instructions for each 700 expansion card expansion box.

IO Class

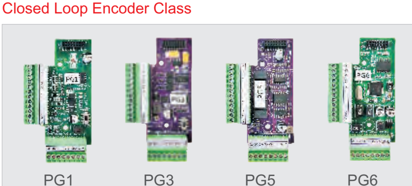


Communication Class





Closed Loop Encoder Class



Type	Model	The order code	Use
I/O expansion card 1	700IP65 -IO1	1 channel AI (Ai3), 2 channels Y (Y1, Y2) terminals, 1 channel (PT100/PT1000) temperature detection.	Installed above the 16PIN pin bank of the expansion box at the 10PIN pin bank
I/O expansion card 2	700IP65 -IO2	2-channel (PT100/PT1000) temperature detection, 2-channel Y (Y1, Y2) terminals.	
CANOPEN communication expansion card	700IP65 -CANOPEN	CANOPEN communication expansion card	Installed on the right side of the 16PIN pin bank of the expansion box and connected to the motherboard at the 10PIN pin bank
ProFinet communication card	700IP65 -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.	
Profbus - DP communication card	700IP65 -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 communications card	700IP65 -Ethercat	EtherCAT fieldbus adapter card, suitable for ultra-high speed I/O networks.	

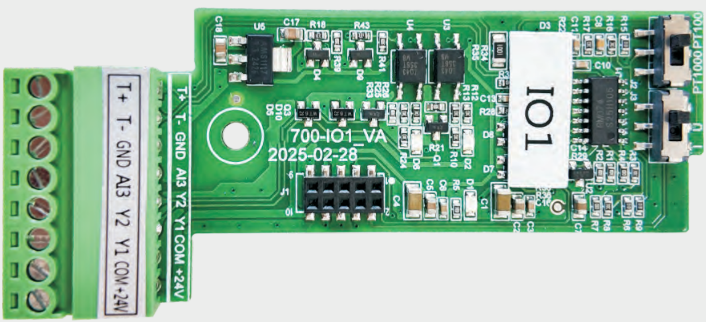
Type	Model	The order code	Use
Collector open ABZ encoder card	700IP65 -PG1	Open collector PG card (PG1 card is only used for asynchronous applications); Compatible with complementary output, encoder card output DC power optional+12	Installed on the 16PIN pin socket of the expansion box and then connected to the motherboard
Differential input ABZ encoder card	700IP65 -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	700IP65 -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	700IP65 -PG6	Suitable for rotary transformers; Suitable for synchronous traction machine closed-loop vector control (VC)	

Chapter 1 I/O expansion card

1.1 IO1 Expansion Card Product Introduction

700-IO1 expansion card is a multifunctional IO expansion card suitable for 700 series frequency converters, which can expand 1 AI (Ai3), 2 Y (Y1, Y2) terminals, and 1 temperature detection (PT100/PT1000).

1.1.1 Appearance and layout



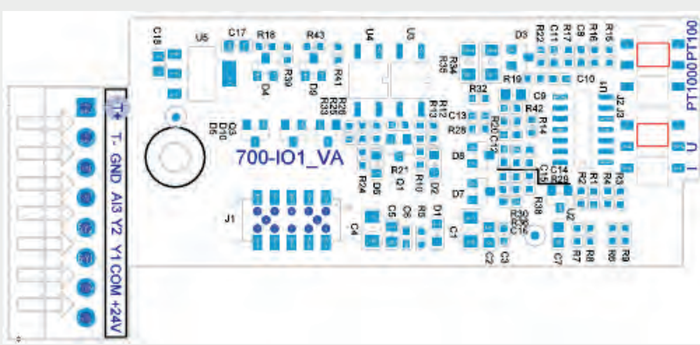


Figure 1-1 I/O Expansion Card 1 Appearance and Layout

Terminal	Terminal name	Function Description
T+	Temperature +	Pt100 temperature sensor, PT1000, KTY, PTC type temperature sensors (J2 jumper selection, default Pt100) 1. Resolution 1 ℃ 2. Range -20 ℃~150 ℃ 3. Detection accuracy: 3 ℃ 4. Support disconnection protection
T-	Temperature -	
AI3-GND	Analog input	Input voltage range: 0-10V (input impedance: 30k Ω); Input current range: 0-20mA (input impedance: 500 Ω)
+24V-COM	analog input DC24V power supply common terminal	Provide+24V power supply externally, generally used as working power supply for digital input/output terminals and external sensor power supply, 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 P6-02, Y2 output setting P6-03
+24V-Y2	Digital output 2	
J1	IO expansion connection terminal	Connect the 10 pin connector to the expansion card transfer board
J2	Temperature selection dial switch	PT100 jumper (facing upwards), Select parameters (P9-38=1) PT1000/KTY/PTC (facing downwards), Select parameters (P9-38=2) Attention: 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	Dial direction U: Voltage type Dial direction I: Current type 0-20mA (4-20mA requires P5-25=2 to be set)

1.1.2 IO1 Expansion Card Terminal Function Description

Y digital output terminal:

When the digital output terminal needs to drive a relay, absorption diodes should be installed on both sides of the relay coil, with a driving capacity of no more than 50mA. Otherwise, it is easy to cause damage to the DC 24V power supply.

Attention: It is necessary to correctly install the polarity of the absorption diode, as shown in the figure below. Otherwise, when the digital output terminal has output, it will immediately burn out the DC 24V power supply.

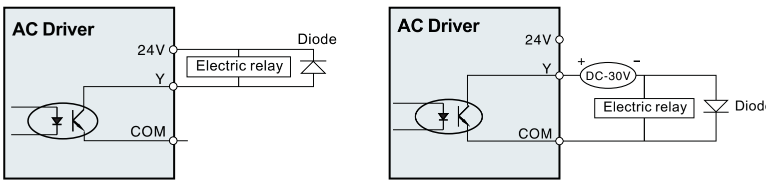


Figure 1-2 Schematic diagram of Y wiring for digital output terminal

AI simulation input terminal: (When selecting voltage signal input,+10V comes from the main control board terminal 10V);

Due to the vulnerability of weak analog voltage signals 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 following figure. In some cases where analog signals are severely interfered with, filtering capacitors or ferrite cores need to be added to the analog signal source side.

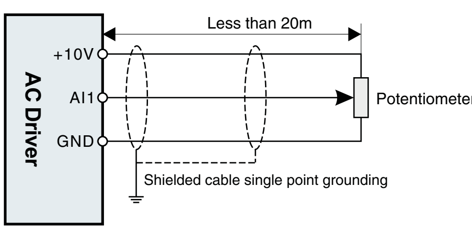


Figure 1-3 Schematic diagram of AI wiring for analog input terminals

1.2 IO2 Expansion Card Product Introduction

700-IO2 expansion card is a multifunctional IO expansion card suitable for 700 series frequency converters, which can expand 1 AI (Ai3), 2 Y (Y1, Y2) terminals, and 1 temperature detection (PT100/PT1000).

1.2.1 Appearance and layout

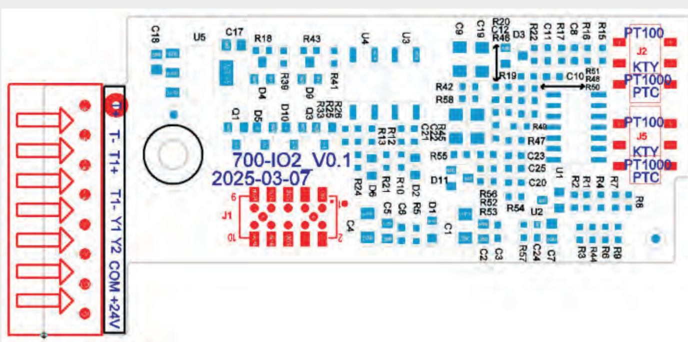


Figure 1-4 700-IO2 Expansion Card

Chapter 15

Terminal	Terminal name	Function Description
T+	Temperature +	PT100 temperature sensor, PT1000, KTY, PTC type temperature sensors (J2 jumper selection, default PT100)
T-	Temperature -	
T1+/T1-	Temperature 2 positive/Temperature 2 negative	PT100 temperature sensor: Pt1000 PTC, KTY type temperature sensors (J2 jumper selection, default Pt100)
+24V-COM	Analog input DC24V power supply common terminal	Provide+24V power supply externally, generally used as working power supply for digital input/output terminals and external sensor power supply, 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 P6-02, Y2 output setting P6-03
+24V-Y2	Digital output 2	
J1	IO expansion connection terminal	Connect the 10 pin connector to the expansion card transfer board
J2	Temperature 1 selection dial switch	PT100 jumper (facing upwards), Select parameters (P9-38=1) PT1000/KTY/PTC (facing downwards), Select parameters (P9-38=2) Attention: When using temperature probes such as KTY and PTC, they can only be used for motor over temperature protection.
J5	Temperature 2 selection dial switch	PT100 jumper (facing upwards), Select parameters (P9-38=1) PT1000/KTY/PTC (facing downwards), Select parameters (P9-38=2)

Chapter 2 Encoder Expansion Card Product Information

Encoder card wiring requirements:

- The cable of the encoder card must be routed separately from the power cable, and parallel routing at close range is strictly prohibited;
- Please use shielded cables for the wiring of the encoder card, and connect the shielding layer to the PE terminal near the controller (to avoid interference, only one end can be grounded);
- The wiring of the encoder card must be separately threaded through pipes, and the metal pipe casing must be reliably grounded.

Introduction to Encoder Card

Provide 5 types of encoder expansion cards (optional accessories), models and functions:

Name	Model	Function Description
OC encoder card	700-PG1	ABZ open electrode input encoder card
Serial Communication Encoder Card	700-PG2	
Differential input encoder card	700-PG3	ABZ differential input encoder card
Sine cosine encoder card	700-PG5	Support sine and cosine signals; Support pulse 1 frequency division differential output
Rotary Transformer Encoder Card	700-PG6	Support feedback signals SIN+/-, COS+/- input signals; Support rotating transformer excitation signal EXC+/- output.

2.1 Open collector ABZ encoder card (700-PG1)

2.1.1 PG1 Product Introduction

700-PG1 is an ABZ open collector signal input with a 1:1 frequency division open collector signal output encoder card.

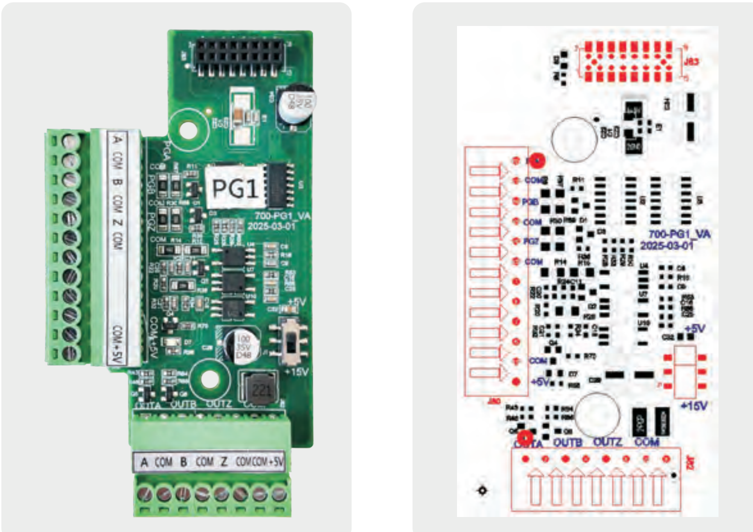


Figure 2-1 700-PG1 Expansion Card

2.1.2 Function Description of PG1 Collector Open Circuit ABZ Encoder Card

Sign	Name	Function Description
J83	16 position female plug	Connect the 16 bit pin to the expansion card transfer board
J80	Encoder A/B/Z input terminals	PGA,PGB,PGZ： Encoder A B Z signal input interface
J1	PGP (+5V,+15V),+15V or+5V power output	Default:+ 5V output. J1 jumper selection+5V or+15V power supply
J82	COM	Power Ground
	OUTA	Divided output A signal, NPN type OC output
	OUTB	Divided output B signal, NPN type OC output
	OUTZ	Divided output Z signal, NPN type OC output

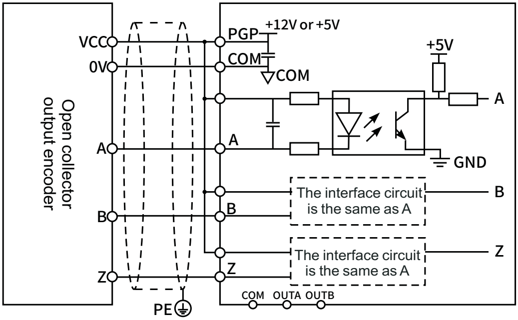


Figure 2-2 Wiring diagram of ABZ encoder card with open collector

2.2 Differential Input ABZ Encoder Card (700-PG3)

2.2.1 PG3 Product Introduction

The 700-PG3 encoder card supports differential OC、 Push pull signal input; Support pulse output; Equipped with 1:1 frequency division differential signal output; Suitable for closed-loop vector control (VC) of asynchronous traction machines.

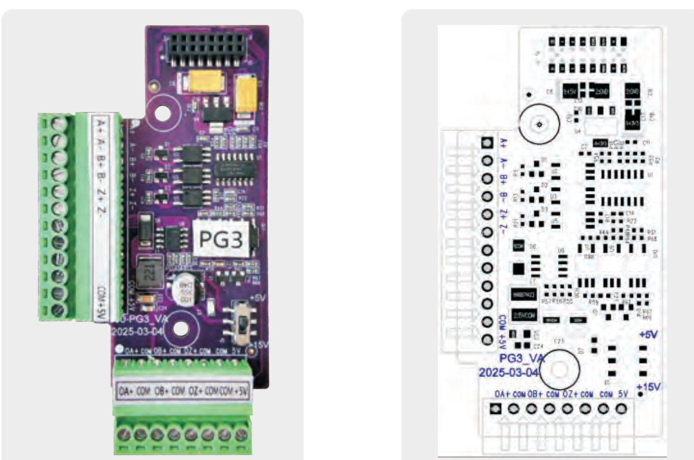


Figure 2-3 700-PG3 Expansion Card

2.2.2 Function Description of PG3 Differential Input ABZ Encoder Card

Sign	Name	Function Description
J1	16 position female plug	Connect the 16 bit pin to the expansion card transfer board
	A+,A-	Encoder A+/A - signal
	B+,B-	Encoder B+/B signal
	Z+,Z-	Encoder Z+/Z-signal
	+5V,COM	+5V power output
	+5V/COM	5V/Power Ground
	OUTA	Divided output A signal, NPN type OC output
	OUTB	Divided output B signal, NPN type OC output
J5	PGP (+5V,+15V),+15V or+5V power output	Default:+5V output. J1 jumper selection+5V or+15V power supply

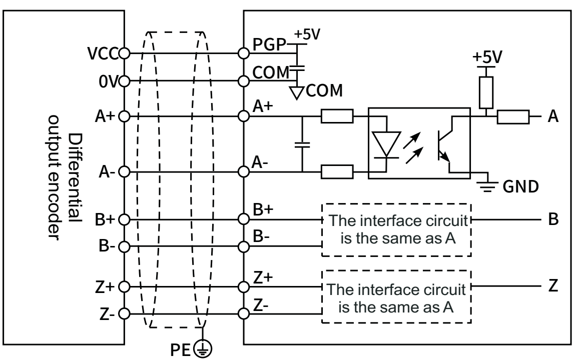
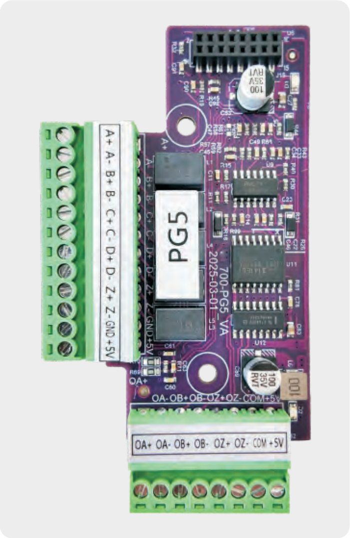


Figure 2-4 Schematic diagram of differential output ABZ encoder card wiring

2.3 Sine Cosine Encoder Interface Card (700-PG5)

2.3.1 PG5 Product Introduction

700-PG5 is a sine and cosine encoder card with frequency division output.



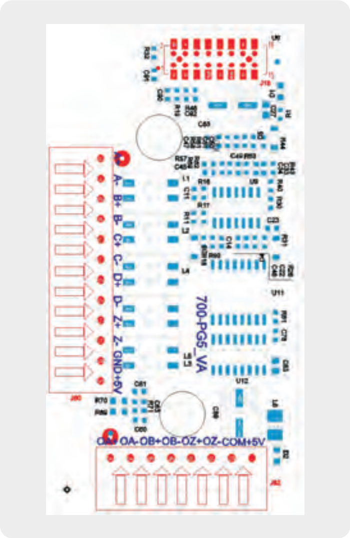


Figure 2-5 700-PG5 Expansion Card

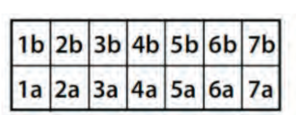
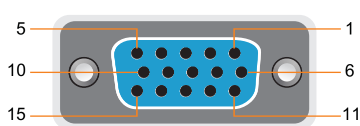
2.3.2 Function Description of PG5 Sine Cosine Encoder Interface Card

Sign	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	PGGND	Power Ground
9	PGVCC	+5V power supply
10/11	C+/C-	Encoder differential signal C+/C-
12/13	D+/D-	Encoder differential signal D+/D-
14/15	NA	

Sign	Name	Function Description
	OA+,OA-	1-division output differential A signal
	OB+,OB-	1-division output differential B signal
	OZ+,OZ-	1-division output differential Z signal

2.3.3 PG5 Encoder Card Wiring

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
	

2.4 Rotary Transformer Interface Card (700-PG6)

2.4.1 PG6 Product Introduction

700-PG6 is a rotary transformer encoder interface card.

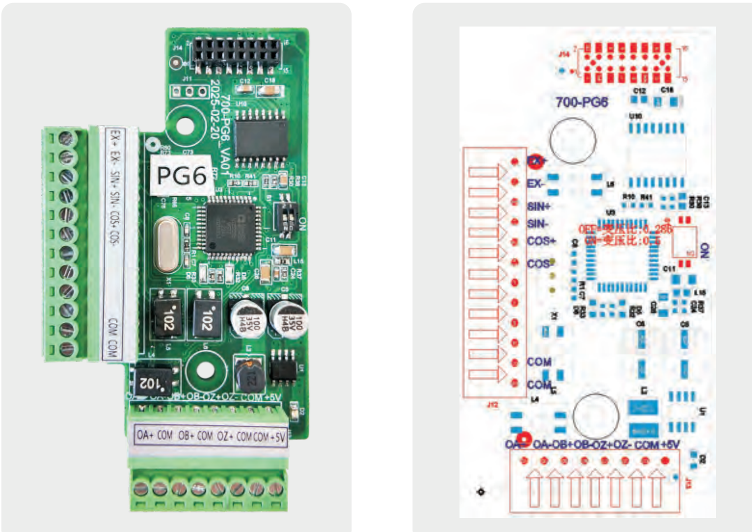


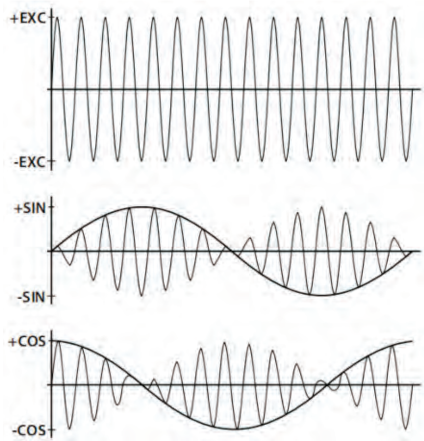
Figure 2-6 700-PG6 Expansion Card

2.4.2 Terminal Function Description of Rotary Transformer Interface Card

Sign	Name	Function Description
J12	+5V, COM	+5V power supply
	EXC-, EXC+	Encoder excitation output signal, 4Vrms/10kHz sine signal
	SIN+, SIN-	Encoder feedback input signal, 2Vrms/10kHz During forward rotation, the SIN signal leads the COS signal by 90° When reversing, the COS signal leads the SIN signal by 90°
	COS+, COS-	

Sign	Name	Function Description
SI	ON	Rotary Transformer Encoder Transformer Ratio: 0.286
	OFF (Default)	Rotary Transformer Encoder Transformer Ratio: 0.5
J14	Control signal line interface	Connect the motherboard encoder interface
J13	OA+, OA-	1: 1. A, B, Z differential signal output (0-500KHz)
	OB+, OB-	
	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 following figure.	

Chapter 3 Communication Expansion Card Products

3.1 ProFinet PN Communication Card

3.1.1 ProFinet PN Communication Card

The 700-PN card is a Profinet fieldbus adapter card that complies with the internationally recognized Profinet Ethernet standard. This card is installed on the 700 series 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.

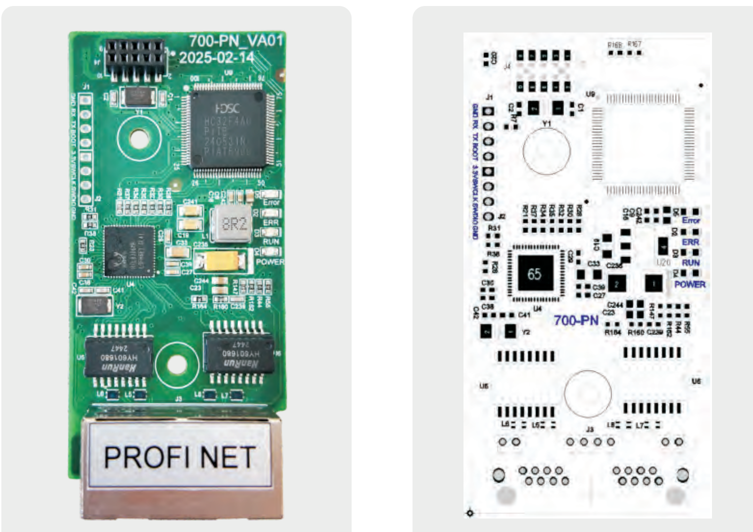


Figure 3-1 700-PN Expansion Card

3.1.2 ProFinet PN Communication Card Terminal Function Description

Sign	Name	Function Description
J3	RJ45 input/output port	To ensure work stability, please use Category 5e shielded twisted pair network cable

Sign	Name	Function Description
J4	10 position female plug	Connect the 10 pin connector to the expansion card transfer board
LED	Pilot lamp	POWER power indicator; RUN light; ERR error indication, communication fault error indicator light.

3.2 MODBUS-TCP Communication Card

3.2.1 Introduction to Modbus TCP Products

700-TCP card is an Ethernet based communication protocol card used for communication between devices in industrial automation and control systems.

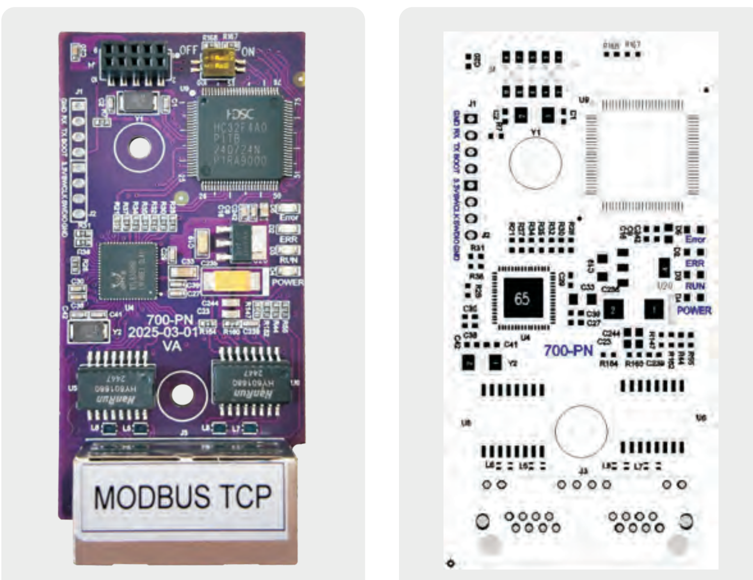


Figure 3-2 700 Modbus TCP Expansion Card

3.2.2 Function Description of Modbus TCP Communication Card Terminal

Sign	Name	Function Description
J3	RJ45 input/output port	To ensure work stability, please use Category 5e shielded twisted pair network cable
J4	10 position female plug	Connect the 10 pin connector to the expansion card transfer board
LED	Pilot lamp	POWER power indicator; RUN light; ERR error indication, communication fault error indicator light.

3.3 Profbus DP Communication Card

3.3.1 Profbus DP Product Introduction

The Profbus DP communication card is a Profbus DP fieldbus adapter card that complies with the internationally recognized Profibus fieldbus standard. It 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. The DP expansion card can achieve Profibus DP communication.

Type	Profbus-DP
Diagnostic support	Support
DPV1 support	Support
PPO4 support	Support
PPO type selection	Siemens backend settings
PZD mapping address	Siemens backend settings
Station number setting dialing code	Set 1 to 125
Main station crash	The expansion card proactively informs the frequency converter
Communication speed between card and frequency converter	Fixed rate
Substation malfunction	The expansion card proactively informs the main station
CAN communication support	Not Supported

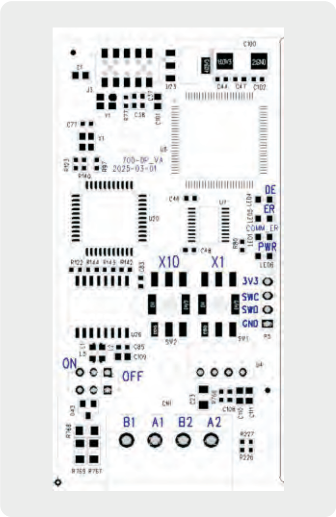


Figure 3-3 700-DP Expansion Card

3.3.2 Profbus DP Communication Card Terminal Function Description

Sign	Name	Function Description
CN1	Profibus communication terminal	Profibus communication terminal, plug and unplug wiring terminal
J3	10 position female plug	Connect the 10 pin connector to the expansion card transfer board
SW2，SW1	DP communication address dip switch	Pro Bus DP communication slave address, Sw2 is ten bits, and SW1 is one bit.
S1	Profibus terminal resistor	Terminal resistor dip switch
LED	Pilot lamp	DE: Communication instructions ER： Fault indication COM_ER: Inverter communication indication PWR: Power indicator

3.3.3 Profbus DP Communication Card Communication Configuration

Configure the parameters of the frequency converter

Function code	Name	Description (setting range)	Set value	Change
P0-04	Run command source	0: Operation panel running command channel (LED off) 1: Terminal command channel (LED on) 2: Communication command channel (LED flashes)	2	Running commands issued through communication
P0-06	Main frequency source X selection	0: Up/Down modification frequency, no memory after shutdown 1: Up/Down modification frequency power-off memory 2: AI1 3: AI2 4: Multi-speed 5: Simple PLC 6: PID 7: Communication given 8: PULSE pulse setting 9: Up/Down modifies the frequency, and the memory is stopped when the power is turned off.	7	Target frequency given through communication
P8-11	Communication protocol selection	0: Modbus protocol 1: Communication expansion card	1	Select special communication card for communication

3.3.3.1 Profibus DP data format

According to the ProfiDrive protocol, the usage types are divided into five categories: PPO1, PPO2, PPO3, PPO4, and PPO5. The functions that each data format can accomplish are shown in the table below:

Data type	Supported features
PP01	➢ Single-function parameter operations ➢ Inverter command and frequency setting ➢ Frequency converter status, running frequency read

Data type	Supported features
PP02	➢ Single-function parameter operations ➢ Inverter command and frequency setting ➢ Frequency converter status, running frequency read ➢ The four function parameters are written periodically ➢ The four function parameters are periodically read
PP03	➢ Inverter command and frequency setting ➢ Frequency converter status, running frequency read
PP04	➢ Inverter command and frequency setting ➢ Frequency converter status, running frequency read ➢ The four function parameters are written periodically ➢ The four function parameters are periodically read
PP05	➢ Single-function parameter operations ➢ Inverter command and frequency setting ➢ Frequency converter status, running frequency read ➢ 10 function parameters are written periodically ➢ 10 function parameters are periodically read

3.3.3.2 PPO type description

The data block contained in the PPO type data format is divided into two regions, namely the PKW region (parameter region) and the PZD region (procedure data region). The type data format is shown in the following figure.

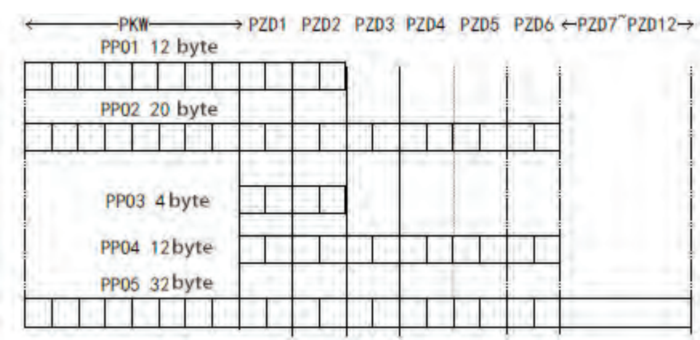


Figure 3-4 PPO type data format

3.3.3.3 PKW data description

PKW data mainly realizes the master station to read and write a single parameter of the frequency converter, and the communication address of the frequency converter parameter is directly given by the communication data. The functions achieved are as follows:

a) Frequency converter function parameter reading;

b) Change of inverter function parameters;

Data format:

PKW data contains three groups of array areas, namely PKE, IND,PWE, where PKE data byte length is 2 bytes IND is 2 bytes,PWE,PWE is 4 bytes.

The data format is shown in the following table:

<table>
<tr><th colspan="8">The master station sends data PKW</th></tr>
<tr><td>Operation command</td><td colspan="2">Parameter address</td><td colspan="3">Reserve</td><td colspan="2">Write operation: Parameter value
Read operation: empty</td></tr>
<tr><td>PKE</td><td>PKE</td><td>IND</td><td>IND</td><td>PWE</td><td>PWE</td><td>PWE</td><td>PWE</td></tr>
<tr><th colspan="8">Communication card response data PKW</th></tr>
<tr><td>Operation command</td><td colspan="2">Parameter address</td><td colspan="3">Reserve</td><td colspan="2">Success: Return value
Failed: Error message</td></tr>
<tr><td>PKE</td><td>PKE</td><td>IND</td><td>IND</td><td>PWE</td><td>PWE</td><td>PWE</td><td>PWE</td></tr>
</table>

<table>
<tr><th colspan="2">The master station sends data PKW description</th><th>Supported features</th></tr>
<tr><td>PKE</td><td>High 4 bits: command code
0: No request
1: Read the parameter data
2: Change the parameter data
(The above command code is decimal data)
Lower 4 bits: reserved
Low 8 bits: indicates the high level of the parameter address</td><td>High 4 bits: response code
0: No request
1: The parameters are correctly operated
7: cannot be executed
Low 8 bits: indicates the high level of the parameter address</td></tr>
<tr><td>IND</td><td>High 8 bits: indicates the low part of the parameter address
Lower 8 bits: reserved</td><td>High 8 bits: indicates the low part of the parameter address
Lower 8 bits: reserved</td></tr>
<tr><td>PWE</td><td>High 16 bits: reserved
Lower 16 bits: not used during the read request. Indicates the parameter value when the request is written</td><td>When the request succeeds: Parameter value
When the request fails: Error code (consistent with standard MODBUS)
1: indicates an illegal command
2: indicates the illegal address
3: indicates illegal data
4: Other errors</td></tr>
</table>

3.3.3.4 Application example

The main station reads the PKW area of the transmission data and the PKW area of the frequency converter response data for the frequency converter function parameter F0-08, as shown in the following figure :

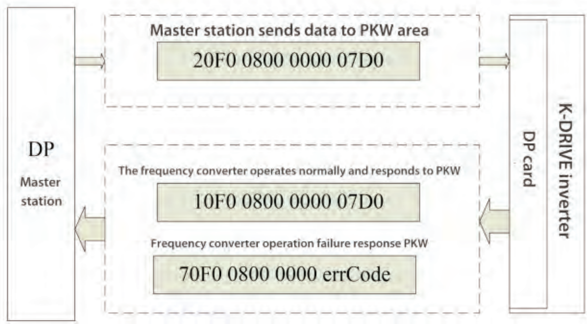


Figure 3-5 Example of master station reading frequency converter parameters and sending PKW data

3.3.3.5 PZD area data description

Real time modification and reading of frequency converter data, as well as periodic data exchange, are implemented by the main station in the PZD area. The communication address of the data is directly configured by the frequency converter. It mainly includes the following contents:

¤ Real time setting of frequency converter control commands and target frequency;

¤ Real time reading of the current status and operating frequency of the frequency converter;

¤ Real time interaction of functional parameters and monitoring parameter data between the frequency converter and Profibus DP master station.

The default mapping for written PZD1 is U3-17, and the default mapping for PZD2 is U3-16.

The default mapping of PZD1 read is U1-39, and the default mapping of PZD2 is U1-00.

The PZD process data mainly completes the periodic data exchange between the main station and the frequency converter. The exchange data is shown in Table 8:

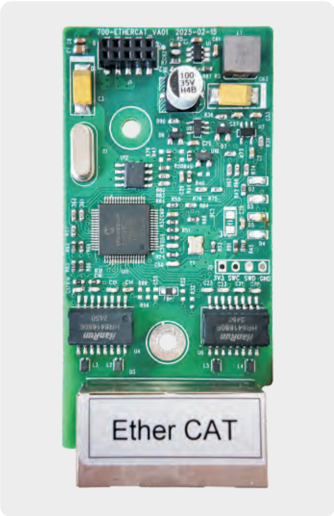
PZD area for sending data from the main station			Frequency converter response data PZD area		
PZD1	PZD2	PZD3~PZD12	PZD1	PZD2	PZD3~PZD12
Control Word (U3-16)	Frequency setting (U3-17)	Real time modification of frequency converter functional parameters	Status Word (U0-00)	Operating frequency (U0-00)	Real time reading of frequency converter functional parameters

Main station sends data PZD description		Frequency converter response data PZD area
PZD1	Frequency converter command word (command source needs to be set to communication, i.e. P0-02=2) 0001: Forward running 0002: Reverse operation 0003: Forward jog 0004: Reverse jog 0005: Free shutdown 0006: Deceleration shutdown 0007: Fault reset 0008: Fault reset (can only be reset in communication control mode)	Frequency converter operation status signal interest 0001: Forward running 0002: Reverse operation 0003: Shutdown
PZD2	The target frequency of the AC drive (frequency source set to "communication") is within the range of reverse frequency upper limit (negative value) to forward frequency upper limit (including decimal point, for example, 2000 corresponds to 20.00 Hz on the AC drive). When the given target frequency exceeds this range, the AC drive operates at that frequency upper limit. For example, if the frequency limit is set to 50.00 Hz and set to 6000, the AC drive will run forward at a frequency of 50.00 Hz. If the frequency limit is set to 50.00 Hz and the communication is set to -6000, the AC drive will operate in reverse at a frequency of 50.00 Hz.	Frequency of frequency converter operation (unit: 0.01Hz) Returns the actual operating frequency of the current frequency converter, with a data value of sixteen signed digits
PZD3~PZD12	Real time change of function parameter values without writing to EEPROM	Real time reading of functional parameters

3.4 Ethercat Communication Card

3.4.1 Ethercat Product Introduction

EtherCAT fieldbus adapter card, suitable for ultra-high speed I/O networks. This protocol is applicable to the I/O layer. This card has high efficiency, flexible topology structure, and easy operation. It is installed in the frequency converter to increase communication efficiency and achieve AC drive networking function. The AC drive is controlled by the fieldbus master station.



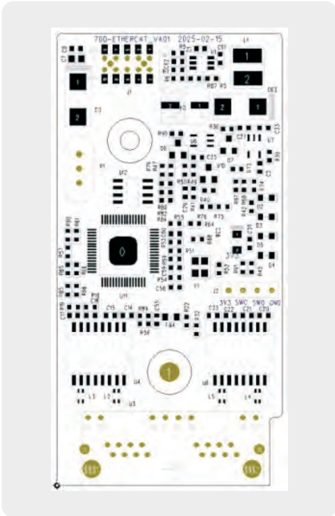


Figure 3-6 700 Ethercat Expansion Card

The Ethercat Communication Expansion Card (SI-ECAT) adopts a standard Ethernet RJ45 socket and is connected to the Ethercat main station. Its pin signal definition is consistent with the standard Ethernet pin, and it can be used for both cross and straight connections.

3.4.2 Ethercat Communication Card Terminal Function Description

Identification	Terminal name	Function description
U3	Input/output port	To ensure work stability, please use Category 5e shielded twisted pair cable.
J1	10 position female plug	Connect the 10 pin connector to the expansion card transfer board
PILOT LAMP	D2	Green constantly on, working in OP state
		Green flashing, working/safe mode in PREOP
		OFF state, disconnected or operating in initial mode
	D3	Green is constantly on, normal
		OFF state, disconnected from communication with the driver

Identification	Terminal name	Function description
PILOT LAMP	D5	Red constantly on, ESC internal malfunction
		OFF status, normal
	D4	Power indicator light: green constantly on, normal
		OFF status, communication board not powered on

The Ethercat RJ45 interface is connected to the Etherccat main station RJ45 socket using standard Ethernet. Its pin signal definition is the same as that of standard Ethernet pins. They can be connected using cross cables or straight cables.

Identification	Terminal name	Function description
U1	ECAT IN	Network interface. The left side is used for input, and the right side is used for output.
	ECAT OUT	

¤ After installing the card, ECAT IN is located on the left side and ECAT OUT is located on the right side when facing the RJ45 interface. The two interfaces must be connected correctly.

¤ When facing RJ45 interface. The two interfaces must be connected correctly. Cat5e shielded twisted pair (STP) network cables must be used to ensure stability.

3.4.3 Ethercat Communication Card Function Code Configuration

Function code	Name	Description (setting range)	Factory Default	Change
P0-04	Run command source	0: Operation panel running command channel (LED off) 1: Terminal command channel (LED on) 2: Communication command channel (LED flashes)	2	Running command issued by communication
P0-06	Main frequency source X selection	0: Up/Down modification frequency, no memory after shutdown 1: Up/Down modification frequency power-off memory 2: AI1 3: AI2	7	The given target frequency is communicated

Function code	Name	Description (setting range)	Factory Default	Change
		4: Multi-speed 5: Simple PLC 6: PID 7: Communication given 8: PULSE pulse setting 9: Up/Down modifies the frequency, and the memory is stopped when the power is turned off.		
P8-11	Serial communication protocol	0: Modbus protocol 1: Communication Card Bridge Protocol	1	Select special item communication card for communication

3.4.4 Ethercat and inverter communication control related parameters

Name	Description (setting range)	Index	Sub-index
Control command	0001: Forward running 0002: Reverse operation 0003: positive inching 0004: Reverse inching 0005: Free stop 0006: Deceleration shutdown) 0007: Fault reset 0008: Fault reset (only in -control mode)	16#2073	16#02
DO	BIT0: RELAY1 output control BIT1: DO1 output control BIT2: RELAY2 output control	16#2073	16#03
A01	0 ~ 7FFF means 0% ~ 100%	16#2073	16#04
A02	0 ~ 7FFF means 0% ~ 100%	16#2073	16#05

AC drive parameters (common)

Function code	Name	Description (setting range)	Index	Sub-index
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;	16#20F0	16#0A

Function code	Name	Description (setting range)	Index	Sub-index
P0-21	Acceleration and deceleration time unit	0: 1 second 1: 0.1 seconds 2: 0.01 seconds	16#20F0	16#13
P0-23	Acceleration time 1	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 1	0s ~ 30000s(P0-21=0) 0.0s ~ 3000.0s(P0-21=1) 0.00s ~ 300.00s(P0-21=2)	16#20F0	16#12
P7-00	Jog running frequency	0.00Hz ~ Maximum frequency	16#20F7	16#01
P7-01	Jog acceleration time	0.0s ~ 3000.0s	16#20F7	16#02
P7-02	Jog deceleration time	0.0s ~ 3000.0s	16#20F7	16#03
PD-01	Torque digital given	-200.0% ~ 200.0%	16#20FD	16#03
PD-03	Torque control positive direction maximum frequency	0.00Hz ~ Maximum frequency (P0-14)	16#20FD	16#04
PD-04	Torque control reverse direction maximum frequency	0.00Hz ~ Maximum frequency (P0-14)	16#20FD	16#05
U1-05	Output power (KW)	---	16#2070	16#06
U1-06	DI input status, hexadecimal number	---	16#2070	16#07
U1-07	DO output status, hexadecimal number	---	16#2070	16#08

The description of communication driven parameter indicators is as follows:

Each object in the dictionary should be uniquely addressed by using indexes and sub indexes.

Index: This field (hexadecimal) specifies objects of the same type in the dictionary.

Subindex ": This field specifies the overall arrangement of offsets for each object in the same index in hexadecimal format；

The mapping between communication driven parameters and object dictionaries is as follows:

Object dictionary index=0x2000+parameter group number；

Object dictionary sub index=hexadecimal offset of parameter group+1；

By default, when using the 700IP65-EA card, the written PDO1 and PDO2 are mapped to U3-17 and U3-16. Therefore, the first item of RPDO must be U3-17; Otherwise, the operation will be abnormal. In addition, if any non-zero values are written to the eight high-order bits of U3-17, the AC driver will report a communication fault (Err27).

3.4.5 EtherCAT Communication Protocol

In DC mode, the DC synchronization mode cycle must be at least 1 ms, but less than 100 ms. Otherwise, EtherCAT communication failure will occur.

■ **PDO Data Description**

PDO data is used by the main station to modify and read communication driven data in real-time, and to perform regular data exchange. The data communication address is driven by communication. Mainly including:

a) Real time setting of communication driven control commands and target frequencies；

b) Real time reading of AC drive current status and operating frequency；

c) The functional parameters and monitoring data are used for regular data exchange between the AC driver and EtherCAT master station PDO process data, as shown in the table below.

Primary sending PDO (0x1600)		
Fixed RPDO		Variable RPDO
AC drive target frequency	AC drive command	Modify the functional parameters of the frequency converter
RPDO1	RPDO2	RPDO3 to RPDO10
Corresponding AC drive data PDO (0x1A00)		
AC drive status	AC drive operating frequency	Read the functional parameters of the AC drive
TPDO1	TPDO2	TPDO3 to TPDO10

Note: Up to 10 RPDOs and 10 TPDOs can be configured.

Data sent by master station

Primary sending RPDO	
RPDO1	The AC drive target frequency (the frequency source is set as "communication") is within the range from the upper limit of the reverse frequency (negative value) to the upper limit of the forward frequency (including the decimal point, for example, 2000 corresponds to 20.00 Hz on the AC drive). When the given target frequency exceeds the range, the AC drive operates at the upper limit of the frequency. For example, if the upper frequency limit is set to 50.00 Hz and set to 6000, the AC drive will operate in the forward direction at 50.00 Hz. If the upper frequency limit is set to 50.00 Hz and the communication is set to - 6000, the AC drive will operate in reverse at 50.00 Hz.
RPDO2	AC drive command word (command source is set to "communication")
	0001: Forward running 0002: Reverse operation 0003: positive inching 0004: Reverse inching 0005: Free stop 0006: Deceleration shutdown 0007: Fault reset 0008: Fault reset (only in communication control mode)
RPDO3 TO RPDO10	Real time modification of function parameter values (Group F and Group A) without writing into EEPROM (electronic read-only memory)

Communication driven response data

Corresponding AC drive data TPDO	
TPDO1	Operation status of AC drive
	0001: Forward running 0002: Reverse operation 0003: Shutdown
TPDO2	Operating frequency (unit: 0.01Hz)
	Returns the current AC drive operating frequency. The returned data is 16 bit signed 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 (Group F and Group A) and monitor parameter values (Group U)

For more information about PDO definitions for other AC drives, see the appropriate AC drive user guide.

■ **Service Data Object (SDO)**

EtherCAT SDO is used to transmit acyclic data, such as communication parameter configuration and servo driver operation parameter configuration. EtherCAT CoE service types, including:

1) Key event messages

2) SDO request

3) SDO response

4) TxPDO

5) RxPDO

6) Remote TxPDO sends request

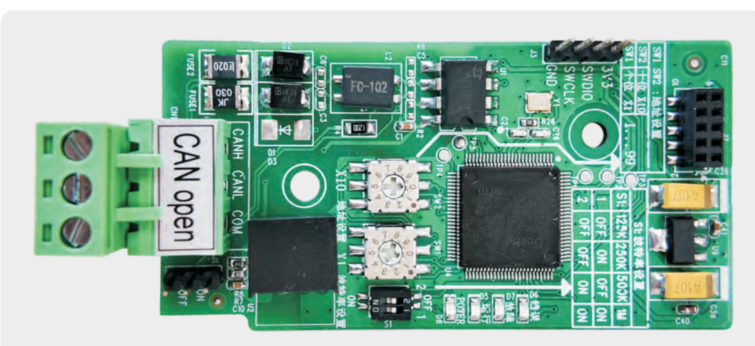
7) Remote RxPDO sends request

8) SDO information.

3.5 Canopen expansion card

3.5.1 Canopen Product Introduction

Canopen communication card is an intelligent communication interface module designed specifically for the field of industrial automation, used to achieve high-speed data exchange between frequency converters and upper computers (PLC/DCS/industrial control computers). This module complies with 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.



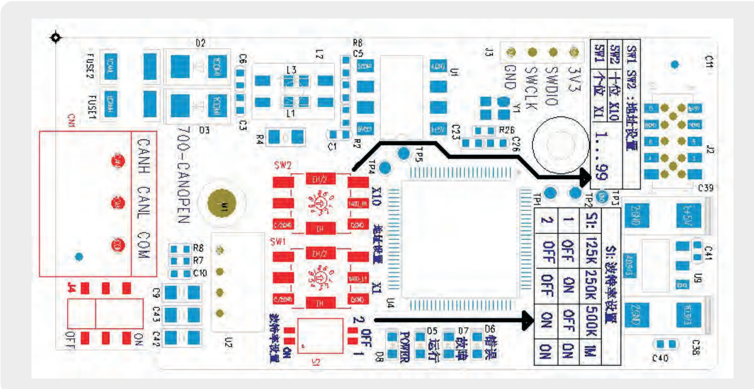


Figure 3-7 700 Canopen Expansion Card

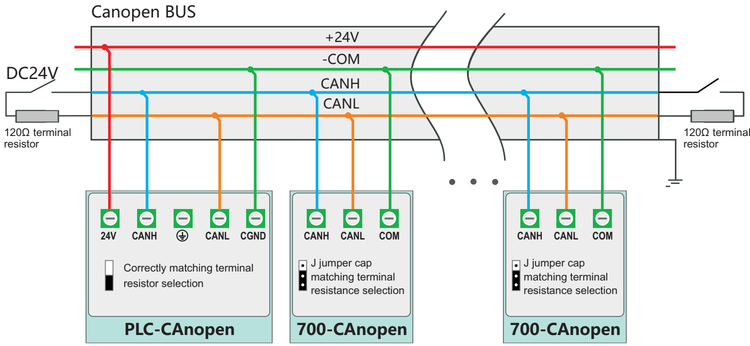
3.5.2 Canopen Communication Card Terminal Function Description

<table>
<tr><th>Identification</th><th>Name</th><th>Function description</th></tr>
<tr><td>CANH</td><td>CANH positive input</td><td>Connect the positive terminal of the CAN bus</td></tr>
<tr><td>CANL</td><td>CAN negative input</td><td>Connect CAN bus reverse terminal</td></tr>
<tr><td>COM</td><td>Power Ground</td><td>Connect the reference ground of all CAN nodes</td></tr>
<tr><td rowspan="2">J4</td><td rowspan="2">CAN terminal matching resistor setting jumper</td><td>ON (upward) for terminal resistance matching</td></tr>
<tr><td>OFF (downward) does not perform terminal resistance matching</td></tr>
</table>

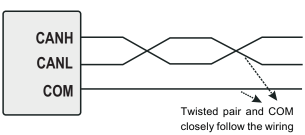
3.5.2 Description of Canopen Communication Card Address and Baud Rate DIP Switch

<table>
<tr><th>Identification</th><th>Name</th><th colspan="5">Function description</th></tr>
<tr><td rowspan="3">S1</td><td rowspan="3">Dial switch baud rate setting</td><td>Baud rate</td><td>125K</td><td>250K</td><td>500K</td><td>1M</td></tr>
<tr><td>1 dial code</td><td>OFF</td><td>ON</td><td>OFF</td><td>ON</td></tr>
<tr><td>2 dial code</td><td>OFF</td><td>OFF</td><td>ON</td><td>ON</td></tr>
<tr><td rowspan="4">SW1/SW2</td><td rowspan="4">Encoder address setting</td><td colspan="5">Address settings for SW2 and Sw1:</td></tr>
<tr><td>SW2</td><td>Tens digit</td><td>0~9</td><td colspan="2" rowspan="2">Address 01-99</td></tr>
<tr><td>SW1</td><td>Ones digit</td><td>0~9</td></tr>
<tr><td colspan="5">For example, if SW1=1 and SW2=2, then the address is 21</td></tr>
</table>

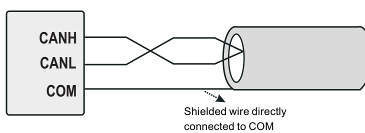
CANOPEN connection method: It is recommended to use shielded twisted pair connection for CAN bus, and twisted pair connection for CANH and CANL; Connect 120 Ω terminal matching resistors at both ends of the bus to prevent signal reflection; All nodes' CAN signal reference grounds are connected together; Connect up to 64 nodes, and the distance between each node branch line should be less than 0.3m.



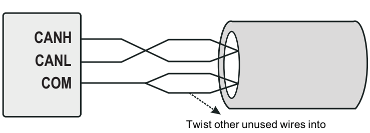
Recommended usage methods for different cables on site:



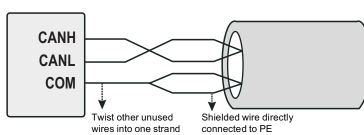
(1) Single core self winding cable



(2) Dual core twisted pair tape shielding



(3) Multi core twisted pair unshielded



(4) Multi core twisted pair tape shielding

3.5.4 Canopen Communication Related Function Codes

Function code	Name	Description (setting range)
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 communication 1: Expansion card communication (CAN/DP)

3.5.5 Canopen Communication Protocol Description

Support the Node Guard protocol, which can be used by the master station to query device status. Support the Heartbeat protocol, and report the current status to the master station when the slave station is located. SDO only supports the accelerated transmission mechanism, with 1 function code and 2 bytes each transmission suppo-rting 3 TPdos and 3 RPdos. Support for emergency targets;

Communication object COBID

CANOPEN provides a variety of communication objects, each communication object has different characteristics (refer to CANOPEN standard protocol), can be used according to different applications. The expansion card uses the predefined COB-ID. The specific rules are as follows:

1. NMT object :0x000
2. SYNC object :0x080
3. SDO objects

   Send SD0-0x600+Node-Id

   Receives 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

3.5.6 Frequency converter parameter operation

3.5.6.1 Frequency converter parameter mapping

Frequency converter parameter addresses are divided into functional code parameter addresses and non-functional code parameter addresses. For details, please refer to the MODBUS Communication Protocol chapter - Function code parameter address marking rules in 700IP65 Series High-performance Vector Frequency Converter User Manual.

Mapping specification

The frequency converter function code set is mapped to the range 0x2000 to 0x20FF of the CANopen object dictionary. The function code number is added by 1 to the function code number of the subindex of the mapping object dictionary. The function code of the frequency converter is P0-04, the main index number of the mapping object dictionary is 0x20F0, and the sub-index number is 0x05.

Function codes are divided into three groups: P0 to PF, A0 to AF, and UO to UF.

When the function code is read, the mapping address corresponds to the following:

Function code group	CANopen index
P0~PF	0x20F0~0x20FF
A0~AF	0x20A0~0x20AF
U0~UF	0x2070~0x207F

When writing EEPROM operations, the corresponding mapping address is as follows:

Function code group	CANopen index
P0~PF	0x20F0~0x20FF
A0~AF	0x20A0~0x20AF

When writing to RAM, the mapping address corresponds to the following:

Function code group	CANopen 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 sub index number is 0x18; When writing the P0-23 function code value and EEPROM, its object dictionary index is 0x20F0 and sub index is 0x18;

When writing the P0-23 function code value and only writing to RAM, its object dictionary index number is 0x2000 and sub index number is 0x18;

The motor tuning function does not allow changing functional parameters through communication. The frequency converter function code is stored in EEPROM and can be read repeatedly, but do not repeatedly rewrite it. When programming, pay attention to rewriting instructions for function codes, and do not drive the PLC program unconditionally to cause cyclic communication writing operations, in order to avoid damaging the memory of the frequency converter.

3.5.6.2 SDO read and write operations

The frequency converter uses CANopen Service Data Object (SDO) to read and operate on the frequency converter. The main station sends data in the format shown in the table:

CAN	CANopen data	illustrate
11 digit ID	0x600+Node ID	Node ID device address dialing settings
RTR	0	Remote frame flag "0"
DATA0	Command code (0x40)	0x40 read command
DATA1	Index low byte	Function code group (P0 group “0xF0")
DATA2	Index high byte	Mapping address
DATA3	Subindex	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	Mapping address
DATA3	Subindex	Function code number+1 ("0x03")
DATA4	Data 1	Data low byte
DATA5	Data 2	Data high byte
DATA6	Data 3	Correct: "0" Error: SDO operation failed error code
DATA7	Data 4	

3.5.6.3 SDO writes frequency converter operation

Use CANopen Service Data Object (SDO) to write operations to the frequency converter, and 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 dialing settings
RTR	0	Remote frame flag "0"
DATA0	Command code	0x2B
DATA1	Index low byte	Function code group (P0 group “0xF0")
DATA2	Index high byte	Mapping address
DATA3	Subindex	Function code number+1 ("0x03")
DATA4	Data 1	Data low byte
DATA5	Data 2	Data high byte
DATA6	Data 3	Keep '0'
DATA7	Data 4	Keep '0'

Write the response data of the frequency converter SDO slave station as shown in the table below. The command code for successful operation returns a value of "0x60", with the index unchanged. Data 4, 5, 6, and 7 return "0". The command code for failed operation is "0x80", with the index unchanged. Data 4, 5, 6, and 7 return SDO failure error codes.

Return:

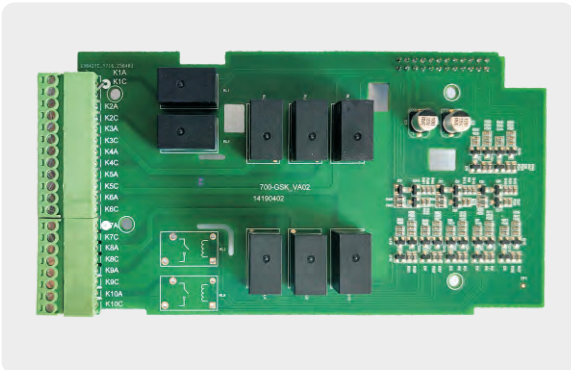
<table>
<tr><th>CAN</th><th>CANopen data</th><th>illustrate</th></tr>
<tr><td>11 digit ID</td><td>0x580+Node ID</td><td>Node ID device address dialing settings</td></tr>
<tr><td>RTR</td><td>0</td><td>Remote frame flag "0"</td></tr>
<tr><td>DATA0</td><td>Command code (0x40)</td><td>Correct '0x60' failed '0x80</td></tr>
<tr><td>DATA1</td><td>Index low byte</td><td>Function code group (P0 group "0xF0")</td></tr>
<tr><td>DATA2</td><td>Index high byte</td><td>Mapping address</td></tr>
<tr><td>DATA3</td><td>Subindex</td><td>Function code number+1 ("0x03")</td></tr>
<tr><td>DATA4</td><td>Data 1</td><td rowspan="4">Correct: "0"
Error: SDO operation failed error code</td></tr>
<tr><td>DATA5</td><td>Data 2</td></tr>
<tr><td>DATA6</td><td>Data 3</td></tr>
<tr><td>DATA7</td><td>Data 4</td></tr>
</table>

The main communication control related function codes are shown in the main index address 0x2073 in the table below. For other function codes, please refer to the user manual.

<table>
<tr><th>Name</th><th>CANopen subindex</th><th colspan="2">Setting Range</th></tr>
<tr><td>Frequency setting</td><td>0x11</td><td colspan="2">0~maximum frequency, 0.01Hz</td></tr>
<tr><td>Control command</td><td>0x12</td><td>0001: Forward running
0002: Reverse operation
0003: Forward jog
0004: Reverse jog</td><td>0005: Free shutdown
0006: Deceleration shutdown
0007: Fault reset</td></tr>
<tr><td>DO control</td><td>0x13</td><td colspan="2">BIT0: DO1 output control
BIT1: DO2 output control
BIT2: RELY1 output control
BIT3: RELY2 output control
BIT4: FMR output control</td></tr>
<tr><td>AO1 control</td><td>0x14</td><td colspan="2">0~7FFF represents 0%~100%</td></tr>
<tr><td>AO2 control</td><td>0x15</td><td colspan="2">0~7FFF represents 0%~100%</td></tr>
<tr><td>FM control</td><td>0x16</td><td colspan="2">0~7FFF represents 0%~100%</td></tr>
</table>

Chapter 4 One Outer Card For Four PUmps control

The constant pressure water supply card enables 4 water pumps to work in conjunction, continuously supply water, realize multiple pumps to work in turn at regular intervals, and has functions such as sleep and wake-up. The pump can be locked to realize switching operation between single pump and multiple pumps; it has many alarm functions such as overload voltage and underload voltage.



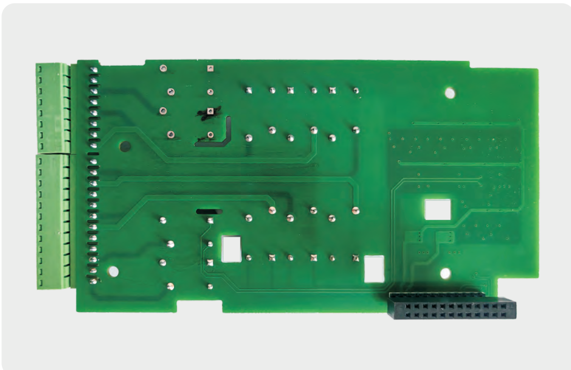


Figure 4-1 700-GSK Water supply control card

4.1 Terminal wiring

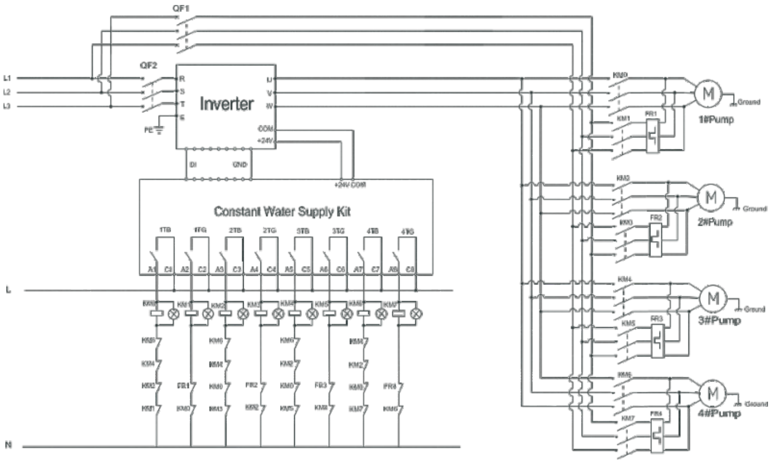


Figure 4-3 Constant pressure water supply card terminal wiring schematic diagram

The application control loop terminal layout diagram is as follows:

1TB		1TG		2TB		2TG		3TB		3TG		4TB		4TG	
A1	C1	A2	C2	A3	C3	A4	C4	A5	C5	A6	C6	A7	C7	A8	C6

The control loop terminal layout diagram is as follows:

	A1	A7	C7	A8	C8	....
C1	A2	A3	A4	A5	A6	
	C2	C3	C4	C5	C6	....

Control terminal output contactor , TB (1-4) variable frequency output signal, TG (1-4) bypass output signal.

A1-C1 No. 1 variable frequency normally open output signal; A2-C2 No. 1 bypass normally open output signal;

A3-C3 No. 2 variable frequency normally open output signal; A4-C4 No. 2 bypass normally open output signal;

A5-C5 No. 3 variable frequency normally open output signal; A6-C6 No. 3 bypass normally open output signal;

A7-C7 No. 4 variable frequency normally open output signal; A8-C8 No. 4 bypass normally open output signal;

4.2 Water supply control

4.2.1 TB/TG operation and switch

TB operation means that the pump or motor is controlled by the output of the VFD .

TG operation means that the pump or motor is controlled by the output of the grid power supply.

TB/TG switch means that the control of the pump or motor is switched from TB to TG, or reverse .

4.2.2 Operation selection

The VFD controls the pump to start running. Based on the pressure feedback, the VFD can decide which pump or several pumps to wake up and work. In fact, at any point in time, the VFD can only drive one pump.

For example, when the first pump reaches the highest limit frequency and the system requests another pump to work together, the VFD switches the first pump to work under the TG model (grid power supply), then wakes up the second pump and drives the pump to operate at the appropriate operating frequency.

4.3 Signal output terminal wiring instructions:

In multi-pump applications, an AC contactor and a grid power supply bypass circuit should be configured between the motor and the VFD output . The AC contactor should be mechanically interlocked with the grid power supply bypass , and the circuit should be logically interlocked to avoid short circuits or related equipment is damaged.

Pay attention to the power phase sequence on the motor or pump, such as L1 , L2 , L3, which should correspond to the U , V , W frequency and output sequence of the inverter . Please check the power phase sequence before running the system to avoid motor reversal problems when switching between variable frequency and grid power supply .

When the motor is running on the grid power supply bypass branch , a motor 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 some situations where analog signals are severely interfered, filter capacitors or ferrite cores need to be added to the analog signal source side.

4.4 Function parameter description

PC16~29 groups of parameters in the user manual are dedicated to constant pressure water supply.

Function code	Name	Description (setting range)	Factory Default	Change
P0-06	Main frequency source X selection	0: Up/Down modification frequency, no memory after shutdown 1: Up/Down modification frequency power-off memory 2: AI1 3: AI2 4: Multi-speed 5: Simple PLC 6: PID 7: Communication given 8: PULSE pulse setting 9: Up/Down modifies the frequency, and the memory is stopped when the power is turned off.	6	★
P1-13	Stop mode	0: Decelerate to stop 1: Free stop	1	☆
PC-16	Water pump function selection	0:Single pump mode 1:One-to-two mode 2:One-to-three mode 3: One to four mode	3	☆
PC-17	Function mode selection	0: Fixed variable frequency pump 1: Rotating variable frequency pump When set to rotation mode, the rotation time is set by the user (using the one to two function, default terminal startup)	0	☆

Function code	Name	Description (setting range)	Factory Default	Change
PC-18	Rotation interval time	0H ~ 3600H It is not recommended to set the interval too small as it may affect the water pressure during rotation	48	☆
PC-19	High voltage alarm set value	When the feedback pressure is greater than or equal to this set value, an alarm will be triggered and the machine will stop after a delay. After the pressure returns to normal, the fault will be automatically resolved after a reset delay time.	1500KPa	☆
PC-20	High voltage alarm delay	0~6000S 0: Turn off the ultra-high pressure alarm, and other alarms will start when the pressure exceeds this value and timeout occurs	3S	☆
PC-21	Low voltage alarm setting value	When the feedback pressure is less than or equal to this set value, an alarm will be triggered and the machine will stop after a delay. After the pressure returns to normal, the fault will be auto-matically resolved after a reset delay time	50KPa	☆
PC-22	High voltage alarm delay	0~6000S 0: Turn off low pressure alarm, and start alarm when timeout occurs for other pressures below this value	3S	☆
PC-23	Low voltage alarm setting value	0: Close 1: Open it	0	☆
PC-24	Antifreeze operating frequency	0.00Hz to upper limit frequency Frequency setting for antifreeze operation	10.00Hz	☆
PC-25	Antifreeze operation time	0min~65000min Antifreeze operation time setting	10min	☆
PC-26	Antifreeze operation interval time	0min~65000min When the interval is set to 0, it runs continuously at the anti freezing frequency	50min	☆

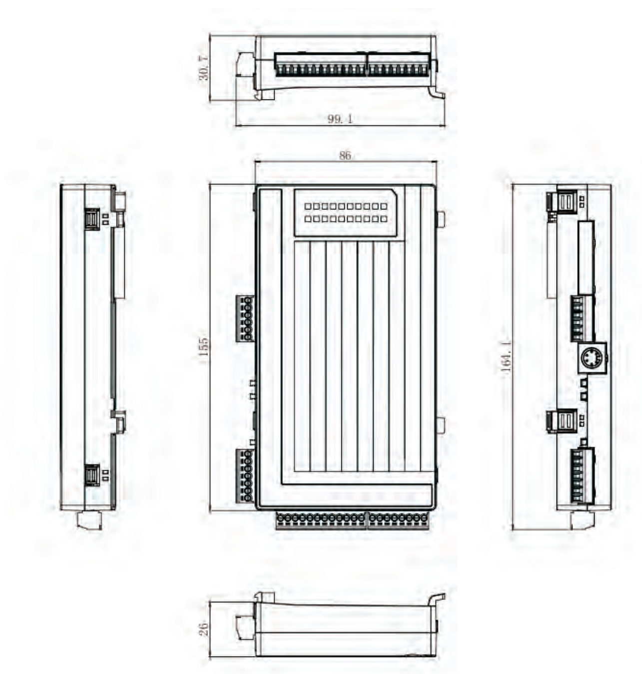
Function code	Name	Description (setting range)	Factory Default	Change
PC-27	Water shortage protection function	0: Close 1: Open it	1	☆
PC-28	Water shortage fault detection threshold	0.0Bar~Set pressure Water shortage threshold setting	0.01KPa	☆
PC-29	Water shortage protection detection time	0.0s~ 200.0s After meeting the water shortage conditions, a water shortage fault will be reported	60.0s	☆

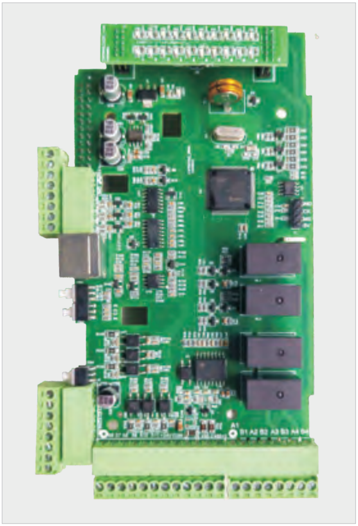
Appendix C:
700-PLC Expansion Card User Manual1

. Software Introduction

700-PLC is a PLC compatible with Mitsubishi FX2N development. The instru-ction set is fully compatible. So application engineers can completely use Mitsubishi's programming software GX Developer or GX Works2 to develop 700-PLC applications.

2. Appearance and Interface Introduction





2.1 Hardware resource

Hardware resource	Component type	Parameter
INPUT	X0~X7, X10~X13	12-CH/PNP-NPN/18-30V
Output Point	Y0~Y6	Y0 Y1 transistor type (open drain output), Y2 (A1.B1), Y3 (A2.B2), Y4 (A3.B3), Y5 (A4.B4) are four relay types, and Y6 is occupied by the frequency converter
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 and external communication support RS485 baud rate: 300/600/1200/2400/4800/9600/19200/38400
	COM3	Internal frequency converter occupancy, 300/600/1200/2400/4800/9600/19200/38400

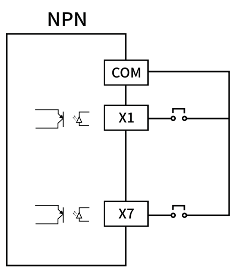
2.2 Terminal Description

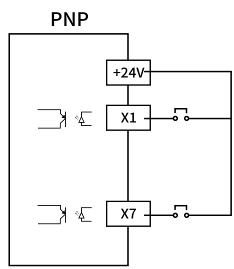
Serial communication		Input terminal											
RS232		X0	X1	X2	X3	X4	X5	X6	X7	X10	X11	X12	X13
Analog port						485 communication		Y output		24V power supply			
+10V	GND	AO	AI1	AI2	Ai3	485+	485-	Y0	Y1	24V	COM	24V	COM
24V power supply		Y2 relay			Y3 relay			Y4 relay			Y5 relay		
24V	COM	A1	B1	Normally open	A2	B2	Normally open	A3	B3	Normally open	A4	B4	Normally open

2.3 Wiring diagram

2.3.1 Input point wiring diagram can use PNP or NPN type

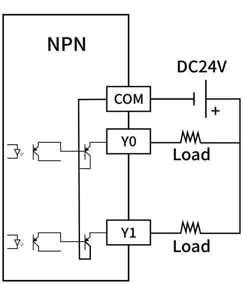
NPN type wiring diagram	PNP type wiring diagram

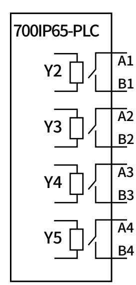




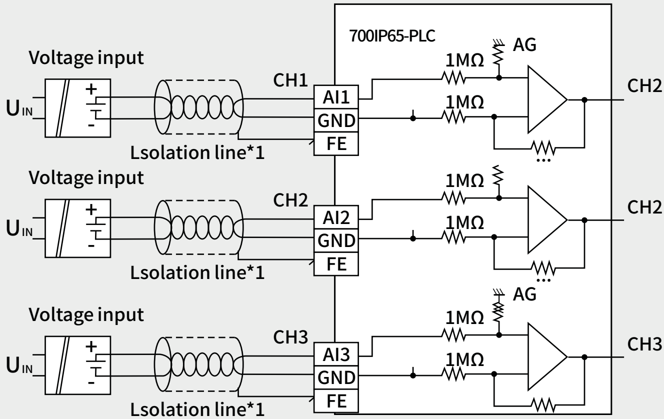
2.3.2 Output point wiring diagram

Output using Y0, Y1 transistor is NPN type	Y2~Y5 are relay type outputs

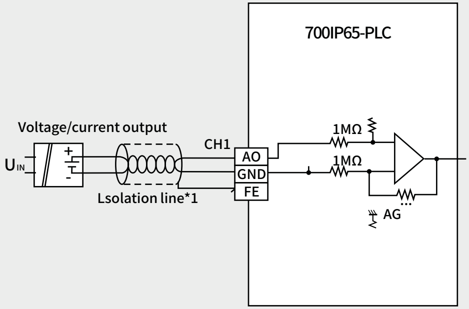




2.3.3 Analog input wiring



2.3.4 Analog output wiring



3. Communication instructions

3.1 Serial communication format setting:

COM2 is D8120; COM3 sets the contents of two registers for D8130.

Position No.	Name	Content	
		0 (bit is OFF)	0 (bit is ON)
b0	Data bits	7 Digits	8 Digits
b1,b2	Parity check	b2,b1 (0,0): None (N) (0,1): Odd free parity (ODD) (1,1): Even Check (EVENT)	
b3	Stop bit	1 Digits	2 Digits
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):1,200 (0,1,1,0):2,400 (0,1,1,1):4,800 (1,0,0,0):9,600 (1,0,0,1):19,200 (1,0,1,0):38,400	
b8	Headers	Not have	There is (D8124) initial value: STX (02H)
b9	Trailer	Not have	There is (D8125) initial value: ETX (03H)
b10,b11	Control line	Computer connection	b11,b10 (0,0): RS-485 half duplex interface (1,0): RS-232C full duplex interface
b12,b13, b14, b15	Not Available		

Available protocol settings for COM2 communication port: (PLC and external 485 communication interface)

COM2 protocol	Setting		Communication format	Protocol Application
	D8126	D8127		
Download Protocol/HMI Monitoring Protocol	Not have	00	Fixed “19200,7, E, 1"	Power on Silent Computer Link Protocol
Parallel protocol master station		01	D8120 has made a decision	M8072=1 Start Parallel Protocol M8070=1 Main Station
Parallel protocol slave station				
MODBUS-RTU slave station	00	02		M8072=1 Start Parallel Protocol M8071=1 Slave Station
MODBUS-ASCII Slave Station	01			
EXTR		03		Professional instructions for frequency converters

The available protocol settings for COM3 communication port: (RS485 half duplex communication for fixed and variable frequency communication).

COM3 protocol	D8039 setting	Communication Format	Protocol Application
Download Protocol/HMI Monitoring Protocol	00	Fixed “19200,7, E, 1"	Power on Silent Computer Link Protocol
MODBUSRTU main station	01	D8130 has made a decision	D8132 communication format code; D8133 slave station address; D8134 data length; D8125 master station register;
MODBUSRTU slave station	02		D8130 sets communication parameters; The default station number for D8131 is set to 1.

Chapter 15

3.2 Modbus Overview

700-PLC can support modbus ASCII mode/RTU mode slave stations, and the master station equipment can access the internal software resources of the PLC through the MODBUS protocol via COM2 and COM1 ports. The supported function codes are as follows:

Modbus Function Code (hex)	Describe
0x01	Read coils
0x03	Read Register
0X05	Write a single coil
0x06	Preset Single Register
0X0F	Force multiple coils
0X10	Write multiple registers

Coil: Refers to a positional variable with only two states, 0 and 1. The RY1N series PLC includes variables such as M, S, T, C, X, Y, etc.

Register: Refers to 16 bit or 32-bit variables. In the RY1N series PLC, 16 bit variables include D, T, C0~199; The 32-bit variables are C200~254.

Communication interface :

<table>
<tr><th>Variable</th><th>Hexadecimal address</th><th>Decimal address</th><th>Number of coils</th><th>Describe</th></tr>
<tr><td>S0-S999</td><td>0x0000- 0x03E8</td><td>0-1000</td><td>1000</td><td rowspan="8">When accessing 32-bit registers in sections C200~C255 through MODBUS, one register is treated as two registers, and one 32-bit register occupies two 16 register spaces. 32-bit registers do not support writing single register (0x06) function codes.
For example, if the user wants to read or write four registers C205~C208, the MODBUS address is 0xECD, and the number of registers is 8 (4 * 2).</td></tr>
<tr><td>X0-X377</td><td>0x0400- 0x04FF</td><td>1024-1279</td><td>256</td></tr>
<tr><td>Y0-Y377</td><td>0x0500- 0x05FF</td><td>1280-1535</td><td>256</td></tr>
<tr><td>T0-T255</td><td>0x0600- 0x06FF</td><td>1536-1791</td><td>256</td></tr>
<tr><td>M0-M1535</td><td>0x0800- 0x0DFF</td><td>2048-3583</td><td>1536</td></tr>
<tr><td>M8000- M8255</td><td>0x0F00- 0x0FFF</td><td>3840-4095</td><td>256</td></tr>
<tr><td>C0-C255</td><td>0x0E00-</td><td>3584-</td><td>256</td></tr>
<tr><td>D0-D2047</td><td>0x1000-</td><td>4096-</td><td>2048</td></tr>
</table>

3.3 Special communication command for frequency converter (EXTR)

Instruction Description:

EXTR Overview is a specialized instruction developed specifically for the expansion frequency converter of 700-PLC.

Instruction Format EXTR S S1. S2. S

S function code: 0X03 reads a data from the frequency converter to the PLC

0X06 Write a data from PLC to frequency converter

S1: Communication address of frequency converter: 0-31

S2: Inverter memory address

S3: The number of communication operand registers is stored in the register of S3+N;

Related registers:

Register	Content
M8117	Using EXTR
M8118	Communication error or parameter error
M8119	Communication error lock
D8117	The timeout period of EXTR
D8118	The extra instruction step encoding currently in use
D8119	Error code

4. PLC system supports types of software components:

Serial No.	Component type	Describe
1	Input	X000-X007 X010-X013
2	Output Point	Y000-Y001 transistor output Y002-Y005 relay output Y006 body frequency converter occupies
3	Intermediate relay M	M0-M383 (regular) M384-M647 (charged holding) M8000-M8255 (System Relay)

Serial No.	Component type		Describe
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 charged holding)
6	Counter C	16bit	C0~C15 C16~C199 (charged holding)
		32bit	C200~C219 (bidirectional) C220~C234 (charged holding, bidirectional) C235~C240 (high-speed, bidirectional)
7	Register D		D0~D127 D128~D1072 (file registers) D8000~D8255 (system registers)
8	Pointer P, I Note (2)		P0~P62 (jump pointer) Note (2) P64~P127 (subroutine pointer) Interrupt subroutine I includes high-speed input, timing, counting, and other 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)

5. List of Basic Sequence

Mnemonic	Function	Operand	Step length
General instructions			
LD	Load normally open contacts	S、X、Y、M、T、C	1
LDI	Loading 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	Not have	1

Mnemonic	Function	Operand	Step length
OR	Parallel normally open contact	S、X、Y、M、T、C	1
ORI	Parallel normally closed contact	S、X、Y、M、T、C	1
ORB	Parallel circuit block	Not have	1
MPS	Store on Stack	Not have	1
MRD	Read out the stack (with no change to the flow pointer)	Not have	1
MPP	Read stack	Not have	1
Output command			
OUT	Drive coil	S、Y、M	1
SET	Set action to save coil command	S、Y、M	1
RST	Clearing of contacts or buffers	S、Y、M、T、C、D	3
Main control command			
MC	Main control common serial contact coil command	N0~N7	3
MCR	Master control reset common serial contact release command	N0~N7	3
End instruction			
END	END	Not have	1
FEND	End of main program	Not have	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
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

Mnemonic	Function	Operand	Step length
Pulse output command			
ANDPLSF	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	Not have	1
INV	Reverse the calculation result	Not have	1
P	Pointer	0~127	1
I	Interrupt insertion pointer	I101/I201/301 I401/I501	1

6. Application Order List

FUC No.	Directives	D instruction	P instruction	Function Description
Program flow				
00	CJ	---	√	Conditional jump
01	CALL	---	√	CALL
02	SRET	---	---	Subroutine return
03	IRET	---	---	Interrupt return
04	EI	---	---	Open interrupt
05	DI	---	---	disable interrupt
06	FEND	---	---	End of main program
07	WDT	---	---	Watchdog Timer
08	FOR	---	---	Cycle range begins
09	NEXT	---	---	End of cycle range
Transmission and Comparison				
10	CMP	√	√	Compare
11	ZCP	√	√	Regional comparison
12	MOV	√	√	Transmit

FUC No.	Directives	D instruction	P instruction	Function Description
13	SMOV	---	---	Shift transfer
14	CML	√	√	Reverse transmission
15	BMOV	---	---	Deliver together
16	FMOV	√	√	Multi point transmission
17	XCH	√	√	Exchange
18	BCD	√	√	BCD conversion
19	BIN	√	---	End of cycle range
Four logical operations				
20	ADD	√	√	BIN addition
21	SUB	√	√	BIN subtraction
22	MUL	√	√	BIN multiplication
23	DIV	√	√	BIN division
24	INC	√	√	BIN plus L
25	DEC	√	√	BIN minus I
26	WAND	√	√	Logical words and
27	WOR	√	√	Logical words or
28	WXOR	√	√	Logical word XOR
29	NEG	√	√	Request for Supplementary Code
Cyclic shift				
30	ROR	√	√	Rotate right
31	ROL	√	√	Rotate left
32	RCR	√	√	Right shift with carry
33	RCL	√	√	Left shift with carry
34	SFTR	√	√	Shift right
35	SFTL	---	√	Shift left
36	WSFR		√	Move the word to the right
37	WSFL		√	Left shift of characters

FUC No.	Directives	D instruction	P instruction	Function Description
38	SFWR	---	√	First in, first out "writing
39	SFRD	---	√	First in, first out "reading
Data processing				
40	ZRST	---	√	Interval reset
41	DECO	---	√	Decode
42	ENCO	---	√	Code
43	SUM	√	√	ON digit
44	BON	√	√	ON digit determination
45	MEAN	√	√	Average value
46	ANS	---	---	Alarm setting
47	ANR	---	√	Alarm reset
48	SOR	√	√	BIN square root
49	FLT	√	√	Conversion between Floating Point Numbers and Decimal Numbers
High speed processing				
50	REF	---	√	Input/output refresh
52	MTR	---	---	Range input
53	HSCS	√	---	Comparison setting (high-speed counter)
54	HSCR	√	---	Comparison 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
Convenient instruction				
60	IST	√	---	State initialization

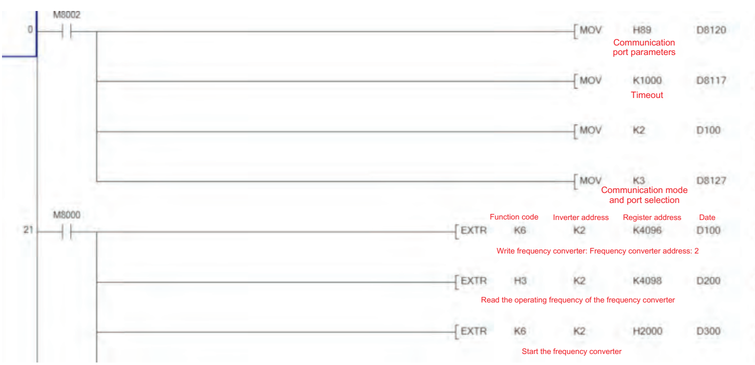
FUC No.	Directives	D instruction	P instruction	Function Description
61	SER	√	√	Data search
62	ABSD	√	---	Absolute value cam sequential control
63	INCD	---	---	Incremental cam sequential control
66	ALT	---	---	Alternating output
67	RAMP	---	---	Ramp signal
69	SORT	---	---	List data sorting
Peripheral devices				
80	RS	---	---	Serial data transfer
81	PRUN	√	√	Parallel operation
82	ASCI	---	√	HEX → ASCII Conversion
83	HEX	---	√	ASCII to HEX conversion
84	CCD	---	√	Correction code
88	PID	---	---	PID operation
Change floating point number				
110	ECMP	---	√	Comparison of Binary Floating Point Numbers
111	EZCP	---	---	Comparison of Binary Floating Point Number Intervals
118	EBCD	---	---	Binary → decimal floating point number
119	EBIN	---	---	Decimal to binary floating point number
120	EADD	---	---	Binary Floating Point Numbers Plus
121	ESUB	---	---	Subtract binary floating-point numbers
122	EMUL	---	---	Binary floating point multiplication
123	EDIV	---	---	Binary Floating Point Numbers Divided by

FUC No.	Directives	D instruction	P instruction	Function Description
127	ESOR	---	√	Square root of binary floating-point numbers
129	INT	---	---	Binary floating point number → BIN integer
130	SIN	---	---	Floating point number SIN operation
131	COS	---	---	Floating point COS operation
132	TAN	---	---	Floating point number TAN operation
Positioning instruction				
156	ZRN	√	---	Origin regression
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 writing
169	HOUR	√	---	Chronograph
170	GRY	√	√	Gray code conversion
Contact comparison				
224	LD=	√	√	(S1)=(S2)
225	LD>	√	---	(S1)>(S2)
226	LD<	√	---	(S1)<(S2)
228	LD<>	√	---	(S1)<>(S2)
229	LD<=	√	---	(S1)<=(S2)
230	LD>=	√	---	(S1)>=(S2)

FUC No.	Directives	D instruction	P instruction	Function Description
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)
244	OR<>	√	---	(S1)<>(S2)
245	OR<=	√	---	(S1)<=(S2)
246	OR>=	√	---	(S1)>=(S2)

7. PLC program instance

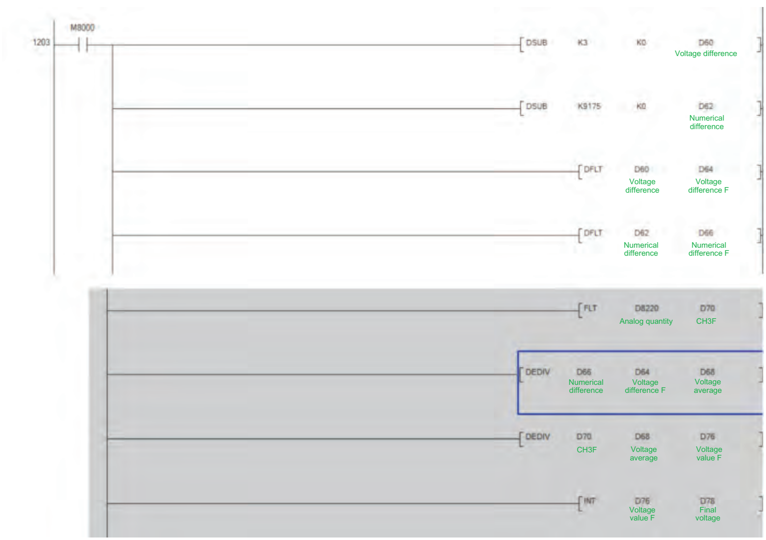
7.1 Communication Example



7.2 Application protection program instance

M8031 is the read protection function of the application program. Enable M8031 in the application to read the application through programming software, modify the application and download it again. That is, by using the locked M8031 value of M8000 M8001 in the program, the application can be protected from being read.

7.3 Communication Example



7.4 Example of Analog Output

7.5 Time program instance

WARRANTY

❶ 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).

❷ 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.

❸ This product enjoys lifetime paid service from the date of purchase by the user from the manufacturer.

❹ 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)

❺ 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

❻ 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.

Energy efficient , beautiful environment