WOLONG

WD5100 SERIES HIGH-PERFORMANCE HIGH-VOLTAGE INVERTER

INSTRUCTION MANUAL

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Firstly, thank you for purchasing our high-voltage inverter!

The high-voltage inverter features a cascade structure with power units, utilizing high-performance vector control technology, achieving a maximum output voltage of 10 kV, with excellent control performance and high reliability. It meets modern industrial needs for energy saving and process speed regulation in large and medium-sized fans and pumps, and is widely used in power, metallurgy, mining, building materials, petrochemical, and municipal industries.

This manual provides detailed information on the functions and usage of the high-voltage inverter, including product selection, installation, parameter setting, operation and commissioning, maintenance, and inspection. Please read this manual carefully before use. Manufacturers should include this manual with the equipment for end-users' reference.

If you encounter any issues during operation and this manual cannot provide answers, please contact our local dealers or directly reach out to our company. Our professional technicians will be pleased to assist you. We welcome your valuable feedback and suggestions!

Notes
◆ To illustrate product details, illustrations in this manual may sometimes show the product with covers or safety shields removed. When using this product, ensure the casing or cover is properly installed, and operate according to the instructions in this manual. ◆ Illustrations in this manual are for reference only. As a general manual for the series, the appearance drawings apply only to standard high-voltage inverters and may differ from the products you ordered. ◆ Content may be updated due to product upgrades or specification changes, and to improve the manual's accuracy and usability.

■Arrival Acceptance Inspection:

Please carefully verify the following items. If there are issues with the product, non-conformance with your order, or damage during transportation, contact your dealer or our company promptly to resolve the matter.

Confirmation Items	Confirmation Method
Is the complete equipment delivered as ordered?	Compare the equipment with the supply list to check for missing parts or other issues, preventing omissions of components or spares.
Is the product consistent with your purchase order?	Verify the nameplate of the high-voltage inverter to ensure the model and specifications match your order requirements.
Is the product damaged?	Inspect the overall appearance for damage during transportation; check for cabinet damage, deformations of doors and side panels.
Is there moisture damage to the product?	Check if the product was exposed to rain during transit; rainwater inside the inverter can cause short circuits and damage components.
Are the internal components intact?	Open the cabinet door and inspect the interior, checking for any looseness in control cables, water ingress, missing or damaged components, etc.

NOTE

◆The supply list includes equipment components, spare parts, and engineering drawings.

Caution

◆If the equipment is damaged during transportation, record the damage at the time of unloading, obtain signed permission from the transportation company representative, and submit a written report to the relevant transportation department, including the extent of the damage and the estimated loss.

◆Non-visible losses should also be reported in writing within the specified time, or the carrier can be notified by fax or telephone.

◆The damaged equipment should be kept in its original condition to allow the carrier to open it, or for necessary inspection by the authorities, and for the carrier to conduct a loss assessment.

■Below is a table of some terms and abbreviations for reference:

Name	Significance and description	Name	Significance and description
d-q axis	Rotating coordinate system with synchronous rotation speed	DI	Digital input
Syn-transfer	Synchronous switching	DO	Digital output
PWM	Pulse width modulation	EMC	Electromagnetic compatibility
I/O	Input/Output	HMI	Touch screen
AI	Analog input	PID	Closed loop: proportional-integral-derivative
AO	Analog output	-	-

Safety Precautions

Safety Statement

1) Please read and adhere to these safety precautions prior to installing, operating, and maintaining the equipment.

2) To ensure personal and equipment safety, adhere to all safety precautions marked on the equipment and described in the manual during installation, operation, and maintenance.

3) The "Caution", "Warning", and "Danger" items in this manual do not encompass all necessary safety precautions but serve as a supplement to comprehensive safety guidance.

4) This equipment should be used in an environment that meets design specifications; otherwise, malfunctions may occur. Functional abnormalities or component damage caused by non-compliance with relevant regulations are not covered under equipment quality assurance.

5) Our company will not assume any legal responsibility for personal accidents, property losses, etc., caused by improper operation of the equipment.

Safety Level Definition

Danger "Danger" indicates a situation which, if not avoided, could result in death or serious injury.

Warning "Warning" indicates that failure to follow the instructions may result in death or serious injury.

Caution "Caution" indicates that minor personal injury or equipment damage may result if the instructions are not followed.

Safety Precautions

Unpacking and acceptance
Caution ◆Before unpacking, please check whether the outer packaging of the equipment is intact and for any damage, soaking, moisture, deformation, etc. ◆Please open the package layer by layer in sequence. Do not hit it violently! ◆When unpacking, please check for any damage, rust, or bruising on the surface of the equipment and its accessories. ◆After unpacking, please meticulously compare the packing list and inspect whether the quantity and documentation of the equipment and its accessories are complete.
Warning ◆If you find any damage, rust, or signs of use on the equipment and its accessories during unpacking, please do not install them! ◆If you discover water ingress in the equipment, or missing or damaged parts during unpacking, please do not install it! ◆Please compare the packing list meticulously. If the packing list does not match the equipment name, do not install it!

During storage and transportation

Caution

◆Please store and transport the equipment according to the specified conditions, ensuring that the storage temperature and humidity meet the requirements.
◆Avoid storing and transporting in areas exposed to splashing water, rain, direct sunlight, strong electric fields, strong magnetic fields, or strong vibrations.
◆Avoid storing the equipment for more than 3 months. If stored longer, implement stricter protection and conduct necessary inspections.
◆Ensure rigorous packaging of the equipment before vehicle transportation, utilizing a closed box for long-distance transportation.
◆Use a flatbed truck to transport the equipment and ensure that the installation base is level. During rainy or snowy weather, adequately protect against precipitation before transport, such as wrapping the equipment in tarpaulin.
◆It is strictly prohibited to co-load this equipment with items or other equipment that may affect or damage it during transport.

Warning

◆Ensure the use of professional loading and unloading equipment for handling large or heavy equipment!
◆When manually moving the equipment, firmly grasp the casing to prevent parts from falling, thereby avoiding injury risk!
◆During equipment handling, gently lift and lower, always attending to objects underfoot to avoid tripping or falling, preventing injury or damage to equipment!
◆When the equipment is hoisted, ensure no personnel are under it and that the crane, hoisting rope, and gear have adequate capacity.

During installation

Warning

◆Thoroughly read the equipment manual and safety precautions before installation!
◆Modification of this equipment is strictly prohibited!
◆Do not tighten the fixing bolts on equipment parts, components, or those marked in red!
◆Avoid installing this equipment in locations with strong electric fields or significant electromagnetic interference!
◆When this equipment is installed in a cabinet or terminal device, the cabinet or terminal device must provide corresponding fireproof enclosures, electrical protection enclosures, mechanical protection enclosures, and other protective devices. The protection level should comply with relevant IEC standards and local laws and regulations.

Danger

◆Non-professionals are strictly prohibited from installing, wiring, maintaining, inspecting, or replacing parts of the equipment!
◆The installation, wiring, maintenance, inspection, or parts replacement of this equipment must be performed only by professionals trained in electrical equipment and with sufficient electrical knowledge.
◆Installers must be familiar with the equipment installation requirements and relevant technical documentation.
◆When installing equipment such as transformers that generate strong electromagnetic interference, install shielding protective devices to prevent malfunction of this equipment!

During wiring

Danger

◆Non-professionals are strictly prohibited from installing, wiring, maintaining, inspecting, or replacing parts of the equipment!
◆Do not perform wiring work when the power supply is on; otherwise, there is a risk of electric shock.
◆Before wiring, ensure all devices are powered off. After cutting off the power, residual voltage may remain in internal capacitors. Please wait at least 10 minutes before performing wiring operations.

Danger

◆Wiring must be performed after the equipment has been properly installed and secured.
◆Ensure that the equipment is well grounded; otherwise, there is a risk of electric shock.
llow the electrostatic discharge (ESD) prevention procedures and wear an anti-static wrist strap when wiring to avoid damaging internal circuits.

Warning

◆It is strictly prohibited to connect the input power to the output terminals of the equipment; doing so may cause damage or fire.
hen connecting the drive to the motor, ensure the phase sequence of the drive and motor terminals is accurate and consistent to prevent reverse rotation.
ıe cables used for wiring must meet the required wire gauge and shielding standards, and the shielding layer of shielded cables must be reliably grounded at one end!
◆After wiring, verify that there are no loose screws or exposed cables inside the device.

During power-on

Danger

◆Before power-on, confirm that the equipment is properly installed, wiring is secure, the cabinet door is closed, and the motor device is permitted to restart.
◆Ensure the power supply meets the requirements before power-on to prevent damage or fire!
◆During power-on, the mechanical components may activate suddenly. Stay clear of moving parts.
◆After power-on, do not open the cabinet door or protective covers; there is a risk of electric shock!
◆Do not touch any wiring terminals of the equipment when powered on; risk of electric shock.
◆Do not dismantle any parts or devices when the equipment is energized; danger of electric shock.

During operation

Danger

◆Do not touch any wiring terminals during operation; risk of electric shock.
◆Do not dismantle any components during operation; risk of electric shock.
◆Do not touch the casing, fans, or resistors to check temperature; risk of burns.
◆It is strictly forbidden for non-professional technicians to detect signals during operation, or it may cause personal injury or equipment damage.

Warning

◆During operation, prevent other objects or metal items from falling into the equipment to avoid causing equipment damage.
◆Do not use the contactor on-off method to control equipment startup and shutdown, as it may cause equipment damage.

During maintenance

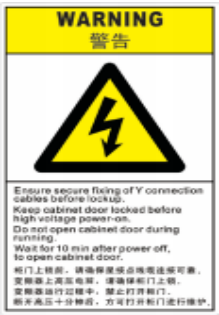
Danger

◆Non-professionals are strictly prohibited from installing, wiring, maintaining, inspecting, or replacing parts of the equipment!
◆It is strictly prohibited to maintain equipment while powered on, as there is a risk of electric shock.
◆After disconnecting power to all devices, wait at least 10 minutes before performing maintenance or other operations.

Warning ◆Perform daily and regular inspections and maintenance according to equipment maintenance requirements, and keep maintenance records.
During repair
Danger ◆Non-professionals are strictly prohibited from installing, wiring, maintaining, inspecting, or replacing parts of the equipment! ◆It is strictly prohibited to perform equipment repairs while powered on, due to the risk of electric shock. ◆After disconnecting power to all devices, wait at least 10 minutes before inspecting, repairing, or performing related operations.
Warning ◆Report equipment repairs in accordance with the equipment warranty agreement. ◆In the event of equipment failure or damage, have professionals troubleshoot and repair the equipment according to maintenance instructions, while maintaining thorough repair records. ◆Replace parts following the equipment's wear parts replacement instructions. ◆Do not continue using damaged equipment, as it may result in more severe damage. ◆After replacing equipment, ensure that you recheck wiring and reset parameters.
When scrapped
Warning ◆Dispose of equipment according to national regulations and standards to prevent property loss or personal injury. ◆Dispose of and recycle scrapped equipment following industrial waste treatment standards to avoid environmental pollution.

Safety Signs

For safe equipment operation and maintenance, adhere to the safety signs affixed to the equipment. Do not damage, remove, or peel off the safety signs. The safety signs are described as follows



Chapter 1 Product Information

1.1 Working Principle and System Composition

■The high-voltage inverter is a voltage source type with power units in series and configured in a high-high manner. All power units are divided into three equally numbered groups and connected in series within each group.

■Grid high voltage electricity is output as multiple low voltage power supplies with phase differences through a phase-shifting transformer to power the power units. After rectification, the power unit outputs single-phase PWM inverter AC power with adjustable voltage and frequency. Each power unit group is connected in series between stages, forming a multi-step PWM voltage output that directly supplies the power required by the high-voltage motor.

■The high-voltage inverter's multi-pulse rectification technology reduces input-side harmonics, minimizes grid-side harmonic pollution, and improves power factor on the grid side. Furthermore, the multi-level output waveform is close to a sine wave, significantly reducing motor torque pulsation.

The control signals of the main control section and the unit control section are transmitted via optical fiber, which effectively avoids electromagnetic interference and ensures the reliability of system control signal transmission.

1.2 System Composition

The high-voltage inverter is composed of a transformer cabinet, a power unit cabinet, and a control cabinet. Additional optional one-to-one manual, one-to-one automatic, one-to-two manual, and one-to-two automatic bypass cabinets can be added according to on-site requirements.

1) Transformer cabinet

The primary equipment in the cabinet is the phase-shifting transformer. The phase-shifting transformer features a dry-type structure with an insulation grade of H. The base of the phase-shifting transformer is bolted to the base of the cabinet. A centrifugal fan is mounted on top of the cabinet to cool the transformer and power unit. The primary side of the phase-shifting transformer is connected to a three-phase high voltage (via the high-voltage incoming line cabinet or industrial frequency bypass cabinet), and the secondary side multiple outputs are connected to the inputs of the power units within the unit cabinet.

2) Power unit cabinet

For 3kV, 6kV, and 10kV output voltage levels, the standard configuration of the power cabinet includes 9, 15, or 24 power units, respectively, divided across three phases, with 3, 5, or 8 power units connected in series per phase. The power unit cabinet and the transformer cabinet share the top-mounted cooling fan. Each power unit is equipped with a pair of optical fibers for communication with the main control system.

3) Control cabinet

The control cabinet primarily includes the main control module, low-voltage power distribution, and interface components.

The main function of the main control module is to achieve system control and status acquisition. Low-voltage power distribution and interface components provide user low-voltage power interfaces, system fan control, user signal interfaces, and other functions.

The indication area on the cabinet door includes a touch screen (HMI), indicator lights, remote/local switches, and an emergency stop button.

4) Input and output cabinet / Wiring compartment

The input and output cabinet or wiring compartment serves as the wiring space for the inverter's input and output power cables.

5) Manual bypass cabinet

The manual bypass cabinet provides a power frequency operation circuit for the motor when the inverter fails, ensuring power frequency start-up and operation for continuous production. After maintenance, the motor is switched back to variable frequency operation.

6) Automatic bypass cabinet

The automatic bypass cabinet provides a power frequency running circuit for the motor during inverter failure, ensuring that the motor can start and run at power frequency to ensure continuous production. Once maintenance is complete, the motor can switch back to variable frequency operation.

1.3 Technical Parameters

Voltage parameters	3kV series	6kV series	10kV series
Input section			
Rated input voltage	3-phase 3kV	3-phase 6kV	3-phase 10kV
Input voltage range	3kV/6kV/10kV ±10% full load operation, -10% to -35% allows long-term derating operation		
Rated input frequency	50/60Hz		
Unit input voltage	690V	690V	690V
Input power factor	>0.95 (20% to 100% load)		
Input current harmonics	Meets IEEE 519-2014 and GBT 14549-93 standards		
Output section			
Output voltage range	0~3kV	0~6kV	0~10kV
Output capacity range[1]	230~3700kVA	230~8000kVA	250~13750kVA
Output frequency range[2]	0 to 50Hz/60Hz MAX 120Hz (120 to 700Hz manufacturer customized)		
Control method	Sensorless/sensor vector control (open/closed loop vector), voltage-type open-loop vector control		
Speed ratio	40:1 (voltage type open-loop vector); 100:1 (open-loop vector); 1000:1 (closed-loop vector)		
Speed accuracy	±0.5% (open-loop vector); ±0.02% (closed-loop vector)		
Acceleration and deceleration time	0.1 to 6500.0 seconds		
Start-stop control	Local or remote		
Control system	ARM、DSP、PFGA、HMI		
Panel display	Touch screen, Simplified Chinese/English		
Overload capacity	120%，1min		
Overall efficiency	≥96%		
System protection	Motor overload, output overload, output short circuit, output grounding, output overcurrent, input overvoltage, fan alarm, door switch interlock protection, transformer overheating alarm, transformer overtemperature trip, etc.		
Mean time between failures	50,000 hours		
Communication interface	Modbus-RTU or Modbus-TCP (optional), PROFIBUS-DP (optional)		
Switch input	7-channel, relay dry contact		
Switch output	8-channel, relay dry contact		

Analog input	2-channel, 4~20mA
Analog output	2-channel, 4~20mA
Operating environment	Indoor
Ambient temperature	-10℃ to +40℃, preheating may be required if below 0℃, derating is necessary above 40℃
Ambient humidity	5% to 95%, no condensation
Altitude	≤1000m, above 1000m derating required (please specify when ordering)
Total equipment noise	Approximately 80 dB
Cooling method	Forced air cooling
Protection level	IP31
Wiring entry and exit method [3]	Bottom entry and exit
Control power supply	380VAC ±10%, three-phase four-wire
Supported encoder types [4]	DC15V OC and DC5V differential encoder (optional)

1.4 Specifications and Dimensions

Specifications and models	Inverter capacity (kVA)	Rated output current (A)	Reference adaptive motor (kW)	Overall dimensions: width W x depth D x height H (in mm)
6kV				
WD5100-315-H060	315	30	250	2700*1325*2552
WD5100-355-H060	355	34	280	
WD5100-400-H060	400	38	315	
WD5100-450-H060	450	43	355	
WD5100-500-H060	500	48	400	
WD5100-560-H060	560	54	450	
WD5100-630-H060	630	61	500	
WD5100-710-H060	710	68	560	
WD5100-800-H060	800	77	630	3050*1575*2629
WD5100-900-H060	900	87	710	
WD5100-1000-H060	1000	96	800	
WD5100-1120-H060	1120	108	900	
WD5100-1250-H060	1250	120	1000	
WD5100-1400-H060	1400	135	1120	
WD5100-1600-H060	1600	154	1250	4500*1325*2732
WD5100-1800-H060	1800	173	1400	
WD5100-2000-H060	2000	192	1600	

WD5100-2250-H060	2250	217	1800	
WD5100-2500-H060	2500	241	2000	
WD5100-2800-H060	2800	269	2250	6200*1500*2732
WD5100-3150-H060	3150	303	2500	
WD5100-3550-H060	3550	341	2800	
WD5100-4000-H060	4000	385	3150	4000*1995*2779
WD5100-4500-H060	4500	433	3550	6800*1500*2777
WD5100-5000-H060	5000	481	4000	
WD5100-5600-H060	5600	539	4500	
WD5100-6300-H060	6300	606	5000	
WD5100-8000-H060	8000	770	6300	8750*1500*3081
10kV				
WD5100-280-M100	280	16	220	2700*1325*2552
WD5100-315-M100	315	18	250	
WD5100-355-M100	355	20	280	
WD5100-400-M100	400	23	315	
WD5100-450-M100	450	26	355	
WD5100-500-M100	500	29	400	
WD5100-560-M100	560	32	450	
WD5100-630-M100	630	36	500	
WD5100-710-M100	710	41	560	
WD5100-800-M100	800	46	630	
WD5100-900-M100	900	52	710	
WD5100-1000-M100	1000	58	800	
WD5100-1120-M100	1120	65	900	
WD5100-1250-M100	1250	72	1000	
WD5100-1400-M100	1400	81	1120	3050*1575*2629
WD5100-1600-M100	1600	92	1250	
WD5100-1800-M100	1800	104	1400	
WD5100-2000-M100	2000	115	1600	
WD5100-2250-M100	2250	130	1800	
WD5100-2500-M100	2500	144	2000	
WD5100-2800-M100	2800	162	2240	4500*1325*2732
WD5100-3000-M100	3000	173	2400	
WD5100-3150-M100	3150	182	2500	
WD5100-3500-M100	3500	202	2800	

WD5100-3750-M100	3750	217	3000	
WD5100-4000-M100	4000	231	3150	
WD5100-4500-M100	4500	260	3550	
WD5100-5000-M100	5000	290	4000	6775*1500*2730
WD5100-5600-M100	5600	320	4500	
WD5100-6300-M100	6300	360	5000	
WD5100-7000-M100	7000	410	5600	
WD5100-8000-M100	8000	460	6300	9600*1500*3081
WD5100-9000-M100	9000	520	7100	
WD5100-9500-M100	9500	550	7600	
WD5100-10000-M100	10000	580	8000	
WD5100-11250-M100	11250	650	9000	11550*1600*3077
WD5100-12500-M100	12500	720	10000	
WD5100-13750-M100	13750	810	11000	
WD5100-15600-M100	15600	900	12500	12350*1600*3439
WD5100-16000-M100	16000	920	13000	

Chapter 2 Installation and Wiring

High-voltage inverters should be installed in appropriate locations for different projects. Customers must refer to the foundation diagram provided by the manufacturer to arrange plant layout and construction.

2.1 Installation Conditions Requirements

1) Regarding the application environment of the equipment, the regulations in the following table should be observed.

Table 2-1 Application Environment Requirements

Item	Regulations	
Ambient temperature	Within the range of -10℃ to +40℃, preheating may be required if below 0℃, and derating may be necessary if above 40℃. The 24-hour average should be between 5℃ and 35℃.	
Relative humidity	At the maximum temperature (40℃), humidity should be less than 50%; At lower temperatures, it should not exceed 85%; Condensation must not occur due to temperature changes.	
Height	Below 1000m altitude, normal operation; above 1000m, derating is necessary.(If order exceeds 1000m, please inform the manufacturer in advance)	
Air pressure	Should be within the range of 860 to 1060 kPa	
Air quality	The dust in the electrical room should be roughly similar to atmospheric dust, especially free of iron particles, silicone particles, etc.	
Corrosion factors	Corrosive gases	Concentration
	Hydrogen sulfide (H_2S)	≤0.001PPM
	Sulfur dioxide (SO_2)	≤0.05PPM
	Chlorine (Cl_2)	≤0.1PPM
	Ammonia (NH_3)	≤0.1PPM
	Nitrogen oxides (NO_x)	≤0.02PPM
	Ozone (O_3)	≤0.002PPM
	Hydrogen Chloride (HCl)	≤0.1mg/m3

Danger

◆Do not use silicone wax on the floor of the electrical room, otherwise it may adversely affect the electrical contact points.

◆After the external cables (ground wire, main circuit cable, control line) are introduced into the cabinet for connection, the cable entry opening should be completely sealed with fireproof putty. If the cable entry hole is open, animals such as rodents can enter the cabinet, potentially causing significant damage to the equipment.

2) Regarding the storage environment of the equipment, the following regulations should be adhered to:

Table 2-2 Storage Environment Conditions

Item	Specification	
Storage temperature	-20℃~+50℃, Air temperature change is less than 1℃/min	Do not place in areas where sudden temperature changes can lead to condensation and freezing.
Relative humidity	5%~95%	
Storage environment	Free from direct sunlight, dust, corrosive gases, flammable gases, oil mist, steam, drips, etc.	

NOTE

◆Improper storage of power electronic devices can impact the service life of the equipment and may even lead to operational failure.

◆Storage environment conditions refer to standards IEC 60721-3-1:2018, class: 1K22, IEC 60721-3-3:2019, class: 3K22, 3S7 (solid particles)*

General requirements:

a) Do not place directly on the ground; use an appropriate support.
b) If moisture is present, add an appropriate amount of desiccant.

c) Use polyethylene material or aluminum metal foil as protective packaging to prevent moisture ingress.

d) Regular inspection: During the storage period, monthly check the condition and packaging of the equipment, focusing on mechanical damage, and damage from humidity, temperature, or fire. If the packaging is damaged or you discover the equipment is damaged, immediately assess the damage, repair the equipment, and then store it as per the above requirements.

Spare parts storage:

To prevent damage to equipment spare parts, consider the following:

Caution

◆The storage area must be free from vibration and shock, and protected against moisture, frost, temperature, dust, and grit.

◆Environmental conditions should meet temperature and humidity requirements: store spare parts in a dry, insect-free original packaging box and keep them away from corrosive gases.

◆Relative air humidity: 5%~95%. If humidity exceeds the maximum allowable level, use environmental control measures such as cooling, heating, or dehumidification to ensure proper spare parts storage conditions.

◆The storage temperature for spare parts should range from -20°C to +50°C.

◆Circuit boards must be stored in antistatic bags that do not leak moisture-proof agents and must be kept away from corrosive gases or gases containing salt, alkali, or other impurities. Do not freeze.

◆The power unit contains film capacitors. If not powered regularly, their electrical characteristics can degrade over time. Therefore, they should be powered at least once every six months.

2.2 Electrical Installation

Precautions before electrical installation

Caution

◆Ensure the wire gauge and voltage withstand requirements of high-voltage lines and control power lines, and the input and output high-voltage cables must undergo stringent dielectric strength tests.

◆Ensure that the high-voltage switch on the input side has effective lightning protection measures in place.

◆The protective armor of the high-voltage incoming and load cables should be reliably grounded and securely fixed to the cabinet. They must possess sufficient mechanical strength and maintain the insulation distance as specified in the high-voltage technical standards.

◆Input and output cables must be routed separately to prevent hazards caused by cross-wiring and insulation damage.

◆Signal lines from the field to the high-voltage frequency conversion power supply should be laid separately from power cables. The analog signal lines must use shielded twisted pairs, with one end of the shield reliably grounded.

◆The high-voltage frequency conversion power supply cabinet must be continuously grounded to the factory ground to ensure personnel safety.

◆During electrical installation, a dedicated grounding electrode should be established within the control cabinet, with a ground resistance not exceeding 2Ω (others not exceeding 4Ω).

◆Before measuring transformer insulation resistance or performing dielectric strength tests, all secondary side terminals must be short-circuited to prevent unit damage. Additionally, prior consent and technical support from the equipment manufacturer are required before testing the transformer.

2.3 Main Circuit Installation

Danger

◆Input and output terminals must be correctly connected to avoid severe damage to the high-voltage frequency converter!

◆Ensure the input power is turned off before wiring. Otherwise, there is a risk of electric shock and fire!

◆Electrical engineering professionals should perform the wiring. Otherwise, there is a risk of electric shock and fire!

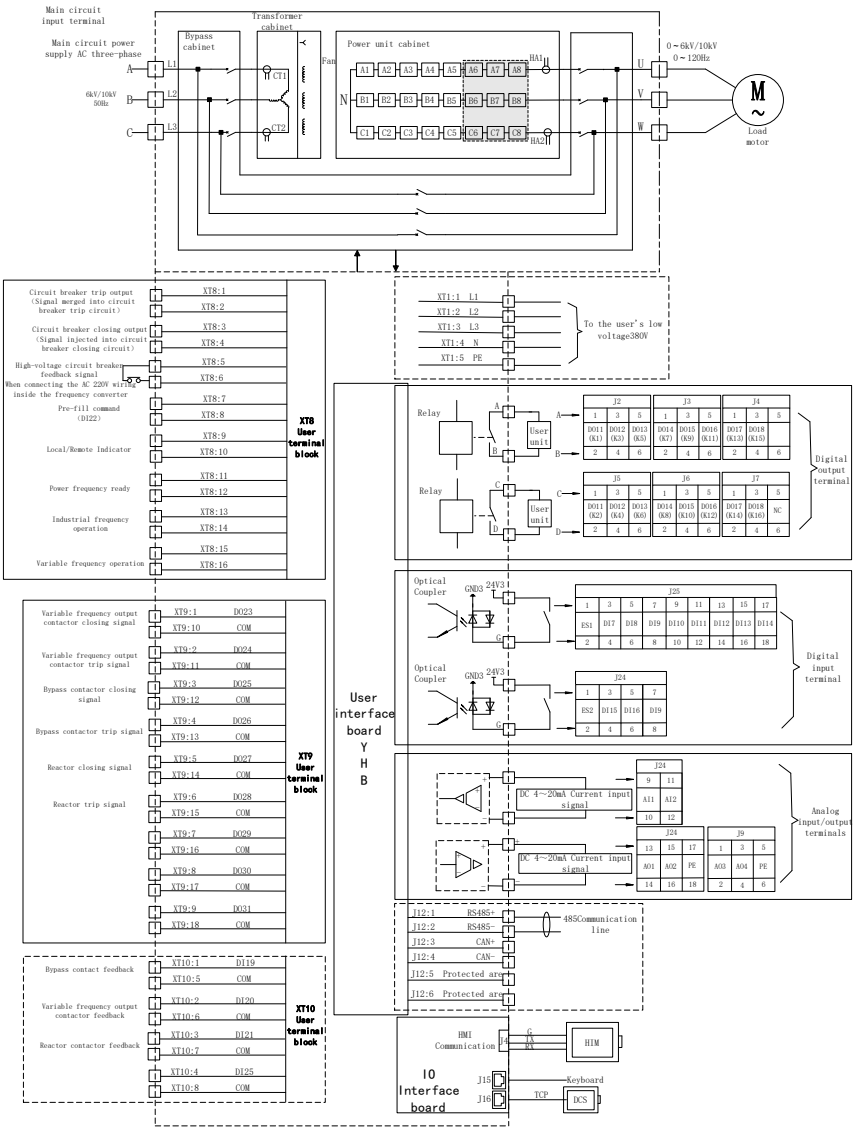
◆Ensure that the cabinet is reliably grounded. Otherwise, there is a risk of electric shock and fire!

◆Before powering on the system, test the emergency stop button to ensure proper operation!

◆Do not directly touch the output terminals. Do not connect the output terminals of the high-voltage inverter to the casing, and avoid short circuits between output terminals. Otherwise, there is a risk of electric shock and short circuit!

2.4 System Grounding

The user must ensure the grounding resistance is less than 4Ω. Use a 25mm×4mm copper busbar for grounding, installed in the cable trench beneath the foundation channel steel frame. The main grounding point of the high-voltage system should be securely connected directly to the copper busbar, which then connects safely to each cabinet's base. The electronic system signal ground points should merge and connect to the copper busbar.


Main circuit input terminal
Main circuit power supply AC three-phase
6kV/10kV 50Hz
Transformer cabinet
Bypass cabinet
Power unit cabinet
Fan
0～6kV/10kV
0～120Hz
Load motor
To the user's low voltage380V
XT8 User terminal block
XT9 User terminal block
XT10 User terminal block
User interface board YHB
Digital output terminal
Digital input terminal
Analog input/output terminals
485Communication line
HMI Communication
IO Interface board
Keyboard
TCP
HIM
DCS

2.5 High Voltage Inlet and Outlet Terminal Connection

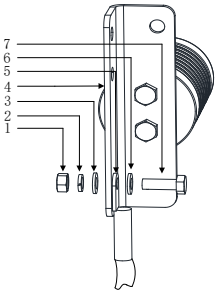
Precautions for connecting high-voltage inlet and outlet terminals:

Caution

◆Confirm the UVW phase of the cable and label it accordingly.

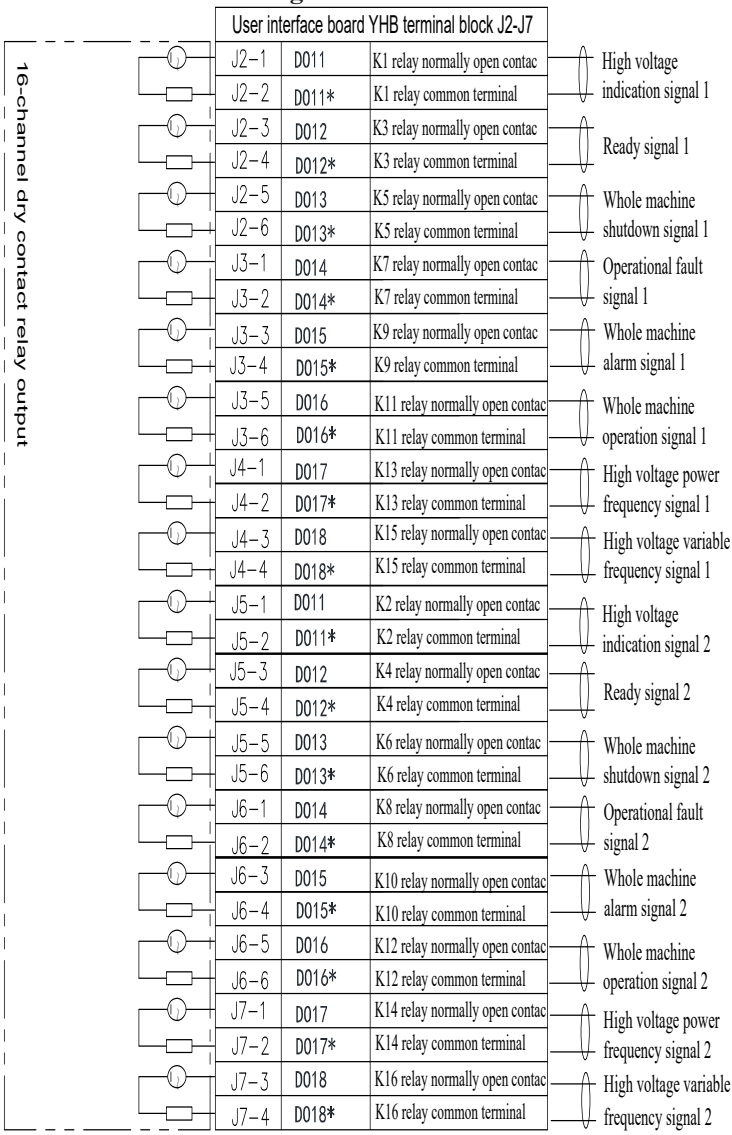
◆Ensure that the device is de-energized.

As illustrated below, thread the three-phase cables through the designated wiring holes and secure them to the corresponding three-phase copper busbars. Tighten the screws with a wrench to a torque of 45 Nm.

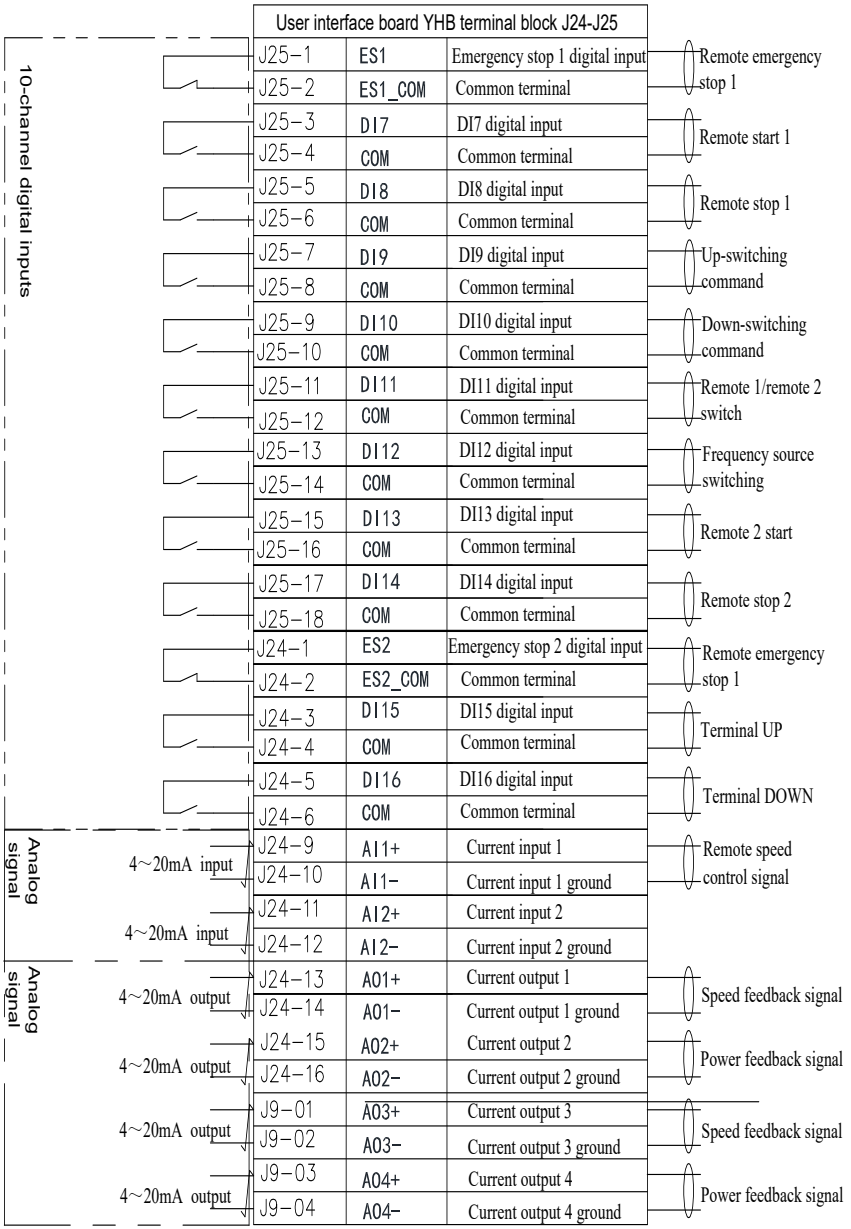


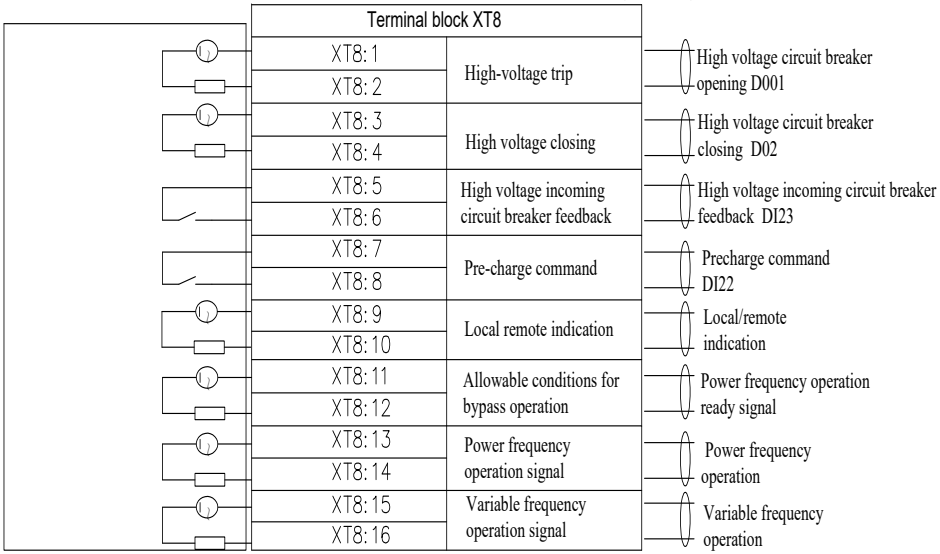
1 - M10 nut
2 - Spring washer
3 - Flat washer
4 - Copper busbar
5 - Copper tube ter
6 - Flat washer
7 - M10 hex bolt

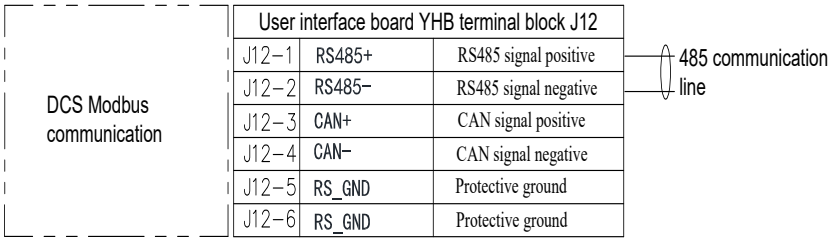
2.6 User Terminal Wiring Instructions

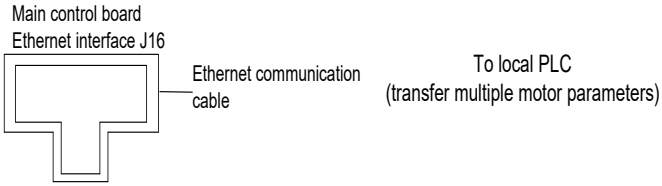


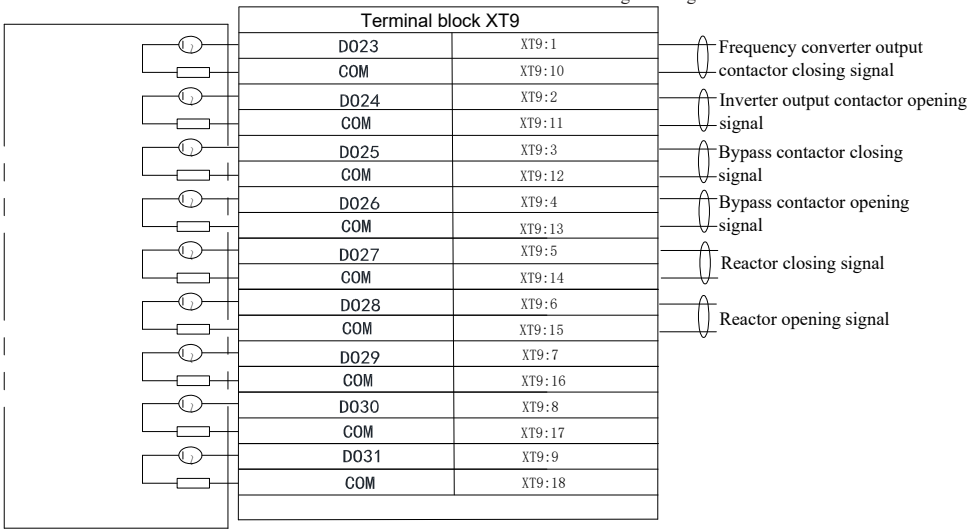
User interface board YHB terminal block J2-J7			
J2-1	D011	K1 relay normally open contac	High voltage indication signal 1
J2-2	D011*	K1 relay common terminal	
J2-3	D012	K3 relay normally open contac	Ready signal 1
J2-4	D012*	K3 relay common terminal	
J2-5	D013	K5 relay normally open contac	Whole machine shutdown signal 1
J2-6	D013*	K5 relay common terminal	
J3-1	D014	K7 relay normally open contac	Operational fault signal 1
J3-2	D014*	K7 relay common terminal	
J3-3	D015	K9 relay normally open contac	Whole machine alarm signal 1
J3-4	D015*	K9 relay common terminal	
J3-5	D016	K11 relay normally open contac	Whole machine operation signal 1
J3-6	D016*	K11 relay common terminal	
J4-1	D017	K13 relay normally open contac	High voltage power frequency signal 1
J4-2	D017*	K13 relay common terminal	
J4-3	D018	K15 relay normally open contac	High voltage variable frequency signal 1
J4-4	D018*	K15 relay common terminal	
J5-1	D011	K2 relay normally open contac	High voltage indication signal 2
J5-2	D011*	K2 relay common terminal	
J5-3	D012	K4 relay normally open contac	Ready signal 2
J5-4	D012*	K4 relay common terminal	
J5-5	D013	K6 relay normally open contac	Whole machine shutdown signal 2
J5-6	D013*	K6 relay common terminal	
J6-1	D014	K8 relay normally open contac	Operational fault signal 2
J6-2	D014*	K8 relay common terminal	
J6-3	D015	K10 relay normally open contac	Whole machine alarm signal 2
J6-4	D015*	K10 relay common terminal	
J6-5	D016	K12 relay normally open contac	Whole machine operation signal 2
J6-6	D016*	K12 relay common terminal	
J7-1	D017	K14 relay normally open contac	High voltage power frequency signal 2
J7-2	D017*	K14 relay common terminal	
J7-3	D018	K16 relay normally open contac	High voltage variable frequency signal 2
J7-4	D018*	K16 relay common terminal	


User interface board YHB terminal block J24-J25
10-channel digital inputs
J25-1 ES1 Emergency stop 1 digital input
J25-2 ES1_COM Common terminal
J25-3 DI7 DI7 digital input
J25-4 COM Common terminal
J25-5 DI8 DI8 digital input
J25-6 COM Common terminal
J25-7 DI9 DI9 digital input
J25-8 COM Common terminal
J25-9 DI10 DI10 digital input
J25-10 COM Common terminal
J25-11 DI11 DI11 digital input
J25-12 COM Common terminal
J25-13 DI12 DI12 digital input
J25-14 COM Common terminal
J25-15 DI13 DI13 digital input
J25-16 COM Common terminal
J25-17 DI14 DI14 digital input
J25-18 COM Common terminal
J24-1 ES2 Emergency stop 2 digital input
J24-2 ES2_COM Common terminal
J24-3 DI15 DI15 digital input
J24-4 COM Common terminal
J24-5 DI16 DI16 digital input
J24-6 COM Common terminal
Remote emergency stop 1
Remote start 1
Remote stop 1
Up-switching command
Down-switching command
Remote 1/remote 2 switch
Frequency source switching
Remote 2 start
Remote stop 2
Remote emergency stop 1
Terminal UP
Terminal DOWN
Analog signal
4~20mA input
J24-9 AI1+ Current input 1
J24-10 AI1- Current input 1 ground
4~20mA input
J24-11 AI2+ Current input 2
J24-12 AI2- Current input 2 ground
Remote speed control signal
Analog signal
4~20mA output
J24-13 AO1+ Current output 1
4~20mA output
J24-14 AO1- Current output 1 ground
4~20mA output
J24-15 AO2+ Current output 2
4~20mA output
J24-16 AO2- Current output 2 ground
4~20mA output
J9-01 AO3+ Current output 3
4~20mA output
J9-02 AO3- Current output 3 ground
4~20mA output
J9-03 AO4+ Current output 4
4~20mA output
J9-04 AO4- Current output 4 ground
Speed feedback signal
Power feedback signal
Speed feedback signal
Power feedback signal

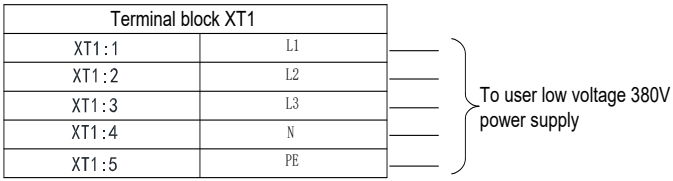

Terminal block XT8
XT8: 1
XT8: 2
High-voltage trip
High voltage circuit breaker opening D001
XT8: 3
XT8: 4
High voltage closing
High voltage circuit breaker closing D02
XT8: 5
XT8: 6
High voltage incoming circuit breaker feedback
High voltage incoming circuit breaker feedback DI23
XT8: 7
XT8: 8
Pre-charge command
Precharge command DI22
XT8: 9
XT8: 10
Local remote indication
Local/remote indication
XT8: 11
XT8: 12
Allowable conditions for bypass operation
Power frequency operation ready signal
XT8: 13
XT8: 14
Power frequency operation signal
Power frequency operation
XT8: 15
XT8: 16
Variable frequency operation signal
Variable frequency operation

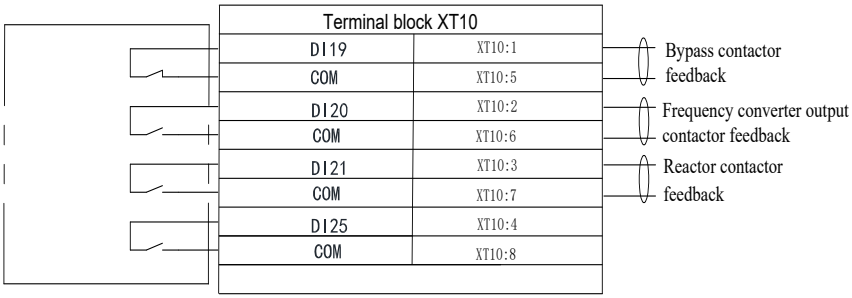

DCS Modbus communication
User interface board YHB terminal block J12
J12-1 RS485+ RS485 signal positive
J12-2 RS485- RS485 signal negative
J12-3 CAN+ CAN signal positive
J12-4 CAN- CAN signal negative
J12-5 RS_GND Protective ground
J12-6 RS_GND Protective ground
485 communication line


Main control board
Ethernet interface J16
Ethernet communication cable
To local PLC
(transfer multiple motor parameters)



Note: COM is 24V+





Chapter 3 Power-on and Commissioning

Caution

◆Do not disconnect the control power supply when the high voltage is energized; otherwise, the cooling, monitoring, and control systems will cease to operate, potentially causing system failure or damage.

Danger

◆If the equipment is not properly installed and inspected, the following test steps may lead to serious injury or life-threatening situations.

◆Before commencing, ensure that the inverter power supply is disconnected and adhere to correct interlocking procedures and warning sign placements.

◆Even after the high-voltage circuit breaker is opened and the control power switch is turned off, hazardous voltages may still be present in the high-voltage inverter cabinet (due to stored energy within the unit).

3.1 Pre-commissioning Inspection Items

Inspection items	Confirm
Ensure that there is no debris inside the cabinet.	
Ensure all electrical connections are secure, and verify that there is no damage to the cabinet or significant loss of external paint. If any of the aforementioned issues are present, inspect the surrounding components, cables, or other materials for integrity.	
Inspect the cables at all separation points and gaps, ensuring no conductors are exposed due to abrasions or other transportation mishaps.	
Ensure the inverter cabinet is securely connected to the plant ground to ensure personnel safety.	
Verify that the grounding wires within each inverter cabinet and on the grounding bar are intact and securely connected without damage.	
Ensure the grounding connection cable re-establishes the ground connection at the cabinet's transport separation point.	
Ensure the top cabinet fan is securely installed and rotates freely with no abnormal friction sounds.	
Verify that the power cable for the top cabinet fan is correctly and securely connected.	
Ensure the wires between the phase-shifting transformer and the power unit are secure and properly wired.	
Verify that the optical fiber connections between the fiber board in the main control cabinet and each power unit are correct and secure.	
Ensure all connectors on the system interface board are correctly connected and firmly secured, and that the communication lines between the core control board and the optical fiber board are correctly connected.	
For electromagnetic compatibility, it is recommended that users provide shielded analog signal cables, routed separately from power cables.	
Verify that all user wiring is accurate and secure.	
Ensure the control and main power supplies are correctly and securely connected, adhering to relevant electrical standards.	
The power supply can only be activated after confirming correct wiring of the high-voltage inverter and ensuring all electrical cabinet doors are locked. Once powered, cabinet doors must not be opened.	

Caution

◆During the above operations, please ensure the reliability of the cabinet grounding and the correct connection of power cables and power cords, to avoid potential personal injury and equipment damage.

3.2 Control Cabinet Power-on Commissioning Steps

Steps	Commissioning Content
1	Check whether the control power supply wiring is correct, and if the voltage value is within the required range.
2	Close the main power switch (QP1) of the control cabinet.
3	Turn on the lighting power switch (QP3) and check if the lighting is functioning normally.
4	Turn on the control power switch (QP4) and verify if the control power supply is functioning properly.
5	Turn on the fan power switches (QP5 and QP6), set the fan automatic operation function code to active, start the cabinet top fan, and check whether the fan rotates smoothly without abnormalities and the rotation direction is correct.
6	Observe whether the touch screen displays correctly.
7	Once the touch screen displays correctly, enter the system properties interface, ensure the login button appears, accurately input the account password, and confirm successful login.
8	Enter the parameter setting interface and correctly input motor parameters and related control parameters.
9	Verify that the logic of the high-voltage cabinet interlock, emergency stop button, and remote/local transfer switch is correct, effective, and reliable.
10	Prepare for the high-voltage power-on test.

3.3 High Voltage Commissioning of High-voltage Inverter

Caution
◆Before energizing the high-voltage inverter, it is essential to conduct interlock tripping and closing tests with the user's high-voltage circuit breaker.

3.4 Commissioning Steps without Motor

Caution
◆Ensure that the inverter's input terminals R, S, T, and output terminals U, V, W correspond sequentially to the onsite high-voltage wires—yellow, green, and red—to maintain phase sequence consistency.

Steps	Commissioning Content
1	Ensure the system is powered off, connect the inverter input terminals R, S, and T to the high-voltage incoming line, disconnect the inverter output terminals U, V, and W from the motor wiring, and close all cabinet doors.
2	First, energize the AC control power (see “3.4 Control Cabinet Power-on Commissioning Steps” for detailed procedures). When the equipment issues a closure permission signal, then notify that high voltage power can be applied.
3	Follow the operating procedures to connect the high voltage power (during the first high voltage energization, all personnel must stay at least 3m away from the cabinet). If abnormalities occur, press the emergency stop button or notify to disconnect the high voltage immediately.
4	Re-verify the reliability of the emergency stop high-voltage trip function.
5	After the high voltage is powered on, check whether the input voltage is within normal limits.
6	Observe whether there are any alarms or faults in the unit and system, and verify if all status displays are normal.
7	Verify the correctness of basic functions such as start, stop, acceleration, and deceleration.
8	Validate whether certain fault alarms can be reported promptly and act correctly.

9	After confirming that each unit is free of abnormalities, verify the dual power supply switching functionality;
10	Upon confirmation of no abnormalities, shut down the system and disconnect the high voltage power.
11	Prepare for motor testing.

Caution

◆Do not operate or stop the high-voltage inverter by connecting or disconnecting high-voltage power supplies!

3.5 Steps for No-load Commissioning of the Drive Motor

Steps	Commissioning Content
1	Ensure the motor is disconnected from the load.
2	With the control power supply and high-voltage power disconnected, reliably connect the motor cables to inverter output terminals U, V, and W in the correct phase sequence.
3	Apply high voltage to the inverter following standard procedures and confirm that the inverter's self-test is normal.
4	Reconfirm that all parameters are correctly set, tune the motor, and after successful tuning with no faults, set the target frequency (typically 5-10Hz for the first time).
5	Start the inverter and check whether the motor's rotation direction is correct (if a power frequency bypass cabinet is installed on-site, test the power frequency motor's forward and reverse rotation first) to ensure normal operation.
6	Gradually increase the set frequency to 50Hz, then decrease to 5Hz, performing multiple acceleration and deceleration tests on the inverter and observing for any abnormalities in the motor during the process.
7	After successful commissioning with no abnormalities, shut down the system and disconnect the high-voltage power supply, preparing for on-load commissioning.

3.6 Motor Load Test Steps

Steps	Commissioning Content
1	Connect the motor and load; after completing all checks, turn on inverter control power and high-voltage power.
2	Once the inverter is ready and the motor load is light, start the inverter. As the frequency increases, observe the rise in inverter voltage and current, and load until meeting the user's production process requirements.
3	If faults or alarms occur during startup or operation, immediately shut down the system and perform emergency handling according to the fault description and on-site procedures outlined in the high-voltage inverter user manual.
4	After commissioning, conduct 24-hour on-site monitoring. Record data such as equipment operating frequency, transformer temperature, input and output voltage, and input and output current.
5	After a successful 24-hour trial operation, proceed to user training and shift handover.

NOTE

◆If normal startup was not completed during initial running, the second startup must only be performed after the motor is stationary or at least 10 minutes have passed.

Chapter 4 Operation Instructions

This chapter provides a detailed step-by-step guide to all normal operation procedures after the high-voltage inverter is installed and commissioned. All essential steps are numbered and must be executed precisely according to these procedures.

Danger

◆Strictly follow the "Safety Precautions" during operation. Only trained personnel authorized by the user organization are permitted to operate the inverter.

◆The inverter is a high-voltage hazardous device. All operators must familiarize themselves with the following precautions before operating to prevent personal injury or property damage.

4.1 Precautions Before Operation

Caution

◆Ensure that the input voltage remains within the specified allowable range.

◆Enable the flying start function when starting the motor in a non-stationary state.

◆The sequence of power-on and power-off shall be followed as follows: start up by switching control power first, then high voltage; during shutdown, after the motor stops completely, disconnect high voltage first, then turn off control power.

◆During operation, users should continuously monitor the load conditions and promptly shut down if any abnormalities occur, resorting to emergency stop if necessary.

◆Ensure that there is no abnormal electromagnetic interference near the installation site of the inverter.

◆Personnel on-site must receive training, be familiar with the equipment structure, and master operational procedures, safety regulations, and precautions.

◆During maintenance, follow high-voltage operation protocols, including wearing insulating gloves, insulating shoes, and safety glasses.

◆On-site maintenance activities are prohibited for a single person.

◆Safety barriers labeled "High Voltage Danger" must be installed and must not be removed during operation.

◆Do not place flammable materials such as equipment drawings or user manuals near the inverter.

◆When handling or measuring inverter components, ensure that signal and control lines do not short or contact other terminals.

◆Operating the inverter with the cabinet door open or opening the door during operation is prohibited, as it may cause personal injury.

◆Dismantling or repairing the fan before disconnecting high voltage is strictly prohibited.

◆When transporting inverter equipment, ensure the load is balanced and the ground is level during unloading.

Caution

◆During maintenance or power unit replacement, the cabinet door may only be opened after the inverter has been disconnected from high voltage for more than 10 minutes. Confirm that the unit power indicator is off before proceeding, as residual high voltage may still be present shortly after disconnection.

◆After commissioning, the inverter's operating parameters are set. Unauthorized modifications by non-professional personnel are prohibited, as they may cause abnormal shutdowns or equipment failures.

4.2 Cabinet Door Buttons and Indicator Lights

Part name	Function
Emergency stop button	In case of an emergency system failure, the user can press this emergency stop button to turn off all IGBTs, cut off inverter output, and trip the upstream high voltage, minimizing damage.
Local/Remote Transfer switch	This switch is used for local and remote control switching of the inverter
Running indicator light	This indicator light shows whether the inverter is in operation. If in operation, this indicator is on.
Fault indicator light	This indicator light indicates whether the inverter is in a fault state. If a fault occurs, the fault indicator light comes on.
Alarm indicator light	This indicator light shows whether the inverter is in an alarm state. If an alarm occurs, the alarm indicator light comes on.

Caution

◆ If the emergency stop button is pressed, turn it clockwise to release it before applying high voltage

◆ When the bypass cabinet is connected in power frequency mode, the emergency stop button on the control cabinet is invalid. At this point, if you want to disconnect high voltage power, you can only do so by directly cutting off the upper-level power supply via the emergency stop button on the bypass cabinet

4.3 Control Mode Switching

4.3.1 Local Control

When the "local/remote" switch is set to "local", the user can directly use the touch screen to start and stop the inverter. In local control, the target frequency is input through the "frequency setting" on the human-machine interface.

4.3.2 Remote Control

When the "local/remote" switch is set to "remote", both the frequency source and command source can be set by function codes. Typically, the command source is selected as the digital terminal setting, and the frequency source is selected as the analog input terminal setting.

NOTE

◆ During operation, the inverter supports both remote and local switching without shutdown, but it must be considered that the target frequencies may differ

4.4 Inverter Operation Mode

The high-voltage inverter has multiple operating modes including process open-loop operation, process closed-loop operation, deceleration stop, and free stop.

4.4.1 Open-Loop Process Operation

In standby mode, when "Local/Remote" is set to "Remote", if a remote start command is received, the inverter initiates from the current state using the acceleration time provided by the system, and finally runs at the frequency specified by the user.

In standby mode, when "local/remote" is set to "Local", the remote start command is invalid; the inverter starts via the "start" button on the local touch screen.

4.4.2 Closed-Loop Process Operation

If the frequency source is set to PID in the parameter settings, the inverter will operate in closed-loop mode after starting. In closed-loop mode, users can set the desired value for the controlled variable (such as pressure or temperature, converted into a 4-20mA analog signal). The inverter will automatically adjust the motor speed based on the actual value of the controlled variable and the PID parameters set in the system, thus ensuring the actual value aligns with the target value automatically.

4.4.3 Normal Shutdown

When "Local/Remote" is selected as "Remote," a remote stop command can stop the high-voltage inverter according to the parameter-defined method.

When "Local/Remote" is set to "Local," the remote stop command is invalid, and the high-voltage inverter is stopped by the "Stop" button on the local touch screen.

4.4.4 Emergency Shutdown

In any situation, the "Emergency Stop" button on the local panel is effective. Upon receiving an emergency stop command, the system immediately blocks the inverter output and stops freely, disconnecting high voltage. Reclosure is only permitted after the "Emergency Stop" button is reset.

4.5 Alarm/Fault Reset

When the system generates an alarm, it can automatically reset if the system returns to normal (e.g., transformer overheating). In case of system failure, pressing the "Reset" button clears the alarm.

4.6 Inverter operation instructions

This device directly connects to the high-voltage power grid. Please observe the following safety precautions during operation:

■ The operator must wear high-voltage resistant insulating shoes before entering the high-voltage equipment operating area.

■ Insulation pads must be laid around the equipment.

■ It is strictly prohibited for a single person to perform high-voltage operations.

Danger

◆ Even if high voltage power is cut off, wait 10 minutes before opening the cabinet door for maintenance, as the DC bus may still be energized, risking electric shock.

◆ This equipment is only suitable for power supply systems with voltage levels specified in the technical agreement.

4.6.1 Power-on

■ Inspection before initial power-up or after maintenance and repair

Inspection Items	Confirm
◆ Confirm that the screws of high-voltage input and output cable terminals are fully tightened.	
◆ Confirm that cables between cabinets separated during transportation are correctly and securely connected.	
◆ Confirm that all control lines and signal wires are correctly and securely connected.	
◆ Confirm that all system grounding wires between transport-separated cabinets are reliably connected to the plant ground.	
◆ Confirm that series cables between units and the neutral point cables are correctly and securely connected.	

■ Routine inspection before power supply

Inspection Items	Confirm
◆ Before supplying power, remove all grounding protection wires.	
◆ Check whether the filter needs replacement.	
◆ Verify that equipment fault information has been correctly handled.	
◆ Close and lock the equipment's cabinet door.	

1) Power on the control cabinet.

2) Check to ensure that all transmission system-related parameters are set correctly. The parameters that must be checked include: parameters related to frequency setting,

parameters related to the operation control mode and the operation curve.

3) Close all cabinet doors (except the control cabinet door).

4) The upper-level system can close the high-voltage switch only after the closing permission signal from the inverter is valid.

5) After the high voltage is powered on, ensure the touch screen status indicates "Ready" before initiating the operation.

Caution

◆Parameters that significantly affect startup must be carefully confirmed to ensure the equipment's safety and normal startup.

◆If certain cabinet doors are not securely closed, the system will report a fault, and the closing permission signal will not be issued.

4.6.2 Startup

1) Power on in accordance with the power-on requirements.

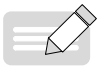
2) Verify that the high-voltage inverter system's touch screen indicates "Ready" and the fault indicator light on the control cabinet is off. If there is a fault or alarm, troubleshoot based on the alarm information from the keyboard/touch screen and refer to Chapter 7 Troubleshooting of this manual.

3) Set the target frequency according to the specified frequency setting method.

4) Issue the start control signal according to the specified control mode.

4.6.3 Stop Operation

Perform shutdown operations according to the designated shutdown method.



NOTE

◆When deceleration stop is selected, if a start signal is reissued before the frequency output drops to the stop frequency, the system will accelerate back to the set target frequency.

4.6.4 Free Stopping

After a free stop, the inverter ceases voltage output, allowing the motor to rotate freely and gradually decelerate due to load and friction.

Caution
◆It is crucial to thoroughly evaluate whether the operational process permits the motor to stop freely. ◆During a free stop, voltage may persist on the output cable due to the motor's residual magnetism.

4.6.5 Power Off

Except for disconnecting the high voltage directly due to severe faults, the high-voltage supply should only be disconnected after the inverter halts.

Action Items	Confirm
◆Inform all relevant workstations to prepare for the power outage.	
◆Press the equipment stop button to cease operation.	
◆Disconnect the circuit breaker of the user's incoming line cabinet.	

Danger
◆After high voltage disconnection, it takes at least 10 minutes for the DC voltage to drop to a safe level (refer to the equipment cabinet label for specifics).

4.6.6 Troubleshooting

1) If the main control system is malfunctioning, manually press the emergency stop button on the control cabinet to immediately disconnect the high voltage input.

2) Inverter faults are categorized into minor faults (i.e., alarms), general faults, and major faults. The system continues operation when an alarm occurs. In the event of general faults, the system assesses whether to continue operation, decelerate to stop, or immediately halt based on preset configurations. Upon a major fault, the system halts immediately and disconnects the high-voltage input automatically.

3) Inverter shutdown.

4) Power off

5) After 10 minutes post power failure, address the fault as per the troubleshooting methods outlined in Chapter 7.

Caution
◆If the emergency stop button is activated, it should be turned back to its normal position after fault clearance.

4.6.7 Maintenance

Danger
◆ Even if high voltage power is cut off, wait 10 minutes before opening the cabinet door for maintenance, as the DC bus may still be energized, risking electric shock.

1) Execute the inverter power-off operation.

2) Engage the emergency stop button (maintain closure without restoration), ensure the upper-level high-voltage switchgear has a distinct disconnection point, the grounding knife is grounded, and a warning sign is posted.

3) Open the transformer cabinet door, secure the grounding wire on the transformer's input side, and implement safety grounding measures.

4) Conduct inspection and maintenance on the transformer cabinet and power cabinet.

5) Upon completion of inspection and maintenance, remove safety grounding wires from transformer's input and output sides.

6) Reset the emergency stop button.

■Maintenance work

Maintenance items	Confirm
◆During line maintenance, implement necessary measures: disconnect circuit breakers, disconnect relevant isolation switches, and post warning signs to prevent others from restoring power midway.	
◆Ensure the system is in a shutdown state and the high-voltage power indicator is off.	
◆Post disconnection of high and low voltage power, electrical verification is required before work; while verifying high voltage, employ a tester matching the voltage grade and wear insulating protective gear.	
◆Post confirmation of zero-voltage, ground the three-phase incoming lines of construction equipment to assure worker safety.	

◆Install grounding wires at all potential power supply points to equipment. For dual-line power supply units, during inspection of a busbar switch, isolating switch, or load switch, ensure both busbar switches are disconnected and both ends of the construction switch are grounded.	
◆During grounding wire installation, initiate grounding first followed by wire hanging. The sequence is reversed during removal. Insulating protective gear is required during installation and removal.	
◆The grounding wire should be placed visibly to staff at all times with a "Working in Process" warning sign at the grounding site.	

Chapter 5 Panel Operation

The inverter's functionalities can be configured, and information can be accessed via the touch screen. The touch screen (henceforth referred to as HMI) constitutes the standard human-machine interface of the high-voltage inverter. The specific functionalities are depicted in Figure 5-1

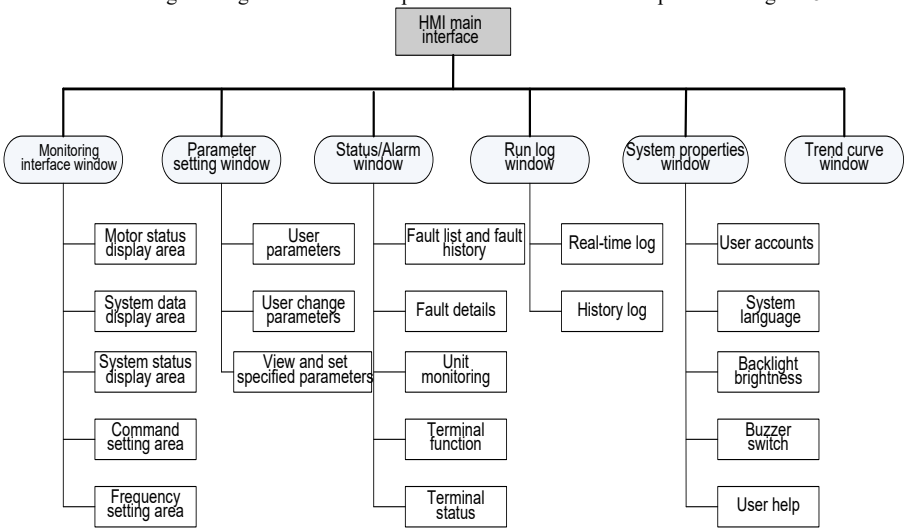


Figure 5-1 HMI Function Block Diagram

Tap the interface label to toggle between six functions. Upon selection of a function by the operator, its label illuminates for distinction. As shown in the figure below, the current function is the operation interface. The first interface after booting is the operation interface.

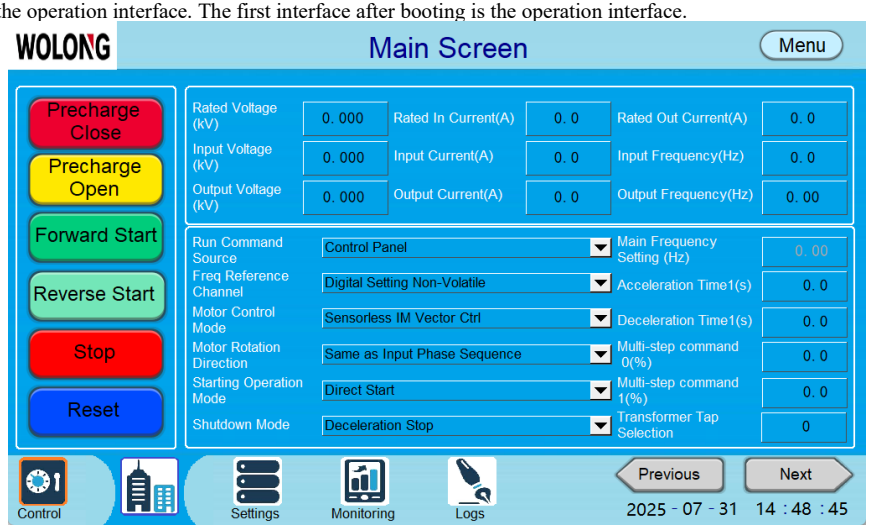


Figure 5-2 System Main Interface - Operation Interface

5.1 Operation Interface

The operation interface is shown in Figure 5-3, mainly divided into five areas: motor status display area, system data display area, system status display area, command setting area, and frequency setting area.

Figure 5-3 Operation Interface

The functions are specified in the following table:

SN	Area name	Area description
①	Motor status display area	Monitor the motor operation status.
②	System data display area	Monitor key system parameters, such as system output frequency, input/output voltage, and current.
③	System status display area	Quickly pinpoint the current system status, such as control mode, operating status, and fault/alarm status.
④	Command setting area	In local control mode, the command setting area can control the start and stop of the high-voltage inverter.
⑤	Frequency setting area	Frequency can be set by quick decrease, quick increase, or by directly entering the target value in the setting box.

Table 5-1 Operation interface area function table

◆Start: When the system is in the "ready" state and the target frequency is set, press this start button and confirm the operation, and the inverter will operate according to the current setting mode. During inverter operation, the "frequency setting" value can be modified online, with the last set value as the target frequency.

◆Stop: Press this stop button and confirm the operation, and the inverter will stop according to the set method.

◆Reset: Used to reset a fault when it occurs, effective in both local and remote modes.

◆When the inverter command source is remote or the inverter is in equipment dehumidification mode,

the "Start" and "Stop" buttons are disabled and do not respond to user operations.

NOTE

◆"Frequency setting" is used for target frequency calculation when the HMI is the frequency source. When the inverter's frequency source is not "HMI setting," the HMI "frequency setting" cannot be adjusted and does not partake in target frequency calculations.

◆When a system fault or alarm occurs, the HMI will automatically display a fault or alarm information dialog box, and the backlight will illuminate. At this time, the system status on the operation interface shows "system failure" or "system alarm," and the corresponding status light will illuminate or flash.

5.2 Parameter Setting

High-voltage inverters have numerous system parameters to meet the application requirements for different scenarios. The parameter setting function is used for viewing and modifying system parameters, with a total of 6 sub-functions:

■ User parameters: For users to rapidly adjust user-level parameters;

■ User-changed parameters: Display all functional parameters different from the device's factory settings;

■ View and set specified parameters: After-sales accounts can view and modify specific functional parameters by entering the parameter number.

■ Parameter setting: After-sales accounts can modify commonly used system parameters.

■ Motor/manufacturer parameters: After-sales accounts can view the inverter manufacturer's parameters and the motor 1 parameters.

■ Commissioning guidance: Accessible to after-sales level accounts for rapid on-site application configuration.

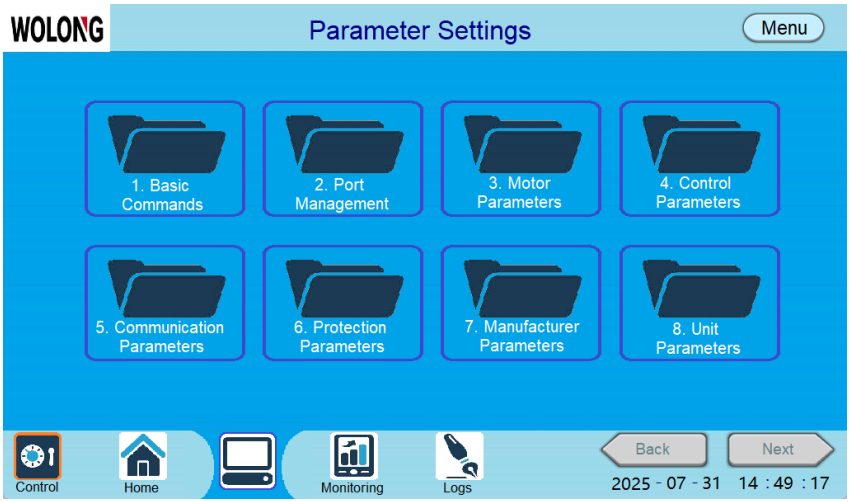


Figure 5-4 Parameter Setting Window

5.3 System Information Function

This function enables quick viewing of each unit's status, including unit temperature and bus voltage.

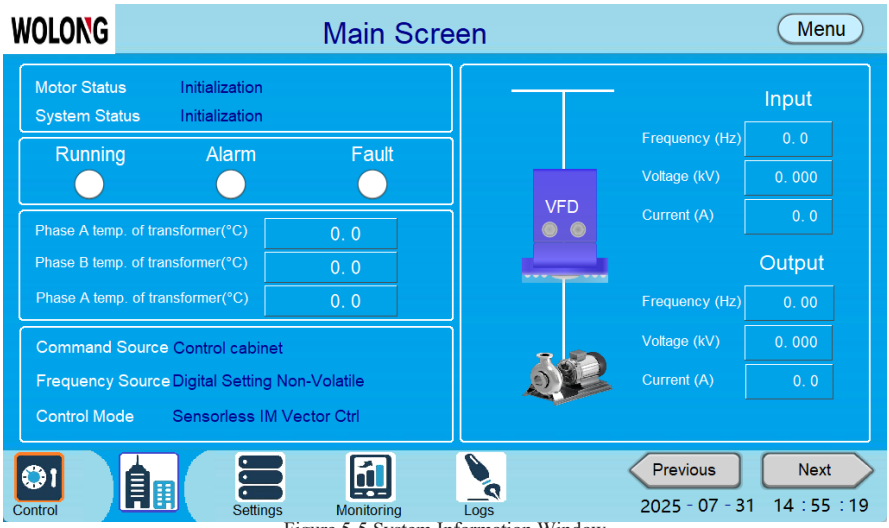


Figure 5-5 System Information Window

This window also allows clicking on a specific unit to view detailed alarm/fault information for that unit.

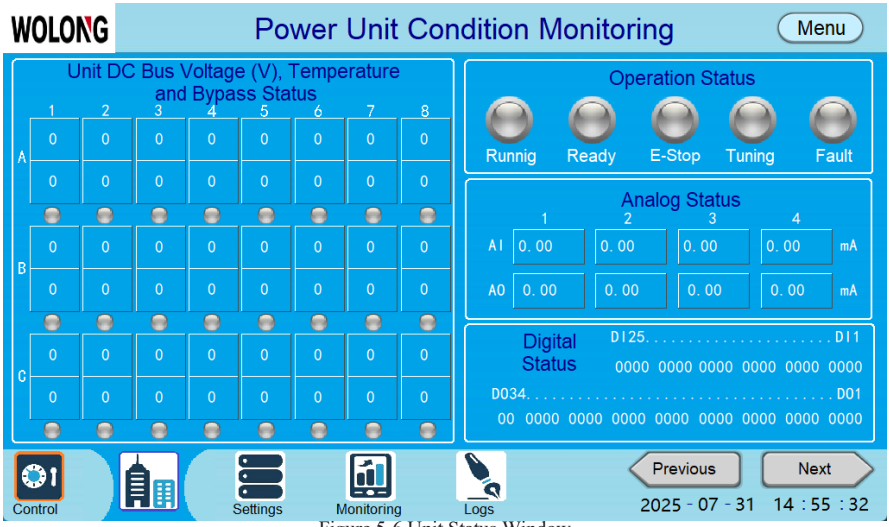


Figure 5-6 Unit Status Window

Additionally, the high-voltage inverter provides abundant DI, DO, AI, and AO port resources. The terminal status function on this page updates terminal status, analog sampling/output, temperature data, and communication interface status in real-time, facilitating commissioning personnel to monitor current signals.

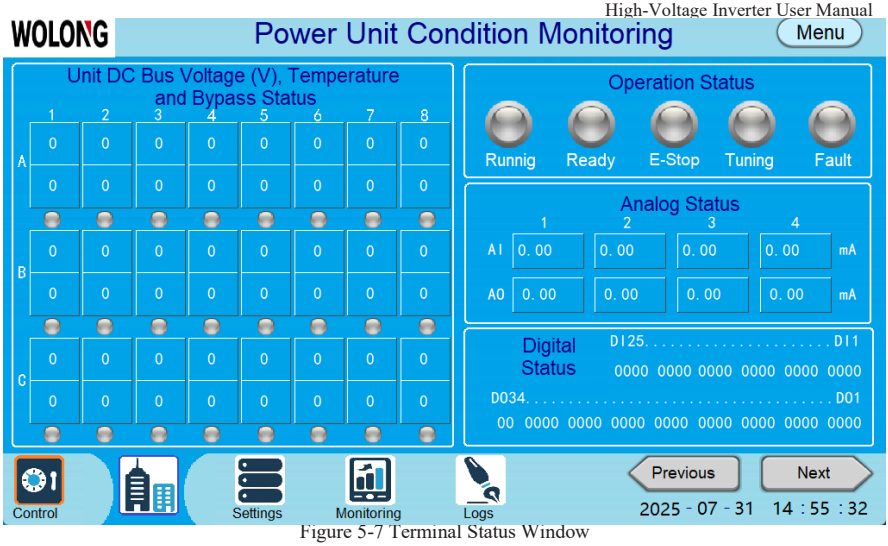


Figure 5-7 Terminal Status Window

5.4 Operation Log

The operation log function records various commands, faults/alarms, significant system status changes, and other events during operation, including their occurrence and recovery times.

Similar to the fault list function, real-time logs record all operation logs from power-on to now; the historical logs display the operation records for a specific day from all history. All logs are stored on the SD card in a special file format. Users at the after-sales level and above can export data from the SD card to a PC for viewing as needed. All records are preserved for 255 days.

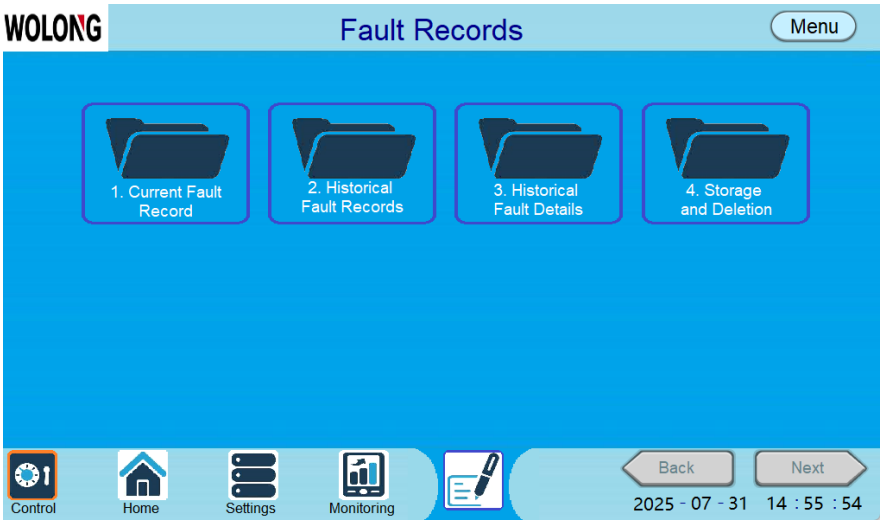


Figure 5-8 View Operation Log

5.5 System Properties

System properties are mainly used for setting operational permissions and comfort, COM baud rate, viewing operation instructions, and displaying various software versions.

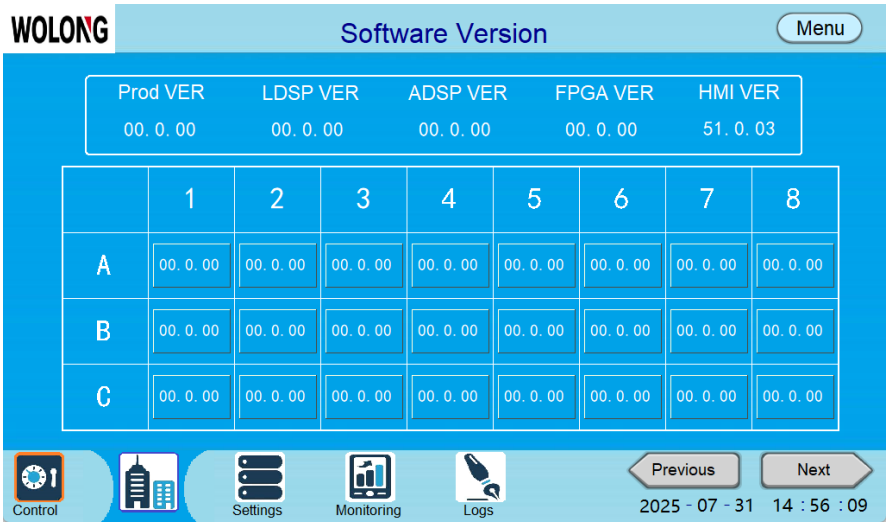


Figure 5-9 System Properties Window

Chapter 6 Parameter Description

P0 Group—Basic Function Group

P0-01	Motor 1 control method		Factory value	2
	Setting range	0	Speed sensorless vector control SVC1	
		1	Speed sensor vector control FVC	
		2	Voltage type open-loop vector control SVC2	

0: Speed sensorless vector control SVC1

Refers to open-loop vector control, suitable for typical high-performance control applications. One inverter can only drive one motor.

1: Speed sensor vector control FVC

Refers to closed-loop vector control; an encoder must be installed on the motor, and the inverter must be equipped with a PG card of the same type as the encoder. Suitable for high-precision speed or torque control scenarios. One inverter can only drive one motor.

2: Voltage type open-loop vector control SVC2

Also refers to open-loop vector control, suitable for control situations with low load demands. Compared to "0: Speed sensorless vector control," control accuracy is slightly lower, but it reduces sensitivity to motor parameters and is suitable for one inverter driving multiple motors.

Note: The motor control mode of high-voltage inverters is vector control, and motor parameter identification must be performed. Only accurate motor parameters can fully exploit the advantages of vector control. Better performance can be achieved by adjusting the regulator parameters in the P2 group function code.

P0-02	Remote 1 command source selection		Factory value	1
	Setting range	0	Operation panel command channel	
		1	Terminal command channel 1	
		2	Modbus	
		3	PROFIBUS-DP	
		5	PC	
		6	CAN	

Select the input channel for the inverter's remote 1 control command. The inverter control commands include: start, stop, forward, reverse, jog, etc.

0: Operation panel command channel

Run commands are controlled by the RUN and STOP/RES buttons on the operation panel.

1: Terminal command channel 1

Run commands are controlled via multi-function input terminals FWD, REV, JOGF, JOGR, etc.

2: Modbus

Run commands are issued via Modbus communication.

3: PROFIBUS-DP/Profinet

Run commands are issued through communication methods. When this option is selected, a communication device supporting the PROFIBUS-DP communication card must be selected. For details, see Appendix B: PROFIBUS-DP Card Usage Instructions.

5: PC

The operation command is controlled by the start, stop, and other buttons on the PC background software.

6: CAN

Provided by CAN communication.

For function parameters related to communication, please refer to the relevant description of Pd group communication parameters.

P0-03	Main frequency source X selection		Factory value	0
	Setting range	0	Digital setting (preset frequency P0-08, UP/DOWN can be modified, no memory after power off)	
		1	Digital setting (preset frequency P0-08, UP/DOWN can be modified, with power-off memory)	
		2	AI1	
		3	AI2	
		4	AI3	
		5	AI4	
		7	Multi-segment instructions	
		8	Simple PLC	
		9	PID	
		10	PC communication setting	
		11	Modbus given	
		12	PROFIBUS-DP given	
		13	HMI given	
		14	CAN given	

Select the input channel for the main frequency reference of the inverter. There are 15 main reference frequency channels:

0: Digital setting (no memory after power failure)

The initial frequency setting value corresponds to the P0-08 preset frequency value. The inverter's set frequency value can be changed by pressing the ▲ and ▼ keys on the keyboard (or the UP and DOWN keys on the multi-function input terminal).

When the inverter is powered off and then powered on again, the set frequency value restores to the P0-08 digital setting preset frequency value.

1: Digital setting (with power-off memory)

The initial frequency setting value corresponds to the P0-08 preset frequency value. The inverter's set frequency value can be changed by pressing the ▲ and ▼ keys on the keyboard (or the UP and DOWN keys on the multi-function input terminal).

When the inverter is powered off and then powered on again, the set frequency will be the last set frequency before power-off, using the ▲ and ▼ keys on the keyboard.

It should be noted that P0-23 is for digital setting frequency stop memory selection. P0-23 is used to choose whether the frequency correction amount is remembered or reset when the inverter stops.P0-23 relates to shutdown, not power-off memory; attention should be paid to this in application.

2: AI1

3: AI2

4: AI3

5: AI4

The frequency is determined by the analog input terminal, with a 4mA~20mA current input, where AI1 and AI2 are internally isolated.

Users can freely select the corresponding relationship between the input current value of AI1, AI2, AI3, and AI4, and the target frequency. The high-voltage inverter provides 5 sets of relationship curves, which can be configured by the user through the A6 group function code.

7: Multi-segment instructions

When choosing the multi-segment instruction mode, different state combinations of the digital input DI terminal are needed to correspond to different set frequency values. The high-voltage inverter can set 4 multi-segment command terminals. The 16 states of these terminals can correspond to any of 16 multi-segment commands using the Pc group function code. The multi-segment command is a percentage of the maximum frequency P0-10.

When the digital input DI terminal serves as a multi-segment command terminal, appropriate settings should be made in the P4 group. Please refer to the relevant function parameters description of the P4 group for details.

8: Simple PLC

When the frequency source is a simple PLC, the inverter's operating frequency source can switch between 1 and 16 arbitrary frequency commands. The holding time for each of the 1 to 16 frequency commands and their respective acceleration and deceleration time can be set by the user. Refer to the relevant instructions of the Pc group for details.

9: PID

Select the output of the process PID control as the operating frequency. Generally used for on-site process closed-loop control. When using PID as the frequency source, it is necessary to set the "PID Function" related parameters in the PA group.

10: PC communication setting

It indicates that the main frequency source is provided by the host computer’s background software through communication.

11: Modbus communication setting

It indicates that the main frequency source is provided via Modbus communication.

12: PROFIBUS-DP/Profinet communication setting

It indicates that the main frequency source is provided by the PROFIBUS communication card via communication.

13: HMI given

It indicates that the main frequency source is provided by the HMI communication method.

14: CAN

It indicates that the main frequency source is provided via CAN communication.

P0-08	Preset frequency	Factory value	50.00Hz
	Setting range	0.00~Maximum frequency (P0-10)	

When the frequency source is selected as a digital setting, this function code value serves as the initial value of the inverter's frequency digital setting.

P0-09	Running direction		Factory value	0
	Setting range	0	Same direction	
		1	Opposite direction	

By changing this function code, the motor's rotation direction can be altered without modifying its wiring. It is equivalent to adjusting any two of the motor's (U, V, W) wires to achieve the direction of rotation change.

Prompt

1. After parameter initialization, the motor's running direction will revert to its original state. Use with caution in scenarios where changing the motor's direction is strictly prohibited after system debugging.

2. In applications utilizing synchronous switching, the motor's rotation direction cannot be adjusted by modifying the P0-09 parameter.

P0-10	Maximum frequency	Factory value	50.00Hz
	Setting range	50.00~600.00Hz	

In high-voltage inverters, when analog input and multi-segment instructions are used as frequency sources, their respective 100.0% values are calibrated relative to P0-10.

P0-11	Upper frequency source		Factory value 0
	Setting range	0	P0-12 Settings
		1	AI1
		2	AI2
		3	AI3
		5	Communication Settings
		6	AI4

Defines the source of the upper frequency limit. The upper frequency limit can originate from a digital setting (P0-12), an analog input, or a communication setting.

When using analog inputs (AI1, AI2, AI3, AI4) or communication settings, it is similar to the main frequency source; refer to the introduction in P0-03.

For example, in winding control sites using torque control, to prevent "runaway" phenomena caused by material breakage, the upper limit frequency can be set via analog. The inverter will maintain operation at this upper limit frequency once reached.

P0-12	Upper frequency limit	Factory value	50.00Hz
	Setting range	Lower frequency limit P0-14 to maximum frequency P0-10	

Set the upper frequency limit; the setting range is from P0-14 to P0-10.

P0-13	Upper frequency offset	Factory value	0.00Hz
	Setting range	0.00Hz to maximum frequency P0-10	

When the upper limit frequency source is configured as an analog input, P0-13 serves as an offset for the set value. The offset frequency is added to the upper limit frequency defined by P0-11 to determine the final upper limit frequency setting.

P0-14	Lower frequency limit	Factory value	3.00Hz
	Setting range	0.00Hz to upper limit frequency P0-12	

When the frequency command is below the lower limit frequency set by P0-14, the inverter operates by default at the lower limit frequency.

P0-17	Acceleration time 1	Factory value	80.0s
	Setting range	0.0s~6500.0s	
P0-18	Deceleration time 1	Factory value	100.0s
	Setting range	0.0s~6500.0s	

The acceleration time is the duration needed for the inverter to ramp from zero frequency to the maximum frequency (determined by P0-17); see T1 in Figure 6-1.

The deceleration time is the duration for the inverter to decelerate from the maximum frequency (set by P0-18) to zero; see T2 in Figure 6-1.

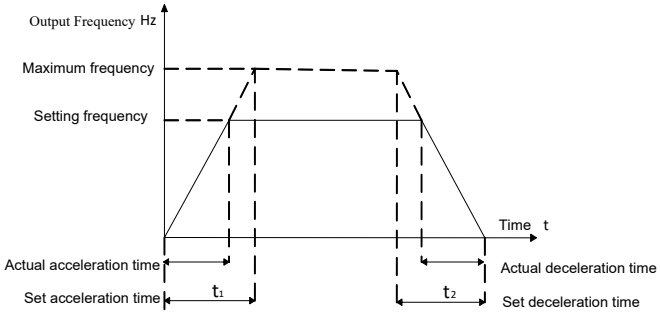


Figure 6-1 Schematic Diagram of Acceleration and Deceleration Time

P0-21	Auxiliary frequency source offset during superimposition	Factory value	0.00Hz
	Setting range	0.00Hz to maximum frequency P0-10	

This function code is only effective when the frequency source is selected as main and auxiliary operation. When the frequency source involves main and auxiliary operation, P0-21 serves as a bias frequency, which is superimposed on the main and auxiliary calculation results to form the final frequency setting, allowing more flexible control.

P0-22	Frequency command resolution		Factory value	2
	Setting range	2	0.01Hz	

This parameter determines the resolution for all frequency-related function codes.

P0-23	Digital frequency setting stop memory selection		Factory value	0
	Setting range	0	No memory	
		1	Memory	

This function is only applicable when the frequency source is set to digital.

"No memory" refers to the inverter stopping and the digital set frequency being restored to the P0-08 (preset frequency) value, with any frequency corrections via the ▲, ▼ keys on the keypad or terminals UP, DOWN being reset.

"Memory" means that after the inverter stops, the digital set frequency retains the value from the last shutdown, and any frequency corrections via the ▲, ▼ keys on the keypad or terminals UP, DOWN remain effective.

P0-24	Motor selection		Factory value	0
	Setting range	0	Motor 1	
		1	Motor 2	
		2	Motor 3	
		3	Motor 4	

It supports the application of time-sharing control for four motors, allowing each motor to independently set nameplate parameters, tune parameters, select different control modes, and configure parameters related to operation performance independently.

Motor parameter group 1 corresponds to function parameter groups P1 and P2; group 2 corresponds to A2; group 3 to A3; and group 4 to A4.

Users can select the current motor parameter group using the P0-24 function code or switch motor parameters via the digital input terminal DI. When there is a conflict between the function code selection and terminal selection, the terminal selection takes precedence.

P0-25	Acceleration/deceleration time reference frequency		Factory value	0
	Setting range	0	Maximum frequency (P0-10)	
		1	Setting frequency	
		2	100 Hz	

Acceleration and deceleration time refers to the duration from zero frequency to the frequency set by P0-25. Figure 6-1 shows a schematic of this time.

When P0-25 is set to 1, the acceleration/deceleration time depends on the set frequency. If this frequency varies frequently, the motor's acceleration will change, so caution is needed during application.

P0-26	UP/DOWN frequency command reference during operation		Factory value	0
	Setting range	0	Operating frequency	
		1	Setting frequency	

This parameter is only valid when the frequency source is set to digital.

This setting determines whether frequency adjustments via the ▲, ▼ keys or UP/DOWN terminals are based on the operating frequency or the set frequency—whether the target frequency is increased or decreased relative to the current operational frequency or the set value.

The difference between these two settings is evident during acceleration and deceleration; when the inverter's operating frequency differs from the set frequency, the choice significantly affects performance.

P0-27	Remote 1 command source bundled with frequency source		Factory value	H.0020
	Setting range	Units digit	PC binding frequency source selection	
		0	No bundle	
		1	Digital frequency source setting	
		2	AI1	
		3	AI2	
		4	AI3	
		5	AI4	
		6	PULSE setting (DI18)	
		8	Simple PLC	
		9	PID	
		A	PC communication setting	
		b	Modbus given	
		C	PROFIBUS-DP given	
		d	HMI given	
		E	CAN given	
		Tens digit	Terminal command channel 1 binding frequency source selection (0~E, same digit)	
		Hundreds digit	Modbus binding frequency source selection (0~E, same digit)	
		Thousands digit	PROFIBUS-DP binding frequency source selection (0~E, same digit)	

Define the bundled combinations between 4 operation command channels and 15 frequency setting channels to facilitate synchronous switching.

The meaning of the above frequency reference channels is the same as that of main frequency source X selection P0-03. Please refer to the P0-03 function code description.

Different operation command channels can be bundled with the same frequency reference channel. When a command source has a bound frequency source, only the corresponding bound frequency source will take effect during the command source's valid period.

P0-29	Remote 2 command source selection		Factory value	1
	Setting range	1	Terminal command channel 2	
		0、2~6	Explanation: same as function code P0-02	

Select the input channel for inverter remote 2 control commands. For detailed instructions, please refer to P0-02. The four communication modes cannot be used simultaneously.

This parameter is used to set the selected remote 2 command source. When changing remote 2 command source, this parameter must be set correctly.

P0-30	Remote 2 command source bundled frequency source	Factory value	H.0030
	Setting range	0~H.EEEE	

For the usage of remote 2 command source bundled frequency source, please refer to the relevant instructions of P0-27.

P1 Group—Motor 1 Parameters

P1-00	Motor type selection	Factory value	0
	Setting range	0	Ordinary asynchronous motor
		1	Variable frequency asynchronous motor
		2	Electrically excited synchronous motor
P1-01	Motor rated power	Factory value	Model confirmation
	Setting range	1kW~65535kW	
P1-02	Motor rated voltage	Factory value	Model confirmation
	Setting range	1V~65535V	
P1-03	Motor rated current	Factory value	Model confirmation
	Setting range	0.1A~6553.5A	
P1-04	Motor rated frequency	Factory value	Model confirmation
	Setting range	0.01Hz~Maximum frequency	
P1-05	Motor rated speed	Factory value	Model confirmation
	Setting range	1rpm~65535rpm	

The above function codes pertain to motor nameplate parameters. Whether employing open-loop vector control or closed-loop vector control, it is essential to accurately set the relevant parameters according to the motor nameplate.

To achieve enhanced open-loop or closed-loop vector control performance, motor parameter tuning is necessary, and the accuracy of the tuning results is closely tied to the correct setting of the motor nameplate parameters.

P1-06	Stator resistance of asynchronous motor	Factory value	Tuning parameters
	Setting range	0.01%~30.00%	
P1-08	Leakage inductance of asynchronous motor	Factory value	Tuning parameters
	Setting range	0.01%~50.00%	

P1-10	No-load current of asynchronous motor	Factory value	Tuning parameters
	Setting range	0.01%~100.00%	

P1-06~P1-10 are parameters of the asynchronous motor, usually not listed on the motor nameplate, and need to be obtained via automatic tuning with the inverter. Among these, "asynchronous motor static tuning" can only retrieve the parameters P1-06 and P1-08, whereas "complete tuning of asynchronous motor" can obtain these two parameters along with P1-10 (no-load current), encoder phase sequence, current loop PI parameters, etc.

If onsite tuning of the asynchronous motor is not feasible, the corresponding function codes can be input based on the parameters provided by the motor manufacturer. It is recommended to perform at least "asynchronous motor static tuning" onsite.

P1-27	Number of encoder pulses	Factory value	1024
	Setting range	1~65535	

Set the number of pulses per revolution for the ABZ or UVW incremental encoder.

In speed sensor vector control mode, the encoder pulse number must be correctly set to ensure normal motor operation.

P1-30	AB phase sequence of ABZ incremental encoder		Factory value	0
	Setting range	0	Forward	
		1	Reverse	

This function code is only applicable to ABZ incremental encoders, used for setting the phase sequence of the AB signals in ABZ encoders.

This function code is applicable to both asynchronous and synchronous motors. During complete tuning, the AB phase sequence of the ABZ encoder can be obtained.

P1-36	Encoder loss detection threshold	Factory value	5.0%
	Setting range	0.0%: Not detected 0.0%~70.0%	

Used to set the detection threshold for encoder loss faults. When set to 0.0%, the inverter does not detect encoder loss faults.

When the deviation between the encoder feedback value and the internally estimated speed exceeds this threshold, the inverter will report encoder fault P20.

P1-37	Tuning selection		Factory value	0
	Setting range	0	No action	
		1	Asynchronous motor static tuning	
		2	Complete tuning of asynchronous machines	

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

1: Asynchronous motor static tuning, suitable for situations where the asynchronous motor and load are difficult to disconnect, preventing complete tuning.

Before performing static tuning of the asynchronous motor, ensure to set the motor type and the motor nameplate parameters P1-01 to P1-05. If using the speed sensor vector control (FVC) mode, correctly setting the encoder pulse number P1-27 is also necessary. Action description: Set the function code to 1, then press the start button. The inverter will perform static tuning. During static tuning, current will flow through the motor, but the motor will not rotate or will rotate only slightly.

2: Complete tuning of asynchronous motor

To ensure the dynamic control performance of the inverter, choose complete tuning. The motor must be disconnected from the load to keep it in a no-load state.

During the complete tuning process, the inverter first automatically performs static tuning, then accelerates to 30% of the motor's rated frequency as per the acceleration time P0-17, holds for a period, and then decelerates to a stop according to the deceleration time P0-18, completing the tuning process.

Before fully tuning the asynchronous motor, besides setting the motor type and nameplate parameters P1-00 to P1-05, you also need to set the encoder type and encoder pulse numbers P1-27 and P1-28 correctly.

After the asynchronous motor is completely tuned, the inverter can obtain motor parameters P1-06, P1-08, and P1-10, as well as the encoder AB phase sequence P1-30 and vector control current loop PI parameters P2-13 to P2-16.

Action description: Set the function code to 2, then press the start button. The inverter will perform a complete tuning.

Tuning via HMI: After local control and logging in with the after-sales password, click "Tuning Guide" → "Motor Parameters" on the parameter setting interface. Set the motor parameters and download them (you can skip this if the parameters are correct). After successfully downloading the parameters, follow "Motor Tuning" instructions: when the system is ready, choose static or complete tuning as needed. Click confirm to display the start/stop dialog box. Start the motor to proceed with motor tuning.

P2 Group—Motor 1 Vector Control Parameters

P2-00	Speed loop proportional gain 1	Factory value	0.025
	Setting range	0.000~1.000	
P2-01	Speed loop integral gain 1	Factory value	0.050
	Setting range	0.000~65.535	
P2-02	Switching frequency 1	Factory value	5.00
	Setting range	0.00~P2-05	
P2-03	Speed loop proportional gain 2	Factory value	0.015
	Setting range	0.000~1.000	
P2-04	Speed loop integral gain 2	Factory value	0.025
	Setting range	0.000~65.535	
P2-05	Switching frequency 2	Factory value	10.00
	Setting range	P2-02~P0-10	
P2-08	Speed loop kf gain	Factory value	1.00
	Setting range	0.01~1.00	

When the inverter operates at different frequencies, different speed loop PI parameters can be selected. When the operating frequency is less than Switching Frequency 1 (P2-02), the speed loop PI adjustment parameters are P2-00 and P2-01.When the operating frequency is greater than Switching Frequency 2, the speed loop PI adjustment parameters are P2-03 and P3-04.The speed loop PI parameters between Switching Frequency 1 and Switching Frequency 2 are linearly switched between two sets of PI parameters, as shown in the following figure:

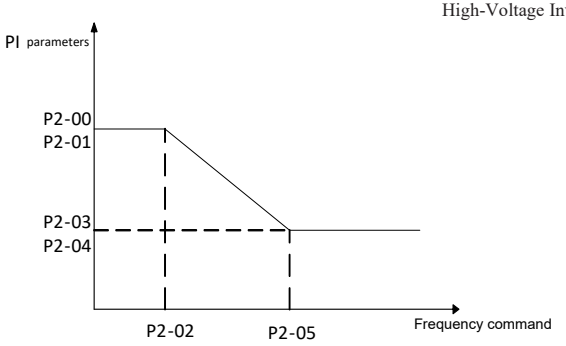


Figure 6-2 PI Parameter Diagram

By setting the proportional coefficient and integral time of the speed regulator, the dynamic response characteristics of the vector control speed can be adjusted.

Increasing the proportional gain and reducing the integral time can accelerate the dynamic response of the speed loop. However, excessive proportional gain or too small integral time may cause system oscillations. The recommended adjustment method is:

If the factory parameters cannot meet the requirements, make fine adjustments based on the factory values. First, increase the proportional gain to ensure the system does not oscillate; then, reduce the integral time for faster response and smaller overshoot.

Note: Improper PI parameter settings may lead to excessive speed overshoot. It may even cause an overvoltage fault when the overshoot recedes.

P2-09	Speed control drive torque upper limit source	Factory value	0
	Setting range	0	P2-10
		1	AI1
		2	AI2
		3	AI3
		5	Communication Settings
		6	MIN（AI1，AI2）
		7	mAX（AI1，AI2）
		8	AI4
P2-10	Speed control drive torque upper limit digital setting	Factory value	120.0%
	Setting range	0.0%~300.0%	
P2-12	Speed control braking torque upper limit digital setting	Factory value	1.0%
	Setting range	0.0%~150.0%	

In speed control mode, the maximum output torque of the inverter is controlled by the torque upper limit source.P2-09 and P2-10 are the torque upper limits during drive operation, i.e., electric operation; P2-12 is the torque upper limit during braking, i.e., during power generation. Increasing the setting aids inverter deceleration braking, but excessive settings may lead to overvoltage faults in the inverter power unit.

P2-09 selects the setting source for the torque upper limit. When set via analog or communication, 100% corresponds to P2-10, where 100% of P2-10 represents the motor's rated torque.

P2-13	Current loop proportional gain	Factory value	0.50
	Setting range	0.00~5.00	
P2-14	Current loop integral gain	Factory value	25.0
	Setting range	0.0~6000.0	

Vector control current loop PI adjustment parameters, typically default and need not be modified.

Note that the integral controller of the current loop sets integral gain directly, rather than using integral time as a dimension.

If the current loop PI gain is set too large, it could induce control loop oscillations. Hence, when significant current or torque fluctuations occur,

manually decrease the PI proportional gain or integral gain here.

P2-23	Flux loop proportional gain	Factory value	1.72
	Setting range	0.00~10.00	
P2-24	Flux loop integral gain	Factory value	2.0
	Setting range	0.0~1200.0	
P2-25	Flux filter time	Factory value	0.0300
	Setting range	0.0000~6.5535	
P2-26	Flux linkage set value	Factory value	1.000
	Setting range	0.000~10.000PU	
P2-27	Flux ramp time	Factory value	0.5
	Setting range	0.0~5.0s	

Vector control flux loop PI parameters typically do not require modification.

In vector control mode for the electro-excitation synchronous machine, large output current fluctuations typically require a reduction in the integral gain of P2-24.

P2-26 flux linkage set value corresponds to the base value of motor rated voltage/motor rated frequency. It is generally unchanged; adjusting this parameter can enable weak or strong magnetic operation of the motor. Note: Setting this parameter beyond 1.000 puts the motor in a strong magnetic operation, causing overexcitation, winding heating, and possible motor damage during prolonged operation.

P4 Group Input Terminals

The inverter comes standard with 24 multifunctional digital input terminals. Systems requiring more I/O can expand via PLC optional modules.

P4-00	DI1 terminal function selection	Factory value	1031 (Emergency Stop)
P4-01	DI2 terminal function selection	Factory value	1025 (Transformer overtemperature fault)
P4-02	DI3 terminal function selection	Factory value	1024 (Transformer overtemperature alarm)
P4-03	DI4 terminal function selection	Factory value	1026 (cabinet door travel switch)
P4-04	DI5 terminal function selection	Factory value	27 (cabinet top fan status feedback)
P4-05	DI6 terminal function selection	Factory value	1020 (local and remote switching)
P4-06	DI7 terminal function selection	Factory value	33 (control power supply is normal)
P4-07	DI8 terminal function selection	Factory value	0
P4-08	DI9 terminal function selection	Factory value	1 (forward operation)
P4-09	DI10 terminal function selection	Factory value	1003 (three-wire operation control)
P4-10	DI11 terminal function selection	Factory value	9 (fault reset)
P4-11	DI12 terminal function selection	Factory value	28 (remote 1/remote 2 switch)
P4-12	DI13 terminal function selection	Factory value	58 (forward operation 2)
P4-13	DI14 terminal function selection	Factory value	1060 (three-wire operation control 2)
P4-14	DI15 terminal function selection	Factory value	0
P4-15~P4-25	DI16 terminal function selection~DI26 terminal function selection	Factory value	0
P4-42~P4-57	DI43 terminal function selection X00~DI58 terminal function selection X17	Factory value	0

These parameters are used to set the functions of the digital multifunction input terminals. The selectable functions are shown in the following table. The settings of P4-00~P4-06 cannot be changed.

NOTE

◆When the thousands digit of the set value is 1, it indicates that it is effective when normally open. If the set value is “1001”, it means the inverter will rotate forward when the external terminal is inactive; if the set value is “1”, it means the inverter rotates forward when the external terminal is active.

Settings	Function	Notes
0	No function	Unused terminals can be set to “No Function” to prevent accidental operation.
1	Forward operation (FWD)	The inverter's forward and reverse rotation are controlled via external terminals. Applies to terminal channel 1.
2	Reverse operation (REV)	
3	Three-wire operation control	Applies to terminal channel 1.This terminal is used to determine if the inverter operates in three-wire control mode. For details, please refer to the description of function code P4-73 (“Terminal command mode”).

Settings	Function	Notes
4	Forward jog (FJOG)	FJOG is forward jog operation, and RJOG is reverse jog operation.
5	Reverse jog (RJOG)	
6	Terminal UP	Modify the frequency increase and decrease commands when the frequency is set via external terminals. When the frequency source is set to digital, the set frequency can be adjusted up and down.
7	Terminal DOWN	
8	Free parking	The inverter blocks output, so the motor's stopping process is not controlled by the inverter. This method is equivalent to the free parking described in P6-10.
9	Fault reset (RESET)	The fault reset function via the terminal allows for remote fault reset.
10	Run pause	Once enabled, the inverter stops according to the stop mode, but all operational parameters are retained. Such as PLC parameters and PID parameters. After this terminal's signal disappears, the inverter returns to its previous running state before stopping.
11	External fault input	When this signal is sent to the inverter, it reports fault P15.
12	Multi-segment command terminal 1	The 16 states of these four terminals enable the configuration of 16 different speeds or 16 other types of commands. For details, refer to the "Multi-segment command function description" following this table.
13	Multi-segment command terminal 2	
14	Multi-segment command terminal 3	
15	Multi-segment command terminal 4	
16	Acceleration/deceleration time selection terminal 1	The four states of these two terminals allow for the selection of four different acceleration and deceleration time.
17	Acceleration/deceleration time selection terminal 2	
18	Frequency source switching	Used for switching between different frequency sources. Based on the settings of the frequency source selection function code (P0-07), this terminal switches between two frequency sources when set to alternate.
19	UP/DOWN setting reset	When the frequency is set digitally, this terminal resets the frequency changed by UP/DOWN, restoring it to the value set by P0-08.
20	Local and remote switching	When this input point is active, local (HMI) control is disabled, and the inverter enters remote mode. This terminal enables switching between local and remote command sources (P0-02).
21	Acceleration and deceleration prohibited	Ensures the inverter remains unaffected by external signals (except stop commands), maintaining the current output frequency.
22	PID pause	PID is temporarily disabled; the inverter maintains the current frequency and ceases PID adjustments on the source.
23	PLC status reset	If the PLC is paused during operation and resumes, this terminal restores the inverter to the initial state of the basic PLC.
24	Transformer over-temperature alarm	When this input is active, it indicates the phase-shifting transformer temperature has reached the alarm threshold; the inverter reports A87.
25	Transformer over-temperature fault	When active, it signals the transformer's temperature has exceeded the fault threshold; reports P57.

Settings	Function	Notes
26	Cabinet door travel switch	When active, indicates the cabinet door is not closed properly or the door switch is faulty; reports P58.
27	Cabinet top fan status feedback	After high-voltage power-up, if the fan does not start normally, it reports a fan fault or alarm based on system settings.
28	Remote 1/Remote 2 switch	Under remote control, this terminal effectively inhibits the control of the remote 1 command source (P0-02), putting the inverter into remote 2 control mode. This terminal allows switching between remote 1 (P0-02) and remote 2 (P0-29) command sources.
29	Torque control inhibit	The inverter is inhibited from torque control and enters speed control mode.
31	Emergency stop	After pressing the emergency stop button, the system shuts down, and the high voltage trips.
33	Control power supply is normal	When this input point is invalid, the inverter reports fault P46 and stops.
34	Frequency setting takes effect	If this function is set in the DI function selection, the inverter will not respond to frequency changes until the terminal status is valid.
35	PID action direction is reversed	When this terminal is valid, the PID action direction is opposite to the one set by PA-03.
37	Emergency disconnection	When this terminal is valid, the system stops and high voltage disconnects.
38	PID integration pause	When this terminal is valid, the integral adjustment function of the PID is paused, but the proportional and differential adjustment functions remain effective.
39	Switch between main frequency source X and preset frequency	If this terminal is valid, main frequency source X is replaced with the preset frequency (P0-08).
40	Auxiliary frequency source Y and preset frequency switching	When this terminal is valid, the auxiliary frequency source Y is replaced with the preset frequency (P0-08).
41	Motor selection 1	There are four motor selection terminals. Motor parameters are switched based on a priority principle of terminal validity. This terminal is effective first and switches to motor 1 parameters.
42	Motor selection 2	There are four motor selection terminals. Motor parameters are switched based on a priority principle of terminal validity. This terminal is effective first and switches to motor 2 parameters.
43	PID parameter switching	PID parameter switching is performed via this terminal. When this terminal is invalid, the PID parameters default to PA-05~PA-07.
44	User-defined fault 1	When user-defined faults 1 and 2 are valid, the inverter reports faults P27 and P28 respectively.
45	User-defined fault 2	
46	Speed control / torque control switching	Switch the inverter between torque control and speed control modes.
50	Bypass cabinet 1 incoming contactor/disconnector feedback	When this terminal is valid, it indicates that the upstream vacuum contactor of bypass cabinet 1 inverter has been closed.
51	Bypass cabinet 1 outgoing contactor/disconnector feedback	When this terminal is valid, it indicates that the downstream vacuum contactor of bypass cabinet 1 is closed.
52	Bypass cabinet 1 power frequency contactor/disconnector feedback	When this terminal is valid, it indicates that the vacuum contactor for industrial frequency operation in bypass cabinet 1 has been closed.
53	Variable frequency contactor feedback	When this terminal is valid, it indicates that the variable frequency contactor for synchronous switching of motor 1 has been closed.

Settings	Function	Notes
54	Power frequency contactor feedback	When this terminal is valid, it indicates that the power frequency contactor for synchronous switching of motor 1 has been closed.
56	Excitation cabinet ready	When this terminal is valid, it indicates that the excitation cabinet is ready and valid.
57	Excitation cabinet fault	When this terminal is valid, it indicates that there is a fault in the excitation cabinet, and the inverter reports a P54 error.
58	Forward operation 2 (FWD)	The inverter's forward and reverse rotation are controlled via external terminals. Applicable to terminal channel 2.
59	Reverse operation 2 (REV)	
60	Three-wire operation control 2	Applicable to terminal channel 2.This terminal is used to determine if the inverter operates in three-wire control mode. For details, please refer to the description of function code P4-73 (“Terminal command mode”).
61	Pre-charge command	Once this terminal is valid, the relevant timing for the inverter pre-charge is executed. Applicable to inverters requiring pre-charge.
63	Crossflow fan status feedback	When this input point is valid, it indicates that the crossflow fan should be operational. For a unit equipped with a crossflow fan, if the feedback is invalid after system startup, the system will issue an A88-crossflow fan alarm.
66	Bypass cabinet 2 incoming contactor/disconnector feedback	When this terminal is valid, it indicates that the upstream vacuum contactor of bypass cabinet 2 inverter has been closed.
67	Bypass cabinet 2 outgoing contactor/disconnector feedback	When this terminal is valid, it indicates that the downstream vacuum contactor of bypass cabinet 2 has been closed.
68	Bypass cabinet 2 power frequency contactor/disconnector feedback	When this terminal is valid, it indicates that the vacuum contactor for industrial frequency operation in bypass cabinet 2 has been closed.
69	Pre-charge contactor feedback	When this terminal is valid, it indicates that the pre-charge contactor is in the closed state.
71	Process ready	If the customer selects this function and this terminal is invalid, the inverter is not allowed to operate.
73	Incoming circuit breaker/contactor feedback	When this terminal is valid, it indicates that the incoming circuit breaker/contactor is in the closed state. If this terminal is valid but there is no input voltage to the entire unit, the system will report a P160 fault.
75	Up-switching command	When this terminal is valid during normal operation, the inverter will automatically control the motor to switch from variable frequency drive to mains frequency drive without disturbance. This terminal functions as a button-triggered setting mode.
76	Down-switching command	When this terminal is valid with the motor running at mains frequency, the inverter will automatically control the motor to switch from mains frequency drive to variable frequency drive without disturbance.
79	Reactor over-temperature fault	When this terminal is valid, it indicates that the reactor used for synchronous switching has an over-temperature fault, and the inverter reports P161 and terminates the synchronous switching.
80	Reactor bypass contactor feedback	Applicable to the inverter's synchronous switching function, used to determine whether the reactor bypass contactor is engaged.
81	Pre-charge resistor bypass contactor feedback	Applicable to the inverter in resistor pre-charge mode, used to determine whether the pre-charge resistor bypass contactor is engaged;
82	Excitation cabinet operation feedback	The excitation cabinet configured for the on-site electrically excited synchronous motor is controlled by the inverter to start and stop excitation. This signal provides feedback on the excitation cabinet’s operation status. When the feedback does not match the excitation control set by the inverter, the system reports a P54 fault.
83	Bypass instruction	Applicable to automatic bypass cabinets. When this command is valid and the inverter is operational, the logic for automatic transfer to mains frequency will be executed;

Settings	Function	Notes
85	Bypass cabinet down-switching instruction	Applicable to automatic bypass cabinets. When this command is valid, it will automatically switch from mains frequency operation to variable frequency operation. This terminal functions as a button-triggered setting mode.
86	Fan 2 fault	After the inverter is powered on at high voltage, it detects that fan 2 is not operating normally and reports a fan fault or fan alarm according to system configuration.
87	Fan 3 fault	After the inverter is powered on at high voltage, it detects that fan 3 is not operating normally and reports a fan fault or fan alarm according to system configuration.
88	Fan 4 fault	After the inverter is powered on with high voltage, fan 4 is detected to not be operating normally. A fan fault or fan alarm is reported according to the system configuration.
89	Fan 5 fault	After the inverter is powered on with high voltage, fan 5 is detected to not be operating normally. A fan fault or fan alarm is reported according to the system configuration.
90	Fan 6 fault	After the inverter is powered on with high voltage, fan 6 is detected to not be operating normally. A fan fault or fan alarm is reported according to the system configuration.
91	Fan 7 fault	After the inverter is powered on with high voltage, fan 7 is detected to not be operating normally. A fan fault or fan alarm is reported according to the system configuration.
92	Presupplementary brake command	When this terminal is valid, the inverter disconnects all pre-charging related contactors, and the entire unit is cut off from high voltage. It is suitable for inverters requiring pre-charging functionality.
93	Motor 3 selection	There are four motor selection terminals. Motor parameters are switched according to the terminal status priority principle. This terminal is prioritized, switching to motor 3 parameters.
94	Motor 4 selection	There are four motor selection terminals. Motor parameters are switched according to the terminal status priority principle. This terminal is prioritized, switching to motor 4 parameters.
95	Variable frequency contactor 2 feedback	This terminal is valid, indicating that the variable frequency contactor of motor 2 is closed.
96	Power frequency contactor 2 feedback	This terminal is valid, indicating that the power frequency contactor of motor 2, used for synchronous switching, is closed.
97	Variable frequency contactor 3 feedback	This terminal is valid, indicating that the variable frequency contactor of motor 3 is closed.
98	Power frequency contactor 3 feedback	This terminal is valid, indicating that the power frequency contactor of motor 3, used for synchronous switching, is closed.
99	Variable frequency contactor 4 feedback	This terminal is valid, indicating that the variable frequency contactor of motor 4 is closed.
100	Power frequency contactor 4 feedback	This terminal is valid, indicating that the power frequency contactor of motor 4, used for synchronous switching, is closed.
101	Soft start 1 activation	This terminal is valid, indicating that motor 1 is selected and started.
102	Soft start 2 activation	This terminal is valid, indicating that motor 2 is selected and started.
103	Soft start 3 initiation	This terminal is valid, indicating that the selection of Motor 3 is complete and motor 3 is started.
104	Soft start 4 initiation	This terminal is valid, indicating that the selection of Motor 4 is complete and motor 4 is started.
105	Soft start 1 shutdown	This terminal is valid, indicating that motor 1 is stopped.
106	Soft start 2 shutdown	This terminal is valid, indicating that motor 2 is stopped.
107	Soft start 3 shutdown	This terminal is valid, indicating that motor 3 is stopped.
108	Soft start 4 shutdown	This terminal is valid, indicating that motor 4 is stopped.
110	Bypass Cabinet 1 frequency conversion branch circuit closing	When the system status allows closing, given this terminal is valid, the incoming and outgoing contactors of the automatic bypass cabinet will automatically close in sequence. This terminal functions as a button-triggered setting mode.

Settings	Function	Notes
111	Bypass Cabinet 2 frequency conversion branch circuit closing	When the system status allows closing, and the terminal is valid, the incoming contactor 2 and outgoing contactor 2 of the automatic bypass cabinet 2 will automatically close in sequence. This terminal functions as a button-triggered setting mode.
112	Bypass cabinet 2 down-switching command	Applicable to automatic bypass cabinets. When this command is valid, Motor 2 will automatically switch from an industrial frequency operation state to a variable frequency operation state. This terminal functions as a button-triggered setting mode.
113	Grounding switch feedback	When the system requires maintenance, after the inverter disconnects high voltage, the grounding switch is closed. The system high voltage trip signal remains valid, and the closing permission signal remains invalid, ensuring the system remains in a safe state without high voltage.
114	Heating and dehumidification feedback	The high-voltage inverter supports optional heaters. When the control power is normal and this terminal is valid, the system enters a heating and decondensation state. The system does not output closing permission until the heating and decondensation process is completed, then allowing high-voltage closing of the entire machine.
128	Cooling fan feedback	When optional motor cooling fan control is selected, this terminal provides feedback on whether the cooling fan is on. If the cooling fan control is inconsistent with this feedback, the system will report a P165 fault.
134	Motor over temperature feedback	For sites with motor overheat protection, configuring this terminal function allows for timely shutdown or initiation of related protection when the motor overheats, preventing motor damage.
135	Bypass cabinet power feedback	For applications with optional manual/automatic bypass cabinets, detect whether the bypass cabinet power supply is normal. On one hand, this serves to feedback whether the bypass cabinet power supply is faulty; on the other hand, if feedback from the bypass cabinet contactor/switch is abnormal, it can assist in locating feedback disconnection issues in the contactor/switch. If this terminal is valid, it indicates that the bypass cabinet power supply is normal.

■Multi-segment instruction function description

The four multi-segment command terminals can be combined into 16 states, each corresponding to 16 command setting values. Specific details are shown in the following table (listing the first 8 combinations):

K4	K3	K2	K1	Command settings	Corresponding parameters
OFF	OFF	OFF	OFF	Multi-segment instruction 0	Pc-00
OFF	OFF	OFF	ON	Multi-segment instruction 1	Pc-01
OFF	OFF	ON	OFF	Multi-segment instruction 2	Pc-02
OFF	OFF	ON	ON	Multi-segment instruction 3	Pc-03
OFF	ON	OFF	OFF	Multi-segment instruction 4	Pc-04
OFF	ON	OFF	ON	Multi-segment instruction 5	Pc-05
OFF	ON	ON	OFF	Multi-segment instruction 6	Pc-06
OFF	ON	ON	ON	Multi-segment instruction 7	Pc-07

When the frequency source is selected as multi-speed, 100.0% of function codes Pc-00~Pc-15 correspond to the maximum frequency P0-10.

In addition to functioning as a multi-speed feature, the multi-segment instruction can also serve as a PID reference source to meet the requirement of switching between different setpoints.

P4-66	DI1~DI26 filter time	Factory value	0.030s
	Setting range	0.000s~1.000s	

Set the software filter time for the DI terminal status. If the input terminal is prone to interference causing false operation, increasing this parameter can enhance the anti-interference capability. However, increasing this filter time will slow down the response of the DI terminal.

P4-67	DI9 terminal delay time	Factory value	0.0s
	Setting range	0.0s~3600.0s	

Used to set independent filter times for DI9~DI12 terminals. For example, if P4-67 is set to 1.0s, the DI9 input signal must be sustained for at least 1.0s for the inverter to detect it.

P4-71	DI16 terminal alternative selection	Factory value	0
	Setting range	0~7	
P4-72	DI17 terminal alternative selection	Factory value	0
	Setting range	0~7	

Alternative selection for multifunction terminals DI16 and DI17;

When P4-71 is set to 0 or 1: DI16 terminal substitution is invalid, and the function's validity is still determined by DI16 level and the function set in P4-15;

When P4-71 is set to 2~7: DI16 terminal replaces corresponding input points DI2~DI7, making the original DI16 terminal inactive, while DI2~DI7 are considered identical to DI16;

For example, if P4-71 is set to 3, DI16 will function as DI3 level, and the original DI3 will no longer operate; the function's validity is determined based on DI16 level and the function set in P4-02.

The meaning of P4-72 refers to P4-71.

P4-73	Terminal command mode		Factory value: H.22
	Setting range	Units digit	Terminal command channel 1 mode selection
		0	Two-wire mode 1
		1	Two-wire mode 2
		2	Three-wire mode 1
		3	Three-wire mode 2
		Tens digit	Terminal command channel 2 mode selection
		0	Two-wire mode 1
		1	Two-wire mode 2
		2	Three-wire mode 1
		3	Three-wire mode 2

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

NOTE

◆For the convenience of explanation, the following arbitrarily selects DI9, DI10, and DI11 of the multifunction input terminals DI9 to DI18 as external terminals. The functions of the three terminals DI9, DI10, and DI11 are selected by setting the values of P4-08 to P4-10. For detailed function definitions, see the setting range of P4-08 to P4-17.

0: Two-wire mode 1. This is the most commonly used two-wire mode. Terminals DI9 and DI10 determine the motor's forward and reverse operation.

Taking remote 1 terminal command channel 1 as an example, the function code settings are as follows:

Function code	Name	Settings	Functional description
P4-73	Terminal command mode	H.x0	Two-wire mode 1
P4-08	DI9 terminal function selection	1	Forward operation (FWD)
P4-09	DI10 terminal function selection	2	Reverse operation (REV)

K1	K2	Run command
1	0	Forward Rotation
0	1	Reversing Rotation
1	1	Stop
0	0	Stop

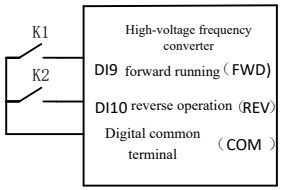


Figure 6-3 Two-Wire Mode 1

As shown in the figure above, in this control mode, K1 is closed, and the inverter runs forward.K2 is closed and reverses. If K1 and K2 are both closed or disconnected, the inverter stops running.

1: Two-wire mode 2: In this mode, DI9 terminal acts as the run enable terminal, while DI10 defines the run direction.

Taking remote 1 terminal command channel 1 as an example, the function code settings are as follows:

Function code	Name	Settings	Functional description
P4-73	Terminal command mode	H.x1	Two-wire mode 2
P4-08	DI9 terminal function selection	1	Forward operation (FWD)
P4-09	DI10 terminal function selection	2	Reverse operation (REV)

K1	K2	Run command
1	0	Forward Rotation
1	1	Reversing Rotation
0	0	Stop
0	1	Stop

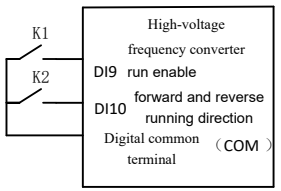


Figure 6-4 Two-Wire Mode 2

As shown in the figure above, in this control mode, with K1 closed and K2 open, the inverter rotates forward; with K2 closed, it rotates in reverse; when K1 is open, the inverter stops.

2: Three-wire control mode 1; in this mode, DI10 is the enable terminal, and DI9 and DI11 determine the motor's forward and reverse operation.

Taking remote 1 terminal command channel 1 as an example, the function code settings are as follows:

Function code	Name	Settings	Functional description
P4-73	Terminal command mode	H.x2	Three-wire mode 1
P4-08	DI9 terminal function selection	1	Forward operation (FWD)
P4-09	DI10 terminal function selection	1003	Three-wire operation control
P4-10	DI11 terminal function selection	2	Reverse operation (REV)

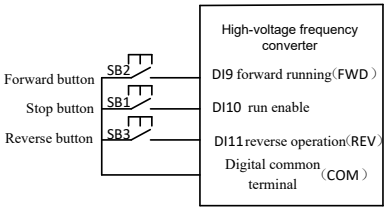


Figure 6-5 Three-Wire Control Mode 1

As shown in the figure above, in this control mode, when SB1 is disconnected, pressing SB2 causes the inverter to rotate forward, pressing SB3 causes it to reverse, and the inverter stops when SB1 is closed. During normal startup and operation, SB1 must remain disconnected. Commands from SB2 and SB3 take effect on the closing edge, and the inverter's operating status is determined by the last action of these three buttons.

3: Three-wire control mode 2; in this mode, DI10 is the enable terminal, the run command is given by DI9, and direction is determined by the state of DI11.
The function code settings are as follows:

Function code	Name	Settings	Functional description
P4-73	Terminal command mode	3	Three-wire mode 2
P4-08	DI9 terminal function selection	1	Run command
P4-09	DI10 terminal function selection	1003	Three-wire operation control
P4-10	DI11 terminal function selection	2	Forward and reverse running direction

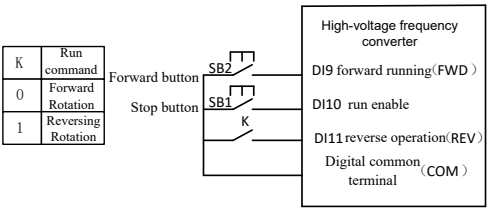


Figure 6-6 Three-Wire Control Mode 2

As shown in the figure above, in this control mode, when the SB1 button is open, pressing the SB2 button activates the inverter. The inverter rotates forward when K is open, and reverses when K is closed; the inverter stops immediately when the SB1 button is closed. During normal startup and operation,

it must be maintained in the open state of the SB1 button. The command from SB2 takes effect at the closing edge.

P5 Group Output Terminals

The inverter is equipped with 34 multifunction digital output terminals as standard. If the above output terminals do not meet on-site application requirements, they can be expanded with optional PLC modules.

P5-01	DO1 output function selection	Factory value	1041 (High Voltage Trip)
P5-02	DO2 output function selection	Factory value	40 (High Voltage Closing Allowed)
P5-03	DO3 output function selection	Factory value	44 (main power indication)
P5-04	DO4 output function selection	Factory value	15 (Ready to Run)
P5-05	DO5 output function selection	Factory value	1 (inverter is running)
P5-06	DO6 output function selection	Factory value	1001 (inverter is shutting down)
P5-07	DO7 output function selection	Factory value	2 (fault (fault shutdown))
P5-08	DO8 output function selection	Factory value	45 (alarm)
P5-09	DO9 output function selection	Factory value	46 (HMI Reset)
P5-10~P5-23	DO10 output function selection~DO23 output function selection	Factory value	0
P5-24	DO24 output function selection	Factory value	62
P5-25 ~ P5-32	DO25 output function selection~DO32 output function selection	Factory value	0
P5-33	DO33 output function selection	Factory value	1
P5-34	DO34 output function selection	Factory value	2
P5-35~P5-52	DO35 output function selection~DO52 output function selection	Factory value	0
P5-53~P5-56	Terminal function selection Y14~Terminal function selection Y17	Factory value	0
P5-57~P5-64	Terminal function selection Y00~Terminal function selection Y07	Factory value	0
P5-65~P5-68	Terminal function selection Y10~Terminal function selection Y13	Factory value	0

The functions of the multi-function output terminals are as follows:

Settings	Function	Notes
0	No output	Output terminal has no function
1	Inverter running	Indicates that the inverter is in operation, has an output frequency (which can be zero), and outputs an ON signal.
2	Fault (fault shutdown)	When the inverter encounters a fault and shuts down, it outputs an ON signal.
5	Zero speed operation	When the inverter is running and the output frequency is zero, it outputs an ON signal. When the inverter is in a stop state, this signal is OFF.
6	Motor pre-overload alarm	Before the motor overload protection activates, it evaluates the overload pre-alarm threshold, and outputs an ON signal once the threshold is exceeded.
7	Inverter pre-overload alarm	Outputs an ON signal 10 seconds before inverter overload protection occurs.
12	Cumulative running time reached	When the inverter's total operating time exceeds the preset threshold, it outputs an ON signal.
14	Torque limited	When in speed control mode and output torque reaches the torque limit, the inverter enters stall protection mode and outputs an ON signal.
15	Ready to run	When high voltage power is normal, system self-check completes, and no faults are detected by the inverter, it is in operational state, and an ON signal is output.
16	AI1>AI2	When the analog input AI1 value is greater than AI2's input value, an ON signal is output.
17	Upper frequency limit reached	When both the operating frequency and the target frequency reach or exceed the upper limit frequency, an ON signal is output.
18	Lower frequency limit reached No output when stopped	When both the operating frequency and the target frequency reach or are below the lower limit frequency, an ON signal is output. This signal is OFF in the stop state.
23	Inverter zero-speed output	When the inverter output frequency is 0, an ON signal is output. This signal is also O in the stop state.
24	Power-on time reached	When the inverter's cumulative power-on time exceeds the set power-on time, an ON signal is output.
40	High-voltage closing permitted	After the control system is powered on, an ON signal is output when all the following conditions are met: 1) Emergency stop, emergency disconnection, and grounding switch feedback are invalid 2) The inverter has no P09 — user's high voltage undervoltage or fault condition 3) High voltage power-off time exceeds the closing delay setting of P8-58 4) The system has completed automatic de-condensation
41	High-voltage trip	When any of the following events occur, an ON signal is output: 1) Emergency stop input, emergency disconnect input, or grounding switch feedback is valid. 2) The system has a critical fault. Note: If 2) occurs and the power frequency contactor in bypass cabinet 1 is opened, an ON signal is output.
44	Main power indicator	When the input voltage reaches 1/16 of the inverter's rated input voltage, an ON signal is output.
45	Alarm	When any alarm occurs in the system, an ON signal is output.
46	HMI reset	If communication between the HMI and control board is interrupted for 40 seconds, an ON signal is output.
47	Bypass cabinet outlet contactor is open.	For the automatic bypass cabinet, if the outlet contactor is closed and inverter fault or emergency stop signals are valid, an ON signal is output.
49	Excitation cabinet excitation command.	Used to control the operation of the excitation cabinet.

Settings	Function	Notes
52	Frequency converter contactor closing.	In applications with a switching cabinet, during variable-frequency operation or synchronous down-switching, the signal outputs ON to control the frequency converter contactor to close.
53	Frequency converter contactor opening.	In applications with a switching cabinet, during variable-frequency operation or synchronous up-switching, the signal outputs ON to control the frequency converter contactor to open.
54	Power frequency contactor closing.	In applications equipped with a switching cabinet, during synchronous up-switching, the signal outputs ON to control the closing of the power frequency contactor.
55	Power frequency contactor disconnection	In applications with a switching cabinet, during synchronous down-switching, the signal outputs ON to control the disconnection of the power frequency contactor.
58	Power controller operation command	During power controller pre-charge, an operation command is output to the power controller.
59	Power controller contactor control	During the pre-charge of the power controller, it is used to release or engage the contactor of the power controller.
60	Pre-charge contactor engagement	After system pre-charging is completed, it is used to control the engagement of the vacuum contactor at the transformer front end.
61	Motor 1 automatically switches to power frequency	For bypass cabinet 1, when the output contactor is engaged, the high voltage power supply is normal, and the inverter is operational. If an inverter fault occurs, the inverter disconnects the output contactor of bypass cabinet 1, and once the automatic bypass delay time is reached, it outputs an ON signal.
62	Fan automatic operation	When the fan automatic operation function is enabled or high voltage is engaged, this terminal outputs ON to activate the fan. After high voltage is turned off, it waits for the fan delay shutdown time P9-71 before outputting OFF to automatically shut down the fan.
63	Pre-charge contactor disconnection	For an optional pre-charged high-voltage inverter, when a pre-charge fault, valid manual pre-charge disconnection command, or serious fault occurs, it outputs an ON signal to disconnect the pre-charge contactor, isolating the entire system's high voltage.
64	Switchgear 2 high voltage tripping	When any of the following events occur, an ON signal is output: 1) Emergency stop, emergency disconnection, or grounding switch feedback is active 2) The high voltage trip function is active and the power frequency contactor of bypass cabinet 2 is disconnected
65	Motor 2 automatically switches to power frequency	For bypass cabinet 2, when the output contactor is engaged, the high voltage power supply is normal, and the inverter is operational. If an inverter fault occurs, the inverter disconnects the output contactor of bypass cabinet 2, and once the automatic bypass delay time is reached, it outputs an ON signal.
66	Motor 1 frequency conversion indication	When motor 1 is driven by the inverter, an ON signal is output.
67	Motor 1 power frequency indication	When motor 1 is driven by power frequency, an ON signal is output.
68	Up-switching ready	When the inverter drives the motor to operate at variable frequency and the entire machine's input phase sequence is positive, an ON signal is output.
69	Down-switching ready	When the motor is in power frequency mode and the inverter is in a ready-to-run state, an ON signal is output.
70	Synchronous switching contactor unlocking	During synchronous switching, it is used to release the interlocking control of the power frequency contactor and the variable frequency contactor.
71	Up-switching process indication	When the inverter controls the motor in the up-switching process, it outputs an ON signal.
72	Down-switching process indication	When the inverter controls the motor in the down-cut process, it outputs an ON signal.

Settings	Function	Notes
75	Heater on	For models equipped with an optional heater, when the system is in decondensation mode, it outputs an ON signal and stops after decondensation is complete.
76	Pre-charging resistor bypass contactor opening	Applicable to the inverter resistance pre-charging method; when any of the following events occurs, it outputs an ON signal: 1) High voltage tripping is effective 2) The system reports a pre-charge fault 3) Externally provided pre-charging trip signal 4) Inverter high voltage power loss
77	Pre-charging resistor bypass contactor closing	Applicable to the inverter resistance pre-charging mode, used to bypass the pre-charging resistor after pre-charging is complete.
78	Reactor bypass contactor opening	Applicable to synchronous switching; this signal is valid when the synchronous switching command is active.
79	Reactor bypass contactor closing	Applicable to synchronous switching; this signal is valid when the synchronous switching command is inactive.
80	Motor 2 variable frequency indication	Applicable for one-to-two bypass cabinets. When motor 2 is driven by the inverter, it outputs an ON signal.
81	Motor 2 power frequency indication	Applicable for one-to-two bypass cabinets. When motor 2 is driven by power frequency, it outputs an ON signal.
82	Remote 1/Remote 2 indication	Used to indicate whether the inverter is currently controlled by Remote 1 or Remote 2.
83	Switchgear 2 closing permission	Applicable for one-to-two bypass cabinets. Based on the No. 40 output terminal function, the one-to-two manual bypass cabinet outputs Switchgear 1 high-voltage closing permission for the branch when bypass cabinet 1 incoming knife switch is closed and bypass cabinet 2 incoming knife switch is open; it outputs switchgear 2 high-voltage closing permission for the branch when bypass cabinet 2 incoming knife switch is closed and bypass cabinet 1 incoming knife switch is open. The one-to-two automatic bypass cabinet outputs switchgear 1 high-voltage closing permission for the branch when bypass cabinet 2 incoming contactor is open; it outputs switchgear 2 high-voltage closing permission for the branch when bypass cabinet 1 incoming contactor is open.
84	Specifying fault output	Used in conjunction with the specified fault output number (P8-65), this signal is valid when the inverter's current fault number matches the above function setting.
87	Bypass cabinet 1 outgoing contactor closed	Applicable to automatic bypass cabinet control. When the command to close the inverter's variable frequency branch of bypass cabinet 1 is given or the down-switching logic for bypass cabinet 1 is executed, this signal is valid. The signal is used for triggering the given mode.
88	Bypass cabinet incoming contactor open	Applicable to automatic bypass cabinet control. When a system fault occurs and the inverter shuts down during variable frequency operation of the motor, this signal is output.
89	Bypass cabinet 1 power frequency contactor open	Applicable to automatic bypass cabinet control. When power frequency motor 1 is running and a down-switching command is given to bypass cabinet 1, this signal is output. The signal is used for triggering the given mode.
90	Bypass cabinet 2 outgoing contactor closed	Applicable to automatic bypass cabinet control. When the command to close the inverter's variable frequency branch of bypass cabinet 2 is given or the down-switching logic for bypass cabinet 2 is executed, this signal is valid. The signal is used for triggering the given mode.
91	Bypass cabinet 2 power frequency contactor open	Applicable to automatic bypass cabinet control. When power frequency motor 2 is running and a down-switching command is given to bypass cabinet 2, this signal is output. The signal is used for triggering the given mode.

Settings	Function	Notes
92	Variable frequency contactor 2 closed	In switching cabinet applications, when motor 2 operates at variable frequency or during synchronous down-switching, the signal outputs ON to control the closing of variable frequency contactor 2.
93	Variable frequency contactor 2 open	In switching cabinet applications, when motor 2 runs at variable frequency or during synchronous up-switching, this signal outputs ON to control the disconnection of variable frequency contactor 2.
94	Power frequency contactor 2 closed	In applications with switchgear, during motor 2 synchronous up-switching, the signal outputs ON to control power frequency contactor 2 to close.
95	Power frequency contactor 2 open	In switching cabinet applications, during motor 2 synchronous down-switching, the signal outputs ON to control the disconnection of power frequency contactor 2.
96	Variable frequency contactor 3 closed	In switching cabinet applications, when motor 3 operates at variable frequency or during synchronous down-switching, the signal outputs ON to control the closing of variable frequency contactor 3.
97	Variable frequency contactor 3 open	In switching cabinet applications, when motor 3 operates at variable frequency or during synchronous up-switching, the signal outputs ON to control the disconnection of variable frequency contactor 3.
98	Power frequency contactor 3 closed	In switching cabinet applications, during motor 3 synchronous up-switching, the output outputs ON to control power frequency contactor 3 to close.
99	Power frequency contactor 3 opening	In applications equipped with a switching cabinet, during motor 3 synchronous up-switching, the signal outputs ON to control the power frequency contactor 3 to disconnect.
100	Variable frequency contactor 4 closing	In applications equipped with a switching cabinet, when motor 4 is operating at variable frequency or during synchronous up-switching, the signal outputs ON to control the variable frequency contactor 4 to close.
101	Variable frequency contactor 4 opening	In applications equipped with a switching cabinet, when motor 4 is operating at variable frequency or during synchronous up-switching, the signal outputs ON to control the variable frequency contactor 4 to disconnect.
102	Power frequency contactor 4 closing	In applications equipped with a switching cabinet, during motor 4 synchronous up-switching, the signal outputs ON to control the power frequency contactor 4 to close.
103	Power frequency contactor 4 opening	In applications equipped with a switching cabinet, during motor 4 synchronous down-switching, the signal outputs ON to control the power frequency contactor 4 to disconnect.
104	Synchronous switching contactor unlocking 2	During the synchronous switching process, it is used to release the interlocking control between power frequency contactor 2 and variable frequency contactor 2.
105	Synchronous switching contactor unlocking 3	During the synchronous switching process, it is used to release the interlocking control between power frequency contactor 3 and variable frequency contactor 3.
106	Synchronous switching contactor unlocking 4	During the synchronous switching process, it is used to release the interlocking control between power frequency contactor 4 and variable frequency contactor 4.
107	Motor 3 frequency conversion indication	When motor 3 is driven by the inverter, an ON signal is output.
108	Motor 3 power frequency indication	When motor 3 is driven by power frequency, an ON signal is output.
109	Motor 4 frequency conversion indication	When motor 4 is driven by the inverter, an ON signal is output.
110	Motor 4 power frequency indication	When motor 4 is driven by power frequency, an ON signal is output.
112	Bypass cabinet 1 incoming contactor closing	Applicable to the automatic bypass control of the inverter. When the inverter branch of bypass cabinet 1 closing is valid, the signal output controls the closing of the incoming contactor.

Settings	Function	Notes
113	Bypass cabinet 2 incoming contactor closing	Applicable to the automatic bypass control of the inverter. When the given bypass cabinet 2 inverter branch closing is valid, this signal output controls the closing of the incoming contactor 2.
120	Motor cooling fan control	When the system is running, this terminal outputs ON to activate the motor cooling fan. After stopping, it outputs OFF to deactivate the fan after the delay time P8-79 for cooling fan shutdown has elapsed.
125	Bypass low-voltage pre-charge resistor contactor control	The low-voltage secondary pre-charge function is optional. According to the electrical configuration, this signal controls the bypass contactor of the pre-charge resistor in the low-voltage pre-charge circuit. When the signal is ON, the pre-charge resistor in the low-voltage pre-charge loop is bypassed.

P5-69	DO12 terminal delay time	Factory value	0.0s
	Setting range	0.0s~3600.0s	
P5-70	DO13 terminal delay time	Factory value	0.0s
	Setting range	0.0s~3600.0s	
P5-71	DO14 terminal delay time	Factory value	0.0s
	Setting range	0.0s~3600.0s	
P5-72	DO15 terminal delay time	Factory value	0.0s
	Setting range	0.0s~3600.0s	

Used to set the delay time from changes in the state of DO12~DO15 terminals to their actual output changes.

P6 Group Start and Stop Control

P6-00	Startup method		Factory value	0
	Setting range	0	Direct start	
		1	Forward flying start	
		2	Reverse flying start	
		3	Forward and reverse flying start	

Flying start, also known as speed tracking, allows the inverter to measure the speed of a motor that is already in operation. Consequently, the inverter can supply an output voltage corresponding to the motor's rotation frequency, minimizing the impact during startup. During a flying start, the inverter monitors the motor flux and starts the motor based on its current rotational frequency.

This function code can be used to set the search direction for the flying start. When the motor's free rotation direction is known, "Forward" or "Reverse" can be selected. When the rotor's rotation direction is unknown, "Forward/Reverse" can be chosen. If "Direct Start" is selected, the system will initiate directly without flying start.

0: Direct start

The inverter starts from the pre-set startup frequency.

1: Forward flying start

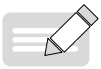
The inverter first searches the motor's speed in the forward direction, then starts at the tracked frequency, ensuring a smooth, impact-free startup of the running motor.

2: Reverse flying start

The inverter initially performs a reverse search of the motor's speed, then starts at the tracked frequency, providing a smooth, impact-free startup of the rotating motor.

3: Forward and reverse flying start

The inverter begins by searching the motor's speed forward. If unsuccessful, it performs a reverse search, then starts at the tracked frequency, ensuring smooth, impact-free startup of the rotating motor.



NOTE

◆ When Bit4 of the auxiliary function selection (P8-53) is set to 1, the forward and reverse flying start function is enabled by default.

P6-01	Start delay	Factory value	0.0s
	Setting range	0.0s~60.0s	
P6-03	Start frequency	Factory value	1.00Hz
	Setting range	0.00Hz~10.00Hz	
P6-04	Start frequency holding time	Factory value	0.0s
	Setting range	0.0s~100.0s	

To ensure the motor torque during startup, please set an appropriate starting frequency. To fully establish the magnetic flux during motor startup, the starting frequency must be maintained for a certain period.

The start frequency P6-03 is not restricted by the lower frequency limit. However, if the target frequency is set lower than the starting frequency, the inverter will not start and will remain in standby mode.

The start frequency holding time has no effect during forward/reverse switching.

The start frequency holding time is not included in the acceleration time, but is included in the operation time of the simple PLC.

Example 1:

P0-03 = 0

P0-08 = 2.00Hz

P6-03 = 5.00Hz

P6-04 = 2.0s

The frequency source is digitally given

The digital setting frequency is 2.00Hz

The starting frequency is 5.00Hz

The start frequency holding time is 2.0s

At this time, the inverter will be in standby mode, and the output frequency will be 0.00Hz.

Example 2:

P0-03 = 0	The frequency source is digitally given
P0-08 = 10.00Hz	The digital setting frequency is 10.00Hz
P6-03 = 5.00Hz	The starting frequency is 5.00Hz
P6-04 = 2.0s	The start frequency holding time is 2.0s

At this time, the inverter accelerates to 5.00Hz, holds for 2.0 seconds, and then accelerates to the given frequency of 10.00Hz.

P6-07	Acceleration and deceleration method		Factory value	0
	Setting range	0	Linear acceleration and deceleration	
		1	Static S-curve	

Select the inverter's frequency change mode during start and stop.
0: Linear acceleration and deceleration

The output frequency increases or decreases linearly. Provides four types of acceleration and deceleration time. It can be selected via the multifunction digital input terminal (P4-00~P4-08).

1: Static S-curve

With the target frequency fixed, the output frequency increases or decreases according to the S-curve. Suitable for applications requiring gentle start or stop, such as elevators, conveyor belts, etc.

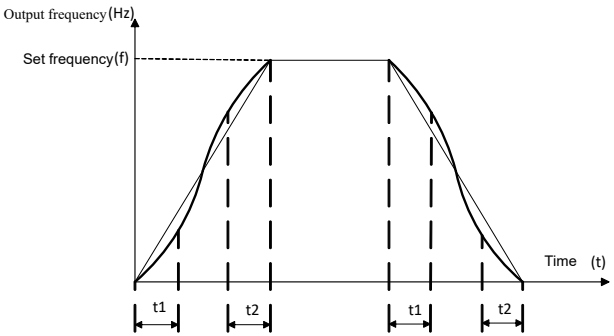


Figure 6-7 Static S-curve

P6-10	Stop mode	Factory value	1
	Setting range	0	Slow down and stop
		1	Free parking

0: Decelerate to stop

After the stop command becomes effective, the inverter reduces the output frequency according to the deceleration time and stops once the frequency reaches zero.1: Free Stop

After the stop command becomes effective, the inverter immediately stops output, allowing the motor to coast to a stop due to mechanical inertia.

P6-16	Flying start current set point	Factory value	20.0%
	Setting range	1.0%~50.0%	

The flying start current set point determines the current level when performing a flying start for frequency scanning; it is calibrated to the motor's rated current.

P6-17	Flying start scanning frequency acceleration time	Factory value	3.00S
	Setting range	0.01s~5.00s	

The flying start sweep time refers to the time taken to sweep from 1.05 times the maximum frequency down to 0 Hz.

P6-18	Flying start scan termination threshold	Factory value	19.0%
	Setting range	1.0%~50.0%	

The flying start sweep termination threshold is the point at which the inverter determines that the output voltage has reached the threshold, indicating a successful flying start.

Generally, if the actual motor speed is anticipated, P6-16 should be decreased, and P6-18 increased; if the actual motor speed is exceeded, increase P6-16 and decrease P6-18.

P6-21	Synchronous switching phase offset	Factory value	2.0
	Setting range	-90.0~90.0°	

This refers to the phase angle difference between the power grid voltage and the inverter output voltage during a transition from variable frequency to power frequency. A larger synchronous switching phase offset results in a higher current when both power frequency and variable frequency are operating simultaneously.

P6-22	Synchronous switching phase protection value	Factory value	1.5
	Setting range	0.0~5.0°	

Indicates that the phase difference between the grid voltage and the inverter output voltage is less than the P6-22 synchronous switching phase protection value, lasting for 10ms, signifying successful phase lock.

P6-23	Synchronous switching frequency protection threshold	Factory value	1.0Hz
	Setting range	0.0Hz~5.0Hz	

Indicates that the frequency difference between the grid voltage and the inverter output voltage is less than the P6-23 synchronous switching frequency protection threshold, signifying successful frequency lock.

P6-24	Synchronous switching timeout	Factory value	15.0s
	Setting range	0.0~600.0s	

Sets the timeout period for synchronous switching. If the synchronous switching is not completed within the allotted time, a switching timeout fault is reported.

P6-30	Fast switching enable		Factory value	0
	Setting range	Units digit: Quick up-switching	0: Off	
			1: Quick up-switching enabled	
		Tens digit: Quick down-switching	0: Off	
			1: Quick down-switching enabled	

Suitable for up-switching scenarios without reactors. When this function code is enabled, the inverter performs fast switching after receiving commands to switch from variable frequency to power frequency or vice versa.

Note: This function requires the correct setting of the inverter contactor, power frequency contactor closing and opening signals, as well as feedback signals.

P6-31	Quick up-switching fine-tuning coefficient	Factory value	0.10
	Setting range	0.01~1.00	

Used to set the speed adjustment for quick frequency and phase lock up-switching, which is set to 0.10 by default.

P6-32	Early shutdown time	Factory value	0.008s
	Setting range	0.000~0.100s	

It is used to prevent both work and frequency conversion from driving the motor simultaneously. It is recommended to set this time to 0.5 power frequency cycle time.

P6-33	Power frequency contactor 1 closing action time	Factory value	0.100s
	Setting range	P6-32~10.000s	

This function code is used to compensate for the contactor action time during quick up-switching. After setting the function code P6-33 to 8.008, the system will automatically perform three closing and opening operations of the power frequency contactor. The software will automatically save the optimal closing action time to the P6-33 parameter. Under normal circumstances, this closing time ranges from 40ms to 140ms.

Tip: Power frequency contactor feedback DI and power frequency contactor closing DO must be configured on the IO board, not on the PLC.

P6-34	Power frequency contactor 2 closing action time	Factory value	0.100s
	Setting range	P6-32~10.000s	

Please refer to P6-33 for the function description.

P6-35	Power frequency contactor 3 closing action time	Factory value	0.100s
	Setting range	P6-32~10.000s	

Please refer to P6-33 for the function description.

P6-36	Power frequency contactor 4 closing action time	Factory value	0.100s
	Setting range	P6-32~10.000s	

Please refer to P6-33 for the function description.

P7 Group Time Parameters

P7-60	Cumulative power-on time	Factory value	0 hours
	Setting range	0h~65535h	

Displays the cumulative power-on time of the inverter. When the power-on time reaches the set value of P8-16, the inverter multi-function digital output (24) outputs an ON signal.

P7-07	Cumulative running time	Factory value	0 hours
	Setting range	0h~65535h	

Displays the cumulative running time of the inverter. When the running time reaches the set value P8-17, the inverter's multi-function digital output (12) outputs an ON signal.

P7-08	Cumulative power consumption	Factory value	0 kWh
	Setting range	0~9999 kWh	

Displays the inverter's cumulative power consumption in kWh.

P7-23	Cumulative power consumption	Factory value	0 million kWh
	Setting range	0~9999 million kWh	

Displays the inverter's cumulative power consumption in million kWh.

P8 Group Auxiliary Functions

P8-00	Jog operation frequency	Factory value	2.00Hz
	Setting range	0.00Hz~maximum frequency	
P8-01	Jog acceleration time	Factory value	20.0s
	Setting range	0.0s~6500.0s	
P8-02	Jog deceleration time	Factory value	20.0s
	Setting range	0.0s~6500.0s	

Define the specified frequency and acceleration/deceleration time for the inverter during jog operations.

During jog operation, the starting mode is fixed to direct start (P6-00=0) and the stopping mode is fixed to deceleration stop (P6-10=0).

P8-03	Acceleration time 2	Factory value	Model confirmation
	Setting range	0.0s~6500.0s	
P8-04	Deceleration time 2	Factory value	Model confirmation
	Setting range	0.0s~6500.0s	

P8-05	Acceleration time 3	Factory value	Model confirmation
	Setting range	0.0s~6500.0s	
P8-06	Deceleration time 3	Factory value	Model confirmation
	Setting range	0.0s~6500.0s	
P8-07	Acceleration time 4	Factory value	Model confirmation
	Setting range	0.0s~6500.0s	
P8-08	Deceleration time 4	Factory value	Model confirmation
	Setting range	0.0s~6500.0s	

Provide 4 groups of acceleration and deceleration time, namely P0-17\P0-18 and the 3 aforementioned groups of times.

The definitions of the 4 groups of acceleration and deceleration time are identical. Please refer to the relevant instructions for P0-17 and P0-18.

By using different combinations of the multifunction digital input terminal DI, you can switch between 4 groups of acceleration and deceleration time. For detailed usage methods, please refer to the relevant instructions in the function code P4 group DI terminal function.

P8-09	Hop frequency 1	Factory value	0.00Hz
	Setting range	0.00Hz~maximum frequency	
P8-10	Hop frequency 2	Factory value	0.00Hz
	Setting range	0.00Hz~maximum frequency	
P8-11	Jump frequency amplitude	Factory value	0.00Hz
	Setting range	0.00Hz~maximum frequency	
P8-68	Hop frequency 3	Factory value	0.00Hz
	Setting range	0.00Hz~maximum frequency	
P8-69	Hop frequency 3 amplitude	Factory value	0.00Hz
	Setting range	0.00Hz~maximum frequency	

When the set frequency is within the jump frequency range, the actual operating frequency will adjust to the jump frequency that is nearest to the set frequency. By configuring the jump frequency, the inverter can bypass the mechanical resonance point of the load.

The high-voltage inverter can set the jump frequency point; if the jump frequency amplitude is set to 0, the jump frequency function is deactivated.

For the principle diagram of the jump frequency and jump frequency amplitude, please refer to Figure 6-8.

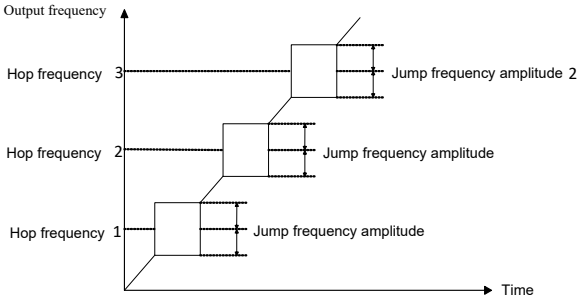


Figure 6-8 Schematic Diagram of Jump Frequency

P8-13	Reverse control enable		Factory value	1
	Setting range	0	Allow reversal	
		1	No reversal	

This parameter configures whether the inverter is allowed to operate in reverse. If reversal is not permitted, set P8-13 to 1.

P8-14	Operating mode when set frequency is below lower limit frequency		Factory value	0
	Setting range	0	Operate at the lower frequency limit	
		1	Shutdown	
		2	Zero speed operation	

When the set frequency is lower than the lower limit frequency, the inverter's operating mode can be selected through this parameter. Provides three operation modes to meet various application requirements.

P8-15	Droop control	Factory value	0.00Hz
	Setting range	0.00Hz~10.00Hz	

The droop rate allows for a slight speed difference between the master and slave stations, thereby avoiding conflicts between them. The default value of this parameter is 0.

The droop rate should be adjusted only when both the master and slave are using speed control mode. For each transmission process, the appropriate droop rate needs to be gradually determined in practice. It is recommended not to set P8-15 too high, as this may cause a significant decrease in steady-state speed under heavy load conditions. The master does not need to enable this parameter; the slave adjusts the droop control setting based on on-site working conditions.

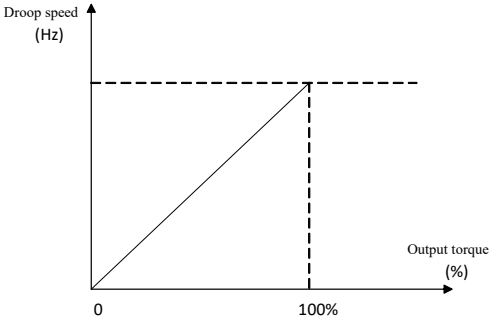


Figure 6-9 Droop Speed-Output Torque Curve

Droop speed = Synchronous frequency × output torque × droop rate ÷ 10

For example: if P8-15=1.00, synchronous frequency is 50Hz, and output torque is 50%, then:
Droop speed = 50Hz × 50% × 1.00 ÷ 10 = 2.5Hz

Actual inverter frequency = 50Hz – 2.5Hz = 47.5Hz

P8-18	Start protection selection		Factory value	1
	Setting range	0	No protection	
		1	Protection	

This parameter relates to the safety protection functions of the inverter.

If set to 1, and the run command is valid when the inverter is powered on (e.g., the terminal run command is closed before power-on), the inverter will not respond to the run command. The run command must be removed once, then the inverter will respond only after the run command becomes valid again.

Additionally, if set to 1, and the run command is valid during inverter fault reset, the inverter will not respond to the run command. The run command must be removed first to clear the run protection state.

Setting this parameter to 1 can prevent the motor from responding inadvertently to a run command during power-on or fault reset, reducing potential hazards.

P8-19	Frequency detection value (FDT1)	Factory value	50.00Hz
	Setting range	0.00Hz~maximum frequency	
P8-20	Frequency detection hysteresis value (FDT1)	Factory value	5.0%
	Setting range	0.0%~100.0% (FDT1 level)	

When the operating frequency exceeds the detection value, the inverter's multi-function output DO outputs an ON signal; when the frequency falls below the detection value by a certain amount, the DO ON signal is canceled.

These parameters are used to set the detection threshold of the output frequency and the hysteresis for releasing the output action.P8-20 represents the percentage of the hysteresis frequency relative to the detection value P8-19.The diagram below illustrates the FDT function. When the operating frequency exceeds the detection value (P8-19), the multi-function 3-level frequency detection FDT1 outputs an ON signal; when the frequency drops below the threshold by the amount specified in P8-20, the DO ON signal is canceled.

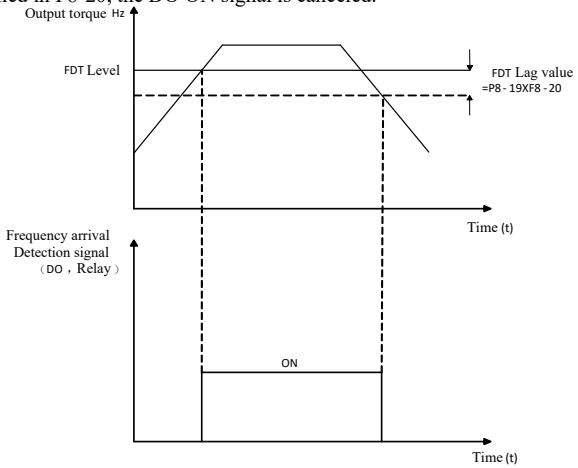


Figure 6-10 Schematic Diagram of the FDT Level

P8-21	Frequency arrival detection width	Factory value	0.0%
	Setting range	0.00–100% (maximum frequency)	

When the inverter's operating frequency is within a certain range of the target frequency (P8-21), the inverter's multifunction 4-frequency detection outputs an ON signal.

This parameter is used to set the detection range of frequency arrival, expressed as a percentage relative to the maximum frequency. The figure below is a schematic diagram of the frequency arrival.

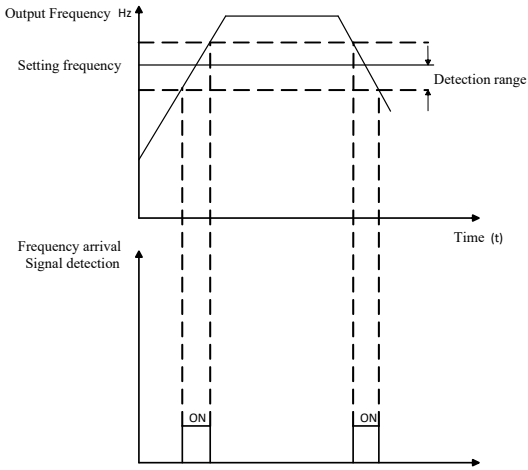


Figure 6-11 Schematic Diagram of the Frequency Arrival Detection Amplitude

P8-22	Is the jump frequency valid during acceleration and deceleration?	Factory value	0
	Setting range	0: invalid; 1: valid	

This function code is used to set whether the jump frequency is valid during acceleration and deceleration.

When set to valid, if the operating frequency is within the jump frequency range, the actual operating frequency will skip over the set jump frequency boundary.

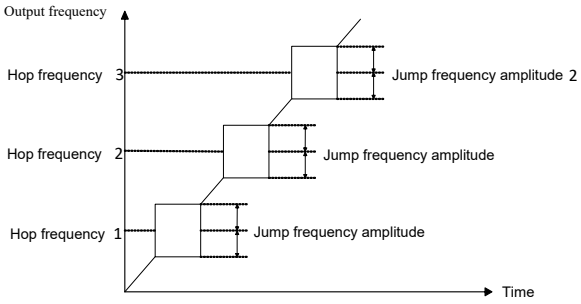


Figure 6-12 shows a schematic diagram of effective jump frequency during acceleration and deceleration

P8-25	Switching frequency point between acceleration time 1 and acceleration time 2	Factory value	0.00Hz
	Setting range	0.00Hz~maximum frequency	
P8-26	Switching frequency point between deceleration time 1 and deceleration time 2	Factory value	0.00Hz
	Setting range	0.00Hz~maximum frequency	

This function is valid when motor 1 is selected and the acceleration/deceleration time is not switched by the DI terminal. It is used to independently select different acceleration and deceleration time during operation based on the operating frequency range, without using the DI terminal.

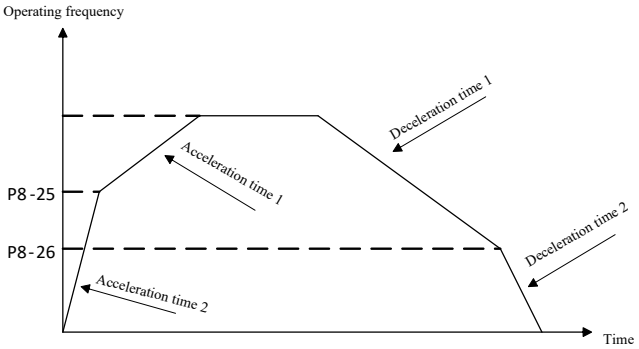


Figure 6-13 Schematic Diagram of Acceleration and Deceleration Time Switching

Figure 6-13 is a schematic diagram of the acceleration and deceleration time switching. During acceleration, if the operating frequency is less than P8-25, select acceleration time 2; if greater than P8-25, select acceleration time 1.

During deceleration, if the operating frequency is greater than P8-26, select deceleration time 1; if less than P8-26, select deceleration time 2.

P8-27	Terminal jog priority	Factory value	0
	Setting range	0: invalid; 1: valid	

This parameter is used to set whether the terminal jog function has the highest priority.

When terminal jog priority is valid, if a terminal jog command occurs during operation, the inverter switches to terminal jog mode.

P8-28	Frequency detection value (FDT2)	Factory value	50.00Hz
	Setting range	0.00Hz~maximum frequency	
P8-29	Frequency detection hysteresis value (FDT2)	Factory value	5.0%
	Setting range	0.0%–100.0% (FDT2 level)	

When the operating frequency exceeds the detection value (P8-28), the inverter multifunction 25-level detection FDT2 outputs an ON signal; when the frequency drops below the detection threshold by a certain amount (P8-29), the DO output turns off. The frequency detection function is exactly the same as that of FDT1. Please refer to the relevant instructions of FDT1, specifically the instructions for function codes P8-19 and P8-20.

	Arbitrary arrival frequency detection value 1	Factory value	50.00Hz

P8-30	Setting range	0.00Hz~maximum frequency	
P8-31	Arbitrary arrival frequency detection width 1	Factory value	0.0%
	Setting range	0.0%~100.0% (Maximum frequency)	
P8-32	Arbitrary arrival frequency detection value 2	Factory value	50.00Hz
	Setting range	0.00Hz~maximum frequency	
P8-33	Arbitrary arrival frequency detection width 2	Factory value	0.0%
	Setting range	0.0%~100.0% (Maximum frequency)	

When the inverter output frequency is within the positive and negative detection amplitude range (P8-31) of the arbitrary detection value (P8-30), terminal multifunction 26 — frequency arrival 1 outputs an ON signal.

When the inverter output frequency is within the positive and negative detection amplitude range (P8-33) of the arbitrary detection value (P8-32), terminal multifunction 27 — frequency arrival 2 outputs an ON signal.

The high-voltage inverter provides two sets of arbitrary frequency detection parameters, used to set the frequency values and detection ranges respectively. Figure 6-14 is a schematic diagram of this function.

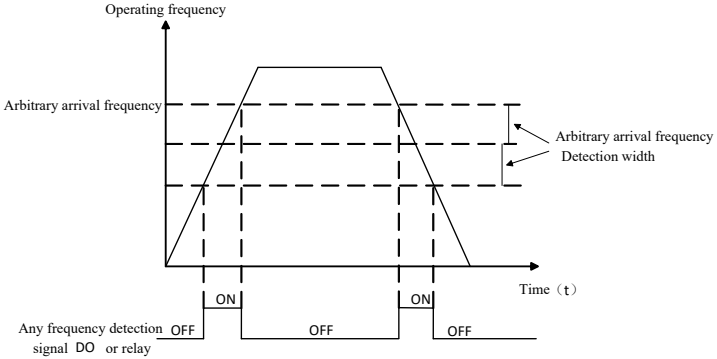


Figure 6-14 Schematic Diagram of Arbitrary Arrival Frequency Detection

P8-38	Arbitrary current 1	Factory value	100.0%
	Setting range	0.0%~300.0% (rated motor current)	
P8-39	Arbitrary current 1 width	Factory value	0.0%
	Setting range	0.0%~300.0% (rated motor current)	
P8-40	Arbitrary current 2	Factory value	100.0%
	Setting range	0.0%~300.0% (rated motor current)	
P8-41	Arbitrary current 2 width	Factory value	0.0%
	Setting range	0.0%~300.0% (rated motor current)	

When the inverter output current is within the positive and negative detection width (P8-39) of the set arbitrary arrival current (P8-38), the inverter multifunction terminal 28 — arbitrary current arrival 1 outputs an ON signal.

When the inverter output current is within the positive and negative detection width (P8-41) of the set arbitrary arrival current (P8-40), the inverter multifunction terminal 29 — arbitrary current arrival 2 outputs an ON signal.

The high-voltage inverter provides two sets of arbitrary current and detection width parameters. The schematic diagram of this function is shown below.

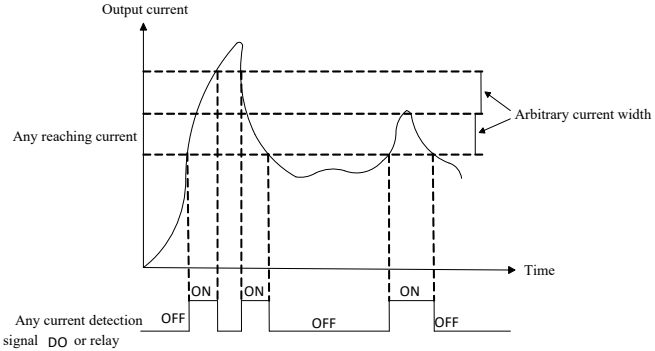


Figure 6-15 Schematic Diagram of Arbitrary Current Detection

P8-52	Auxiliary function selection	Factory value	0
	Setting range	Units digit	0: None
			1: Variable frequency to power frequency
			2: Power frequency to variable frequency

When this function code is set to 1, it is equivalent to the valid command of the terminal given frequency conversion to power frequency. When P8-52 is set to 1, the one-touch soft start function for the motor can be activated.

P8-53	Auxiliary function selection	Factory value	H.0011
	Setting range	0~FFFF	

This function code is used for the auxiliary functions of the inverter, making the system more flexible and suitable for various application scenarios. The specific settings are as follows:

BIT0	Fault high voltage tripping processing	0: All faults will cause high voltage tripping immediately
		1: Immediate high voltage tripping only for severe faults

BIT3	Command source switching during operation Continue to operate	0: Valid
		1: Invalid
BIT4	After the fault is automatically reset, Run selection	0: Stop if there is no running command;
		1: Maintain inverter status before the fault (valid for command sources of terminal three-wire mode and communication mode);
BIT5	Derating selection enable	0: Continue normal operation in abnormal situations;
		1: In abnormal situations, operate at derated power;
BIT7	IO board power supply abnormality handling selection	0: System reports P47
		1: The system does not report P47

BIT9	Terminal pre-charge command mode	0: Pulse mode
		1: Level mode
BIT11	Precharge command source	0: HMI
		1: Terminal
BIT13	Local frequency source	0: HMI
		1: Determined by the main and auxiliary frequency sources

P8-54	Auxiliary function selection 2	Factory value	H.0000
	Setting range	0~FFFF	

This function code is used for the auxiliary functions of the inverter, making the system more flexible and suitable for various application scenarios. The specific settings are as follows:

BIT0	Flying start selection after unit bypass	0: Forced flying start
		1: Start according to P6-00
BIT6	RS3-Modbus and PROFIBUS interface communication format selection	0: Given value -30000~30000
		1: Given percentage -10000~10000

P8-55	High voltage power supply determination ratio	Factory value	80%
	Setting range	50%~100%	

When the input voltage sampling value exceeds this parameter threshold, the high voltage on the entire system is completed, and the power unit self-test logic begins. If the input voltage is low, the threshold can be appropriately lowered.

When the input voltage sampling value is lower than the square of this parameter, the entire machine determines a high-voltage power failure, activates the power-off logic, and stops detecting power unit faults. During variable frequency operation, if the input voltage drops below the square of this parameter, the system reports a P09-input undervoltage fault.

P8-57	Auxiliary function selection 2	Factory value	H.0000
	Setting range	0~H.PF12	

Units digit: Bypass cabinet type selection

0: No bypass cabinet;

1: Manual bypass cabinet;

2: Automatic bypass cabinet.

P8-58	Closing delay allowed	Factory value	300
	Setting range	30s~3600s	

To ensure component longevity, the cascaded phase-shifting transformer and unit bus capacitor should not frequently experience high voltage changes, necessitating the setting of closing delay parameters. After the system experiences a high-voltage power off, it automatically initiates a countdown and enters a "closing delay" state, allowing the upper-level high voltage to reconnect only after the countdown concludes.

P8-59	Input voltage filter time	Factory value	0.50
	Setting range	0.00~10.00	

This parameter represents the filter time for input voltage anomaly detection. If the sampled input voltage exceeds 5% of the rated input voltage and is below the high-voltage power supply judgment ratio (P8-55) for the filter duration, the system determines a P160-input voltage anomaly and issues a high-voltage trip signal.

When this parameter is set to 0.00, the input voltage anomaly detection feature is disabled.

P8-60	Dehumidification enable	Factory value	15
	Setting range	0Min~120Min	

The temperature and humidity sampling board can measure the ambient temperature and humidity within the cabinet to assess whether there is condensation in the system and calculate the dehumidification time required. When this parameter is non-zero, the system's decondensation strategy is active. If set to 0, the decondensation strategy is forcibly disabled. It is not recommended to set this parameter to 0.

P8-63	Frequency setting ratio	Factory value	100.0%
	Setting range	80.0%~100.0%	

This parameter is used to fine-tune the actual output frequency. When this parameter is set below 100.0%, the AO output and displayed output frequency remain constant, but the actual frequency command given to the motor is the displayed output frequency multiplied by the frequency setting ratio.

P8-64	State retention time after power failure	Factory value	0s
	Setting range	0s~9s	

According to national standards, high-voltage inverters must have the capability to self-start when power is restored after an immediate outage. This parameter sets the maximum allowable power failure duration. If the inverter loses power during operation and recovers within this period, it can automatically return to its pre-power failure operational state.

NOTE

◆To enable the power failure and power-on self-start function, the fault automatic reset (P9-09) and BIT4 of the auxiliary function selection (P8-53) must be enabled simultaneously.

◆Only supports communication-given command mode or three-wire terminal command mode

◆Not supported in application sites with automatic bypass cabinet configurations

P8-65	Specify the fault output number	Factory value	0
	Setting range	0~65535	

When a specified fault (P8-65) occurs in the inverter, the multi-function terminal 84 changes to the specified fault output state ON. When this parameter is set to 0, the designated fault output function is disabled.

P8-66	Automatic power frequency cut-off delay	Factory value	5.0s
	Setting range	0.0~600.0s	
P8-67	Automatic power frequency switching signal duration	Factory value	30.0s
	Setting range	1.0~600.0s	

When configuring an automatic bypass cabinet, the motor back electromotive force (EMF) decay time varies after the inverter stops due to a fault. Therefore, the automatic power frequency cut-off delay (P8-66) should be set according to the motor characteristics. When the inverter automatically bypasses due to a fault, it stops immediately, and the output and input contactors are disengaged sequentially. After the P8-66 delay, the multi-function terminal 61 issues an ON signal for the motor automatic power frequency cut-off.

The output duration of the multi-function terminal 61—motor automatic power frequency cut-off signal—can be configured using the automatic power frequency signal duration (P8-67), with a factory default of 30 seconds of continuous output.

When the upper-level DCS protection logic requires determining power frequency closure based on process conditions, the multi-function terminal 61—motor automatically outputs a power frequency cut-off signal to the DCS, lasting for duration P8-67, which allows power frequency closing signal.

According to process conditions, if the upstream grid capacity is sufficient and the load does not permit shutdown, the duration P8-66 can be minimized to enable rapid power frequency engagement.

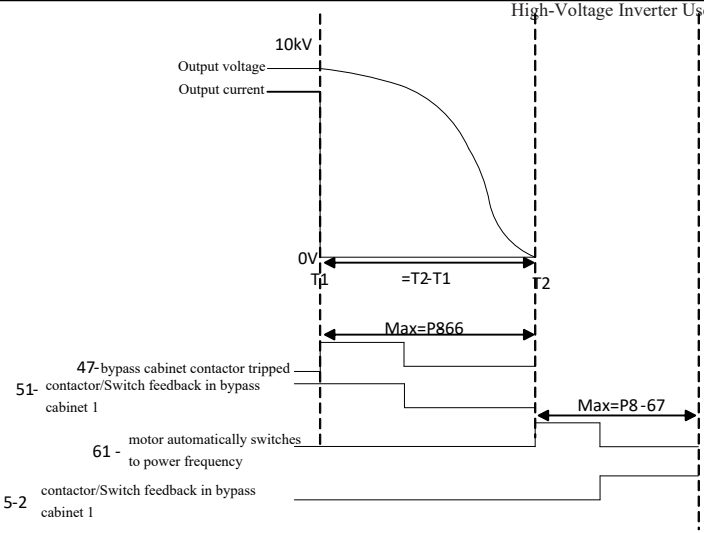


Figure 6-16 Duration of Automatic Power Frequency Switching Signal

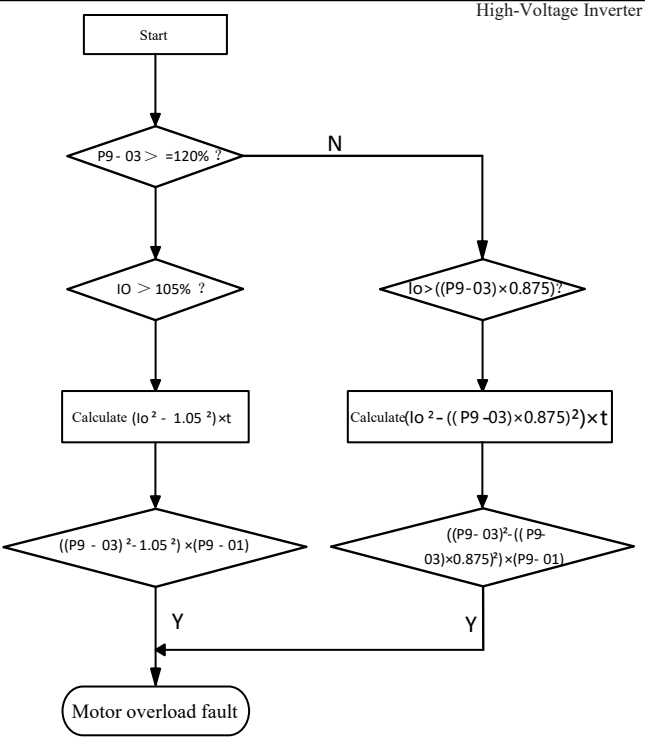
P9 Group Protection Settings

P9-00	Motor overload software protection selection	Factory value	1
	Setting range	0~1	
P9-01	Motor overload duration	Factory value	60.00s
	Setting range	0.01s~600.00s	

P9-00=0: No motor overload protection function, which may pose a risk of motor overheating and damage.

P9-00=1: At this setting, the inverter assesses motor overload based on the inverse time curve of the overload protection.

The logic timing diagram for motor overload protection is:



P9-02	Motor overload pre-warning factor	Factory value	80%
	Setting range	50%~100%	

This function provides an early warning signal to the control system via DO before motor overload fault protection is activated. The pre-warning factor determines how much in advance the warning is issued prior to overload protection. The larger the value, the shorter the warning lead time.

P9-03	Motor overload software protection threshold	Factory value	120.0%
	Setting range	10.0%~220.0%	

This function is used for motor overload fault protection.100.0% corresponds to the motor's rated current. If the motor current exceeds the rated current multiplied by the overload protection threshold and persists beyond P9-01, a motor overload fault is triggered.

P9-06	Output overvoltage protection point	Factory value	125.0%
	Setting range	0.0%~200.0%	

This function provides output overvoltage fault protection to prevent excessive back EMF of the motor.100.0% corresponds to the rated voltage of the motor.

P9-08	Fault automatic reset times clearing time	Factory value	1.0h
	Setting range	0.1~1000.0h	
P9-09	Fault automatic reset times	Factory value	3
	Setting range	0~20	

P9-10	Fault DO action selection during automatic fault reset	Factory value	0
	Setting range	0: No action 1: Action	
P9-11	Fault automatic reset interval	Factory value	2.0s
	Setting range	0.1s~100.0s	
P9-79	Operation state selection during fault auto-reset	Factory value	0
	Setting range	0: Maintain 1: Do not maintain	

When the inverter enables P9-09 fault automatic reset, it sets the number of automatic resets.P9-11 is the wait time from inverter fault to automatic reset. After exceeding the number of P9-09 resets, the inverter remains in a fault state.

After system startup, the accumulated fault auto-reset count is reset once after each P9-08 reset interval passes.

Based on P9-10 setting, it is possible not to output fault DO signals before the auto-reset count is exhausted.

According to P9-79, it can maintain the system DO signal unchanged until the auto-reset count is exhausted.

P9-12	Input phase loss protection selection	Factory value	1
	Setting range	0~1	

Choose whether to protect against input phase loss.

P9-13	Output phase loss protection selection	Factory value	1
	Setting range	0~1	

Choose whether to protect against output phase loss.

P9-14	Input current imbalance threshold	Factory value	40.0%
	Setting range	0.0%~100.0%	

The input current imbalance fault detects the negative sequence component of input current. If it exceeds P9-14 and persists for 500 ms, an imbalance fault is reported.

P9-15	Output current imbalance threshold	Factory value	40.0%
	Setting range	0.0%~100.0%	

The output current imbalance fault detects the negative sequence component of output current. If it exceeds P9-14 and persists for 500 ms, an imbalance fault is reported.

P9-17	Input voltage imbalance threshold	Factory value	40.0%
	Setting range	0.0%~100.0%	

The input voltage imbalance fault detects the negative sequence component of input voltage. If it exceeds P9-17 and persists for 500 ms, an imbalance fault is reported.

P9-24	Transformer primary connector setting	Factory value	0
	Setting range	-1~1 -1: -5% contact 0: 0% contact 1: 5% contact	

When the neutral point of the phase-shifting transformer is changed to -5% or 5%, P9-24 must be set accordingly. Generally, P9-24 does not need to be changed; only when the neutral point contact position changes does P9-24 need adjustment. Incorrect setting of P9-24 will lead to deviations in input voltage and input power calculations.

P9-27	Output voltage imbalance threshold	Factory value	40.0%
	Setting range	0.0%~100.0%	

The output voltage unbalance alarm detects the negative sequence component of the output voltage. If it exceeds P9-27 and persists for 500ms, an output voltage unbalance alarm is triggered. The output voltage imbalance defaults to alarm level and can be configured via the thousand's place of P9-48.

P9-28	Fault threshold for small output impedance	Factory value	8.0%
	Setting range	0.0%~100.0%	

The fault of small output impedance detects the zero-sequence component of the output voltage. If it exceeds P9-28 and persists for 500ms, a small output impedance fault is reported.

P9-30	Inverter overcurrent set point	Factory value	150.0%
	Setting range	0.0%~180.0% (100.0% represents the rated output current of the inverter)	

During inverter operation, if the instantaneous output current surpasses the set point (based on the inverter's rated output current), an overcurrent fault is reported.

P9-31	Inverter maximum output current limitation	Factory value	120.0%
	Setting range	0.0%~(P9-30-20.0)% (100.0% indicates the inverter's rated output current)	

This function code sets the upper threshold for output current during normal inverter operation.

The set value of P9-31 is related to P9-30.If P9-30 is set to ≤20.0%, P9-31 ranges from 0.0% to 180.0%. If P9-30 exceeds 20.0%, P9-31 ranges from 0.0% to (P9-30−20.0%).100.0% indicates the inverter's rated output current.

P9-59	Momentary stop enable	Factory value	0
	Setting range	0: Off 1: Enable	

P9-38	Proportional gain for momentary stop without stopping	Factory value	0.000
	Setting range	0.000~1.000	
P9-39	Integral gain for momentary stop without stopping	Factory value	0.000
	Setting range	0.000~15.000	
P9-60	Voltage recovery acceleration time for momentary stop without stopping	Factory value	60.0s
	Setting range	0.0s~6500.0s	
P9-61	Voltage recovery deceleration time for momentary stop without stopping	Factory value	60.0s
	Setting range	0.0s~6500.0s	

This function is primarily used at load sites such as primary fans in power plants, coal feeders, auxiliary plant machinery, substation main transformer cooling fans, and converter station valve cooling equipment. It meets the demand for continuous load operation without shutdown during power grid fluctuations.

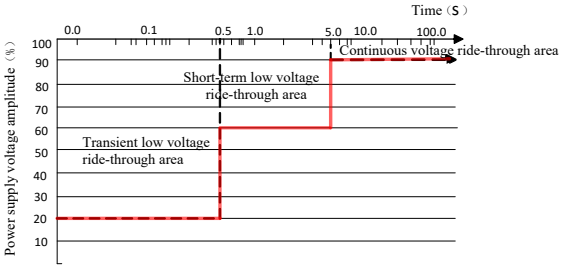


Figure 6-17 Voltage Drop Specifications

Table 6-1 Specifications for Instantaneous Stop Without Stopping

Main input voltage (Rated voltage of the inverter)	Abnormal voltage duration (ms)	Requirement during duration
(0%, 20%)	(0,350]	The inverter does not stop outputting signals, and the system alarm indicates to minimize the drop in motor speed.
[20%, 60%)	(0,500]	
[60%, 80%)	(0,5000]	The inverter continues to operate, with a slight drop in speed under load, and the system alarm indicates.
[80%, 120%)	/	The inverter operates continuously without a speed decrease.

P9-40	Stall frequency	Factory value	20.0Hz
	Setting range	5.0~50.0Hz	
P9-41	Stall time	Factory value	20s
	Setting range	0~400	

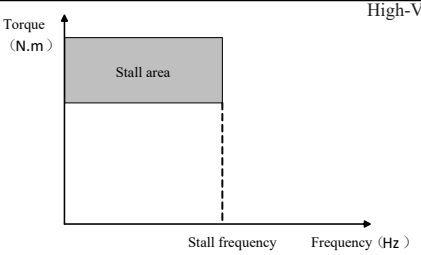


Figure 6-18 Motor stall area

If the following conditions are simultaneously met, the motor stall fault is valid:

(1) The inverter's output frequency is lower than the stall frequency set by P9-40.

(2) The inverter's output torque reaches the torque limit. The inverter's output torque limit is determined by P9-31. The torque limit is a fundamental parameter setting of the inverter, defining its maximum output torque. The torque limit parameter indirectly affects the detection of motor stall faults, but it is not used as a setting parameter for the motor stall fault.

3) The above two conditions are simultaneously met and persist for a duration exceeding the stall time set by P9-41.

When the P9-41 stall time is set to 0 seconds, the motor stall fault detection function is disabled.

P9-42	Motor excitation fault protection threshold	Factory value	40.0%
	Setting range	0.0~100.0	
P9-43	Motor excitation fault detection time	Factory value	20s
	Setting range	0~400	

In vector control mode, if the difference between the flux command value and the flux feedback value exceeds P9-42 and persists longer than P9-43, the inverter determines a motor excitation fault occurs.

P9-47	Fault protection action selection 1	Factory value	00000
	Setting range	Units digit -: Motor overload (P11) 0: Free stop 1: Stop according to shutdown method 2: Continue running Tens digit -: Input phase loss (P12) (same as units digit) Hundreds digit -: Output phase loss (P13) (same as units digit) Thousands digit -: External fault (P15) (same as units digit) Ten-thousands digit -: Communication fault (P16) (same as units digit)	
	Fault protection action selection 2	Factory value	22201

P9-48	Setting range	Units digit -: Encoder fault (P20) 0: Free stop 1: Switch to SVC1 and continue running 2: Switch to SVC1 and shut down according to the shutdown method 3: Switch to SVC2 and continue running 4: Switch to SVC2 and shut down according to the shutdown method Tens digit -: Parameter read/write exception (P21) 0: Free stop 1: Stop according to shutdown method Hundreds digit -: Input voltage imbalance (P120) 0: Free stop 1: Stop according to shutdown method 2: Continue running Thousands digit -: Output voltage imbalance (P121) (same as hundreds digit) Ten thousand digit -: DP card communication failure (P52) (same as hundreds digit)	
P9-49	Fault protection action selection 3	Factory value	00000
	Setting range	Units digit -: User-defined fault 1 (P27) 0: Free stop 1: Stop according to shutdown method 2: Continue running Tens digit -: User-defined fault 2 (P28) (same as units digit) Hundreds digit -: Cumulative power-on time fault (P29) (same as units digit) Thousands digit -: Load shedding fault (P30) 0: Free stop 1: Decelerate and stop 2: Decelerate to 7% of the motor rated frequency and continue running, automatically restoring to the set frequency when no load is lost Ten-thousands digit -: PID feedback loss during operation (P31) (same as units digit)	
P9-50	Fault protection action selection 4	Factory value	00000
	Setting range	Units digit -: Speed deviation too large (P42) 0: Free stop 1: Stop according to shutdown method 2: Continue running Tens digit -: Motor overspeed (P43) (same as units digit) Hundreds digit -: Magnetic pole position detection failure (P51) (same as units digit) Thousands digit -: Reserved Ten-thousands digit -: PLC communication abnormality (P39) (same as units digit)	
	Fault protection action selection 5	Factory value	01012

P9-51	Setting range	Units digit -: Switching timeout fault (P163) 0: Free stop 1: Stop according to shutdown method 2: Continue running Tens digit -: Unit communication failure (P61) 0: Stop immediately and trip the high voltage 1: Free Stop Hundreds digit -: Transformer secondary short circuit (P93) (same as tens digit) Thousands digit -: Inverter loss too high (P97) (same as tens digit) Ten-thousands digit -: Motor cooling fan (P165) (same as units digit)	
P9-54	Fault during operation frequency selection	Factory value	1
	Setting range	0: Operate at the current frequency 1: Operate at the set frequency 2: Operate at the upper frequency limit 3: Operate at the lower frequency limit 4: Operate at the abnormal backup frequency	
P9-55	Abnormal backup frequency setting	Factory value	100.0%
	Setting range	60.0%~100.0% (maximum frequency)	

When "Free Stop" is selected, the inverter displays F*** and stops immediately.

When "Stop According to the Stop Mode" is selected, the inverter displays A*** and stops according to the stop mode, then displays F*** after stopping.

When "Continue to Run" is selected, the inverter continues to run and displays A***, with the running frequency set by P9-54.

When "4 - abnormal backup frequency operation" is selected, the inverter operates based on the value set in P9-55 (as a percentage of the maximum frequency) as the target frequency.

P9-67	Overspeed detection value	Factory value	20.0%
	Setting range	0.0%~50.0% (maximum frequency)	
P9-68	Overspeed detection time	Factory value	5.0s
	Setting range	0.0s~60.0s	

Note: This function is only valid when the inverter is operating in speed sensor vector control mode.

When the inverter detects that the motor's feedback frequency exceeds the maximum frequency, with the excess greater than P9-67 and the duration exceeding P9-68, it triggers fault/alarm P43 for motor overspeed and manages it according to the fault protection action mode.

When the overspeed detection time is 0.0s, overspeed fault detection is disabled.

P9-69	Speed deviation excessive detection value	Factory value	20.0%
	Setting range	0.0%~50.0% (maximum frequency)	
P9-70	Speed deviation excessive detection time	Factory value	0.0s
	Setting range	0.0s~60.0s	

When the inverter operates in vector control with a speed sensor, if the motor's feedback speed deviates from the set frequency by more than P9-69 and this persists longer than P9-70, it triggers fault/alarm P42 for excessive speed deviation and manages it according to the fault protection action mode. When the speed deviation detection time is 0.0s, the excessive speed deviation fault detection is deactivated.

When the inverter is in sensorless vector control and it detects that the motor feedback speed is out of phase with the set frequency for longer than P9-70, it triggers fault/alarm P42 for excessive speed deviation, managed according to the fault protection mode.

P9-71	Fan shutdown delay time	Factory value	0s
	Setting range	0s~36000s	

In the dehumidification state before energization or after high voltage is on, terminal function 62 outputs ON to enable automatic fan operation. After high voltage disconnection, the fan turns off automatically after the delay time P9-71 with output OFF.

The standard fan automatic operation function requires no setting of P8-53's enable control bit. To disable it, set BIT8 of P8-53 to zero.

P9-72	Auxiliary function selection 1	Factory value	H.003E
	Setting range	0~FFFF	

This code is used for inverter auxiliary function selection 1, enabling and disabling various fault detection functions. The specific settings are as follows:

BIT0	Sampling phase sequence calculation enable	0: Disable
		1: Enable (also when P0-01=3)
BIT1	Transformer overload protection mode selection	0: Inverse time limit table
		1: Inverse time curve
BIT2	Current detection fault P18	0: Disable
		1: Enable
BIT3	Overvoltage suppression enable	0: Disable
		1: Enable
BIT4	Input sampling wiring error A181	0: Disable
		1: Enable

BIT5	Transformer no-load current abnormality P35	0: Disable	
		1: Enable	

BIT0: The sampling phase sequence calculation function refers to the calculation of input voltage phase sequence, output voltage phase sequence, input current phase sequence, and output current phase sequence. The phase sequence is displayed on UA-30~UA-33, where 120° indicates positive sequence, and -120° indicates negative sequence.

BIT1: Inverse time table for transformer overcurrent protection. The inverse time table is as follows:

Input current	Overload time
(1.2,1.5)	60s
(1.5,1.65)	20s
1.65 times or more	5s

The default protection mode is inverse time curve with 1.2 times rated current for 1 minute, occurring every 10 minutes.

BIT2: Current detection fault involves detecting the output current sampling Hall circuit; fault code is P18-Current Detection Fault.

BIT3: The overvoltage suppression function prevents overvoltage in the power unit bus during inverter deceleration. Disabling this feature may cause a P66 unit overvoltage fault.

BIT4: Input sampling wiring error alarm is triggered when the inverter detects wiring errors in the input sampling lines during operation, including three-phase input voltage RST sampling line and two-phase RT input current sampling line.

BIT5: Transformer no-load current abnormality fault detection enable switch. When the inverter is stopped, if input current exceeds 30% of rated input current for over 10 seconds, a P35 transformer no-load current abnormality is reported. This is a severe high-voltage trip fault.

P8-24	Fan failure delay time	Factory value	5s
	Setting range	0s~60s	
P9-77	Allowable number of fan failures	Factory value	3
	Setting range	0~8	
P9-78	Fan abnormal maximum output current limit 1	Factory value	70.0%
	Setting range	0.0~100.0%	
P9-79	Fan abnormal maximum output current limit 2	Factory value	70.0%
	Setting range	0.0~100.0%	

This function detects abnormal feedback from the cabinet top fan. If feedback exceeds the threshold continuously, the system reports a P59-Fan Fault and activates the high-voltage trip. The fan redundancy function is optional, while the system is standard-equipped with it.

All fan operating statuses are separately fed back to the control system for real-time monitoring. When the number of failures does not exceed the limit and persists for the P8-24 duration, the system issues an A89 fan alarm and limits the maximum output current based on the number of fan faults: with one fan failure, de-rating based on the minimum of P9-78 and P9-31; with two fans, based on the minimum of P9-79 and P9-31; with more than two fans, based on the minimum of (P9-79)2 and P9-31.

When the number of faulty fans exceeds the P9-77 limit and lasts for P8-24 time, the inverter reports a P59-fan fault and outputs a high-voltage trip signal, disconnecting the upstream incoming circuit breaker to prevent inverter overheating and to timely protect the phase-shifting transformer and power devices.

PA Group PID Function

PID control is a commonly used method in process control. It performs proportional, integral, and derivative operations on the difference between the feedback signal of the controlled variable and the target signal, adjusting the inverter's output frequency to form a closed-loop system to stabilize the controlled variable at the target value.

It is suitable for process control scenarios such as flow, pressure, and temperature control. Figure 6-19 presents the control principle block diagram of process PID.

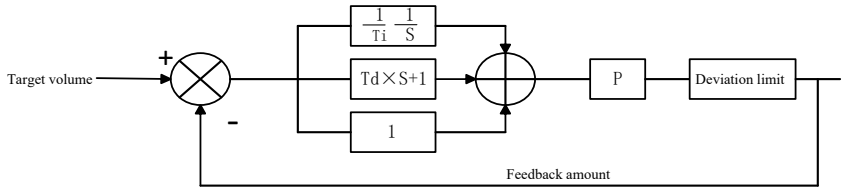


Figure 6-19 Process PID Principle Block Diagram

PA-00	PID Given Source		Factory value	0
	Setting range	0	PA-01 Settings	
		1	AI1	
		2	AI2	
		3	AI3	
		5	Communication Given	
		6	Multi-Segment Command Setting	
		7	AI4	
PA-01	PID Value Given		Factory value	50.0%
	Setting range		0.0%~100.0%	

This parameter is used to select the target value channel for process PID.

The target value set for process PID is a relative value, with a setting range of 0.0% to 100.0%.Similarly, the feedback of PID is also a relative quantity. The function of PID is to make these two relative quantities equal.

PA-02	PID Feedback Source		Factory value	0
	Setting range	0	AI1	
		1	AI2	
		2	AI3	
		3	AI1~AI2	
		5	Communication Given	
		6	AI1+AI2	

		7	MAX (|AI1|, |AI2|)
		8	MIN (|AI1|, |AI2|)
		9	AI4

This parameter is used to select the feedback signal channel for process PID.

The feedback amount of process PID is a relative value, with a setting range of 0.0% to 100.0%.

PA-03	PID Action Direction		Factory value	0
	Setting range	0	Positive action	
		1	Reverse action	

Positive action: When the PID feedback signal is less than the given value, the inverter output frequency increases. For example, in tension control of winding.

Reverse action: When the PID feedback signal is less than the given value, the inverter output frequency decreases. For example, in tension control of unwinding.

This function is influenced by the inversion of the PID action direction at the multi-function terminal (function 35). Please pay attention during use.

PA-04	PID given feedback range	Factory value	1000
	Setting range	0~65535	

The PID given feedback range is a dimensionless unit, used for the PID given display U0-15 and the PID feedback display U0-16.

The relative value of the set feedback for PID is 100.0%, corresponding to the feedback range PA-04.For example, if PA-04 is set to 2000, then when the PID is set to 100.0%, the PID set display U0-15 will read 2000.

PA-05	Proportional gain Kp1	Factory value	20.0
	Setting range	0.0~100.0	
PA-06	Integration time Ti1	Factory value	2.00s
	Setting range	0.01s~10.00s	
PA-07	Derivative time Td1	Factory value	0.000s
	Setting range	0.00s~10.000s	

■Proportional gain Kp1:

Determines the regulation strength of the entire PID controller. The larger the Kp1, the greater the regulation strength. This parameter of 100.0 indicates that when the deviation between the PID feedback and the setpoint is 100.0%, the PID controller adjusts the output frequency command to the maximum frequency.

■Integral time Ti1:

Determines the strength of the integral regulation of the PID controller. The shorter the integral time, the greater the regulation strength. Integral time refers to the duration for which the integral controller continues to adjust until the adjustment amount reaches the maximum frequency when the deviation between PID feedback and setpoint is 100.0%.

■Derivative time Td1:

Determines the regulation strength of the PID controller's response to the rate of deviation change. The longer the derivative time, the greater the regulation strength. Derivative time refers to the period during which a 100.0% change in feedback results in the maximum adjustment from the derivative controller.

PA-08	PID reverse cut-off frequency limit	Factory value	2.00Hz
	Setting range	0.00~maximum frequency	

In some cases, the PID can only bring the setpoint and feedback to the same state when the PID output frequency is negative (i.e., the inverter is running in reverse). However, excessively high reverse frequencies are not permitted in certain situations. PA-08 is used to determine the upper limit of reverse frequency.

However, excessive reverse frequency is not permissible in some situations. PA-08 is used to determine the upper limit of the reverse frequency.

NOTE

◆When field PID regulation reaches the lower limit frequency but the balance condition is still not met, and operation below this limit is not allowed, PA-08 must be set to 0.00Hz.

◆When the frequency source is main + auxiliary (PID), the upper limit of PID reverse cut-off frequency is unrestricted, making PA-08 invalid.

PA-09	PID deviation limit	Factory value	0.0%
	Setting range	0.0%~100.0%	

When the deviation between the PID setpoint and feedback value is less than PA-09, PID stops adjusting. Thus, when the deviation between setpoint and feedback is small, the output frequency remains stable, which is highly effective in certain closed-loop control scenarios.

PA-10	PID differential limiting	Factory value	0.10%
	Setting range	0.00%~100.00%	

The derivative effect in a PID controller is quite sensitive and can easily cause system oscillations. Therefore, PID derivative output is generally limited within a small range. PA-10 is used to set this range.

PA-11	PID given change time	Factory value	0.00s
	Setting range	0.00s~650.00s	

PID given change time refers to the duration for the PID setpoint to change from 0.0% to 100.0%.

When the PID setpoint varies, it changes linearly according to the specified change time, reducing the adverse effects of sudden setpoint jumps on the system.

PA-12	PID feedback filter time	Factory value	0.00s
	Setting range	0.00s~60.00s	
PA-13	PID output filter time	Factory value	0.00s
	Setting range	0.00s~60.00s	

PA-12 is used to filter the PID feedback. This filtering helps reduce the interference impact on the feedback but will decrease the response performance of the closed-loop process system.

PA-13 is used to filter the PID output frequency, which weakens the sudden changes in the inverter output frequency but similarly reduces the response performance of the closed-loop process system.

PA-15	Proportional gain Kp2		Factory value	20.0
	Setting range		0.0~100.0	
PA-16	Integral time Ti2		Factory value	2.00s
	Setting range		0.01s~10.00s	
PA-17	Derivative time Td2		Factory value	0.000s
	Setting range		0.00~10.000	
PA-18	PID parameter switching conditions		Factory value	0
	Setting range	0	Do not switch	
		1	Switch via DI terminal	
		2	Automatic switching based on deviation	
PA-19	PID parameter switching deviation 1		Factory value	20.0%
	Setting range		0.0%~PA-20	
PA-20	PID parameter switching deviation 2		Factory value	80.0%
	Setting range		PA-19~100.0%	

In certain applications, a single set of PID parameters cannot satisfy the operation process's needs, requiring different PID parameters under varying conditions.

This set of function codes is used for switching between two groups of PID parameters. The setting method for regulator parameters PA-15 to PA-17 is similar to that of parameters PA-05 to PA-07.

The two sets of PID parameters can be switched via the multi-function digital DI terminal or automatically based on the PID deviation.

When selecting multi-function DI terminal switching, set the multi-function terminal function to 43 (PID parameter switching terminal). If the terminal is invalid, choose parameter group 1 (PA-05 to PA-07); if valid, choose parameter group 2 (PA-15 to PA-17).

When automatic switching is chosen, and the absolute deviation between the setpoint and feedback is less than PID parameter switching deviation 1 (PA-19), the PID parameters will select parameter group 1.When the absolute deviation between the setpoint and feedback exceeds PID switching deviation 2 (PA-20), the PID parameter selection chooses parameter group 2.If the deviation between the setpoint and feedback is between switching deviation 1 and turning deviation 2, the PID parameters are linearly interpolated between the two sets, as shown in Figure 6-20.

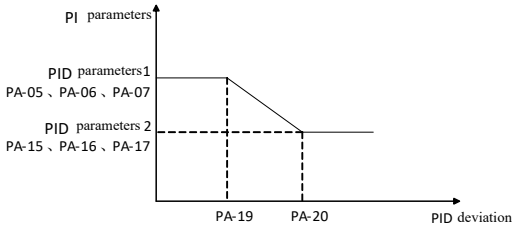


Figure 6-20 PID Parameter Switching

PA-21	PID initial value	Factory value	0.0%
	Setting range	0.0%~100.0%	
PA-22	PID initial value holding time	Factory value	0.00s
	Setting range	0.00s~650.00s	

Upon inverter start-up, the PID output is fixed at the PID initial value (PA-21) and maintained for the duration (PA-22), after which the PID begins closed-loop regulation calculation. Figure 6-21 is the PID initial value function diagram

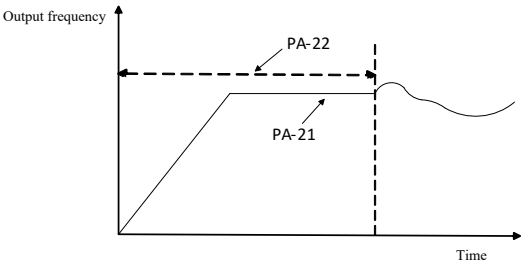


Figure 6-21 PID Initial Value Function Diagram

PA-23	Maximum positive value of the two output deviations	Factory value	1.00%
	Setting range	0.00%~100.00%	
PA-24	Maximum negative value of the two output deviations	Factory value	1.00%
	Setting range	0.00%~100.00%	

This function limits the difference in PID outputs over two cycles (2ms per cycle) to suppress rapid changes in the PID output, promoting inverter stability.

PA-23 and PA-24 correspond to the maximum absolute value of the output deviation in the forward and reverse directions, respectively.

PA-25	PID integral properties		Factory value: 00
	Setting range	Units digit	Integral separation
		0	Invalid
		1	Valid
		Tens digit	Whether to stop integration after the output reaches the limit
		0	Continue integration
		1	Stop integration

Integral separation:

If integral separation is set to valid, when the multi-function digital DI integral pause (function 22) is active, the PID integral calculation stops, and only the proportional and differential effects are valid.

When integral separation is set to invalid, it remains ineffective regardless of the status of the multi-function digital DI.

Whether to stop integration after the output reaches the limit:

After the PID operation output reaches the maximum or minimum value, you can choose whether to stop the integral action. If stop integration is selected, the PID integral calculation stops, which may help reduce the PID overshoot.

PA-26	PID feedback loss detection value	Factory value	0.0%
	Setting range	0.0%: Do not determine feedback loss;0.1%~100.0%	
PA-27	PID feedback loss detection time	Factory value	0.0s
	Setting range	0.0s~20.0s	

This function code is used to determine whether PID feedback is lost.

When the PID feedback amount is less than the feedback loss detection value PA-26 and persists longer than the PID feedback loss detection time PA-27, the inverter reports fault P31 and handles it according to the selected fault handling method.

PA-28	PID shutdown calculation		Factory value	0
	Setting range	0	No operation during shutdown	
		1	Shutdown operation	

It is used to decide whether the PID continues to operate during shutdown. In general applications, the PID should stop calculations during shutdown.

Pb Group Fault Record

Pb-00	The sixth fault type	0~199
Pb-01	The seventh fault type	
Pb-02	The eighth fault type	
Pb-03	The ninth fault type	
Pb-04	The tenth (most recent) fault type	

Record the five most recent fault types of the inverter; 0 indicates no fault. For possible causes and solutions for each fault code, please refer to Chapter 9, Fault Diagnosis and Countermeasures.

Pb-05	Frequency at the tenth (most recent) fault	Frequency at the most recent fault
Pb-06	Output current at the tenth (most recent) fault	Output current at the most recent fault
Pb-07	Output voltage at the tenth (most recent) fault	Output voltage at the most recent fault
Pb-08	Input current at the tenth (most recent) fault	Input current at the most recent fault
Pb-09	Input voltage at the tenth (most recent) fault	Input voltage at the most recent fault
Pb-10	Inverter status at the tenth (most recent) fault	Inverter status at the most recent fault
Pb-11	Fault information at the tenth (most recent) fault	Fault information at the most recent fault
Pb-15	Frequency at the ninth fault	Same as Pb-05~Pb-11
Pb-16	Output current at the ninth fault	
Pb-17	Output voltage at the ninth fault	
Pb-18	Input current at the ninth fault	

Pb-19	Input voltage at the ninth fault	
Pb-20	Inverter status at the ninth fault	
Pb-21	Fault information at the ninth fault	
Pb-25	Frequency at the eighth fault	Same as Pb-05~Pb-11
Pb-26	Output current at the eighth fault	
Pb-27	Output voltage at the eighth fault	
Pb-28	Input current at the eighth fault	
Pb-29	Input voltage at the eighth fault	
Pb-30	Inverter status at the eighth fault	
Pb-31	Fault information at the eighth fault	
Pb-35	Frequency at the seventh fault	Same as Pb-05~Pb-11
Pb-36	Output current at the seventh fault	
Pb-37	Output voltage at the seventh fault	
Pb-38	Input current at the seventh fault	
Pb-39	Input voltage at the seventh fault	
Pb-40	Inverter status at the seventh fault	
Pb-41	Fault prompt message for the seventh fault	
Pb-45	Frequency during the sixth fault	Same as Pb-05~Pb-11
Pb-46	Output current during the sixth fault	
Pb-47	Output voltage during the sixth fault	
Pb-48	Input current during the sixth fault	
Pb-49	Input voltage during the sixth fault	
Pb-50	Inverter status during the sixth fault	
Pb-51	Fault prompt message during the sixth fault	
Pb-55	Fifth fault type	Fault type during the fifth fault (0~199)
Pb-56	Fifth fault prompt message	
Pb-57	Fourth fault type	Same as Pb-55
Pb-58	Fourth fault prompt message	
Pb-59	Third fault type	Same as Pb-55
Pb-60	Third fault prompt message	
Pb-61	Second fault type	Same as Pb-55
Pb-62	Second fault prompt message	
Pb-63	First fault type	Same as Pb-55
Pb-64	First fault prompt message	

PC Group Multi-Segment Instructions, Simple PLC

The multi-segment instructions of the high-voltage inverter offer more functions than the typical multi-speed. Besides achieving multi-stage speed, they can serve as a reference source for a simple process PLC. Therefore, the dimensions of multi-segment instructions are relative values.

The simple PLC function differs from the user-programmable feature of the high-voltage inverter, performing only basic combinations of multi-segment instructions.

Pc-00	Multi-segment instruction 0	Factory value	0.0%
	Setting range	-100.0%~100.0%	
Pc-01	Multi-segment instruction 1	Factory value	0.0%
	Setting range	-100.0%~100.0%	
Pc-02	Multi-segment instruction 2	Factory value	0.0%
	Setting range	-100.0%~100.0%	
Pc-03	Multi-segment instruction 3	Factory value	0.0%
	Setting range	-100.0%~100.0%	
Pc-04	Multi-segment instruction 4	Factory value	0.0%
	Setting range	-100.0%~100.0%	
Pc-05	Multi-segment instruction 5	Factory value	0.0%
	Setting range	-100.0%~100.0%	
Pc-06	Multi-segment instruction 6	Factory value	0.0%
	Setting range	-100.0%~100.0%	
Pc-07	Multi-segment instruction 7	Factory value	0.0%
	Setting range	-100.0%~100.0%	
Pc-08	Multi-segment instruction 8	Factory value	0.0%
	Setting range	-100.0%~100.0%	
Pc-09	Multi-segment instruction 9	Factory value	0.0%
	Setting range	-100.0%~100.0%	
Pc-10	Multi-segment instruction 10	Factory value	0.0Hz
	Setting range	-100.0%~100.0%	
Pc-11	Multi-segment instruction 11	Factory value	0.0%
	Setting range	-100.0%~100.0%	
Pc-12	Multi-segment instruction 12	Factory value	0.0%
	Setting range	-100.0%~100.0%	
Pc-13	Multi-segment instruction 13	Factory value	0.0%
	Setting range	-100.0%~100.0%	
Pc-14	Multi-segment instruction 14	Factory value	0.0%
	Setting range	-100.0%~100.0%	

Pc-15	Multi-segment instruction 15	Factory value	0.0%
	Setting range	-100.0%~100.0%	

Multi-segment instructions can be applied in multiple scenarios: as a frequency source and as a setting source for simple PLC.

In these applications, the dimension of the multi-segment instruction is relative, ranging from -100.0% to 100.0%. When it serves as a frequency source, it represents a percentage of the maximum frequency P0-10. Since the PLC setting is inherently relative, the multi-segment instruction does not require dimension conversion when used as a PID setpoint source.

Multi-segment instructions need to be switched and selected according to the different states of the multifunction digital DI. For details, please refer to the relevant instructions of the P4 group.

Pc-16	Simple PLC operation mode		Factory value	0
	Setting range	0	Stop after single operation	
		1	Maintain final value after a single run	
		2	Continuous looping	

The simple PLC function serves two purposes: as a frequency source or as a voltage source for VF separation.

Figure 6-22 is a schematic diagram of a simple PLC used as a frequency source. When the simple PLC is used as a frequency source, the positive or negative value of Pc-00 to Pc-15 determines the running direction. A negative value indicates that the inverter operates in reverse direction.

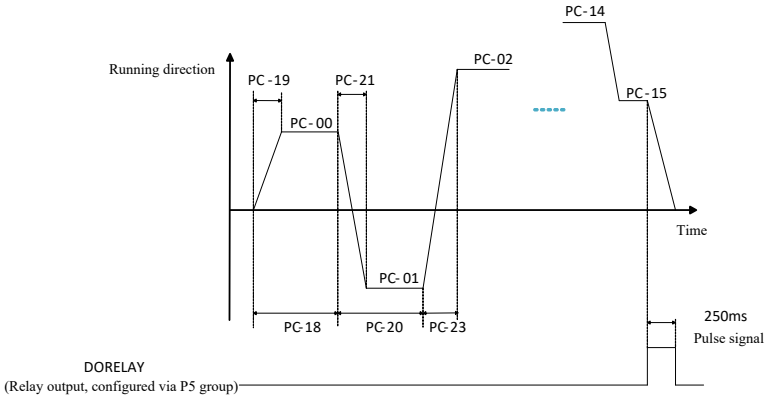


Figure 6-22 Schematic Diagram of a Simple PLC

When used as a frequency source, the PLC offers three operating modes; however, as a VF separation voltage source, it does not have these modes. Where:

0: Stop after a single run

The inverter automatically stops after completing a single cycle and requires a run command to restart.

1: Maintain the final value after a single run

After the inverter completes a single cycle, it automatically sustains the operating frequency and direction of the last section.

2: Continuous looping

After completing one cycle, the inverter automatically starts the next cycle until a stop command is issued.

Pc-17	Simple PLC power-off memory selection		Factory value	00
	Setting range	Units digit	Power-off memory selection	
		0	No memory after power-off	
		1	Power-off memory	
		Tens digit	Shutdown memory selection	
		0	No memory on shutdown	
		1	Shutdown memory	

PLC power-off memory refers to memorizing the PLC's operating stage and frequency before a power failure and resuming from the memorized stage on the next power-up. Choosing not to memorize means the PLC process restarts every time the power is turned on.

PLC shutdown memory records the PLC's previous operation stage and frequency upon shutdown, and resumes from the memorized stage during the next operation. If you choose not to retain memory, the PLC process will restart each time it is initiated.

Pc-18	Simple PLC Section 0 Running Time	Factory value	0.0s (h)
	Setting range	0~6500.0s (h)	
Pc-19	Simple PLC section 0 acceleration and deceleration time	Factory value	0
	Setting range	0~3	
Pc-20	Simple PLC section 1 running time	Factory value	0.0s (hours)
	Setting range	0~6500.0s (h)	
Pc-21	Simple PLC section 1 acceleration and deceleration time	Factory value	0
	Setting range	0~3	
Pc-22	Simple PLC section 2 running time	Factory value	0.0s (h)
	Setting range	0~6500.0s (h)	
Pc-23	Simple PLC section 2 acceleration and deceleration time	Factory value	0
	Setting range	0~3	
Pc-24	Simple PLC section 3 running time	Factory value	0.0s (h)
	Setting range	0~6500.0s (h)	
Pc-25	Simple PLC section 3 acceleration and deceleration time	Factory value	0
	Setting range	0~3	
Pc-26	Simple PLC section 4 running time	Factory value	0.0s (h)
	Setting range	0~6500.0s (h)	
Pc-27	Simple PLC section 4 acceleration and deceleration time	Factory value	0
	Setting range	0~3	
Pc-28	Simple PLC section 5 running time	Factory value	0.0s (h)
	Setting range	0~6500.0s (h)	

Pc-29	Simple PLC section 5 acceleration and deceleration time	Factory value	0
	Setting range	0~3	
Pc-30	Simple PLC section 6 running time	Factory value	0.0s (h)
	Setting range	0~6500.0s (h)	
Pc-31	Simple PLC section 6 acceleration and deceleration time	Factory value	0
	Setting range	0~3	
Pc-32	Simple PLC section 7 running time	Factory value	0.0s (h)
	Setting range	0~6500.0s (h)	
Pc-33	Simple PLC section 7 acceleration and deceleration time	Factory value	0
	Setting range	0~3	
Pc-34	Simple PLC section 8 running time	Factory value	0.0s (h)
	Setting range	0~6500.0s (h)	
Pc-35	Simple PLC section 8 acceleration and deceleration time	Factory value	0
	Setting range	0~3	
Pc-36	Simple PLC section 9 running time	Factory value	0.0s (h)
	Setting range	0~6500.0s (h)	
Pc-37	Simple PLC section 9 acceleration and deceleration time	Factory value	0
	Setting range	0~3	
Pc-38	Simple PLC section 10 running time	Factory value	0.0s (h)
	Setting range	0~6500.0s (h)	
Pc-39	Simple PLC section 10 acceleration and deceleration time	Factory value	0
	Setting range	0~3	
Pc-40	Simple PLC section 11 running time	Factory value	0.0s (h)
	Setting range	0~6500.0s (h)	
Pc-41	Simple PLC section 11 acceleration and deceleration time	Factory value	0
	Setting range	0~3	
Pc-42	Simple PLC section 12 running time	Factory value	0.0s (h)
	Setting range	0~6500.0s (h)	
Pc-43	Simple PLC section 12 acceleration and deceleration time	Factory value	0
	Setting range	0~3	
Pc-44	Simple PLC section 13 running time	Factory value	0.0s (h)
	Setting range	0~6500.0s (h)	
Pc-45	Simple PLC section 13 acceleration and deceleration time	Factory value	0
	Setting range	0~3	
Pc-46	Simple PLC section 14 running time	Factory value	0.0s (h)
	Setting range	0~6500.0s (h)	

Pc-47	Simple PLC section 14 acceleration and deceleration time		Factory value	0
	Setting range		0~3	
Pc-48	Simple PLC section 15 running time		Factory value	0.0s (h)
	Setting range		0~6500.05s (h)	
Pc-49	Simple PLC section 15 acceleration and deceleration time		Factory value	0
	Setting range		0~3	
Pc-50	Simple PLC running time unit		Factory value	0
	Setting range	0	S (seconds)	
		1	h (hour)	
Pc-51	Multi-segment instruction 0 setting mode		Factory value	0
	Setting range	0	Function code Pc-00 given	
		1	AI1	
		2	AI2	
		3	AI3	
		5	PID	
		6	Preset frequency (P0-08) is given; UP/DOWN can be modified	
		7	AI4	

This parameter determines the channel for multi-segment instruction 0.

Besides Pc-00, multi-segment instruction 0 offers various other options to facilitate switching between multi-segment instructions and other methods. When multi-segment instructions or simple PLC are used as frequency sources, switching between these two frequency sources is easily achieved.

PD Group Communication Parameters

This group of parameters is mainly used to set the interface parameters for system external communications.

PD-00	Communication baud rate	Factory value	H.5005
	Setting range	Units digit: Modbus baud rate	1: 600bps
			2: 1200bps
			3: 2400bps
			4: 4800bps
			5: 9600bps
			6: 19200bps
			7: 38400bps
			8: 57600bps
			9: 115200bps
		Tens digit: Reserved	Reserved
		Hundreds digit: Reserved	Reserved
			0: 20
			1: 50
			2: 100

		Thousands digit: CANlink baud rate	3: 125
			4: 250
			5: 500
			6: 1M

This parameter is used to set the data transmission rate between the host device and the inverter. Note that the baud rate set for the host device and the inverter must be consistent; otherwise, communication will not be possible. The higher the baud rate, the faster the communication speed.

PD-01	Data format	Factory value	0
	Setting range	0	0: No parity (8-N-2)
		1	1: Even parity (8-E-1)
		2	2: Odd parity (8-O-1)
		3	3: 8-N-1

This parameter is used to set the data format between the host device and the inverter. The data format must be consistent; otherwise, communication cannot be carried out.

PD-02	Local address	Factory value	1
	Setting range	1~247; 0 is the broadcast address	

When the local address is set to 0, it becomes the broadcast address, enabling the broadcast function of the host device.

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

PD-03	Response delay	Factory value	2
	Setting range	0ms~20ms	

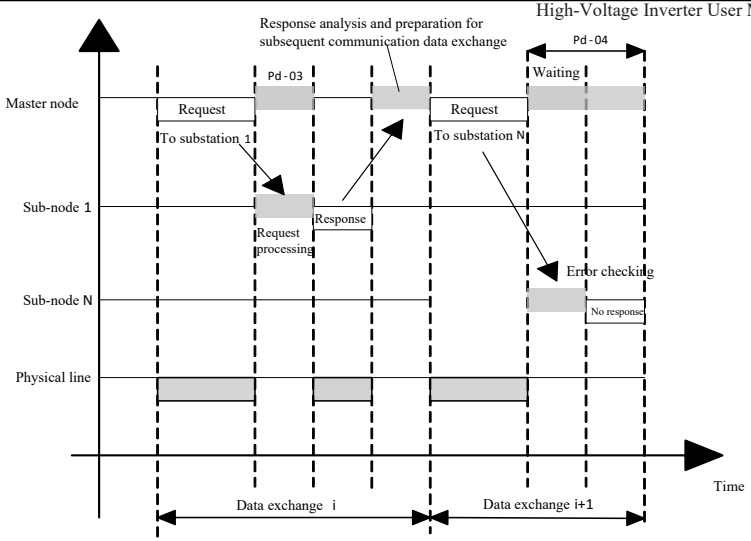


Figure 6-23: Master/Slave Communication Timing Diagram for Various Situations

Response Delay: Refers to the interval between the inverter completing data reception and sending data to the upper computer device. If the response delay is less than the system processing time, the response delay shall be subject to the system processing time. If the response delay is longer than the system processing time, after the system finishes processing the data, it shall wait in delay until the response delay time expires before sending the data to the upper computer device.

PD-04	MODBUS communication timeout	Factory value	0.0
	Setting range	0.0 (Invalid), 0.1s~60.0s	

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

When this function code is set to a valid value, if the interval between one communication and the next exceeds the communication timeout, the system will report a communication abnormality error (P16).Normally, it is set to invalid. If set in a system with continuous communication, this parameter allows monitoring of communication status.

PD-05	Data transfer format selection	Factory value	1
	Setting range	Units digit: Modbus 0: Non-standard Modbus protocol 1: Standard Modbus protocol	

When the unit digit of the function code is 1, communication uses the standard Modbus protocol; when it is 0, during read commands, the slave returns one extra byte beyond the standard Modbus protocol. See "Appendix A: Modbus Communication Protocol" for details.

PD-08	Profibus communication timeout	Factory value	0.0
	Setting range	0.0 (Invalid), 0.1s~60.0s	

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

When set to a valid value, if the interval between communications exceeds the timeout, the system reports a DP card communication fault (P52); fault level can be selected (P9-48).Normally, it is set to invalid. If set in a system with continuous communication, this parameter allows monitoring of communication status.

PF Group User Password

PF-00	User password	Factory value	0
	Setting range	0~65535	

Setting PF-00 to any non-zero number activates password protection. Next time you access the menu, you must enter the correct password; otherwise, you cannot view or modify parameters. Please remember the set user password.

Setting PF-00 to 00000 will clear the user password, disabling password protection.

PF-01	Parameter initialization		Factory value	0
	Setting range	0	No action	
		1	Restore factory parameters, excluding motor parameters	

1: Restore factory settings, excluding motor parameters

Setting PF-01 to 1 restores most inverter function parameters to factory defaults, but motor parameters, fault records, total run time (P7-07), total power-on time (P7-06), total power consumption (P7-08, P7-23), PF group, and output voltage hardware parameters (A5-08) are not restored.

PF-02	Function parameter mode display attributes		Factory value	11
	Setting range	Units digit	U group display selection	
		0	Do not display	
		1	Display	
		Tens digit	Group A display selection	
		0	Do not display	
		1	Display	
		Hundreds digit	Group B display selection	
		0	Do not display	
		1	Display	
		Thousands digit	Group C display selection	
		0	Do not display	
		1	Display	

A0 Group Torque Control and Limit Parameters

A0-00	Speed/torque control mode selection		Factory value	0
	Setting range	0	Speed control	
		1	Torque control	

Used to select the inverter control mode: speed control or torque control. Note: this function code cannot be used to switch during inverter operation.

The multifunction DI terminal has two functions related to torque control: torque control prohibition (function 29) and speed control/torque control switching (function 46).These two terminals should be used in conjunction with A0-00 to achieve switching between speed and torque control.

When the speed control/torque control switching terminal is invalid, the control mode is determined by A0-00. If the switching is valid, the control mode is the inverse of the value of A0-00.

In any case, when the torque control prohibition terminal is enabled, the inverter is fixed in speed control mode.

A0-01	Torque setting source selection in torque control mode		Factory value	0
	Setting range	0	Digital setting (A0-03)	
		1	AI1	
		2	AI2	
		3	AI3	
		5	Communication Given	
		6	MIN (AI1,AI2)	
		7	mAX (AI1,AI2)	
		8	AI4	
		9	CAN	
A0-03	Digital setting of torque in torque control mode		Factory value	150.0%
	Setting range		-200.0%~200.0%	

A0-01 is used to select the torque setting source, with a total of 10 methods.

The torque setting adopts a relative value, with 100.0% corresponding to the motor's rated torque. The setting range is -200.0% to 200.0%, indicating the inverter's maximum torque is twice its rated torque.

When the torque command is positive, the inverter runs forward.
When the torque command is negative, the inverter runs in reverse.

The descriptions of various torque setting sources are as follows:

0: Digital setting (A0-03)

Indicates that the target torque directly uses the A0-03 setting value.

1: AI1

2: AI2

3: AI3

8: AI4

Indicates the target torque is determined by the analog input terminal, where:
AI1, 2, 4 are 4.00 to 20.00 mA current inputs.

AI3 can be 0.00 V to 10.00 V voltage input or 4.00 to 20.00 mA current input, controlled by a jumper on the control board. Jumper selection; AI/AO type selection (A6-79) parameters need to be configured simultaneously.

The mapping curve between AI3 input value and target torque can be freely selected by the user through A6-48. Refer to the A6 parameter description for details.

5: Communication setting

Indicates that the target torque is provided via RS3-MODBUS-RTU interface communication. The host computer provides data through communication address 0x1002; data format includes two decimal places, ranging from -320.00% to +320.00%.

9: CAN

When operating as a point-to-point communication slave and receiving data as torque reference, the data transmitted by the master is used as the communication setpoint (see relevant instructions in Group A8).

A0-05	Torque control forward maximum frequency	Factory value	50.00Hz
	Setting range	0.00Hz to maximum frequency (P0-10)	
A0-06	Torque control reverse maximum frequency	Factory value	50.00Hz
	Setting range	0.00Hz to maximum frequency (P0-10)	

In torque control, the acceleration and deceleration time of the frequency upper limit are set in P8-07 (acceleration) / P8-08 (deceleration).It is used to set the maximum forward or reverse operating frequency of the inverter in torque control mode.

When the inverter is in torque control, if the load torque is less than the motor output torque, the motor speed will continue to rise. To prevent mechanical system accidents such as runaway, the maximum motor speed during torque control must be limited.

If it is necessary to dynamically and continuously change the maximum frequency of torque control, this can be done by controlling the upper limit frequency.

A0-07	Torque acceleration time	Factory value	0.00s
	Setting range	0.00s~650.00s	
A0-08	Torque acceleration time	Factory value	0.00s
	Setting range	0.00s~650.00s	

In torque control mode, the difference between the motor output torque and the load torque determines the speed change rate of the motor and load. Therefore, the motor speed may change rapidly, causing issues like noise or excessive mechanical stress. By setting the torque control acceleration and deceleration time, the motor speed can change smoothly.

In small torque start torque control, it is not recommended to set the torque acceleration and deceleration time; if set, it is recommended to appropriately increase the speed filter coefficient.

When quick torque response is required, set the torque control acceleration and deceleration time to 0.00s.

For example: two motors are rigidly connected to drive the same load. To ensure even load distribution, one inverter is set as the master using speed control, and the other as the slave using torque control. The actual output torque of the master acts as the torque command for the slave. At this time, the slave's torque must quickly follow the master, so the torque control acceleration and deceleration time for the slave are 0.00s.

A5 Group Control Optimization Parameters

A5-00	Dead zone compensation time	Factory value	20.0
	Setting range	0.0~50.0us	

Adjusting this value can improve the effective utilization of voltage. If set too low, it could distort the current waveform. Users are not recommended to change it.

A5-08	Output voltage hardware parameters	Factory value	37.994
	Setting range	0.000~65.535	

The output voltage hardware parameters pertain to the output voltage sampling circuit and generally should not be altered.

A5-11	High torque start mode enabled	Factory value	0
	Setting range	0~1	
A5-12	High starting torque mode current setting	Factory value	50%
	Setting range	0~125%	
A5-13	High starting torque mode current ramp time	Factory value	0.5s
	Setting range	0.0~5.0s	
A5-14	High starting torque mode PLL settling time	Factory value	2s
	Setting range	0~5s	

The high starting torque mode is primarily used for starting brushless electrically excited synchronous machines and permanent magnet synchronous machines. A5-12 represents the setting value of inverter output current during high starting torque mode, A5-13 specifies the ramp time for the output current command, and A5-14 designates the time for phase-locked loop establishment in high starting torque mode. Generally, customers are advised not to change it.

A5-18	Additional features	Factory value	0x8001
	Setting range	0xFFFF	

BIT0: Enable torque limit of input voltage. The inverter automatically limits the output torque based on the input voltage, restricting the inverter’s output power.

BIT2: Enable speed rollback mode. This function automatically enables speed rollback mode when the inverter output torque reaches its limit to prevent the inverter from constantly being in a torque limit high current state.

BIT15: Enable pre-excitation. This function is activated to excite the motor before the inverter starts.

A5-27	Overvoltage suppression voltage loop proportional gain	Factory value	10.0
	Setting range	0.0~100.0 0.0: Disable overvoltage suppression regulation	
A5-28	Overvoltage suppression voltage loop integral gain	Factory value	5.0
	Setting range	0.0~100.0	

This function is valid when P9-72BIT3 is active, and enables the fast overvoltage suppression feature. Generally, the proportional and integral gains of the overvoltage suppression voltage loop do not need to be adjusted. It should be noted that excessive PI parameter tuning may cause severe output current waveform distortion during the deceleration braking overvoltage suppression process.

A6 Group Analog Parameters

A6-00	AI curve 1 minimum input	Factory value	4.00mA
	Setting range	0.00mA~A6-02	
A6-01	AI curve 1 minimum input corresponding setting	Factory value	0.0%
	Setting range	-100.00%~100.0%	
A6-02	AI curve 1 maximum input	Factory value	20.00mA
	Setting range	A6-00~20.00mA	
A6-03	AI curve 1 maximum input corresponding setting	Factory value	100.0%
	Setting range	-100.00%~100.0%	
A6-04	AI1 filter time	Factory value	0.10s
	Setting range	0.00s~10.00s	
A6-05	AI curve 2 minimum input	Factory value	4.00mA
	Setting range	0.00mA~A6-07	
A6-06	AI curve 2 minimum input corresponding setting	Factory value	0.0%
	Setting range	-100.00%~100.0%	
A6-07	AI curve 2 maximum input	Factory value	20.00mA
	Setting range	A6-00~20.00mA	
A6-08	AI curve 2 maximum input corresponding setting	Factory value	100.0%
	Setting range	-100.00%~100.0%	
A6-09	AI2 filter time	Factory value	0.10s
	Setting range	0.00s~10.00s	

A6-10	AI curve 3 minimum input	Factory value	4.00mA
	Setting range	0.00mA~A6-12	
A6-11	AI curve 3 minimum input corresponding setting	Factory value	-100.0%
	Setting range	-100.00%~100.0%	
A6-12	AI curve 3 maximum input	Factory value	20.00mA
	Setting range	A6-10~20.00mA	
A6-13	AI curve 3 maximum input corresponding setting	Factory value	100.0%
	Setting range	-100.00%~100.0%	

The above function codes are used to define the relationship between the analog input current and its corresponding set value.

When the analog input current exceeds the set maximum input (e.g., A6-02), it is calculated using the maximum input value. Conversely, if the analog input current is less than the set minimum input (e.g., A6-00), it is calculated using the minimum input value or 0.0%.If it's A6-11, it is calculated based on -100.0%.

The AI input filter time is used to set the software filter time for AI. When onsite analog signals are prone to interference, increase the filter time to stabilize the detected analog quantity. However, longer filter times result in slower response speeds to the analog signals. Setting should be balanced according to actual application scenarios.

The meaning of the nominal value corresponding to 100.0% of the analog setting varies across different application scenarios. Please refer to the specific descriptions in each application section. The following figure shows a typical AI setting:

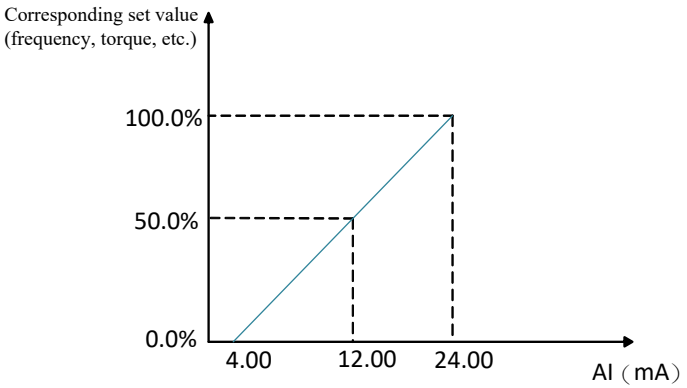


Figure 6-24 Correspondence Between Analog Reference and Set Value

A6-14	AI curve 4 minimum input	Factory value	4.00mA
	Setting range	0.00mA~A6-16	
A6-15	AI curve 4 minimum input corresponding setting	Factory value	0.0%
	Setting range	-100.00%~100.0%	

A6-16	AI curve 4 inflection point 1 input	Factory value	8.80mA
	Setting range	A6-14~A6-18	
A6-17	AI curve 4 inflection point 1 input corresponding setting	Factory value	30.0%
	Setting range	-100.00%~100.0%	
A6-18	AI curve 4 inflection point 2 input	Factory value	13.60mA
	Setting range	A6-16~A6-20	
A6-19	AI curve 4 inflection point 2 input corresponding setting	Factory value	60.0%
	Setting range	-100.00%~100.0%	
A6-20	AI curve 4 maximum input	Factory value	20.00mA
	Setting range	A6-18~20.0mA	
A6-21	AI curve 4 maximum input corresponding setting	Factory value	100.0%
	Setting range	-100.00%~100.0%	
A6-22	AI curve 5 minimum input	Factory value	4.00mA
	Setting range	0.00mA~A6-24	
A6-23	AI curve 5 minimum input corresponding setting	Factory value	-100.0%
	Setting range	-100.00%~100.0%	
A6-24	AI curve 5 inflection point 1 input	Factory value	9.60mA
	Setting range	A6-22~A6-26	
A6-25	AI curve 5 inflection point 1 input corresponding setting	Factory value	-30.0%
	Setting range	-100.00%~100.0%	
A6-26	AI curve 5 inflection point 2 input	Factory value	14.40mA
	Setting range	A6-24~A6-28	
A6-27	AI curve 5 inflection point 2 input corresponding setting	Factory value	30.0%
	Setting range	-100.00%~100.0%	
A6-28	AI curve 5 maximum input	Factory value	20.00mA
	Setting range	A6-26~20.00mA	
A6-29	AI curve 5 maximum input corresponding setting	Factory value	100.0%
	Setting range	-100.00%~100.0%	

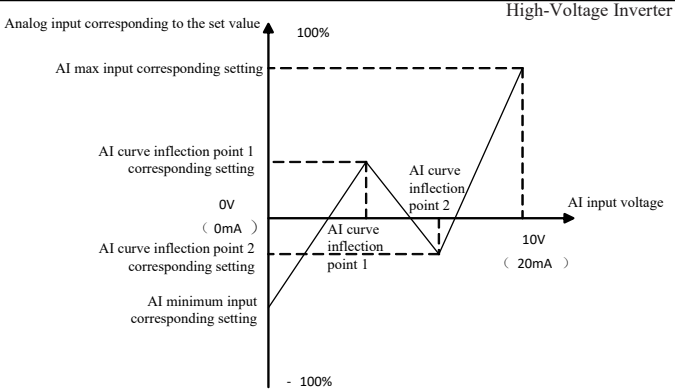


Figure 6-25 Analog Input Corresponding Setting Value – AI Input Voltage Curve

In addition to linear correspondence, AI curves 4 and 5 provide curves with inflection points 1 and 2; this feature allows more flexible setting of values corresponding to AI input. It is important to note that the AI minimum input voltage (current), inflection point 1 voltage (current), inflection point 2 voltage (current), and maximum voltage (current) must increase sequentially.

A6-30	AI1 set jump point	Factory value	0.0
	Setting range	-100.0%~100.0%	
A6-31	AI1 set jump range	Factory value	0.5
	Setting range	0.0%~100.0%	
A6-32	AI2 set jump point	Factory value	0.0
	Setting range	-100.0%~100.0%	
A6-33	AI2 set jump range	Factory value	0.5
	Setting range	0.0%~100.0%	
A6-34	AI3 set jump point	Factory value	0.0
	Setting range	-100.0%~100.0%	
A6-35	AI3 set jump range	Factory value	0.5
	Setting range	0.0%~100.0%	
A6-36	AI4 set jump point	Factory value	0.0
	Setting range	-100.0%~100.0%	
A6-37	AI4 sets the jump amplitude	Factory value	0.5
	Setting range	0.0%~100.0%	

Analog inputs AI1~AI4 all have the function of setpoint jump. The so-called jump function means that when the analog value corresponding to a setting changes within the upper and lower limits of the jump point, the setting is fixed to the value of the jump point.

For example, if the voltage of AI1 input fluctuates around 5.00V, within a range of 4.90-5.10V, and the minimum input of AI1 is 10.00V corresponding to 100.0%, then the detected AI1 is set to fluctuate between 49.0% and 51.0%.Setting the jump point of AI1 to 50.0% and the jump amplitude to 1.0%. After processing AI1 input through the jump function, the resulting AI1 setting is fixed at 50.0%, stabilizing the input and eliminating fluctuations.

A6-48	AI setting curve selection 1				Factory value
	Setting range	Units digit: AI1 curve selection	1	Curve 1	1
			2	Curve 2	
			3	Curve 3	
			4	Curve 4	
			5	Curve 5	
		Tens digit: AI2 curve selection	1	Curve 1	1
			2	Curve 2	
			3	Curve 3	
			4	Curve 4	
			5	Curve 5	
		Hundreds digit: AI3 curve selection	1	Curve 1	1
			2	Curve 2	
			3	Curve 3	
			4	Curve 4	
			5	Curve 5	
		Thousands digit: AI4 curve selection	1	Curve 1	1
			2	Curve 2	
			3	Curve 3	
			4	Curve 4	
			5	Curve 5	

Use A9-14 to select the input curve mode for AI1 to AI4. For specific modes 1-5, see A6-01 to A6-29.

A6-50	AI below minimum input setting selection			Factory value	0000
	Setting range	Units digit: AI1 lower than minimum input setting	0	Minimum input corresponding setting	
			1	0.0%	
		Tens digit: AI2 lower than minimum input setting	0	Minimum input corresponding setting	
			1	0.0%	
		Hundreds digit: AI3 lower than minimum input setting	0	Minimum input corresponding setting	
			1	0.0%	
		Thousands digit: AI4 lower than minimum input setting	0	Minimum input corresponding setting	
			1	0.0%	

Use A6-50 to configure the function for small AI inputs. If set to 0, it is fixed at the minimum value; if set to 1, it is fixed at 0.0%.

A6-52	AO1 output function selection	Factory value	0
A6-53	AO2 output function selection	Factory value	2
A6-54	AO3 output function selection	Factory value	0
A6-55	AO4 output function selection	Factory value	0
A6-56	AO5 output function selection	Factory value	2

The output range of analog outputs AO1, AO2, AO3, AO4, and AO5 is 4mA~20mA.

The range of analog output and the calibration relationship with the corresponding functions are shown in the following table:

Settings	Function	Functions corresponding to analog output from 0.0% to 100.0%
0	Operating frequency	0~Maximum output frequency
1	Target frequency	0~Maximum output frequency
2	Output current	0~2 times the rated current of the motor
3	Output torque	0~2 times the rated torque of the motor
4	Output power	0~2 times the rated power
5	Output voltage	0~1.5 times the rated voltage of the inverter
7	AI1	4.00mA~20.00mA
8	AI2	4.00mA~20.00mA
9	AI3	4.00mA~20.00mA
10	AI4	4.00mA~20.00mA
12	Communication Settings	0.0%~100.0%
13	Motor speed	0~Speed corresponding to the maximum output frequency
16	Exciting current	0~2 times the rated current of the motor
17	Input voltage	0~1.5 times the rated input voltage of the inverter
18	Input current	0~2 times the rated input current of the inverter

A6-61	AO1 zero bias coefficient	Factory value	20.0%
	Setting range	-100.0%~+100.0%	
A6-62	AO1 gain	Factory value	0.80
	Setting range	-10.00~+10.00	
A6-63	AO2 zero bias coefficient	Factory value	20.00%
	Setting range	-100.0%~+100.0%	
A6-64	AO2 gain	Factory value	0.80
	Setting range	-10.00~+10.00	
A6-65	AO3 zero bias coefficient	Factory value	20.0%
	Setting range	-100.0%~+100.0%	

A6-66	AO3 gain	Factory value	0.80
	Setting range	-10.00~+10.00	
A6-67	AO4 zero bias coefficient	Factory value	20.00%
	Setting range	-100.0%~+100.0%	
A6-68	AO4 gain	Factory value	0.80
	Setting range	-10.00~+10.00	
A6-69	AO5 zero bias coefficient	Factory value	20.0%
	Setting range	-100.0%~+100.0%	
A6-70	AO5 gain	Factory value	0.80
	Setting range	-10.00~+10.00	

The above function codes are generally used to correct the zero bias of analog output and the deviation in output amplitude. It can also be used to customize the desired AO output curve.

If zero bias is represented by "b", gain by "k", actual output by "Y", and standard output by "X", then the actual output is:

Y=kX + b

Among them, the zero bias coefficient for AO1, AO2, AO3, AO4, and AO5 is 100% corresponding to 20mA. The standard output refers to the value indicated by the analog output for the range of 0mA~20mA without zero bias and gain correction.

A6-79	AI/AO type selection					Factory value
	Setting range	Units digit	BIT0: AI3 type selection	0	Current input	0
				1	Voltage input	
		Tens digit	BIT0: AO4 type selection	0	Current output	0
				1	Voltage output	
			BIT1: AO5 type selection	0	Current output	
				1	Voltage output	
		Hundreds digit	BIT0: AI5 type selection	0	Current output	0
				1	Voltage output	
			BIT1: AI6 type selection	0	Current output	
				1	Voltage output	
		Thousands digit	BIT0: AO6 type selection	0	Current output	0
				1	Voltage output	
			BIT1: AO7 type selection	0	Current output	
				1	Voltage output	
			BIT2: AO8 type selection	0	Current output	
				1	Voltage output	
			BIT3: AO9 type selection	0	Current output	
				1	Voltage output	

The user can configure each analog input and output type by setting A6-79. For instance, if the hundreds digit of A6-79 is set to "3," then AI5 and AI6 are configured to voltage output. If the digit is "2," it indicates that BIT1 is 1 and BIT0 is 0, meaning AI5 is set to current output and AI6 to voltage output mode.

After completing the parameter settings, adjust the jumper positions on the IO interface board accordingly: J6 for AI3 voltage/current input selection, J8 for AO4 voltage/current output selection, J5 for AO5 voltage/current output selection.

A6-87	AI3 filter time	Factory value	0.10s
	Setting range	0.00s~10.00s	
A6-88	AI4 filter time	Factory value	0.10s
	Setting range	0.00s~10.00s	
A6-89	PLC AI filter time	Factory value	1Beat
	Setting range	1~250Beat	

Input filter time is used to set the software filter duration of AI. When the onsite analog signals are easily disturbed, increase the filter time to stabilize the detected analog value. However, longer filter times slow the response speed of analog detection. Set appropriately based on specific application conditions.

A6-90	AI disconnection selection					Factory value
	Setting range	Units digit: AI1 disconnection selection	BIT0: Reserved	-		2
			BIT1: AI1 disconnection signal hold selection	0	Not maintained	
				1	Disconnection retention	
		Tens digit: AI2 disconnection selection	BIT0: Reserved	-		2
			BIT1: AI2 disconnection signal hold selection	0	Not maintained	
				1	Disconnection retention	
		Hundreds digit: AI3 disconnection selection	BIT0: Reserved	-		2
			BIT1: AI3 disconnection signal hold selection	0	Not maintained	
				1	Disconnection retention	
		Thousands digit: AI4 disconnection selection	BIT0: Reserved	-		2
			BIT1: AI4 disconnection signal hold selection	0	Not maintained	
				1	Disconnection retention	

The A6-90 function code can set the effects of AI1 to AI4 analog inputs upon disconnection. If a bit is set to "2", the corresponding disconnection holding function is enabled. If the system detects a rapid drop in the AI value exceeding the threshold, it determines the AI input is disconnected. If disconnection retention is enabled, the analog input's conversion value remains at pre-disconnection data.

A8 Group Point-to-Point Communication

A8-00	Point-to-point communication function selection	Factory value	0
	Setting range	0: invalid; 1: valid	

Choose whether the point-to-point communication function is active.

Point-to-point communication refers to direct data exchange between two or more inverters, implemented via CANlink. It facilitates a host in setting target frequency and torque for one or more slaves based on its frequency or torque signal.

When multiple inverters connect via CANlink, the terminal resistor must be engaged on the end inverter's CANlink.

When point-to-point communication is active, the CANlink addresses of master and slave are

auto-matched, requiring no manual configuration.

The point-to-point communication rate is configured via PD-00.

A8-01	Master-slave selection	Factory value	0
	Setting range	0: Master; 1: Slave	

Used to designate the inverter as master or slave

In point-to-point communication, set the CANlink baud rate; addresses auto-assign based on master or slave status.

A8-02	Slave command follow	Factory value	0
	Setting range	0: Slave does not follow master command 1: Slave follows master command	

When acting as a master-controlled slave and P0-02=6 (CAN), if set to 1, the slave runs/stops in sync with the master’s command.

A8-03	Point-to-point communication data selection	Factory value	0
	Setting range	0: Synchronous frequency 1: Target frequency	

In master-slave control mode, both master and slave function codes are set to 0; the slave operates in torque mode, obtaining synchronous frequency via communication.

In droop control mode, both master and slave function codes are set to 1; the slave acquires an externally set target frequency, computing real-time droop frequency based on actual torque.

A8-04	Receive data zero bias (torque)	Factory value	0.00%
	Setting range	100.00%~100.00%	

The two parameters above primarily adjust received torque data, allowing users to customize the relationship between master and slave torque commands.

A8-05	Receive data gain (torque)	Factory value	1.00
	Setting range	10.00~10.00	

If zero bias is represented by b, gain by k, data received by slave as x, and data used as y
Then the data actually used is y = kx + b;

The range is -100.00% to 100.00%

A8-08	Received data zero bias (frequency)	Factory value	0.00%
	Setting range	-100.00%~100.00%	
A8-09	Received data gain (frequency)	Factory value	1.00
	Setting range	-10.00~10.00	

The above two functional parameters are mainly used to correct the received frequency data, facilitating users to customize the relationship between frequency commands of the host and slave units.

If zero bias is represented by b, gain by k, data received by slave as x, and data used as y
Then the data actually used is y = kx + b;

The range is -100.00% to 100.00%.

A8-11	View window	Factory value	0.5Hz
	Setting range	0.20Hz~10.00Hz	

This function code is valid in master-slave control mode. Setting this value ensures that the speed of the master and slave units is synchronized within the window range.

A9 Group Unit Parameters

A9-00	Bypass enable			Factory value	0x0
	Setting range	Units digit	0	Invalid	
			1	Manual bypass	
			2	Automatic bypass	
			A	Manual bypass	

Manual bypass: For models equipped with unit bypass contactors, the specified unit bypass is executed by setting A9-04 and A9-05 instructions.

Automatic bypass: For models equipped with unit bypass contactors, in case of a unit failure, the bypass command is automatically calculated and executed according to the configuration options of A9-13 and A9-14.

Manual bypass: For models without unit bypass contactors, after turning off the high voltage, the faulty unit can be bypassed by short-circuiting the unit outputs T1 and T2 and setting the corresponding A9-04 and A9-05 parameters.

A9-02	Bypass contactor closing time	Factory value	200ms
	Setting range	50~1000ms	

It generally takes tens to hundreds of milliseconds for the bypass contactor to fully disconnect from the contact after receiving the energizing command. If a unit's bypass process exceeds the time specified by A9-02 and still fails, it indicates a fault in that unit's bypass process.

A9-03	Maximum back EMF decay time	Factory value	7.0s
	Setting range	0.0~30.0s	
A9-04	Manual bypass setting 1	Factory value	0x0
	Setting range	BIT0: A1 unit bypass BIT1: B1 unit bypass BIT2: C1 unit bypass BIT3: A2 unit bypass … BIT15: A6 unit bypass	
A9-05	Manual bypass setting 2	Factory value	0x0
	Setting range	BIT0: B6 unit bypass BIT1: C6 unit bypass BIT2: A7 unit bypass BIT3: B7 unit bypass … BIT15: C10 unit bypass	

When the motor is in a free stop state, due to inertia, the motor will still rotate for a period of time and generate corresponding back electromotive force. At this time, the motor may continue to charge the bus. If a unit on one phase is bypassed, the voltage on the remaining units may become too high, leading to an overvoltage fault. Therefore, it is necessary to limit the charging time of the units. A9-03 specifies the maximum back-EMF decay time of the motor. If the back-EMF duration exceeds this value, a back-EMF decay timeout fault will be reported.

A9-13	Unit bypass type and automatic reset attribute selection 1					Factory value
	Setting range	Units digit: Unit overvoltage selection	BIT0: Bypass selection	0	Prohibit	3
				1	Allowed	
			BIT1: Automatic reset selection	0	Prohibit	
				1	Allowed	
		Tens digit: Unit undervoltage selection	BIT0: Bypass selection	0	Prohibit	3
				1	Allowed	
			BIT1: Automatic reset selection	0	Prohibit	
				1	Allowed	
		Thousands digit: Unit overcurrent selection	BIT0: Bypass selection	0	Prohibit	3
				1	Allowed	
			BIT1: Automatic reset selection	0	Prohibit	
				1	Allowed	

		Ten-thousands digit: Unit drive power failure selection	BIT0: Bypass selection	0	Prohibit	3
				1	Allowed	
			BIT1: Automatic reset selection	0	Prohibit	
				1	Allowed	
A9-14	Unit bypass type and automatic reset attribute selection 2					Factory value
	Setting range	Units digit: Unit overtemperature selection	BIT0: Bypass selection	0	Prohibit	3
				1	Allowed	
			BIT1: Automatic reset selection	0	Prohibit	
				1	Allowed	
		Tens digit: Reserved	BIT0: Bypass selection	0	Prohibit	3
				1	Allowed	
			BIT1: Automatic reset selection	0	Prohibit	
				1	Allowed	
		Hundreds digit: Unit rectification selection	BIT0: Bypass selection	0	Prohibit	3
				1	Allowed	
			BIT1: Automatic reset selection	0	Prohibit	
				1	Allowed	

Using the A9-13 and A9-14 function codes, users can select which types of unit faults allow bypass or automatic reset. For example, if the unit digit in A9-13 is "3," when a unit overvoltage fault occurs, both bypass and automatic reset are permitted; if it is "2," only automatic reset is permitted, bypass is not allowed; if it is "1," only bypass is permitted, automatic reset is not allowed; if it is "0," neither bypass nor reset is allowed.

A9-15	Pre-charge analog quantity selection	Factory value	0
	Setting range	0:AO11:AO2	
A9-18	The switching point between the first and second stages	Factory value	30.0%
	Setting range	0~80%	
A9-19	First stage pre-charge acceleration time	Factory value	8.0s
	Setting range	0.1~50.0s	
A9-20	The switching point between the second and third stages	Factory value	70.0%
	Setting range	5.0~78.0%	
A9-21	Second stage pre-charge acceleration time	Factory value	4.0s
	Setting range	0.5~50.0s	
A9-22	Third stage pre-charge acceleration time	Factory value	1.0s
	Setting range	0.0~10.0s	

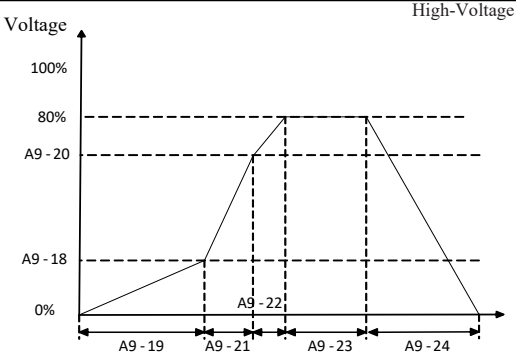


Figure 6-26 Pre-charge Analog Quantity Selection

The two analog outputs provided in A9-15 are used to control the output voltage of the voltage regulator during the secondary pre-charge process. The secondary pre-charge boost process can be divided into three stages. A9-18 is used to set the voltage value reached after the first stage, while A9-19 is used to set the pre-charge time for the first stage. Similarly, A9-20, A9-21, and A9-22 correspond to the precharge time and target voltage value for the second and third stages respectively, until the voltage reaches the target value at the end of the third stage.

A9-23	Precharge duration	Factory value	2.0s
	Setting range	1.0~10.0s	
A9-24	Precharge deceleration time	Factory value	1.5s
	Setting range	0.0s	
A9-29	Precharge current detection threshold	Factory value	7%
	Setting range	0~15%	

After the secondary precharge boost process, the unit bus voltage is also gradually raised. When the voltage reaches the rated precharge voltage, it is maintained for the duration specified by A9-23 before proceeding to the precharge deceleration process.

During the precharge deceleration time specified by A9-24, the master control will reduce the regulator voltage from the rated precharge voltage to the minimum value. The precharge process is primarily to gradually increase the bus voltage to reduce the instantaneous impact on the grid at power-on. During this process, the system does not officially start operating. Therefore, the current will be much smaller than in normal operating conditions. If the primary current of the transformer during precharge exceeds the value specified in A9-29, it indicates potential irregularities in the current during precharge.

AC group AIAO correction

AC-00	AI1 measured current 1	Factory value	Factory calibration
	Setting range	4.500mA~8.000mA	
AC-01	AI1 displays current 1	Factory value	Factory calibration
	Setting range	4.500mA~8.000mA	
AC-02	AI1 measured current 2	Factory value	Factory calibration
	Setting range	16.000mA~19.999mA	
AC-03	AI1 displays current 2	Factory value	Factory calibration
	Setting range	16.000mA~19.999mA	
AC-04	AI2 measured current 1	Factory value	Factory calibration
	Setting range	4.500mA~8.000mA	
AC-05	AI2 displays current 1	Factory value	Factory calibration
	Setting range	4.500mA~8.000mA	
AC-06	AI2 measured current 2	Factory value	Factory calibration
	Setting range	16.000mA~19.999mA	
AC-07	AI2 displays current 2	Factory value	Factory calibration
	Setting range	16.000mA~19.999mA	
AC-08	AI3 measured current 1	Factory value	Factory calibration
	Setting range	4.500mA~8.000mA	
AC-09	AI3 displays current 1	Factory value	Factory calibration
	Setting range	4.500mA~8.000mA	
AC-10	AI3 measured current 2	Factory value	Factory calibration
	Setting range	16.000mA~19.999mA	
AC-11	AI3 displays current 2	Factory value	Factory calibration
	Setting range	16.000mA~19.999mA	
AC-12	AI4 target current 1	Factory value	Factory calibration
	Setting range	4.500mA~8.000mA	
AC-13	AI4 measured current 1	Factory value	Factory calibration
	Setting range	4.500mA~8.000mA	
AC-14	AI4 target current 2	Factory value	Factory calibration
	Setting range	16.000mA~19.999mA	
AC-15	AI4 measured current 2	Factory value	Factory calibration
	Setting range	16.000mA~19.999mA	

This group of function codes is used for calibrating the analog input AI to eliminate the effects of zero offset and gain on the AI input port.

This group of functional parameters has been calibrated at the factory. When restoring to factory settings, they will revert to the factory-calibrated values. Generally, calibration is not necessary at the application site.

The measured current refers to the actual current measured by a multimeter or other measuring instruments. The displayed current refers to the current display value sampled by the inverter. See the display of the current before AI correction in group U0 (U0-21, U0-22, U0-23).

During calibration, input two current values into each AI input port and accurately input the values measured by the multimeter and the values read by the U0 group into the aforementioned function codes, respectively. The inverter will then automatically calibrate the AI's zero bias and gain.

If the user-given current does not match the actual sampled current by the inverter, an on-site calibration method can be used to make the inverter's sampling value match the desired given value. Taking AI1 as an example, the calibration method is as follows:

Given AI1 current signal (approximately 5.000mA)

Measure the actual AI1 current and store it in function parameter AC-00
Check the display value of U0-21 and store it in function parameter AC-01

Given AI1 current signal (approximately 19.000mA)

Measure the actual AI1 current and store it in function parameter AC-02
Check the display value of U0-21 and store it in function parameter AC-03

When calibrating AI2 and AI3, the actual sampling current display positions are U0-22 and U0-23, respectively.

AC-16	A01 target current 1	Factory value	Factory calibration
	Setting range	4.500mA~8.000mA	
AC-17	A01 measured current 1	Factory value	Factory calibration
	Setting range	4.500mA~8.000mA	
AC-18	A01 target current 2	Factory value	Factory calibration
	Setting range	16.000mA~19.999mA	
AC-19	A01 measured current 2	Factory value	Factory calibration
	Setting range	16.000mA~19.999mA	
AC-20	A02 target current 1	Factory value	Factory calibration
	Setting range	4.500mA~8.000mA	
AC-21	A02 measured current 1	Factory value	Factory calibration
	Setting range	4.500mA~8.000mA	
AC-22	A02 target current 2	Factory value	Factory calibration
	Setting range	16.000mA~19.999mA	
AC-23	A02 measured current 2	Factory value	Factory calibration
	Setting range	16.000mA~19.999mA	
AC-24	AO3 measured current 1	Factory value	Factory calibration
	Setting range	4.500mA~8.000mA	

AC-25	AO3 sampling current 1	Factory value	Factory calibration
	Setting range	4.500mA~8.000mA	
AC-26	AO3 measured current 2	Factory value	Factory calibration
	Setting range	16.000mA~19.999mA	
AC-27	AO3 measured current 2	Factory value	Factory calibration
	Setting range	16.000mA~19.999mA	
AC-28	AO4 target current 1	Factory value	Factory calibration
	Setting range	4.500mA~8.000mA	
AC-29	AO4 measured current 1	Factory value	Factory calibration
	Setting range	4.500mA~8.000mA	
AC-30	AO4 target current 2	Factory value	Factory calibration
	Setting range	16.000mA~19.999mA	
AC-31	AO4 measured current 2	Factory value	Factory calibration
	Setting range	16.000mA~19.999mA	
AC-32	AO5 target current 1	Factory value	Factory calibration
	Setting range	4.500mA~8.000mA	
AC-33	AO5 measured current 1	Factory value	Factory calibration
	Setting range	4.500mA~8.000mA	
AC-34	AO5 target current 2	Factory value	Factory calibration
	Setting range	16.000mA~19.999mA	
AC-35	AO5 measured current 2	Factory value	Factory calibration
	Setting range	16.000mA~19.999mA	

This set of function codes is used to calibrate the analog output AO.

This group of functional parameters has been calibrated at the factory. When restoring to factory settings, they will revert to the factory-calibrated values. Generally, calibration is not necessary at the application site.

The target current refers to the theoretical output current value of the inverter. The measured current refers to the actual output current value as measured by instruments such as a multimeter.

Chapter 7 Troubleshooting

The high-voltage inverter features a comprehensive array of alarms and fault functions. When a high-voltage inverter speed control system fails, the system can clearly indicate the fault status and automatically execute protective shutdown, implement a power unit bypass, and even cut off high-voltage input based on the fault alarm level.

On the touch screen, fault alarm indications, fault causes, and response methods are displayed. Guidance provided by the alarm interface allows for rapid fault diagnosis and the implementation of appropriate countermeasures. For technical support, please contact our company directly.

Upon fault protection activation, the system conducts memory processing. Once fault protection is triggered, the system safeguards and blocks output. If the fault resolves itself, the fault indicator light will turn off automatically, but fault information remains recorded. The system can only be restarted after the fault is fully resolved and reset using the "Reset" button. In case of a serious fault, the high-voltage power supply will automatically disconnect. If disconnection does not occur due to other reasons, the user can manually force a disconnect using the “Emergency Stop” button on the control cabinet.

7.1 System Alarm

Alarm Code	Alarm Description	Alarm Cause	Solution
A07	Constant-speed Overvoltage	During shutdown, the bus voltage is excessively high.	Adjust the input voltage to the normal range.
A11	Motor Overload	1. Are the motor overload protection settings appropriate? 2. Is the load too large, or has the motor stalled? 3. Motor abnormalities 4. Abnormal three-phase output voltage sampling 5. Abnormal control hardware	1. Properly configure motor overload parameters P9-01 to P9-03. 2. Reduce the load and inspect the motor and mechanical conditions. 3. Check whether the motor is abnormal; ensure the three-phase winding insulation is intact. 4. Abnormal three-phase output voltage sampling may indicate a motor stall, causing output current to reach inverter's set limit; check the three-phase output voltage sampling board and circuit for normal operation. 5. Replace the IO board or main control board.
A12	Input Phase Loss	1. The three-phase input power is abnormal. 2. The three-phase input voltage sampling board is abnormal 3. The inverter input voltage sampling circuit is abnormal 4. Control hardware abnormalities	1. Check and eliminate problems with peripheral circuits 2. Check whether the three-phase input voltage sampling board is normal; Are the resistance values of the sampling board correct? Is the phase sequence wiring correct? Is the inverter RST three-phase input power line connected correctly? 3. Troubleshoot the three-phase input voltage sampling circuit issues 4. Replace the main control board or IO board; seek technical support
A13	Output phase loss	1. The lead wire from the inverter to the motor is abnormal 2. The output is not connected to the motor 3. The inverter output current sampling circuit is abnormal 4. Control hardware abnormalities	1. Eliminate peripheral faults 2. Connect output to motor load 3. Check if the output current sampling circuit is abnormal 4. Replace the IO board or main control board

Alarm Code	Alarm Description	Alarm Cause	Solution
A15	External alarm	Input external fault signal via multi-function terminal DI	Reset operation
A16	Communication alarm	1. The customer's 485/CAN interface is abnormal 2. The communication line is damaged 3. Communication parameter Pd setting is incorrect	1. Check whether the customer's 485/CAN interface is working properly 2. Check the communication connection cable 3. Set communication parameters correctly
A20	Encoder alarm	1. The P1 group parameters are set incorrectly 2. The wiring from the encoder to the PG card is abnormal 3. PG card is abnormal 4. Issues with 24V, 15V switching power supplies 5. Encoder abnormality 6. Main control board abnormality	1. Set P1 group parameters correctly 2. According to the encoder manual, correctly connect the PG card wiring; check for any broken wires or loose connections 3. Check if the MP38PG5PG card cable is in good contact and if the wiring is correct 4. Check whether the 24V and 15V switching power supplies are normal; replace the IO board 5. Replace the encoder 6. Replace the IO board or main control board
A23	Output insulation drop alarm	1. The three-phase output voltage sampling board is abnormal. 2. The three-phase output voltage sampling circuit is abnormal. 3. The insulation between the motor's three-phase winding and ground is abnormal. 4. The inverter output insulation to ground is abnormal. 5. The control hardware is abnormal.	1. Check whether the three-phase output voltage sampling board is normal; whether the resistance value of the sampling board is correct; whether the phase sequence wiring is correct; whether the inverter UVW three-phase output power line is connected correctly. 2. Check the three-phase output voltage sampling circuit to see if the wiring is correct, whether there is a broken wire or loose connection. 3. Disconnect the connection line between the inverter and the motor, and check the insulation of the motor's three-phase winding. 4. Disconnect the connection between the inverter and the motor, and use a multimeter to measure the impedance of the inverter UVW three-phase output to ground. Normal impedance ranges from megohm to infinity. 5. Replace the IO board or main control board.
A27	User-defined alarm 1	1. The signal status of user-defined fault 1 input through the multi-function terminal DI is valid. 2. IO board anomaly.	1. Reset operation. 2. Replace the other DI terminal or IO board.
A28	User-defined alarm 2	1. The signal status of user-defined fault 2 input through the multi-function terminal DI is valid. 2. IO board anomaly.	1. Reset operation. 2. Replace the other DI terminal or IO board.
A29	Cumulative power-on time alarm	Seek technical support	Seek technical support
A31	PID feedback lost during runtime.	PID feedback is less than the PA-26 set value.	Check the PID feedback signal or set PA-26 to an appropriate value.

Alarm Code	Alarm Description	Alarm Cause	Solution
A36	Input current asymmetry alarm	1. The input current detection circuit is abnormal. 2. The input current sampling transformer is abnormal. 3. The input side of the input transformer is abnormal. 4. Control hardware abnormalities	1. Check the input current detection circuit; whether the wiring is correct; whether there is a broken wire or loose connection. 2. Check the installation of the two-stage input current transformer for correctness and troubleshoot. Check and troubleshoot 3. Seek technical support. 4. Replace the IO board or main control board.
A39	PLC communication abnormality	1. PLC is not powered on. 2. PLC is not running. 3. The communication circuit between the PLC and control board is abnormal.	1. Check the PLC power supply 2. Confirm that the PLC is in RUN state 3. Check the PLC communication circuit wiring
A42	Speed deviation is too large	1. Encoder parameters are incorrectly set. 2. Motor is not tuned. 3. Speed deviation detection parameters are set unreasonably 4. Wiring from encoder to PG card is abnormal. 5. PG card is abnormal. 6. 24V, 15V switching power supply abnormality 7. Main control board abnormality 8. Encoder abnormality	1. Correctly set the P1 group encoder parameters 2. Perform motor tuning and then run 3. Set the size of P9-69 according to actual conditions 4. Follow the encoder manual to correctly connect PG card wiring; check for broken wires or poor connections. 5. Ensure MP38PG5PG card cable is in good contact and wiring is correct. 6. Check whether the 24V and 15V switching power supplies are normal; replace the IO board; 7. Replace the IO board or main control board 8. Replace the encoder
A43	Motor overspeed	1. Encoder parameters are incorrectly set. 2. Motor is not tuned. 3. Speed deviation detection parameters are set unreasonably 4. Wiring from encoder to PG card is abnormal. 5. PG card is abnormal. 6. 24V, 15V switching power supply abnormality 7. Main control board abnormality 8. Encoder abnormality	1. Correctly set the P1 group encoder parameters 2. Perform motor tuning and then run 3. Set the size of P9-69 according to actual conditions 4. Follow the encoder manual to correctly connect PG card wiring; check for broken wires or poor connections. 5. Ensure MP38PG5PG card cable is in good contact and wiring is correct. 6. Check whether the 24V and 15V switching power supplies are normal; replace the IO board 7. Replace the IO board or main control board 8. Replace the encoder
A45	Motor overheat alarm	The motor overheat pre-alarm threshold (P9-58) is non-zero, and the temperature of any CH1~CH3 channel obtained by PLC sampling is higher than the set value	1. Check whether the DI setting is disconnected 2. Check whether the motor is stalled or overloaded, and reduce the load appropriately.
A46	Control system power alarm	1. 24V control power supply abnormality 2. Control power supply detection circuit is abnormal. 3. DI port on the IO board is abnormal. 4. Control hardware abnormalities	1. Check whether the control system has 24V power supply 2. Check the control power supply detection circuit 3. Substitute other DI terminals or replace the IO board.

Alarm Code	Alarm Description	Alarm Cause	Solution
			4. Replace the IO board or main control board.
A51	Magnetic pole position detection failure alarm	Seek technical support	Seek technical support
A52	DP communication alarm	1. Communication between DP card and PLC master station is interrupted 2. The DP card slave station number setting exceeds the limit 3. Communication timeout between the DP card and PLC master station	1. Check whether the communication connection between the DP card and the PLC master station is normal and reliable. 2. Modify the DP card slave station number to within the allowed range. 3. Adjust the Profibus communication timeout parameter PD-08.
A80	Unit over-temperature alarm	1. The ambient temperature is too high 2. The unit heat dissipation channel is obstructed 3. The filter is clogged 4. Fan failure at the top of the cabinet 5. Unit Control Board Failure	1. Lower the ambient temperature for the equipment 2. Replace the unit and seek technical support 3. Clean the dust filter 4. Check if the cooling fan is running in reverse; if the cabinet top fan is faulty. 5. Replace the faulty unit control board
A82	Analog disconnection alarm	1. AI1 to AI4 have analog values set too low or are offline 2. In A6-90, the actual AI used doesn't match the configured AI 3. AI terminal failure 4. IO board failure	1. Check the analog setpoint wiring, confirming it is correctly connected. 2. Verify that the function code accurately corresponds to the actual wiring. 3. Replace the AI terminal or replace the IO board. 4. Replace the IO board.
A83	Unit bypass successful	1.Unit is bypassed 2. Unit bypass board feedback status error. 3. Unit control board failure. 4. Unit bypass board failure	1. Check the history log to understand why the unit was bypassed due to a fault, and replace the faulty unit. 2. Reapply high voltage, conduct unit self-test, check HMI unit and verify that the bypass board is normal. 3. Replace the faulty unit control board 4. Replace the unit bypass board
A84	Power frequency contactor feedback abnormality	1. Power frequency contactor feedback wiring is incorrect or missing 2. The power frequency contactor is damaged	1. Check the power frequency contactor feedback signal line to confirm proper connection. 2. Confirm that the power frequency contactor is normal
A85	Transformer pre-overload	1. Is the load too large or has the motor stalled? 2. Input transformer abnormality 3. The inverter is undersized	1. Reduce the load and inspect the motor and mechanical condition. 2. Seek technical support 3. Choose an inverter with a higher power rating
A86	Motor pre-overload	1. Are the motor overload protection settings appropriate? 2. Is the load too large, or has the motor stalled? 3. Motor abnormalities 4. Abnormal three-phase output voltage sampling 5. Abnormal control hardware	1. Correctly set the P9-01 to P9-03 parameters 2. Reduce the load and inspect the motor and mechanical conditions. 3. Check whether the motor is abnormal; ensure the three-phase winding insulation is intact. 4. Abnormal three-phase output voltage sampling may indicate a motor stall, causing output current to reach inverter's set limit; check the three-phase output

Alarm Code	Alarm Description	Alarm Cause	Solution
			voltage sampling board and circuit for normal operation. 5. Replace the control hardware; seek technical support
A87	Input transformer overheat alarm	1. The ambient temperature is too high (above 40°C). 2. The filter is clogged 3. The gap in the transformer baffle is too large. 4. The cabinet top cooling fan is operating abnormally 5. Inverter over-temperature fault detection circuit signal is abnormal 6. Temperature and humidity board abnormality 7. Wiring circuit between the temperature and humidity board and IO board is abnormal 8. Control hardware abnormality	1. Check the ambient temperature and keep records 2. Clean the dust filter 3. Check whether the transformer baffle gap is too large 4. Check if the cooling fan is reversed; inspect the cabinet top fan for faults 5. Investigate the inverter over-temperature fault detection circuit for disconnections, loose connections, or incorrect signal connections 6. Check if the temperature and humidity board is functioning properly 7. Replace the temperature and humidity board 8. Replace the IO board or main control board; seek technical support
A89	Fan alarm	1. Fan fault detection circuit wiring error 2. Thermal relay failure 3. Fan failure 4. DI circuit of the IO board is abnormal 5. Control hardware abnormality	1. Check the fan fault detection circuit 2. Check the set value of the thermal relay and verify if the relay is faulty 3. Replace the cabinet top fan 4. Replace other DI terminals or replace the IO board 5. Replace the IO board or main control board
A120	Input voltage imbalance alarm	1. The three-phase input voltage sampling board is abnormal. 2. The three-phase input voltage sampling circuit is abnormal. 3. Control hardware abnormalities 4. Abnormal grid input voltage	1. Check whether the three-phase input voltage sampling board is normal; Are the resistance values of the sampling board correct? Is the phase sequence wiring correct? Is the inverter RST three-phase input power line connected correctly? 2. Check the three-phase input voltage sampling circuit to ensure the wiring is correct and there are no broken or loose connections. 3. Replace the IO board or main control board 4. Check whether the grid voltage at the user input end is abnormal
A121	Output voltage imbalance alarm	1. The three-phase output voltage sampling board is abnormal. 2. The three-phase output voltage sampling circuit is abnormal. 3. Control hardware abnormalities	1. Check whether the three-phase output voltage sampling board is normal; whether the resistance value of the sampling board is correct; whether the phase sequence wiring is correct; whether the inverter UVW three-phase output power line is connected correctly. 2. Check the three-phase output voltage sampling circuit to see if the wiring is correct, whether there is a broken wire or loose connection. 3. Replace the IO board or main control board
A123	Motor stall alarm	1. Is the load too large or has the motor stalled?	1. Perform motor tuning, then operate in vector control mode. 2. Reduce the load and inspect the motor and mechanical conditions.

Alarm Code	Alarm Description	Alarm Cause	Solution
		2. The motor power is inadequate, the selected model is too small. 3. Set motor stall parameters, P9-40, P9-41.	3. Restore stall parameters to factory settings.
A163	Switch timeout alarm	1. The synchronous switching timeout is set too short. 2. Excessive fluctuation on the input side.	1. Increase the P6-24 judgment threshold. 2. Seek technical support
A165	Motor cooling fan alarm	User motor cooling fan feedback and heat dissipation. The cooling fan control signal is inconsistent; feedback is valid when the fan is not working, or invalid when the fan is running.	1. Check whether the cooling fan feedback DI is accurate and whether there is a disconnection; 2. Verify whether the cooling fan control DO relay is working correctly, and ensure that the motor cooling fan status matches the DO output state.
A180	Automatic bypass cabinet contactor alarm	The power frequency contactor opens abnormally when switching off the automatic bypass cabinet	1. Check whether the power frequency contactor opening circuit of the automatic bypass cabinet is abnormal. 2. Check whether the power frequency contactor feedback of the automatic bypass cabinet is normal.
A181	Input sampling wiring error	1. The three-phase input voltage sampling phase sequence is incorrect. 2. The input current sampling phase sequence is incorrect.	1. Check whether the phase sequence of the input voltage sampling line from the three-phase input voltage sampling board to the IO board is correct. 2. Check whether the IR and IT input current sampling phase sequence is connected incorrectly
A182	Unit bypass contactor abnormality	1. Unit bypass board feedback status error 2. Unit bypass board abnormality	1. Re-apply high voltage, conduct unit self-test, check whether the unit bypass board is normal using HMI unit. 2. Replace the faulty unit control board
A183	Reactor bypass contactor abnormality	Reactor bypass contactor feedback status error	Check if the feedback and opening and closing circuits of the reactor bypass contactor are normal.
A184	Motor excitation fault	1. The three-phase output voltage sampling board is abnormal. 2. The three-phase output voltage sampling circuit is abnormal. 3. The flying start current setting P6-16 is too high 4. Control hardware abnormalities	1. Check whether the three-phase output voltage sampling board is normal; whether the resistance value of the sampling board is correct; whether the phase sequence wiring is correct; whether the inverter UVW three-phase output power line is connected correctly. 2. Check the three-phase output voltage sampling circuit to see if the wiring is correct, whether there is a broken wire or loose connection. 3. Set the P6-16 value to meet site requirements, typically smaller than the no-load current of P1-10. 4. Replace the IO board or main control board.
A185	Unit communication failure	1. The unit optical fiber line is damaged 2. The power supply of the optical fiber communication link is disturbed	1. Replace the optical fiber 2. Seek technical support

Alarm Code	Alarm Description	Alarm Cause	Solution
A186	Input voltage drop alarm	After powering on the entire machine, the input voltage drops abnormally but does not exceed the allowable range in Table 6-1.	Check whether the power grid anomaly is due to the startup or commissioning of large equipment.
A187	Temperature and humidity sampling board disconnection alarm	1. The temperature sampling port connector of the temperature and humidity sampling board is not securely plugged in 2. The temperature sampling line is damaged or short-circuited.	Replace the temperature sampling harness
A188	Temperature and humidity sampling board communication abnormality	1. The power supply of the temperature and humidity sampling board is abnormal 2. The communication line between the temperature and humidity sampling board and the main control RS2 port is damaged, reverse polarity, or not securely connected. 3. The RS2 port wiring does not meet the 485 daisy-chain wiring mode.	1. Replace the temperature and humidity sampling board 2. Check or replace the communication line 3. Change the RS2 interface communication line connection to a daisy-chain mode.

7.2 System Failure

Fault Code	Fault Description	Fault Cause	Solution
Er002	Acceleration overcurrent	1. Output current sampling circuit abnormality 2. Output hall abnormality 3. Incorrect motor parameter settings for P1 group, with vector control mode and no motor tuning; 4. P9-30 (inverter overcurrent point) setting too small Setting too small 5. Main control board abnormality 6. Starting the motor while rotating; 7. Sudden load during acceleration; 8. Inverter undersized 9. Unit output terminals T1 and T2 reversed	1. Check the output current sampling circuit for correct wiring, broken wires, or loose connections; confirm if output hall is installed in reverse 2. Check for correct ±15V and M signal wiring on the output hall; replace output hall if needed 3. Correct P1 group motor parameters, perform motor tuning, then operate in vector mode 4. Adjust P9-30 to a higher value 5. Replace main control board, reconfigure inverter parameters 6. Enable flying start function, or wait for complete motor stop before starting 7. Cancel sudden load during acceleration 8. Choose inverter with higher power rating 9. Inspect unit output terminal serial lines and center lines
Er003	Deceleration overcurrent	1. Output current sampling circuit abnormality; 2. Output hall abnormality; 3. Incorrect P1 group motor parameters, with vector control mode and no motor tuning; and no motor tuning; 4. P9-30 (inverter overcurrent point) setting too small Setting is too small; 5. Main control board abnormality;	1. Check the output current sampling circuit for correct wiring, broken wires, or loose connections; confirm if output hall is installed in reverse 2. Check for correct ±15V and M signal wiring on the output hall; replace output hall if needed 3. Correct P1 group motor parameters, perform motor tuning, then operate in vector mode 4. Adjust P9-30 to a higher value 5. Replace main control board, reconfigure inverter parameters 6. Enable flying start function, or wait for complete motor stop before starting

Fault Code	Fault Description	Fault Cause	Solution
		6. Starting motor while rotating; 7. Sudden load during deceleration; 8. Inverter undersized; 9. Unit output terminals T1 and T2 reversed;	7. Cancel sudden load during deceleration 8. Choose inverter with higher power rating 9. Inspect unit output terminal serial lines and center lines
Er004	Constant-speed overcurrent	1. Output current sampling circuit abnormality; 2. Output hall abnormality 3. Incorrect P1 group motor parameters, with vector control mode and no motor tuning; 4. P9-30 (inverter overcurrent point) setting too small Setting too small 5. Main control board abnormality 6. Starting motor while rotating; 7. Sudden load during constant speed; 8. Inverter undersized 9. Unit output terminals T1 and T2 reversed	1. Check the output current sampling circuit for correct wiring, broken wires, or loose connections; confirm if output hall is installed in reverse 2. Check for correct ±15V and M signal wiring on the output hall; replace output hall if needed 3. Correct P1 group motor parameters, perform motor tuning, then operate in vector mode 4. Adjust P9-30 to a higher value 5. Replace main control board, reconfigure inverter parameters 6. Enable flying start function, or wait for complete motor stop before starting 7. Cancel sudden load during constant speed 8. Choose inverter with higher power rating 9. Inspect unit output terminal serial lines and center lines
Er009	User high voltage power supply undervoltage	1. Operation without applying high voltage 2. Abnormal three-phase input voltage sampling board 3. Abnormal inverter input voltage sampling circuit 4. Inverter input voltage out of specified range 5. Control hardware abnormality	1. Cancel the operation, verify correctness, then apply high voltage and wait for unit self-check to complete 2. Inspect the three-phase input voltage sampling board for normal operation, correct resistance value, proper phase sequence wiring, and correct connection of the inverter RST three-phase input power line 3. Inspect the three-phase input voltage sampling circuit for correct wiring and check for any breaks or loose connections 4. Adjust input voltage to normal range 5. Replace the IO board or main control board.
Er010	Inverter overload	1. Check if the load is excessive or if the motor is stalled 2. Input transformer abnormality 3. The inverter is undersized	1. Reduce the load and inspect the motor and mechanical condition 2. Seek technical support 3. Choose an inverter with a higher power rating
Er011	Motor Overload	1. Are the motor overload protection settings appropriate? 2. Is the load too large, or has the motor stalled? 3. Motor abnormalities 4. Abnormal three-phase output voltage sampling 5. Abnormal control hardware	1. Set motor overload parameters P9-01~P9-03 correctly. 2. Reduce load and inspect motor and mechanical conditions 3. Check whether the motor is abnormal; ensure the three-phase winding insulation is intact. 4. Abnormal three-phase output voltage sampling may indicate a motor stall, causing output current to reach inverter's set limit; check the three-phase output voltage sampling board and circuit for normal operation. 5. Replace the IO board or main control board.
Er012	Input Phase Loss	1. The three-phase input power is abnormal. 2. Abnormal three-phase input voltage sampling board	1. Check and eliminate problems with peripheral circuits 2. Ensure the three-phase input voltage sampling board functions correctly with

Fault Code	Fault Description	Fault Cause	Solution
		3. Abnormal inverter input voltage sampling circuit 4. Control hardware abnormalities	proper resistance values; verify correct phase sequence wiring and connection of the inverter RST three-phase input power line 3. Troubleshoot the three-phase input voltage sampling circuit issues 4. Replace the main control board or IO board; seek technical support
Er013	Output phase loss	1. Abnormal lead from the inverter to the motor 2. Output not connected to the motor	1. Eliminate peripheral faults 2. Connect output to motor load
Er015	External fault	Input external fault signal via multi-function terminal DI	Reset operation
Er016	Communication fault	1. The customer's 485/CAN interface is abnormal 2. The communication line is damaged 3. Communication parameter Pd setting is incorrect	1. Check whether the customer's 485/CAN interface is working properly 2. Check the communication connection cable 3. Set communication parameters correctly
Er018	Current detection fault	1. Abnormal output Hall sampling circuit 2. Abnormal output Hall 3. Abnormal IO board ±15V power supply 4. Abnormal control hardware	1. Inspect the output current sampling circuit for proper wiring and check for any breaks or loose connections 2. Check for correct ±15V and M signal wiring on the output hall; replace output hall if needed 3. Use a multimeter to check the ±15V switching power supply of the IO board for normal operation. 4. Replace the IO board or the main control board
Er019	Motor tuning failure	1. Abnormal three-phase output current sampling 2. Abnormal output Hall 3. Abnormal three-phase output voltage sampling 4. Abnormal three-phase output voltage sampling board 5. Output not connected to the motor 6. Motor dragged by external force 7. P1 group parameters not set according to motor nameplate 8. Control hardware abnormality	1. Inspect the output current sampling circuit for proper wiring and check for any breaks or loose connections 2. Check for correct ±15V and M signal wiring on the output hall; replace output hall if needed 3. Inspect the three-phase output voltage sampling circuit for correct wiring and check for any disconnections or loose connections; ensure the inverter UVW three-phase output power line is properly connected 4. Check the three-phase input voltage sampling circuit for correct wiring, broken lines, or loose connections. 5. Connect the output to the motor 6. Remove external forces 7. Correctly configure the P1 group motor parameters. 8. Replace the IO board or main control board.
Er020	Encoder fault	1. The P1 group parameter settings are incorrect; 2. The wiring between the encoder and the PG card is abnormal. 3. PG card malfunction 4. Issues with 24V, 15V switching power supplies 5. Encoder abnormality 6. Main control board abnormality	1. Set P1 group parameters correctly 2. According to the encoder manual, correctly connect the PG card wiring; check for any broken wires or loose connections 3. Check if the MP38PG5PG card cable is in good contact and if the wiring is correct 4. Check whether the 24V and 15V switching power supplies are normal; replace the IO board 5. Replace the encoder 6. Replace the IO board or main control board

Fault Code	Fault Description	Fault Cause	Solution
Er021	Parameter read/write malfunction	EEPROM chip damaged	Replace the main control board
Er026	Accumulated running time reached fault	Seek technical support	Seek technical support
Er027	User-defined fault 1	1. The signal status of user-defined fault 1 input through the multi-function terminal DI is valid. 2. IO board anomaly.	1. Reset operation. 2. Replace the other DI terminal or IO board.
Er028	User-defined fault 2	1. The signal status of user-defined fault 2 input through the multi-function terminal DI is valid. 2. IO board anomaly.	1. Reset operation. 2. Replace the other DI terminal or IO board.
Er029	Accumulated power-on time reached fault	Seek technical support	Seek technical support
Er031	PID feedback lost during runtime.	PID feedback is less than the PA-26 set value.	Check the PID feedback signal or set PA-26 to an appropriate value.
Er032	Input impedance too small fault	1. The three-phase input voltage sampling board malfunction. 2. The three-phase input voltage sampling circuit malfunction. 3. Inverter input-to-ground insulation fault. 4. Control hardware abnormalities 5. Input transformer malfunction	1. Verify the normal functioning of the three-phase input voltage sampling board; ensure resistance values are correct; check phase sequence wiring; confirm correct connection of the inverter RST three-phase input power lines. 2. Check the three-phase input voltage sampling circuit to ensure the wiring is correct and there are no broken or loose connections. 3. Disconnect the inverter from the grid and use a multimeter to verify that the impedance of the inverter RST three-phase input to ground is above megohm and approaches infinity. 4. Replace the IO board or main control board. 5. Seek technical support
Er034	Input transformer overload	1. Is the load too large or has the motor stalled? 2. The inverter capacity selection is inadequate 3. Control hardware abnormalities 4. Input transformer malfunction	1. Reduce the load and inspect the motor and mechanical condition 2. Select an inverter with a higher power rating 3. Replace the IO board or main control board 4. Seek technical support
Er035	Transformer no-load current abnormality	1. Transformer malfunction 2. Input current detection circuit malfunction	1. Seek technical support 2. Seek technical support
Er036	Input current asymmetry fault	1. The input current detection circuit is abnormal. 2. Input current sampling transformer is abnormal 3. Abnormality on the input side of the input transformer 4. Control hardware abnormalities	1. Check the input current detection circuit; whether the wiring is correct; whether there is a broken wire or loose connection. 2. Verify if the two-stage input current transformer is installed correctly, and troubleshoot 3. Seek technical support. 4. Replace the IO board or main control board.
Er037		1. Verify proper connection to the correct high-voltage power grid	1. Confirm that the high-voltage grid connected to the inverter is correct

Fault Code	Fault Description	Fault Cause	Solution
	Input high voltage exceeds the limit	2. Abnormal three-phase input voltage sampling board 3. Abnormality in the three-phase input voltage sampling circuit 4. Control hardware abnormalities	2. Inspect the three-phase input voltage sampling board for normal operation, correct resistance value, proper phase sequence wiring, and correct connection of the inverter RST three-phase input power line 3. Inspect the three-phase input voltage sampling circuit for correct wiring and check for any breaks or loose connections 4. Replace the IO board or main control board.
Er038	Output current asymmetry	1. The connection between the inverter and the motor is not secure 2. Abnormal inverter output current sampling circuit 3. Control hardware abnormalities 4. Incorrect P1 group parameter settings	1. Inspect the wiring and tighten the screws 2. Inspect the output current sampling circuit 3. Replace the IO board or main control board 4. Correctly configure the P1 group motor parameters
Er039	PLC communication abnormality	1. PLC is not powered on. 2. PLC is not running. 3. The communication circuit between the PLC and control board is abnormal.	1. Check the PLC power supply 2. Confirm that the PLC is in RUN state 3. Check the PLC communication circuit wiring
Er041	Motor switching failure during operation	1. Abnormal DI terminal input 2. DI port malfunction 3. Control hardware abnormalities	1. Verify the correctness of the user DI terminal input 2. Ensure the user's DI input is a passive dry contact; replace the DI port or the IO board 3. Replace the IO board or main control board
Er042	Speed deviation is too large	1. Encoder parameters are incorrectly set. 2. Motor is not tuned. 3. Speed deviation detection parameters are set unreasonably 4. Abnormal wiring from the encoder to the PG card 5. PG card malfunction 6. 24V, 15V switching power supply malfunction 7. Main control board abnormality 8. Encoder abnormality	1. Correctly set the P1 group encoder parameters 2. Perform motor tuning and then run 3. Set the size of P9-69 according to actual conditions 4. Follow the encoder manual to correctly connect PG card wiring; check for broken wires or poor connections. 5. Ensure MP38PG5PG card cable is in good contact and wiring is correct. 6. Verify if the 24V and 15V switching power supplies are functioning correctly; replace the IO board 7. Replace the IO board or main control board 8. Replace the encoder
Er043	Motor overspeed	1. Encoder parameters are incorrectly set. 2. Motor is not tuned. 3. Speed deviation detection parameters are set unreasonably 4. Abnormal wiring from the encoder to the PG card 5. PG card malfunction 6. 24V, 15V switching power supply malfunction 7. Main control board abnormality 8. Encoder abnormality	1. Correctly set the P1 group encoder parameters 2. Perform motor tuning and then run 3. Set the size of P9-69 according to actual conditions 4. Follow the encoder manual to correctly connect PG card wiring; check for broken wires or poor connections. 5. Ensure MP38PG5PG card cable is in good contact and wiring is correct. 6. Verify if the 24V and 15V switching power supplies are functioning correctly; replace the IO board 7. Replace the IO board or main control board 8. Replace the encoder
Er044	Precharge fault	1. The precharge contactor is not closed 2. Insufficient input voltage at the upper level 3. Abnormal precharge control circuit	1. Confirm that the precharge contactor can operate normally 2. Confirm the incoming input voltage

Fault Code	Fault Description	Fault Cause	Solution
		4. Precharge controller malfunction 5. Bus voltage of any unit cannot sustain charge 6. Unit communication or hardware abnormality preventing self-test completion 7. Input current detected during precharge process 8. Control hardware malfunction	3. Verify that the pre-charge control line connections are correct and check for any disconnections or poor connections. 4. Verify whether the pre-charge controller is functioning properly. 5. Verify that the unit input wiring is correct. 6. Replace the unit fiber optics, unit control board, and re-initiate pre-charging. 7. Reduce A9-29. 8. Replace the IO board or main control board.
Er045	Motor overheat alarm	1. External DI function 134 - motor overtemperature feedback is active. 2. Motor overheat pre-alarm threshold (P9-57) Non-zero and any temperature reading from channels CH1 to CH3 sampled by the PLC exceeds the set value.	1. Check whether the DI setting is disconnected 2. Check whether the motor is stalled or overloaded, and reduce the load appropriately.
Er046	Control system power failure	1. 24V control power supply abnormality 2. Control power supply detection circuit is abnormal. 3. DI port on the IO board is abnormal. 4. Control hardware abnormalities	1. Check whether the control system has 24V power supply 2. Check the control power supply detection circuit 3. Perform substitution of other DI terminals or replace the IO board 4. Replace the IO board or main control board.
Er047	IO board power supply abnormality	1. IO board module power supply is abnormal 2. Control hardware abnormalities	1. Observe the IO board module power indicator (POWERSTATE area) to check if normal, and identify the cause, and find out the cause; 2. Replace the IO board or the main control board.
Er048	Interaction data fault	1. The shorting links for the DSP and ARM flash ports on the main control board have not been removed 2. DSP program is being flashed 3. Main control board abnormal	1. Flash port short circuits on the main control board are shorted as per factory settings. 2. Once programming is complete, reinsert the shorting links as per factory settings and reconnect the control power 3. Replace the main control board
Er051	Magnetic pole position detection failure	Seek technical support	Seek technical support
Er052	DP card communication fault	1. Communication between the DP card and the PLC master station is interrupted. 2. The DP card slave station number setting exceeds limits; 3. Communication between the DP card and the main control board has timed out	1. Check whether the communication connection between the DP card and the PLC master station is normal and reliable. 2. Modify the DP card slave station number to within the allowed range. 3. Adjust the Profibus communication timeout parameter PD-08.
Er054	Excitation cabinet fault	1. Terminal function 57 - Excitation cabinet fault feedback is active. 2. The excitation cabinet command output is inconsistent with its running feedback status.	1. Inspect the terminal input signal for shorts or disconnections. 2. Verify any faults in the excitation cabinet and reset if necessary. 3. Verify disconnection in the command signal for excitation control and check if the excitation cabinet follows start/stop commands. 4. Check whether there is a break in the feedback signal line of the excitation cabinet

Fault Code	Fault Description	Fault Cause	Solution
Er055	Output overvoltage	1. Check if the power rating of the motor matches with the inverter 2. The motor parameter settings of group P1 are incorrect	1. Re-select the inverter or the motor 2. Verify if the motor parameter settings for group P1 are correct
Er057	Input transformer overtemperature fault	1. Ambient temperature is too high (above 40°C) 2. The filter is clogged 3. The gap in the transformer baffle increases 4. The cabinet top cooling fan malfunctions 5. Inverter overtemperature detection circuit Circuit signal abnormality 6. Temperature and humidity board abnormality 7. Wiring circuit between the temperature and humidity board and IO board is abnormal 8. Control hardware abnormality	1. Check the ambient temperature and keep records 2. Clean the dust filter 3. Check whether the transformer baffle gap is too large 4. Check if the cooling fan is reversed; inspect the cabinet top fan for faults 5. Investigate the inverter over-temperature fault detection circuit for disconnections, loose connections, or incorrect signal connections 6. Check if the temperature and humidity board is functioning properly 7. Replace the temperature and humidity board 8. Replace the IO board or main control board; seek technical support
Er058	Cabinet door limit switch failure	1. Some cabinet doors are not properly closed 2. Cabinet door limit switch failure 3. Door limit switch fault detection circuit is abnormal 4. DI circuit of the IO board is abnormal< br> 5. Control hardware is faulty	1. Ensure all cabinet doors are closed 2. Inspect the cabinet door limit switch and its contacts 3. Troubleshoot for disconnections, poor connections, or incorrect signal wiring in the door limit switch fault detection circuit 4. Substitute other DI terminals or replace the IO board 5. Replace the IO board or main control board.
Er059	Fan malfunction	1. Fan fault detection circuit wiring error 2. Fan malfunction 3. DI circuit of the IO board is abnormal 4. Control hardware is faulty	1. Check the fan fault detection circuit 2. Replace the cabinet top fan 3. Perform substitution of other DI terminals or replace the IO board 4. Replace the IO board or main control board.
Er0120	Input voltage imbalance	1. The three-phase input voltage sampling board malfunction. 2. The three-phase input voltage sampling circuit malfunction. 3. Control hardware abnormalities 4. Abnormal grid input voltage	1. Verify the normal functioning of the three-phase input voltage sampling board; ensure resistance values are correct; check phase sequence wiring; confirm correct connection of the inverter RST three-phase input power lines. 2. Check the three-phase input voltage sampling circuit to ensure the wiring is correct and there are no broken or loose connections. 3. Replace the IO board or main control board 4. Check whether the grid voltage at the user input end is abnormal
Er0121	Output voltage imbalance	1. The three-phase output voltage sampling board is faulty 2. The three-phase output voltage sampling circuit is faulty 3. Control hardware abnormalities	1. Diagnose whether the three-phase output voltage sampling board functions properly; verify the resistance value of the sampling board; check the correctness of phase sequence wiring; confirm the inverter UVW three-phase output power line is correctly connected. 2. Examine connectivity of the three-phase output voltage sampling circuit for disconnections or poor connections. 3. Replace the IO board or main control board

Fault Code	Fault Description	Fault Cause	Solution
Er0122	Motor excitation fault	1. The three-phase output voltage sampling board is faulty 2. The three-phase output voltage sampling circuit is faulty 3. Flying start current setting P6-16 is set too high 4. Control hardware abnormalities	1. Diagnose whether the three-phase output voltage sampling board functions properly; verify the resistance value of the sampling board; check the correctness of phase sequence wiring; confirm the inverter UVW three-phase output power line is correctly connected. 2. Examine connectivity of the three-phase output voltage sampling circuit for disconnections or poor connections. 3. Set the P6-16 value to meet site requirements, typically smaller than the no-load current of P1-10. 4. Replace the IO board or main control board.
Er0160	Abnormal input voltage	1. The three-phase input voltage sampling board malfunction. 2. The three-phase input voltage sampling circuit malfunction. 3. Control hardware abnormalities 4. Abnormal grid input voltage 5. Circuit breaker feedback abnormal 6. Pre-charge resistor abnormal	1. Verify the normal functioning of the three-phase input voltage sampling board; ensure resistance values are correct; check phase sequence wiring; confirm correct connection of the inverter RST three-phase input power lines. 2. Check the three-phase input voltage sampling circuit to ensure the wiring is correct and there are no broken or loose connections. 3. Replace the IO board or main control board 4. Check whether the grid voltage at the user input end is abnormal 5. Verify if the circuit breaker and IO board input signals are normal 6. Check whether the pre-charge cabinet resistance is normal
Er0161	Inductor over-temperature	1. Inductor temperature is too high 2. DI circuit of IO board is abnormal 3. Control hardware is abnormal	1. Cool down and dissipate heat for the inductor 2. Replace other DI terminals or replace the IO board 3. Replace the IO board or main control board
Er0162	Back EMF decay timeout fault	1. Too many bypass units 2. The maximum back EMF decay time is set too short 3. The output voltage sampling circuit is abnormal	1. Replace the faulty unit 2. Increase A9-03 maximum back EMF decay time 3. Seek technical support.
Er0163	Switching timeout fault	1. The synchronous switching timeout is set too short. 2. Voltage fluctuation on the input side is too large	1. Increase the P6-24 judgment threshold. 2. Seek technical support
Er0165	Motor cooling fan fault	1. There is inconsistency between the user's cooling fan feedback DI wiring and parameter settings, and the cooling fan control DO wiring and parameter settings 2. The user's cooling fan control DO command or the cooling fan feedback DI is disconnected	1. Check if parameter settings match the wiring 2. Check if DI/DO wiring circuit is correct and free of short circuits or disconnections

7.3 Unit Fault

Fault code	Fault description	Fault cause	Solution
Er060	Unit fault	Seek technical support	Seek technical support
Er061	Unit communication fault	1. The 5V power line of the fiber optic board is not properly connected 2. The fiber optic head is dirty 3. The fiber optic connector is loose 4. Optical fiber damage 5. The optical fiber is not connected to the unit 6. Unit control board fault	1. Properly connect the fiber optic board 5V power line 2. Clean the fiber optic head 3. Reconnect the optical fiber transceiver connector 4. Replace the optical fiber 5. Replace the unit control board 6. Replace the main control board
Er062	Unit blocking fault	1. Power device abnormality 2. Unit control board abnormality	1. Replace the unit with the same power level 2. Replace the unit control board
Er063	Unit overcurrent fault	1. Power device abnormality 2. Unit abnormality	1. Replace the unit with the same power level 2. Replace the unit control board
Er064	Unit input phase loss	1. Check the unit input wiring for correctness 2. Input transformer failure 3. Unit fuse blown 4. Unit control board abnormality	1. Check the unit input wiring to confirm correct connection 2. Seek technical support 3. Replace the fuse and address any other potential issues that could cause it to blow 4. Replace the faulty unit control board
Er066	Unit overvoltage fault	1. Grid voltage is too high 2. P2-12, the brake torque output upper limit, is set too high 3. Faulty unit input wiring error 4. Load inertia is large and deceleration time is set too short 5. Unit Control Board Failure 6. Output current oscillation	1. Lower the input voltage; adjust the input transformer tap to +5% 2. Adjust P2-12 to ensure the output voltage is normal at 50Hz 3. Inspect the unit input wiring for abnormalities 4. Set a longer deceleration time 5. Replace the unit control board 6. Seek technical support
Er068	Unit over temperature fault	1. The ambient temperature is too high 2. The unit heat dissipation channel is obstructed 3. The filter is clogged 4. Fan failure at the top of the cabinet 5. Unit Control Board Failure	1. Lower the ambient temperature for the equipment 2. Replace the unit and seek technical support 3. Clean the dust filter 4. Check if the cooling fan is running in reverse; check for a cabinet top fan fault 5. Replace the unit control board
Er069	Unit undervoltage fault	1. Grid input voltage is too low 2. Input transformer failure 3. Unit control board abnormality	1. Check the grid voltage; adjust the input transformer tap to -5% 2. Seek technical support 3. Replace the control board of the faulty unit; seek technical support
Er070	Unit bypass failure	1. Bypass contactor failure 2. Control line misinserted on bypass contactor 3. Bypass board fault 4. Unit control board abnormality	1. Replace the bypass contactor 2. Reconnect the control wire on the bypass contactor 3. Replace the bypass board 4. Replace the faulty unit control board; seek technical support
Er071	Driver power fault	Seek technical support	Seek technical support

7.4 Replacement of Faulty Power Unit

All power units are fully compatible, and the matching requirements for power devices are minimal. Qualified technicians can replace power units independently. To replace the power unit, follow these steps:

Use the stop or emergency stop button to shut down the inverter;

Turn off the high-voltage input, wait for 15 minutes until all indicator lights are off on the unit;

Unplug the optical fiber connector of the faulty power unit;

Remove connection wires and screws securing the faulty power unit;

Carefully pull out the faulty power unit along the guide rails;

Install the new power unit in reverse order of removal, ensure correct wiring, power on the system, and resume operation;

Contact our company for repair of the faulty power unit.

Chapter 8 Care and Maintenance

This chapter outlines key points for equipment care and maintenance:

Danger

◆ Do not touch the wiring terminals of the high-voltage inverter within 10 minutes after disconnecting high voltage, as residual voltage may remain;

◆ Turn off the main circuit power supply, and only after the power unit has fully discharged (power indicator off), perform maintenance and repairs;

Caution

◆ Avoid direct finger contact with the circuit board to prevent static discharge that might damage the integrated circuits;

◆ Do not modify wiring or disconnect terminals while energized to prevent electric shock;

8.1 Maintenance Work Precautions

1) When repairing circuits, take necessary measures: disconnect the circuit breaker, open relevant knife switches, and place warning signs to prevent others from restoring power during maintenance.

2) Confirm that the system is shut down and the high-voltage indicator light is off.

3) After cutting off the high and low voltage power, electricity must be tested before commencing work. When testing high voltage, use a tester of the appropriate voltage level and wear insulating protective equipment.

4) After confirming the absence of electricity, ground the three-phase input of the construction equipment to ensure worker safety.

5) Install grounding wires at all potential points where power may be supplied to the construction equipment. For dual power supply units, during maintenance of a busbar switch, isolating switch, or load switch, not only should both busbar switches be opened, but both ends of the construction switch should also be grounded.

6) When installing the grounding wire, ground first and then attach the grounding wire. The order is reversed when removing it. Always wear insulating protective equipment during installation and removal.

7) The grounding wire should be placed where it is always visible to staff, with a "Personnel Working" warning sign hung at the grounding location.

8) Maintenance work can be performed only after confirming that the DC residual voltage is less than 20V.

8.2 Operation Precautions

1) The inverter is a high-voltage hazardous device, and all operators must strictly follow the operating procedures.

2) Control power must be activated first, and high voltage can be engaged only after the inverter reaches the high voltage enabling state.

3) When using the touch screen, gently press the buttons with your fingers. Do not tap forcefully or use hard objects to avoid damage.

4) Unauthorized personnel are strictly prohibited from operating the touch screen to prevent erroneous operations.

5) Do not open the cabinet door while the inverter is running to avoid equipment faults and high-voltage trips, which may result in personal injury.

8.3 Daily Inspection

Various faults may occur in the inverter due to changes in the operating environment such as temperature, humidity, smoke, and the aging of internal components. Therefore, routine inspections of the inverter during storage and use are essential to detect any abnormal conditions. Examples include abnormalities in the cooling system, overheating, discoloration, strange odors, unusual noises, and abnormal vibrations. Regularly record the input/output parameters of the inverter to verify normal operation.

Table 8-1 Daily Inspection Items for Inverter

Inspection part	Inspection Items	Inspection method	Criteria	Abnormal countermeasures
Surroundings	◆Dust, oil, water droplets ◆Ambient temperature, humidity, vibration ◆Presence of tools or hazardous materials plus foreign objects in surroundings	Visual inspection	Ambient temperature: -10℃~40℃, Humidity below 95% RH	Improve the on-site environment
Phase-shifting transformer	◆Check whether the heat dissipation channel is blocked. Check whether the wire terminals are tightened and if there are any signs of burns. ◆Check for any abnormal temperature rise. ◆Confirm the cleanliness of the phase-shifting transformer.	Visual inspection	No abnormality	Identify the cause and clean dirt
Touch screen	◆Check the clarity of the touch screen display	Visual inspection	No abnormality	Adjust contrast and brightness
Frame structure	◆Check for any abnormal vibration or noise ◆Check whether bolts (fasteners) are loose ◆Check for deformation or damage ◆Check for dust or stains	Auditory inspection Visual inspection	No abnormality	Identify the cause
Wire	◆Check if the wire is overheated, discolored, or deformed ◆Check if the insulation layer is damaged or discolored	Visual inspection	No abnormality	Identify the cause of overheating
Terminal	◆Check for damage	Visual inspection	No abnormality	Replace
Filter capacitor	◆Check for leakage, discoloration, cracks, shell expansion, etc ◆Measure electrostatic capacitance	Visual inspection Use a multimeter to measure capacitance	No abnormality Electrostatic capacitance ≥ initial value × 0.85	Replace capacitor
Resistance	◆Check for disconnection ◆Check for cracking of the insulator	Visual inspection Multimeter measurement	Resistance value within ±10%	Replace the resistor
Transformer	◆Whether there is any abnormal vibration sound or odor	Visual inspection Auditory inspection Smell	No abnormality	Identify the cause
Printed circuit board	◆Whether the screws and connectors are loose ◆Whether there is any odor or discoloration ◆Whether there are cracks, damage, deformation or rust ◆Whether the capacitor is leaking or deformed	Visual inspection	No abnormality	Tighten and send for repair
Cooling fan	◆Whether there is any abnormal vibration or sound	Visual inspection Auditory inspection	No abnormality	Replace the fan

Ventilation duct	◆Whether there is any blockage or foreign matter attached	Visual inspection Auditory inspection	No abnormality	Remove foreign matter

8.4 Regular Maintenance and Care

High-voltage inverters are highly reliable and maintenance-free. However, we still recommend that users regularly perform the following maintenance on the inverter:

1) Regularly clean the dust from the cabinet door's dust filter to ensure the cooling air path is unobstructed.

2) The on-duty personnel or maintenance staff should regularly inspect the transformer and record the winding temperature; under normal operating conditions, ensure the transformer's coil temperature does not exceed 80°C.

3) The transformer must be cleaned annually after being put into operation.

4) Every six months, check and tighten all electrical connection bolts.

5) The high-voltage inverter has undergone a withstand voltage test during manufacturing. To prevent potential damage from improper high-voltage tests, customers are prohibited from conducting these tests independently. However, they can regularly check the system's insulation condition.

6) Regularly disconnect the power supply, open the cabinet door, and conduct inspection and maintenance according to the daily checklist (refer to Table 8-1).

■ Measures for inverters powered off for over 90 days

If the equipment has not been commissioned for an extended period after arrival, or if the equipment has been inactive for more than 90 days due to various reasons (referring to being in a high-voltage disconnected state), the storage environment of the whole unit must strictly comply with our company's requirements. If our company is not notified for commissioning for over half a year, we will test the inverter during the first commissioning, and the site must cooperate with our personnel and provide voltage regulating equipment for testing.

■About the storage of spare parts

Environmental requirements: environmental conditions must meet the requirements of Section 3.2.4;

Daily maintenance: the power unit contains a large number of capacitors. If the capacitors are not powered for an extended period, their electrical characteristics may deteriorate. It is recommended to power on the unit once every six months for maintenance. Due to the high power of the power unit, it is advised to use the voltage regulator soft charging method upon powering. Connect the voltage regulator's output phases A, B, and C to the power unit's input R, S, and T, adjust the output voltage to 450V~690V, and observe the power unit status. Each power-on maintenance session is suggested to last more than 1 hour.

■Description of service life of electronic components

To ensure the inverter operates normally over a long period, regular maintenance must be performed according to the service life of its electronic components. The service life of the inverter's electronic components varies depending on their environment and operating conditions. The following table provides the maintenance periods of the inverter for reference only:

Table 8-2 Component Replacement Period

Device name	Standard replacement period
Cabinet top fan	3~5 years
Electrolytic capacitor	5~8 years
Fuse	10 years